



Public Works Department

**Stormwater Management:
Moving Towards a Resilient Future**

Session 1

May 2, 2023



Presentation Outline

- **Purpose**
- **Key Terms**
- **Review of 2022 Flooding Events**
- **Existing Stormwater-related Programs**
 - Design Standards
 - Basin Studies
 - Maintenance and Inspections
 - Capital Improvement Program
- **Looking Ahead to Session 2**
- **Summary**





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Purpose

- **Discussion at the October 25, 2022 Board meeting regarding the following stormwater management concerns:**
 - Intensity of future rainfall events
 - Sufficiency of existing design standards
 - Current maintenance standards
- **Following the discussion, Mayor Demings directed staff to do research and update the Board regarding potential modifications to our stormwater program and standards**





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Key Terms

Stormwater Management

▪ Florida Statutes Section 403.031(16)

- “Stormwater management system” means a system designed and constructed or implemented to control discharges which are necessitated by rainfall events, incorporating methods to collect, convey, store, absorb, inhibit, treat, use, or reuse water to prevent or reduce flooding, overdrainage, environmental degradation and water pollution or otherwise affect the quantity and quality of discharges from the system.





Key Terms

Resiliency

- **Florida Statutes Section 380.093 Resilient Florida Grant Program**
 - The Legislature recognizes that the state is particularly vulnerable to adverse impacts from flooding resulting from increases in frequency and duration of rainfall events, storm surge from more frequent and severe weather systems, and sea level rise. Such adverse impacts pose economic, social, environmental, and public health and safety challenges to the state. To most effectively address these challenges, funding should be allocated in a manner that prioritizes addressing the most significant risks
- **Collins Dictionary Definition**
 - The ability of an ecosystem to return to its original state after being disturbed

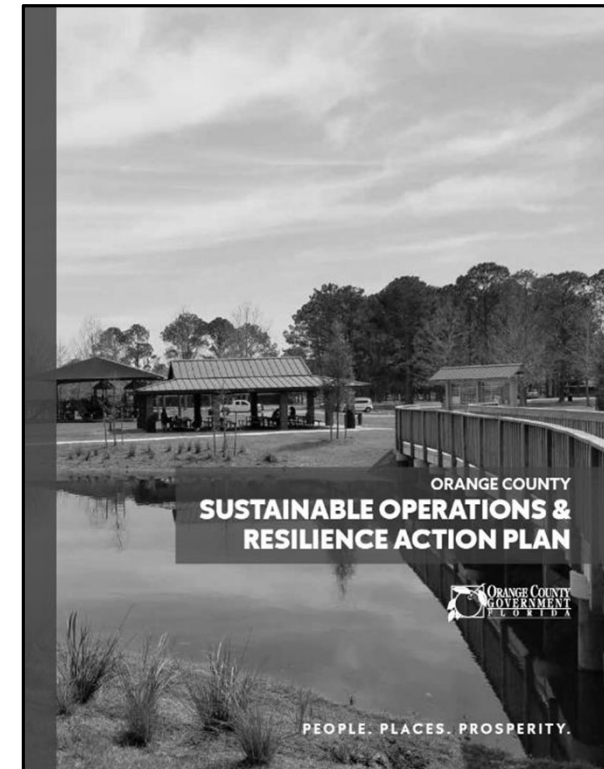




Key Terms

Sustainability Operations & Resilience Action Plan (SORAP)

- **Completed in 2021**
- **Includes focus areas for *Energy & Climate Action* and *Water Use & Quality***
- **Goal 7 includes:**
 - **Completing a Comprehensive Stormwater Infrastructure Plan (CSIP) to address the completion of a stormwater structural inventory**
 - **To identify and approve Low Impact Design strategies that benefit the County’s system and make additions to the design requirements**





Key Terms

9

Countywide Vulnerability Assessment Study

- **The County received a state planning Resilient Florida grant in the amount of \$420,000**
- **Being done in coordination with the Office of Sustainability and Resilience**
- **The study will:**
 - **Collect data on critical and regionally significant assets**
 - **Perform an exposure analysis based on flooding from the 100-year and 500-year design storms**
 - **Perform a sensitivity analysis to measure the impacts of flooding on the critical assets**



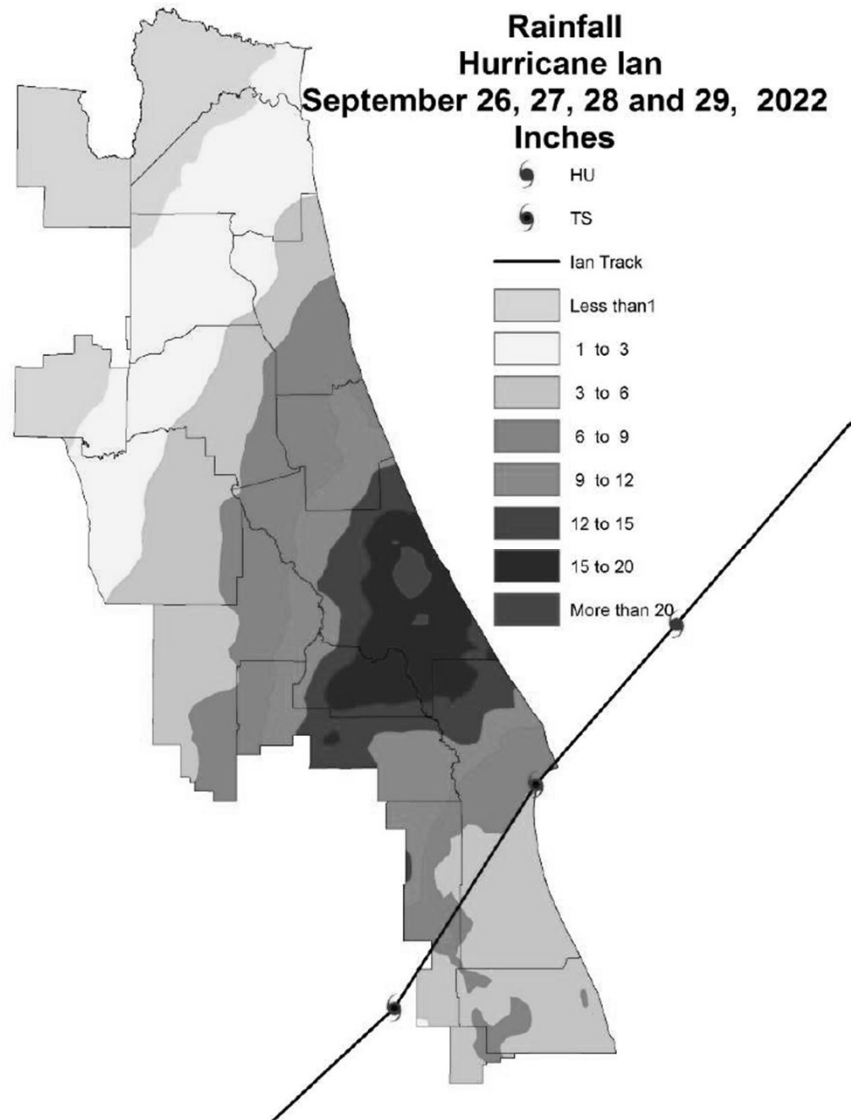
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Legend

-  Standalone Stations
-  Pump Stations

STATION ID	STATION NAME	TOTAL RAINFALL (24-HR PERIOD)	STATION ID	STATION NAME	TOTAL RAINFALL (24-HR PERIOD)
1	Hal Scott	10.24"	13	Lake Conway	11.89"
2	Michael's Dam	12.59"	14	Lake Hart	11.54"
3	Lake Maitland	13.67"	15	White Heron Pump Station	9.78"
4	Riverside Acres	11.97"	16	Dwarf Lake Pump Station	10.07"
5	Orange Blossom	11.97"	17	Westside Manor Pump Station	12.28"
6	Lake Beauclair	4.60"	18	Bonnie Brook Pump Station	13.16"
7	Lake Apopka	9.15"	19	Swann Lake Pump Station	14.23"
8	Orange County National	8.27"	20	Verona Park Pump Station	14.57"
9	Lake Sheen	9.60"	21	Phillips Ponds Pump Station	9.38"
10	Spring Lake	19.43"	22	Somerset at Lakeville Oaks Pump Station	17.22"
11	Shingle Creek	12.17"	23	Shadow Bay Pump Station	10.40"
12	Boggy Creek	12.39"	24	Lake Star Pump Station	11.13"

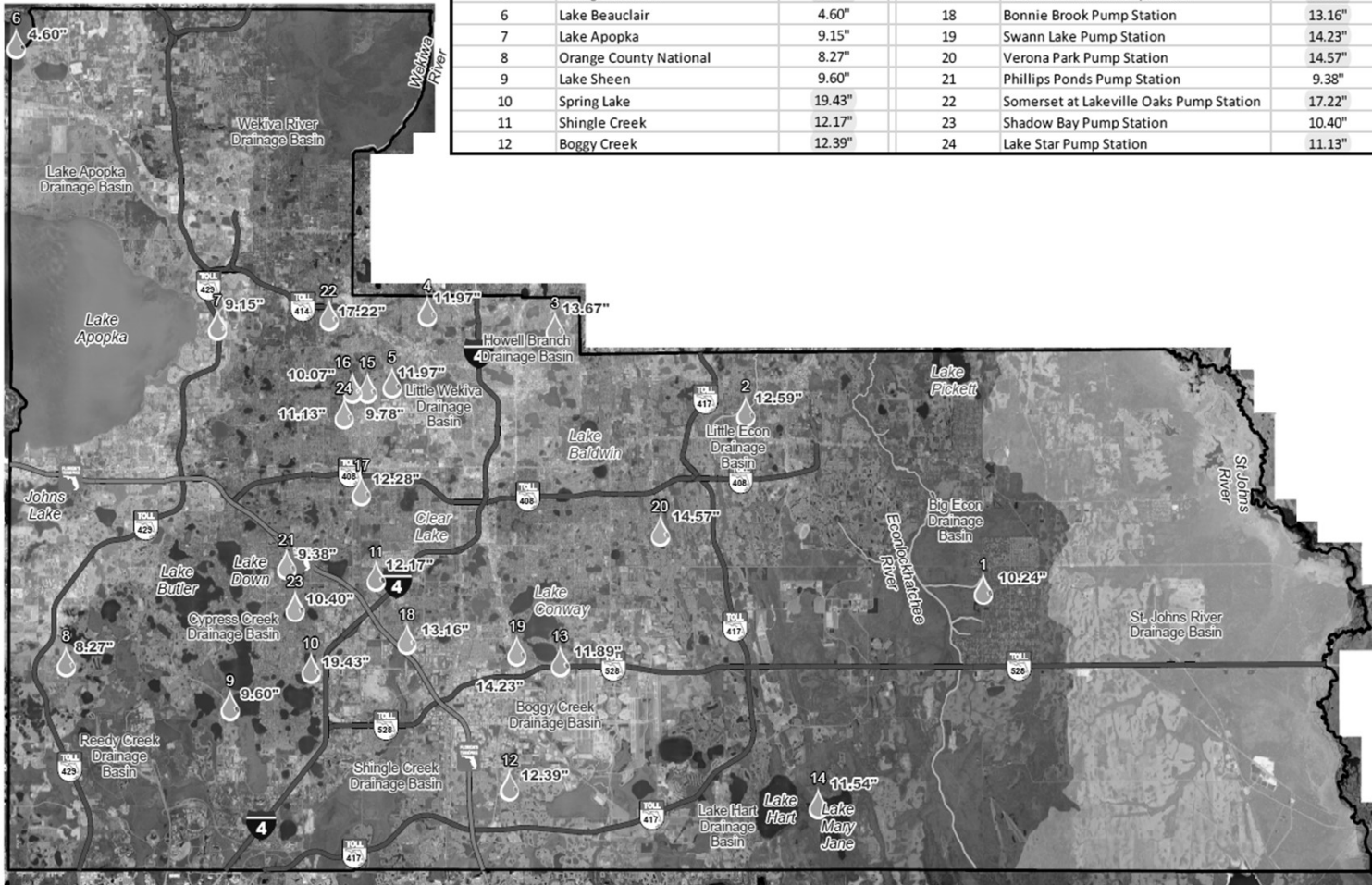
Orange County Rainfall Stations Hurricane Ian 24-Hour Period

September 23, 2022



0 20,000 40,000

1" = 20,000'



Disclaimer:
Data is provided "as is" without warranty of any representation of accuracy, timeliness or completeness. The burden of determining accuracy, completeness, timeliness, merchantability and fitness for or the appropriateness for use rests solely on the requester. The County makes no warranties, express or implied, as to the use of Data. There are no implied warranties of merchantability or fitness for a particular purpose.

The requester acknowledges and accepts the limitation of the Data, including the fact that the data is dynamic and is in a constant state of maintenance, correction and update.



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Orange County Public Works
Stormwater Management Division

January 10, 2023

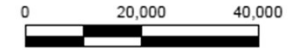


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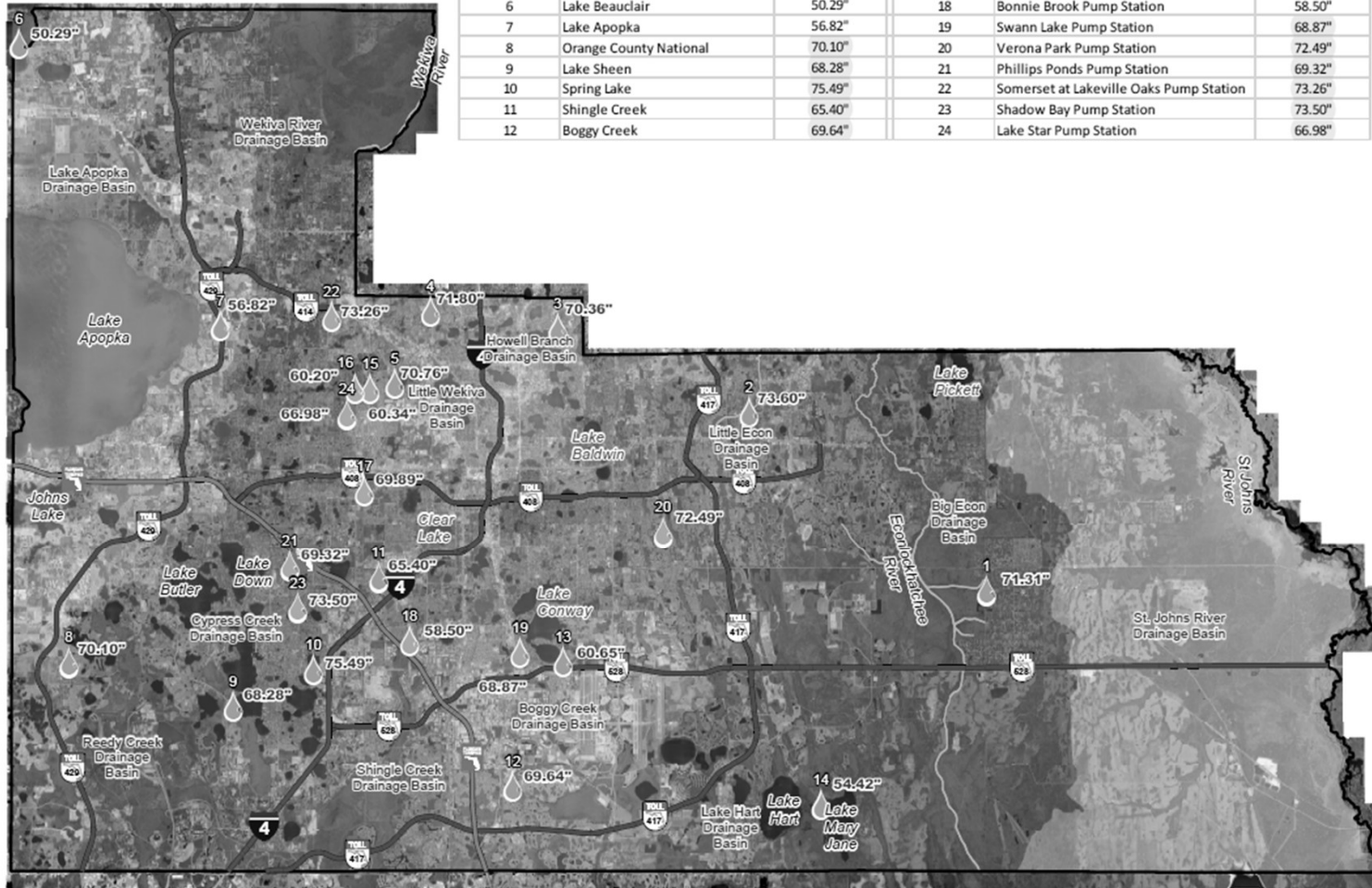
-  Standalone Stations
-  Pump Stations

STATION ID	STATION NAME	TOTAL RAINFALL (2022)	STATION ID	STATION NAME	TOTAL RAINFALL (2022)
1	Hal Scott	71.31"	13	Lake Conway	60.65"
2	Michael's Dam	73.60"	14	Lake Hart	54.42"
3	Lake Maitland	70.36"	15	White Heron Pump Station	60.34"
4	Riverside Acres	71.80"	16	Dwarf Lake Pump Station	60.20"
5	Orange Blossom	70.76"	17	Westside Manor Pump Station	69.89"
6	Lake Beauclair	50.29"	18	Bonnie Brook Pump Station	58.50"
7	Lake Apopka	56.82"	19	Swann Lake Pump Station	68.87"
8	Orange County National	70.10"	20	Verona Park Pump Station	72.49"
9	Lake Sheen	68.28"	21	Phillips Ponds Pump Station	69.32"
10	Spring Lake	75.49"	22	Somerset at Lakeville Oaks Pump Station	73.26"
11	Shingle Creek	65.40"	23	Shadow Bay Pump Station	73.50"
12	Boggy Creek	69.64"	24	Lake Star Pump Station	66.98"

Orange County Rainfall Station Totals for 2022



1" = 20,000'



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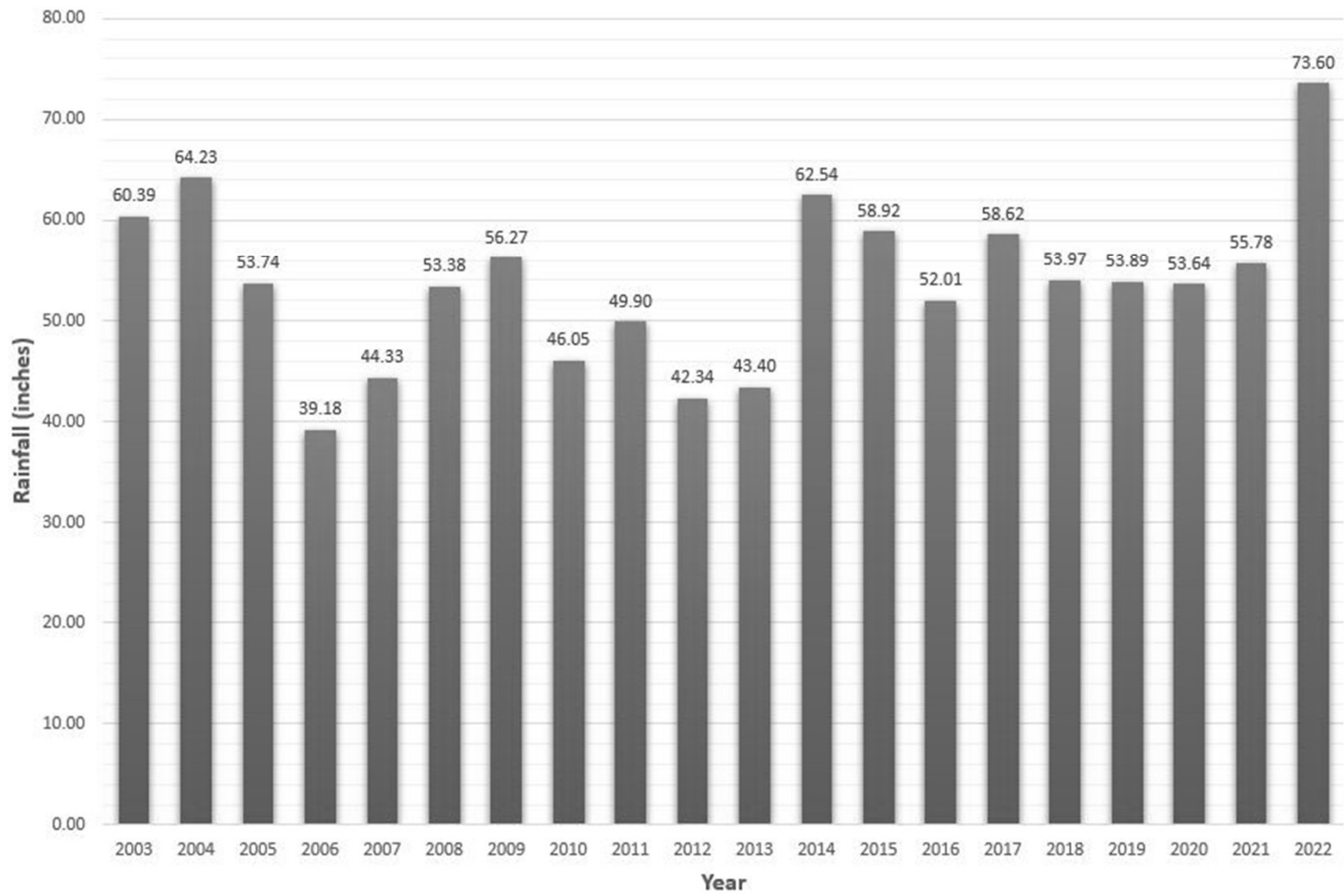
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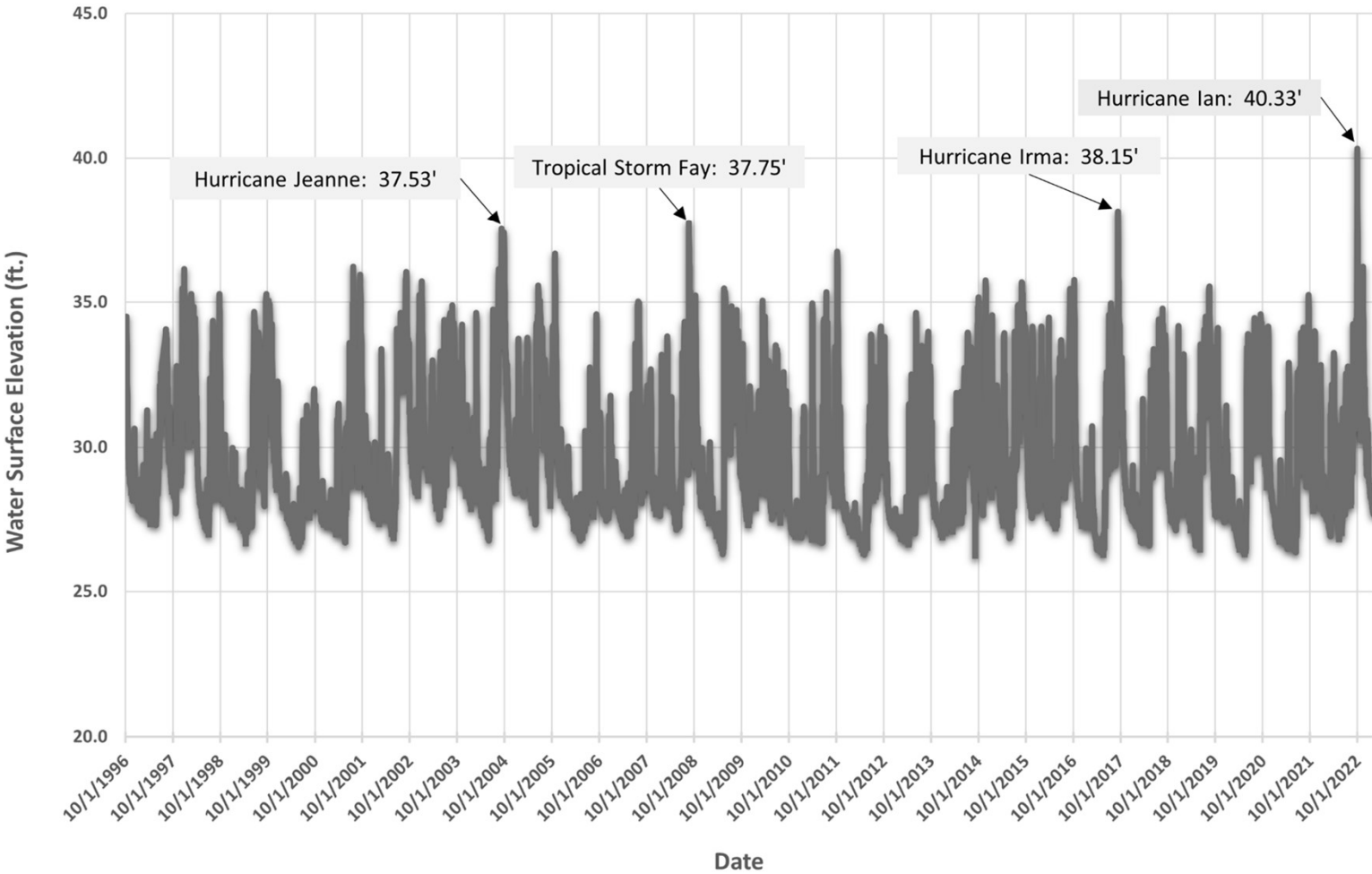
January 10, 2023



Michaels Dam Recorded Rainfall



USGS Gage Little Econlockhatchee (at S.R. 434)





Hurricane Ian Analysis

- **67% of homes that reported possible water intrusion are located within the 100-year floodplain**
- **85% of the properties fall within 500' of floodplain**
- **70% of these properties were built before 1980 (coinciding with establishment of modern stormwater design standards and associated permitting)**
- **Only about 5-6% of all these properties were built since 2000**

HOMES WITH POSSIBLE WATER INTRUSION=	247	
X ZONE	82	33%
FLOODZONE	165	67%
TOTAL BUILT BEFORE 1980 (1979 or older)	172	69.64%
TOTAL BUILT IN 1980 OR LATER	75	30.36%
TOTAL BUILT IN 2000 OR LATER	14	5.67%
BUILT IN X ZONE BEFORE 1980 (1979 or older)	47	19%
BUILT IN X ZONE 1980 OR LATER	35	14%
BUILT IN X ZONE 2000 OR LATER	4	1.62%
BUILT IN FLOODZONE BEFORE 1980 (1979 or older)	125	51%
BUILT IN FLOODZONE 1980 OR LATER	40	16%
BUILT IN FLOODZONE 2000 OR LATER	10	4.05%
*FLOODZONE IS BASED ON THE PARCEL, NOT JUST THE BUILDING		



Hurricane Ian Flooded Areas

Orlo Vista Area



Bonnie Brook Area







- Flooded home
- Flooded road
- Other flooding
- 100-year Floodplain



Hurricane Ian Flooded Areas

Rio Pinar Area

Rouse Rd Area

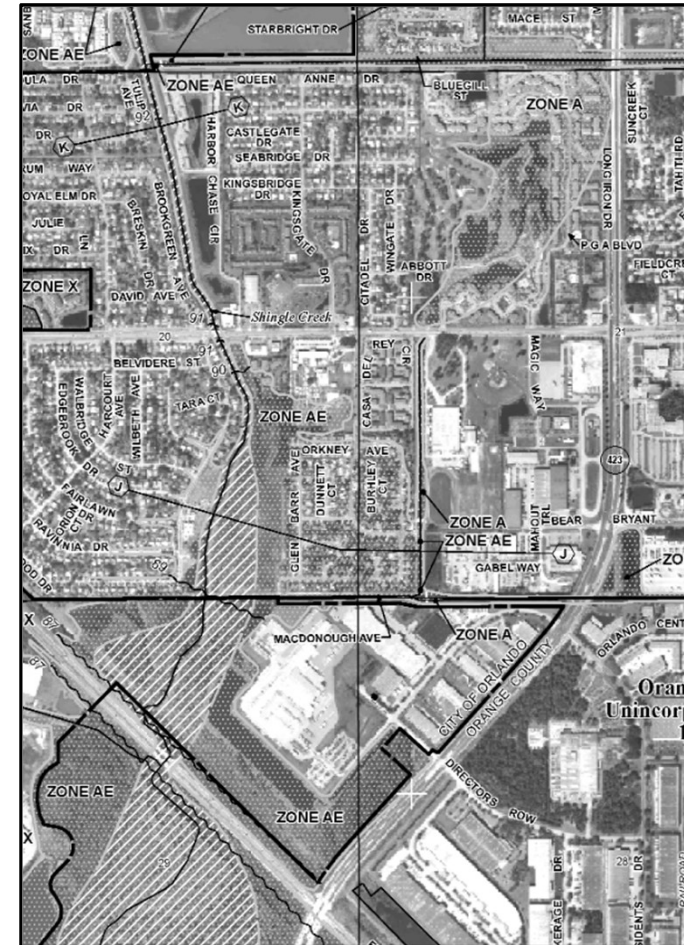
-  Flooded home
-  Flooded road
-  Other flooding
-  100-year Floodplain





Hurricane Ian Analysis

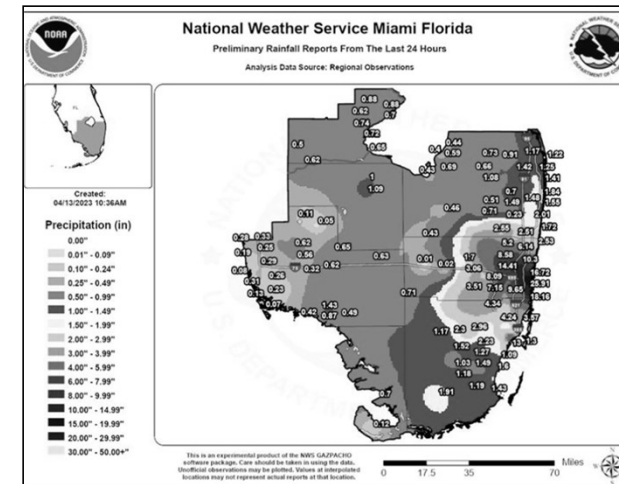
- Rainfall from Hurricane Ian exceeded the 100-year, 24-hr storm event in most of the County, so flooding in and near the 100-year flood plain was expected
- High tailwater conditions for key canals and rivers did not allow open systems to outfall. These included Shingle Creek, the Little Econ. River and the Econ. River
- It does not appear that lack of maintenance for County canals, ponds, etc. was a significant reason for the flooding





Not just hurricanes...

- **Fort Lauderdale got 25 inches of rain in 'unprecedented' storm** – Headline from NBC News
- **April 11, 2023** – Almost 2 months before the start of hurricane season
 - Heavy rain caused by slow-moving frontal system combined with low pressure system in the Gulf of Mexico
 - Parts of Ft. Lauderdale (pop 180,000) saw 25.91 inches of rain in a 6-8 hour period
- **Significant impacts due to flooding**
 - More than 900 calls to fire department
 - Around 600 people taken to shelters
 - Closed airport (FLL) for 2 days
 - Flooded homes & schools, causing \$ millions in damage





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Design Standards – Level of Service (LOS)

22

- **Orange County Code Section 34-247 defines the minimum “Design Storm”**
 - **Open Basin - 25-year frequency, 24-hour duration storm event**
 - **Closed Basin - 100-year frequency, 24-hour duration storm event**
- **Canals, swales, and pipes range from 10 to 25-year frequency events**
- **Ponds are designed with 1 foot of freeboard**
- **The rainfall intensity of the design storms could be updated based on recent data.**

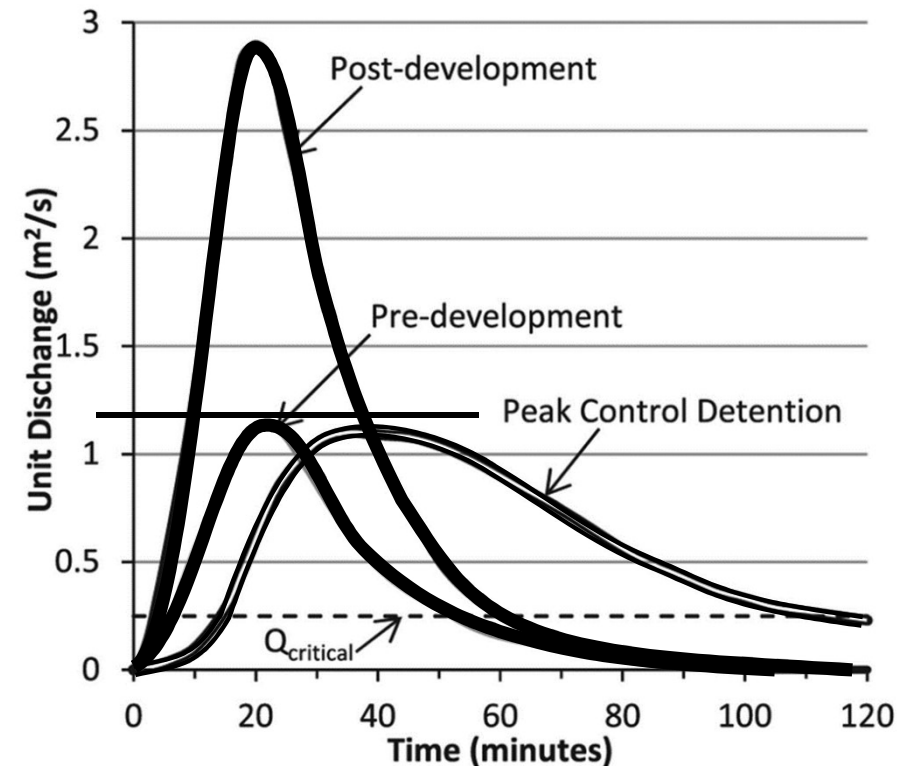




Design Standards – Level of Service (LOS)

23

- In open basins, storm systems are designed so that the rate of stormwater discharge leaving the site cannot exceed the rate of discharge from before the site was developed
- In closed basins, there is no positive outfall and therefore they are designed without a discharge





Design Standards

Comparison with Other Jurisdictions

- **Our consultant performed a review of the stormwater design standards from the following surrounding jurisdictions:**
 - St. Johns River Water Management District (SJRWMD)
 - South Florida Water Management District (SFWMD)
 - Seminole County
 - Osceola County
 - Brevard County
 - Lake County
 - Polk County
- **Orange County’s 25-year and 100-year design storm level of service (LOS) are consistent with the comparable jurisdictions.**





Floodplain Development Standards

- **Floodplain Management - Chapter 19**
 - **Sec. 19-103. Safeguard the public health, safety, and general welfare and to minimize losses due to flooding**
 - **Sec. 19-104. Limitations on sites in regulatory floodway**
 - **Sec. 19-107. Compensatory Storage**
 - **Volume for volume (cup for cup) methodology**
 - **Excavated area must be contiguous**
 - **County may impose additional flood control measures to adequately protect upstream systems, downstream systems, or off-site properties**

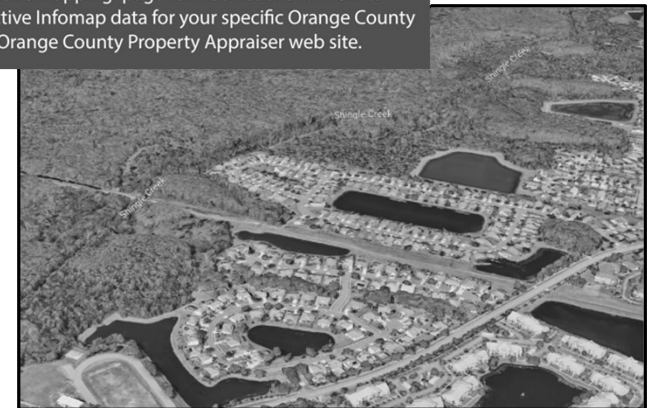


Orange County Flood Plain Map

Available for review online at

www.orangecountyfl.net

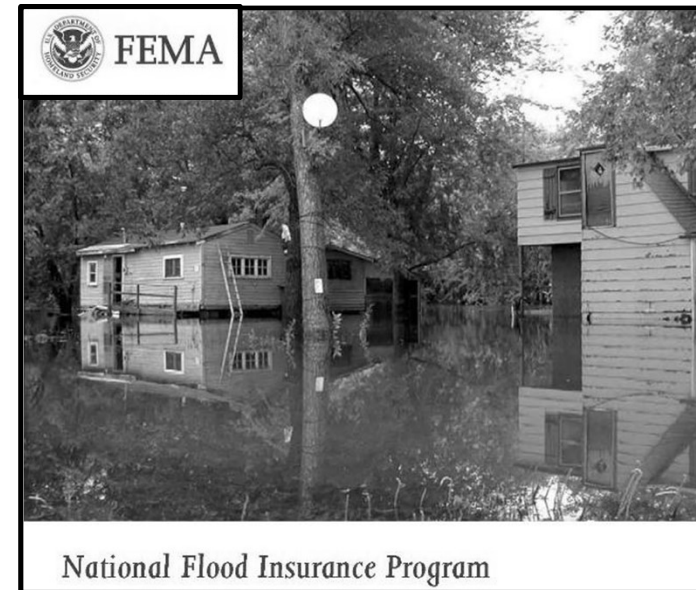
Visit the "Interactive Mapping" page for instructions on how to view the interactive Infomap data for your specific Orange County address or visit Orange County Property Appraiser web site.





FEMA Floodplain Background

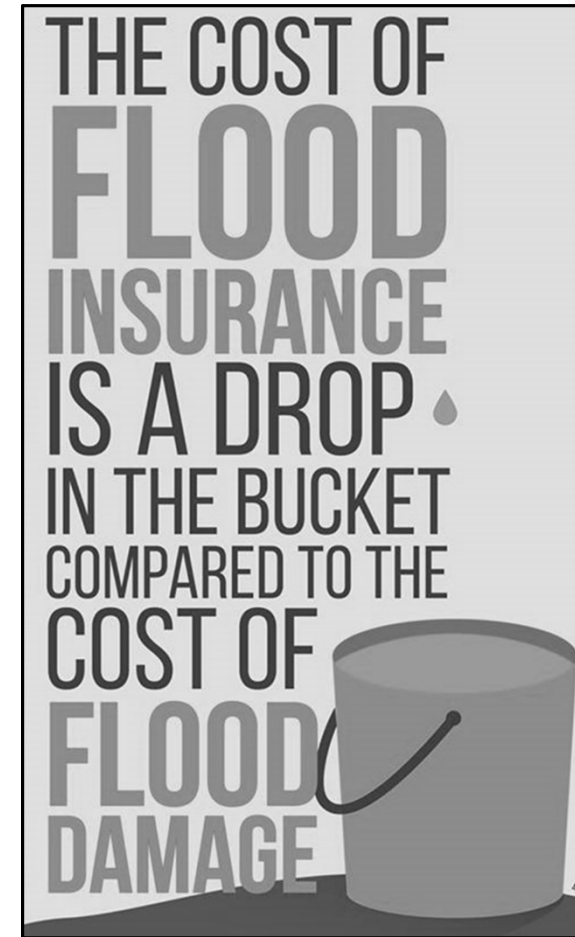
- **Orange County began participating in FEMA's National Flood Insurance Program (NFIP) in the early 1980's**
- **NFIP sets minimum requirements for community floodplain management practices**
- **Allows residents to purchase federally backed flood insurance (can purchase if outside of the floodplain)**





FEMA Floodplain Background

- **County participates in FEMA's Community Rating System (CRS) since early 1990's**
 - Voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the NFIP
 - Provides residents with flood insurance discounts (5 - 45%) based on Classes (10)
 - Classifications are based on the community's CRS credit points obtained in 19 creditable activities (Public Information, Mapping and Regulations, Flood Damage Reduction, Warning and Response)
- **Orange County has a CRS Class 5 rating, providing residents a 25% discount**





FEMA Floodplain Coordination

- A Citizen's Guide to Flood Protection – which covers the required subjects per FEMA's Community Rating System (CRS) program, is sent to 25,000 addresses in the floodplain yearly with the tax mailing (early November)

Are you prepared for a flood in your neighborhood?

You are receiving this because you are in or near an area subject to flooding

Floods can occur in Orange County at any time during the year. However, flooding most frequently occurs during the rainy season, which extends from June to October. Flooding of lakes and streams can result from heavy and prolonged rainfall, which causes their capacity to be exceeded. The flooding could be more severe from rainfall associated with hurricanes or tropical storms. Being prepared is your best defense against a flood.

Know Your Flood Hazard

Regulated floodplains are illustrated on inundation maps called Flood Insurance Rate Maps (FIRMs). It is the official map for a community in which FEMA has delineated both the Special Flood Hazard Areas (SFHAs) and the risk premium zones applicable to the community. SFHAs represent the areas subject to inundation by the 1-percent-annual chance flood event. Structures located within the SFHA have a 26 percent chance of flooding during the life of a standard 30-year mortgage. FEMA FIRM maps are available for free public viewing online at mnc.fema.gov/portal. You can also use Orange County's online Property Appraiser and/or lidapp services to see your property in relation to the existing 1 percent annual chance flood (100-year flood). You can also contact the Stormwater Management Division at 407-836-5611 where a technician will help determine whether or not your property is located within a floodplain. It is critical to note that properties located outside of the SFHA are not guaranteed to be safe from flooding.

Insure Your Property

Flooding is not covered by a standard homeowner's insurance policy. Flood insurance is available to homeowners, condo owners, commercial owners, and all renters. Renters are encouraged to purchase flood insurance for their contents. Homeowners can get up to \$500,000 of coverage and businesses up to \$500,000. Renters can obtain up to \$100,000 of coverage. Note that there is a 30-day waiting period before coverage goes into effect. That means now is the best time to buy flood insurance! Contact your preferred insurance agency for more information. Additional information can be found online at www.floodsmart.gov or by calling 1-888-379-9531. Elevation Certificates that have been submitted in the past are available for review. Copies of the Elevation Certificates can be obtained from the Stormwater Management Division or at the Orange County Administration Center- One Stop Permitting.

Protect Your Property

Various methods may be used to minimize flooding. If the lowest finished floor elevation of your property is lower than the base flood elevation (BFE) established by FEMA, consider elevating your structure. If a flood is imminent, protect your property by sandbagging areas vulnerable to the entry of water. Valuables and furniture may also be moved to higher areas of the dwelling to minimize damage. Orange County will provide technical assistance and one-on-one advice to interested property owners regarding flooding and drainage issues on private property. For more information, please contact the Stormwater Management Division at 407-836-5611.

Build Responsibly

A floodplain permit is issued by the Stormwater Management Division to those who want to build a structure or otherwise develop on a property located within a 100-year floodplain. The Orange County Floodplain Management Ordinance also states that if your structure is damaged or improved to an amount greater than or equal to 50 percent of the structure's market value, it will then have to comply with the current floodplain requirements. The County's ordinance requires that all new construction and substantially improved buildings be built to a finished floor elevation of at least 1 foot above the BFE. Before you build, fill, or otherwise develop in a floodplain, contact the Orange County Public Works Department at 407-836-7900 to discuss county requirements. Any development in a floodplain, without a permit, should be reported to the Orange County Building Department at 407-836-5550 or 311.

Protect Yourself And Your Family

- Orange County coordinates with the National Weather Service to issue public warnings concerning expected floods and storms. Local television and radio stations may announce weather advisories issued by the National Weather Service. These stations may also provide local weather information.
- Tune in to local radio stations such as 96.5 FM (WDBO) or 95.3 FM (WPYC) and local news channels such as News 15 or WTVT9.
- NOAA Weather Radio All Hazards (NWR) are available for purchase in local electronic retail or department stores and provide access to the NOAA Weather Radio System.
- If flooding threatens your home, turn off electricity at the main breaker. If you lose power, turn off all major appliances.
- Turn off the gas, and be alert for gas leaks. Use a flashlight to inspect for damage. Do not smoke or use candles, lanterns or open flames unless you know that the gas has been turned off and the area has been ventilated.
- Avoid low-lying areas. Seek shelter in the highest areas possible.
- Discuss your family emergency plan. Your family may not be together when disaster strikes, so it is important to know how you will contact one another, how you will get back together and what you will do in case of emergency.
- Never attempt to drive through flooded roadways. Floodwaters can conceal damage underneath. As little as two feet of running water can carry away most vehicles, including SUVs. Turn Around, Don't Drown!

Major storms that have affected the Orange County area include:

1960 DONNA

2004 CHARLEY

2004 FRANCES

2004 JEANNE

2017 IRMA

Not only do hurricanes create floods, but they also may cause erosion along the banks of rivers and streams.

Floodplain Benefits

Floodplains serve many useful purposes. Among them, floodplains store excess flood water and help to filter and discuss floodwaters. Without preservation of floodplains and floodplains, floodwaters would inundate developed areas. Floodplains that have been preserved in their natural or nearly natural state also provide wildlife habitats, enhancing the visual appeal of Orange County.

Orange County Flood Plain Map

Available for review online at www.orangecountyfl.net

Visit the interactive Mapping page for information on how to view the interactive information for your specific Orange County address or visit Orange County Property Appraiser web site.

HURRICANE CATEGORY CHART

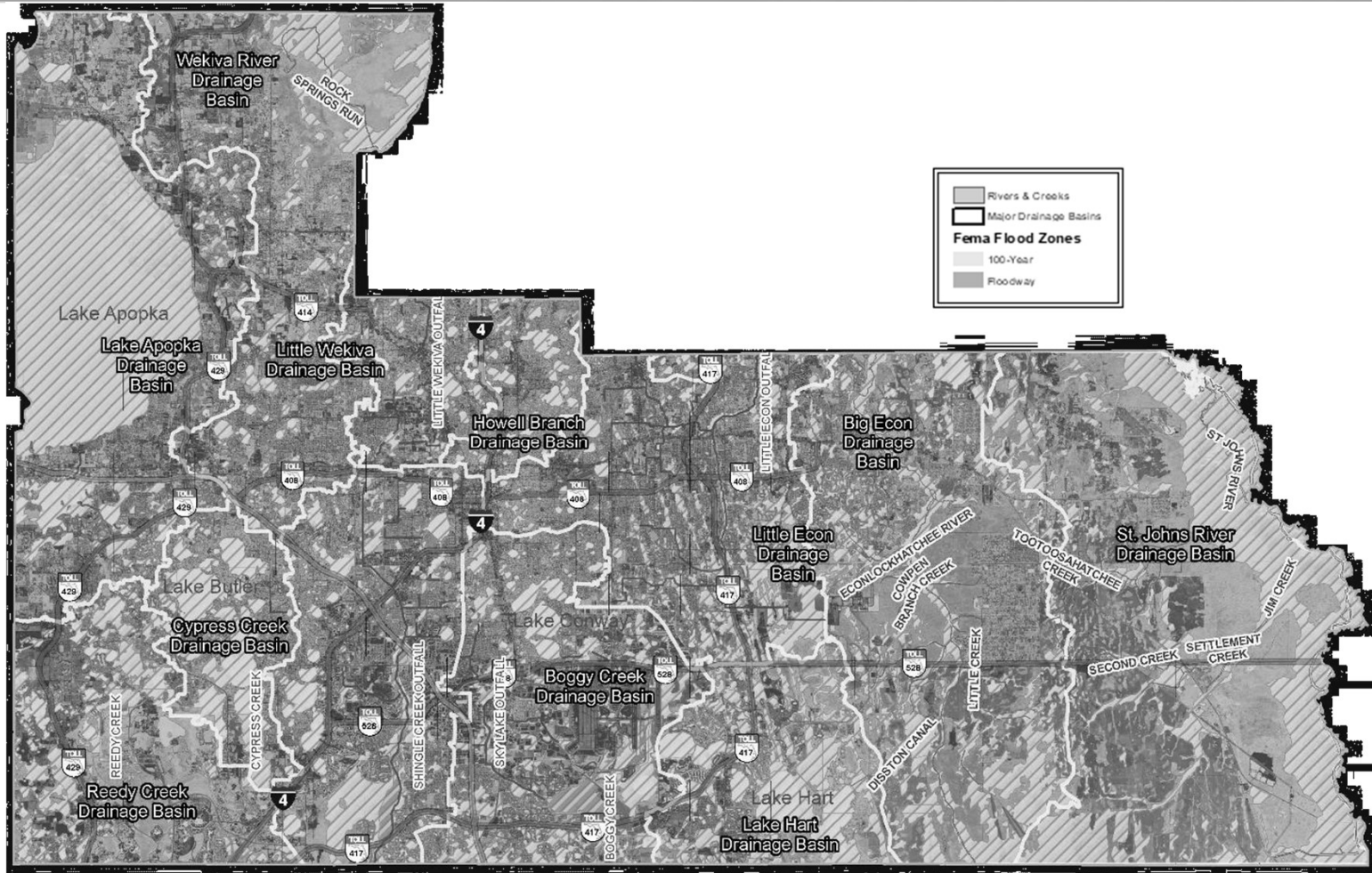
1	75-95 mph
2	96-110 mph
3	111-129 mph
4	130-156 mph
5	Over 157 mph

A Citizen's Guide to Flood Protection

Help Orange County become less vulnerable to floods. The NFIP is a Federal program enabling property owners in participating communities to purchase insurance protection against losses from flooding. **BE AWARE. BE PREPARED. BE SMART & STAY SAFE.**

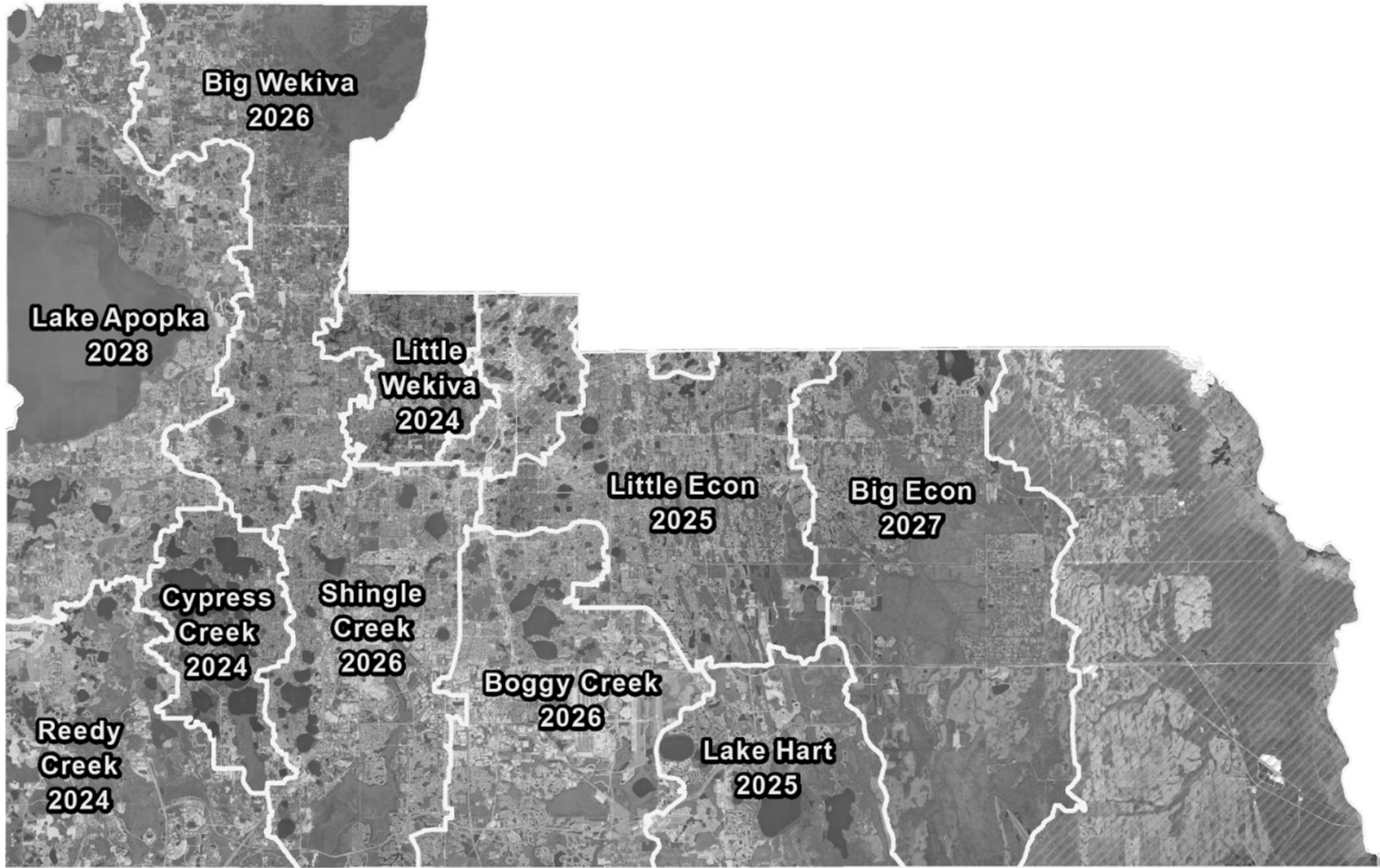


Floodplains - Rivers & Creeks





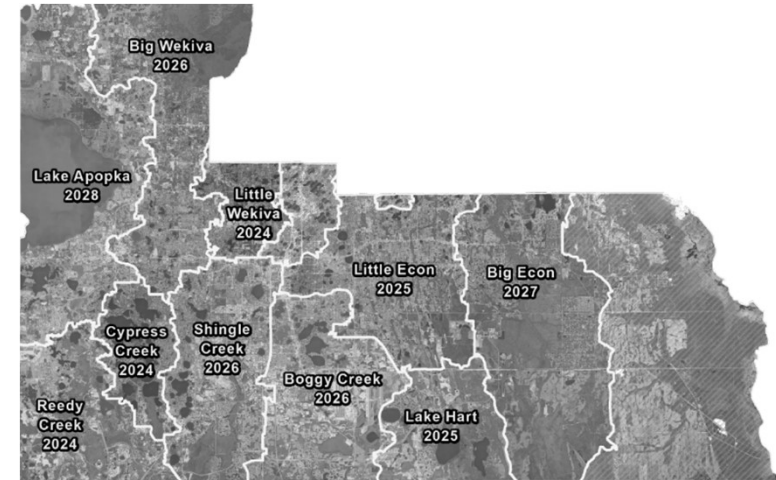
Stormwater Master Basin Studies





Stormwater Master Basin Studies

- In the late 1980's, the Stormwater Management Division initiated a program to study the major drainage basins of Orange County. Prior to this effort, only limited data was available
- A Stormwater Master Plan was prepared for ten of the twelve major drainage basins, and are now between 16 to 26 years old
- Recent development has dramatically altered the drainage patterns first documented
- Updates to the Master Plans were initiated in 2013 - to be completed by 2028





Maintenance and Inspections

- **Public Works maintains:**
 - 2,027 ponds (including 1,645 MSBU ponds)
 - 95 miles of primary canals
 - 85 miles of secondary canals/ditches
- **Staffing – Approximately 188 operational positions**
- **Approximately \$47M annual operating budget**
 - Transportation Trust Fund and MSBU funded
- **MSBU funding first implemented in 1979 pursuant to Admin. Reg 6.13.03. Used for subdivision retention areas that have drainage easements or have been dedicated in fee to the County.**





Maintenance and Inspections

- **Maintenance activities includes mowing, weed control, mosquito control, maintenance and repair of the structural integrity of control devices, and periodic major repairs and improvements to the retention pond**
 - Stormwater ponds are mowed monthly and are sprayed for aquatic vegetation every two months
 - Canals are mowed every four to six weeks and are sprayed for aquatic vegetation every three months
 - Dredging is done on an as needed basis
- **Helps to ensure that they are functioning as designed**





Maintenance and Inspections

- **In 2022, the Stormwater Management Division and their contractors:**
 - Mowed about 25,822 acres of county right-of-way/easements for ponds and primary canals
 - Trimmed or removed over 8,269 trees
 - Chemically sprayed about 683 miles of fences/curbs/edges, and about 3,267 acres of county right-of-way/easements for ponds and primary canals
 - Repaired over 14,459 linear feet of fencing along ponds and right-of-way
 - Processed 475 floodplain permits and reviewed 150 determinations and inquiries





Maintenance and Inspections

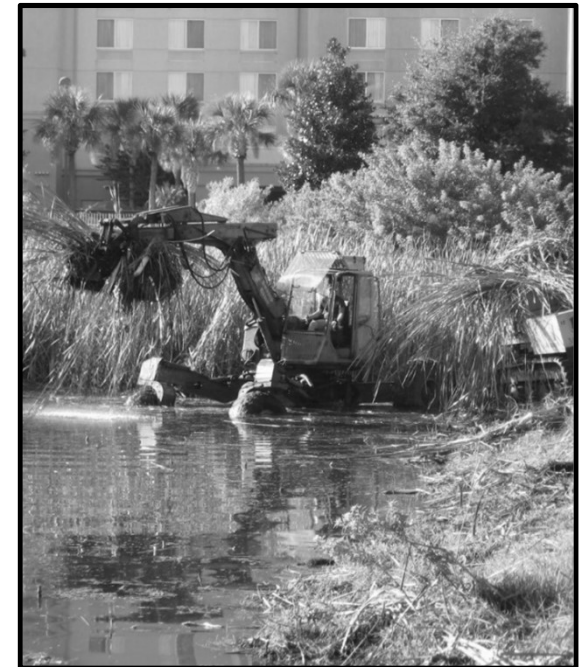
- **Orange County was issued a National Pollutant Discharge Elimination System (NPDES) by FDEP which requires a program to detect and eliminate illicit discharges and improper disposal into the MS4**
- **Permit Purpose and Goals:**
 - **Regulates the discharge of stormwater to surface waters**
 - **Restore and maintain the health of the surface waters**
 - **Establish goals and practices to meet pollution reduction targets**





Maintenance and Inspections

- **The County's NPDES Permit requires:**
 - **Develop and implement a Stormwater Management Plan for the County which includes:**
 - **Maintenance**
 - **Inspections**
 - **Monitoring**
 - **Training & Education**
 - **Reporting**
 - **Shared responsibilities between multiple Departments, administrated by EPD**





Maintenance and Inspections

- **Not all stormwater ponds and systems are owned or maintained by Orange County**
 - Approximately 8,000 privately-owned ponds (includes commercial properties and gated subdivisions)
 - These private systems can affect overall flooding and water quality in the County
- **Private property owners have the responsibility to maintain these systems**
 - Orange County Code requires submittal of an operations and maintenance schedule
 - Gated subdivisions required to retain a professional engineer to assess their stormwater management system every 3 years





Maintenance and Inspections

Private Stormwater System – Hunter's Creek





Maintenance and Inspections

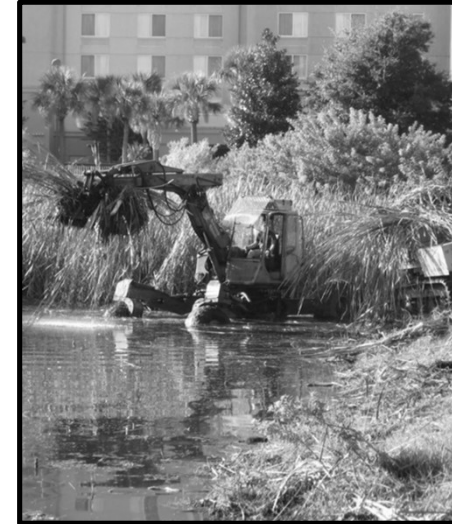
Private Stormwater System – Commercial Center





Maintenance and Inspections

- **The NPDES program currently has four (4) full-time inspection staff that perform the following duties:**
 - **Inspect private development and public infrastructure projects for NPDES permit compliance**
 - **Investigate complaints of illicit discharge**
 - **Inspect existing private stormwater infrastructure**
 - **Issue NPDES violations**
- **Due to the multiple duties of the NPDES inspectors, only about 100 of the total 8,000 private ponds will be inspected this fiscal year**
 - **About 50% of the private ponds inspected are out of compliance, with half of the compliance issues being minor**





Maintenance and Inspections





Capital Improvement Program

- **The County's Capital Improvement Program (CIP) incorporates Stormwater Management, Roads & Drainage, and Environmental Protection Divisions**
 - Focuses on flood protection and water quality improvements
 - Projects replace or improve older drainage systems to increase efficiency, reduce the risk of flooding, and improve water quality
- **The County's annual CIP budget comprises:**
 - Stormwater Management: \$5.75 Million
 - Roads & Drainage: \$6.0 Million
 - EPD: \$1.5 – \$3.0 Million





Capital Improvement Program – Public Works

▪ Recently completed Capital Improvement Projects:

- Stormwater Management Division
 - Little Wekiva River Restoration at Edgewater Drive
 - B-14 Boggy Creek Pipeline – Segment A
 - Bonnie Brooke Pump Station Improvements
 - Summer Woods Pond (Pond 6621 & 6604)
 - Full Sail Pond Weir Improvements (Pond #6612)
- Roads & Drainage Division
 - Washington Avenue and Oak Park Rd (Windermere Heights) Drainage Improvements
 - 2nd Street and Boyce Street (Avenue “C” canal) drainage improvements





Capital Improvement Program - EPD

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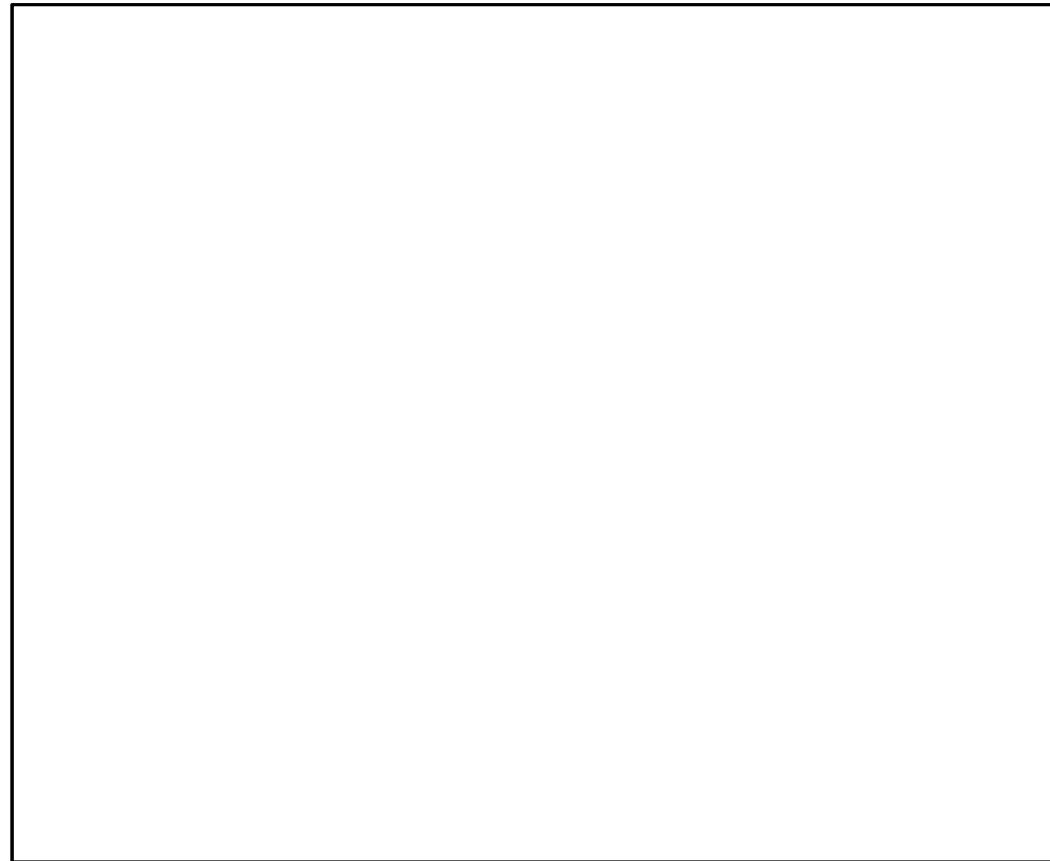
- **EPD CIP: \$1.5 - \$3M annually, 8-10 new projects/yr**
- **Collaboration between PW and EPD:**
 - Water quality and quantity projects addressed simultaneously
 - Advantages of reduced mobilization and disruption to residents
- **Example Project: Lake Christie Baffle Box**
 - Incorporated into existing infrastructure
 - Designed to reduce nutrients
- **Grant funding often available for water quality projects**
 - Federal, FDEP, legislative appropriations





Orlo Vista Flood Mitigation Project

- **Orlo Vista neighborhood**
 - Homes built in 1950s and 1960s
 - Many homes within floodplain
- **Community subject to repeated flooding:**
 - Hurricane Donna (1960)
 - Hurricane Irma (2017)
 - Hurricane Ian (2022)
- **With Hurricane Ian, 148 homes flooded despite early pumping to Shingle Creek**



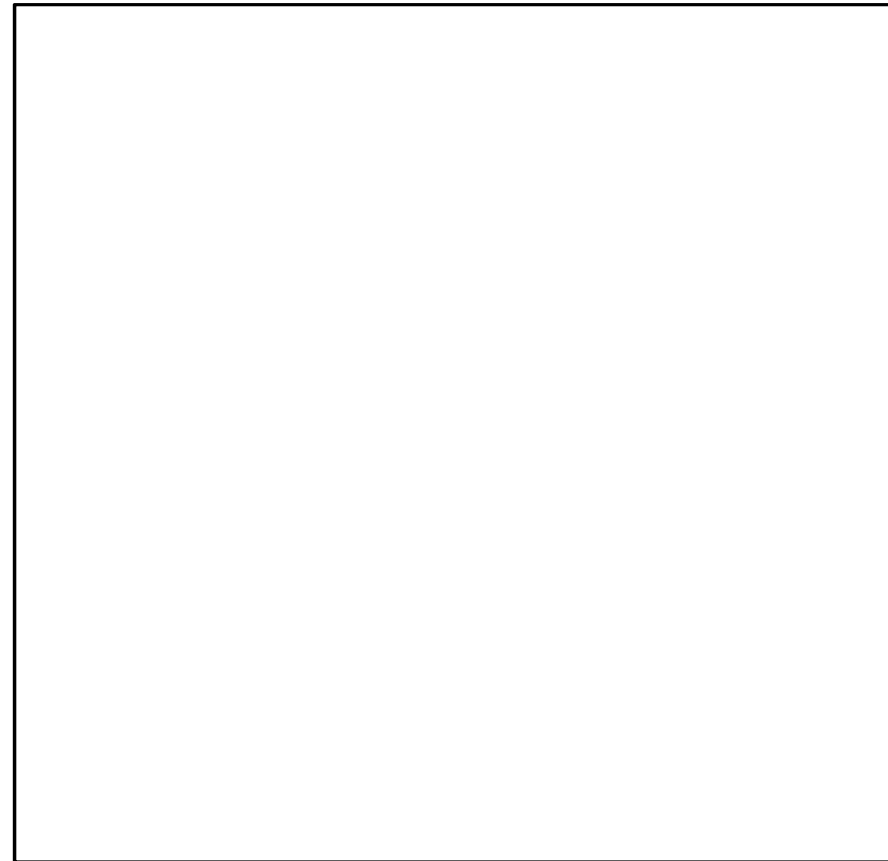


Orlo Vista Flood Mitigation Project

■ Flood Mitigation Project

- Scope: Excavation and slope armoring of existing stormwater ponds, installation of new pump station with force main to Shingle Creek, lowering/installation of piped pond connections to help convey water to the new pump station, and decommission existing pump station
- Construction Cost: \$23.2 Million
- Funding sources: Hazard Mitigation Grant Program (\$17.4 Million), Community Development Block Grant (\$2.5 Million), Orange County (\$3.3 Million)

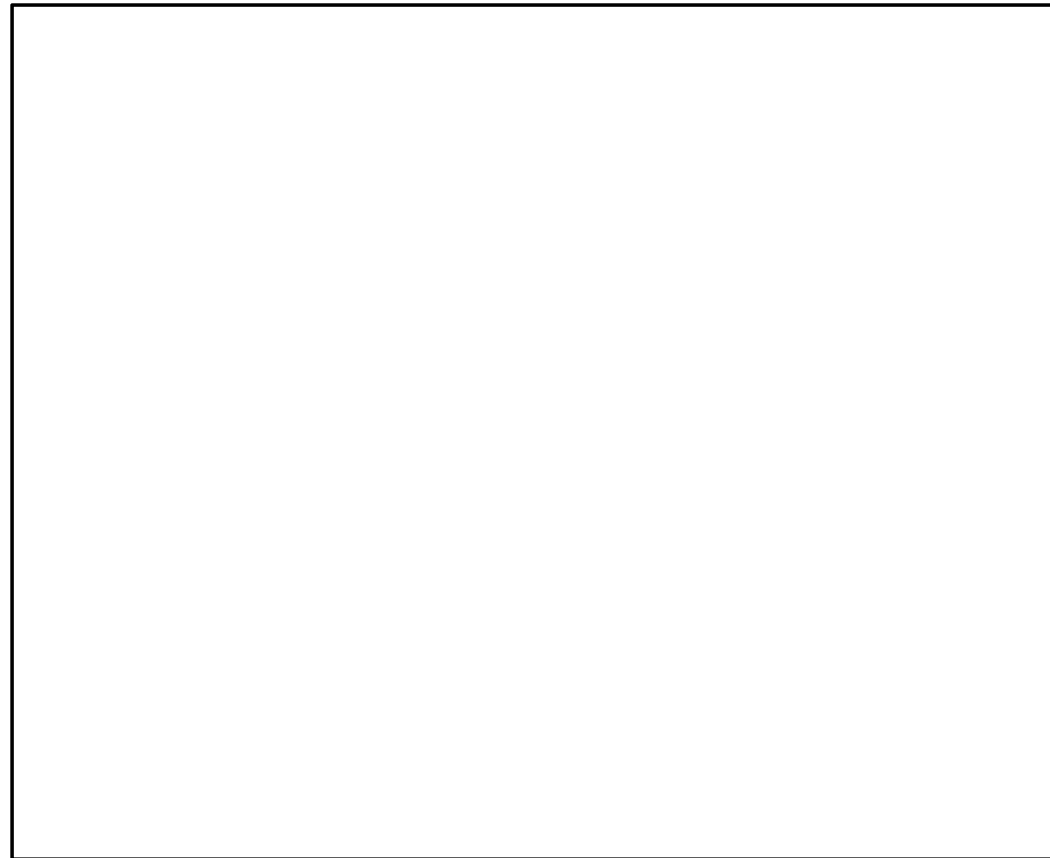
- Project is significantly more expensive than Stormwater's annual CIP budget





Orlo Vista Flood Mitigation Project

- **Mitigation project designed to provide a higher level of flood protection to existing residential structures (100yr/72hr)**
- **No downstream impacts**
- **Start Date: March 13, 2023**
- **Completion date (anticipated): June 2024**





Orlo Vista Flood Mitigation Project





Presentation Outline

- **Purpose**
- **Key Terms**
- **Review of 2022 Flooding Events**
- **Existing Stormwater-related Programs**
 - Design Standards
 - Basin Studies
 - Maintenance and Inspections
 - Capital Improvement Program
- **Looking Ahead to Session 2**
- **Summary**





Looking Ahead to Session 2

■ Presentation Outline

– Purpose

– Recap of May 2, 2023 presentation

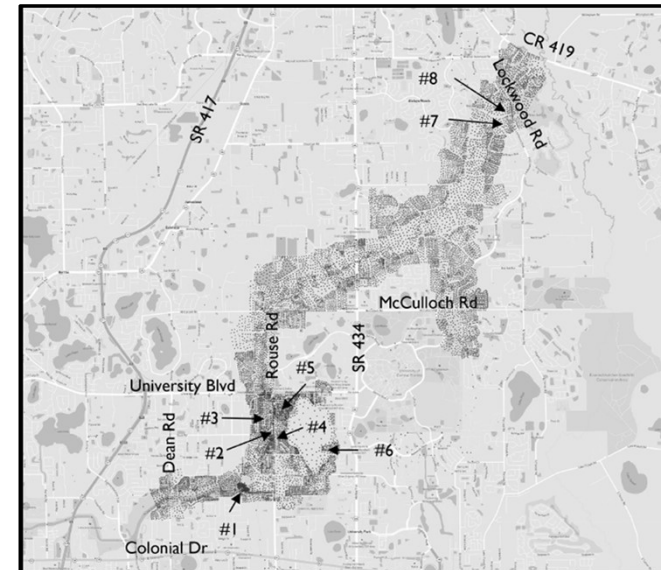
– Summary of March 14, 2023 Innovation Lab Workshop

– Stormwater Program Focus

- Climate Change / Changes in Rainfall Intensity
- Master Basin Studies - Proposed Updates & Changes
- SORAP Collaboration
- Innovative Ideas
- Funding Needs

– Recommendations and Next Steps

– Summary



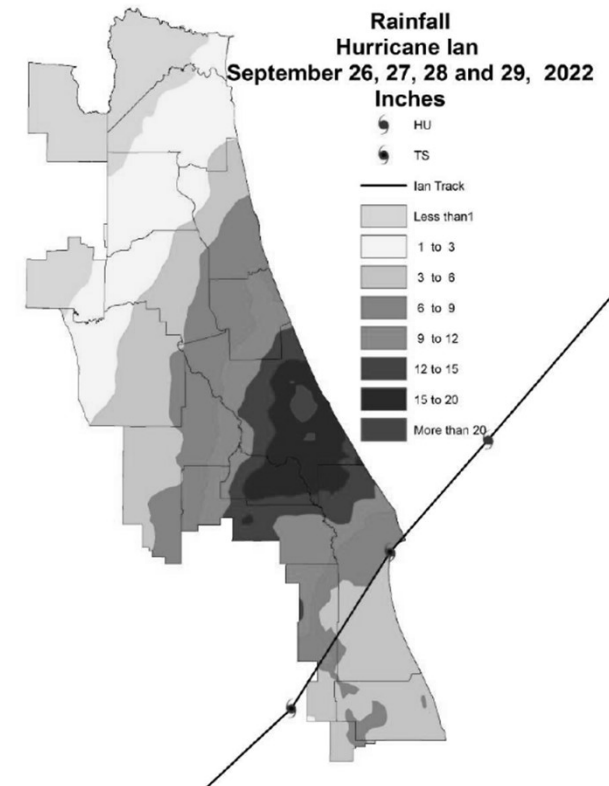


Looking Ahead to Session 2

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Climate Change / Changes in Rainfall Intensity

- How will climate change affect the rainfall intensity/frequency of storms in the future?
- Are our standard design storm intensities still accurate for future conditions?
- Are we able to still meet our stormwater level of service criteria in the future using the existing data?



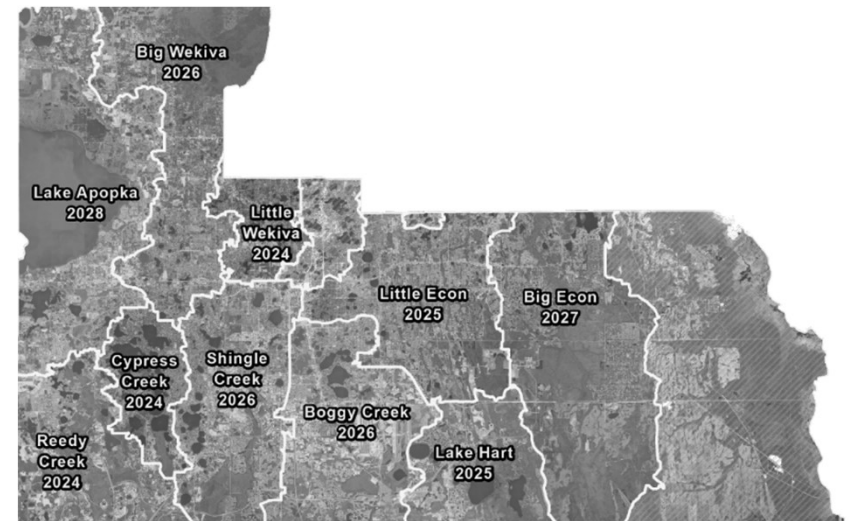


Looking Ahead to Session 2

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Master Basin Studies - Proposed Updates & Changes

- How will changes in rainfall intensity and frequency affect the basin studies and recommendations?
- How will this updated rainfall data change the 100-year floodplain maps?
- How can we implement projects that improve both flood mitigation and water quality?
- How will these changes affect the funding needed for capital projects?

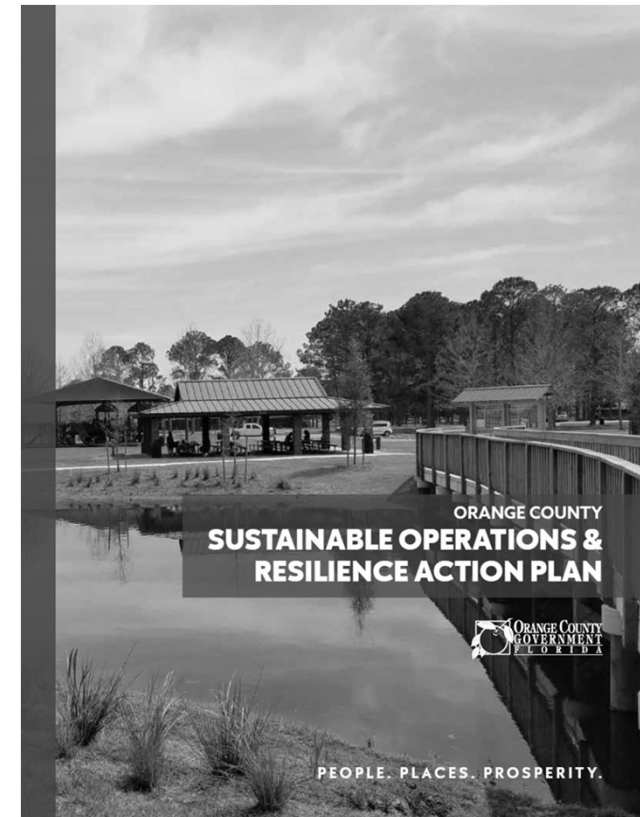




Looking Ahead to Session 2

SORAP Collaboration

- What recommendations will impact stormwater from the countywide vulnerability assessment (funded by the Resilience Florida grant program)?
- How can we address the stormwater needs that result from the vulnerability assessment?
- How can we implement Low Impact Design (LID) strategies in the future for new projects and to retrofit existing systems?
- How can we utilize FEMA funding or other grants to become more resilient?





Looking Ahead to Session 2

54

Innovative Ideas

- **Development of predictive stormwater models to help to better prepare for future storm events**
- **Partnerships with the Utilities Department on Integrated Water Resources Projects**
- **Studies of the impacts of wetland loss on flood risk and water quality**
- **Improvements to the inspection and compliance of private stormwater systems**





Looking Ahead to Session 2

Funding Needs

- The updated master basin studies will likely result in a significant amount of recommended capital needs
 - Current capital funding for stormwater capital projects is very limited
 - Stormwater Utility Ordinance 96-20 located in Chapter 15 Article XII, was adopted on July 23, 1996. The rate was set at \$0.00.
- How could a Stormwater Utility Fee be implemented, and what could it be used for?
- What are other potential sources of funding?





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Summary

- **Stormwater systems are an important part of our SORAP**
- **2022 Flooding was due to historic rainfall well beyond traditional design storm**
- **Most homes that flooded were older or built in or near the floodplain**
- **County's current design standards are in line with other jurisdictions**
- **Current maintenance operations are extensive**
- **Limited budget capacity for major capital projects**
- **Session 2 will explore future of County's program**

