



CITY OF
ST AUGUSTINE
EST. 1565



City of St. Augustine – Resiliency and Stormwater Program

St. Johns County Civic Round Table

February 13, 2023

Jessica L. Beach, P.E.
Chief Resilience Officer
Public Works Department





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Presentation Outline

- ❖ Recap of the Hurricane Season
- ❖ Why do we flood? A look at our challenges...
- ❖ Overview of the Resilience Program and Strategy

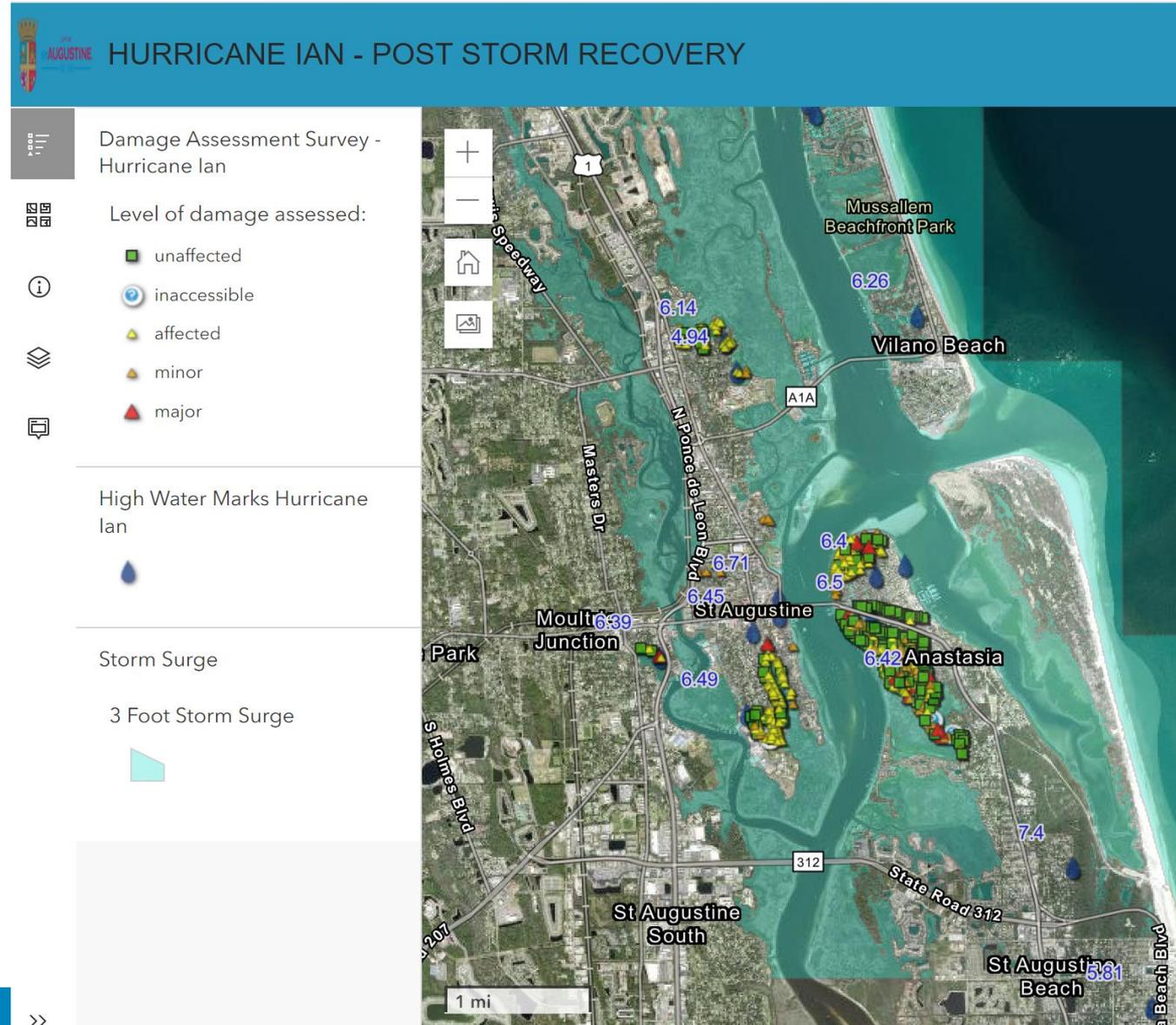




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A Recap of Hurricane Season

- ❖ City wide flooding from Hurricane's Ian and Nicole
- ❖ Map shows high water marks (HWM) – ranged from 4.94 – 7.4
- ❖ Preliminary assessment of impacted homes





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A Recap of Hurricane Season



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

Matthew (7.07 NAVD88)



↑ MATTHEW 7.07 NAVD 88 FT

**Ian (6.5 NAVD88)
Nicole (6.53 NAVD88)**



↑ IAN 6.50 NAVD 88 FT

Irma (4.9 NAVD88)



↑ IRMA 4.90 NAVD 88 FT





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%
Lincolnville			12%
Oyster Creek			1%
North Davis Shores			13%
South Davis Shores			48%



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Flooding is not new to the City



Why Do We Flood ?

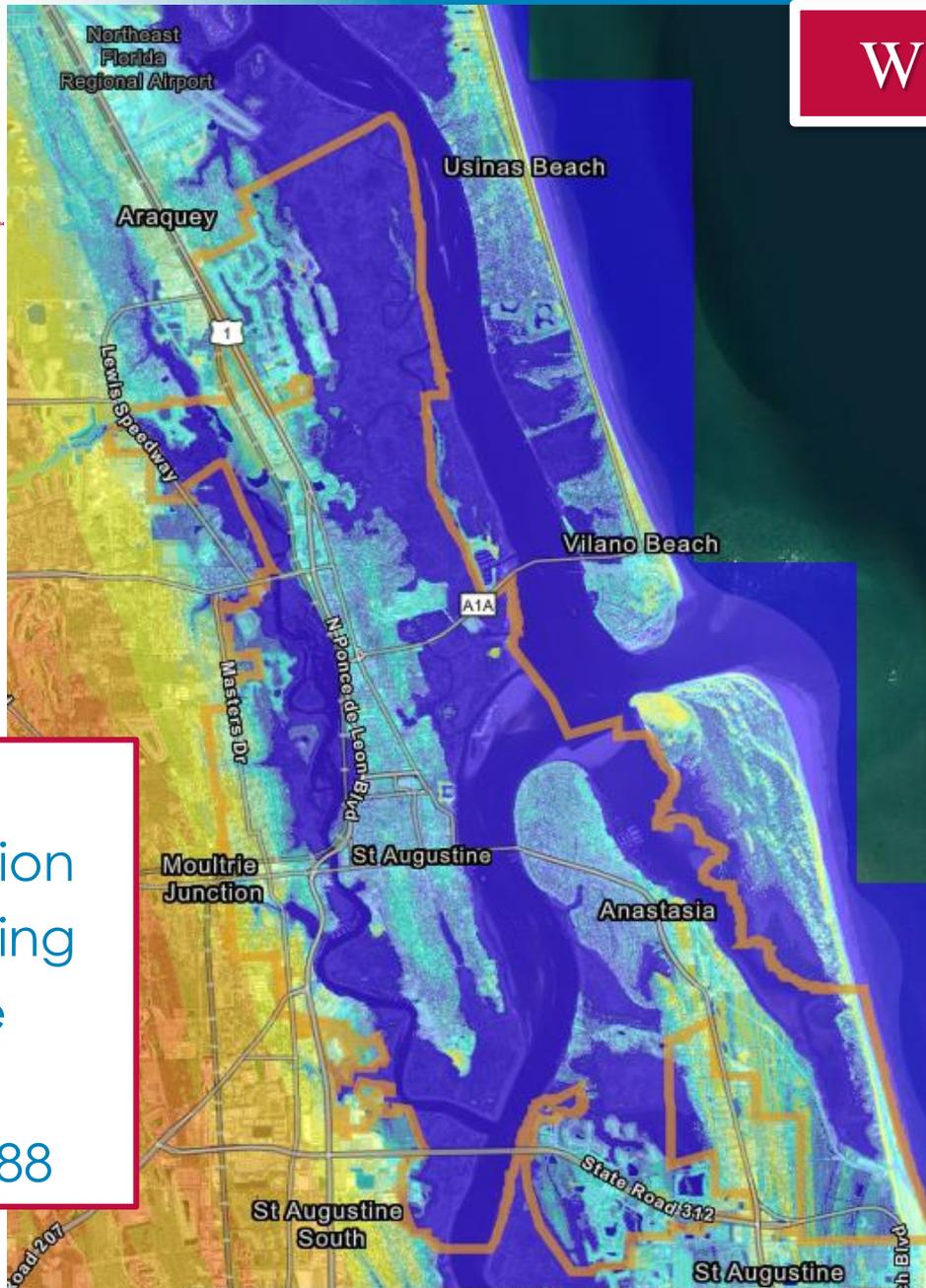


However, the frequency of “sunny day” flooding is on the rise



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❖ Digital
Elevation
Mapping
for the
City in
NAVD88



Why Do We Flood ?

Hurricane's Ian and
Nicole
(HWM ≈ 6.5 NAVD88)

- Wetlands
 - Zip Codes
 - Zoning Codes
 - ...
 - Elevation Certif
 - Storm Surge De
 - COSA_DEM
- | |
|-------------|
| 50 - 116.23 |
| 35 - 50 |
| 25 - 35 |
| 15 - 25 |
| 12 - 15 |
| 9 - 12 |
| 7 - 9 |
| 5 - 7 |
| 3 - 5 |
| -4.3 - 3 |



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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)**



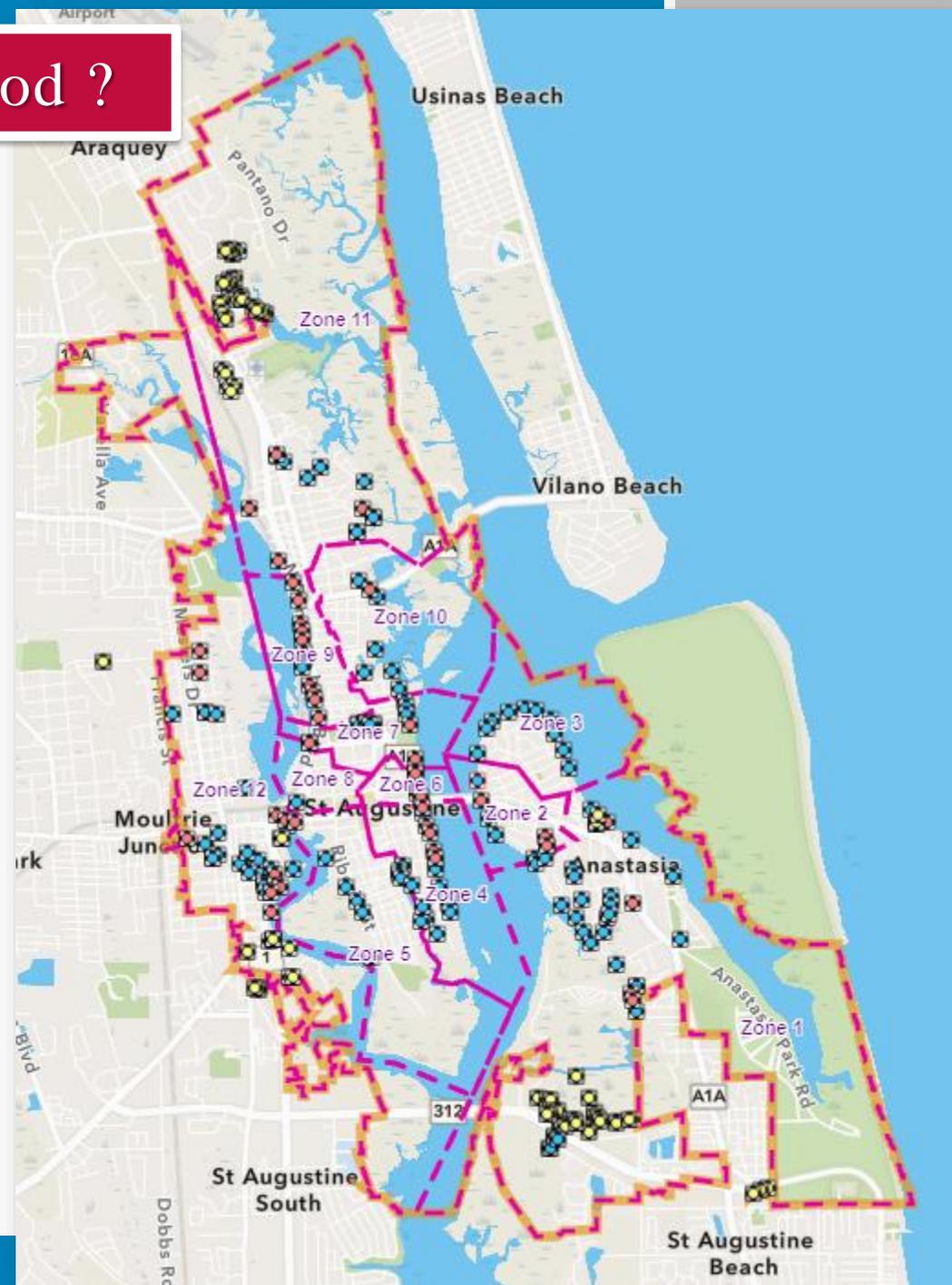


Why Do We Flood ?

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Stormwater Infrastructure:

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





Overview of the Resilience Program and Strategy



www.citystaug.com/resiliency





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Overview of the Resilience Program and Strategy

- ❖ Outreach and Education
 - ❖ “One Stop Shop”:
 - ✓ Programs
 - ✓ Projects
 - ✓ Planning / Studies
 - ✓ Payment / Funding
 - ✓ Policy
 - ✓ Resources for Residents
- www.CityStAug.com/Resiliency

Planning and Studies +

Projects +

Programs +

Policy +

Resources +

Payment/Funding

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

Flood Resilience

Resilience is the ability of individuals, communities, institutions, businesses, and system within St. Augustine to survive, adapt, and grow no matter what kinds of acute shocks (a sudden, sharp event that can threaten the city) and chronic stresses (stresses weakened the fabric of the city on a day-to-day basis) they experience.

The City of St. Augustine faces many challenges when it comes to both coastal and rain driven flooding, as a majority of the city is located in a flood plain. The City of St. Augustine is proactively identifying areas of risks as it relates to the inevitable effects of sea level rise.

Stormwater Updates

For the latest updates given to commission regarding the resilience program, [click here](#).



Programs



Planning / Studies



Payment / Funding



Projects



Policy



Resources



Contact Us

Jessica Beach, P.E.
Chief Resilience Officer
[Send an email](#)
[More Information](#)

FAQs

- [What is flood resilience?](#)
- [What is the city doing about the flooding?](#)
- [What can I do to protect my home from flooding?](#)

[View All](#)

Quick Links

- [St. John's County Emergency Operations Center](#)
- [St. John's County Flood Facts website](#)
- [St. John's County Evacuation Information](#)

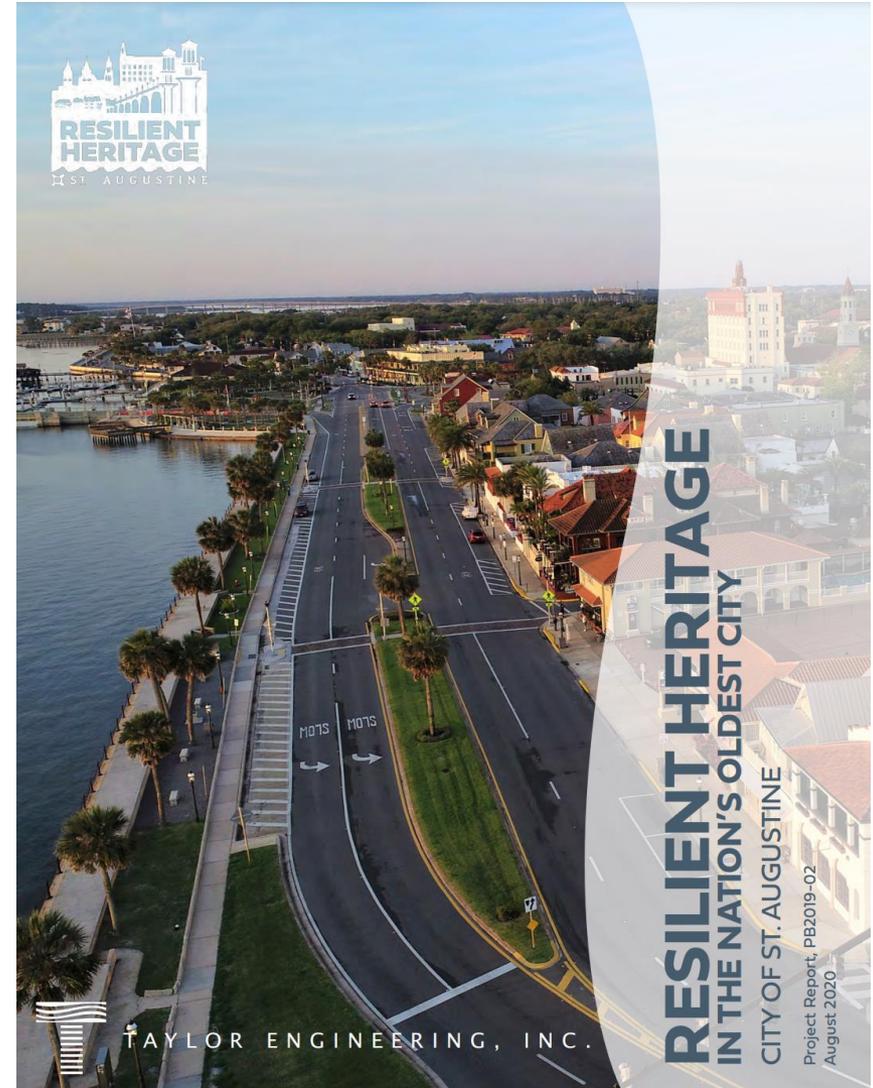
[View All](#)



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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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www.citystaug.com/FMA
for more info

❖ Flood Mitigation Assistance (FMA) Program

- ✓ Cost share program with FEMA to elevate and/or reconstruct flood prone, at-risk structures
- ✓ FY21 – Application Cycle Completed (25 applications), but not selected
- ✓ FY 22 – Application Cycle:
 - Over 80 properties interested in the program, 62 properties had complete applications that met the program requirements
 - City submitted its applications to the State November 14th and is currently under State review, eligible applications will then be submitted to FEMA
 - Total funding request of \$12,353,474 submitted that would be cost shared with FEMA if selected
 - Late August – estimated timeframe to know if selected



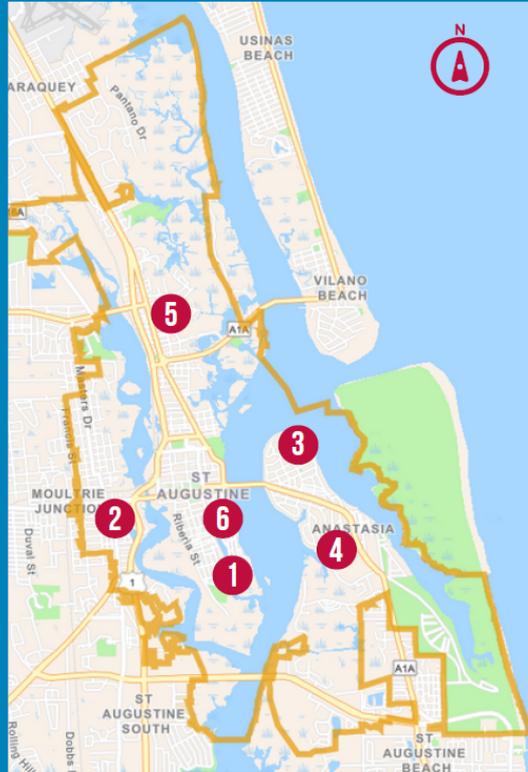
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Project Map Key

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

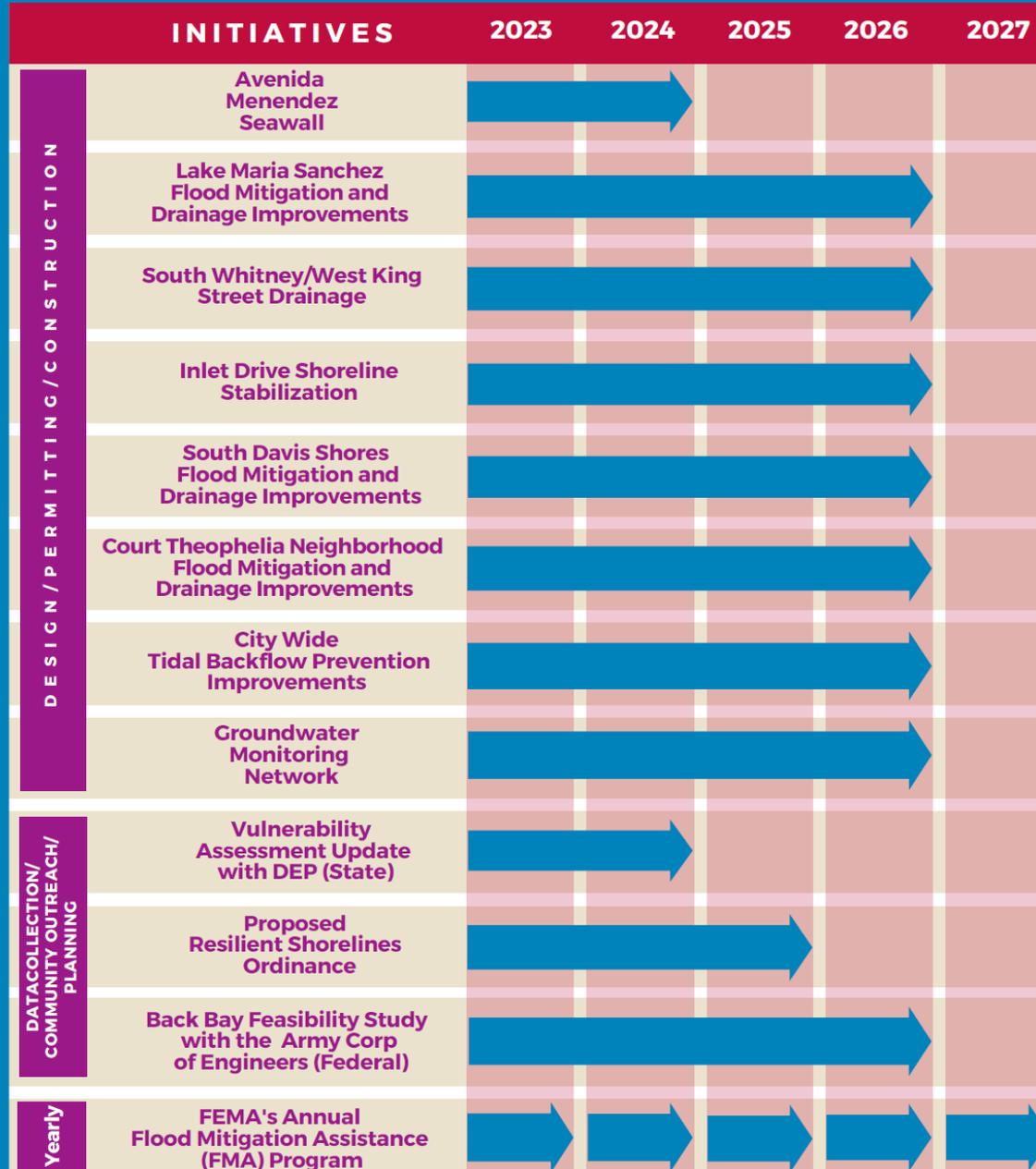




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RESILIENCE EFFORTS TIMELINE





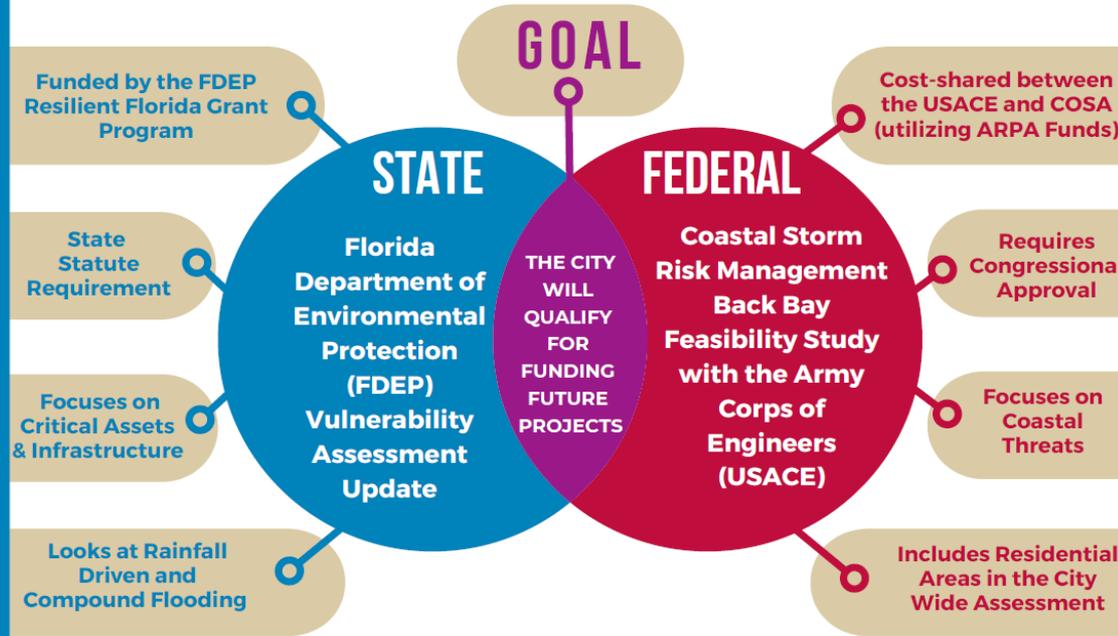
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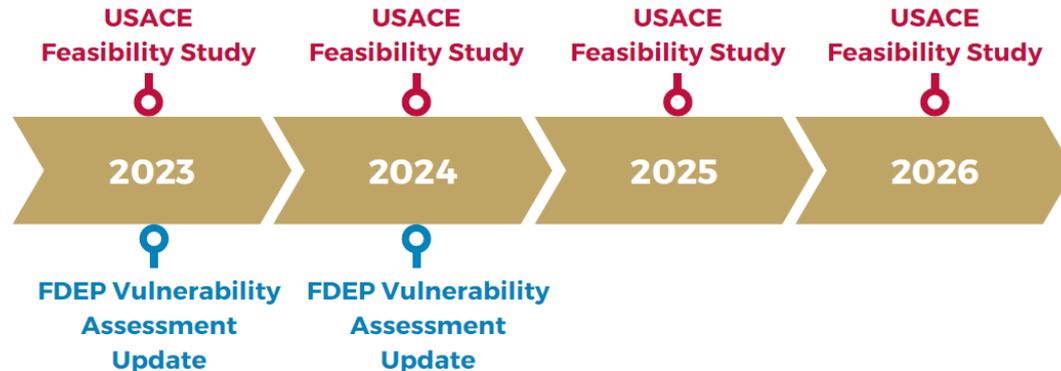
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CITY OF ST. AUGUSTINE STUDIES BREAKDOWN



STUDIES TIMELINE





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.

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.

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.



ESTIMATED ASSESMENT COST:
\$500,000



STUDY SCHEDULE 2023-2024

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





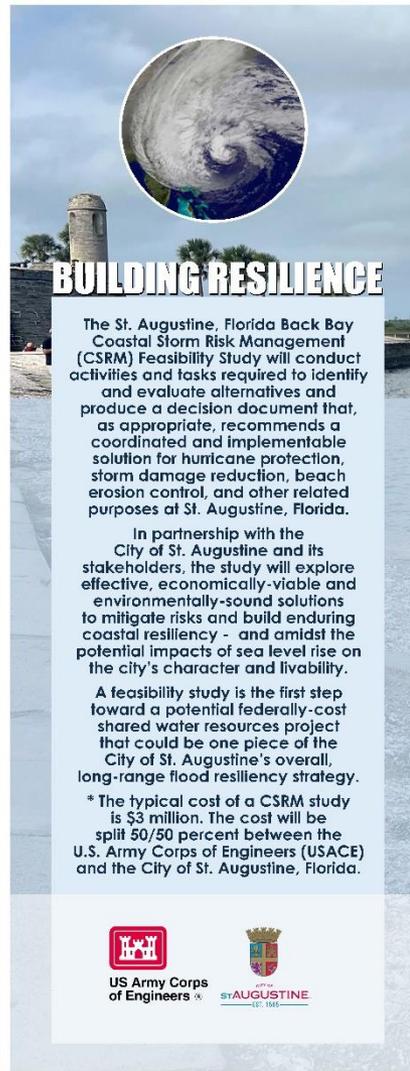
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❖ Public input is important !
❖ 1st Public Meeting
Wed. Feb. 22nd @ 6-8 PM, Alcazar Room

- ❑ Poster sessions
- ❑ Presentation
- ❑ Public Comment
- ❑ Live streamed and recorded

www.citystaug.com/BackBay



BUILDING RESILIENCE

The St. Augustine, Florida Back Bay Coastal Storm Risk Management (CSRSM) Feasibility Study will conduct activities and tasks required to identify and evaluate alternatives and produce a decision document that, as appropriate, recommends a coordinated and implementable solution for hurricane protection, storm damage reduction, beach erosion control, and other related purposes at St. Augustine, Florida.

In partnership with the City of St. Augustine and its stakeholders, the study will explore effective, economically-viable and environmentally-sound solutions to mitigate risks and build enduring coastal resiliency - and amidst the potential impacts of sea level rise on the city's character and livability.

A feasibility study is the first step toward a potential federally-cost shared water resources project that could be one piece of the City of St. Augustine's overall, long-range flood resiliency strategy.

* The typical cost of a CSRSM study is \$3 million. The cost will be split 50/50 percent between the U.S. Army Corps of Engineers (USACE) and the City of St. Augustine, Florida.



US Army Corps of Engineers



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TRANSPARENT PLANNING PROCESS

Feasibility studies use a transparent 6-Step Planning Process that pursues alternatives to reduce economic damages from storms over a 50-year project life, consistent with environmental statutes. In addition to economic and environmental conditions, regional economic development and social effects are addressed during the planning process. There are a variety of approaches, both quantitative and qualitative, to assist with multi-criteria decision making and plan selection.

Public input is paramount in the decision process. Multiple public/stakeholder meetings will occur throughout the study.



MULTI-DISCIPLINARY PROJECT DELIVERY TEAM

The project delivery team (PDT) is the workgroup tasked with conducting the study and consists of varied experts including planners, engineers, biologists, geologists, hydrologists, surveyors, archaeologists, economists, real estate specialists, and more to address problems and opportunities. Each team member is responsible for identifying water resources problems and assisting in formulating solutions to those problems within their area of expertise. This interdisciplinary approach to problem solving is key to a successful feasibility study.



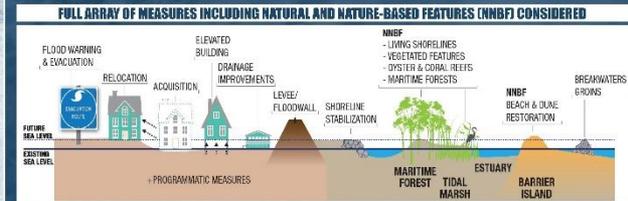
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INTEGRATED FEASIBILITY REPORT AND NATIONAL ENVIRONMENTAL POLICY ACT ANALYSIS

The National Environmental Policy Act (NEPA) is a Federal law enacted in 1969. As required by NEPA, USACE will assess the potential environmental effects of the study alternatives, including a no action alternative. The report also documents coordination with the varied resource agencies that help to shape the final recommendation. Examples of NEPA effects categories include:



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TYPICAL SCHEDULE | PLANNING MILESTONES FOR A 3-YEAR STUDY*



* The study schedule, scope, and budget can vary depending upon the complexity of the study area and corresponding problems identified throughout the study process; changes to the 3-year, \$3 million parameters require documentation and approval of division and Headquarters USACE and concurrence of the local sponsor. A specific schedule and budget for this study will be developed after the Feasibility Cost Sharing Agreement (FCSA) is signed.

* Contingent upon Congressional Authorization and Appropriations

ST. AUGUSTINE, FLORIDA BACK BAY CSRSM FEASIBILITY STUDY



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 waters, 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

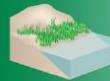
PHASE	STATUS
PHASE 1	DATA COLLECTION
PHASE 2	DRAFT RESILIENT SHORELINE ORDINANCE
PHASE 3	COMMUNITY OUTREACH & ENGAGEMENT SUPPORT

GREEN - SOFTER TECHNIQUES

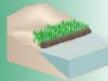
GRAY - HARDER TECHNIQUES

Living Shorelines

Coastal Structures



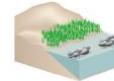
VEGETATION ONLY - Provides a buffer to upland areas and breaks small waves. Suitable for low wave energy environments.



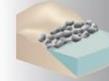
EDGING - Added structure holds the toe of existing or vegetated slope in place. Suitable for most areas except high wave energy environments.



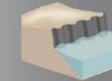
SILLS - Parallel to vegetated shoreline, reduces wave energy, and prevents erosion. Suitable for most areas except high wave energy environments.



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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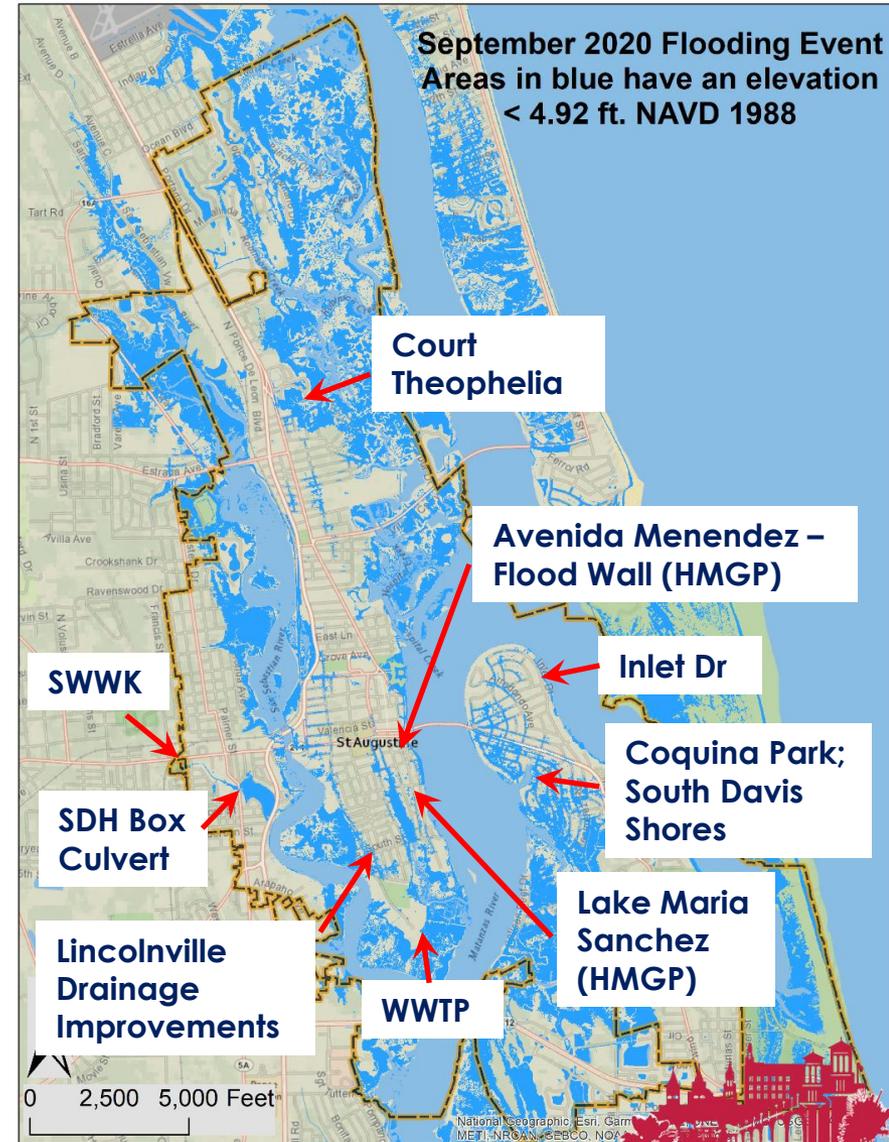
In Summary

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

**Denotes State Funded Project (SJRWMD, FDEP)

❖ **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)**

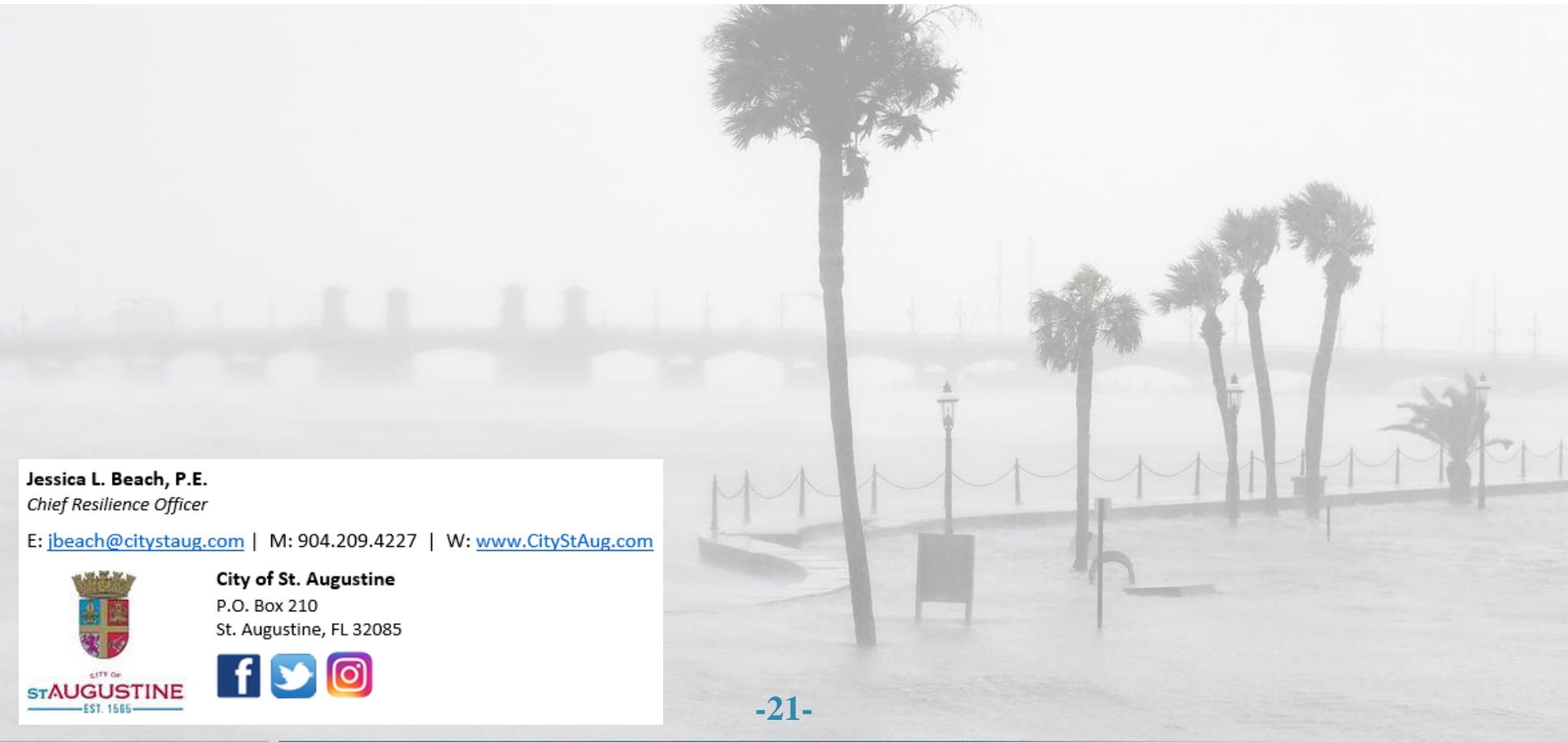




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Thank you for your time!

www.CityStAug.com/Resiliency



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