



City of St. Augustine – Community Adaptation Tools with FEMA Assistance Programs Preservation on Main Street – 2023

July 21, 2023

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Chief Resilience Officer
Public Works Department





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Presentation Outline

- ❖ Why do we flood? A look at our challenges...
- ❖ Overview of the Resilience Program and Strategy
- ❖ FEMA's Flood Mitigation Assistance Program and other tools in the toolbox





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Why Do We Flood ?

Flooding is
not new
to the City



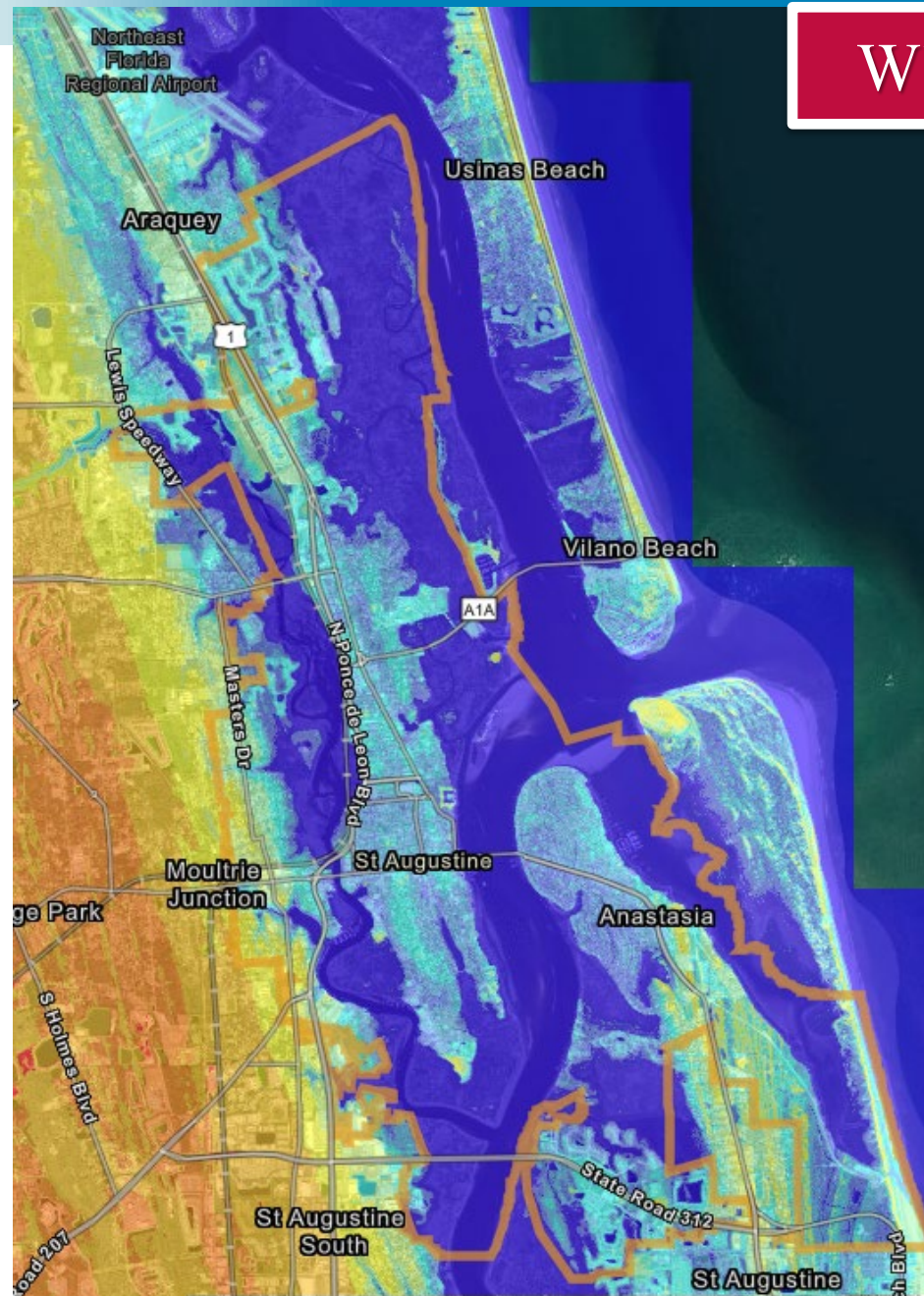
However, the frequency
of “sunny day” flooding is
on the rise





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❖ Digital
Elevation
Mapping for
the City in
NAVD88



Why Do We Flood ?

- Wetlands
 - Zip Codes
 - Zoning Current
 - Address Sites
 - Parcel
 - Storm Surge Zc
 - Elevation Certif
 - Storm Surge Dt
 - COSA_DEM
- | |
|-------------|
| 50 - 116.23 |
| 35 - 50 |
| 25 - 35 |
| 15 - 25 |
| 12 - 15 |
| 9 - 12 |
| 7 - 9 |
| 5 - 7 |
| 3 - 5 |
| -4.3 - 3 |

Hurricane's Ian and
Nicole
(HWM \approx 6.5 NAVD88)

City elevations, range
between 3-9 feet NAVD88



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Why Do We Flood ?

Current City Challenges (stormwater):

- Aging infrastructure
- Undersized collection system
- Low-lying and coastal location (90% of the City is within a flood zone)
- Highly developed (high impervious area)
- **Subject to flooding – both from rainfall and tidal/coastal influence (compound flooding)**



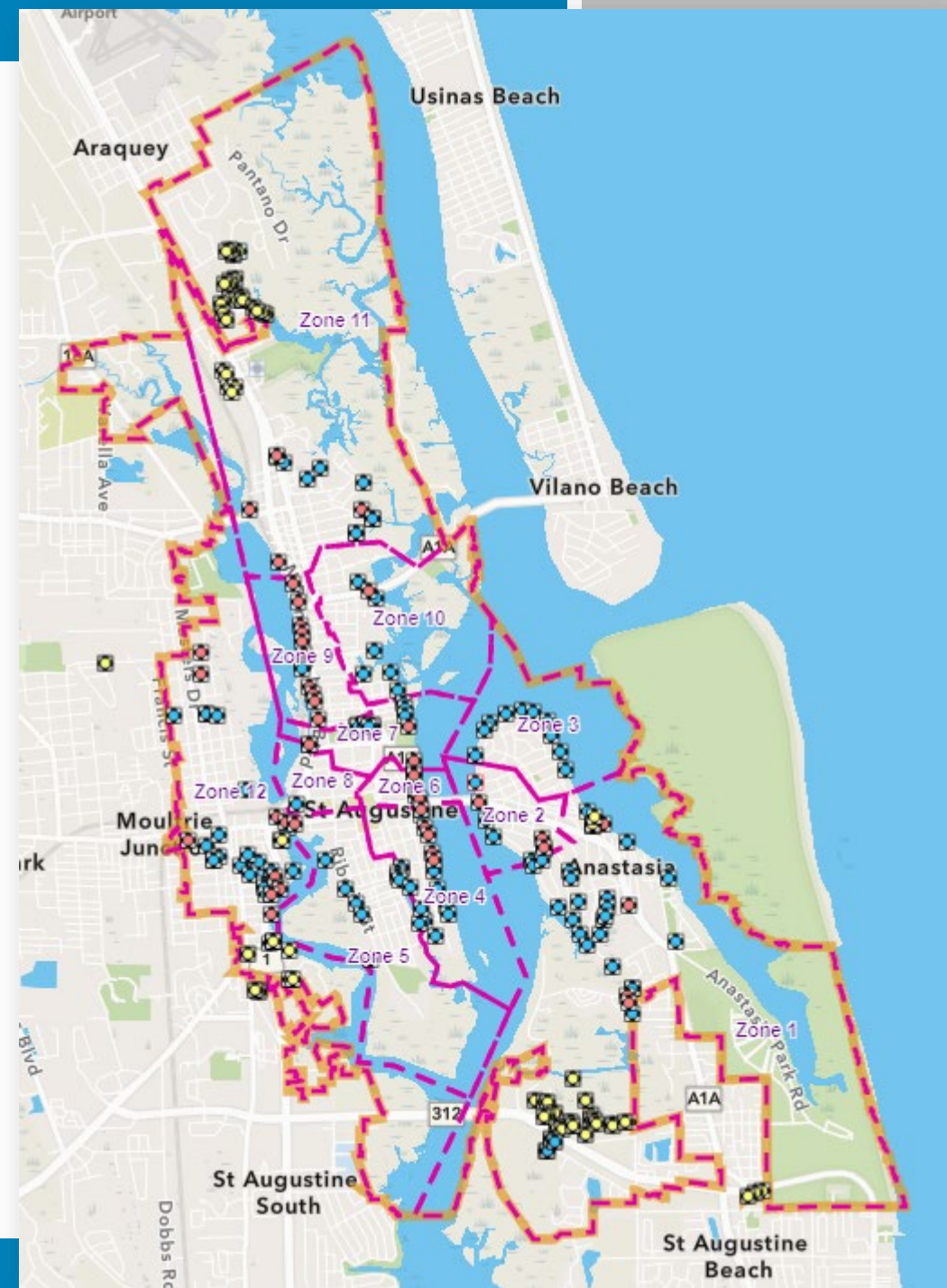


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Why Do We Flood ?

Stormwater Infrastructure:

- 103 Outfalls **Tidally Influenced**
(not including FDOT)
- 949 Storm Inlets
- 20 miles of pipe
- Twelve (12) maintenance zones

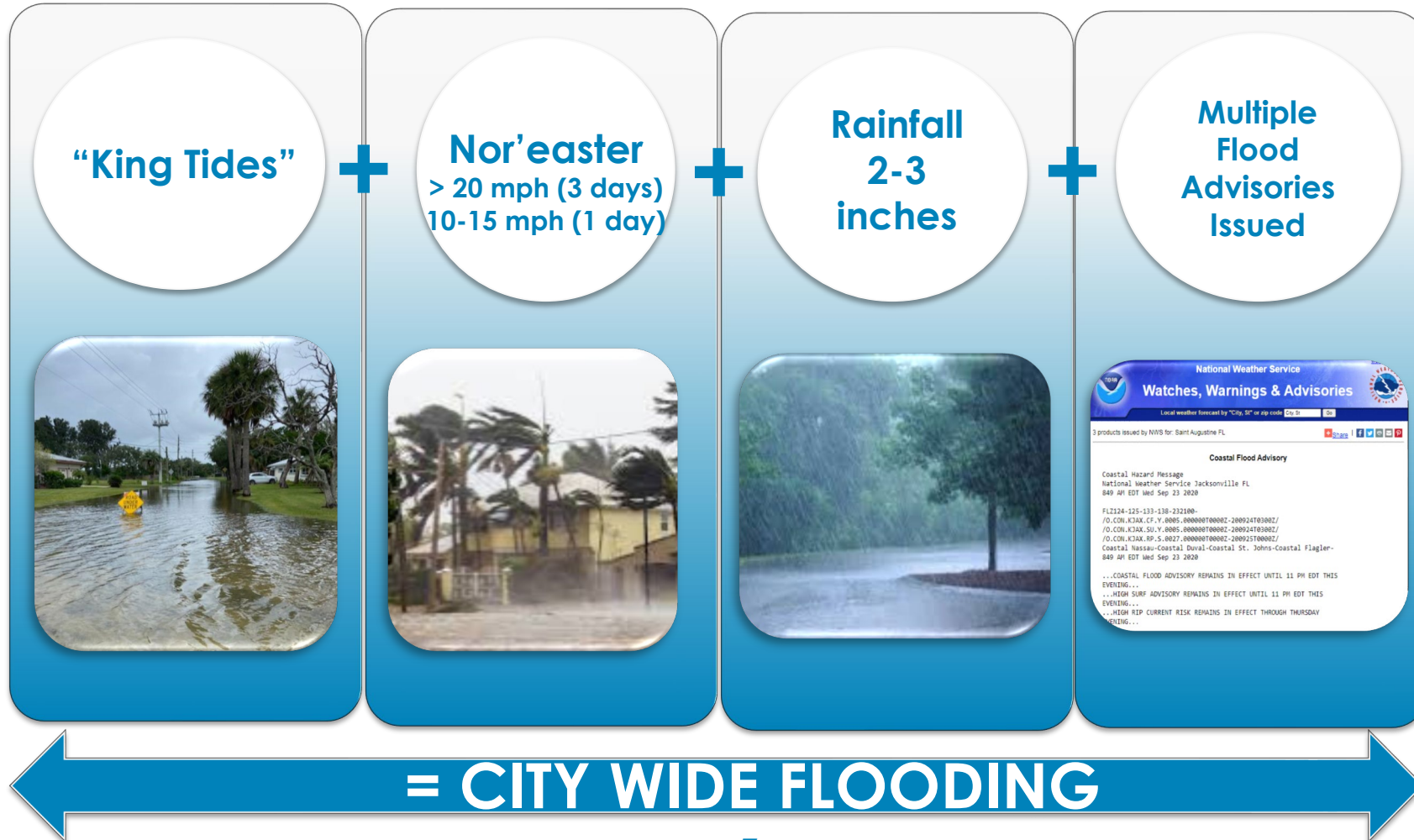




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Why Do We Flood ?

September 2020 - Flood Event (Compound Flooding)





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Why Do We Flood ?



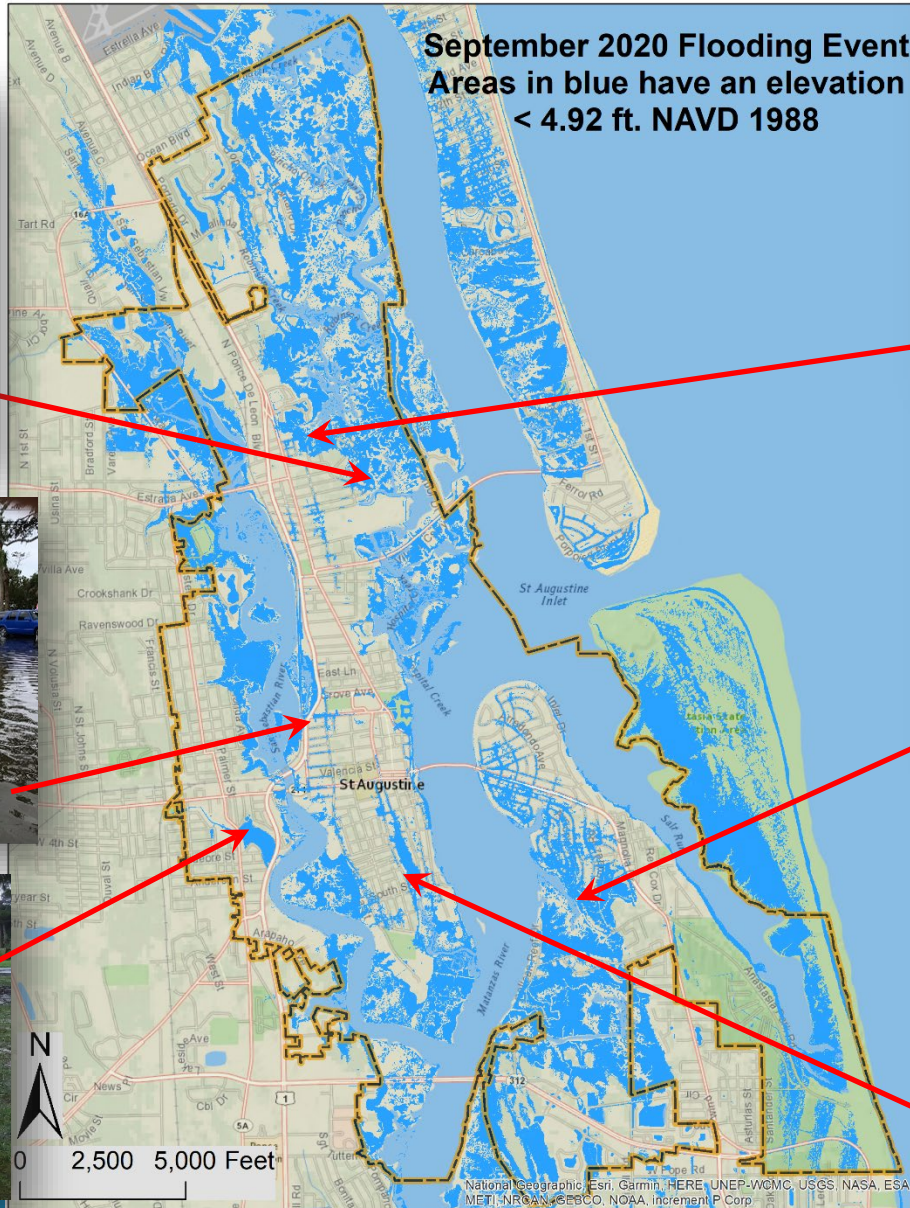
E Park Ave



Orange St & Riberia St



Lewis Blvd



Court Theophelia



Coquina Avenue



Washington St

September
2020 - Flood
Event
(Compound
Flooding)



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A Recap of Hurricane Season

- ❖ City wide flooding from Hurricane's Ian and Nicole
- ❖ Map shows high water marks (HWM) – ranged from 4.94 – 6.71
- ❖ Preliminary assessment of impacted homes

Damage Assessment Survey - Hurricane Ian

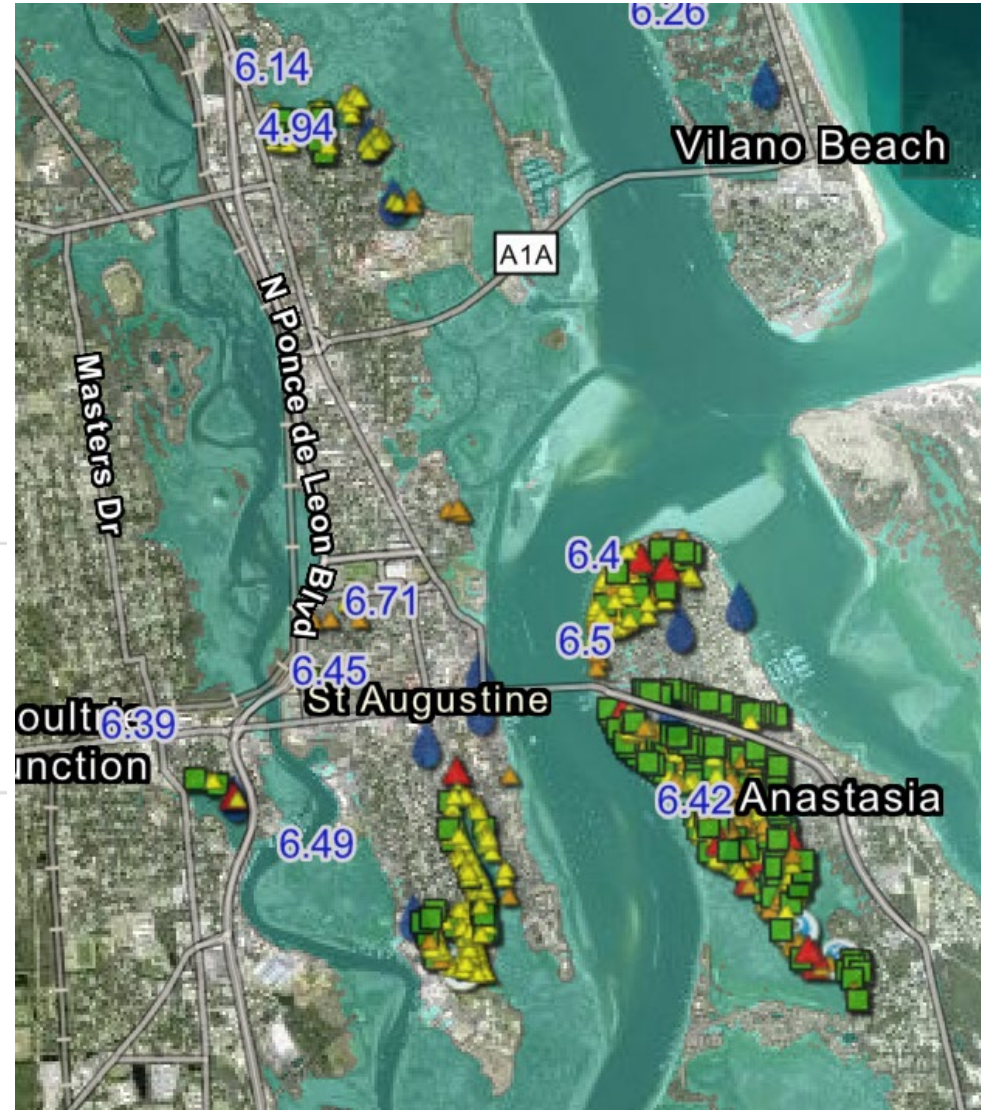
Level of damage assessed:

- unaffected
- inaccessible
- ▲ affected
- ▲ minor
- ▲ major

High Water Marks Hurricane Ian

Storm Surge

3 Foot Storm Surge





A Recap of Hurricane Season

- ❖ **Affected = water under the house/garage, not in living space**
- ❖ **Minor = less than 18" in living space**
- ❖ **Major = more than 18" in living space**

Properties Impacted by Hurricane Ian			
Affected	Minor	Major	Subtotal
330	157	19	506
65	31	4	%
Neighborhood			
Fullerwood			10%
Abbott Tract			1%
Flagler Model Land			2%
Lake Maria Sanchez			13%
Lincolnvile			12%
Oyster Creek			1%
North Davis Shores			13%
South Davis Shores			48%



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A Recap of Hurricane Season

❖ **Castillo de San Marcos**

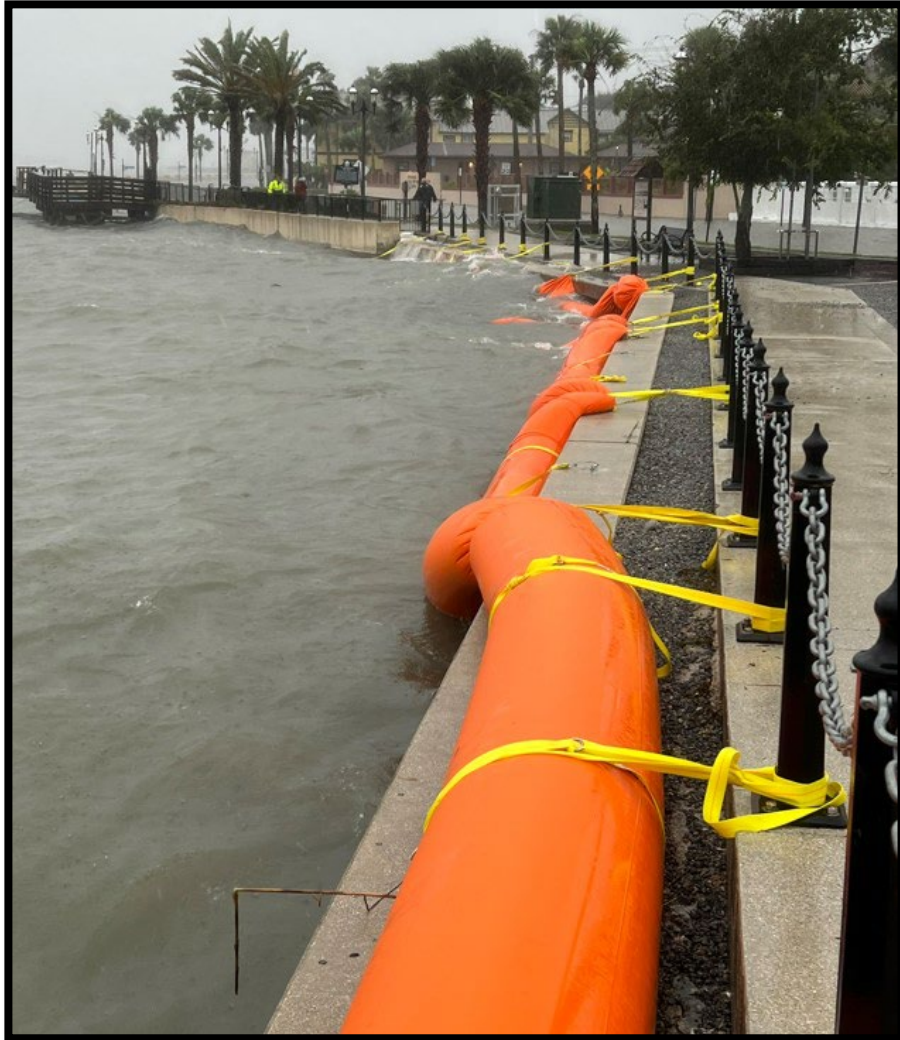




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❖ Bayfront (near Municipal Marina)

A Recap of Hurricane Season





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A Recap of Hurricane Season

❖ Flooding in South Davis Shores Neighborhood





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O'Steens Restaurant – 205 Anastasia Blvd (Island)

A Recap of Hurricane Season



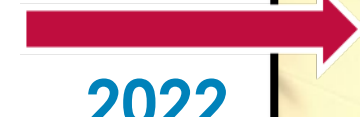
High Water Marks (HWM) at O'Steens Restaurant – 205 Anastasia Blvd (Island)

Matthew
(7.07 NAVD88)



2016

Ian (6.5 NAVD88)
Nicole (6.53 NAVD88)



2022

Irma (4.9 NAVD88)



2017



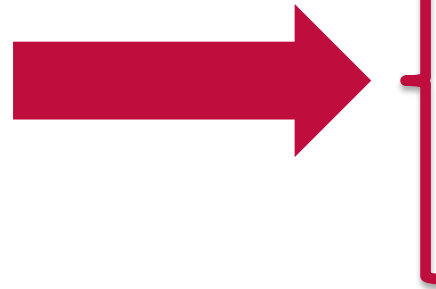


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A Recap of Hurricane Season – Adaptation

❖ Homeowner Examples of Flood Proofing

- ❖ Replaced flooded and damaged materials with PVC - walls, baseboards, chair rail, trim, can be removed if flooded, allowed to dry and re-installed





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A Recap of Hurricane Season – Adaptation

❖ Homeowner Examples of Flood Proofing



❖ Elevate Mechanical/
Electrical Equipment



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❖ Custom Made Door Dams for Garage



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A Recap of Hurricane Season – Adaptation

❖ Homeowner Examples of Flood Proofing



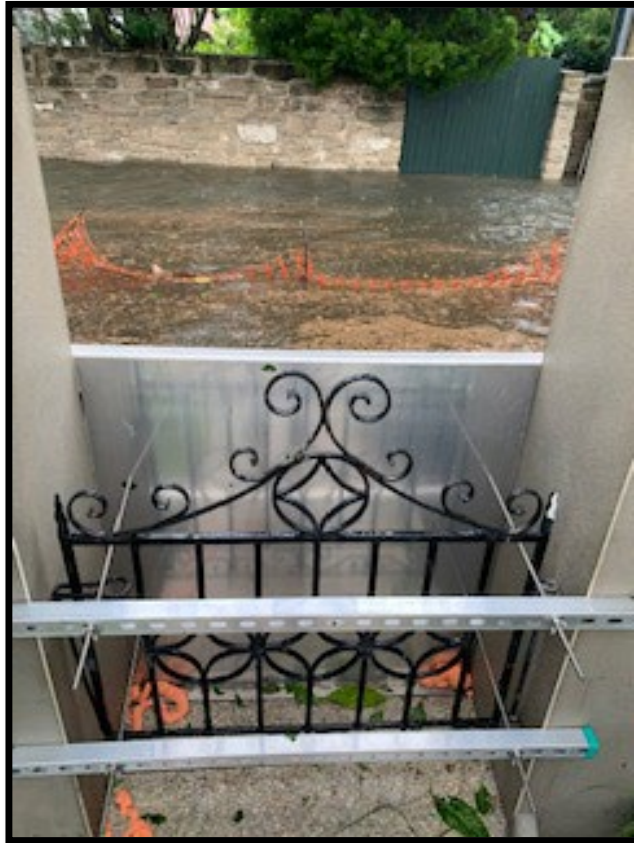
❖ Standard Size Door Dams available Online



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A Recap of Hurricane Season – Adaptation

❖ Homeowner Examples of Flood Proofing



❖ Custom Made Door Dams for Entry Ways with pump system



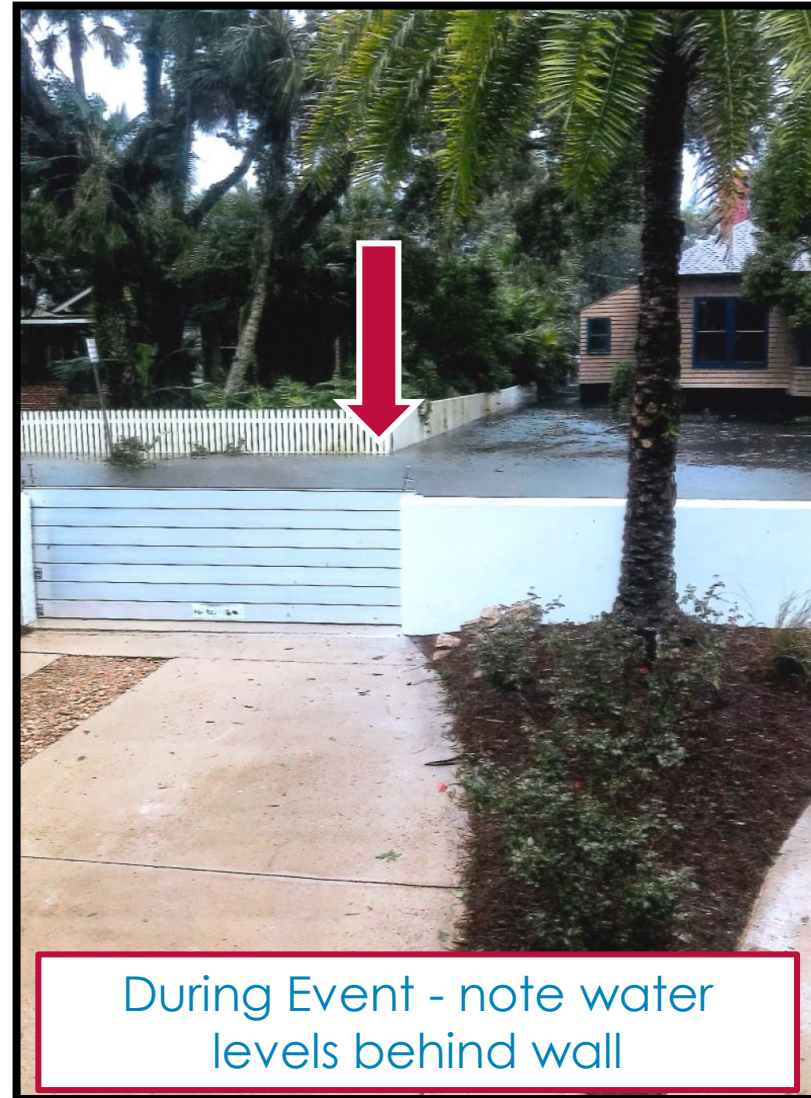
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A Recap of Hurricane Season – Adaptation

❖ Homeowner Examples of Flood Proofing



Deployed Before Event



During Event - note water levels behind wall

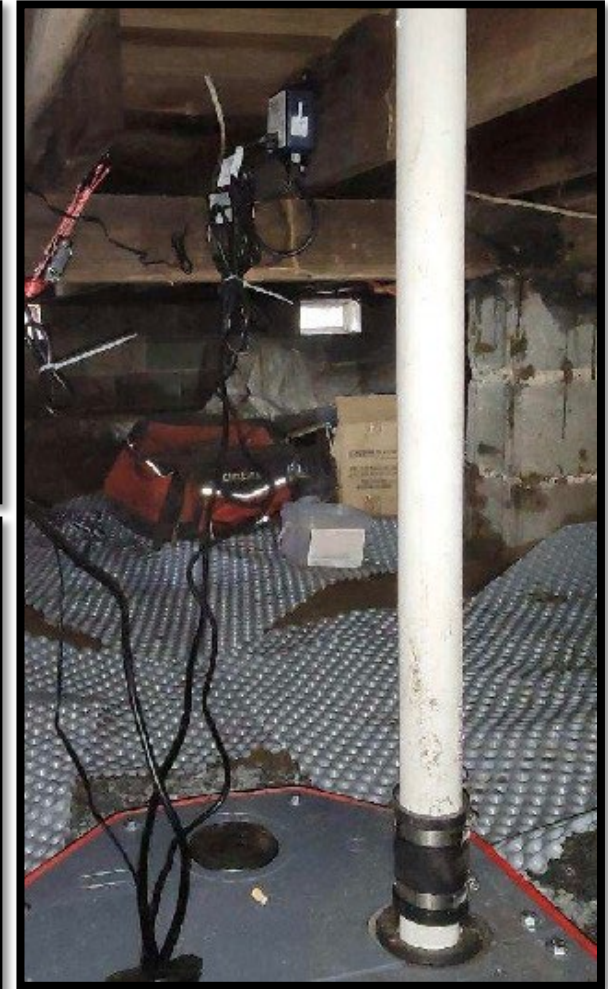
❖ Custom Made Flood Wall System, shared between 3 properties



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A Recap of Hurricane Season – Adaptation

❖ Homeowner Examples of Flood Proofing



❖ Installed sump pump system to help with flooded crawl space



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A Recap of Hurricane Season – Adaptation

❖ Businesses Examples of Flood Proofing



❖ Standard sandbags with plastic sheeting, tape, sealant, caulking of cracks etc.





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❖ Flagler College

A Recap of Hurricane Season – Adaptation



- ❖ It cost about \$200, a few hours of maintenance workers' labor
- ❖ Now, a contractor is on call to build and install
- ❖ 3/4" plywood, 2"x4"s, heavy plastic, rubber channel underneath to preclude the water from going underneath.
- ❖ Recently modified to go higher



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- ❖ 30 Lift Stations damaged in Hurricane Matthew
- ❖ Through **FEMA's Public Assistance Program** – flood proofed, elevated and hardened 13 most vulnerable lift stations
- ❖ Guaranteed maximum price for entire project \$13.8 M
- ❖ Notice to Proceed issued January 4, 2021
- ❖ Construction duration ≈ 2 years (project is completed)

www.citystaug.com/FEMA13

A Recap of Hurricane Season: Success Story – FEMA 13 Lift Stations





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A Recap of Hurricane Season: Success Story – FEMA 13 Lift Stations

Electrical
paneling
vulnerable
to storm
surge/
flooding



- Electrical control panel, standard, at risk/vulnerable
- Minimal protection
- Subject to surge and flooding



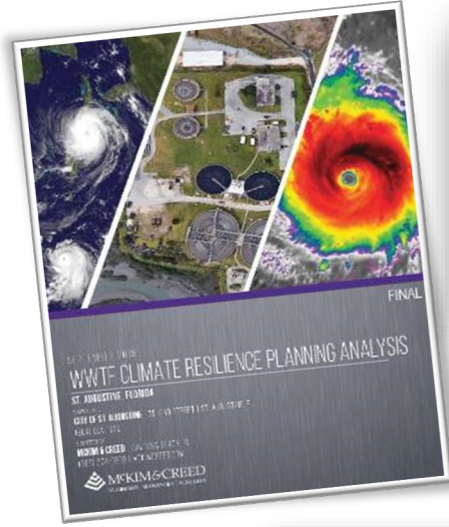
- Elevated to 500-yr event
- Flood proofed and hardened

-24-



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



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



Figure 10: Perimeter Flood Wall and Pump Station



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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





A Recap of Hurricane Season: Summary

- ✓ Success of FEMA 13 rehabilitation/hardening and flood proofing
 - 30 Lift stations impacted in Matthew
 - 2 Lift stations impacted in Ian but remained functional
- ✓ **Quicker recovery for the community after each storm, especially businesses**
- ✓ Properties that have adapted, were not as impacted
 - Elevation, flood proofing, site modifications etc.



Overview of the Resilience Program and Strategy



www.citystaug.com/resiliency





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Programs: Federal Grants through FEMA

<https://www.fema.gov/grants>

- Preparedness Grants
- National Dam Safety Program State Assistance Grant
- Emergency Food and Shelter Program
- National Earthquake Hazards Reduction Program Earthquake State Assistance Grant Program
- Hazard Mitigation Assistance Grants**
- Next Generation Warning System Grant



FEMA

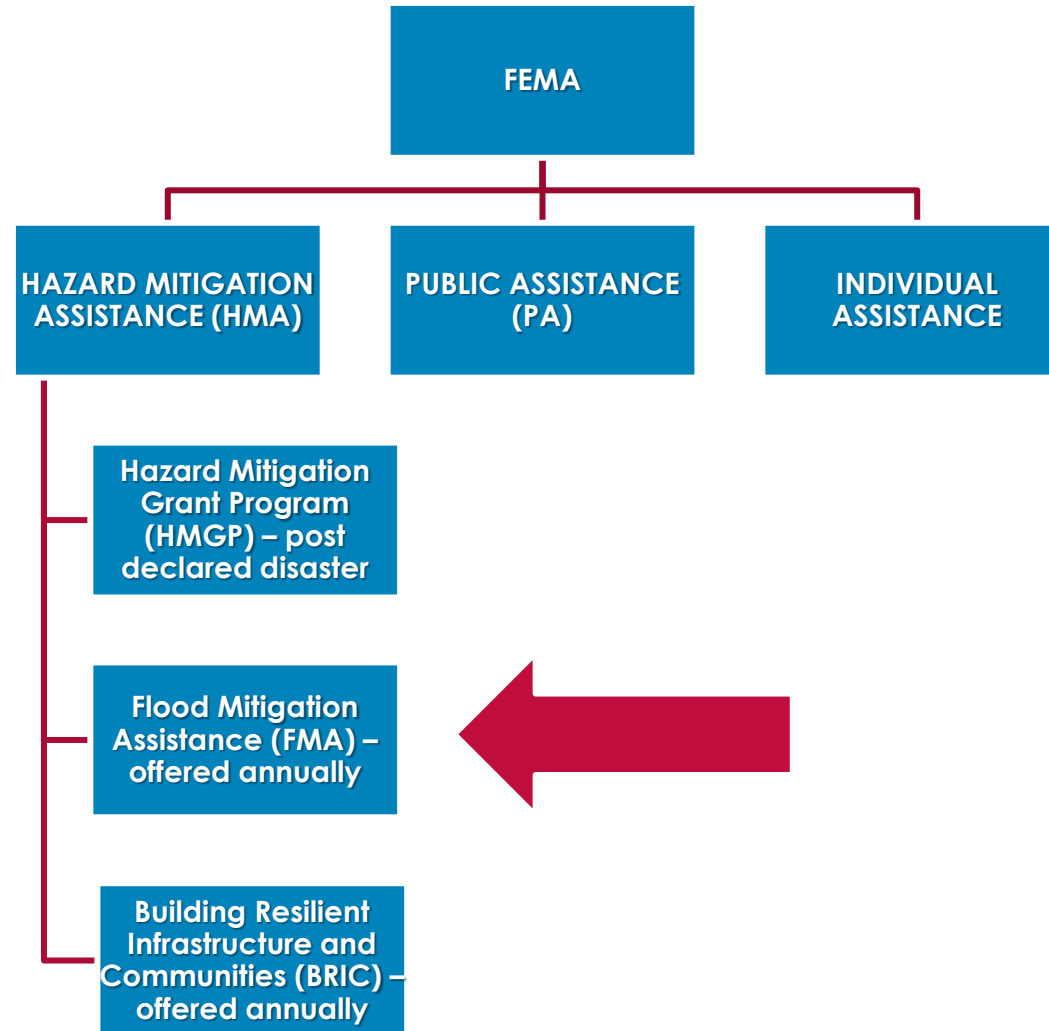


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FEMA

Programs: Hazard Mitigation Assistance Grants



❖ <https://www.fema.gov/grants/mitigation>



Programs: FEMA's Flood Mitigation Assistance (FMA)

- ❖ Many residents and businesses have been impacted from recent flood events with damages to their homes, buildings and properties
- ❖ Feedback from the community was the **request for assistance in elevating homes/structures and information/access to flood mitigation resources**
- ❖ The City responded to this request:
 - ✓ Outreach and educational meetings
 - ✓ Overhauled the website, added resources
 - ✓ Individual flood mitigation site visits
 - ✓ **Federal – FEMA's Flood Mitigation Assistance (FMA) Program**
 - Competitive grant program – available annually
 - Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program
 - City submitted 2 applications in FY20 cycle to pilot the application process
 - ✓ Competitive solicitation process (Request for Qualifications) for grant administration services for FEMA's Hazard Mitigation Assistance Program (with a focus on FMA) – **awarded contract to Quality Engineering and Surveying in 2021**





❖ Program Rules under FMA

- ✓ FMA is a nationally competitive annual FEMA grant program
- ✓ Prioritization is given to those structures listed as Severe Repetitive Loss (SRL) and Repetitive Loss (RL)
- ✓ Cost shares for the homeowner will vary depending on the validation of the structure (100% SRL, 90% RL, 75% Non)
- ✓ Program allows for elevation or reconstruction

❖ Eligibility

- ✓ Must be insured with the NFIP at the time of the application opening period (09/30/23)
- ✓ Policy must be effective as of 9/30/23
- ✓ Must maintain flood insurance to the structure in perpetuity

<https://www.fema.gov/grants/mitigation/floods>





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Programs: Flood Mitigation Assistance (FMA)



www.citystaug.com/FMA

For more information



Program Requirements:

➤ Structure Elevation

- ✓ Physically raising the existing structure to a higher elevation at or above the BFE plus TWO FEET freeboard
- ✓ Guidance states building must be structurally sound and capable of withstanding the elevation activity

➤ Mitigation Reconstruction

- ✓ Construction of an improved, elevated building on the same site where an existing building and/or foundation has been partially or completely demolished or destroyed
- ✓ Eligible mitigation reconstruction costs are limited to \$205,000 Federal Share per property.



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Programs: Flood Mitigation Assistance (FMA)

Before Elevation



After Elevation



Eligible Activities for Elevation

- Engineering services for design, structural feasibility, and cost estimate
- Preparation (generally built into your contractor quote)
- Elevation Certificates (Initial and final)
- Disconnection/Reconnection of utilities
- Elevation of the structure so that the lowest floor is at the BFE +2 foot Freeboard (A zones) or the lowest horizontal member is at the BFE +2 foot Freeboard (V zones)
- Elevation of existing decks, porches, stairs
- Construction of ADA-compliant access facilities
- Relocation expenses incurred by the homeowner



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Programs: Flood Mitigation Assistance (FMA)



**WANT TO LEARN ABOUT
FEMA HOME ELEVATION
GRANTS?**

ST. AUGUSTINE FLOOD OUTREACH MEETING

 City Hall - Alcazar Room
75 King St.
St. Augustine, FL 32084

 Wednesday, May 3rd
Meetings at 3pm & 6pm

Questions?
Call Andy @ 225-698-1600 or
Email: Grants@QESLA.com



❖ Documents Needed for Participation:

- ✓ Homeowner Packet
- ✓ Signed FMA Forms
- ✓ NFIP Insurance Declaration Page
- ✓ Current Elevation Certificate -
- ✓ 3 Elevation Quotes from qualified elevation firms (Quote should indicate who is performing the lift)
- ✓ A sketch of the structure submitted
- ✓ Copy of Contractor License
- ✓ Copy of Riggers Insurance (if lift contractor)
- ✓ Color photos of all 4 sides of structure

❖ Resources:

- ✓ St. Augustine Contractors & Surveyors List
- ✓ How to find your Elevation Certificate
- ✓ Standardized Quote Format
- ✓ Frequently Asked Questions
- ✓ Previous Workshop Presentations

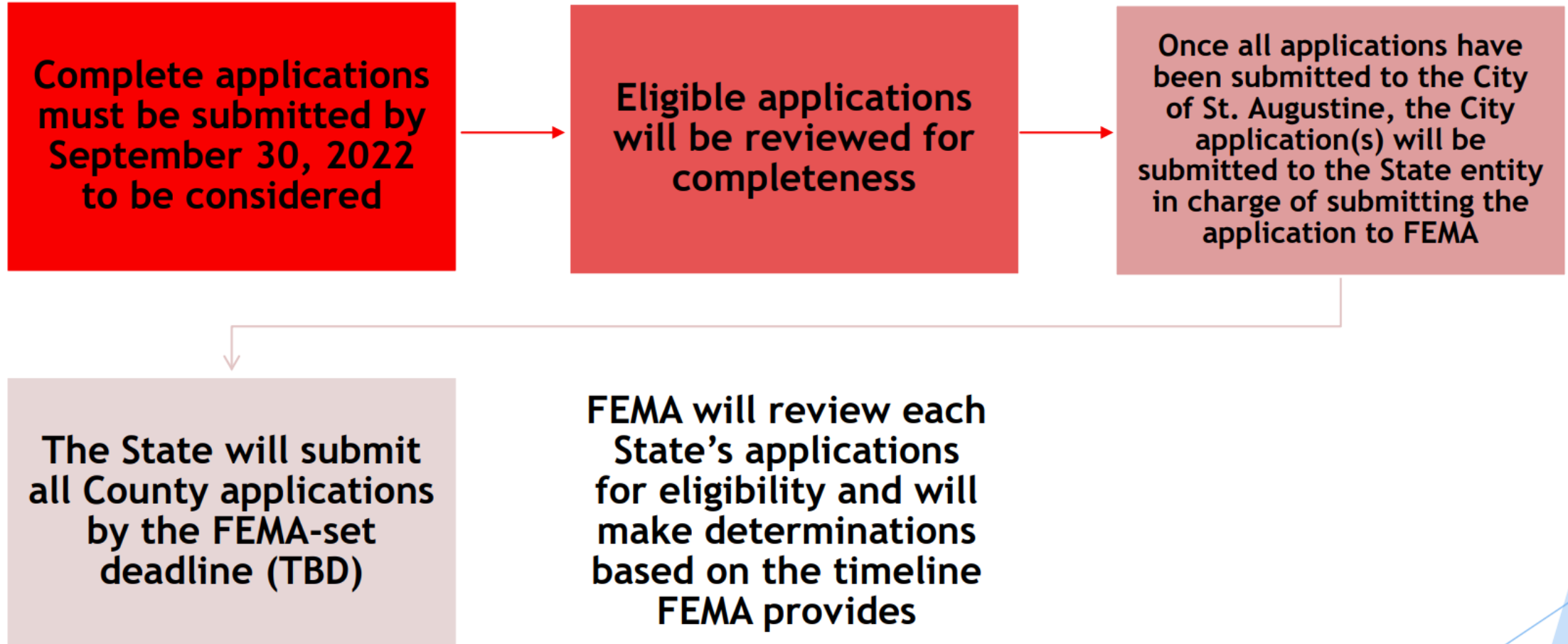
www.citystaug.com/FMA

For more information



Programs: Flood Mitigation Assistance (FMA)

❖ Application Process



www.citystaug.com/FMA

For more information



Programs: Flood Mitigation Assistance (FMA)

☐ Year 1 – 2021

- ✓ Homeowner workshops – August 2021
- ✓ Application cycle opened September 30, 2021
- ✓ Submitted 25 properties, 1 application, **\$ 4,856,424**
- ✓ **We did not have a current SRL/RL properties list (from 2018)**
- ✓ August 2022 - Not selected (i.e. ran out of funding)



☐ Year 2 – 2022

- ✓ Homeowner workshops – May/August 2022
- ✓ Application cycle opened September 30, 2022
- ✓ Hurricanes Ian and Nicole Sept/Nov 2022
- ✓ Over 80 properties interested in the program, **62 properties had complete applications that met the program requirements**
- ✓ 2 applications (11 - SRL/RL + 51- non), **\$12,353,474**



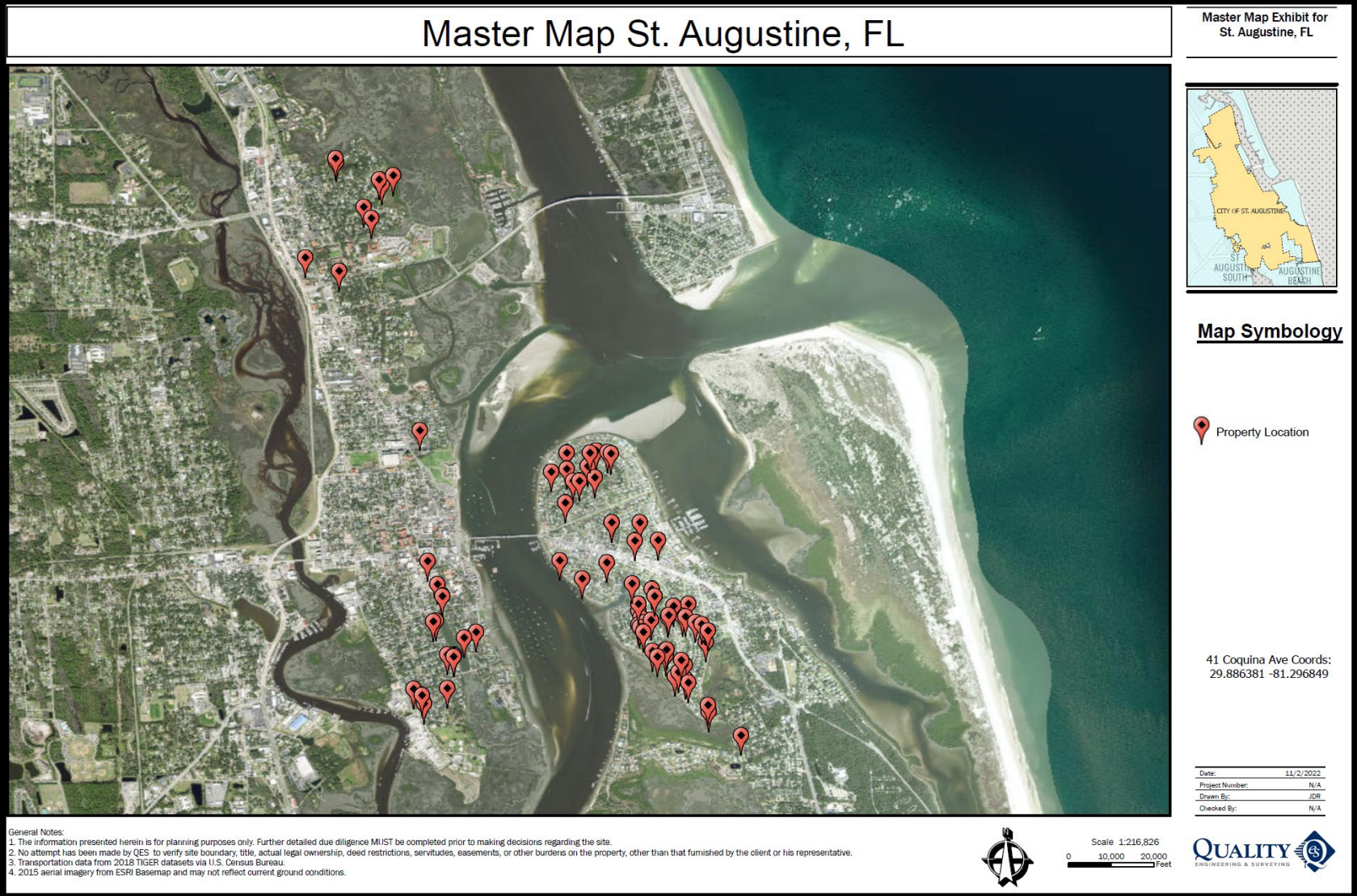
FEMA



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Flood Mitigation Assistance (FMA) Program

Location Map of Properties Submitted for FY 22 Cycle





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Programs: Flood Mitigation Assistance (FMA)



❖ Awarded Grant - 2023

- ✓ 1 property submitted back in 2020 was selected for funding
- ✓ **Mitigation reconstruction**
- ✓ Severe repetitive loss property
- ✓ Contract issued between FDEM (State) and City – similar language as HMGP
- ✓ City is ultimately liable for meeting all Federal regulations and requirements for the project
- ✓ The City entered into a separate contract with the individual homeowner
- ✓ **Required Homeowner to front the full costs, submit for reimbursement to City** – reduces City liability
- ✓ Required Commission Approval
 - Adopted a Resolution
 - Contract (FDEM-COSA-Homeowner)
 - Budget for Federal Share \$183,866.94
 - Grant Admin Costs



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Programs: Flood Mitigation Assistance (FMA)

❖ Lessons Learned

- ✓ You need expertise to manage this program – Federal requirements
- ✓ It takes time to go through the application process to award (18-24+ mos.)
- ✓ You need willing contractors to provide quotes that understand the program
- ✓ Getting applicants to start the process as early as possible to allow time for quotes, elevation certificates etc.
- ✓ Privately insured properties are not eligible – homeowners are not aware
- ✓ Nationally competitive, SRL/RL has the best chances for funding
- ✓ What to do with the “non” properties?
 - STORM Act – future possibility – revolving loan program
- ✓ Property owners are not waiting for the program and are taking action with other types of mitigation strategies
- ✓ The City is liable for compliance with all federal regulations through the contract, difficult to pass that along to the individual property owner
- ✓ To minimize liability, the City has opted to require the homeowner to front the costs
 - This will likely discourage future participation



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Overview of the Resilience Program and Strategy

❖ “One Stop Shop”:

- ✓ Programs
- ✓ Planning / Studies
- ✓ Payment / Funding
- ✓ Projects
- ✓ Policy
- ✓ Resources

www.CityStAug.com/Resiliency



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Overview of the Resilience Program and Strategy

- Flood Hazard Information
- Weather STEM
- Outreach / Education
- Report Flooding
- NOAA Daily Tide Chart
- 2022 King Tide Chart Prediction
- Jacksonville National Weather Service
- Mitigation Strategies**
- Arkly Flood Risk Search
- Flooding and Historic Properties

[Home](#) > [Government](#) > [Resiliency](#) > Resources

Resources

Helpful Links:

- [Mitigation Strategies \(PDF\) for properties](#)
- Arkly Flood Risk Search Tool allows homeowners to search for their properties and learn about their flood risk: <https://www.arkly.com/>
- Search for any property within the United States to look at potential flood risk indicators and ways to protect your property: www.floodfactor.com
- Provides outreach and education and a number of flood proofing type products for commercial and residential properties: www.floodproofing.com
- My Florida Safe Program helps homes become hurricane ready by providing free Wind Mitigation Inspections to homeowners that may lead to cost-share grant opportunities for door, window and roof upgrades: <https://mysafehome.com/>
- [FEMA Technical Guidance on Dry Flood Proofing](#) and [FEMA Guidance to Floodproofing](#) PDF's

Recently added resources

Resiliency Updates Packet (PDF)

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Project Map Key

1. Lake Maria Sanchez Flood Mitigation
2. South Whitney/West King Street Drainage
3. Inlet Drive Shoreline Stabilization
4. South Davis Shores Drainage
5. Court Theophelia Neighborhood Drainage
6. Avenida Menendez Seawall

City Wide Projects

- Tidal Backflow Prevention Program
- Groundwater Monitoring Network

City Planning Studies

- Back Bay Feasibility Study (Federal)
- Vulnerability Assessment Update (State)

City Programs

- Flood Mitigation Assistance (FMA) Program

City Ordinances

- Proposed Resilient Shorelines Ordinance

RESILIENCE STRATEGIES

PROJECTS | PLANNING/STUDIES | POLICY | PROGRAMS

www.CityStAug.com/Resiliency | 904-825-1040 | Stormwater@CityStAug.com

www.CityStAug.com/Resiliency



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Overview of the Resilience Program and Strategy

The screenshot displays the Arkly beta app interface. On the left, a sidebar shows property details for 12 Cuna St, St. Augustine, FL 32084, including area (805 sq ft), ground elevation (6 ft), foundation type (Concrete, 1 Step), flood zone (AE (High-Risk Flood Zone)), and base flood elevation (8 ft). Below this are icons for Tour, Share, and Feedback, and a section titled 'Know Your Risk' with the text 'AE (High-Risk Flood Zone) Less than \$1K self insurance cost per year to keep up with long term damages' and a 'Learn More' link. The main area shows a map of the property and surrounding area, with a 'Flood Risk Time Machine' slider at the bottom. A pop-up window over the map states: 'The map shows FEMA Flood Zones in blue and building-level storm surge risk in shades of red.' The map also shows FEMA Flood Zones and Annual Flood Risk (\$) in shades of red. A legend at the bottom right indicates 'FEMA Flood Zone' (blue) and 'Annual Flood Risk (\$)' (shades of red). The time machine slider is set to 'NOW' and ranges from 2030 to 2100.

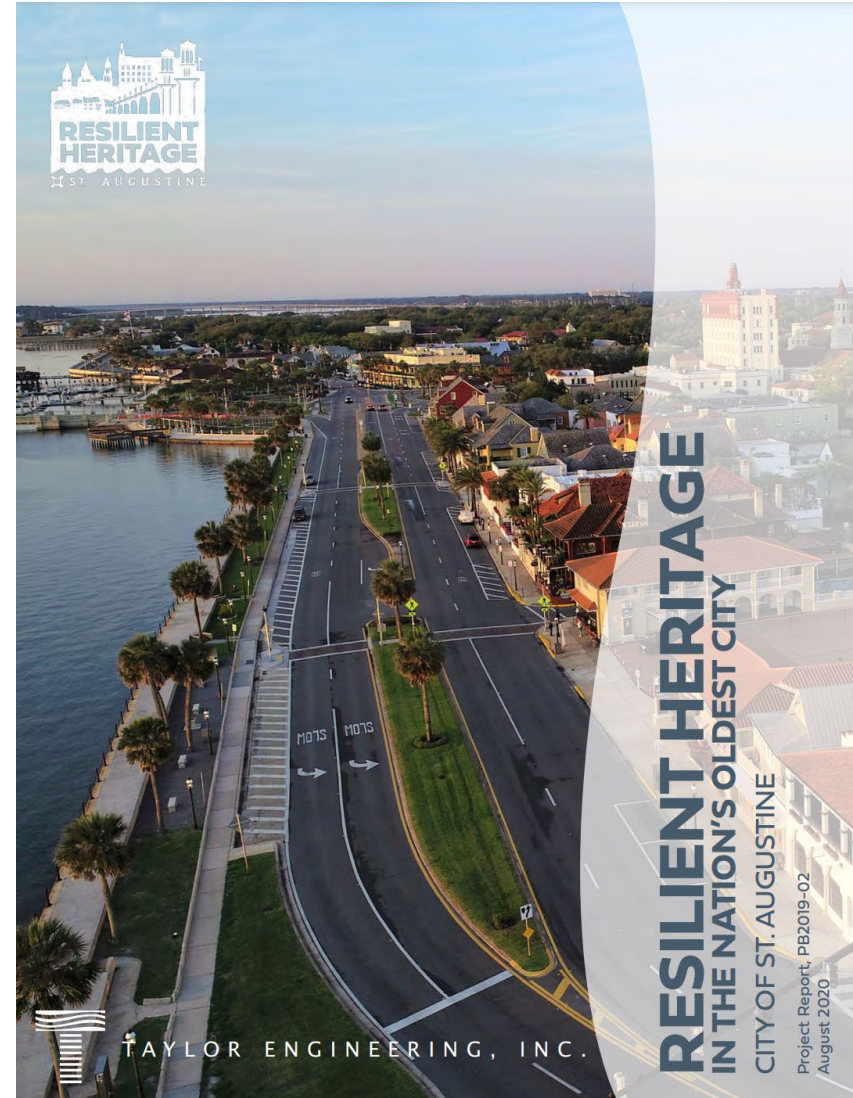
- ❖ New tool – “Arkly” for homeowners to better understand their flood risk financially –this is still in “beta” test, but check it out and submit your feedback



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Overview of the Resilience Program and Strategy

- ❖ Resources Available for Historic Properties
- ❖ Flood Mitigation Guidance for Historic Properties
- ❖ Resilient Heritage in the Nation's Oldest City





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Overview of the Resilience Program and Strategy

- ❖ Mitigation Strategies “Check List”
- ❖ Appendix from Resilient Heritage Study

MITIGATION STRATEGIES	
<small>*Represent Guidelines for Rehabilitating Historic Buildings issued in 2017 part of The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings. Planning and Assessment for Flood Risk Reduction is a step that should be completed for all project prior to selecting a mitigation strategy. The U.S. Department of the Interior, National Park Service publication: Guidelines on Flood Adaptation for Rehabilitating Historic Buildings, 2019 offers guidance for appropriate mitigation strategies for historic buildings and offers the recommended and not recommended modes of action.</small>	
Temporary Protective Measures	
Temporary Protective Measures *	
Flood Wrapping Systems	
Temporary Flood Barrier, System, or Equipment*	
Install Fastening Devices or Stanchions for Temporary Barriers*	
Evaluate Walls & Flood Barrier Against the Forces Induced by Flooding*	
Fill the Basement*	
Develop Procedure, Responsibilities & Training for Temporary Deployment of Flood Systems*	
Install a Generator*	
Relocate Valuable Collections to Higher Floors, Upper Shelves, Or Offsite*	
Utilities + Life Safety	
Install Generators*	
Protect Utilities*	
Protection of Life Support Facilities / Dangerous Goods	
Post-Event Stabilization + Protection	
Mold Remediation	
Structural Remediation	
Site & Landscape	
Site Adaptations*	
Plan & Implement Site Investigation*	
Provide Proper Drainage*	
Improve or Design New Stormwater Management System*	
Porous Pavements	
Infiltration Fields and Strips with Above-Ground Storage	
Rainwater Retention Ponds With or Without Infiltration Possibilities	
Shallow Infiltration Measures	
Rain Water Tanks	
Reduced Paved Surfaces	
Gutter	
Artificial Islands	
Storage / Settling Tank and Storage Basins	
Landscape Adaptations*	
Improve, Restore, or Implement Natural Systems	
Use of Groundcover and Shrubbery	
Add trees as "straws" to help draw water from soil	
Improve Soil Infiltration Capacity	
Stormwater Park / "Water Squares"	
Raising Land	
Swales / Directing Stormwater	
Biofiltration	



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Overview of the Resilience Program and Strategy



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Project Map Key

1. Lake Maria Sanchez Flood Mitigation
2. South Whitney/West King Street Drainage
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City Wide Projects

- Tidal Backflow Prevention Program
- Groundwater Monitoring Network

City Planning Studies

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- Vulnerability Assessment Update (State)

City Programs

- Flood Mitigation Assistance (FMA) Program

City Ordinances

- Proposed Resilient Shorelines Ordinance

RESILIENCE STRATEGIES



RESILIENCE EFFORTS TIMELINE

INITIATIVES	2023	2024	2025	2026	2027	
DESIGN / PERMITTING / CONSTRUCTION	Avenida Menendez Seawall					
	Lake Maria Sanchez Flood Mitigation and Drainage Improvements					
	South Whitney/West King Street Drainage					
	Inlet Drive Shoreline Stabilization					
	South Davis Shores Flood Mitigation and Drainage Improvements					
	Court Theophelia Neighborhood Flood Mitigation and Drainage Improvements					
	City Wide Tidal Backflow Prevention Improvements					
	Groundwater Monitoring Network					
	DATACOLLECTION / COMMUNITY OUTREACH / PLANNING	Vulnerability Assessment Update with DEP (State)				
		Proposed Resilient Shorelines Ordinance				
Back Bay Feasibility Study with the Army Corp of Engineers (Federal)						
Yearly	FEMA's Annual Flood Mitigation Assistance (FMA) Program					



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FLOOD MITIGATION ASSISTANCE (FMA) PROGRAM

What is the FMA Program?

FEMA's Flood Mitigation Assistance (FMA) grant program is a resource provided to the City meant to reduce or eliminate the risk of repetitive flood damage to buildings and structures insured under the National Flood Insurance Program (NFIP).

The FMA Program is a nationally competitive annual FEMA grant program. Prioritization is given to those structures listed as Severe Repetitive Loss and Repetitive Loss.

Cost shares for the homeowner will vary depending on the validation of the structure and are pre-determined by FEMA in most cases.

Who can apply for the FMA program?

Those who currently participate in the National Flood Insurance Program:

- Must be insured with the NFIP at the time of the Cycle 2 application opening period of 9/30/23
- Policy must be effective as of 8/31/23
- Must maintain flood insurance to the structure in perpetuity

More FMA Info: www.citystaug.com/FMA

Before Elevation



What is the FMA Program Timeline?

The FMA Program is a yearly resource available to residents of the City of St. Augustine. The application is due in late September to the City. However, residents can be working to actively building an application all year and turn in paperwork at any time. Once the application has been turned into the state, the awards will not be announced until late summer the following year. If funding is awarded, the grant must be completed within three years of contract execution.

Documents Needed for Participation Elevation and Reconstruction

- Signed FMA Forms
- NFIP Insurance Declaration Page
- Current Elevation Certificate - contact a local surveyor or check to see if the City has one on file: **904-209-4327 / fma@citystaug.com**
- 3 Elevation Quotes from qualified elevation firms (Quote should indicate who is performing the lift)
 - A sketch of the structure submitted
 - Copy of Contractor License
- Copy of Riggers Insurance (if lift contractor)
- Color photos of all 4 sides of structure

Planning & Building Dept- 904-825-1065

Public Works Dept- 904-825-1040

After Elevation





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VULNERABILITY ASSESMENT UPDATE

With The Florida Department of Environmental Protection

What is this study?

Vulnerability Assessments (VA) identify or address risks of flooding and sea level rise and help development of adaptation/resilience plans, projects, and policies that allow for preparation for threats from flooding and sea level rise. The final report does include an adaptation plan with recommendations for identified projects to be implemented.



Why is this study needed?

Previous studies, including a coastal vulnerability assessment, were completed in 2016, which identified major flood pathways in the city. However that previous VA does not meet the current criteria outlined in section 380.093 of Florida statutes. By completing the FDEP VA it qualifies the city for the 50% cost-share for implementation projects and the city is eligible for future funding.

ESTIMATED ASSESMENT COST:
\$500,000



How will this study benefit the community?

A Vulnerability Assessment helps a community determine which structural and social assets are likely to be impacted by future coastal flooding and sea level rise and help create an adaptation plan for future mitigation projects. By integrating scientific methods and developing awareness of different structural and social assets that may be vulnerable to future coastal flooding, the community may ensure that the most useful basis for planning is established.

STUDY SCHEDULE 2023-2024

PHASE	STATUS
PHASE 1	DATA COLLECTION & ANALYSIS
PHASE 2	COMMUNITY OUTREACH
PHASE 3	REPORTING

How is this study being funded?

The City of St. Augustine has been awarded funding from the Resilient Florida Grant Program in the estimated total assessment cost of \$500,000.



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BACK BAY COASTAL STORM RISK MANAGEMENT

A City Wide Feasibility Study With The U.S. Army Corps of Engineers

What is this study?

The City of St. Augustine Coastal Storm Risk Management Study is a three-year federal feasibility study that investigates coastal storm impacts on the City of St. Augustine. In partnership with the Army Corps of Engineers, City of St. Augustine and its stakeholders, the study will also explore economically-viable and environmentally-sound solutions to mitigate coastal storm risks.

Why is this study needed?

The reduction of flood-related damages to residential, commercial and historic/culturally significant resources, and critical infrastructure is vital. The study will identify comprehensive Coastal Storm Risk Management strategies to increase resilience and to reduce risk from future storms and compounding impacts of sea level change.

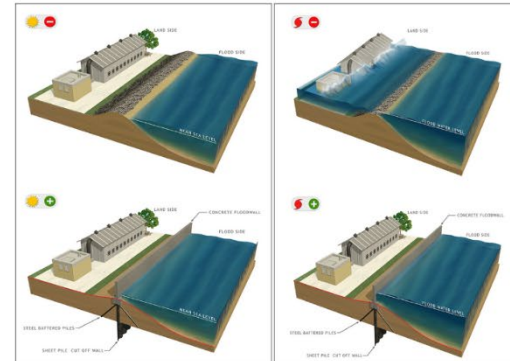
How will this study benefit the community?

The objective of the study is to investigate Coastal Storm Risk Management problems and identify solutions to reduce damages from coastal flooding that affects population, critical infrastructure, historic and culturally significant resources, and ecosystems, which will benefit the community as future projects are designed to mitigate flooding.

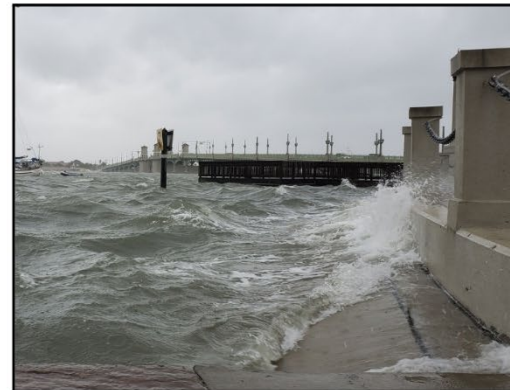
How is this study being funded?

The City of St. Augustine will be utilizing \$1,500,000 in American Rescue Plan Act (ARPA) funds, while the Army Corps of Engineers will fund \$1,500,000 for a total cost of \$3,000,000.

Flood Wall Example



St. Augustine Bay Front During a Storm



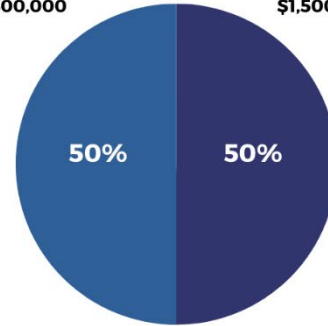
BACK BAY COASTAL STORM RISK MANAGEMENT

A City Wide Feasibility Study With The U.S. Army Corps of Engineers

Total Estimated Study Cost: \$3,000,000

Army Corps of Engineers \$1,500,000

City of St. Augustine \$1,500,000



St. Augustine Bay Front During a Storm



Taken on Nov. 13, 2019 of water crashing over the sea wall and flooding the park lawn.

Photo Credit:

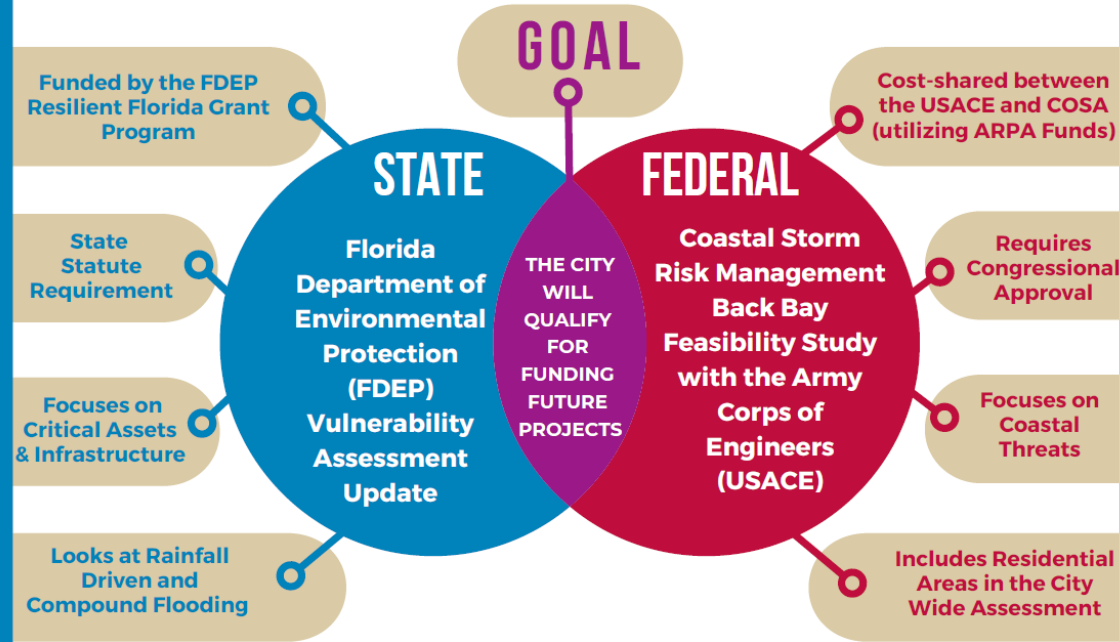
<https://www.nps.gov/casa/learn/historyculture/climatechange.htm>

STUDY SCHEDULE 2023-2026

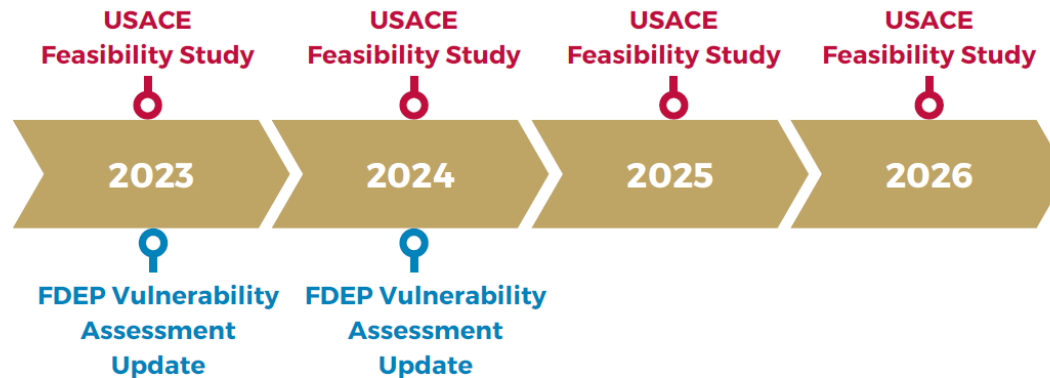
PHASE	STATUS
PHASE 1	DATA COLLECTION, ANALYSIS AND MODELING / COMMUNITY OUTREACH
PHASE 2	DATA COLLECTION, ANALYSIS AND MODELING / COMMUNITY OUTREACH
PHASE 3	DEVELOPMENT / ADOPTION, FINAL STUDY



CITY OF ST. AUGUSTINE STUDIES BREAKDOWN



STUDIES TIMELINE



PROPOSED RESILIENT SHORELINES ORDINANCE

What is this proposed ordinance?

The City of St. Augustine is working on implementing a Resilient Shorelines Ordinance to help combat sea level rise and coastal storm surge threats to the city. A Resilient Shoreline Ordinance will help promote nature-based designs that create/protect habitat & improve water quality.

Why is this proposed ordinance needed?

Sea level rise increasingly threatens both public and private infrastructure. The development of a resilient shoreline ordinance will provide the city and its residents guidance and opportunities for protective infrastructure such as seawalls, living shorelines, and hybrid approaches. The proposed ordinance will allow for a consistent approach to inform both public and private stakeholders on appropriate shoreline policy, infrastructure construction, maintenance and repair, and methodology and account for future flood risk.

SCHEDULE 2023-2025



LIVING SHORELINES SUPPORT RESILIENT COMMUNITIES


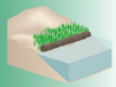
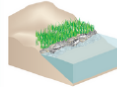
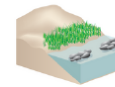
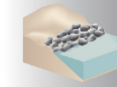
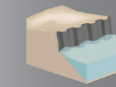
Living shorelines use plants or other natural elements—sometimes in combination with harder shoreline structures—to stabilize estuarine coasts, bays, and tributaries.

- One square mile of salt marsh stores the carbon equivalent of 75,000 gal of gas annually.
- Marshes trap sediments from tidal waves, allowing them to grow in elevation as sea level rises.
- Living shorelines improve water quality, provide fisheries habitat, increase biodiversity, and promote recreation.
- Marshes and oyster reefs act as natural barriers to waves. 15 ft of marsh can absorb 50% of incoming wave energy.
- Living shorelines are more resilient than bulkheads.
- 33% of shorelines in the U.S. will be hardened by 2100, decreasing fisheries habitat and biodiversity.
- Hard shoreline structures like bulkheads prevent natural marsh migration and may create seaward erosion.

The National Centers for Coastal Ocean Science | coastalscience.noaa.gov

PHASE	STATUS
PHASE 1	DATA COLLECTION
PHASE 2	DRAFT RESILIENT SHORELINE ORDINANCE
PHASE 3	COMMUNITY OUTREACH & ENGAGEMENT SUPPORT

GREEN - SOFTER TECHNIQUES GRAY - HARDER TECHNIQUES

Living Shorelines			Coastal Structures		
					
VEGETATION ONLY - Provides a buffer to upland areas and breaks small waves. Suitable for low wave energy environments.	EDGING - Added structure holds the toe of existing or vegetated slope in place. Suitable for most areas except high wave energy environments.	SILLS - Parallel to vegetated shoreline, reduces wave energy, and prevents erosion. Suitable for most areas except high wave energy environments.	BREAKWATER - (vegetation optional) - Offshore structures intended to break waves, reducing the force of wave action, and encourage sediment accretion. Suitable for most areas.	REVETMENT - Lays over the slope of the shoreline and protects it from erosion and waves. Suitable for sites with existing hardened shoreline structures.	BULKHEAD - Vertical wall parallel to the shoreline intended to hold soil in place. Suitable for high energy settings and sites with existing hard shoreline structures.



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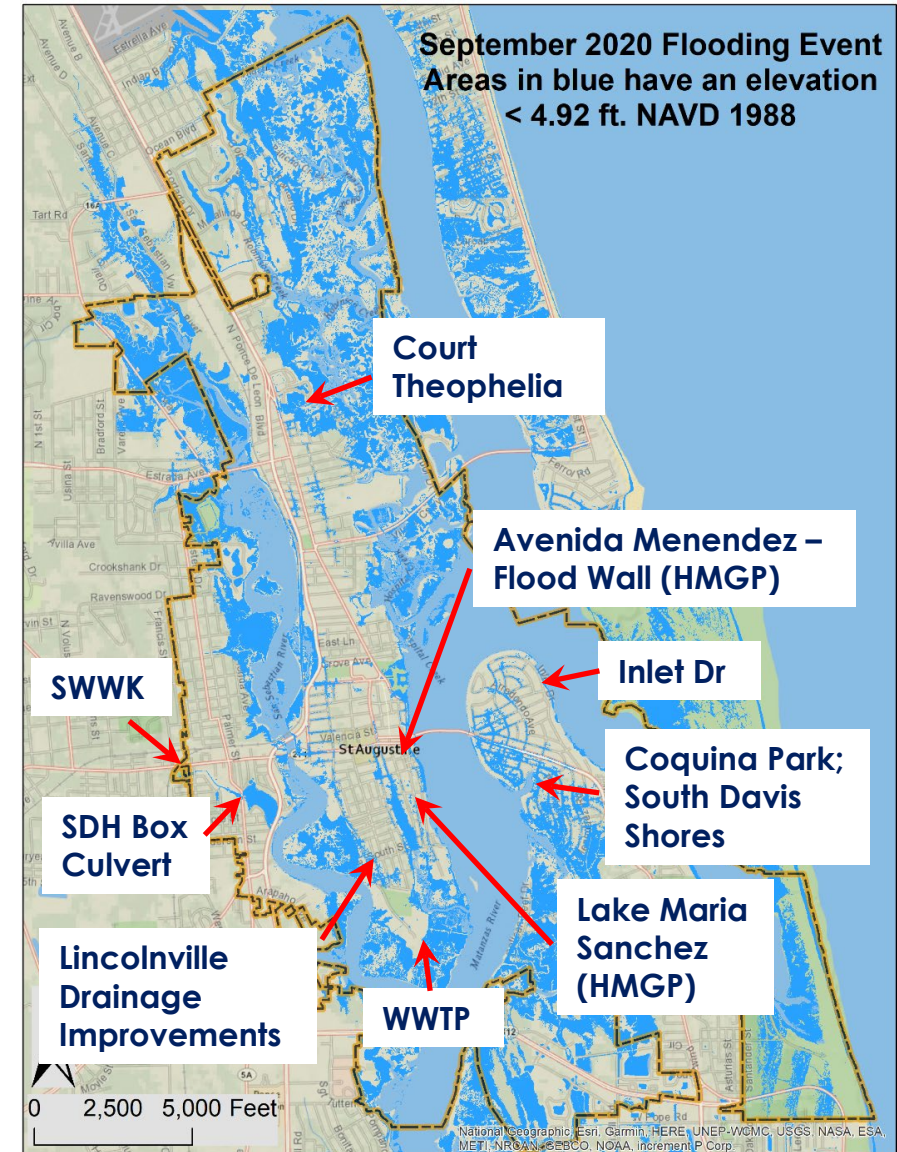
Funding Summary

❖ Current Flood Mitigation Investments ≈ \$69,741,833 (\$58,218,292, grant funded, 83%):

- ❑ Lake Maria Sanchez*, **
- ❑ FEMA 13 Lift Station Hardening and Flood Proofing*
- ❑ Wastewater Treatment Plant (WWTP) Flood Proofing
- ❑ South Whitney/West King (SWWK) Flood Mitigation*, **
- ❑ Avenida Menendez Flood Wall*
- ❑ City-wide tide check valves (43 installed, 20 future)**
- ❑ Coquina Park
- ❑ South Dixie Highway Culvert Replacement**
- ❑ Lincolnville Utility and Drainage Improvements*, **
- ❑ South Davis Shores Flood Mitigation and Drainage Improvements *, **
- ❑ Inlet Drive Shoreline Resiliency Improvements *, **
- ❑ Flood Mitigation and Drainage Improvements for the Court Theophelia Neighborhood *, **
- ❑ Updated Vulnerability Assessment (State)**
- ❑ USACE Back Bay Feasibility Study (Federal)**

*Denotes Federally Funded Project (FEMA –PA, HMGP; HUD/DEO-CDBG-NR)

**Denotes State Funded Project (SJRWMD, FDEP)





Final Thoughts...Resilience is Really Complex



- ❖ **Interdisciplinary**
- ❖ **Requires coordination within multiple entities (government, public, private)**
- ❖ **Lessons learned from others**
- ❖ **Creative thinking to tackle these complex problems**
- ❖ **Where there are challenges also lies opportunities**
- ❖ **Be “Trail Blazers”, build the bridge as we go across**



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Thank you for your time!
www.CityStAug.com/Resiliency



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Chief Resilience Officer

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