

City of Jacksonville Adaptation Action Area Workgroup Report and Recommendations

November 2019



The Honorable Lenny Curry
Mayor

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EXECUTIVE SUMMARY

The City of Jacksonville implemented the Florida Statutes 2015 Peril of Flood legislation (Section 163.3178(2)(f)2, Florida Statutes) by establishing an Adaptation Action Area (AAA). An AAA is a designation in the Conservation/Coastal Management Element of the City's Comprehensive Plan, which identifies an area that experiences coastal flooding due to extreme high tides and storm surge and that is vulnerable to the impacts of sea level rise. The purpose of designating an AAA is to prioritize funding and resources for infrastructure needs and adaptation planning. The City's AAA designation was adopted into the Comprehensive Plan in 2017, and a Workgroup was established to review existing programs and policies in relation to the AAA to determine the need and appropriate timing for additional and financially feasible responses to the effects of coastal flooding within the AAA. The Workgroup held meetings from February through August of 2019, and this report documents their recommendations and findings.

The City's AAA was originally adopted using research and data from the US Army Corps of Engineers (USACE); the National Oceanic and Atmospheric Administration (NOAA); the Southeast Florida Regional Climate Change Compact; the University of Florida's Florida Climate Institute; and the Northeast Florida Regional Council's (NEFRC) Emergency Preparedness Committee on Sea Level Rise. Assumptions from these sources show a potential sea level rise range of 1 – 3 feet by 2060 and 3-6 feet by 2110. The City selected a medium range of impact of two (2) feet of sea level rise by 2060 to establish the initial geographic boundary of the AAA. After mapping areas that would be affected by a two-foot sea level rise, it was found that the AAA and the Coastal High Hazard Area (CHHA) boundaries correlate to a high degree. The CHHA is an existing, regulatory/planning boundary defined by Florida Statutes (Section 163.3178(2)(h)). As such, a reasonable policy approach was to recognize the CHHA as also encompassing the AAA.

However, Jacksonville is unique in that the city has an extensive interconnected coastal and riverine system susceptible to both storm surge and sea level rise. Accordingly, a key finding of the AAA Workgroup is that traditional numerical models used solely for coastal storm surge predictions are not necessarily adequate for the inland portions of the St. Johns River. As such, it was determined that probabilistic flooding potential is not portrayed accurately for the City riverfront extending from approximately the Mathews Bridge southward to the county line. This finding is one reason that the Workgroup recommends the AAA boundary be expanded to include the area that is within the projected limits of a Category 3 storm surge and those contiguous areas of the 500-year Flood Zone.

The Workgroup learned about and evaluated existing policies and regulations related to infrastructure, land development, utilities, and emergency management. Discussions

resulting from these presentations culminated in a series of recommendations. When compiled, these recommendations, which were structured within an adaptation planning framework, ended up creating the following core areas on which Jacksonville’s resiliency efforts can be based.



Education & Community Outreach



Land Development Regulations & Procedures



Inter-agency Coordination



Infrastructure



Economic & Human Resources

Underlying these recommendations is the recognition that the City needs more information and analysis about how vulnerable Jacksonville is, and will be, to sea level rise and coastal flooding. Given this, another key recommendation from the Workgroup is that the City conduct a vulnerability assessment. This assessment would measure the impact of sea level rise and identify the people, infrastructure, habitats, and functions that may be affected.

Lastly, a fundamental recommendation of the Workgroup is the need for a Chief Resiliency Officer or Office for the City of Jacksonville. The Workgroup found that states, counties, and municipalities challenged by sea level rise are increasingly hiring or appointing a resiliency officer or staffing a resiliency office in order to perform long-range adaptation planning or to achieve long-term objectives. This position or office would have significant responsibilities concerning tasks such as education and awareness, coordination, and implementation of resiliency initiatives.

This document outlines the origins of the City’s designated Adaptation Action Area; the membership and scope of the AAA Workgroup; assumptions regarding sea level rise for Jacksonville; detailed descriptions of the City’s five core areas for sea level rise resiliency; an adaptation planning framework; and the recommendations of the Workgroup. The last section of the document outlines incremental steps to move the City from planning to implementation.

PURPOSE & INTENT

The purpose of this document is to provide a guiding framework for making Jacksonville more resilient to sea level rise and coastal flooding. It summarizes the challenges currently facing the City and the discussion of the AAA Workgroup related to these issues. The document presents the recommendations of the Workgroup as policy statements to lead to a more resilient Jacksonville. It is anticipated that recommendations provided in this report will be submitted for legislation as amendments to the Comprehensive Plan and/or amendments to the City's Ordinance Code.

This document is intended to provide direction for Jacksonville's path forward given the challenge of sea level rise and coastal flooding. In addition to establishing the City's core areas concerning resiliency and adaptation, the last section of the document provides fundamental steps that the City can take towards resiliency.

Role of the Comprehensive Plan

The 2030 Comprehensive Plan is a policy document required by Florida Statutes Chapter 163, and by Chapter 650 of the City of Jacksonville Code of Ordinances. Pursuant to the Florida Statutes and the City's Code of Ordinances, the Comprehensive Plan outlines the short and long-term goals directing the development of programs and policies that guide growth and development in an effective and orderly manner. The ultimate goal of which is to promote the public health, safety and welfare.

The City's Comprehensive Plan is comprised of ten elements that contain a listing of goals, objectives and policies. Goals, objectives, and policies are intended to be general rules of conduct that allow for broad discretion in decision-making. The goals, objectives and policies are often associated with more detailed and specific implementing rules, regulations and programs such as the City of Jacksonville Code of Ordinances.

Land Development Regulations

The City's Land Development Regulations are ordinances enacted for the regulation of any aspect of development and includes any local government zoning, rezoning, subdivision, site development review, building construction or sign regulations or any other regulations controlling the development of land. For example, Land Development Regulations include the Zoning Code, the Code of Subdivision Regulations, the Flood Plain Management Ordinance.

In general, the purpose of the Land Development Regulations is to promote the health, safety, and welfare of the public, to regulate the use of land and buildings and to implement the Comprehensive Plan adopted pursuant to Chapter 650, Ordinance Code and Florida Statutes Chapter 163.

CONTEXT

Adaptation Action Area Workgroup

The AAA Working Group (Workgroup) was established pursuant to the City of Jacksonville's 2030 Comprehensive Plan, specifically Conservation/Coastal Management Element (CCME) Objective 11.5 and Policy 11.5.4.

CCME Objective 11.5

The City has established an Adaptation Action Area (AAA) and shall consider appropriate responses to address current and future risks related to the associated impacts of sea-level-rise.

CCME Policy 11.5.4

The City of Jacksonville shall create a working group to review existing programs and policies in relation to the AAA to determine the need and appropriate timing for additional and financially feasible responses to the effects of coastal flooding within the Adaptation Action Area. The working group shall be established within one year of the effective date of this policy.

The AAA Working Group consists of members with a broad variety of expertise in areas such as environmental sciences, economics and land development. The Workgroup also includes a representative of the City Council and a lay member.

MEMBERS OF THE ADAPTATION ACTION AREA WORKGROUP

- Emily Pierce, Esq. – Chair, Rogers Towers P.A.
- Michelle Tappouni – Vice Chair, Lay Member
- Shannon Blankinship, St. Johns Riverkeeper
- Dr. Chiradip Chatterjee, University of North Florida
- Shane Corbin, City of Atlantic Beach
- Matt Galnor, Jacksonville Chamber of Commerce
- Joseph Loretta, Northeast Florida Builders Association
- Jim Love, State Farm Insurance and former City Council Member
- Dr. Jeff Martin, Jacksonville University
- The Honorable Samuel Newby, City Council At-Large Group 5
- Erik Olsen, P.E., Olsen Associates, Inc.



The AAA Workgroup was staffed by the City of Jacksonville Planning and Development Department. The Workgroup met from February through August 2019. Meetings were open to the public and public comments were received.

Adaptation Action Area Workgroup Mission

Evaluate the City's existing programs and policies in relation to the Adaptation Action Area (AAA) to determine the need and timing, if appropriate, for additional and financially feasible responses to the effects of coastal flooding within the Adaptation Action Area. Recommend policy and regulatory changes deemed necessary and appropriate to protect public and private investment within the AAA.

Scope of the Workgroup

Task 1 – Identify the Impacts of Coastal Flooding within the AAA

Define the condition of, and affects resulting from, coastal flooding within the AAA. At a minimum, considerations should include population, critical infrastructure, natural resources, and economic impact.

Task 2 – Evaluate the City's Existing Programs and Policies

Examine the strengths, shortcomings, and opportunities of existing policies and regulations in relation to the AAA. The regulatory assessment may include, but is not limited to, drainage regulations and infrastructure, floodplain management and regulations, land use policies, zoning regulations, and hazard mitigation.

Task 3 - Recommendations

Based on the findings of Task 2, recommend policy and regulatory changes deemed necessary and appropriate to protect private and public investment within the AAA. Recommendations should include, but may not be limited to, additional and financially feasible actions/initiatives relating to the effects of coastal flooding within the AAA.

The Workgroup learned about and evaluated existing local policies and regulations related to infrastructure, land development, utilities, and emergency management. Discussions resulting from these presentations culminated in a series of recommendations provided in this report.

As shown in the Workgroup's Mission and Scope above, discussions and recommendations were limited to local policies and regulations, and specifically to the topic of sea level rise and coastal flooding with an assumption of two feet of rise by the year 2060. Given these constraints, the Workgroup requested that the City hold future conversations related to

broader issues of climate impacts and coordinate with State agencies regarding climate-related policies and regulations that are developed and implemented at the state-level.

When compiled, these recommendations, which were structured within an adaptation planning framework, ended up creating core areas on which to base Jacksonville's resiliency efforts. The core areas are education and community outreach; land development regulations and procedures; inter-agency coordination; infrastructure; and economic and human resources.

Planning Area

The geographic boundaries of the original AAA were based upon sea rise research from the US Army Corps of Engineers (USACE); the National Oceanic and Atmospheric Administration (NOAA); the Southeast Florida Regional Climate Change Compact; the University of Florida's Florida Climate Institute; and the Northeast Florida Regional Council's (NEFRC) Emergency Preparedness Committee on Sea Level Rise. The



assumptions on the potential rates of rise above current sea level ranged from 1-3 feet by 2060 and 3-6 feet by 2110. The Planning and Development Department (Department) selected a medium range impact of two feet of sea level rise by 2060 to establish the geographic boundaries of the AAA.

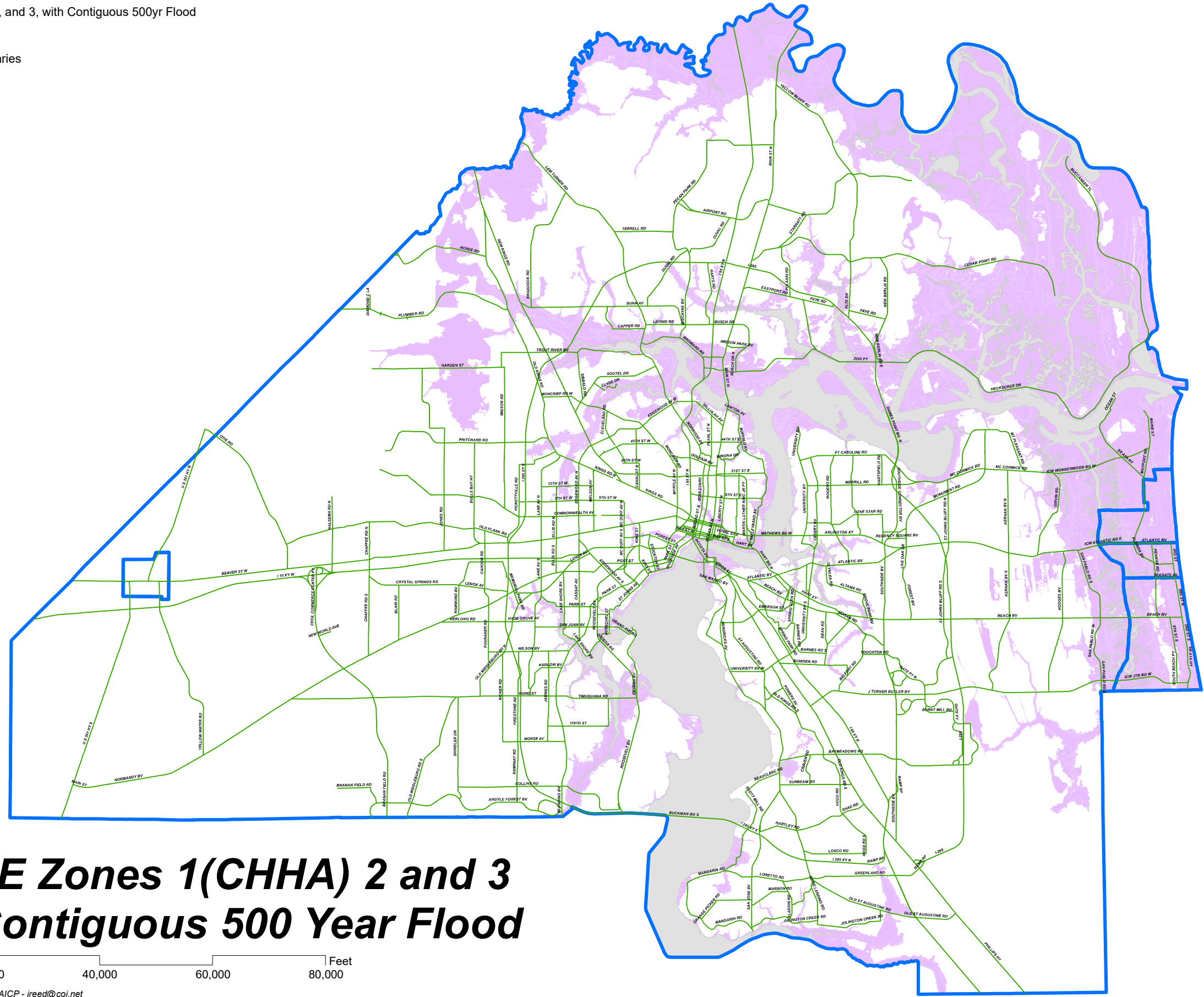
After mapping areas that would be affected by a two-foot sea level rise, it was found that the AAA and the existing Coastal High Hazard Area (CHHA) boundaries correlated to a high degree. As such, a reasonable policy approach was to recognize the CHHA as also encompassing the AAA.

However, Jacksonville is unique in that the city has an extensive interconnected coastal and riverine system susceptible to both storm surge and sea level rise. Accordingly, a key finding of the AAA Workgroup is that traditional numerical models used solely for coastal storm surge predictions are not necessarily adequate for the inland portions of the St. Johns River. As such, it was determined that probabilistic flooding potential is not portrayed accurately for the City riverfront extending from approximately the Mathews Bridge southward to the county line. **This finding is one reason that the Workgroup recommends the AAA boundary be expanded to include the area that is within the projected limits of a Category 3 storm surge and those contiguous areas of the 500-year Flood Zone.**

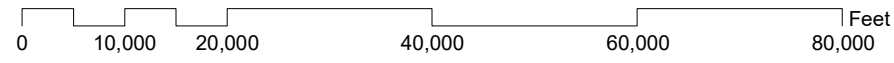
See the Map of Recommended Adaptation Action Area (AAA) on next page. The Map will be added as a layer to the City's interactive, web-based GIS mapping system upon adoption.

Legend

- Surge Zones 1, 2, and 3, with Contiguous 500yr Flood
- River
- Municipal Boundaries



SURGE Zones 1(CHHA) 2 and 3 with Contiguous 500 Year Flood



Developed by James M. Reed, AICP - jreed@coj.net
June 2019
I:\users\jmr\ArcMap1_2019\CHHA_AAA_2019\CHHA_AAA_2019\Surge_FEMA500_Comparison_20160620
Content intended for illustrative purposes only.

CORE AREAS

Recommendations from the Workgroup were organized into five (5) core areas in order to guide the City's resiliency strategy. Three (3) fundamental recommendations underlie all of the others: the proposed AAA boundary; the need for a Chief Resiliency Officer (or similar); and the need for a vulnerability assessment.

The recommendation to expand the AAA boundary and the reasoning behind this recommendation is stated above, and a detailed discussion of the recommended vulnerability assessment is provided in the "Area/Asset Vulnerability" section of this report.

The recommendation for a Chief Resiliency Office/r states that:

The City should establish a top-level position or authority, create an office, and/or assign tasks to oversee and coordinate the planning of interagency resiliency programs and public and private projects, engage stakeholders to promote public-private partnerships, and manage and leverage funding for resiliency initiatives. Tasks of such a position, authority, or office may include, but are not limited to, educational outreach, development of resiliency tools or resources for public and private use, and creation of a resource center to assist property owners.

The intent of this recommendation is that a high-ranking position within the Mayor's Administration is created, or that the City creates an independent agency/authority to focus on resiliency efforts. This position/office/agency/authority may be tasked with, or may direct efforts at, educating and informing professional groups that work directly with potential property owners (such as realtors, insurers, etc) about properties located within the AAA or, in general, properties that may be vulnerable to sea level rise or coastal flooding. Further, it is the intent of this recommendation that this position / office / agency / authority would coordinate across City departments such as, but not limited to, the Planning and Development Department (PDD); the Jacksonville Fire and Rescue Department (JFRD); the Public Works Department (PW); the Neighborhoods Department; and the Parks, Recreation, and Community Services Department to effectively and efficiently implement resiliency initiatives. It is also anticipated that this position/officer/agency/authority would collaborate with regional or state entities such as the Northeast Florida Regional Council (NEFRC) and the Florida Department of Environmental Protection (FDEP) to further resiliency measures.



Education & Community Outreach

Educate and inform residents about sea level rise and its impacts.

The **Education and Community Outreach** core area focuses on providing residents, property owners and prospective property owners with resources and information about sea level rise and related impacts so that they may make knowledgeable decisions when deciding where to locate; how to protect their property; and how to mitigate flooding. This area also contains recommendations that address the community at-large, including those looking for more localized data on sea level rise and major storm events and those whose decisions in the workplace may be informed by sea level rise data or by subject matter experts.

Recommendations from the AAA Workgroup provide various mechanisms to educate, notify, and disseminate information to the community. For example, recommendations include disclosing flood hazards to the public, gathering and disseminating the spatial limits of flooding following a major storm event, establishing a technical advisory committee to provide expertise related to adaptation to sea level rise, and updating the AAA every five years in order to respond to the best available data.

The intent of these recommendations is to help inform property owners about flood risks affecting their property and to educate community members about options for mitigating flood risk, including low-impact techniques and the value of urban vegetation.



Land Development Regulations & Procedures

Improve the location and site characteristics for new developments and retrofit existing development to avoid or accommodate rising water.

The **Land Development Regulations and Procedures** core area highlights the need for a regulatory approach to new development and for a path to retrofit existing development. Land development regulations, policies, and procedures that respond to sea level rise should be established and implemented in the near term given the longevity of buildings and development patterns.

Several recommendations fall within this core area. Recommendations are diverse and include, but are not limited to the following:

- Using entitlement mechanisms to guide development away from environmentally sensitive lands and to areas that are already high, dry, and connected.
- Exploring the use of a resilience scorecard, matrix, or similar approach to integrate disaster risk into development decisions. Development of this tool could be informed based on the outcomes of the proposed vulnerability assessment, and using this type of tool would encourage decision-makers to consider resiliency as part of a project's overall feasibility and/or cost (both tangible and intangible).
- Looking at incentives for the provision of green infrastructure and hazard mitigation projects, as well as for removing vulnerable structures from the AAA or bringing such structures into compliance with the City's Ordinance Code.
- Evaluating/revising the Land Development Regulations to encourage and increase a wide variety of protection strategies for developments within the AAA. One strategy is to develop and apply more stringent design standards for stormwater ponds. Other strategies include, but are not limited to, increasing buffers or setbacks from mean high water lines, wetlands, and/or waterways, limiting or requiring (where appropriate) green infrastructure solutions or storm hardening solutions, and increasing the required freeboard for structures located in flood-prone areas.
- Determining the threshold above which a structure within the AAA would need to come into compliance with the City's Ordinance Code – particularly given that regulations within the AAA may become more stringent over time. The Workgroup discussed the option that the threshold for compliance may exclude improvements made to increase the resiliency of a structure.
- Creating processes to safeguard the local natural environment from anticipated sea level rise.

The full list of detailed recommendations can be found within the “Recommendations” section of this report.



Inter-agency Coordination
 Establish or improve coordination and cooperation between and among City, regional, and state departments, agencies, and institutions.

The **Inter-agency Coordination** core area concentrates on creating and enhancing the relationships and coordination efforts between and among City, regional, and state agencies in order to improve the City's resiliency to sea level rise. The Workgroup's recommendation that the City hire or appoint a Chief Resiliency Officer, or similar, provides an opportunity for these coordination and partnership efforts to reside in one office or under the direction of one individual.

The success of resiliency initiatives will likely be reliant on cohesive and effective processes across a variety of agencies both internal to the City and external. Through the Workgroup’s recommendations, the City will continue to foster relationships with several agency partners such as the Florida Department of Environmental Protection (FDEP); JEA; the St. Johns River Water Management District (SJRWMD); and others. For example, one recommendation discourages the permitting of bulkheads where bulkheads do not exist and instead, encourages soft solutions to stabilize shorelines. This recommendation reinforces a positive relationship with an existing FDEP rule with the same intent (18-21.004(2)(f), F.A.C.). Discussion by the Workgroup also included recognizing the importance of coordinating across City Departments to maintain or improve the City’s ranking within the Federal Emergency Management Agency’s (FEMA) Community Rating System (CRS). This program provides incentives for communities that practice proper floodplain management.

Recommendations within this core area also include those that would require collaboration between or among multiple agencies or departments to implement specific programs. Examples of recommendations that would need collaboration include evaluating development projects within the AAA prior to making public expenditures for these projects and considering the acquisition of flood-prone properties that could serve as both recreation/open space and flood water storage capacity during major storm or high tide events.

Additionally, the Workgroup recommended that agencies coordinate to mitigate flood hazards on adjacent properties that may occur due to publicly funded actions. The intent of this recommendation originated with a discussion about elevating roadways, and what the stormwater impact would be to properties adjacent to elevated roadways.

The full list of detailed recommendations can be found within the “Recommendations” section of this report.



Infrastructure
Repair and maintain infrastructure in flood-prone neighborhoods, and implement new solutions for managing stormwater and rising groundwater.

The **Infrastructure** core area highlights policies and procedures that seek to retrofit the existing stormwater and drainage systems and to establish new mechanisms for designing and installing public infrastructure that will be resilient to sea level rise. For the most part, “infrastructure” refers to drainage and stormwater systems; however, roadway systems are

also part of the City's infrastructure and have been included as such within the Workgroup's recommendations.



Separate from the AAA Workgroup, the Storm Resiliency and Infrastructure Development Review Committee (SRAIDRC), an Ad-hoc Committee created at the behest of the Mayor and Council President, met from February through June of 2019. The SRAIDRC's charge was to provide efficient and immediate solutions to infrastructure that is being challenged by storm surge and extreme tides

and tidal fluctuations, while keeping an eye on future needs and planning, specifically concerning infrastructure hardening and infrastructure development. Outcomes from the SRAIDRC included changes to the City's Ordinance Code (such as revisions to freeboard requirements and the buffering of floodways) and procedural changes. Not connected to the SRAIDRC process, the AAA Workgroup found these changes to be necessary as well, and as such, they recommended policy statements that would include, and broaden the intent of, the changes prompted by the SRAIDRC.

Several of the Workgroup's recommendations within this core area go beyond topics that were covered by the SRAIDRC as their scope was more limited to short term, immediate actions directed at drainage and stormwater infrastructure systems. Recommendations from the Workgroup include, but are not limited to the following:

- Ensuring that adaptation strategies include roadways, stormwater systems, and related infrastructure. The North Florida Transportation Planning Organization (NFTPO), Jacksonville Transportation Agency (JTA), and the Florida Department of Transportation (FDOT) should be among the agencies coordinated with regarding roadway infrastructure.
- Comparing and assessing protection mechanisms (hard or soft structural options) when designing and engineering these systems for projects within the AAA. An assessment would include but not be limited to a cost-benefit analysis and an analysis of the short- and long-term impacts of these mechanisms to the surrounding area.
- Considering options for requiring the repair and maintenance of private sea walls and bulkheads that protect critical public resources or infrastructure.
- Updating the Master Stormwater Management Plan. One intended outcome of this recommendation is to continue floodplain mapping in areas not currently mapped.
- Evaluating alternative stormwater storage solutions and natural groundwater storage solutions like low impact development features and wetlands systems.
- Improving stormwater infrastructure to account for extreme storm events.

- Considering the appropriateness of projects within the AAA prior to making public expenditures for these projects. This recommendation applies to both private and public developments that are being considered for public expenditures and ensures that the City take into account a project’s potential vulnerability to both storm surge and sea level rise.
- Developing procedures to safeguard local natural environments from anticipated sea level rise. In part these measures include promoting preservation, reforestation, and afforestation to increase soil moisture retention, as shown in the City of Jacksonville Stormwater Case Booklet (May 2019).



Economic & Human Resources

Ensure a vibrant economy as adaptation solutions are implemented and focus on preserving and protecting the health, safety, and welfare of the population.

The **Economic and Human Resources** core area is focused on ensuring that Jacksonville has a resilient economy and that the quality of life is preserved, enhanced, or restored, when necessary.

The AAA Workgroup was briefed on the Duval County Local Mitigation Strategy (LMS) by staff in the Emergency Preparedness Division. The LMS is a planning process required by the State to oversee a plan of mitigation initiatives to help the county anticipate, and prepare for, hazard avoidance. The Workgroup has recommended that the Emergency Preparedness Division collaborate with relevant agencies and non-profits to prepare for trauma associated with displacement, or related issues, following an extreme weather event.



The Emergency Preparedness Division also manages implementation of FEMA’s repetitive loss program. Currently a voluntary land acquisition project is underway involving multiple homes in the Reed Subdivision/South Shores neighborhood. This area is located in the 100-year flood plain, is prone to tidal flooding, and sustained significant damage due to Hurricane Irma. The area was initially identified for acquisition for public safety reasons; emergency and rescue vehicles were no longer able to get to homes because of the significant flooding in the roadways.

Additional recommendations in this area provide guidance on evaluating the City’s sensitivity to coastal flooding and sea level rise within the AAA through the monitoring of

demographic, socioeconomic, and development data and recognizing any signs of climate gentrification that may occur over time using this data. Further, another recommendation asks that the City consider the impact that adaptation strategies and regulations within the AAA may have on economically distressed communities and to seek to mitigate any negative impacts.

AREA / ASSET VULNERABILITY

Underlying the Workgroup's recommendations is the recognition that the City needs more data and analysis about how vulnerable Jacksonville is, and will be, to sea level rise and coastal flooding. Given this, another key finding and recommendation from the Workgroup is that the City conduct a vulnerability assessment.

The recommendation states:

The City shall fund and conduct a coastal flooding and sea level rise vulnerability assessment that includes storm surge, tidal fluctuations, and extreme rainfall events and identifies populations, habitats, infrastructure, and functions that may be most sensitive to coastal flooding and sea level rise.

The assessment shall take into consideration that Jacksonville has both a coastal and riverine system and that currently accepted storm surge models do not adequately take into consideration the riverine system, particularly west and south of the Mathews Bridge. A Technical Advisory Committee (TAC) of subject matter experts shall be established prior to the assessment; they will be engaged throughout the assessment to ensure the data and analysis is accurate, thorough, and consistent with the scope of the project.



Outcomes from the vulnerability assessment will inform and determine adaptation strategies and planning and mitigation actions.

Three variables determine vulnerability: exposure, sensitivity, and adaptive capacity. Based on the *Sea-Level Rise Vulnerability Tools and Resources* document from the Florida Department of Environmental Protection (FDEP), a sea level rise vulnerability assessment would contain at least three essential sections: an exposure analysis; an impact (or sensitivity) analysis; and an assessment of adaptive capacity.

Exposure is the baseline risk given the spatial extent and level of exposure to sea level rise or coastal flooding. An exposure analysis uses a sea level rise projection from a computer model to determine the risk of sea level rise given a specific scenario occurring by a specified year.

Sensitivity identifies the degree of impact if the area is exposed. A sensitivity analysis includes an asset inventory as well as a measurement of the impact of sea level rise and coastal flooding to those assets. This type of analysis can also provide the community with an opportunity to determine the value and importance of various community assets.

Adaptive Capacity is the ability to adjust, repair, or respond to exposure. Adaptive capacity can apply to an area or an asset. An assessment of adaptive capacity measures the degree to which the community is able to adapt to sea level rise and may consider policies, procedures, finances, social capital, and additional resources that may contribute to an area's ability to adapt.

Exposure and sensitivity have an inverse relationship to adaptive capacity, and influencing one of these variables would increase or decrease the vulnerability of an area or asset. For example, if an asset has high exposure and high sensitivity and low adaptive capacity, that asset is likely to be highly vulnerable to risk, but if it has low exposure, low sensitivity, and high adaptive capacity, it is likely to have low vulnerability to risk. The variables of exposure, sensitivity, and adaptive capacity are not concrete or fixed. They are somewhat subjective and operate on a spectrum.

Workgroup recommendations that relate to exposure, sensitivity, and adaptive capacity include those that prioritize the value of collecting data from previous extreme weather events and establishing a protocol to collect data from any future events. In addition to detailing and prioritizing adaptation strategies, outcomes from a vulnerability assessment may include development of a resiliency scorecard, matrix, or similar approach that would be used to integrate hazard risk into land development decisions.

ADAPTATION STRATEGIES

Adaptation strategies are a toolkit for adaptation, and they typically fall within one of four categories:

- **Protection** strategies are those that directly protect vulnerable structures.
- **Accommodation** strategies provide for alterations that allow vulnerable structures to stay in place with modifications.
- **Managed Retreat** strategies offer voluntary, incentivized, or gradual retreat where protection and accommodation are not efficient or effective.
- **Avoidance** strategies aim to guide new development away from vulnerable areas.

The AAA Workgroup used these four categories as a framework to create a comprehensive group of recommendations. In using these categories to guide the development of their recommendations, the Workgroup ensured that a strategy was available for each situation, ranging from protection to avoidance and those conditions in-between.



RECOMMENDATIONS

EDUCATION & COMMUNITY OUTREACH	LAND DEVELOPMENT REGULATIONS & PROCEDURES	INTER-AGENCY COORDINATION	INFRASTRUCTURE	ECONOMIC & HUMAN RESOURCES
<ul style="list-style-type: none"> The City shall educate, inform, and disclose flood hazards to the public through various mechanisms such as real estate disclosures, public mapping resources, community or citywide public information campaigns, or other innovative and effective approaches. The City should fund and gather post-storm mitigation efforts to include comprehensive and immediate documentation of the spatial limits of upland flooding after a major storm event. A post-storm report and mappings should be formulated and be made publicly available. The City should establish a technical advisory committee to provide expertise regarding the different aspects of sea level rise adaptation. If deemed appropriate by the City, a member of the technical advisory committee may be appointed as an ex-officio member of the Downtown Investment Authority (DIA), Downtown Development Review Board (DDRB), Planning Commission (PC) or similar organization in order to advise regarding the effects of sea level rise and storm surge effects on proposed projects and abutting properties in the AAA. Update the Adaptation Action Area for sea level rise and infrastructure vulnerability assessments every five (5) years so that decisions regarding adaptation planning and investments can be based on best available data. 	<ul style="list-style-type: none"> The AAA boundary should be defined as, or take into consideration, the greater of the Cat 3 storm surge area or the FEMA 500-year flood plain as shown (2019) but not include those 500-year flood plains disconnected from the Cat 3 surge area, and implement adaptation strategies commensurate with the storm and flood risks. The City should explore the use of a resilience scorecard, matrix, rating system, or similar approach and user guidelines to assist local planners and emergency managers to integrate disaster risk into Land Use and Zoning decisions and the feasibility of incentivizing green infrastructure and hazard mitigation projects on residential and commercial properties. The City Ordinance Code and other relevant Land Development Regulations should be evaluated, and revised when feasible, to encourage and increase protection strategies for new development and significant redevelopment of properties within the AAA. Such protection strategies should consider nuisance flooding, tidal fluctuations, sea level rise, and storm surge and may include, but are not limited to, increasing buffers and setbacks; requiring or limiting (as appropriate) storm hardening or green infrastructure solutions; increasing freeboard requirements; requiring more stringent design standards for stormwater facilities; and exploring the use of a resilience scorecard, matrix, rating system, or similar approach and user guidelines. 	<ul style="list-style-type: none"> The City should establish a top-level position or authority, create an office, and/or assign tasks to oversee and coordinate the planning of interagency resiliency programs and public and private projects, engage stakeholders to promote public-private partnerships, and manage and leverage funding for resiliency initiatives. Tasks of such a position, authority, or office may include, but are not limited to, educational outreach, development of resiliency tools or resources for public and private use, and creation of a resource center to assist property owners. The City shall coordinate with all applicable agencies to mitigate flood hazards on adjacent properties that may occur due to publicly funded actions. In non-urban areas or low energy environments, discourage the permitting of bulkheads where bulkheads do not currently exist, and instead, encourage soft solutions to stabilize shorelines. In order to reduce or mitigate upstream flooding, the City should evaluate and prioritize opportunities to acquire lands located within major stormwater basins that can serve as both recreation and open space and flood water storage capacity during major storm and high tide events. The City's Emergency Preparedness Division shall consider collaborating with relevant entities and non-profit organizations in order to prepare for trauma associated with displacement and post-traumatic stress disorder following an extreme weather event. 	<ul style="list-style-type: none"> The City, through educational campaigns, promotional materials, and partnerships with non-profit and for-profit entities, should promote and participate in the implementation of green infrastructure solutions to mitigate flooding within the AAA. The City shall fund and conduct a coastal flooding and sea level rise vulnerability assessment that includes storm surge, tidal fluctuations, and extreme rainfall events and identifies populations, habitats, infrastructure, and functions that may be most sensitive to coastal flooding and sea level rise. <p>The assessment shall take into consideration that Jacksonville has both a coastal and riverine system and that currently accepted storm surge models do not adequately take into consideration the riverine system, particularly west and south of the Mathews Bridge. A Technical Advisory Committee (TAC) of subject matter experts shall be established prior to the assessment; they will be engaged throughout the assessment to ensure the data and analysis is accurate, thorough, and consistent with the scope of the project.</p> <ul style="list-style-type: none"> Adaptation strategies shall address, but are not limited to, roadways, stormwater systems and related infrastructure. 	<ul style="list-style-type: none"> Based on available data, the City should study or analyze the conditions preceding, and during, Hurricane Irma (2017) and the area affected by flood waters resulting from the storm. The Planning and Development Department shall consider demographic, socioeconomic, and development data such as, but not limited to, age (elderly and children); income; lack of personal transportation or transit-dependent; number of historic properties; government-owned properties; and locations connected to centralized water/sewer when evaluating the city's sensitivity to coastal flooding and sea level rise within the AAA. The City's Emergency Preparedness Division shall consider collaborating with relevant entities and non-profit organizations in order to prepare for trauma associated with displacement and post-traumatic stress disorder following an extreme weather event. The City shall continue to strengthen its efforts towards equity and environmental justice. With regards to communities living within the AAA, the City should monitor demographic, socioeconomic, and housing data to prevent or manage any signs of climate gentrification. The City shall consider the impact of AAA strategies and regulations on economically distressed communities and seek opportunities to mitigate negative impacts in an equitable manner.

RECOMMENDATIONS, continued

EDUCATION & COMMUNITY OUTREACH	LAND DEVELOPMENT REGULATIONS & PROCEDURES	INTER-AGENCY COORDINATION	INFRASTRUCTURE	ECONOMIC & HUMAN RESOURCES
<ul style="list-style-type: none"> The City, through educational campaigns, promotional materials, and partnerships with non-profit and for-profit entities, should promote and participate in the implementation of green infrastructure solutions to mitigate flooding within the AAA. 	<ul style="list-style-type: none"> In order to reduce or mitigate upstream flooding, the City should evaluate and prioritize opportunities to acquire lands located within major stormwater basins that can serve as both recreation and open space and flood water storage capacity during major storm and high tide events. The City shall evaluate the feasibility of providing incentives to the owners of existing structures located within the AAA for the removal of such structures or the renovation of such structures to bring them into compliance with City Ordinance Codes revised for adaptation and resiliency. In order to guide development away from the AAA and environmentally sensitive lands towards areas that are already high, dry, and connected, the Planning and Development Department shall explore the feasibility of offering density bonuses, transfers of development rights, clustering development entitlements, or other similar types of strategies to limit new development within the AAA and within environmentally sensitive or special flood hazard areas, or as an incentive for a development's use of low impact development stormwater solutions. The City should consider revising the City Ordinance Code and any other relevant Land Development Regulations to distinguish between properties within the AAA versus those outside of the AAA with regards to the current redevelopment or renovation threshold above which a structure must come into compliance with the City's Ordinance Code as regulations pertaining to properties within the AAA may be more stringent. 	<ul style="list-style-type: none"> Update the Adaptation Action Area for sea level rise and infrastructure vulnerability assessments every five (5) years so that decisions regarding adaptation planning and investments can be based on best available data. The City should evaluate private and public development or redevelopment projects that are within the AAA prior to making public expenditures for these projects. The City should develop and create systems and processes to safeguard local natural environments from an anticipated 2-foot sea level rise. Measures should include, but not be limited to promoting preservation, reforestation, and afforestation to increase soil moisture retention, provide shade and increase habitat for species under stress; and removing invasive non-native vegetation within the AAA to benefit shoreline stabilization. The City shall coordinate and participate in any state or regional resiliency efforts. 	<ul style="list-style-type: none"> The City should assess and compare protection mechanisms, such as hard structural options like sea walls or other physical barriers and soft structural options like living shorelines and dune or wetland restoration, when designing and engineering such systems for capital improvement projects located within the AAA. Factors to compare and consider include, but may not be limited to, a cost/benefit analysis and an analysis of the short and long-term impacts of these systems to the surrounding areas. The City should consider the feasibility of various options for requiring the repair and maintenance of private sea walls/bulkheads that are critical in the protection of private property, significant resources, or public infrastructure. The City should consider the repair, maintenance, and improvement of drainage infrastructure projects based on their location within the AAA and the frequency of nuisance flooding within the area. Planning for the probable occurrence of nuisance flooding in the future may also be considered. The City should evaluate the feasibility of updating the Master Stormwater Management Plan and prioritize areas related to mapping floodplains in areas of the City not yet mapped. The City should evaluate alternative stormwater storage solutions and natural groundwater storage solutions such as, but not limited to, low impact development features, trees, and wetland systems and evaluate and improve stormwater infrastructure to consider extreme storm events. 	<ul style="list-style-type: none"> If deemed appropriate by the City, a member of the technical advisory committee may be appointed as an ex-officio member of the Downtown Investment Authority (DIA), Downtown Development Review Board (DDRB), Planning Commission (PC) or similar organization in order to advise regarding the effects of sea level rise and storm surge effects on proposed projects and abutting properties in the AAA.

RECOMMENDATIONS, continued

EDUCATION & COMMUNITY OUTREACH	LAND DEVELOPMENT REGULATIONS & PROCEDURES	INTER-AGENCY COORDINATION	INFRASTRUCTURE	ECONOMIC & HUMAN RESOURCES
	<ul style="list-style-type: none"> The City Ordinance Code and any other relevant Land Development Regulations shall be amended to include requirements for disclosure of a property’s location within the AAA along with an explanation of the AAA. At a minimum, these requirements shall address disclosure before final action or approval in the following processes or situations: sale, lease or transfer of property; issuance of building permits; requests for zoning and land use changes; and subdivision review and platting. The City should develop and create systems and processes to safeguard local natural environments from an anticipated 2-foot sea level rise. Measures should include, but not be limited to promoting preservation, reforestation, and afforestation to increase soil moisture retention, provide shade and increase habitat for species under stress; and removing invasive non-native vegetation within the AAA to benefit shoreline stabilization. 		<ul style="list-style-type: none"> The City should evaluate private and public development or redevelopment projects that are within the AAA prior to making public expenditures for these projects. The City should develop and create systems and processes to safeguard local natural environments from an anticipated 2-foot sea level rise. Measures should include, but not be limited to promoting preservation, reforestation, and afforestation to increase soil moisture retention, provide shade and increase habitat for species under stress; and removing invasive non-native vegetation within the AAA to benefit shoreline stabilization. 	

CURRENT COMPREHENSIVE PLAN POLICIES

Several current goals, objectives, and policies of the 2030 Comprehensive Plan address topics of interest to the Workgroup. Those policies have been compiled and included in this report as Appendix F. Additionally, existing policies related to the AAA, as originally adopted, have been included as well.

FROM PLANNING TO IMPLEMENTATION

According to the *Natural Hazard Mitigation Saves: 2018 Interim Report* from the National Institute of Building Sciences, mitigation measures such as adopting model building codes can prevent deaths and injuries and can save \$11 for every \$1 spent on mitigation. Preparation and mitigation may also provide job creation and spur economic development. The recommendations provided in this report are extensive and full implementation for some of them may take years. However, as previously mentioned, three fundamental recommendations provide the foundation for the remainder of the Workgroup's recommendations. These fundamental recommendations provide the "Next Steps" towards sea level rise resiliency.

Next Steps

Planning for resiliency is a long-range process and investment. Given all of the recommendations in this document, first steps should include the following:

1. Adopt the recommended expanded boundaries of the AAA into the Comprehensive Plan and City Ordinance Code. See Map in Appendix D.

The AAA boundary should be defined as, or take into consideration, the greater of the Cat 3 storm surge area or the FEMA 500-year flood plain as shown (2019) but not include those 500-year flood plains disconnected from the Cat 3 surge area, and implement adaptation strategies commensurate with the storm and flood risks.

2. Hire or appoint a Chief Resiliency Officer or establish a resiliency office or similar agency or authority.

The City should establish a top-level position or authority, create an office, and/or assign tasks to oversee and coordinate the planning of interagency resiliency programs and public and private projects, engage stakeholders to promote public-private partnerships, and manage and leverage funding for resiliency initiatives. Tasks of such a position, authority, or office may include, but are not limited to, educational outreach,

development of resiliency tools or resources for public and private use, and creation of a resource center to assist property owners.

3. Fund and conduct a thorough Vulnerability Assessment.

The City shall fund and conduct a coastal flooding and sea level rise vulnerability assessment that includes storm surge, tidal fluctuations, and extreme rainfall events and identifies populations, habitats, infrastructure, and functions that may be most sensitive to coastal flooding and sea level rise.

The assessment shall take into consideration that Jacksonville has both a coastal and riverine system and that currently accepted storm surge models do not adequately take into consideration the riverine system, particularly west and south of the Mathews Bridge. A Technical Advisory Committee (TAC) of subject matter experts shall be established prior to the assessment; they will be engaged throughout the assessment to ensure the data and analysis is accurate, thorough, and consistent with the scope of the project.

Prioritization

With the exception of the fundamental recommendations shown above, the recommendations within this report have not be prioritized. The Chief Resiliency Officer, or similar position/agency, would likely be tasked with organizing and prioritizing recommended actions. Findings from a vulnerability assessment would inform this prioritization.

Several methods of prioritization exist. Recommended actions could be prioritized by available funding, timeline, need, or community or political acceptance.

Monitoring and Evaluation

Because assumptions and projections for sea level rise change over time, a key recommendation of the Workgroup was to **update the Adaptation Action Area for sea level rise and infrastructure vulnerability assessments every five (5) years so that decisions regarding adaptation planning and investments can be based on best available data.**

The intent of this recommendation is clear. Policies, programs, and decision-making tools or resources will need to be updated or revised to accommodate new data and changing conditions. Additionally, the Workgroup intended that this recommendation could be used as a reason to evaluate policies and regulations within the AAA and determine their value or applicability to areas outside of the AAA at a future date.

APPENDIX A: DEFINITIONS

Afforestation – the act or process of establishing a forest especially on land not previously forested

Climate gentrification – gentrification (process of changing the character of a neighborhood through the influx of more affluent residents and businesses) caused or exacerbated by climate change

Coastal High Hazard Area (CHHA) – the area below the elevation of the category 1 storm surge line as established by a Sea, Lake, and Overland Surge from Hurricanes (SLOSH) computerized storm surge model (Section 163.3178(2)(h), Florida Statutes)

Freeboard – factor of safety usually expressed in feet above a flood level for purposes of floodplain management

Living shoreline – shoreline management practice that provides erosion control benefits; protects, restores, or enhances natural shoreline habitat; and maintains coastal processes through the strategic placement of plants, stone, sand fill, and other structural organic materials

Low Impact Development (LID) – systems and practices that use or mimic natural processes that result in the infiltration, evapotranspiration or use of stormwater in order to protect water quality

Nuisance flooding – minor, recurrent flooding that takes place at high tide. Also called high tide flooding, it occurs when the ocean has reached the “brim” locally and may lead to public inconveniences such as road closures. It is increasingly common as coastal sea levels rise and has become a “sunny day” event, not necessarily linked to storms or heavy rain.

Reforestation – the act or process of replanting an area with trees

APPENDIX B: ORIGINAL RECOMMENDATIONS SUBMITTED BY WORKGROUP MEMBERS

The list below is of the original draft recommendations exactly as submitted by individual AAA Workgroup members. Draft recommendations were developed into policy-level statements and discussed by the Workgroup, resulting in a final list of approved recommendations (as shown in this report).

- City should consider a resiliency officer or coordinator or a resiliency office. The position would coordinate across Planning, Public Works, and Environmental Quality and would operate out of the Mayor's Office.
- Hire a Chief Resiliency Officer to coordinate funding and planning between federal, state, regional and City resiliency initiatives. Help coordinate and prioritize City CIP projects that involve Jax Parks, COJ Emergency Preparedness, Environmental Quality Division, Public Works, Planning, Landscape and Maintenance, and more.
- Develop a permitting resource center where people can find out the history and risks associated with properties in Duval County, as well as all permits required or potentially required by Federal, State, Regional and City agencies for future uses prior to the sale of real estate between buyers and sellers.
- Provide educational outreach on sanitation in relation to water use and water contact during flooding events, wildfires, algae blooms, and power outages
- The City of Jacksonville (COJ) shall make flood zone geography apparent to the public through the installation of flood zone signage. Identify city features and locations within specific Flood Zones by placing signs in situ identifying and defining the flood zone. This could include photography of previous flood events. For example, when one enters Memorial Park on Riverside BLVD there would be a sign stating that you are entering a Storm Surge 1 Flood Zone, define what a Storm Surge 1 Flood is, what the occurrence percentage is, and show photos of Memorial Park flooded during Hurricane Irma.
- Update real estate transaction disclosure requirements to include hazards related to climate change including flood risk, zone, prior flood damage including surrounding property, before closing
- Promote and expand urban vegetation by planting trees, installing roof gardens, and protecting existing vegetation and open space
- Increase maintenance and cleanup of gutters, drainage ditches and culverts
- Manage Stormwater onsite utilizing low-impact development techniques
- Complete a sea level rise vulnerability assessment that includes storm surge, tidal fluctuations, and extreme rainfall events.
- Complete a vulnerability assessment to identify specific species, habitats, landscapes, ecosystem functions, and cultural resources such as museums and historical sites that may be the most sensitive to climate change
- Based upon the documented impacts of H. Irma in 2017, the COJ should acknowledge that recently adopted FEMA mapping for the sections of the AAA fronting the St. Johns River – extending from the Mathews Bridge southward to the county line – are inaccurate with

respect to the extent of flood potential they are intended to represent. The COJ should provide interim guidance to property owners, as well as fund an area specific reanalysis of present day flooding potential in that area.

- Recommend that COJ post-storm mitigation efforts include a comprehensive (and immediate) documentation of the spatial limits of upland flooding after a major storm event – by at least a drone survey. A post-storm report and mapping should be formulated and be made publicly available.
- Resilience matrix, scorecard, etc. could be informed/developed based on outcomes of vulnerability assessment.
- Explore the use of a resilience scorecard and user guidelines to assist local planners and emergency managers to integrate disaster risk into Land Use and Zoning decisions.
- Provide assistance or incentives for improving hazard preparedness of homes
- Incentivize residential and commercial green infrastructure projects like natural shorelines, dune replenishment, tree planting and creation of Stormwater sinks. Place the highest priority for permitting estuarine shoreline stabilization on techniques that protect fisheries and aquatic mammals and promote biodiversity
- Explore the use of a resilience scorecard and user guidelines to assist local planners and emergency managers to integrate disaster risk into Land Use and Zoning decisions.
- Significantly increase estuarine buffers and oceanfront setbacks
- Restrict hard-armoring in new development or in areas where hard armoring does not currently exist
- Establish mandatory construction setbacks from the seawall, mean high water line, wetlands and waterways (currently 25-feet). Limit development on a property if sufficient setbacks cannot be met
- Require 2-feet of freeboard for structures located in tidally influenced floodplain; foundations that are more resilient to erosion and wave impacts or flood resilient construction materials in new and redevelopment project
- Evaluate the adoption of more stringent Building Code requirements, such as elevation above base flood level, for new construction or substantial reconstruction within the AAA taking into consideration the benefits and burdens of any such requirements.
- Legislate a requirement for developments to capture and treat Stormwater onsite from the 10—year 24-hour storm
- Present day COJ riverfront property commercial or multi-family design standards solely address the requirements of the St. Johns Water Management District regarding onsite water detention for a 25-year rainfall event. The COJ should promulgate design requirements for all sites located within the AAA which take into account all physiographic phenomena associated with a 100-year storm event, plus 2 ft. of sea level rise. This includes rainfall, storm surge, waves, drainage, etc. Documentation of same shall be certified by a Professional Engineer. A ready example of such a requirement are the design standards required by Statute for oceanfront development seaward of the Coastal Construction Control Line (CCCL) throughout Florida.
- The City should consider utilization of low impact development stormwater considerations, in addition to the current stormwater criteria on projects. (potentially offering bonus density incentives – or something similar – maybe this would transition into the scorecard that you mentioned.

- Maybe any property within the AAA should be required to include low impact development stormwater considerations in addition to the current criteria.
- Protect and restore wetland ecosystems which provide natural first line of protection from storm surges and flooding
- Investigate consequences of installing hard structural options (such as dikes, levees, floodwalls, and saltwater intrusion barriers) compared to soft structural options (such as dune restoration, living shorelines, and creation wetland restoration, periodic beach nourishment).
- Evaluate the adoption of more stringent Building Code requirements, such as elevation above base flood level, for new construction or substantial reconstruction within the AAA taking into consideration the benefits and burdens of any such requirements.
- Require that property owners who have private seawalls which protect public infrastructure – must repair or replace such seawalls if damaged by a major storm event. Example, River Road in Riverside. Failure to do so should necessitate that repairs be undertaken by the COJ at the upland owners expense.
- Require that the COJ prioritize and fund drainage solutions for present day nuisance flooding phenomena presently existent in the San Marco, Riverside and Avondale historical neighborhoods. Advance planning for the probable future occurrence of nuisance flooding within the AAA throughout the City Core as well, due to sea level rise, should be similarly prioritized.
- Increase maintenance and cleanup of gutters, drainage ditches and culverts
- Update the Stormwater Master Plan to include alternatives to storage via retention ponds and to prioritize retaining trees and natural wetlands on site; ie: 25-foot vegetated buffer along shorelines and 100-foot buffer along wetlands, parks, and other protected areas.
- Conduct floodplain mapping in areas not detailed by the flood insurance study
- Evaluate and improve capacity of Stormwater infrastructure for high intensity rainfall events
- Manage Stormwater onsite utilizing low-impact development techniques [NOTE – see existing CCME Policy 6.7.3 and FLUE Policy 1.5.13 (under separate cover)]
- COJ shall fund and hire an engineering firm to create a Flood Protection Plan for Jacksonville. The Plan would propose multiple engineering options and their costs for protecting the city to meet specific disasters and to, also, address a sea level rise of four feet by 2100.
 - The Center for Climate Integrity (CCI) provided a cost estimate of \$3.5 Billion to build a seawall to protect Jacksonville from a sea level rise of 2 feet by 2040. The CCI used the engineering firm Resilient Analytics to determine that cost. This is a non specific and likely non rigorous study. COJ needs a rigorous study with specific engineering options and costs.
- The City should look at vacant properties that are in-line of major stormwater basins / creeks or tributaries that connect to the St. Johns River Water Management District, and look to develop these properties as potential regional parks which include large / significant floodable ponds that could assist with upstream flooding during Heavy Rain Events in association with high tide / storm surge conditions.
- Develop a priority list and funding source for buying out Repetitive Loss Properties (RLP), removing structures, and restoring land to its predevelopment condition





- If the City adopts more stringent Building Code requirements for property within the AAA, evaluate whether the City can or should provide incentives to the owners of existing structures located within the AAA for the removal of such structures or the renovation of such structures to bring them into compliance with revised Building Codes.
- Prohibit COJ expenditures toward private and public development (or redevelopment) in the City Core for properties which are developed in the AAA and which will be impacted by a major storm event to the point that they could become inoperable or inaccessible. Publicly funded infrastructure would be excluded from such a prohibition.
- Promote land use and agricultural practices including aquaculture, saline resistant crops, and animal agriculture outside of areas likely to flood
- Coordinate priorities, funding and resources with the Duval County Local Mitigation Strategy
- Establish a consortium of state universities to undertake continuous economic analysis to develop costs and benefits of different aspects of climate adaptation
- COJ should require a peer review of all project designs for proposed major commercial and/or multi-family developments within the City Core located within the AAA. A Technical Advisory Committee (TAC) should be formed for such a purpose in order to evaluate the effects of sea level rise and probable storm surge effects on flooding, drainage, infrastructure, intended use, impacts on abutting properties, etc.
- If the City adopts more stringent Building Code requirements for property within the AAA, evaluate whether the Ordinance Code should be revised to distinguish between circumstances when a structure needs to be brought into compliance with the Zoning Code requirements such as landscaping and parking versus having to be brought into compliance with more stringent Building Code requirements which could include such requirements as elevating the structure.
- In the aftermath of extreme events, prepare for additional trauma due to dispossession, mental health challenges, and post traumatic-stress disorder
- Ensure equity and environmental justice to prevent disparate impacts to economically challenged sectors in planning
- Require publicly funded projects to maximize energy efficiency, water conservation and limit taxpayer investments in vulnerable coastal areas
- Coordinate City personnel around obtaining a Community Service Rating (CSR) score of 6 (2019) to 4 by following the guidance for Open Space Preservation and Building Regulations
- Develop a priority list and funding source for buying out Repetitive Loss Properties (RLP), removing structures, and restoring land to its predevelopment condition
- Create a Shoreline Adaptation Plan that develops standards for undeveloped and reclaimed wetlands and floodplains (including buyout properties) that maximizes protection and preservation. Include land acquisition for adaptation purposes (considering sea level rise, increase in frequency of severe storms, wildfire threat, loss of wildlife and fisheries habitat)
- Develop strategy to regularly update floodplain maps
- Organize marine biosphere reserves and protected areas for the habitat of marine mammals to maintain critical breeding grounds

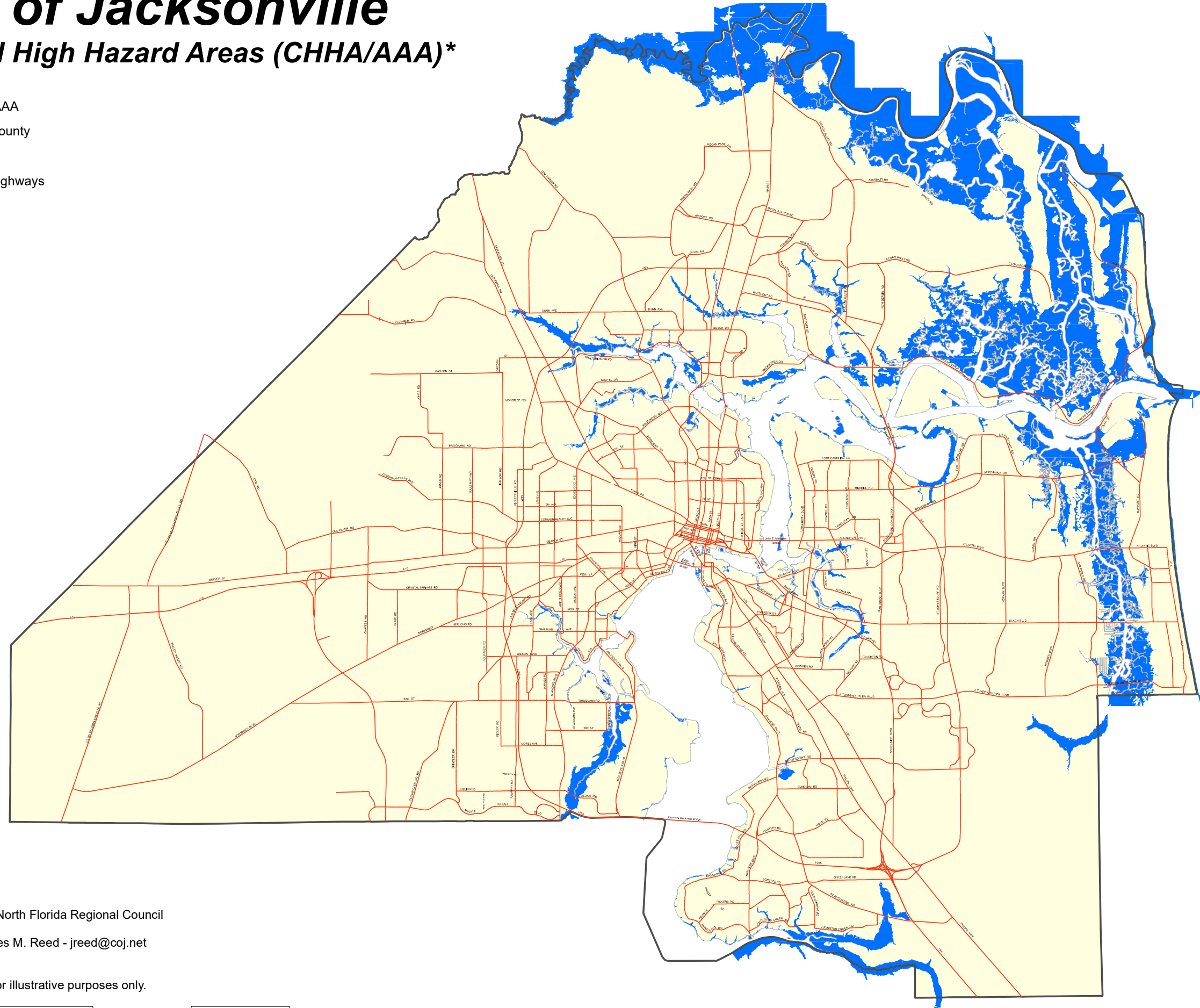
- Promote reforestation and afforestation of marginal lands to increase soil moisture retention, provide shade and increase habitat for species under stress
- Remove invasive non-native vegetation from riparian areas
- Explore the benefits of forming a Northeast Florida Resiliency Compact, similar to the Southeast Climate Change Compact or Tampa Bay Resiliency Group.
- The City should consider creation of urban forest areas on individual projects / new developments, or within City Maintained property to assist with reduction of Carbon Monoxide emissions.

APPENDIX C: MAP OF COASTAL HIGH HAZARD AREA
(CHHA)

City of Jacksonville

Coastal High Hazard Areas (CHHA/AAA)*

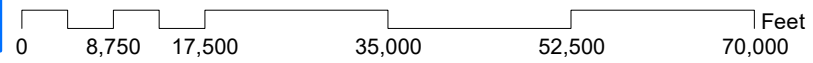
-  CHHA/AAA
-  Duval County
-  River
-  Major Highways



*Data provided by North Florida Regional Council

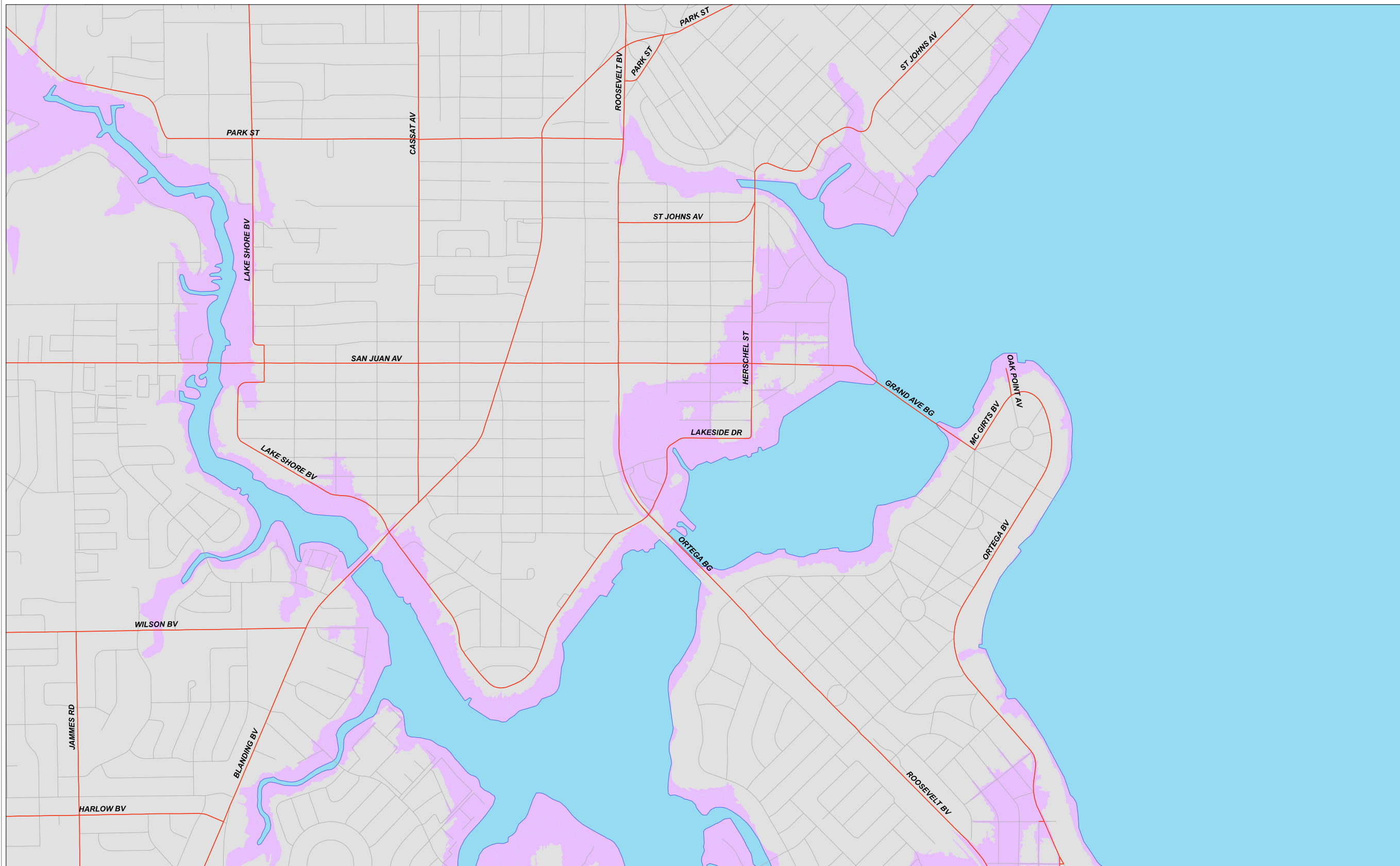
Developed by James M. Reed - jreed@coj.net
February 2019

Content intended for illustrative purposes only.

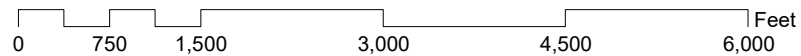


APPENDIX D: LOCALIZED MAPS SHOWING RECOMMENDED ADAPTATION ACTION AREA (AAA)

The Workgroup requested and used these four smaller geographic locations in order to determine the recommended AAA boundary. See the following high resolution maps.



Developed by James M. Reed, AICP - jreed@coj.net
 November 2019
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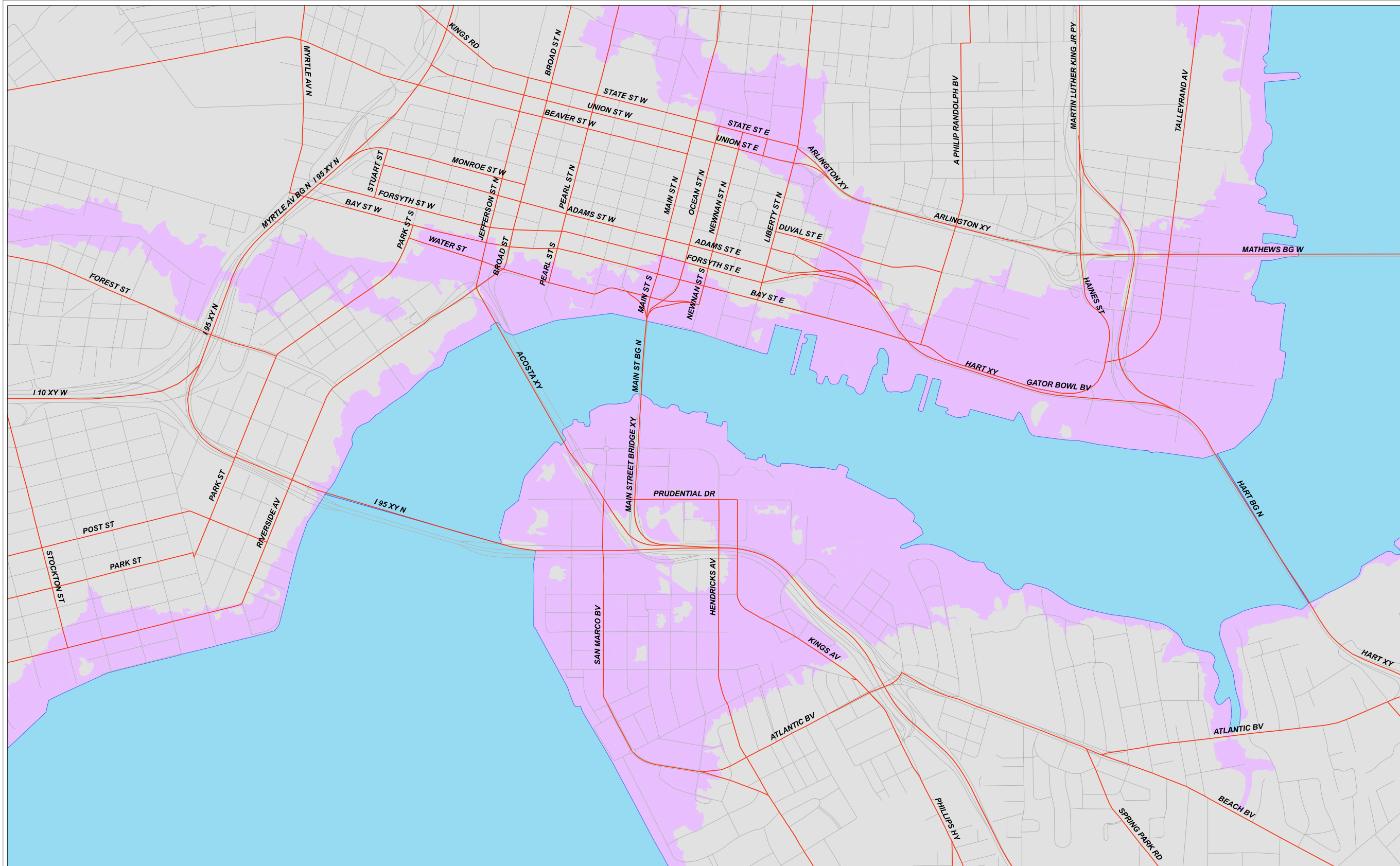


Ortega River

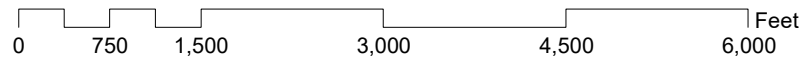
Proposed Adaptation Action Area

- Major Highways
- Roads
- █ River
- █ Proposed AAA
- █ Duval County





Developed by James M. Reed, AICP - jreed@coj.net
 November 2019
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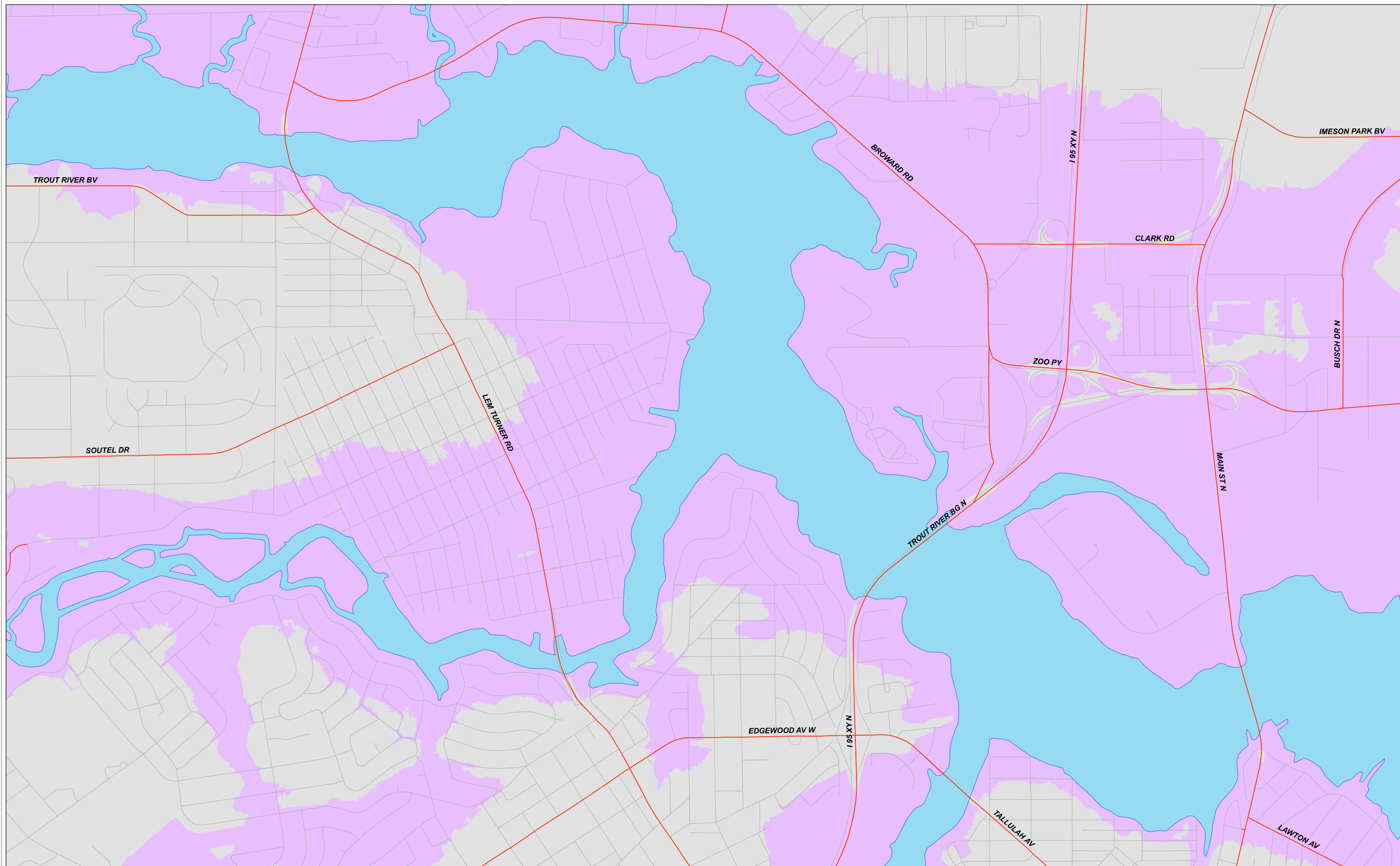
Jacksonville

Downtown - Riverside - San Marco

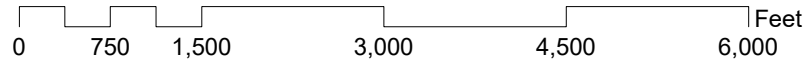
Proposed Adaptation Action Area

- Major Highways
- Roads
- River
- Proposed AAA
- Duval County





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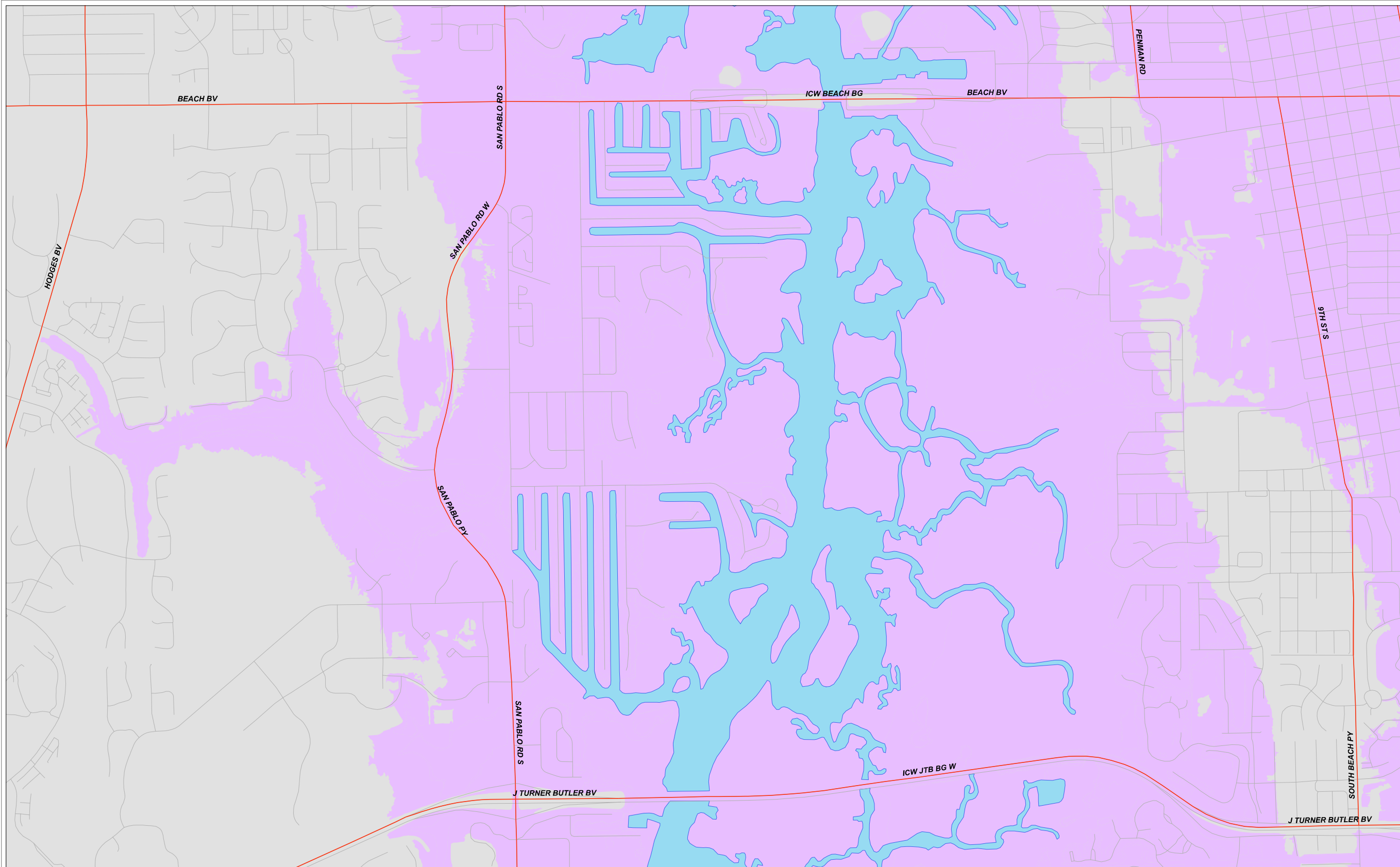


Trout River

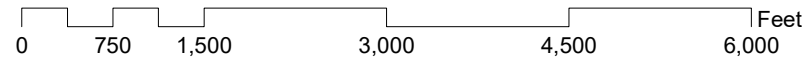
Proposed Adaptation Action Area

- Major Highways
- Roads
- River
- Proposed AAA
- Duval County










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 November 2019
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 Surge_FEMA500_Comparison_20160620\4_proposedAAA_local_maps
 Content intended for illustrative purposes only.



Jacksonville

San Pablo - Intracoastal Proposed Adaptation Action Area

-  Major Highways
-  Roads
-  River
-  Proposed AAA
-  Duval County



APPENDIX E: RESOURCES

- City of Jacksonville Urban Forestry Program; *City of Jacksonville Stormwater Case Study Booklet*, May 2019.
www.coj.net/trees > Education
Or contact the City of Jacksonville’s Urban Forestry Program within the Department of Public Works
- Florida Department of Environmental Protection (FDEP), Office of Resilience and Coastal Protection, Florida Resilient Coastlines Program
www.floridadep.gov/ResilientCoastlines
- FDEP, Florida Coastal Management Program, and National Oceanic and Atmospheric Administration (NOAA); *Florida Adaptation Planning Guidebook* (June 2018)
<https://floridadep.gov/sites/default/files/AdaptationPlanningGuidebook.pdf>

Sea-Level Rise Vulnerability Assessment Tools and Resources: A Guide for Florida’s Local Governments (June 2015)
https://floridadep.gov/sites/default/files/SLR-VA-tools-extended_1.pdf
- NOAA’s Digital Coast
<https://coast.noaa.gov/digitalcoast/>
- Northeast Florida Regional Council, Regional Community Institute of Northeast Florida, Inc.; *Summary and Regional Action Plan: A Report of the Emergency Preparedness Committee on Sea Level Rise*
<https://www.nefrc.org/WiP/PDFs/Resource-Library/Regional-Action-Plan.pdf>

APPENDIX F: CURRENT COMPREHENSIVE PLAN GOALS, OBJECTIVES, AND POLICIES

The following list of objectives and policies are from the 2030 Comprehensive Plan and relate to, or directly address Workgroup discussion and/or draft recommendations submitted by Workgroup members.

CONSERVATION / COASTAL MANAGEMENT ELEMENT (CCME)

Objective 4.1 The City shall protect and conserve the natural functions of its existing wetlands, including estuarine marshes. In order to achieve this objective and its associated policies, the City shall continue to work with the applicable regional, state and federal agencies charged with these regulatory responsibilities.

Policy 6.7.3 The City, in conjunction with the Low Impact Development (LID) subcommittee of the Subdivision Standards Policy Advisory Committee (SSPAC) and the St. John's River Water Management District, shall construct an LID manual by September 2012. The LID Manual shall include meaningful and predictable guidelines and standards that the City shall use to encourage LID in order to reduce the impact of new and existing development and manage stormwater at its source. Encouragement strategies may include: offering credits to off-set the Stormwater Utility Fee and allowing alternative designs to be permitted without deviations or variances from the Land Development Regulations.

Policy 7.3.4 Shoreline development in Coastal High Hazard Areas shall be protected by vegetation, setbacks, and/or restoration, rather than by seawalls or other coastal protection structures which contribute to erosion. Exception may be made for navigation and emergency transportation purposes.

Policy 11.3.2 Utilizing such programs as the Flood Mitigation Assistance Program (FMAP), Repetitive Flood Claims (RFC) and Severe Repetitive Loss (SRL), the City will continue to work with the State of Florida Division of Emergency Management (DEM), the Federal Emergency Management Agency (FEMA) and the National Flood Insurance Program (NFIP) to mitigate flooding hazards through the acquisition, elevation or relocation mitigation alternatives (Local Mitigation Strategy).

Policy 11.3.6 The City will continue to participate in the National Flood Insurance Program (NFIP) and will make all reasonable efforts to maintain a Community Rating System score of 6 or higher.

Policy 11.3.7 The City's Emergency Preparedness Division shall maintain a Local Mitigation Strategy which will be reviewed and updated in accordance with state and federal requirements to remain eligible for pre- and post-disaster funding assistance.

Policy 11.3.12 The Federal Emergency Management Agency (FEMA) Flood Insurance Study for the City of Jacksonville, Duval County, Florida and Incorporated Areas and the accompanying Flood Insurance Rate Maps (FIRM), and all subsequent amendments and revisions to such maps, shall be adopted by reference as a part of the floodplain management ordinance and shall serve as the minimum basis for establishing flood hazard areas, along with the supporting data and flood hazard areas included in the Master Stormwater Management Plan. Flood zones shall also be depicted on Future Land Use Element Map L-4.

The flood hazard areas and base flood elevations contained in the Flood Insurance Study and shown on Flood Insurance Rate Maps (FIRM) and the requirements of Title 44 Code of Federal Regulations, Sections 59 and 60 may be revised by the Federal Emergency Management Agency, requiring revision to the floodplain management regulations to remain eligible for participation in the National Flood Insurance Program.

Objective 11.4 The City of Jacksonville shall be consistent with, or more stringent than, the flood resistant construction requirements of the Florida Building Code (FBC) and applicable flood plain management regulations (44 C.F.R. part 60). Construction activities seaward of the coastal construction control lines shall be consistent with Chapter 161, Florida Statutes.

Objective 11.5 The City has established an Adaptation Action Area (AAA) and shall consider appropriate responses to address current and future risks related to the associated impacts of sea-level-rise.

Policy 11.5.1 The City of Jacksonville shall recognize the Coastal High Hazard Area (CHHA) identified in Map C-18 as also encompassing the Adaptation Action Area (AAA) for those low-lying coastal zones that may experience coastal flooding due to extreme high tides and storm surge and are vulnerable to the impacts of rising sea level. (Sec. 163.3177(6)(g)(10), F.S.) Land within the AAA is subject to potential high tide inundation under a horizon 2060 two foot sea level rise scenario.

Policy 11.5.2 The City shall consider the implications of the AAA when reviewing changes to the use, intensity and density of land lying within the AAA.

Policy 11.5.3 The City shall recognize existing regulations, programs and policies that overlap with the AAA and that are currently in place to limit public investment and address appropriate development and redevelopment practices related to flooding. These regulations, programs and policies include but are not limited to the floodplain management ordinance, CHHA policies, the Local Mitigation Strategy and the Post Disaster Redevelopment Plan and shall only be applied in cases where such regulation would otherwise apply to a development or redevelopment project.

Policy 11.5.4 The City of Jacksonville shall create a working group to review existing programs and policies in relation to the AAA to determine the need and appropriate timing for additional and financially feasible responses to the effects of coastal flooding within the Adaptation Action Area. The working group shall be established within one year of the effective date of this policy.

FUTURE LAND USE ELEMENT (FLUE)

Policy 1.5.13 Through site plan review, the City shall encourage the following methods to support low impact development:

- The use of topography, physical environment and other natural features;
- The use of energy-saving techniques and devices, including sun and wind orientation;
- Impact on wetlands;
- Listed species regulations.

INFRASTRUCTURE ELEMENT (IE) – Drainage Sub-element

Objective 1.4 The City shall maximize the efficiency of operations of its stormwater facilities through scheduled and proper maintenance.

Policy 1.4.1 The City shall maintain a method for financing the operation and management of stormwater facilities. The funding shall be used to reduce existing flooding, improve water quality, and preserve or restore the values of the natural systems.

Policy 1.4.2 The funding established pursuant to Policy 1.4.1 shall be used in part to ensure continued proper operation, maintenance, and functioning of stormwater facilities.