



CITY OF
ST AUGUSTINE
EST. 1565

Old City South Neighborhood Association

“Stormwater and Resiliency Program Update”

March 18, 2021

Jessica L. Beach, P.E.
Chief Resilience Officer





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Presentation Outline

- ❖ Background and Overview of the Stormwater Program
- ❖ Resiliency Planning
- ❖ Understanding Flooding and Flood Risks
- ❖ Project Implementation



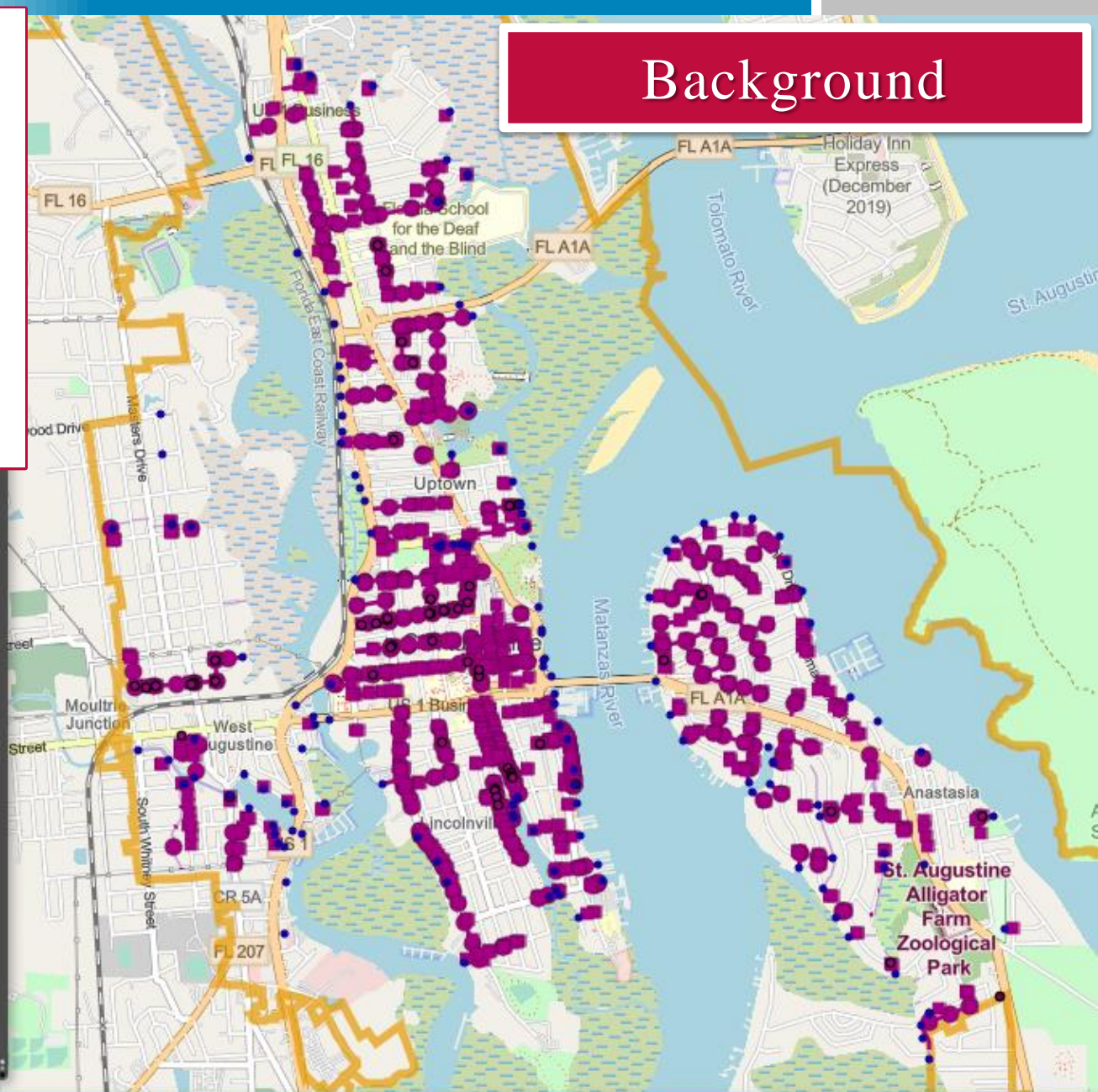
Stormwater Infrastructure:

163 Outfalls Tidally Influenced (not including FDOT)

- 949 Storm Inlets
- 20 miles of pipe

Background

- ✓ PublicWorks - swDischargePoint
- ✓ PublicWorks - swCulvert
- ✓ PublicWorks - swFitting
- ✓ PublicWorks - swInlet
- ✓ PublicWorks - swGravityMain
- ✓ PublicWorks - swManhole





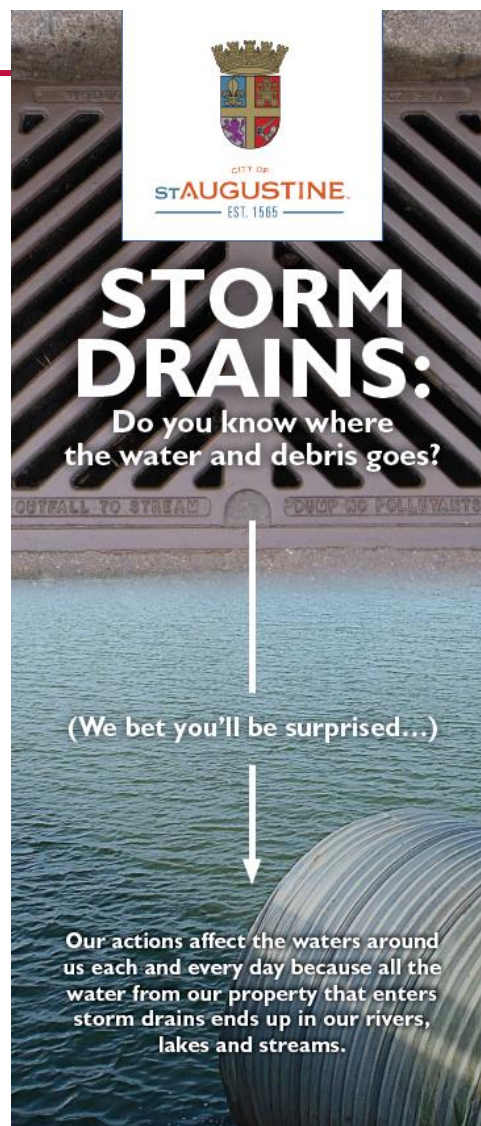
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Stormwater Infrastructure:

- Regulated by the Florida Department of Environmental Protection (FDEP)
- City operates and maintains a “Phase 2, MS4 NPDES” permit from FDEP
- Governs the stormwater program
 - Education and Outreach
 - Public Involvement and Participation
 - Illicit Discharge Detection/Elimination
 - Construction Site Stormwater Runoff Control
 - Pollution Prevention/Good Housekeeping

<https://www.citystaug.com/431/Stormwater>

Background



Here are tips on how to keep our storm drains and community clean:



- Wash vehicles at the carwash, not on a street or driveway.

- Use fertilizer sparingly

- Set sprinklers to water lawn and garden areas only, not pavement to prevent loss and erosion.



- Pick up pet waste and dispose of properly.

- Keep trash out of storm drains, if you see it, pick it up.



- Dispose of yard debris and grass properly. Sweep into piles for collection. Do not hose them down the drain.

- Direct downspouts and rain gutters away from paved surfaces.



- Recycle Motor Oil, antifreeze and other fluids.

REPORT ANY ILLEGAL DISCHARGE OR SPILLS.
Call the City of St. Augustine at 904-825-1040.

www.citystaug.com

**ONLY RAIN
DOWN THE DRAIN...**



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Stormwater Infrastructure -

Operation and Maintenance:

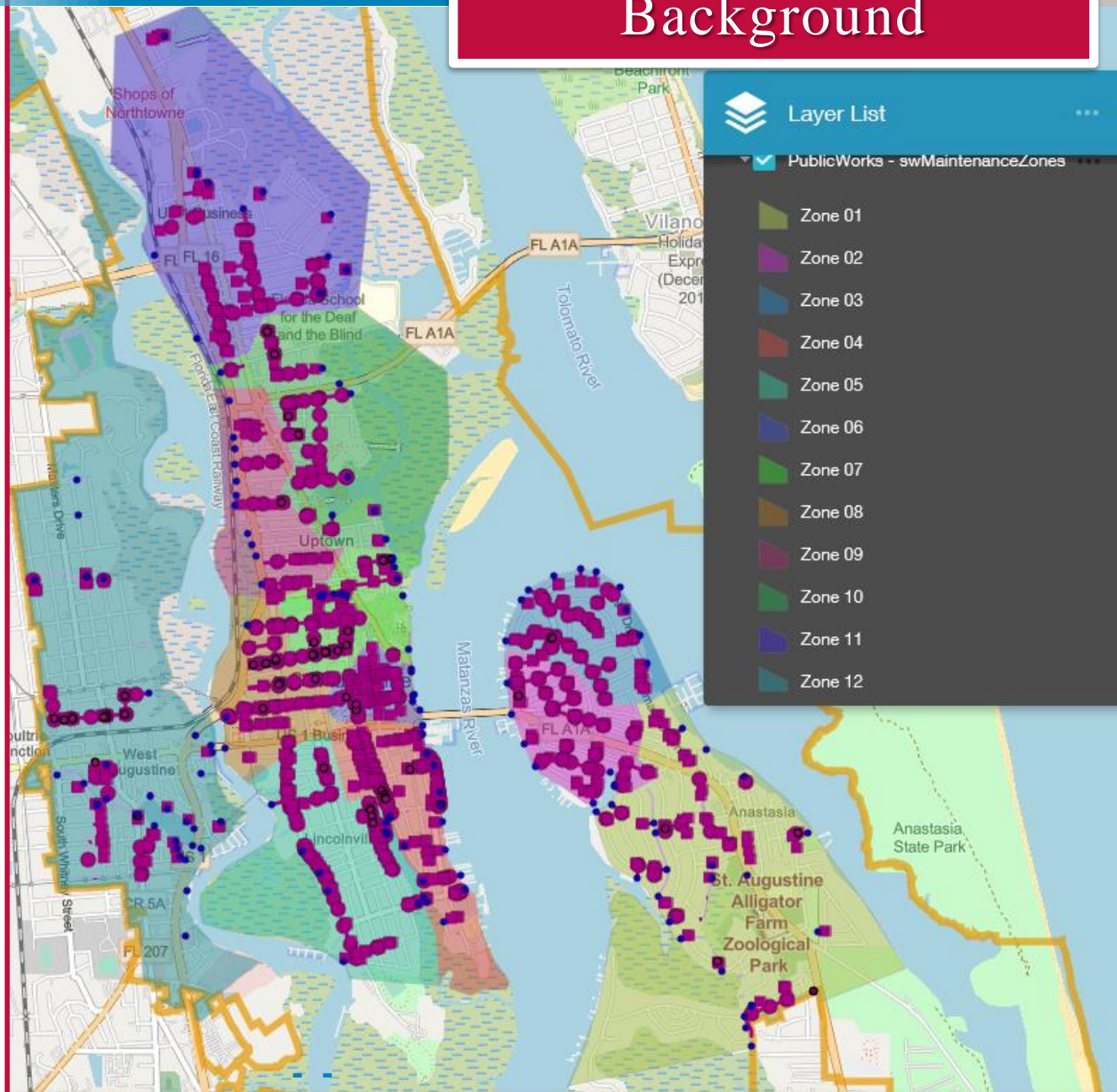
ST. AUGUSTINE

- 12 zones
- All infrastructure inspected at least once each year
- Increased frequency during Hurricane Season (pre and post storm cleaning)
- Vacuum truck to remove sediment and debris
- Street sweeping
- Inspections of tide check valves
- 4 dedicated crew
- Report flooding or service requests at:

Public Works (904) 825-1040
stormwater@citystaug.com

<https://www.citystaug.com/431/Stormwater>

Background



Public Works Infrastructure

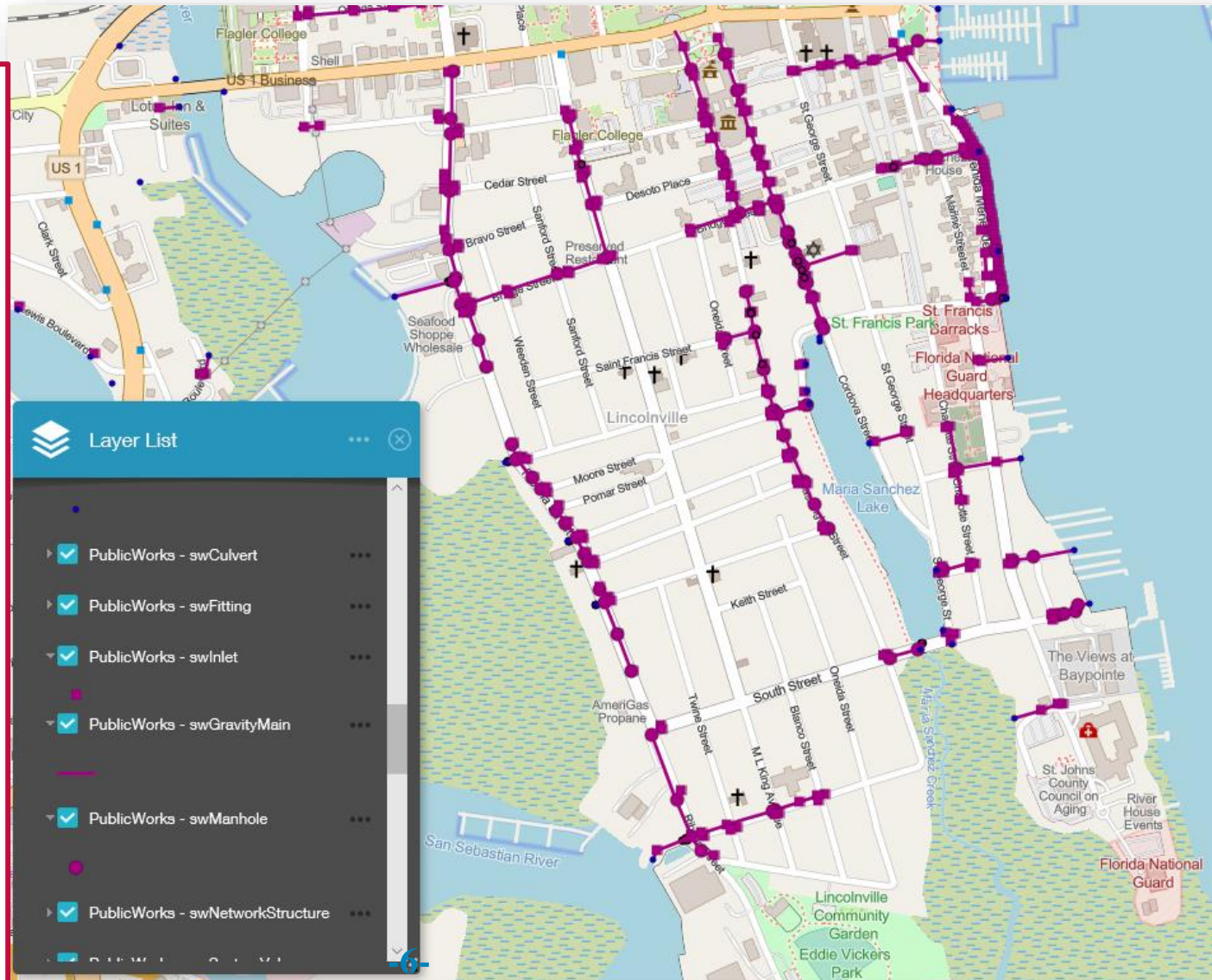


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Stormwater Infrastructure: OCSNA Area

- 8 - Sediment Collection Vaults along Riberia & Avenida Menendez (water quality benefit)
- Tide check valves
- Storm inlets, pipes and outfalls

Background



City of St. Augustine - Public Works Infrastructure



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Background



Installation During Construction



After Construction

Sediment Collection Vaults (8 Total) along Riberia Street and
Avenida Menendez
(Provides water quality benefit)



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Background



Operation and Maintenance of Vaults:

- Vacuum Truck used to remove sediment build up in the Vault Boxes
- Filters removed and cleaned . .
- Each vault is serviced at least once per year



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Background



Current City Challenges (stormwater):

- Aging infrastructure
- Undersized collection system
- Low-lying and coastal location (within a flood zone)
- Highly developed (high impervious area)
- **Subject to flooding – both from rainfall and tidal influence**





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Planning Efforts

➤ Stormwater Master Plan Update – February 2013

- ❑ Developed Watershed Models to Evaluate Options
- ❑ Defined Level of Service
- ❑ Stormwater Utility Evaluation and Recommendations
- ❑ Updated Stormwater Utility Fee (effective March, 2014) – New fee structure based on actual impervious area; Discount for permitted stormwater treatment facilities
- ❑ 3 Pilot Projects Featured:
 - ✓ Lake Maria Sanchez Stormwater Management
 - ✓ South Dixie Highway
 - ✓ Sidney Street (completed 2016)

STORMWATER MASTER PLAN UPDATE
PHASE 1

FINAL REPORT

STORMWATER UTILITY FEE UPDATE

NEW STORMWATER RATES ON UTILITY BILLS

Stormwater rates will be changing starting on your April 2014 utility bill. Some rates will be lower, some higher, depending on the size of your home or developed property. Residential customers will pay a flat rate, while non-residential rates are computed based on developed, impervious area.

Small home (35,000 sq-ft or less)	\$3.66/month
Single home (35,000 sq-ft to 45,000 sq-ft)	\$7.00/month
Large home (45,000 sq-ft to 60,000 sq-ft)	\$10.20/month
Multi-family unit (condo or townhouse)	\$2.66/month
Mobile home	\$1.91/month
Non-residential customers	\$7.00/1,000 sq-ft/month

Why does the city need a stormwater fee? The fee goes to cover the cost of maintaining and improving the City's stormwater collection and treatment system.

What is an impervious area?

Impervious is any surface that does not allow for infiltration of rainwater to occur and includes roofs, driveways, patios, sidewalks, and other paved areas. In St. Augustine a single family unit (SFU) is defined as 7,500 square feet and it is the basis for assessing non-residential rates.



NON-RESIDENTIAL RATE EXAMPLE

$$\begin{aligned} &9,000 \text{ sq-ft} + 10,000 \text{ sq-ft} \\ &2,752 \text{ sq-ft} = 6.90 \text{ SFUs} \\ &6.90 \text{ SFUs} \times \$7.00/\text{month} = \$48.32/\text{month} \end{aligned}$$



MARCH 2014



Our Mission

The Department of Public Works is responsible for operating and maintaining our stormwater infrastructure to meet the criteria of the permit administered by the Florida Department of Environmental Protection. Your fees pay for repairs of roadway drainage, new projects, maintenance, and administration of the program.



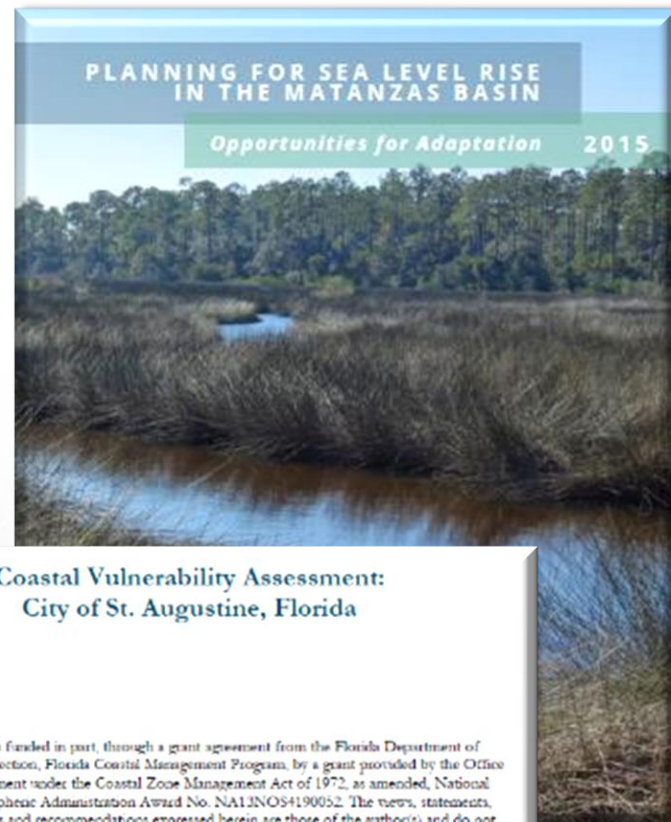
For more information on stormwater and other water resource services, please visit www.StAugSW.com or contact us at 904-825-1049.



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Planning Efforts

- **Planning for Sea Level Rise in the Matanzas Basin (2015)¹**
- **Community Resilience Initiative – Pilot Project (2016 – 2017)**
 - ❑ Coastal Vulnerability Assessment ²
 - ❑ Strategic Adaptation Plan ³



Coastal Vulnerability Assessment: City of St. Augustine, Florida

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June 24, 2016

Florida Community Resiliency Initiative Pilot Project

Adaptation Plan
for St. Augustine, Florida

May 2017



UF UNIVERSITY of
FLORIDA



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RESEARCH RESERVE SYSTEM
SCIENCE COLLABORATIVE



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Planning Efforts



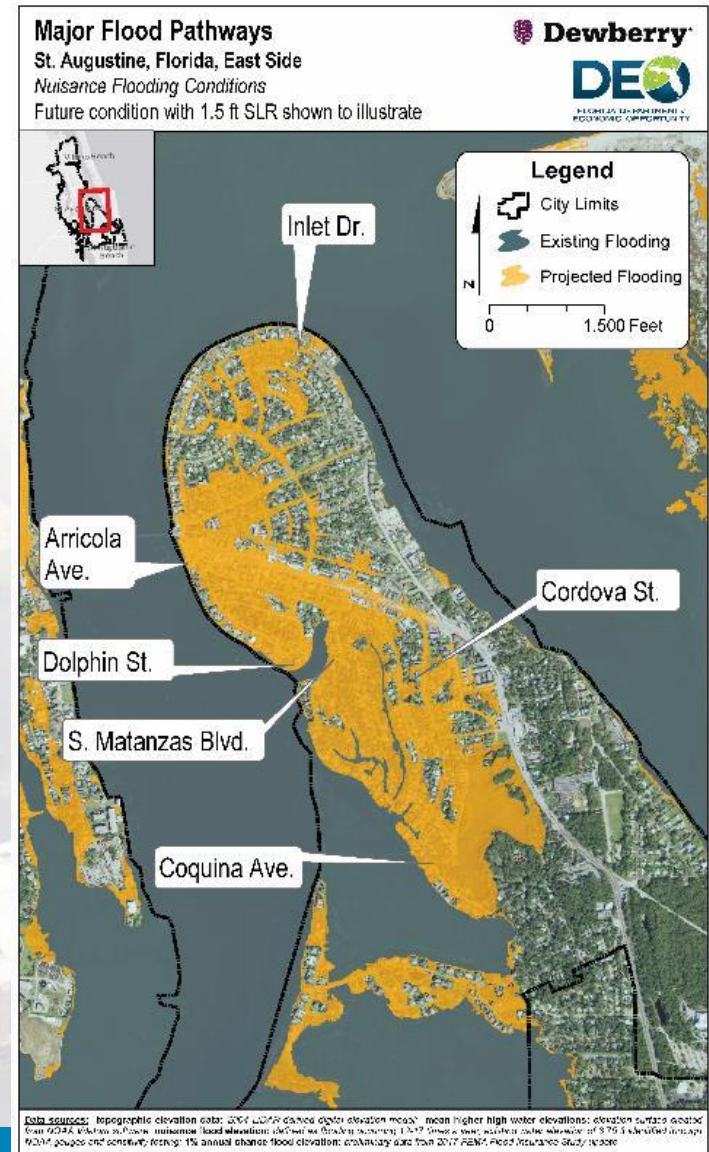
Coastal Vulnerability Assessment

- Evaluated total area flooded, roads, bridges, buildings, 2,550 historic and archeological resources, water and wastewater plants, groundwater supply
- **3 Scenarios:**
 - Mean Higher High Water – daily inundation about 2' NAVD88
 - Nuisance Flooding – 12-17 times per year, 3.75' NAVD88
 - 1% annual chance flood event – 26% chance in 30 years, 6-10' NAVD88

Planning Efforts

Strategic Adaptation Plan:

- ✓ Educate the public about SLR & policy responses
- ✓ Develop baseline budgets
- ✓ Adopt policies that limit spending in areas where retreat or re-design are more effective
- ✓ Base decisions on FEMA's updated FIRMs
- ✓ Install LID/Green infrastructure
- ✓ ***Targeted upgrades to City's stormwater system***
- ✓ WWTP options
- ✓ FDOT roadway improvements for resiliency
- ✓ Historic Preservation Comprehensive Plan





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Understanding Flooding and Flood Risk

September 2020 Flooding Events

"King Tides"



Nor'easter
> 20 mph (3 days)
10-15 mph (1 day)



Rainfall
2-3
inches



Multiple
Flood
Advisories
Issued



= CITY WIDE FLOODING



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Understanding Flooding and Flood Risk

❖ Rainfall Driven Flood Event

❖ Sunday, 9-27-2020

- ❑ Flood warnings were issued for St. Johns County and St. Augustine
 - ❑ Citywide Flooding
 - ❑ **3.61 inches in 1 ½ hours > 100-year storm event**
 - ❑ Total of 5.12 inches in 4 hours > 100-year storm event
 - ❑ City design standard:
 - 10-year, 1-hour = 3.1 inches
- ❖ Riberia Street design = 25-year, 24-hour storm event (≈ 2.7 inches in 1 ½ hours) design was exceeded - road was flooded





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Understanding Flooding and Flood Risk



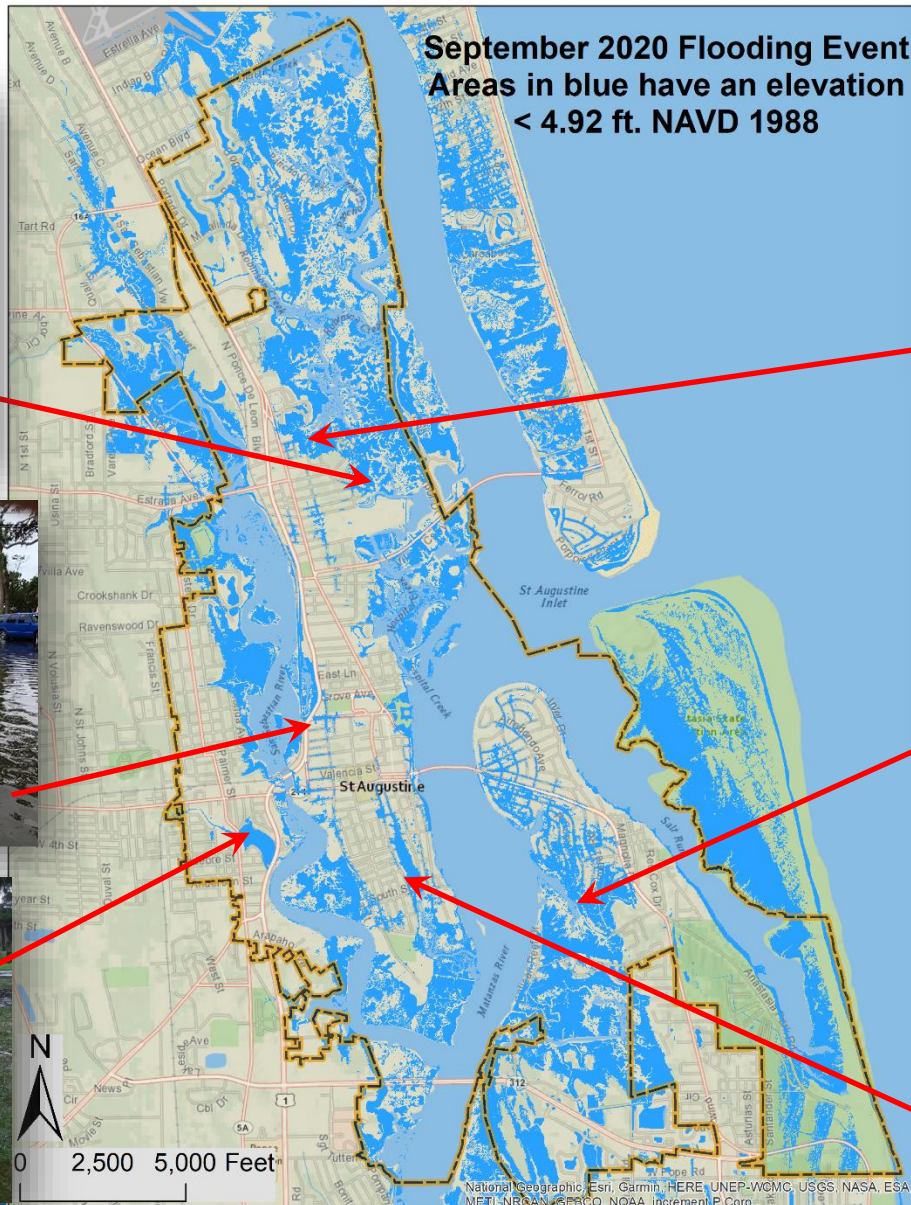
E Park Ave



Orange St & Riberia St



Lewis Blvd



Court Theophelia



Coquina Avenue



Washington St



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Understanding Flooding and Flood Risk



- ❖ Washington Street – Flooding photos from September event

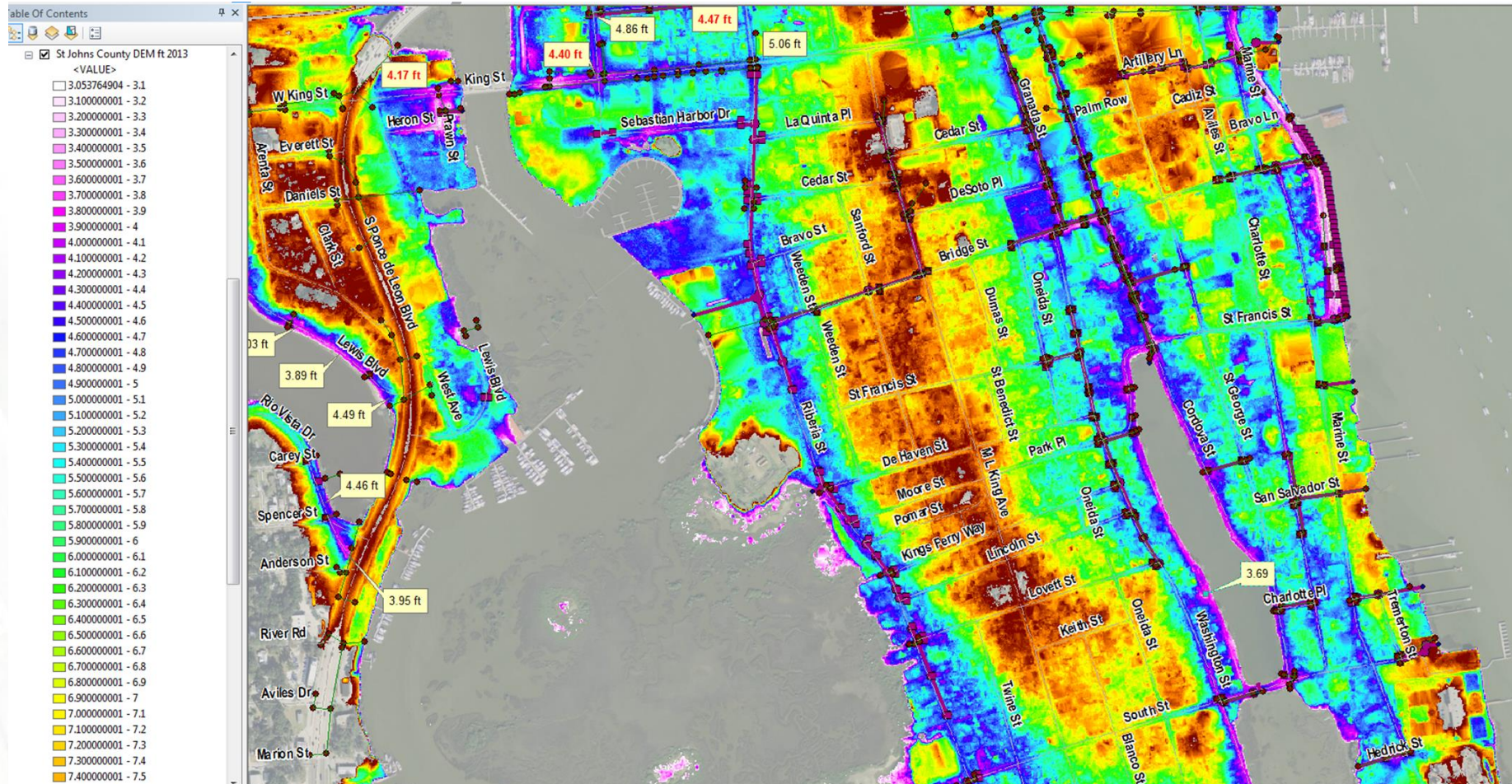


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Understanding Flooding and Flood Risk

❖ Lake Maria Sanchez and Surrounding Area – Digital Elevation Map (DEM)





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Understanding Flooding and Flood Risk

- ❑ Base Flood Elevation (BFE) – Flood Insurance Rate Maps (FIRM)
- ❑ Know your finish floor elevation (FFE)
- ❑ St. Johns County Flood Viewer to search for any properties and determine which flood zone they are located in. You can access the link here:
<https://www.gis.sjcfl.us/floodviewer/>
- ❑ Northeast Florida Regional Council's Regional Resilience Exposure Tool (R2ET). Resource for citizens, businesses and government to engage the community in discussions on sea level rise and emergency preparedness to build a more resilient future:
<http://buildcommunityresilience.com/northeastflorida/>
- ❑ There is also a flood factor tool to find your home's flood factor such as past floods, current risks, and future projects: <https://floodfactor.com/>



Understanding Flooding and Flood Risk

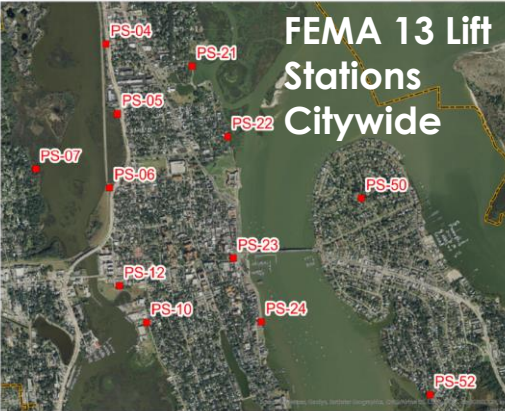
- ❑ Private and public participation
- ❑ City is offering individual flood mitigation site visits:
 - Email Stormwater@citystaug.com or jbeach@citystaug.com or call 825-1040 to request a site visit
- ❑ Flood mitigation tools available to private property owners – see also www.FloodFactor.com and www.FloodProofing.com for more information:
 - Flood barriers, walls, door dams etc.
 - Flood proofing your home
 - Elevating structures where possible, Flood Mitigation Assistance (FMA) program for potential funding through FEMA
- ❑ Policy – Building Code Task Force Committee –
 1. Protecting older homes from the flooding impacts of new homes that are required to be constructed at higher elevations
 2. Provide incentives for property owners to use building techniques which do not require land filling for new home construction
 3. Limit the amount of impervious surface that is allowed on residential lots. There is currently no limit to the amount of paving a homeowner can do on their property



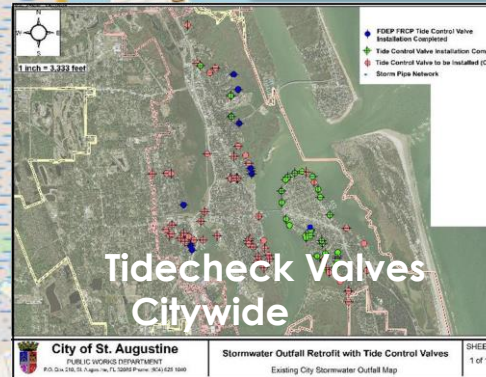
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Project Implementation

FEMA 13 Lift Stations Citywide



Tidecheck Valves Citywide



Avenida Menendez Seawall



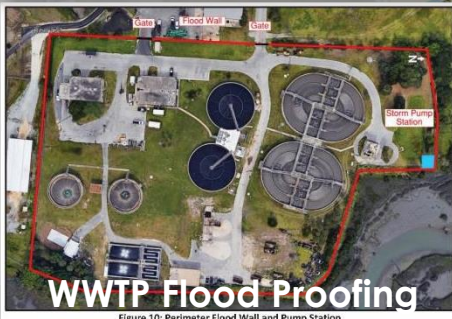
Lake Maria Sanchez



Lincolnville Drainage Improvements



WWTP Flood Proofing





Lake Maria Sanchez Flood Mitigation and Drainage Improvement Project

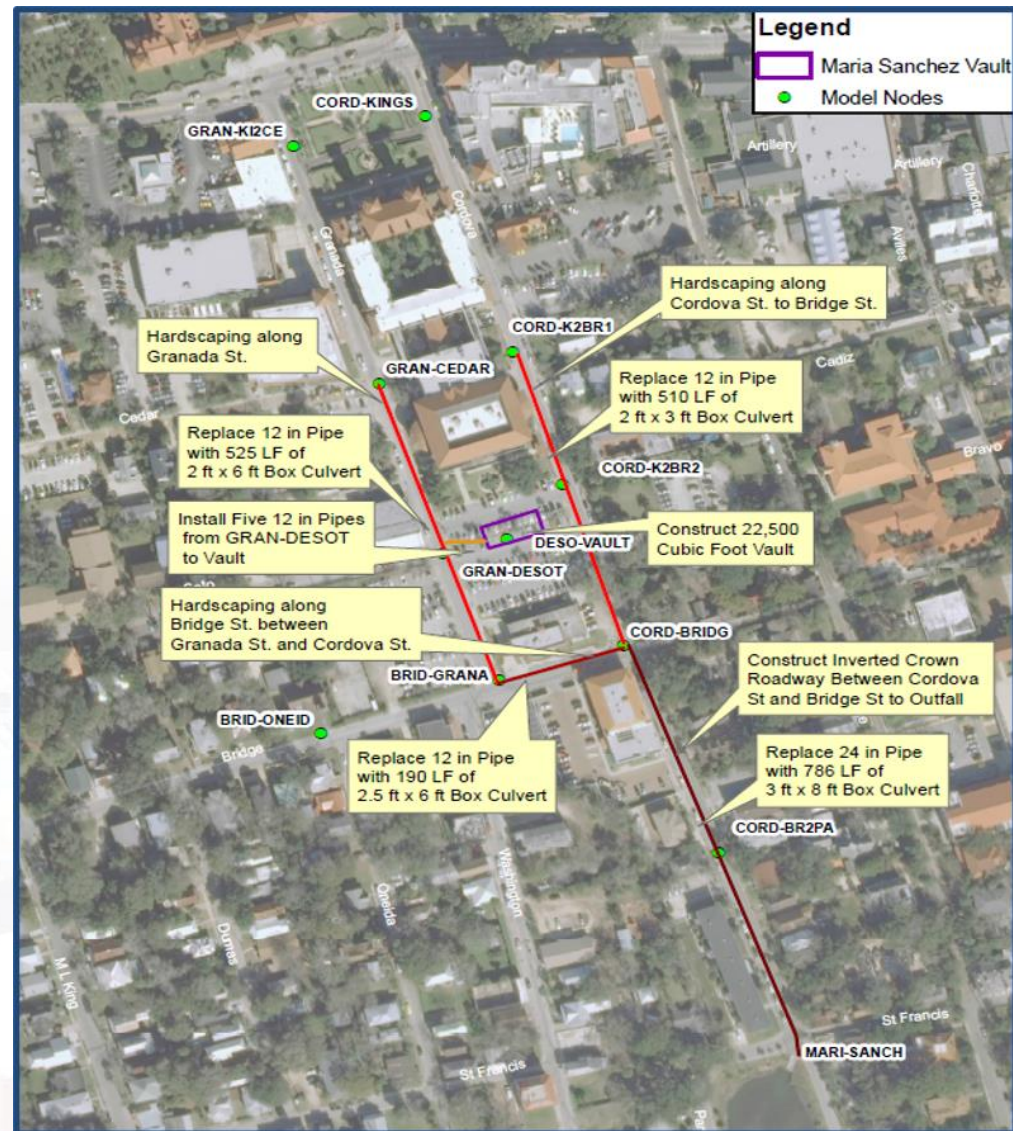
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❖ City's Stormwater Master Plan – 2013

- Identified 3 pilot projects

❖ Downtown Drainage Improvements

- Cordova, Granada, and Bridge Streets
- Upgrade collection system
- Improve conveyance to Lake
- Provide stormwater treatment





Lake Maria Sanchez Flood Mitigation and Drainage Improvement Project

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- ❖ **Hurricane Matthew 2016– Federal Funding Available for Hazard Mitigation Projects**
- ❖ **City re-visited the Downtown Drainage Improvement project:**
- ❖ Increased scope
- ❖ Address future vulnerabilities
- ❖ Address current flooding
- ❖ Make the City more resilient
- ❖ The City applied in June 2017 for Federal funding for this project - #1 ranked project
- ❖ FEMA notified City of funding award, design initiated in September 2018

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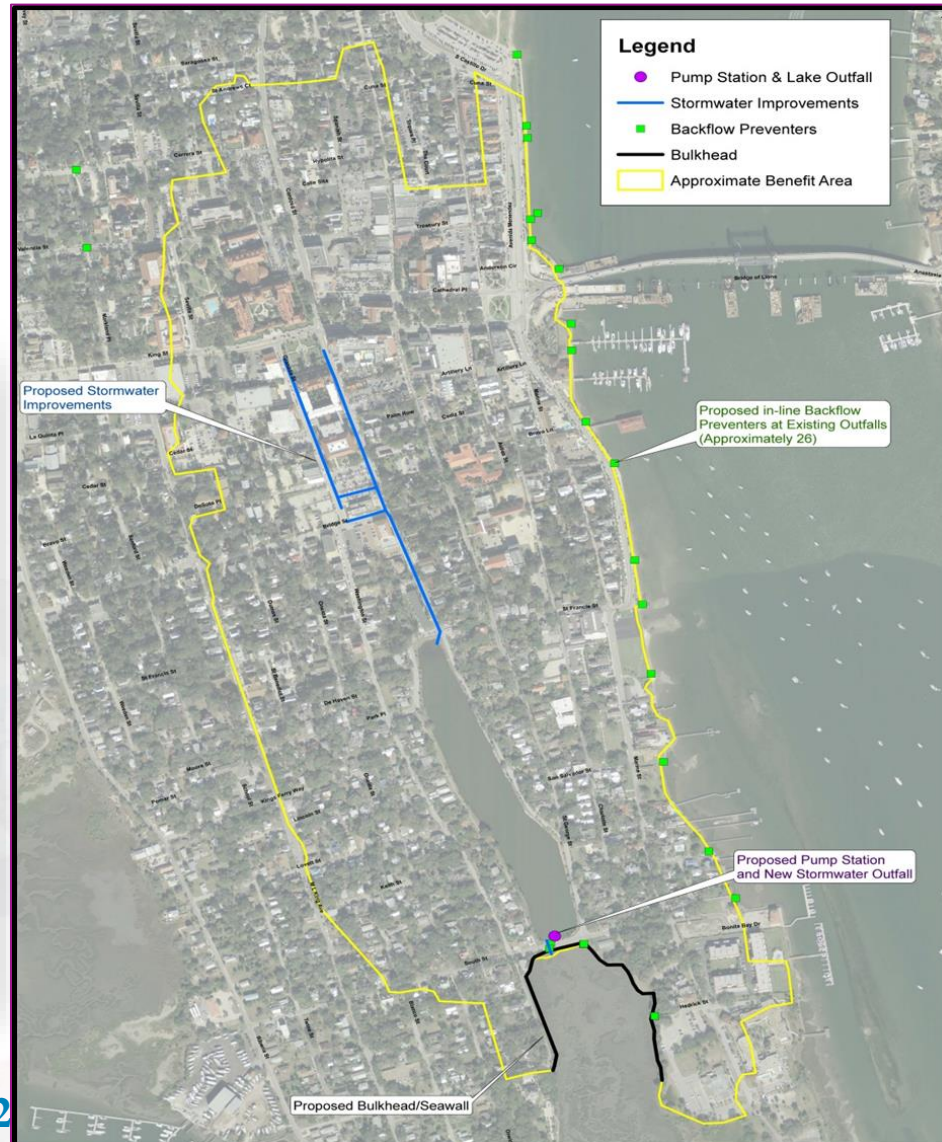


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Lake Maria Sanchez Flood Mitigation and Drainage Improvement Project

- ❖ Lake Maria Sanchez Flood Mitigation and Drainage Improvement Project is under design



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Lake Maria Sanchez Flood Mitigation and Drainage Improvement Project

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❖ Flood Protection (Structures)

- ✓ Estimated 200 Acre Benefit Area
- ✓ 25-Year Storm Event + 2050 Sea Level Rise (6.4 Feet Storm Surge)
- ✓ Protect 186 Structures (Currently at Risk)



❖ Flood Protection (Roadways)

- ✓ 10-Year, 24-Hour Rainfall Event Level of Service (7.6 inches)
- ✓ Protected from Coastal Flooding
- ✓ Reduces both Depth and Duration of flooding



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Lake Maria Sanchez Flood Mitigation and Drainage Improvement Project





Lake Maria Sanchez Flood Mitigation and Drainage Improvement Project





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Lake Maria Sanchez Flood Mitigation and Drainage Improvement Project

❖ Flood Wall - Rendering



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Lake Maria Sanchez Flood Mitigation and Drainage Improvement Project

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❖ Pump Station - Rendering





Lake Maria Sanchez Flood Mitigation and Drainage Improvement Project

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❖ South Street Facing East - Rendering





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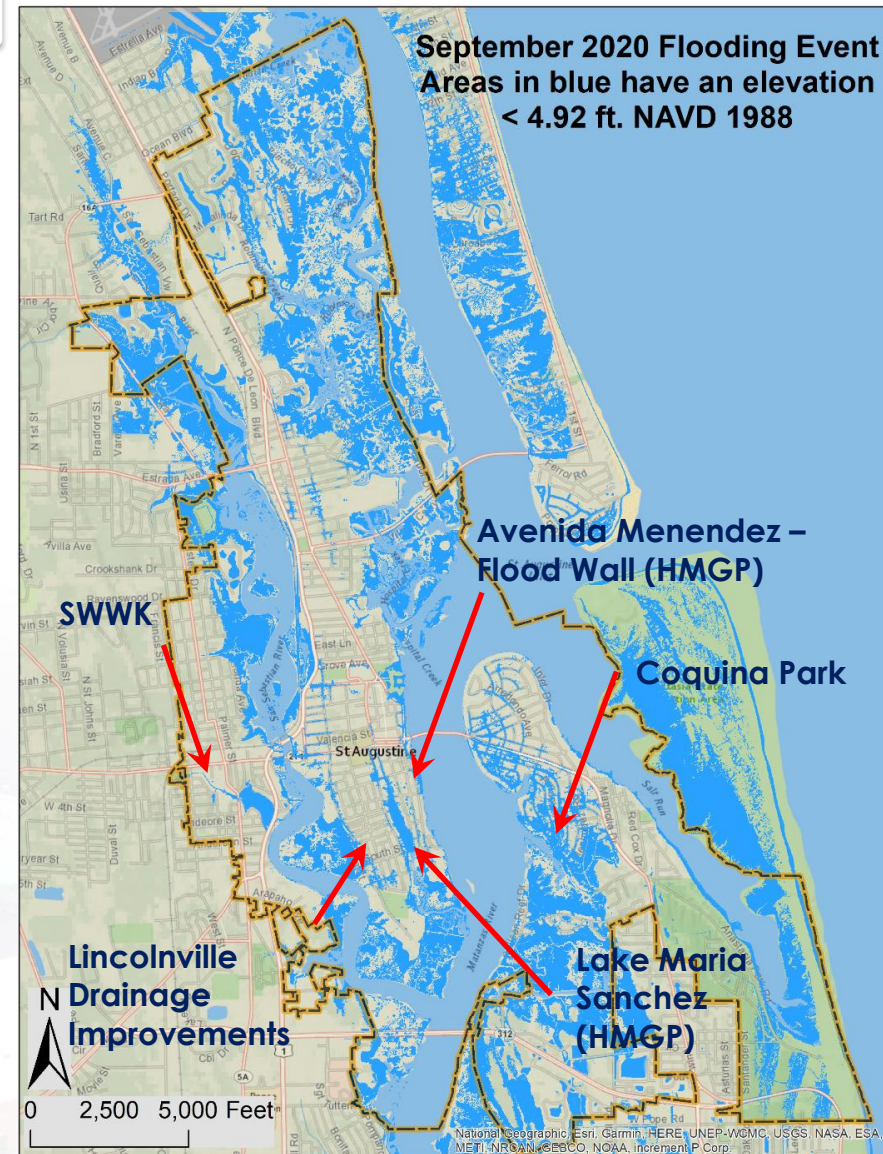
Moving Forward

❖ Current Flood Mitigation Investments ≈ \$36,133,000 (\$27,611,932 grant funded):

- ❑ Lake Maria Sanchez (HMGP)
- ❑ Avenida Menendez Flood Wall (HMGP)
- ❑ Installed tide check valves (43 Citywide)
- ❑ Coquina Park
- ❑ South Whitney/West King (SWWK) Flood Mitigation (HMGP)
- ❑ South Dixie Highway (SDH) Culvert Replacement
- ❑ Lincolnville Utility and Drainage Improvements
- ❑ FEMA 13 Lift Station Hardening and Flood Proofing

❖ Additional Flood Mitigation Projects planned &/or being developed:

- ❑ South Davis Shores Resiliency Master Plan
- ❑ Oyster Creek Flood Mitigation project
- ❑ Other Neighborhood Resiliency projects





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References and Recognition

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5. Wapro - Wastop Inline Check Valve.
<http://www.wapro.com/en-us/content/wastopr-inline-check-valve>
6. Photo credits: Alamy Stock Photo – Sean Pavone (bridge at sea), Rob Clement (Castillo de San Marcos), AP Photo – John Bazemore (flooding at bayfront/fort),
7. St Johns River Water Management District Cost Share Programs –Lou Donnangelo, Program Director, Email: ldonnangelo@sjrwmd.com
<https://www.sjrwmd.com/localgovernments/funding/>
8. Florida Department of Environmental Protection Florida Resilient Grant Program – Whitney Gray, Program Administrator, email: Whitney.Gray@FloridaDEP.gov





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Questions and Discussion



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Additional Projects – If time
permits or as part of the Q&A

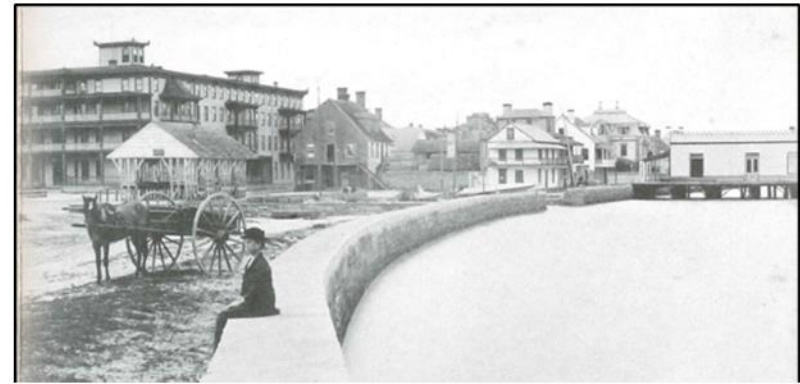


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Avenida Menendez Seawall

Completed 2013

- Suffered storm damages
- Required consensus building
- Encapsulated the original seawall
- Walking promenade
- Stormwater treatment
- Environmental mitigation
- Elevated to 7 feet NAVD
- FEMA/HMGP funding



FEMA



TAYLOR ENGINEERING, INC.





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- Completed in 2018
- Elevated existing seawall to 7 feet NAVD
- Installed drainage system
- Pedestrian walkway to connect historical seawall to the Bridge of Lions
- Florida Inland Navigation District (FIND) funded
- City contracted with DiMare Construction



MATTHEWS
DESIGN GROUP





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Avenida Menendez Seawall - Connectivity

- Reinforce existing seawall to support new wall
- Replace failing section of seawall
- Elevate a section of seawall to tie into north and south elevations to “close the gap”
- Awarded HMGP funding

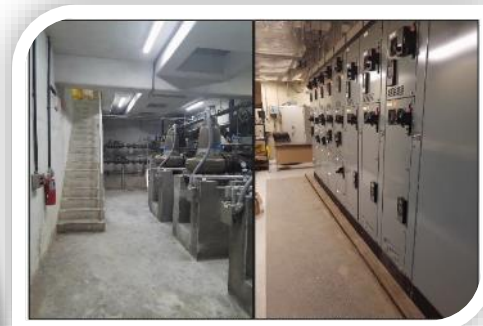
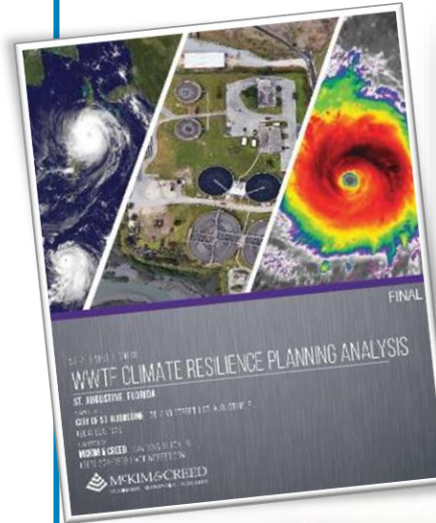




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Wastewater Treatment Plant Options for Resiliency

- Initially identified in the coastal vulnerability assessment as critical infrastructure at risk now
- Evaluated existing infrastructure to assess vulnerability of flooding from storm surge and projected Sea Level Rise



MCKIM&CREED
ENGINEERS SURVEYORS PLANNERS



Figure 10: Perimeter Flood Wall and Pump Station

Perimeter Wall and Pump Station Estimated Costs at Multiple Heights for Year 2030 (2018 dollars)

Type of Wall	Top Elevation (feet NAVD)	Average Height of Wall (feet)	Protection Cost	Category of Hurricane Protection Level (2030)	Preventable Damage Cost	Benefit/Cost Ratio
Sheet Pile	18	11	\$ 3,700,000	3	\$16,000,000	4.3
	20	13	\$ 4,200,000	4	\$21,000,000	5.0
	25	18	\$ 5,300,000	5	\$21,000,000	4.0



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Wastewater Treatment Plant Options for Resiliency

- Alternative lower cost solution
- Protection to 12 feet (plant is at \approx 7 feet NAVD 88)
- Most critical infrastructure protected
- Total cost \approx \$148,000





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FEMA 13 LIFT STATIONS REHABILITATION

- ❖ Bidding Complete
 - ✓ First 10 of 13 Stations
- ❖ Guaranteed maximum price for entire project \$13.8 M
- ❖ Notice to Proceed issued January 4, 2021
- ❖ Construction duration \approx 2 years
- ❖ List of 13 Lift Stations to be Rehabilitated or Replaced:
 - ❖ LS-4, 5, 6, 7, 10, 11, 12, 21, 22, 23, 24, 50, and 52
- ❖ Arricola Ave. Force Main

