Town of Loxahatchee Groves

Resilient Florida

Brought to you by the Town Council:

Anita Kane	–	Mayor
Margaret Herzog	–	Vice Mayor
Todd McLendon	–	Councilmember
Lisa El-Ramey	–	Councilmember
Paul Coleman	–	Councilmember

July 9, 2025

KESHAVARZ & ASSOCIATES
CIVIL ENGINEERING | SURVEYING | CONSULTING

Key Staff and Acknowledgements

Town Staff

Francine Ramaglia
Town Manager

Richard Gallant
Director of Public Works

Jeff Kurtz
Project Coordinator

Public Works & Office Staff

Consultants and Contributors

- **Keshavarz & Associates**
  Civil Engineering & Surveying
- **Engenuity Group, Inc.**
  Civil Engineering & Surveying
- **Steering Committee**
  Guidance, Advisement, Oversight, Knowledge and Experience

Summary of Topics

1. A Review of Program Goals, Tasks and Timeline
2. Critical Assets
3. Modeling Concepts
4. Results
5. Final Report and Recommendations

1. A Review of Program Goals, Tasks & Timeline

Program Tasks & Timeline

Work Plan Item	Milestone Target Date
• Project Kickoff	Complete
• Data Collection	Complete
• Public Outreach Meeting No. 1	Complete
• Modeling Analysis	Complete
• Public Outreach Meeting No. 2	That's today!
• Final Report	In Progress, Summer 2025

2. Critical Assets

Critical Assets

(Definition per FS 380.093.)

1) Transportation assets and evacuation routes including

- Airports
- Bridges
- Bus terminals
- Ports
- Major roadways

Critical Assets *(Definition per FS)*

2) Critical infrastructure, including

- Stormwater treatment facilities and pump stations
- Wastewater treatment facilities and lift stations
- Drinking water facilities
- Water utility conveyance systems
- Electric production and supply facilities
- Solid and hazardous waste facilities
- Communications facilities
- Disaster debris management sites

Critical Assets *(Definition per FS)*

3) Critical community and emergency facilities, including

- Schools, colleges, universities
- Community centers
- Correctional facilities
- Disaster recovery centers
- Emergency operations centers
- Fire stations
- Health care facilities

Critical Assets *(Definition per FS)*

3) Critical community and emergency facilities, including

- Hospitals
- Law enforcement facilities
- Local government facilities
- Logistical staging areas
- Risk shelter inventory
- State government facilities

Critical Assets *(Definition per FS)*

4) Natural, cultural and historical resources, including

- Conservation lands
- Parks
- Surface waters and wetlands
- Historical and cultural assets

Critical Assets

Town Critical Assets Identified by Steering Committee

ID and Name	Asset Category	Basin Name
• 1. PBC Fire Station 21	3	OK-S-03
• 2. Palms West Hospital	3	CC-12 (Adjacent Canal)
• 3. Town Hall/ Offices	3	CC-S-09
• 4. Communication Tower	2	DS-E-01
• 5. Pump Station and Outfall	2	DS-01
• 6. Pump House	2	DS-W-01
• 7. Fire Tower	2	CC-S-05
• 8. Forestry Service	3	CC-S-05
• 9. Elementary School	3	OK-01 (Adjacent Canal)

Focus Areas

Typical Examples

- Areas of Increased Development Intensity
- Areas where issues have previously occurred
- Areas isolated from the main system and outfall
- Public gathering and event spaces
- Sensitive environmental resources

Considerations for Focus Areas

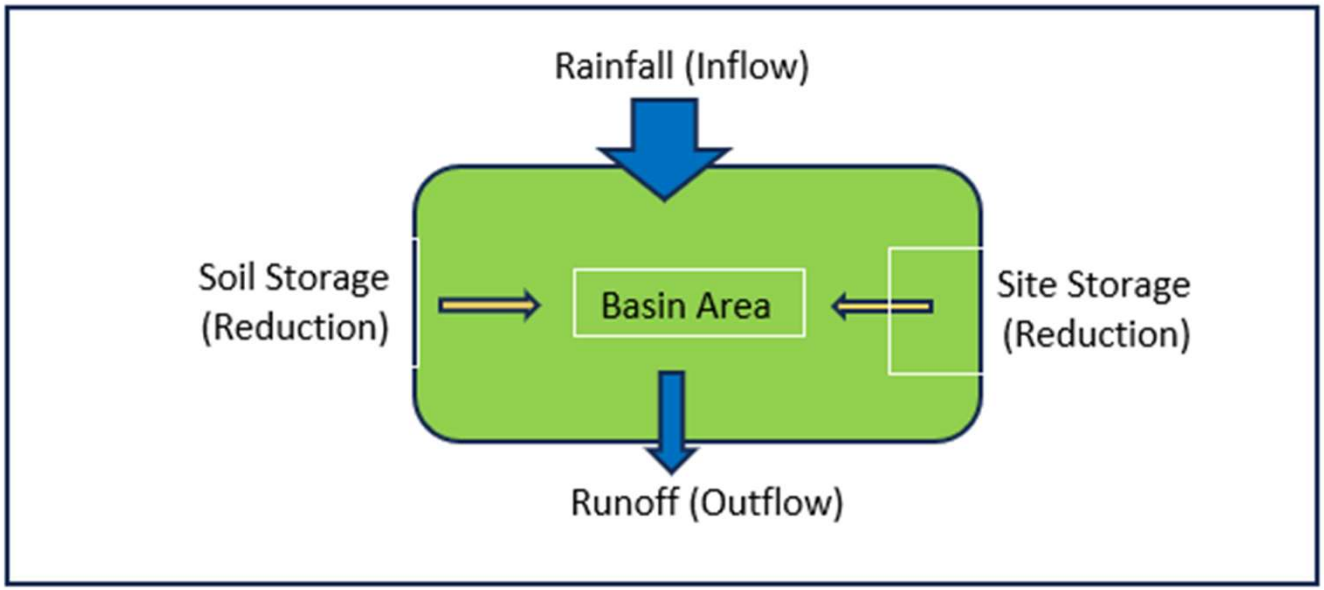
- Depth of 6 inches or greater
- Flooding for 24 hours or longer
- Affects multiple residences, prevents access to key supplies (grocery store, gas station) or a unique service (equine veterinarian)
- Standing water threatens a structure, tower, generator or transformer, or immovable equipment

3. Modeling Concepts

Concepts

Runoff

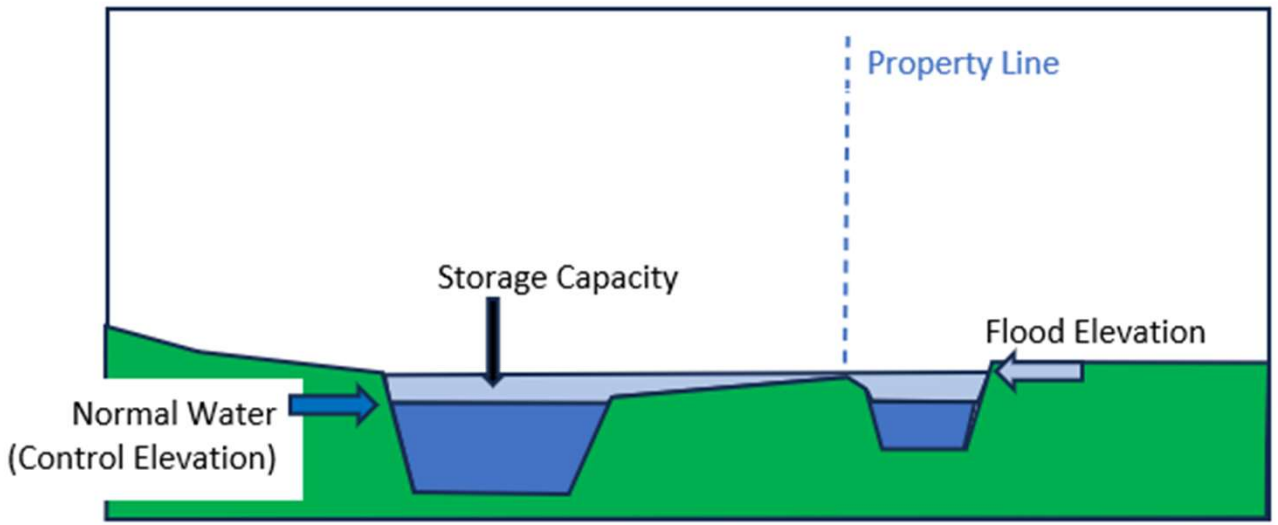
Amount of water remaining for release to the canal system when rainfall occurs on a basin after reductions for soil and topographic storage.



Concepts

Storage Capacity

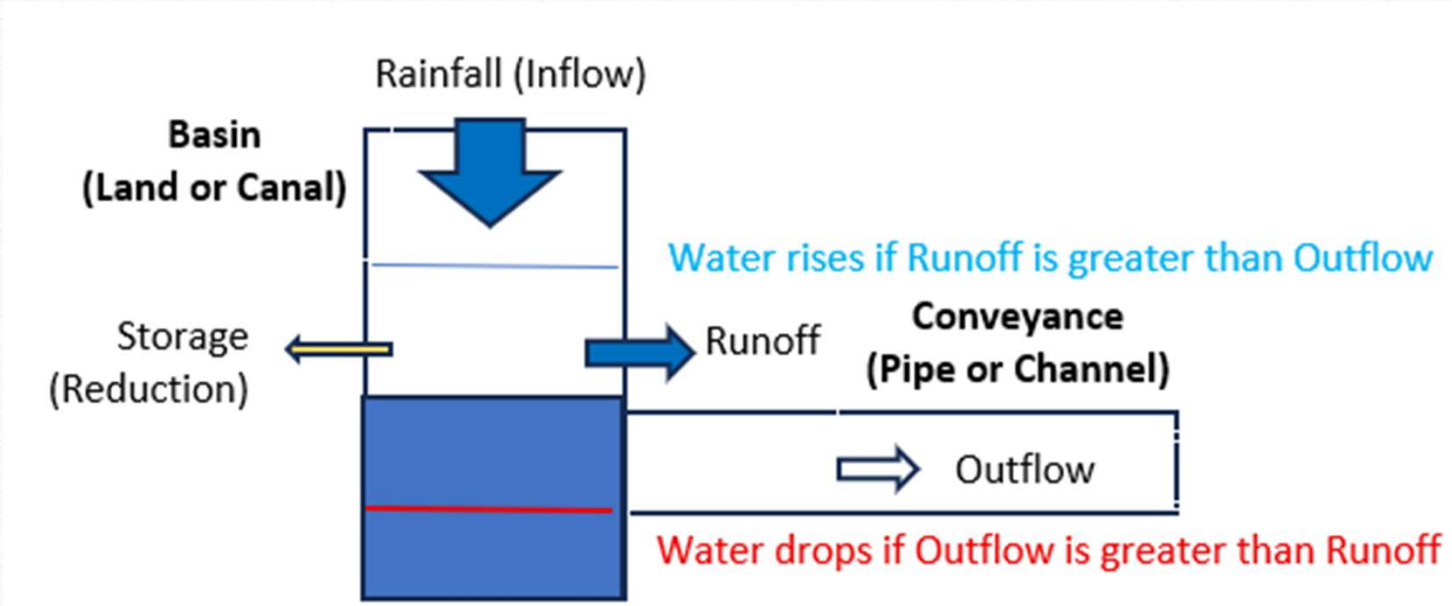
Volume above existing water table filled by collected runoff



Concepts

Conveyance Capacity

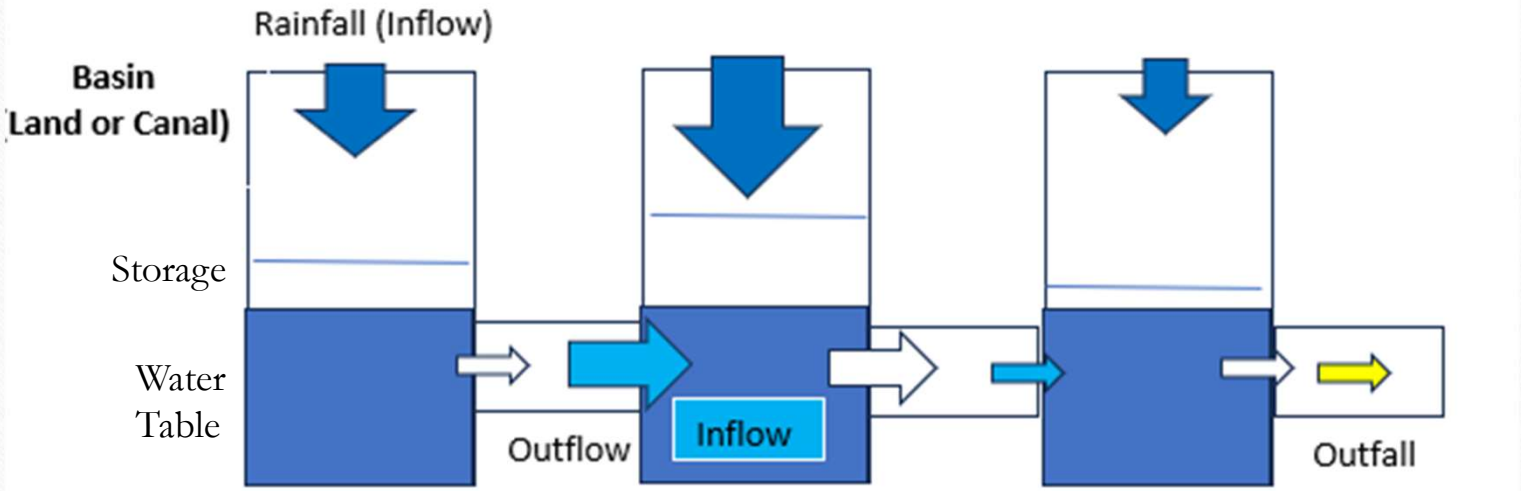
Rate at which flow occurs within the channels and pipes



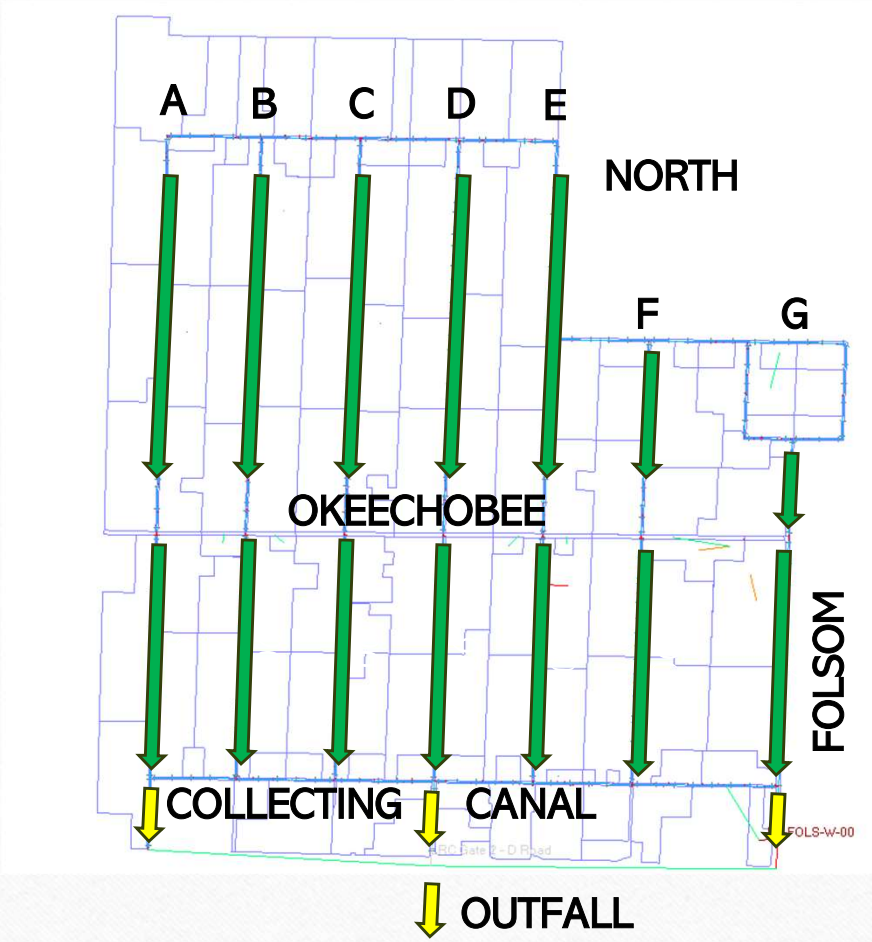
Concepts

Outfall Capacity

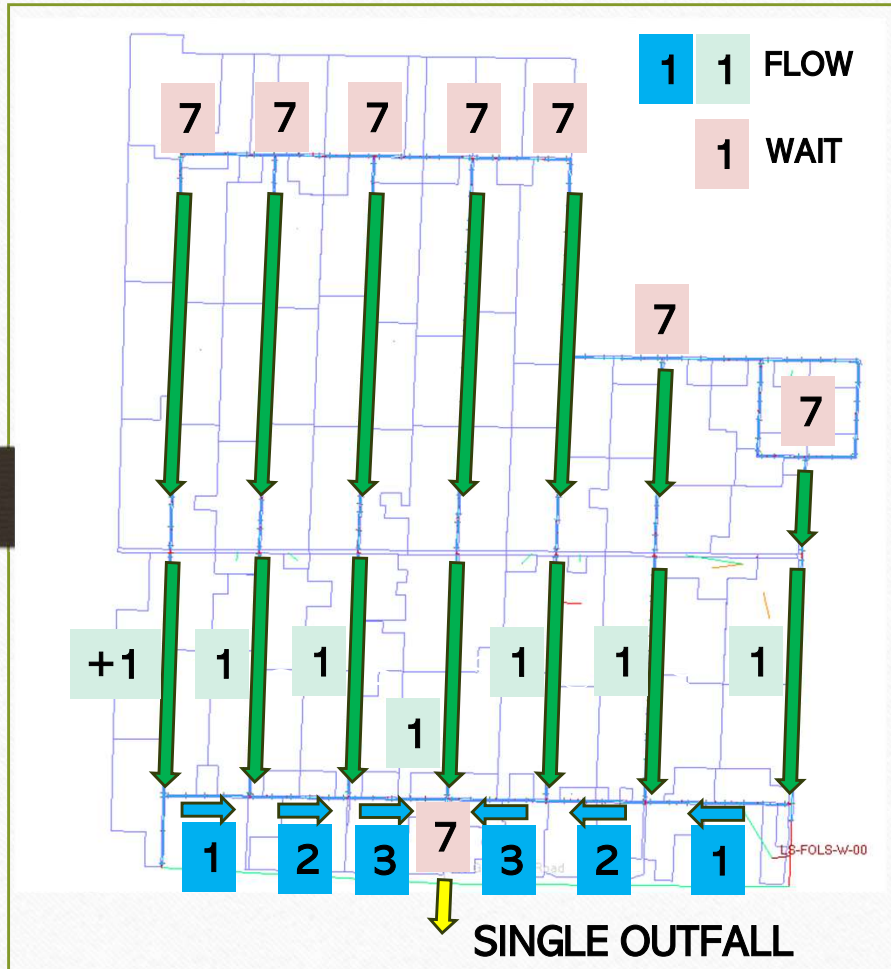
Outfall is the point when water leaves the system and is no longer a factor in the water elevation

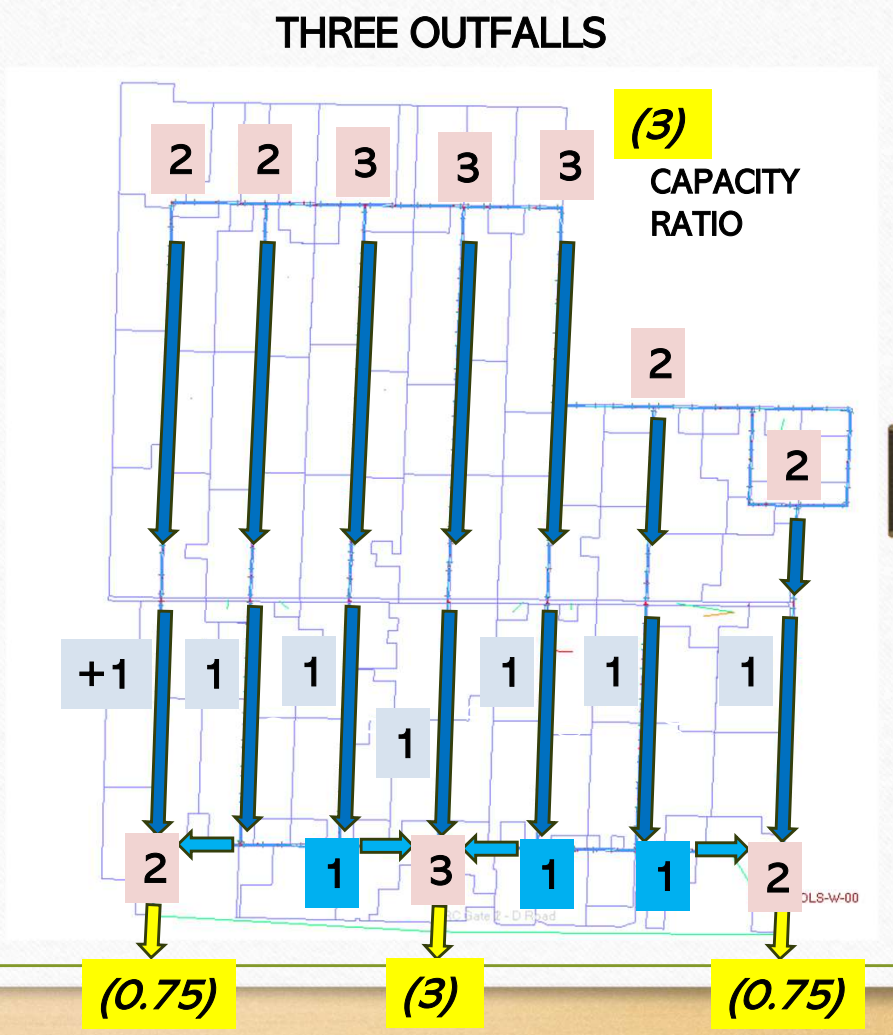


Concepts


A
B
C
D
E
NORTH
F
G
OKEECHOBEE
FOLSOM
COLLECTING
CANAL
FOLS-W-00
OUTFALL

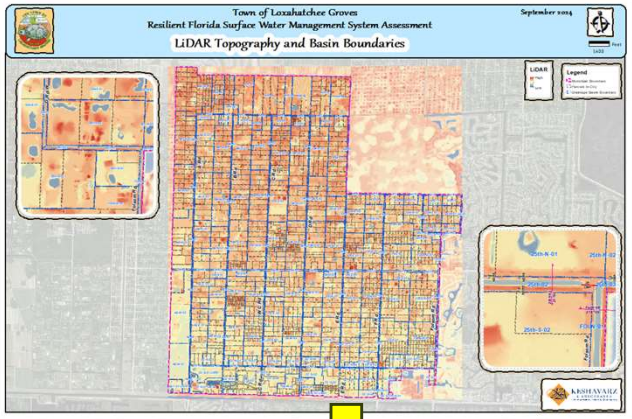
Concepts


1 1 FLOW
1 WAIT
7 7 7 7 7
7
7
+1 1 1 1 1 1 1
1
1 2 3 7 3 2 1
SINGLE OUTFALL

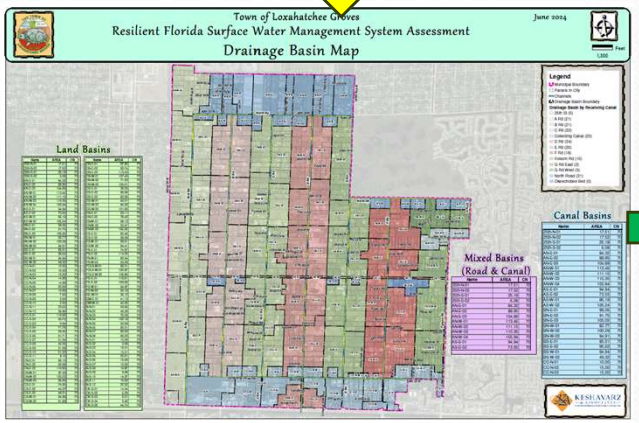

THREE OUTFALLS
(3)
CAPACITY RATIO
2 2 3 3 3
2
2
+1 1 1 1 1 1 1
1
2 1 3 1 1 2
(0.75) (3) (0.75)

Concepts

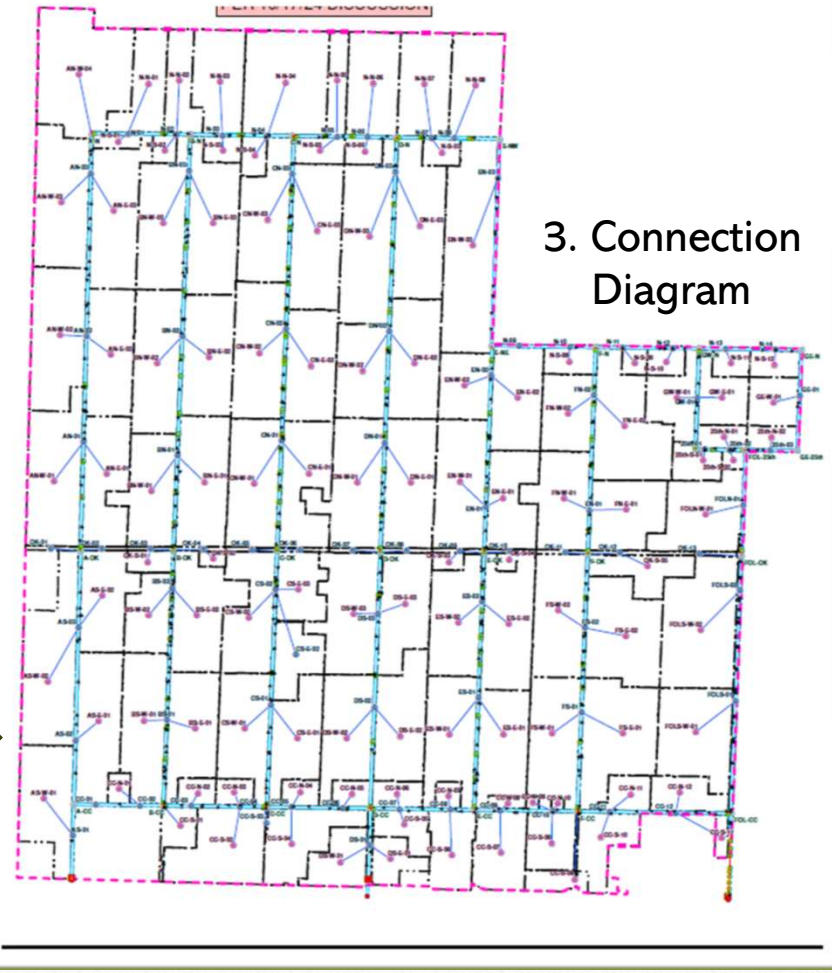
1. LiDAR Topography



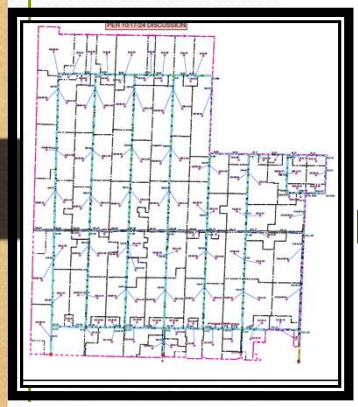
2. Basin Delineation



3. Connection Diagram



Concepts



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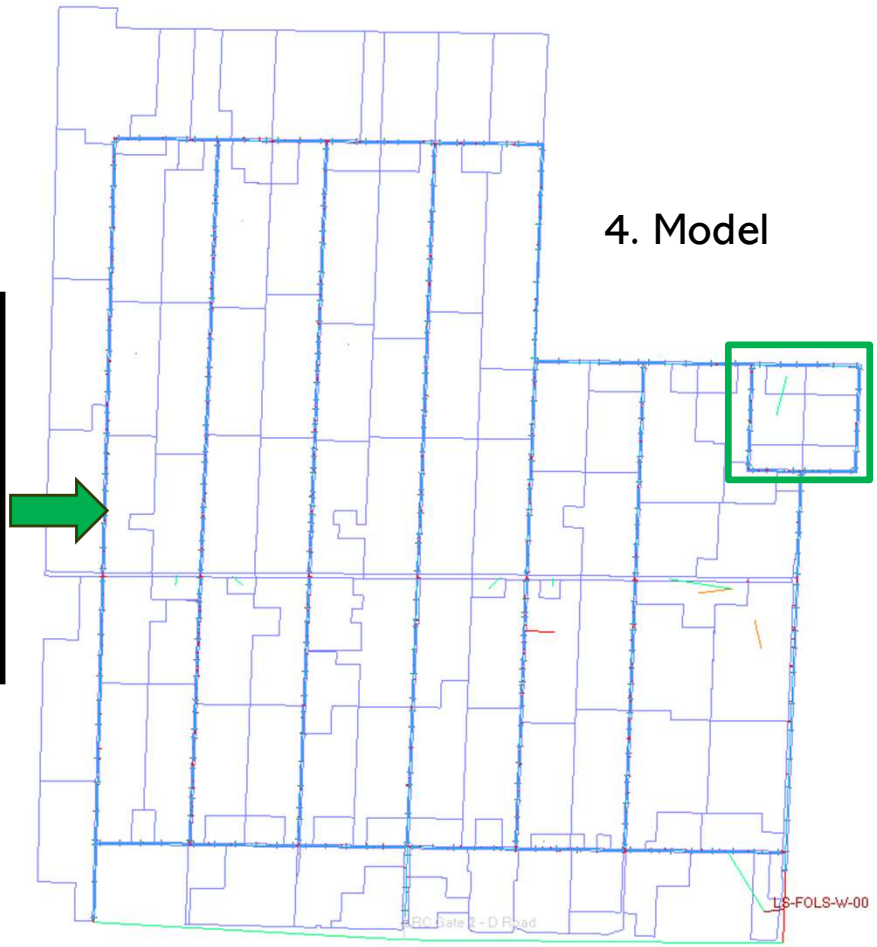
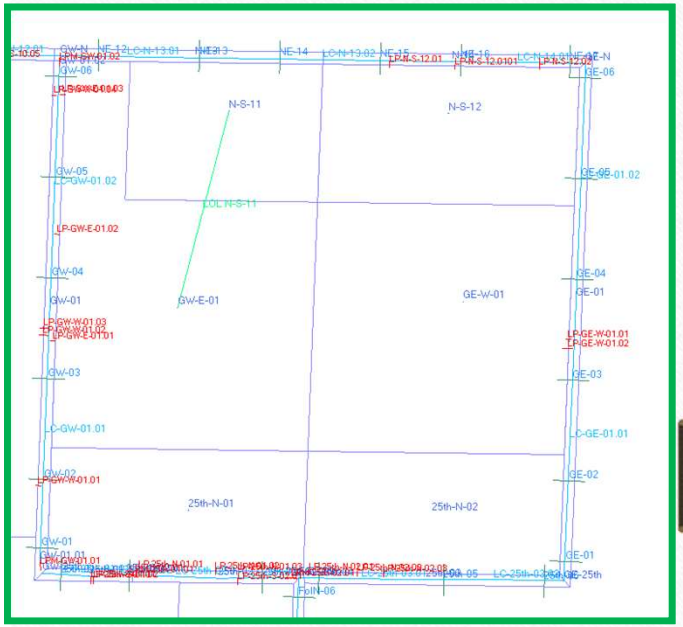
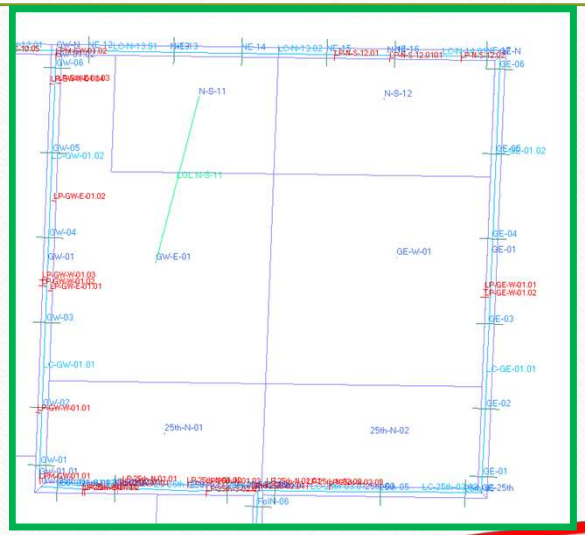
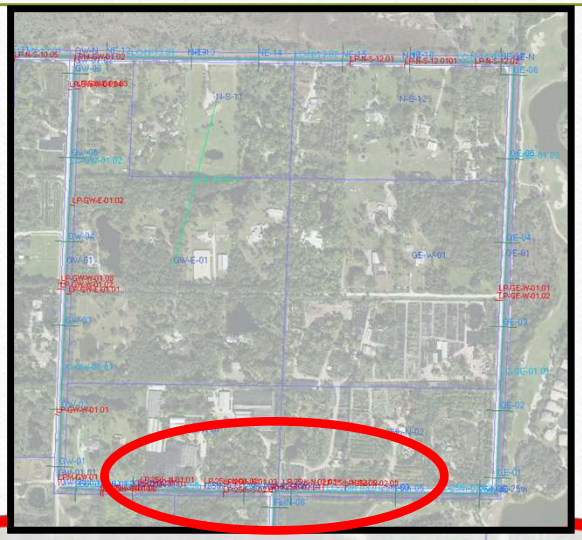
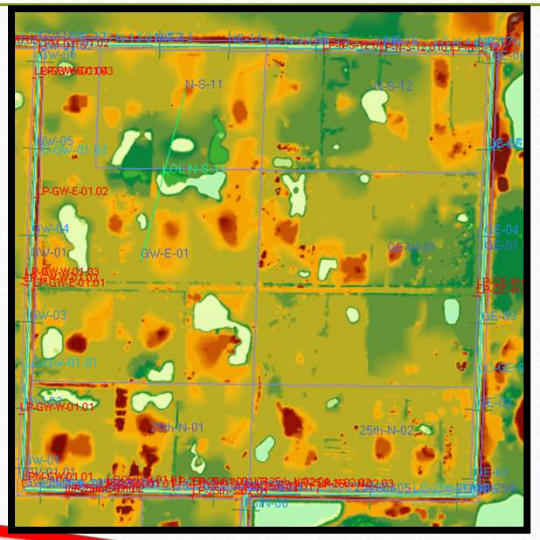




Concepts


N-S-11
N-S-12
GW-E-01
GE-W-01
25th-N-01
25th-N-02

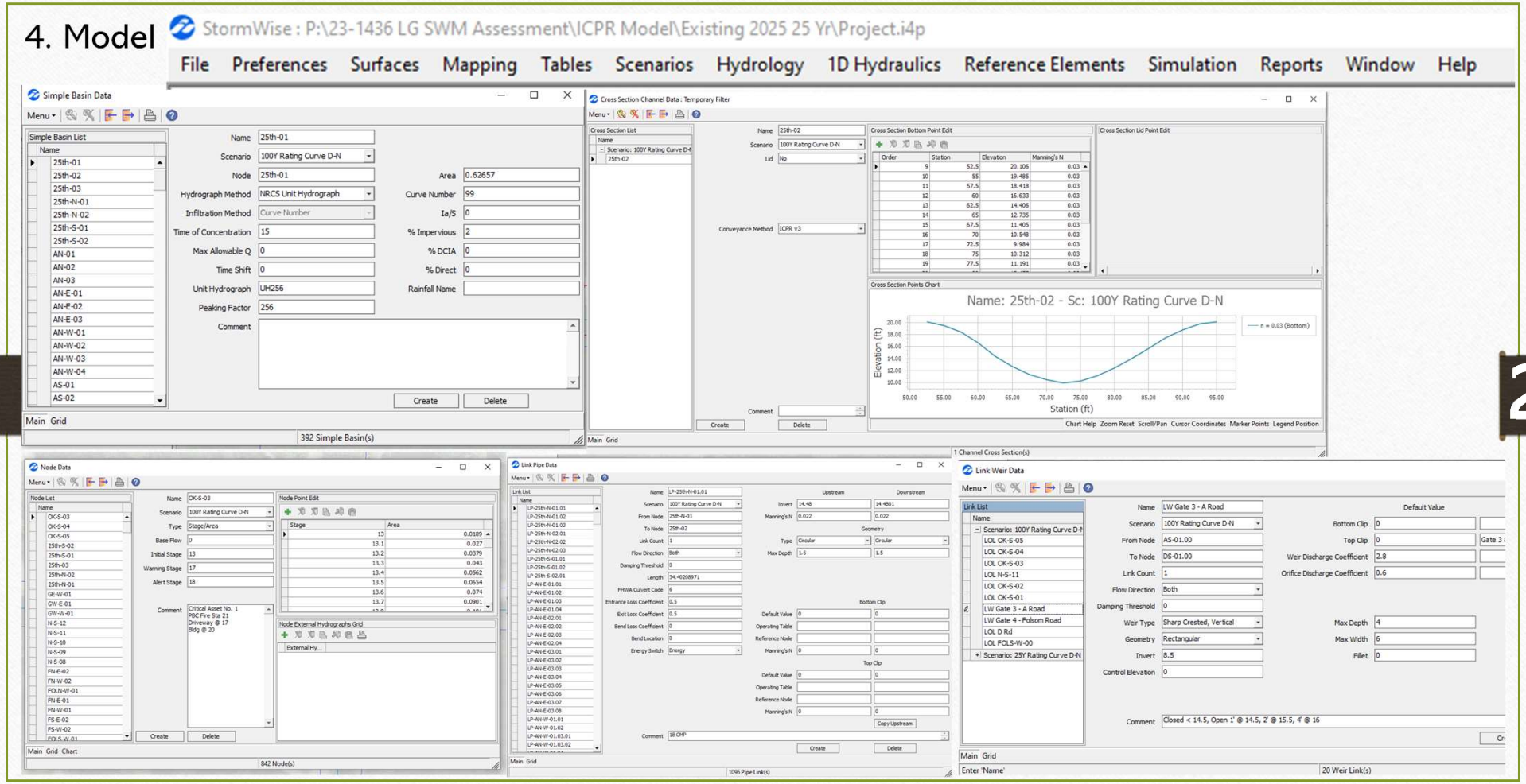

N-S-11
N-S-12
GW-E-01
GE-W-01
25th-N-01
25th-N-02


N-S-11
GW-E-01
25th-N-01
25th-N-02


LP-25th-N-01.02
LP-25th-N-01.03
LP-25th-N-02.01
LP-25th-N-02.02
LC-25th-02.01
25th-02
LC-25th-02.02
25th-03
25th-02.02
LPM-25th-02.01
FOL-25th
25th-04
LC-25th-03.01
LP-25th-S-02.01
FolN-06

Concepts

4. Model



4. Results

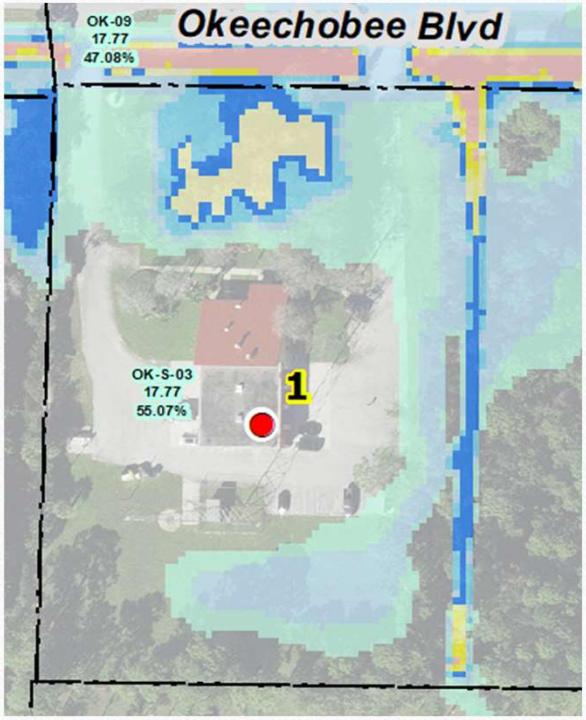
Modeling Simulations

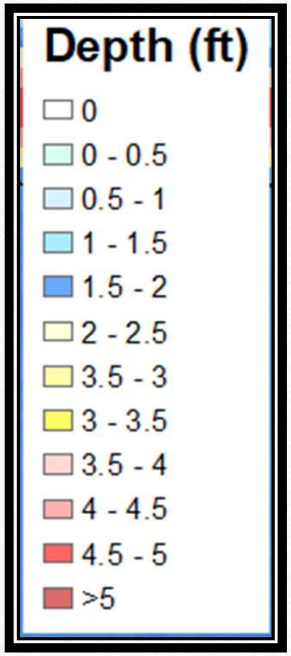
Year	Frequency, Duration	Rainfall	Sea Level	
2025	10-Year, 3-Day	10.0 in		+ 0.00 ft
	25-Year, 3-Day	12.3 in *		
	100-year, 3-Day	17.0 in		
2040	100-Year, 3-Day	19.87 in	Intermediate Low	+ 0.98 ft
			Intermediate High	+ 1.40 ft
2070	100Year, 3-Day	22.61 in	Intermediate Low	+ 1.44 ft
			Intermediate High	+ 2.63 ft

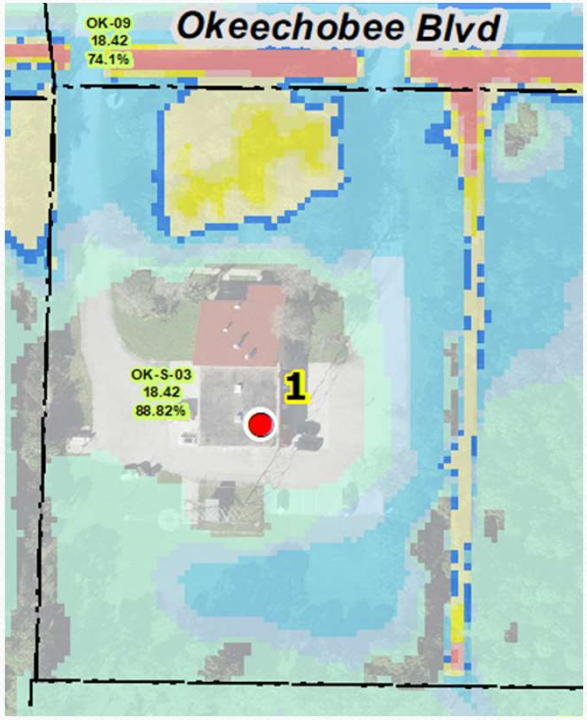
*12.3 inches in 72 hours analyzed to mimic Tropical Storm Isaac (August 2012)

Critical Asset No. 1: PBC Fire Station No. 21

2025 10Y-3D (10.0 in.) v. 100Y-3D (17.0 in.)





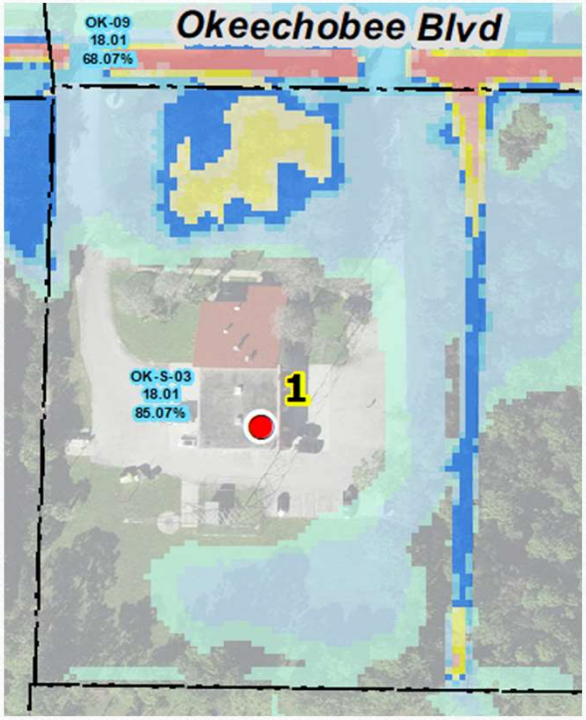


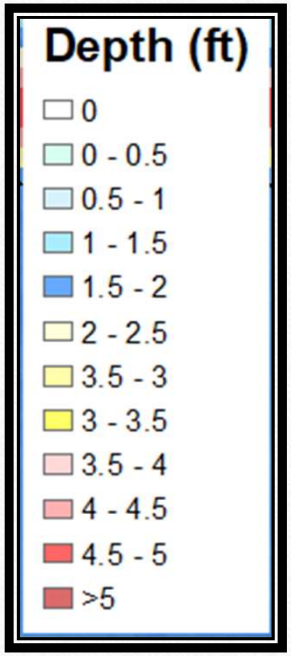
Risk Level = 1; Driveway flooding, 6-12 in.

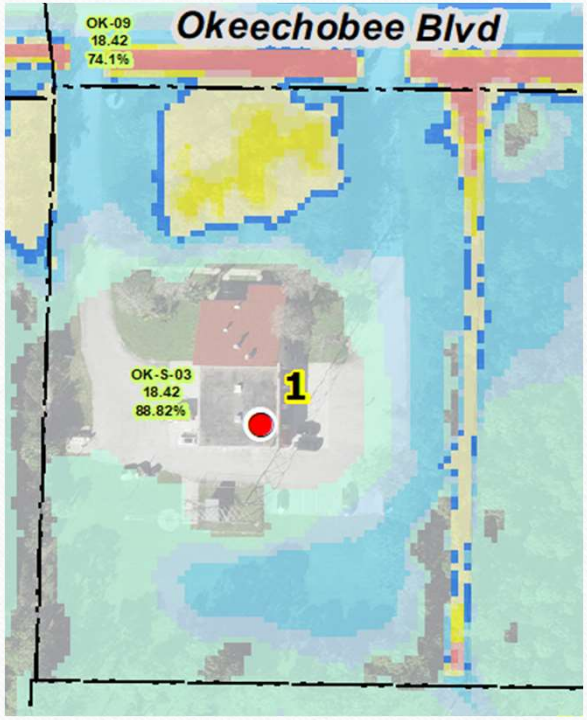
Risk Level = 2; Driveway flooding, 12-18 in.

Critical Asset No. 1: PBC Fire Station No. 21

2025 25Y-3D (12.3 in.) v. 100Y-3D (17.0 in.)





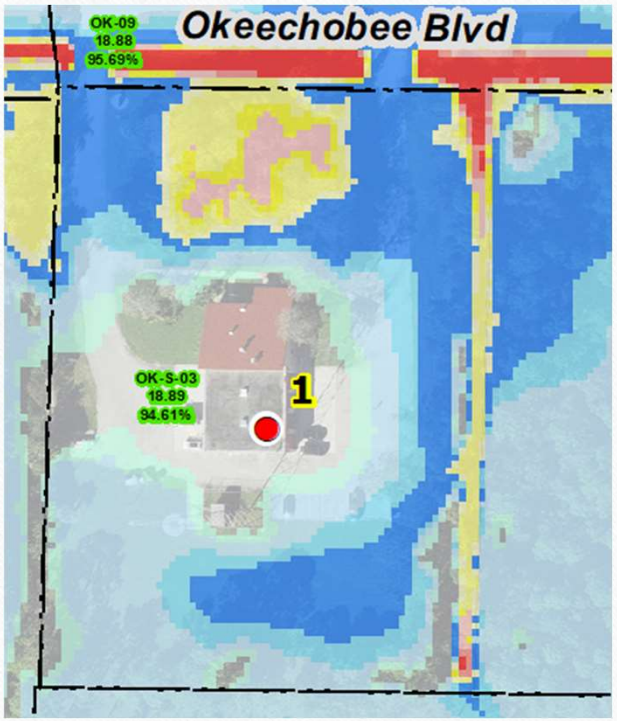


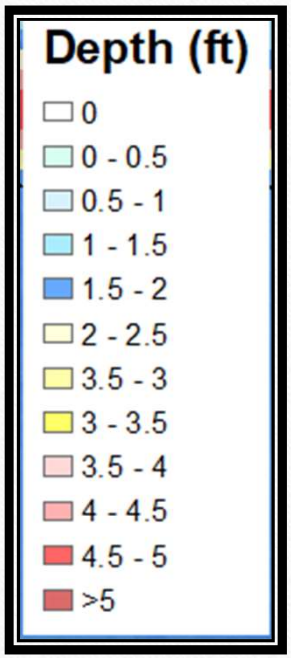
Risk Level = 1; Driveway flooding, 6-12 in.

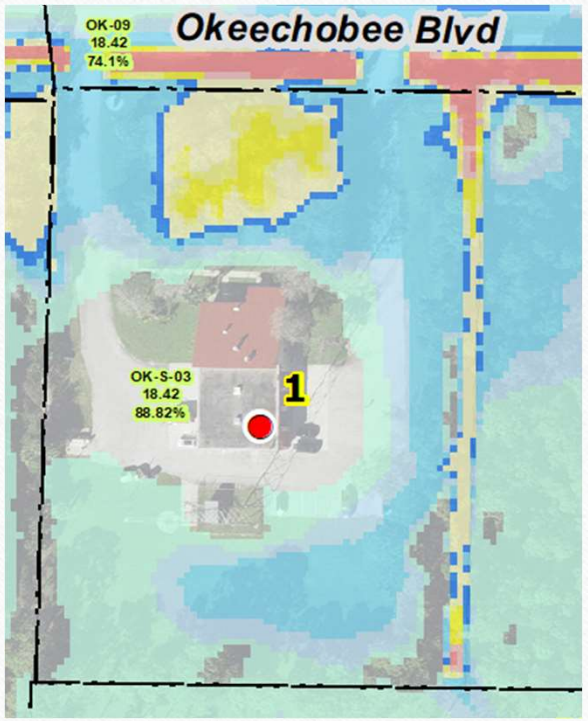
Risk Level = 2; Driveway flooding, 12-18 in.

Critical Asset No. 1: PBC Fire Station No. 21

2070 100Y-3D (22.61 in.) v. 2025 100Y-3D (17.0 in.)







Risk Level = 2; Driveway flooding, 18-24 in.

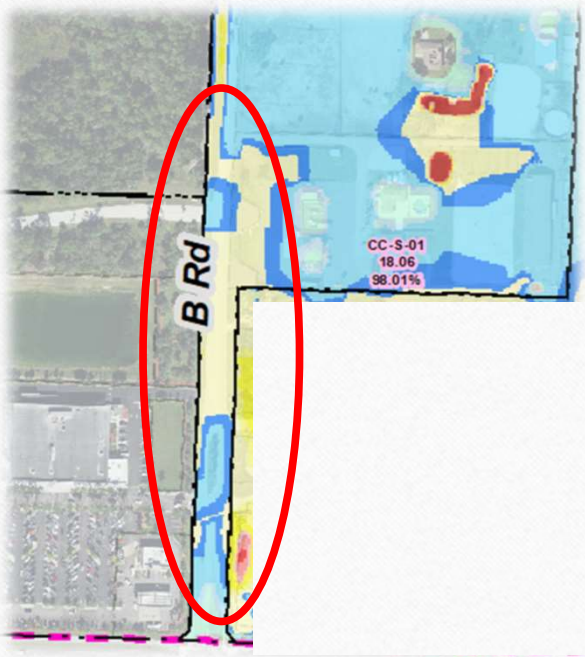
Risk Level = 2; Driveway flooding, 12-18 in.

Roadways Example

B Road South of Okeechobee Blvd

2025 10 Yr (1 – 1.5 ft)
Risk Level = 2

2025 100 Yr (1.5 – 2 ft)
Risk Level = 2



2070 100 Yr (2 – 2.5 ft)
Risk Level = 3

June 2025

Legend
- Municipal Boundary
- Parcels In City

Town of Loxahatchee Groves
Resilient Florida Surface Water Management System Assessment
2025 10Y-3D Simulation
Depth of Maximum Water

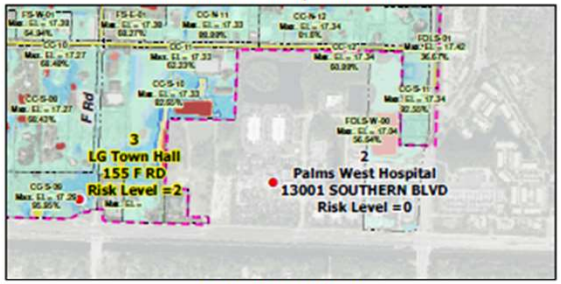
Rainfall (in.) = 10.0
Sea Level Rise (ft.) = 0.0

Depth (ft)
0 | 0 - 0.5 | 0.5 - 1.0 | 1.0 - 1.5 | 1.5 - 2.0 | 2.0 - 2.5 | 3.0 - 3.5 | 3.5 - 4.0 | 4.0 - 4.5 | 4.5 - 5.0 | >5

Critical Asset No. 1
Palm Beach County Fire Station

Critical Asset No. 4
Palm Beach County School Board Communications Tower

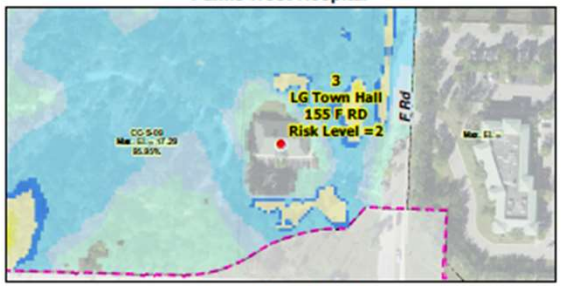
Critical Asset No. 7
US Department of Transportation / Fire Tower



Critical Asset No. 2
Palms West Hospital

Critical Asset No. 5
Primary Storm Discharge Structure

Critical Asset No. 8
Forest Service



Critical Asset No. 3
Town Hall

Critical Asset No. 6
Maintenance Operations Building & Pump House

Critical Asset No. 10
Elementary School

June 2025

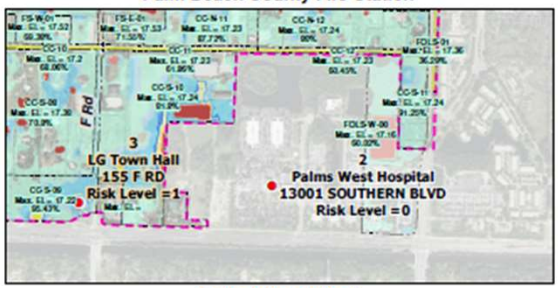
Legend
Municipal Boundary
Parcels In City

Town of Loxahatchee Groves
Resilient Florida Surface Water Management System Assessment
2025 25Y-3D Simulation
Depth of Maximum Water

Rainfall (in.) = 12.3
Sea Level Rise (ft.) = 0.0

Depth (ft)
0 | 0 - 0.5 | 0.5 - 1.0 | 1.0 - 1.5 | 1.5 - 2.0 | 2.0 - 2.5 | 3.5 - 4.0 | 4.0 - 4.5 | 4.5 - 5.0 | 3.0 - 3.5 | >5

Critical Asset No. 1
Palm Beach County Fire Station



Critical Asset No. 2
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Palm Beach County School Board Communications Tower

Critical Asset No. 5
Primary Storm Discharge Structure

Critical Asset No. 6
Maintenance Operations Building & Pump House

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US Department of Transportation / Fire Tower

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Forest Service

Critical Asset No. 10
Elementary School

June 2025

Legend
- Municipal Boundary
- Parcels In City

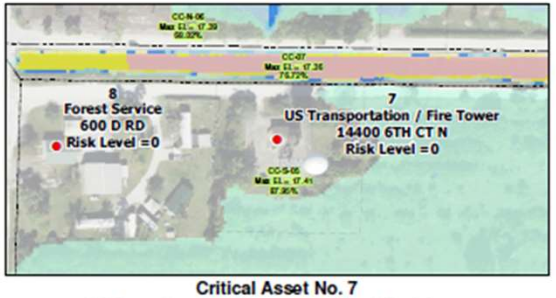
Town of Loxahatchee Groves
Resilient Florida Surface Water Management System Assessment
2025 100Y-3D Simulation
Depth of Maximum Water

Rainfall (in.) = 17.0
Sea Level Rise (ft.) = 0.0

Depth (ft)
0 | 0 - 0.5 | 0.5 - 1.0 | 1.0 - 1.5 | 1.5 - 2.0 | 2.0 - 2.5 | 3.0 - 3.5 | 3.5 - 4.0 | 4.0 - 4.5 | 4.5 - 5.0 | >5

Critical Asset No. 1
Palm Beach County Fire Station

Critical Asset No. 4
Palm Beach County School Board Communications Tower



Critical Asset No. 7
US Department of Transportation / Fire Tower

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Palms West Hospital

Critical Asset No. 5
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Critical Asset No. 10
Elementary School

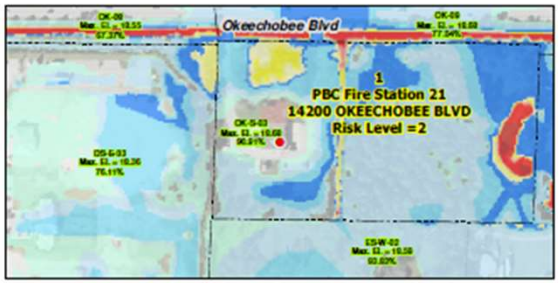
June 2025

Town of Loxahatchee Groves
Resilient Florida Surface Water Management System Assessment
2040 100Y-3D Simulation
Depth of Maximum Water

Legend
- Municipal Boundary
- Parcels In City

Rainfall (in.) = 19.87
Sea Level Rise (ft.) = 1.0

Depth (ft)
0 | 0 - 0.5 | 0.5 - 1.0 | 1.0 - 1.5 | 1.5 - 2.0 | 2.0 - 2.5 | 3.5 - 3.0 | 3.0 - 3.5 | 3.5 - 4.0 | 4.0 - 4.5 | 4.5 - 5.0 | >5



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Palm Beach County Fire Station

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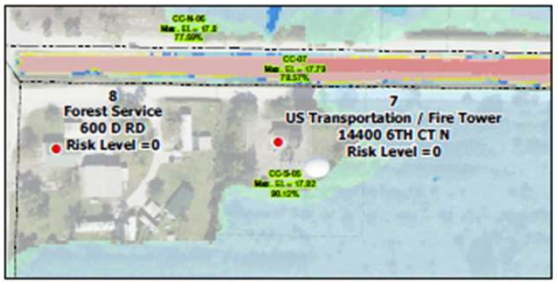
Palm Beach County School Board Communications Tower



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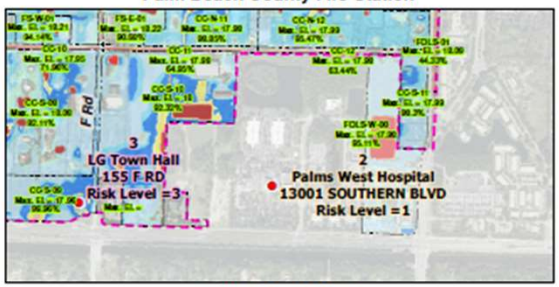
US Department of Transportation / Fire Tower



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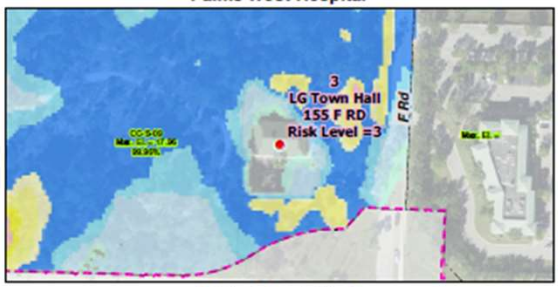
Forest Service



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Town Hall

Critical Asset No. 6
Maintenance Operations Building & Pump House

Critical Asset No. 10
Elementary School

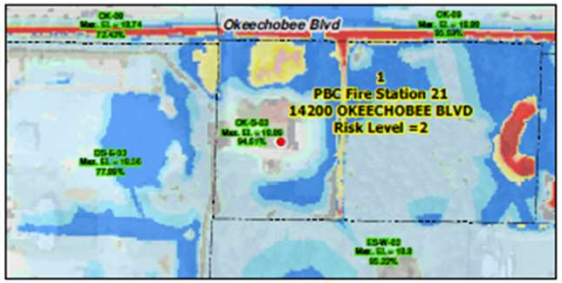
June 2025

Legend
Municipal Boundary
Parcels In City

Town of Loxahatchee Groves
Resilient Florida Surface Water Management System Assessment
2070 100Y-3D Simulation
Depth of Maximum Water

Rainfall (in.) = 22.61
Sea Level Rise (ft.) = 3.0

Depth (ft)
0 | 1.5 - 2.0 | 3.5 - 4.0
0 - 0.5 | 2.0 - 2.5 | 4.0 - 4.5
0.5 - 1.0 | 3.5 - 3.0 | 4.5 - 5.0
1.0 - 1.5 | 3.0 - 3.5 | >5



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Palm Beach County School Board Communications Tower

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Critical Asset No. 10
Elementary School

5. Final Report and Recommendations

Final Report

Contents

- Description of Inputs and Modeling Process
- Reported Results and Conclusions
- Result Maps and Tables
- Result Map GIS Files
- Critical Asset Inventory with Risk Level for Each Simulation

Recommendations

Storage Capacity

- Investigate land acquisition for creation of reservoir area(s)
- Evaluate storage requirements for new development to balance Town-wide flood resistance
- Evaluate use of operable gates at Okeechobee Boulevard to maintain variable control elevations in north and south basins
- Evaluate interlocal partnership opportunities for offsite storage of captured water during larger storm events

Recommendations

Conveyance Capacity

- Evaluate upsizing undersized culverts
- Evaluate reduction in required culvert size for north-south canals
- Continue canal maintenance and debris removal
- Evaluate use of specific lettered canals as emergency outfall channels with larger pipes and greater outfall capacity to C-51 Canal
- Evaluate improvements in conveyance from north portion of Town where access to outfall is most restricted

Recommendations

Outfall Operations

- Replace/ update outdated control systems and software
- Increase telemetry within Town system for better response control
- Consider adjustment of operation protocol to address a greater range of events and tailwater conditions
- Update/ upgrade outfall control structures at A Rd and Folsom Road to improve release capacity

Existing Conditions Model

10Y-3D Results (10.0 in. Rainfall)

ID	Critical Asset Name	ADDRESS	Max El. (ft. NAVD)	% of Basin Area	Risk Level
1	PBC Fire Station 21	14200 OKEECHOBEE BLVD	17.77	55%	1
2	Palms West Hospital	13001 SOUTHERN BLVD	17.34	61%	0
3	LG Town Hall	155 F RD	17.29	96%	2
4	Communication Tower (PBCSB)	14367 CITRUS DR	16.79	11%	0
5	LGWCD Primary Discharge Structure	D RD AND TANGERINE DR	16.79	53%	0
6	LGWCD Maintenace/Pump House	245 W D RD	16.91	29%	0
7	US Transportation / Fire Tower	14400 6TH CT N	17.14	87%	0
8	Forest Service	600 D RD	17.14	87%	0
9	LG Elementary School	16020 OKEECHOBEE BLVD	17.4	16%	0

Existing Conditions Model

100Y-3D Results (17.0 in. Rainfall)

ID	Critical Asset Name	ADDRESS	Max El. (ft. NAVD)	% of Basin Area	Risk Level
1	PBC Fire Station 21	14200 OKEECHOBEE BLVD	18.42	89%	2
2	Palms West Hospital	13001 SOUTHERN BLVD	17.62	62%	0
3	LG Town Hall	155 F RD	17.6	97%	2
4	Communication Tower (PBCSB)	14367 CITRUS DR	17.26	74%	2
5	LGWCD Primary Discharge Structure	D RD AND TANGERINE DR	16.49	51%	0
6	LGWCD Maintenace/Pump House	245 W D RD	17.41	79%	0
7	US Transportation / Fire Tower	14400 6TH CT N	17.41	88%	0
8	Forest Service	600 D RD	17.41	88%	0
9	LG Elementary School	16020 OKEECHOBEE BLVD	17.93	91%	1

Existing Conditions Model

2070 100Y-3D Results (22.61 in. Rainfall)

ID	Critical Asset Name	ADDRESS	Max El. (ft. NAVD)	% of Basin Area	Risk Level
1	PBC Fire Station 21	14200 OKEECHOBEE BLVD	18.89	95%	2
2	Palms West Hospital	13001 SOUTHERN BLVD	18.17	65%	2
3	LG Town Hall	155 F RD	18.15	100%	3
4	Communication Tower (PBCSB)	14367 CITRUS DR	17.76	82%	3
5	LGWCD Primary Discharge Structure	D RD AND TANGERINE DR	17.3	55%	2
6	LGWCD Maintenace/Pump House	245 W D RD	17.94	93%	0
7	US Transportation / Fire Tower	14400 6TH CT N	18.01	93%	0
8	Forest Service	600 D RD	18.01	93%	0
9	LG Elementary School	16020 OKEECHOBEE BLVD	18.2	92%	3

Roadways Summary

Risk:

1: 0-1', 100' min. length	***1***
2: 1-2', 100' min. length	***2***
3: >2', 100' min. length	***3***

Roadway Name	Category	2025 Risk Level	2040 Risk Level	2070 Risk Level
25th St N	1	1	1	1
A Rd N	1	1	2	2
A Rd S	1	1	1	1
B Rd N	1	1	1	2
B Rd S	1	2	2	3
C Rd N	1	1	1	2
C Rd S	1	1	1	1
D Rd N	1	1	1	1
D Rd S	1	1	1	1
E Rd N	1	1	2	2
E Rd S	1	1	1	2
F Rd N	1	1	1	1
F Rd S	1	2	2	3
G Rd E	1	2	2	2
G Rd W	1	1	1	1
North Rd W	1	0	1	1
North Rd E	1	2	2	2
Collecting Canal Rd	1	2	2	2
Okeechobee Blvd (County)	1	2	2	2
Folsom Rd N (County)	1	1	1	1
Folsom Rd S (County)	1	1	1	1
Southern Blvd (State)	1	0	0	0

Town of Loxahatchee Groves
Resilient Florida Surface Water Management System Assessment
2025 10Y-3D Depth of Maximum Water

April 2025

Rainfall (in.) = 10.0
Sea Level Rise (ft.) = 0.0

Feet
500

KESHAVARZ & ASSOCIATES

Town of Loxahatchee Groves

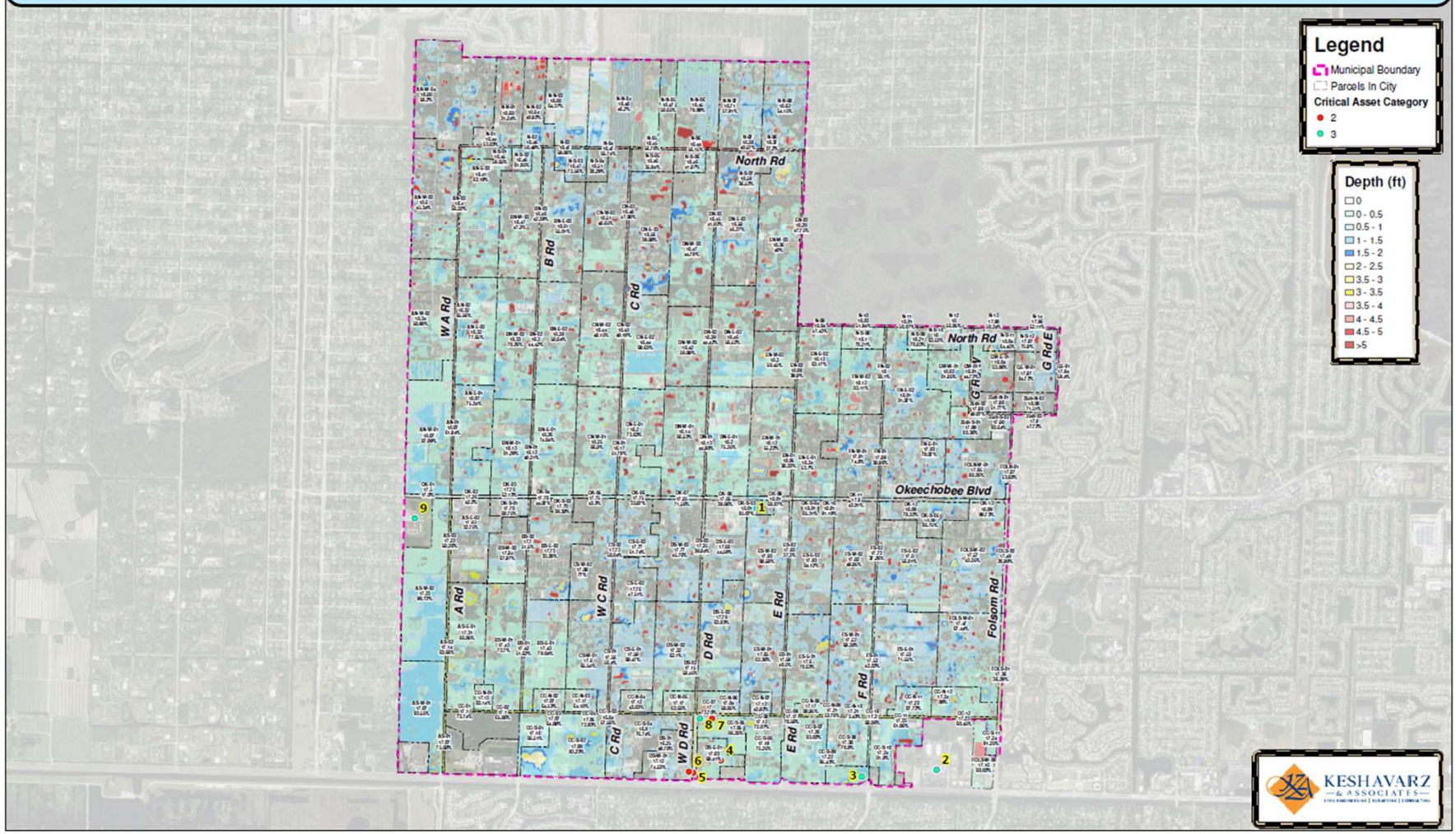
Resilient Florida Surface Water Management System Assessment

2025 25Y-3D Depth of Maximum Water

April 2025

Rainfall (in.) = 12.3
Sea Level Rise (ft.) = 0.0

Feet
500



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Town of Loxahatchee Groves

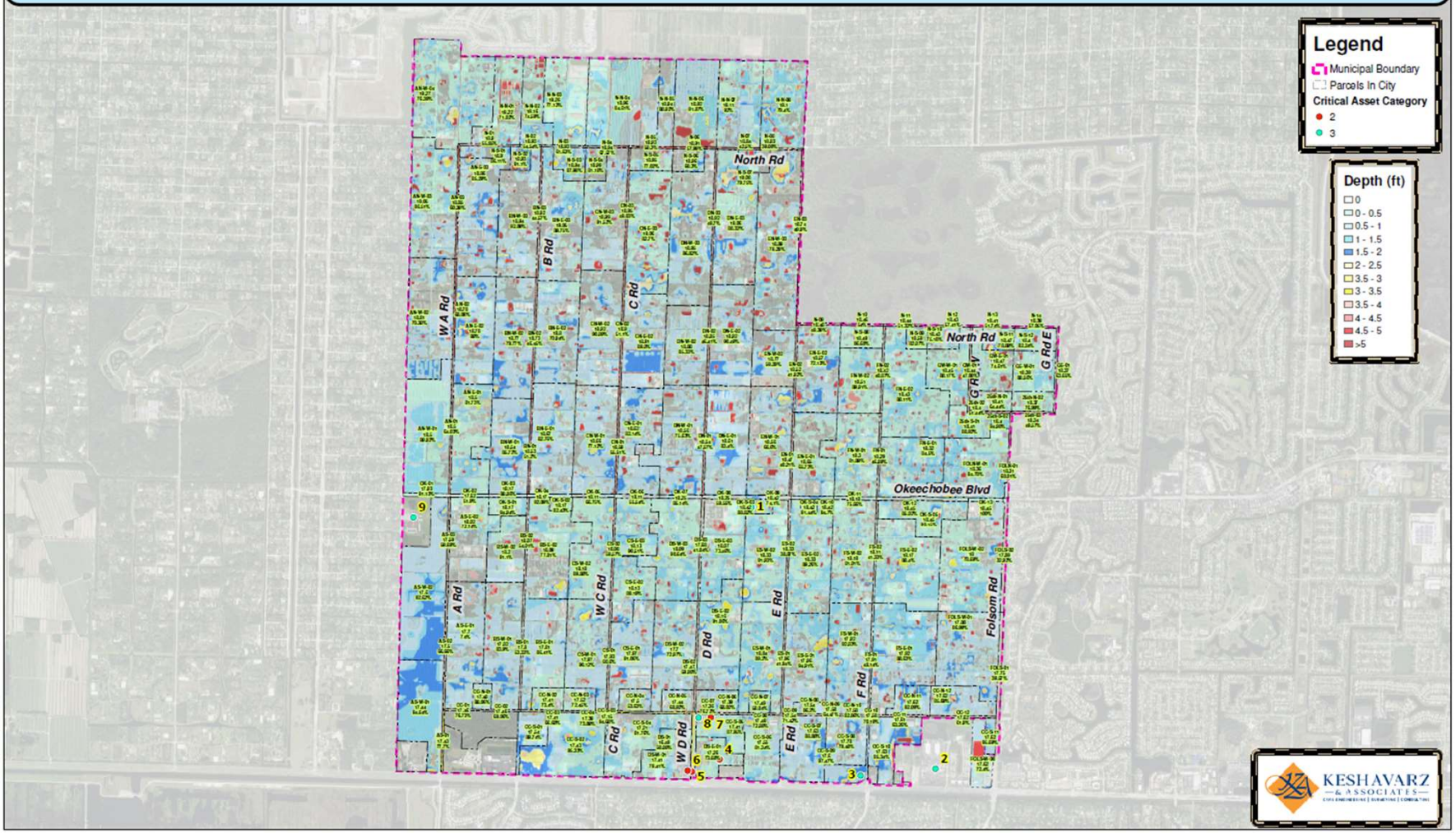
Resilient Florida Surface Water Management System Assessment

2025 100Y-3D Depth of Maximum Water

April 2025

Rainfall (in.) = 17.0
Sea Level Rise (ft.) = 0.0

Feet
500



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Town of Loxahatchee Groves

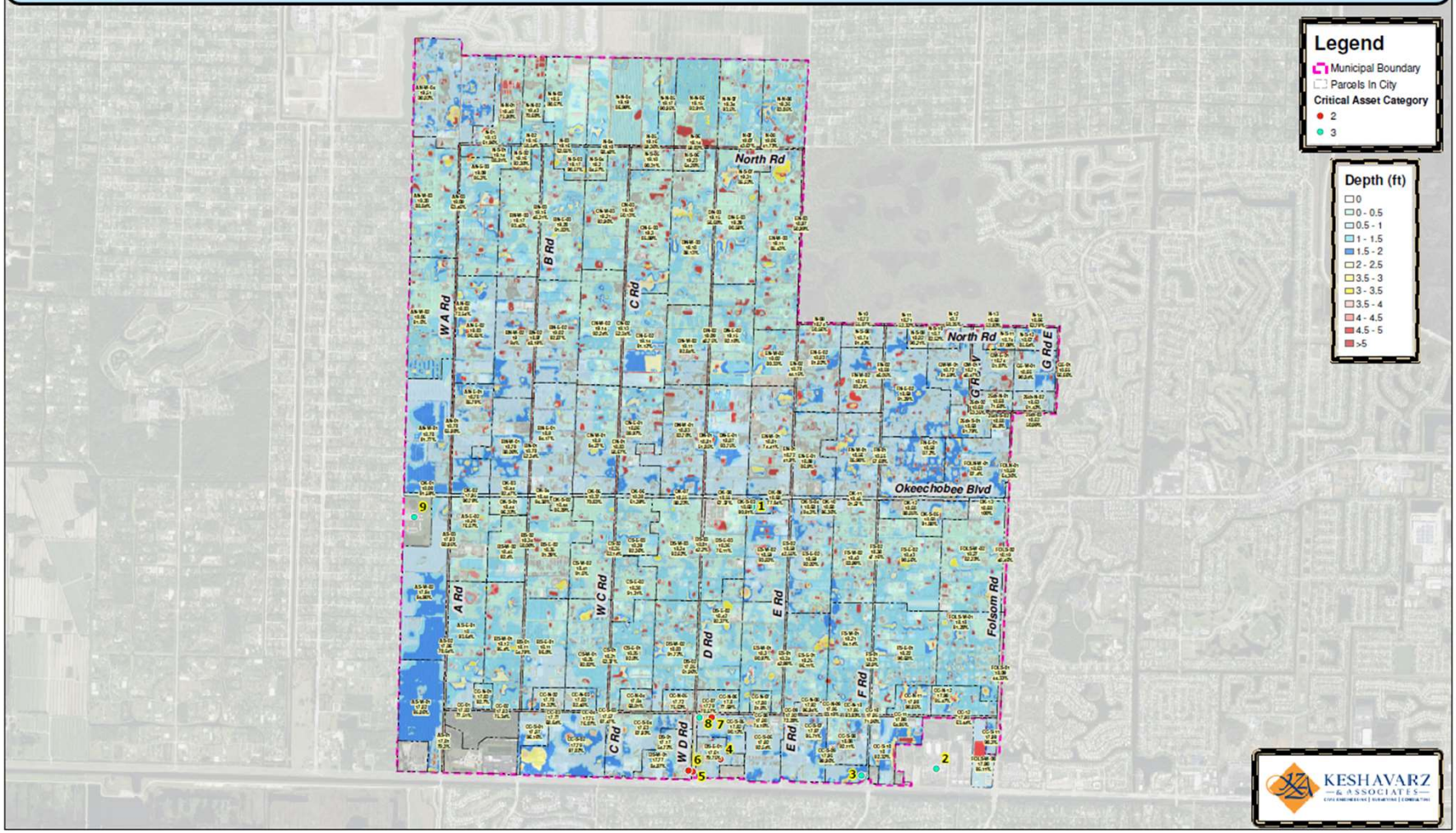
Resilient Florida Surface Water Management System Assessment

2040 100Y-3D Depth of Maximum Water

April 2025

Rainfall (in.) = 19.87
Sea Level Rise (ft.) = 1.0

Feet
500



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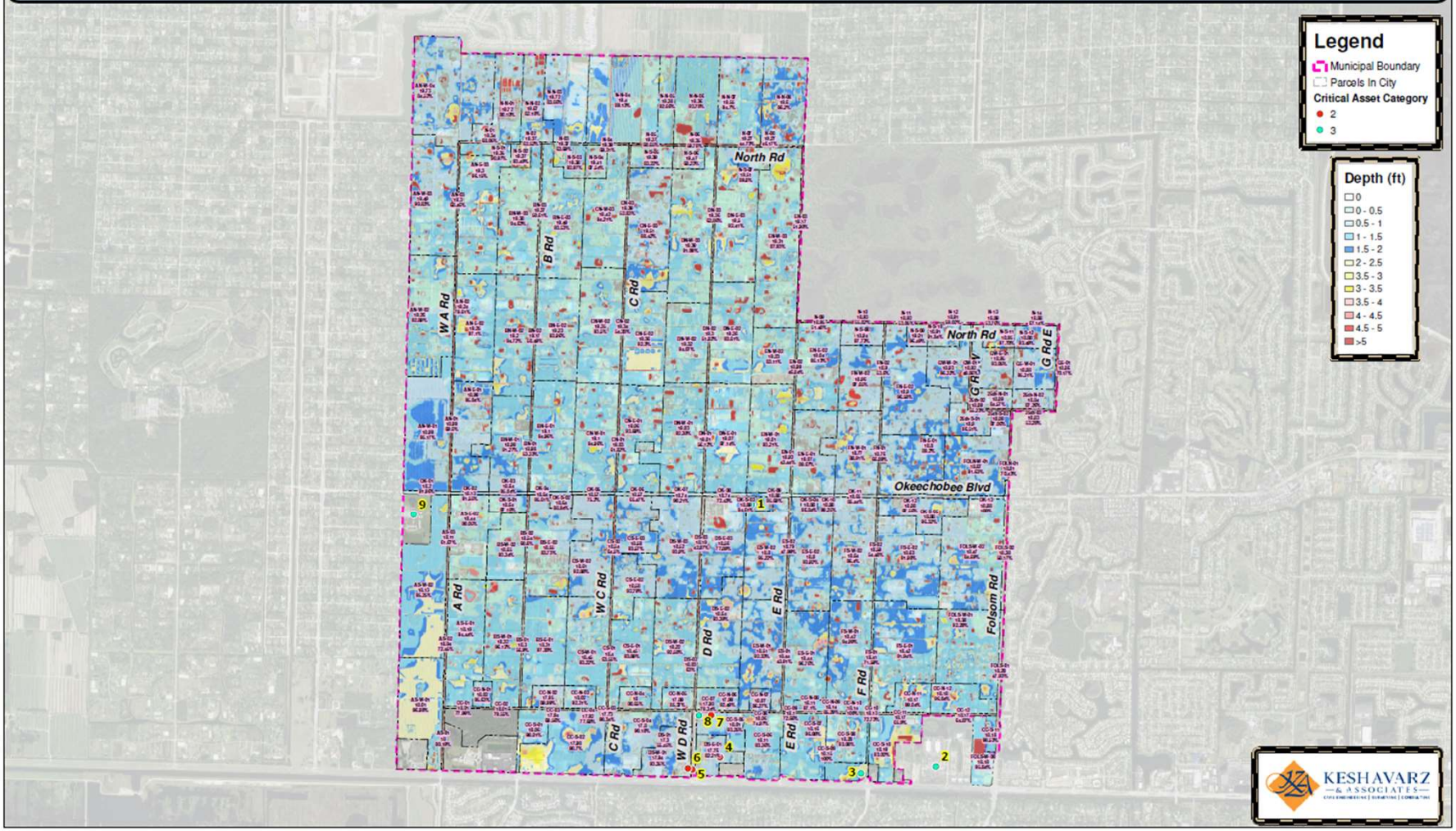
Town of Loxahatchee Groves
Resilient Florida Surface Water Management System Assessment

2070 100Y-3D Depth of Maximum Water

April 2025

Rainfall (in.) = 22.61
Sea Level Rise (ft.) = 3.0

Feet
500



KESHAVARZ & ASSOCIATES

THE END

Thank you for participating, and we welcome your input.

Please e-mail the Town Grant Manager with your inquiries, photo or idea submissions, and plenty of positive encouragement.