Phase 1 Adaptation Plan

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Executive Summary

Coastal communities in Florida are already experiencing the effects of sea-level rise (SLR), stronger coastal storms, and more intense precipitation events. As sea levels are projected to rise at an accelerating rate in the coming years and decades, increases in flood frequency and flood depth in coastal areas are expected, which could lead to increased flood insurance costs, market value declines, and property damage. As a low-lying coastal community bordering the Atlantic Ocean on the east and the Intracoastal Waterway to the west, Atlantic Beach is especially vulnerable to storm surge, rainfall flooding, nuisance flooding, and SLR.

In 2019, Atlantic Beach completed a coastal vulnerability assessment that was updated this year to include the City's utility service area north of the City within City of Jacksonville city limits. In this assessment, projected SLR, nuisance flooding, and 100-year recurrence interval flood risk areas were modeled for 25-, 50-, and 100-year future scenarios. These models were then used to assess potential risks to property, structures, and infrastructure and to identify focus areas within the City. A vulnerability assessment such as this is a key step in the adaptation planning process as the findings are used to inform the strategies discussed in this Plan. Further, a vulnerability assessment fulfills a statutory requirement for designating Adaptation Action Areas (AAAs) and forms the scientific basis for complying with the "Peril of Flood" statutory requirement. The next step in the process is to complete an adaptation plan.

An adaptation plan identifies goals and strategies to best minimize risks and establishes a process to implement those strategies. Becoming a more resilient community is not a one-time process of planning and implementing. Rather, it is a continual process that will forever be a part of the City's future. According to the National Oceanic and Atmospheric Administration (NOAA), the ultimate goal of an adaptation plan is to create coastal communities that are organized to take action, have the tools to take action, and take action to plan for and adapt to the impacts of SLR and climate change. This Phase 1 Adaptation Plan is the result of the first iteration of the City's adaptation planning process. This Plan contains general recommendations for adaptation strategies to be applied to exposed areas of the City as well as a recommended implementation schedule. Subsequent iterations of this living document will be completed after solicitation of public input and will contain additional objective data, more specific strategies, and updated implementation schedules as appropriate.

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1.0 Background

1.1 Location and History

The City of Atlantic Beach is one of three small coastal communities in northeast Florida that make up the *Beaches* of Jacksonville. The City is approximately 4 square miles in size with a population of around 14,000 and is located between the Atlantic Ocean on the east and the San Pablo Creek/Atlantic Intracoastal Waterway (AICW) on the west. Atlantic Beach is a near fully-developed municipality where the predominant land use is residential consisting of stable and well-established neighborhoods.

As a low-lying coastal community, Atlantic Beach is especially vulnerable to flood risks as experienced during Hurricane Irma, Hurricane Matthew, and the November 2015 Nor'easter. Additionally, most of the City was developed before modern stormwater regulations for flood protection, which has contributed to flooding issues in the City. Understanding these existing and potential hazards, the City, with the assistance from the Florida Department of Environmental Protection (FDEP) Resilient Coastline program, completed a vulnerability assessment in 2019, which will inform this Adaptation Plan.

1.2 Sea-Level Rise (SLR) Trend

Scientists from around the world have been studying climate change and the resulting SLR impacts for decades. Today, multiple sources of data are available to predict realistic scenarios of future sea levels and their impacts on coastal communities. These projections are generally based on global climate models (GCMs) that use assumptions regarding future human behavior with respect to greenhouse gas emissions. On average globally, the sea level has risen by approximately 8 inches since scientific recordkeeping began in 1880. This rate has increased in recent decades to a little more than an inch per decade. Global average sea level has risen by approximately 7 to 8 inches (16 to 21 cm) since 1900, with around 3 inches occurring since 1993. In addition to the global average SLR, local SLR – sometimes called *relative SLR* – happens at different rates in different places. Local SLR is affected by the global SLR, but also by local land motions and the effects of tides, currents, and winds.

Figure 1-1 shows an increase in the global average sea level since 1880 in inches. The blue line, which shows tide-gauge data, becomes steeper in more recent decades. This indicates an increasing rate of change. The surrounding light-blue shaded area shows upper and lower 95-percent confidence intervals, and the orange line shows sea level as measured by satellites for comparison from 1993 through 2016 (US Global Change Research Program, 2017). As sea levels have risen, the incidence of nuisance flooding or *sunny day* flooding during spring-tide events at certain times of the year have increased five- to tenfold since the 1960s in several US coastal cities, and rates of increase at over 25 long-term gage locations on the Atlantic and Gulf coasts are accelerating. In Atlantic Beach, nuisance flooding resulting in overtopped roads is occurring now in areas of Atlantic Beach such as Dutton Island Road and West Plaza. The closest NOAA primary tidal gauge to Atlantic Beach is at the Mayport Bar Pilot's Dock (NOAA tide gauge No.

8720218) near the ferry slip. Figure 1-2 depicts the relative change in sea level at the Mayport Bar Pilot's Dock over the 90-year history of this station. The current local rate of sea-level change is approximately 1 inch every decade (https://tidesandcurrents.noaa.gov/sltrends/).

Although the rate of change in SLR is uncertain, there is no uncertainty that sea level is rising in our area. As sea levels rise, incidents of nuisance flooding will increase, and flooding due to severe weather events will affect larger areas of the City. To aid in planning and assessing the City's potential vulnerability under future scenarios with higher sea levels, the City conducted a rigorous technical analysis to determine what those effects may be and how they will impact residents and critical infrastructure.

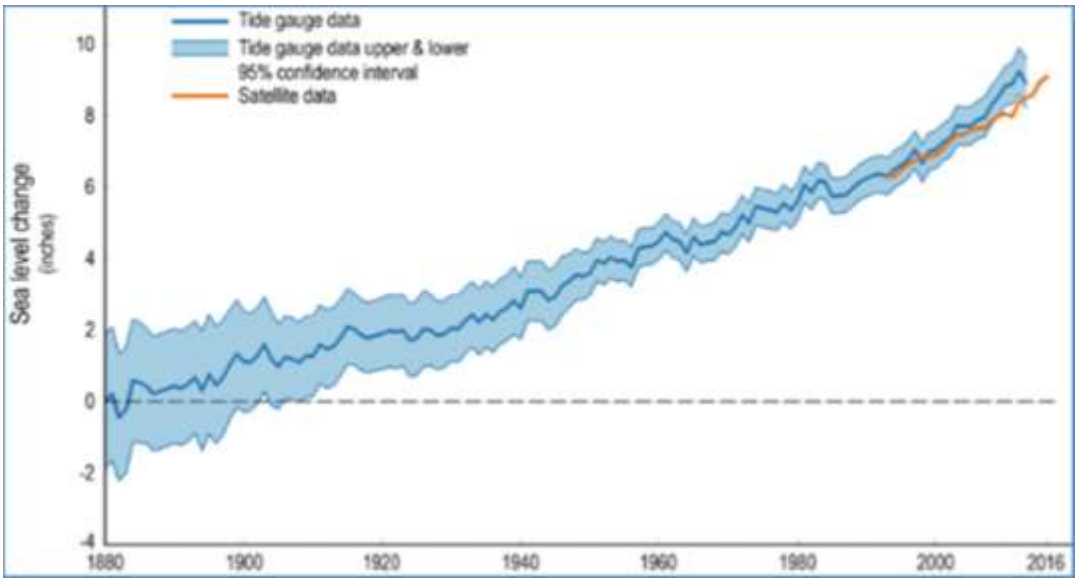

Figure 1-1 – Global Change in Sea Levels

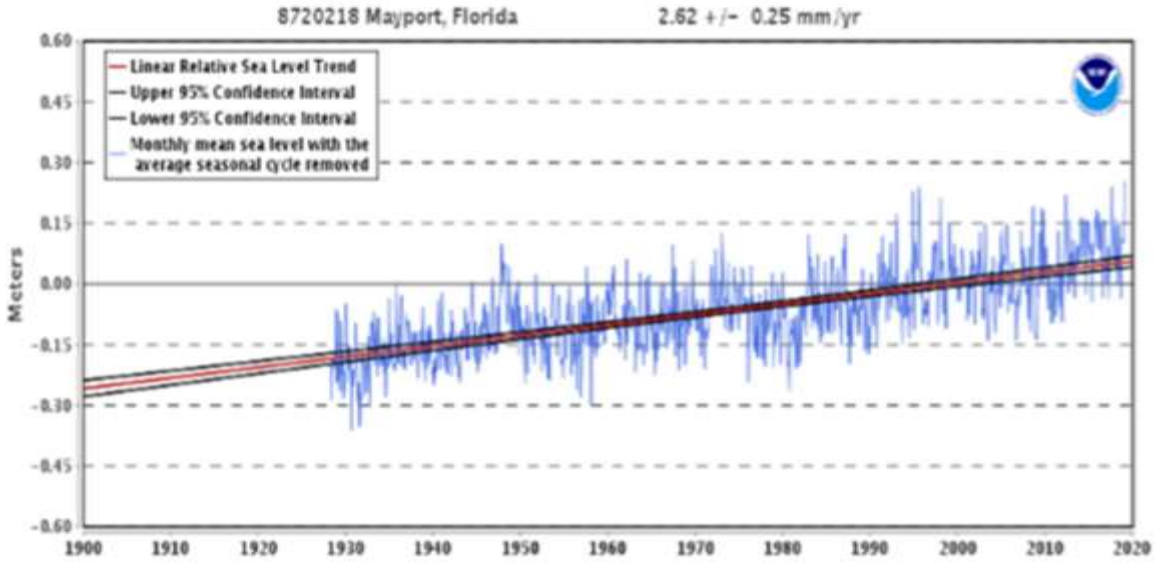

Figure 1-2 – Sea Level Trends at Mayport Bar Pilots Dock

1.3 Community Resilience

Resiliency is the ability to collaboratively prepare for, prevent, absorb, recover from, and more equitably adapt for damage from chronic stressors (i.e., aging infrastructure and SLR) and adverse events (i.e., hurricanes, coastal storms, and flooding). Resiliency in coastal communities such as Atlantic Beach is especially important due to high population densities and coastal hazards. A community that is informed and prepared will be more resilient and have a greater opportunity to rebound quickly after an adverse event.

1.4 General Adaptation Planning

An adaptation plan is a sound and sensible method for Florida's coastal communities to develop and enhance their strategies for protecting coastal populations and infrastructure. An adaptation plan identifies goals and strategies to best minimize risks and establishes a process to implement those strategies. According to NOAA, the ultimate goal of an adaptation plan is to create coastal communities that are organized to take action, have the tools to take action, and take action to plan for and adapt to the impacts of SLR and climate change. A community can select from a wide range of strategies in the following categories: Protection, Accommodation, Strategic Relocation, Avoidance, and Procedural.

1.4.1 Protection

Protection strategies involve both hard and soft (*gray* or *green*) structurally defensive measures to mitigate impacts of current and future flooding to maintain existing development. Examples such as seawalls, revetments, and levees are examples of hard or *gray* protection strategies, while examples such as beach renourishment and living shorelines are examples of soft or *green* strategies.

1.4.2 Accommodation

Accommodation strategies do not act as a barrier to inundation but rather alter the design, construction, and use of structures to handle periodic flooding. Examples include elevating structures above flood stage and stormwater retrofits that improve drainage or use natural features to soak up or store water and runoff (i.e., green infrastructure).

1.4.3 Strategic Relocation

Strategic relocation strategies consist of relocating existing development to safer areas through voluntary or incentivized measures. Examples include redevelopment regulations, home buyout programs, and rolling easements.

1.4.4 Avoidance

Avoidance strategies involve guiding new development away from vulnerable areas to safer, more appropriate areas. Such measures include transfer of development rights, land conservation, and increased setbacks/buffers.

1.4.5 Procedural

Procedural strategies aim to generate vulnerability and adaptation information, increase awareness of vulnerabilities and adaptation options, or incorporate such information into plans or policies. Examples include vulnerability assessments, community outreach and education activities, new comprehensive plan language addressing SLR, and real estate disclosures.

2.0 Legal Context

2.1 Comprehensive Planning

Florida Statutes require every municipality in Florida to maintain a comprehensive plan, which *shall provide the principles, guidelines, standards and strategies for the orderly and balanced future economic, social, physical, environmental, and fiscal development of the area…* (Fla. Stat. 163.3177(1)). Comprehensive plans contain different *elements*, some of which are required by the state including a Future Land Use Element and a Conservation and Coastal Management Element.

The Future Land Use Element, according to Florida Statute, *shall establish the long-term end toward which land use programs and activities are ultimately directed*. This and several additional statutes provide a solid legal basis for adding to or revising the Goals, Objectives, and Policies of the Future Land Use Element for adaptation purposes. For example, statutory provisions discouraging urban sprawl address protecting and conserving natural resources such as wetlands, beaches, and floodplains.

The Conservation and Coastal Management Element is required by Florida Statute to address SLR. Senate Bill (SB) 1094, enacted in 2015, requires coastal localities to include a redevelopment component within this element and specified that the principles, strategies, and engineering solutions described in the redevelopment component must address flood risk arising from several sources, including SLR. The redevelopment component is the logical place to include guidelines and restrictions that do not take effect until they are triggered by an event, such as flooding of a particular depth. SB 1094's requirements provide communities with a good reason to adopt such measures and also with a potent tool for inoculating restrictions on development against takings claims.

Comprehensive plans must be informed by analysis of relevant and appropriate data, which must be gathered from professionally accepted sources or generated by the local government so long as the methodologies for gathering data are professionally accepted. Florida law also requires that changes to the comprehensive plan must be supported by analysis and that such analysis must reflect reasonable and proportionate applications of the data cited. Scientific certainty is not a required feature of supporting data or their analysis. This flexibility means that the City's Coastal Vulnerability Assessment will not operate as a *floor* or *ceiling* for planning purposes. If the City refers to the Vulnerability Assessment as supporting particular language or parameters, the City would only need to articulate a logical link between the Assessment and the action.

Planning timeframes also changed under SB 1094 in 2015 by allowing localities to incorporate additional planning periods for specific components or projects rather than be limited to the 5- and 10-year periods previously required. This change has vital implications for plans involving assets or facilities whose useful life exceeds 10 years and whose location makes them vulnerable to SLR. Local governments can now ensure SLR projections inform their plans for such infrastructure designs, planning restrictions, and capital investments. The University of Florida's

Conservation Clinic drafted model language to ensure adaptation planning employs an appropriate timeframe:

> *Policy 1.2.1: [Planning Horizon] Utilize a (__) year planning horizon when considering the adoption of any protection, accommodation, and managed retreat strategy within the City/County.*

The 2011 Comprehensive Planning Act authorized localities to designate Adaptation Action Areas (AAAs), which are locations *that experience coastal flooding due to extreme high tides and storm surge and that are vulnerable to the related impacts of rising sea levels.* This designation is to prioritize funding and planning in these vulnerable areas.

2.2 Litigation Risk

As SLR shifts the operations of local government, the result is potentially a double-edged sword situation regarding litigation risk. If local governments act to address SLR, they could be sued by property owners claiming injury from limitations on the property's use or adverse effects to property values. On the other hand, local governments could also be sued for failing to address SLR.

Takings Law protects private-property owners from government actions that fail to provide them with *just compensation* for the condemnation or appropriation of their real property or for regulations that deprive their real property of all or almost all of its use and economic value. In Florida, two sources of Takings Law are available: the Fifth Amendment to the US Constitution and the Bert Harris Private Property Rights Protection Act. Takings Law can be complex and unpredictable in its application to particular cases and the source of highly fact-specific legal disputes.

Local governments will face challenges legally when implementing particular adaptation strategies. However, many state and local governments already use a multitude of strategies to manage development in their communities. By using existing strategies in new ways, governments may be able to minimize the complexities of adaptation.

3.0 Coastal Vulnerability

Given the location of the City of Atlantic Beach between the AICW and the Atlantic Ocean and its relatively low elevation, certain areas of the City are particularly vulnerable to SLR. The City of Atlantic Beach Coastal Vulnerability Assessment was completed in June 2019 and updated in April 2021 to include City-owned water and wastewater infrastructure outside the City limits. The Vulnerability Assessment identified areas of the City that may be subject to increased flooding due to SLR.

The Coastal Vulnerability Assessment also identified assets such as buildings, residences, and critical infrastructure in these areas that could be impacted. The following sections of this report describe the exposure of these assets to SLR as well as their sensitivity to this exposure.

3.1 Exposure

For coastal flooding, exposure is defined as the impact to an asset from extreme coastal storm flooding and nuisance flooding using the SLR scenarios identified in the Coastal Vulnerability Assessment. Extreme coastal storm flooding in the context of this analysis are 100-year storm events caused by a temporary increase in water levels due to a combination of high tides, storm surge, waves, and rainfall. Nuisance flooding is defined as water levels expected at least once per year that are 1 foot greater than the mean higher high-water level. Appendix A to this Plan provides maps depicting exposure under these conditions for current and future scenarios.

The coastal flooding analysis completed for the Coastal Vulnerability Assessment included flooding from storm surge as well as rain-induced flooding for predicted sea levels in 25, 50, and 100 years. The results of this analysis identified the potential exposure of property and critical infrastructure within the study area to flooding during a 100-year storm event. Table 3-1 provides the results of the exposure analysis for the 25- and 50-year scenarios.

Table 3-1 – Exposure of Property by Scenario

2044 Scenarios	Number of Parcels Impacted (% of All Parcels)	Number of Buildings on Impacted Parcels	Land Value of Impacted Parcels	Building Value of Impacted Parcels	Taxable Value of Impacted Parcels
SLR Only	262 (4%)	391	$38,694,113	$87,283,163	$106,064,775
Nuisance Flooding	249 (4%)	372	$33,564,377	$90,415,917	$111,555,621
100-Year Flood	1,035 (17%)	1,085	$100,693,496	$191,438,845	$233,842,120

2069 Scenarios	Number of Parcels Impacted (% of All Parcels)	Number of Buildings on Impacted Parcels	Land Value of Impacted Parcels	Building Value of Impacted Parcels	Taxable Value of Impacted Parcels
SLR Only	391 (6%)	509	$48,601,525	$108,385,260	$134,427,495
Nuisance Flooding	797 (13%)	910	$82,899,477	$191,359,836	$241,442,753
100-Year Flood	2,191 (35%)	2,248	$246,920,675	$424,598,402	$576,235,059

3.2 Sensitivity

Although the assets discussed above will potentially be exposed to flooding, some will be more sensitive to exposure than others. In this context, sensitivity is how assets identified in the exposure analysis respond or function during and after a flood impact. For example, a sewer pump station can be sensitive to flood waters if the electrical components become inundated, while a roadway that is flooded is less likely to suffer damage and is therefore less sensitive.

3.3 Ranking

The Coastal Vulnerability Assessment mapped critical assets within the City as well as water and wastewater assets that the City of Atlantic Beach owns and operates, which are outside the City limits. Tables 3-2 and 3-3 were developed from this mapping data and depict the exposure of each asset to various current and future flooding conditions.

The degree of exposure of each asset was then combined with a qualitative assessment of the sensitivity and consequence of flooding of each exposed asset based on considerations unique to each asset category. The resulting matrix and ranking of critical assets are depicted in Tables 3-4 and 3-5. Figure 3-2 graphically depicts the ranking of each critical roadway section identified in Table 3-5.

Table 3-2 – Degree of Exposure of Critical Facilities

Facility Type	Facility Address/Name	Existing Condition Rainfall Induced (24-Hour Events)			FEMA 100-Yr	Future Conditions 100-Yr Return Period Rainfall Induced		Future Conditions 100-Yr Return Period Storm Surge Induced	
		10-Year	25-Year	100-Year	Current	2044	2069	2044	2069
Water Plant No. 1	469 11th Street	N	N	N	N	N	N	N	Y
Water Plant No. 2	2301 Mayport Rd	N	N	N	N	N	N	N	N
Water Plant No. 3	902 Assisi Ln	N	N	N	N	N	N	N	N
Water Plant No. 4	2848 Mayport Rd	N	N	N	Y	N	N	Y	Y
Wastewater Plant	1100 Sandpiper LN	N	N	N	N	N	N	N	N
Public Works Facility	1200 Sandpiper LN	N	N	N	N	N	N	N	N
Potable Water Well	2848 Mayport Rd	N	N	N	Y	N	Y	Y	Y
Potable Water Well	902 Assisi Ln	N	N	N	N	N	N	N	Y
Potable Water Well	2848 Mayport Rd	N	N	N	Y	N	Y	Y	Y
Potable Water Well	902 Assisi Ln	N	N	N	N	N	N	N	N
Potable Water Well	2301 Mayport Rd	N	N	N	N	N	N	N	N
Potable Water Well	2301 Mayport Rd	N	N	N	N	N	N	N	N
Potable Water Well	1100 Sandpiper LN	N	N	N	N	N	N	N	N
Potable Water Well	469 11th Street	N	N	N	N	N	Y	N	Y
Potable Water Well	1200 Sandpiper LN	N	N	N	N	N	N	N	N
Life Guard Station	1 Ahern St	N	N	N	N	N	N	N	N
City Hall	800 Seminole Rd	N	Y	Y	Y	Y	Y	Y	Y
Commission Chambers	800 Seminole Rd	N	Y	Y	Y	Y	Y	Y	Y
Police & Fire Department	850 Seminole Rd	N	Y	Y	Y	Y	Y	Y	Y
Adele Grage Community Center	716 Ocean Bv	N	N	N	N	N	N	N	N
Jordan Park Community Center	1671 Francis Av	N	N	N	N	N	N	N	N
Gail Baker Community Center	2072 George St	N	N	N	N	Y	Y	N	N
Public Utility Office	902 Assisi Ln	N	N	N	N	N	N	N	N
Atlantic Beach Elementary	298 Sherry Dr	N	N	Y	N	Y	Y	N	Y
Pump/Lift Station	425 11th St	Y	Y	Y	Y	Y	Y	Y	Y
Pump/Lift Station	1082 Ticonderoga St	N	N	N	N	N	N	N	Y
Pump/Lift Station	571 Coastal Oak Ln	N	N	N	N	N	N	N	N
Pump/Lift Station	302 Camelia St	N	N	Y	Y	Y	Y	Y	Y
Pump/Lift Station	858 Cavalla Rd	Y	Y	Y	Y	Y	Y	Y	Y
Pump/Lift Station	2595 America's Cup Cr E	N	N	Y	Y	Y	Y	Y	Y
Pump/Lift Station	1030 Mimosa Cove Ct E	N	Y	Y	Y	Y	Y	Y	Y
Pump/Lift Station	458 David St	N	N	Y	N	Y	Y	Y	Y
Pump/Lift Station	69 Donner Rd	N	Y	Y	N	Y	Y	N	N
Pump/Lift Station	2200 Fairways Villa Dr	N	N	N	N	N	N	N	Y
Pump/Lift Station	2301 Mayport Rd	N	N	N	N	N	N	N	N
Pump/Lift Station	995 Gavagan Rd	N	N	N	N	N	N	Y	Y
Pump/Lift Station	2121 Featherwood Dr W	N	N	N	N	N	N	N	N
Pump/Lift Station	2210 Aspin Ridge Dr	N	N	N	N	N	N	Y	Y
Pump/Lift Station	460 Palm Av	Y	Y	Y	Y	Y	Y	Y	Y
Pump/Lift Station	2632 St Rd A1A	N	Y	Y	Y	Y	Y	Y	Y
Pump/Lift Station	1998 Park St	N	N	N	N	N	N	N	N
Pump/Lift Station	1045 Monmouth Ct	N	N	N	N	N	N	N	Y
Pump/Lift Station	2544 Montreal St	N	N	N	N	N	N	N	N
Pump/Lift Station	2567 West End St	N	N	N	Y	N	N	Y	Y
Pump/Lift Station	2318 Barefoot Tr	N	N	N	N	N	N	N	Y
Pump/Lift Station	2294 Mayport Rd	N	N	N	N	N	N	N	N
Pump/Lift Station	Dutton Island Rd W	N	N	N	N	N	N	Y	Y
Pump/Lift Station	799 Mayport Rd	N	N	N	N	N	N	N	N
Pump/Lift Station	914 Schooners Bay Dr	N	N	N	N	N	N	N	Y
Pump/Lift Station	2277 Seminole Rd	Y	Y	Y	N	Y	Y	N	N
Pump/Lift Station	1799 Selva Marina Dr	N	N	Y	N	Y	Y	Y	Y
Pump/Lift Station	404 20th St	Y	Y	Y	Y	Y	Y	Y	Y
Pump/Lift Station	481 Stewart St	N	N	N	N	N	N	N	N
Pump/Lift Station	739 Renault Dr	N	N	N	Y	Y	Y	Y	Y
Pump/Lift Station	1397 Camelia St	N	N	N	N	N	N	N	N
Pump/Lift Station	2885 Wonderwood Ln	N	N	N	N	N	N	N	Y

Table 3-3 – Degree of Exposure of Major Roadway Segments

Roadway	Segment	Existing Condition Rainfall Induced (24-Hour Events)			FEMA 100-Yr	Future Conditions 100-Yr Return Period Rainfall Induced		Future Conditions 100-Yr Return Period Storm Surge Induced	
		10-Year	25-Year	100-Year	Current	2044	2069	2044	2069
MAIN ST	A1	N	N	N	N	N	N	N	N
MAIN ST	A2	N	N	Y	N	Y	Y	N	N
MAIN ST	A3	Y	Y	Y	N	Y	Y	N	N
MAIN ST	A4	N	N	N	N	N	N	Y	Y
MAIN ST	A5	N	Y	Y	Y	Y	Y	Y	Y
MAIN ST	A6	N	N	N	N	Y	Y	Y	Y
MAIN ST	A7	N	N	N	N	N	N	Y	Y
MAIN ST	A8	N	N	N	Y	N	N	Y	Y
MAIN ST	A9	N	N	N	N	N	N	Y	Y
DUTTON DR	B1	N	N	N	N	N	N	Y	Y
DUTTON DR	B2	N	N	N	N	N	N	N	N
CHURCH RD	B3	N	N	Y	N	Y	Y	N	Y
CHURCH RD	B4	Y	Y	Y	N	Y	Y	N	Y
DUTTON DR	B5	N	N	N	N	N	N	N	N
LEVY RD	C1	N	N	N	Y	N	N	Y	Y
LEVY RD	C2	N	N	N	N	N	N	Y	Y
LEVY RD	C3	N	N	N	N	N	N	N	Y
LEVY RD	C4	N	N	N	N	N	N	N	N
W PLAZA	D1	N	N	N	N	N	N	N	N
PLAZA DR	E1	N	N	N	N	N	N	N	N
PLAZA DR	E2	N	N	Y	N	Y	Y	N	N
PLAZA DR	E3	N	N	N	N	N	N	N	N
PLAZA DR	E4	N	N	N	N	N	N	N	Y
PLAZA DR	E5	N	N	Y	Y	Y	Y	Y	Y
PLAZA DR	E6	Y	Y	Y	N	Y	Y	N	Y
PLAZA DR	E7	N	N	N	N	N	N	N	N
SEMINOLE RD	F1	N	N	N	N	N	N	N	N
SEMINOLE RD	F10	N	N	Y	Y	Y	Y	Y	Y
SEMINOLE RD	F11	N	N	N	N	N	Y	N	Y
SEMINOLE RD	F12	N	N	N	N	N	N	N	Y
SEMINOLE RD	F13	N	N	Y	N	Y	Y	N	Y
SEMINOLE RD	F14	N	N	N	N	N	N	N	Y
SEMINOLE RD	F2	Y	Y	Y	N	Y	Y	N	Y
SEMINOLE RD	F3	N	N	N	N	N	N	N	N
SEMINOLE RD	F4	N	N	N	N	Y	Y	N	N
SEMINOLE RD	F5	N	N	N	N	N	N	N	N
SEMINOLE RD	F6	N	N	N	N	N	N	N	Y
SEMINOLE RD	F7	N	N	Y	N	Y	Y	N	Y
SEMINOLE RD	F8	N	N	N	N	N	N	N	Y
SEMINOLE RD	F9	N	N	Y	N	Y	Y	N	Y
SELVA MARINA DR	G1	N	N	Y	Y	Y	Y	Y	Y
SELVA MARINA DR	G2	N	N	N	N	N	N	N	Y
SELVA MARINA DR	G3	N	N	Y	Y	Y	Y	Y	Y
SELVA MARINA DR	G4	N	N	N	N	N	N	N	Y
SHERRY DR	H1	N	N	Y	Y	Y	Y	Y	Y
SHERRY DR	H2	N	N	N	N	N	N	N	Y

Table 3-4 – Ranking of Exposed Critical Facilities & Infrastructure

Facility Type	Facility Address	Flood Exposure	Vulnerability			Consequence				Total Score
			Sensitivity	Adaptive Capacity	Average Score	Environ-mental	Social	Economic	Average Score	
Water Plant No. 1	469 11th Street	4	5	3	4	1	5	5	4	11.7
Water Plant No. 2	2301 Mayport Rd	1	5	3	4	1	5	5	4	8.7
Water Plant No. 3	902 Assisi Ln	1	5	3	4	1	5	5	4	8.7
Water Plant No. 4	2848 Mayport Rd	8	5	3	4	1	5	5	4	15.7
Sewer Plant	1100 Sandpiper LN	1	5	3	4	5	5	5	5	10.0
Public Works Facility	1200 Sandpiper LN	1	3	3	3	3	3	5	4	7.7
Potable Water Well	2848 Mayport Rd	8	5	3	4	1	5	3	3	15.0
Potable Water Well	902 Assisi Ln	4	5	3	4	3	5	3	4	11.7
Potable Water Well	2848 Mayport Rd	8	5	3	4	2	5	3	3	15.3
Potable Water Well	902 Assisi Ln	1	5	3	4	5	5	3	4	9.3
Potable Water Well	2301 Mayport Rd	1	5	3	4	5	5	3	4	9.3
Potable Water Well	2301 Mayport Rd	1	5	3	4	3	5	3	4	8.7
Potable Water Well	1100 Sandpiper LN	1	5	3	4	2	5	3	3	8.3
Potable Water Well	469 11th Street	5	5	3	4	1	5	3	3	12.0
Potable Water Well	1200 Sandpiper LN	1	5	3	4	2	5	3	3	8.3
Neptune Beach PS	NA	3	5	3	4	5	3	3	4	10.7
Life Guard Station	1 Ahern St	3	1	1	1	1	1	1	1	5.0
City Hall	800 Seminole Rd	9	3	3	3	1	3	3	2	14.3
Commission Chambers	800 Seminole Rd	9	3	3	3	1	3	3	2	14.3
Police & Fire Department	850 Seminole Rd	9	3	3	3	1	5	3	3	15.0
Adele Grage Community Ctr	716 Ocean Bv	1	3	3	3	1	1	3	2	5.7
Jordan Park Community Ctr	1671 Francis Av	1	3	3	3	1	1	3	2	5.7
Gail Baker Community Ctr	2072 George St	6	3	3	3	1	1	3	2	10.7
Office Building	902 Assisi Ln	1	3	3	3	1	1	3	2	5.7
Atlantic Beach Elementary	298 Sherry Dr	8	3	5	4	1	5	5	4	15.7
Pump/Lift Station	425 11th St	10	5	3	4	5	3	3	4	17.7
Pump/Lift Station	1082 Ticonderoga St	4	5	3	4	5	3	3	4	11.7
Pump/Lift Station	571 Coastal Oak Ln	1	5	3	4	5	3	3	4	8.7
Pump/Lift Station	302 Camelia St	8	5	3	4	5	3	3	4	15.7
Pump/Lift Station	858 Cavalla Rd	10	5	3	4	5	3	3	4	17.7
Pump/Lift Station	2595 America's Cup Cr E	8	5	3	4	5	3	3	4	15.7
Pump/Lift Station	1030 Mimosa Cove Ct E	9	5	3	4	5	3	3	4	16.7
Pump/Lift Station	458 David St	8	5	3	4	5	3	3	4	15.7
Pump/Lift Station	69 Donner Rd	9	5	3	4	5	3	3	4	16.7
Pump/Lift Station	2200 Fairways Villa Dr	1	5	3	4	5	3	3	4	8.7
Pump/Lift Station	2301 Mayport Rd	1	5	3	4	5	3	3	4	8.7
Pump/Lift Station	995 Gavagan Rd	6	5	3	4	5	3	3	4	13.7
Pump/Lift Station	2121 Featherwood Dr W	1	5	3	4	5	3	3	4	8.7
Pump/Lift Station	2210 Aspin Ridge Dr	6	5	3	4	5	3	3	4	13.7
Pump/Lift Station	460 Palm Av	10	5	3	4	5	3	3	4	17.7
Pump/Lift Station	2632 St Rd A1A	9	5	3	4	5	3	3	4	16.7
Pump/Lift Station	1998 Park St	1	5	3	4	5	3	3	4	8.7
Pump/Lift Station	1045 Monmouth Ct	4	5	3	4	5	3	3	4	11.7
Pump/Lift Station	2544 Montreal St	1	5	3	4	5	3	3	4	8.7
Pump/Lift Station	2567 West End St	8	5	3	4	5	3	3	4	15.7
Pump/Lift Station	2318 Barefoot Tr	4	5	3	4	5	3	3	4	11.7
Pump/Lift Station	2294 Mayport Rd	1	5	3	4	5	3	3	4	8.7
Pump/Lift Station	Dutton Island Rd W	6	5	3	4	5	3	3	4	13.7
Pump/Lift Station	799 Mayport Rd	3	5	3	4	5	3	3	4	10.7
Pump/Lift Station	914 Schooners Bay Dr	4	5	3	4	5	3	3	4	11.7
Pump/Lift Station	2277 Seminole Rd	10	5	3	4	5	3	3	4	17.7
Pump/Lift Station	1799 Selva Marina Dr	8	5	3	4	5	3	3	4	15.7
Pump/Lift Station	404 20th St	10	5	3	4	5	3	3	4	17.7
Pump/Lift Station	481 Stewart St	1	5	3	4	5	3	3	4	8.7
Pump/Lift Station	739 RENAULT DR	8	5	3	4	5	3	3	4	15.7
Pump/Lift Station	1397 Camelia St	1	5	3	4	5	3	3	4	8.7
Pump/Lift Station	2885 Wonderwood Ln	4	5	3	4	5	3	3	4	11.7

Table 3-5 – Ranking of Exposed Roadway Segments

Road Name	Segment ID	Segment Length	Flood Exposure	Vulnerability Rating
MAIN ST	A1	949	1	Low
MAIN ST	A2	517	8	Moderate-High
MAIN ST	A3	184	10	High
MAIN ST	A4	326	6	Moderate
MAIN ST	A5	691	9	High
MAIN ST	A6	695	7	Moderate-High
MAIN ST	A7	684	6	Moderate
MAIN ST	A8	696	8	Moderate-High
MAIN ST	A9	688	6	Moderate
DUTTON DR	B1	650	6	Moderate
DUTTON DR	B2	1719	1	Low
CHURCH RD	B3	425	8	Moderate-High
CHURCH RD	B4	925	10	High
DUTTON DR	B5	647	1	Low
LEVY RD	C1	244	8	Moderate-High
LEVY RD	C2	250	6	Moderate
LEVY RD	C3	773	4	Moderate-Low
LEVY RD	C4	2165	1	Low
W PLAZA	D1	861	1	Low
PLAZA DR	E1	443	1	Low
PLAZA DR	E2	549	8	Moderate-High
PLAZA DR	E3	2427	1	Low
PLAZA DR	E4	328	4	Moderate-Low
PLAZA DR	E5	624	8	Moderate-High
PLAZA DR	E6	2443	10	High
PLAZA DR	E7	205	1	Low
SEMINOLE RD	F1	3586	1	Low
SEMINOLE RD	F10	969	8	Moderate-High
SEMINOLE RD	F11	213	5	Moderate
SEMINOLE RD	F12	437	4	Moderate-Low
SEMINOLE RD	F13	809	8	Moderate-High
SEMINOLE RD	F14	931	4	Moderate-Low
SEMINOLE RD	F2	836	10	High
SEMINOLE RD	F3	1660	1	Low
SEMINOLE RD	F4	442	6	Moderate
SEMINOLE RD	F5	803	1	Low
SEMINOLE RD	F6	761	4	Moderate-Low
SEMINOLE RD	F7	909	8	Moderate-High
SEMINOLE RD	F8	741	4	Moderate-Low
SEMINOLE RD	F9	619	8	Moderate-High
SELVA MARINA DR	G1	1045	8	Moderate-High
SELVA MARINA DR	G2	2967	4	Moderate-Low
SELVA MARINA DR	G3	6103	8	Moderate-High
SELVA MARINA DR	G4	2096	4	Moderate-Low
SHERRY DR	H1	2025	8	Moderate-High
SHERRY DR	H2	1185	4	Moderate-Low

Vulnerability Rating	Total Roadway Length (ft.)
High	16,230
Moderate-High	16,230
Moderate	3,253
Moderate-Low	10,219
Low	15,465

Figure 3-1 – Critical Roadway Segment Ranking

3.4 Public Input

The City conducted five public meetings during the development of the Coastal Vulnerability Assessment to discuss the technical approach to assessing vulnerability, present the findings of the assessment, and to solicit public comments and concerns relating to current and future coastal flooding.

The City conducted a public meeting regarding adaptation planning and resiliency on April 6 and May 24, 2021, to solicit input from the public and respond to comments and concerns. Input from the City's Environmental Stewardship Committee was solicited at their April 14 meeting and the preliminary findings were presented to this group on May 12 and June 2. Input from all meetings have been incorporated into the plan.

In addition to local City of Atlantic Beach public meetings regarding vulnerability and adaptation planning, City staff have worked closely with the City of Jacksonville (COJ) and have participated in the City's Adaptation Action Area Working Group, Storm Resilience and Infrastructure Development Review Committee, and the City Council Special Committee on Resilience.

3.5 Local Priorities

The adopted 2021 priorities of the City Commission relating to adaptation planning include the following:

- Continuing efforts to understand the potential impacts of local SLR and work towards improving community resilience.
- Update/adopt a long-term capital improvement plan (CIP) to include adaptation, resiliency, and stormwater.
- Ensure equitable spending throughout the community.
- Continue to foster productive partnerships with neighboring municipalities and state and local agencies.

The City is also actively working to protect natural areas that may improve storm defenses and supports the continued reauthorization of the Duval County Shore Protection Project (DCSPP) that results in periodic beach renourishment.

4.0 Adaptation Strategies

4.1 Range of Adaptation Strategies

Adaptation strategies can be implemented through regulations, policies, or capital projects and integrated into existing or new plans such as comprehensive plans, post-disaster redevelopment plans, CIPs, and in this case, adaptation plans. Adaptation strategies can be implemented to reduce exposure, reduce sensitivity, or increase adaptive capacity. The following sections describe these adaptation strategy categories and provide examples of general strategies within each category.

4.1.1 Reducing Exposure

In the context of SLR, exposure refers to the likelihood and timing of when an asset might experience flooding due to the combination of rising sea levels and extreme rainfall and/or coastal surge events. The goal of exposure-reducing adaptation strategies is to reduce or eliminate the chances of an asset experiencing flooding in the future. This requires removing the asset from the future floodplain or altering the drainage system to limit future water levels during extreme events. Table 4-1 provides a qualitative comparison of common strategies that could be effective for reducing asset exposure to future flooding in the City.

Table 4-1 – Comparison of Exposure Reduction Strategies

Adaptation Strategy	Implementation Cost	Environmental Impact	Societal Impact	Construction Feasibility	Service Life
Retreat from Vulnerable Areas					
Land Acquisition/Conservation					
Seawall Improvements					
Stormwater Improvements (i.e., check valves, dams, pumps)					
Raising Critical Infrastructure (i.e., roads, buildings)					
Coastal Dune Maintenance					
Marsh/Vegetative Buffer Maintenance					

*Note: Green shaded boxes indicate strategies with lower costs, minimal environmental/societal impacts, relatively simple implementation, or longer service life. Yellow shaded boxes indicate strategies with moderate costs, some environmental/societal impacts, complex but feasible implementation, or moderate service life. Red shaded boxes indicate strategies with high costs, significant environmental/societal impacts, extremely complex, or short service life.

4.1.2 Reducing Sensitivity

Sensitivity refers to the degree to which an asset's functionality is affected by exposure to a hazard. In this case, the hazard is flooding and the goal of sensitivity-reducing adaptation

strategies is to reduce or eliminate impacts that flooding has on an asset's ability to function during or immediately after flooding. Table 4-2 qualitatively compares common strategies that could be effective for reducing asset sensitivity to future flooding in the City.

Table 4-2 – Comparison of Sensitivity Reduction Strategies

Adaptation Strategy	Implementation Cost	Environmental Impact	Societal Impact	Construction Feasibility	Service Life
Flood Proofing Water/Sewer Infrastructure					
Flood Proofing Emergency Service Operations (Police, Fire, City Hall)					
Flood Proofing Businesses and Homes					
Flood Recovery Strategies to Reduce Flood Durations					
Backup Power Generation for Critical Services (Water, Sewer, Emergency Services)					

*Note: Green shaded boxes indicate strategies with lower costs, minimal environmental/societal impacts, relatively simple implementation, or longer service life. Yellow shaded boxes indicate strategies with moderate costs, some environmental/societal impacts, complex but feasible implementation, or moderate service life. Red shaded boxes indicate strategies with high costs, significant environmental/societal impacts, extremely complex, or short service life.

4.1.3 Increasing Adaptive Capacity

Adaptive capacity is the ability to adjust to or live with the impacts of SLR and changes in extreme storm events. The adaptive capacity of existing infrastructure is often fairly confined to its inherent ability to be adjusted, so increasing the adaptive capacity of existing infrastructure is challenging. Strategies for increasing the adaptive capacity of a community are forward-looking and involve policies, regulations, and strategies to enhance the adaptability of a community. The following are examples of strategies to enhance adaptive capacity:

- Public Outreach and Education – As residents become more aware of future SLR and its associated flood risks, they will be more likely to support local adaptation efforts and will have the opportunity to make educated decisions that have positive impacts on the adaptability of the community.
- CIP – Local governments may choose to consider future flooding risks when developing projects in their CIP or discourage investment in projects that may be vulnerable to flood risks. The local government may also discontinue maintenance and repairs to infrastructure that is repetitively damaged and relocate or retrofit existing infrastructure to be more flood resilient.
- Pursuing Funding for Adaptation Projects – Implementing adaptation strategies can be very expensive. Several federal and state grant funding programs exist that can provide funds for implementing adaptation strategies.

- Transfer of Development Rights (TDR) – This strategy is meant to limit or reduce development within vulnerable areas by allowing one property owner to sever development rights in exchange for compensation from another property owner who would like their development rights to increase. The receiving area is then allowed to have increased density or dwelling units per acre. A TDR program serves as an incentive for a property owner to avoid developing on vulnerable property by providing compensation for lost privileges.
- Cluster Development – Cluster development encourages developers to concentrate development in upland/desirable areas on a tract of land while preserving/avoiding vulnerable areas, which maximizes protection of future structures, preserves vulnerable areas, and often saves developers money.
- Setbacks and Buffers – Setbacks and buffers are building restrictions that establish a distance from a boundary line where landowners are prohibited from building structures. These are regulatory tools that can be established through zoning and floodplain codes or conservation easements and serve to protect existing or new structures and inhabitants by allowing inland migration of shorelines and preservation of wetlands, dunes, estuaries, and other environmentally sensitive areas.
- Conservation Easements – A conservation easement is a strategy used by local governments for the permanent conservation of private lands by placing a limitation on the uses and/or allowable amount of development on a property to protect its associated resources while still allowing the owner to live, retain, and develop the property with limited use. The easement can apply to all or a portion of a property. Usually, a conservation easement preserves a portion of property in its natural state.
- Floodplain Regulations – Floodplain regulations are a tool that a coastal community could amend to impose additional restrictions on development in floodplains above the National Flood Insurance Program (NFIP) minimum standards, such as *use* restrictions within the 100-year floodplain areas (only allow limited residential, recreational, or agricultural uses), and/or impose design requirements in the 500-year floodplain areas that are currently not required (elevation requirements).
- Building Codes and Standards – Building codes establish minimum requirements for building construction. Under the Florida Building Code Act, all local codes were replaced by the Florida Building Code in 2002. However, local governments may adopt more stringent regulations where local conditions warrant. Additional regulations governing construction include flood-protection regulations pursuant to NFIP and the state Coastal Construction Control Line (CCCL) permitting standards. A coastal community may look into applying flood-resistant code standards to currently unregulated areas that may be vulnerable to flooding in the future, such as the 500-year floodplain.
- Redevelopment Standards – Redevelopment standards are regulatory tools a community can use to limit, or even in some cases prohibit, what is allowed to be rebuilt on a property that has been damaged or destroyed by natural hazards. Communities can limit redevelopment of repetitive loss structures and/or other storm-damaged structures in highly vulnerable areas.

- Real Estate Disclosures – Governmental bodies (e.g., state or local agencies) could compile data, erosion maps, inundation models, and other relevant information and make this information accessible to potential property buyers and developers. Governments could require sellers to disclose to potential buyers that a property is in an area vulnerable to flooding.

4.2 Focus Areas for Adaptation

Predicted SLR over the next 25 years has a fair degree of certainty and less certainty over a 50-year time horizon. 100-year predictions in SLR are extremely uncertain. From a planning perspective and given increasing uncertainty over time, the City's adaptation planning efforts will focus on the 25-year time horizon with consideration given to the 50-year predictions. Based on the exposure and sensitivity analyses over these timeframes, the focus areas identified for adaptation planning are provided below.

4.2.1 Citywide

The City of Atlantic Beach is considered by COJ to be in an AAA. As discussed in Section 2.1, the 2011 Comprehensive Planning Act authorized localities to designate AAAs, which are locations *that experience coastal flooding due to extreme high tides and storm surge and that are vulnerable to the related impacts of rising sea levels*. COJ opted to define AAAs in Duval County as areas that are subject to inundation from a 500-year flood event or a Category 3 hurricane storm surge. The NOAA predicts that virtually all of the City of Atlantic Beach could be inundated by a Category 3 storm; hence, the entire city is considered to be in an AAA.

Although no return interval is assigned to a Category 3 storm, unlike a 100-year flood event, the entire community can still be considered to have potential exposure. Accordingly, all of the City of Atlantic Beach is considered to be a focus area for adaptation primarily from a planning and policy perspective.

4.2.2 Areas West of Mayport Road

As indicated by the future 100-year flood maps shown in Figure 4.2, many residential and commercial areas west of Mayport Road are predicted to be impacted from rising sea levels. These areas are expected to be subject to the chronic condition of nuisance flooding as well an increasing likelihood of inundation due to storm surge and rainfall-induced flooding during a 100-year storm event. Figure 4-2 depicts the expected extent of flooding due to the 100-year storm event in 2044.

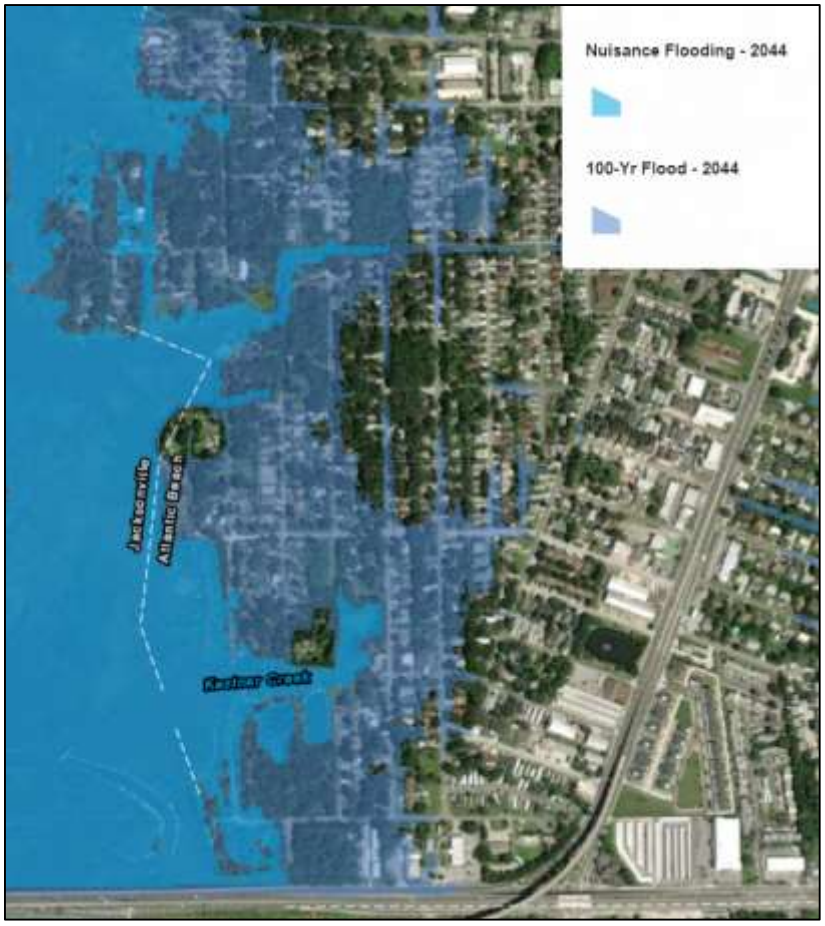

Figure 4-1 – 2044 Nuisance and 100-Year Storm Flooding West of Mayport Road

4.2.3 Major Drainageways

East of Mayport Road, minimizing the extent and duration of flood events depends largely on the ability of the major drainageways to manage the stormwater runoff discharging into them. Adaptation measures will be required to ensure that the major drainageways function properly and will not be adversely impacted by rising sea levels.

Figure 4-2 shows that the major drainageways serving the City include Hopkins Creek, Sherman Canal, Puckett Creek, and Sherman Creek.

Figure 4-2 – Major Drainageways

4.2.4 Roadways

As discussed in Section 3, many of the major ingress and egress routes from the City may be affected by rising sea levels. These roadways will be considered a focus area for adaptation planning. The two busiest roads in the City are Mayport Road and Atlantic Boulevard. Both roadways are managed by the Florida Department of Transportation (FDOT), not the City of Atlantic Beach.

4.2.5 Critical Utility Infrastructure

Critical infrastructure that will be a focus area for adaptation planning to include numerous lift stations, two of the City's water plants, and four potable water wells.

4.2.6 Critical Public Facilities

Public facilities expected to be exposed to future flooding conditions will also be focus areas for adaptation planning efforts. These include City Hall, the Police and Fire Departments, and several of the City's community centers.

4.3 Current Strategies and Existing Regulations

Assessing existing strategies and regulations is recommended by the FDEP before identifying adaptation strategies and recommendations. This includes looking at the City's current plans, development regulations, and other initiatives that may be used or modified for adaptation purposes.

4.3.1 Existing Plans

Coastal Vulnerability Assessment

This assessment used existing and projected conditions to model 25-, 50-, and 100-year scenarios for SLR and future flood hazards. The models were then used to identify vulnerable areas, properties, and infrastructure.

2018 Stormwater Master Plan Update

This update built on the previous 1995, 2002, and 2012 plans and modeled existing and projected hydrologic conditions within the City and includes recommended stormwater improvement projects in identified locations.

2030 Comprehensive Plan

In 2019, the City updated the Comprehensive Plan to comply with the *Peril of Flood* statute, which required local governments to incorporate SLR planning into their redevelopment policies. In addition, the plan contains numerous goals, objectives, and policies related to adaptation.

4.3.2 Existing Development Regulations

Finished Floor Elevation (FFE)

All lots and building sites shall be developed so that habitable space is constructed at a minimum FFE of 8.5 feet above mean sea level or with 2.5 feet of freeboard (above the base flood elevation), whichever is greater.

Base Flood Elevations

Development that encroaches into a regulated floodway must demonstrate that the development will not cause any increase in base flood elevations.

Floodplain Storage

Development within the 100-year floodplain must create storage onsite to mitigate for any filling of volume onsite to accomplish *no net loss* of storage.

Onsite Storage of Stormwater

Development that exceeds 50 percent of the market value of all improvements or which increases the impervious surface on a site by more than 250 square feet must provide onsite storage of stormwater.

Impervious Surface Area

In 2019, the maximum impervious surface area for properties within residential zoning districts was reduced from 50 to 45 percent.

Grading and Drainage

All development sites must be graded so that stormwater drains to the adjacent street, existing natural element, or a City drainage structure after meeting on-site stormwater storage requirements. Except as required to meet coastal construction codes or as required to meet applicable flood zone or stormwater regulations, the elevation or topography of a development site shall not be altered.

Wetland Mitigation

Any impacted wetlands on a development site must be replaced elsewhere on the site or within the City so that no net loss of jurisdictional wetlands occurs within the City.

Wetland Buffer

New development must maintain a 50-foot buffer from jurisdictional wetlands adjacent to water bodies connected to the Intracoastal Waterway and a 25-foot buffer from other jurisdictional wetlands. This buffer is reduced to 25 feet for single-family lots platted before 2002.

Special Planned Area (SPA)

An SPA zoning district may be applied for or required by the City where a proposed development has unique characteristics or special environmental features. This zoning district provides flexibility and creates opportunities for preservation (i.e., cluster development).

4.3.3 Current Initiatives

Federal Emergency Management Agency's (FEMA's) Community Rating System (CRS)

The City participates in the CRS program, which provides reductions in flood insurance premiums for cities that implement activities that exceed the minimum criteria for FEMA's NFIP.

Leadership in Energy and Environmental Design (LEED) Certification

The City of Atlantic Beach became LEED for Cities certified in 2019. Cities with this certification aim to ensure a more sustainable future by creating a healthier environment.

Urban Forestry

Since 2019, over 450 trees have been planted in public spaces throughout the City. Additionally, the City is working to strengthen its tree protection ordinance to preserve and regenerate the urban canopy.

Street Sweeping and Stormwater Inlet Cleaning

Street sweeping and inlet cleaning help reduce localized flooding by removing debris that blocks drainage infrastructure.

Vulnerable Property Acquisition

Multiple properties have been purchased by the City over the years for preservation purposes including the Tide Views, Dutton Island, and River Branch Preserves. Recently, the City purchased Selva Preserve and an approximately 2-acre parcel west of Lily Street providing preservation of wetlands, maintenance of stormwater storage capacity, and storm-surge protection for adjacent properties.

Duval County Shore Protection Project (DCSPP)

The DCSPP, which is the federal program established for beach renourishment, is critical to maintenance and restoration of beach and dune systems, providing protection to the Atlantic Ocean coastline in Duval County.

4.4 Recommended Strategies for Focus Areas

The following adaptation strategies have been developed for the identified vulnerable focus areas within the study area. These recommendations and associated timeframes are based on best available information and shall be updated as new information becomes available or additional adaptation strategies are identified.

4.4.1 Citywide

The following relate to recommended changes and updates of policies, ordinances, etc. to better help the City manage and adapt to changing vulnerability and flooding potential throughout the City. These apply to the chronic stressor of SLR and the acute stressor of a major storm event.

- Ensure that every CIP implemented by the City is examined through the lens of resilience.
- Review building and zoning codes of other Florida cities and counties for resilience and adaptation-related elements and determine if the City of Atlantic Beach's building and zoning codes should be updated to reflect similar elements.
- Craft policies that do not disincentivize property owners from making repairs and renovations for resiliency purposes because such repairs may currently trigger a requirement for full compliance with all current codes.
- Reinforce the value of trees for absorbing stormwater runoff.
- Explore ways to disclose flood zone and prior flooding information on real estate transactions and lease agreements.
- Establish education and public engagement tools such as user-friendly websites, newsletters, social media platforms, and resource guides to reach diverse audiences.

- Establish a community relief center to enable and provide assistance to citizens to deal with stressors related to water inundation.
- Keep shorelines natural by implementing a 6-foot low-maintenance buffer (no mowing, fertilizer, pesticide, or herbicide application) along public lands adjacent to waterways and drainage ditches. This should also be encouraged along waterways on private property through education and outreach.
- Partner with COJ, Jacksonville Port Authority (JAXPORT), and the US Army Corps of Engineers (USACE) to develop a program for the beneficial reuse of dredged material through Thin Layer Placement (TLP), or other methods of strategic placement. This may be especially important to the City's marsh system. TLP may help to build the marsh up ahead of SLR and prevent marsh areas from converting to open waters, resulting in a reduction of wave energy reaching the upland shoreline.
- Work with COJ to establish an outreach program to provide voluntary property vulnerability assessments in vulnerable areas of the City. Provide property owners with suggested adaptation actions they may wish to undertake to increase resiliency to SLR, storm surge, and extreme tides while simultaneously providing habitat and water-quality benefits.
- Map riparian areas subjected to invasive species (i.e., Brazilian Pepper), develop a program to eradicate species on public property, and provide guidance to owners of infested private properties. Invasive species often do not provide the degree of protection from erosion and wave attenuation that native species do.
- Ensure that the DCSPP remains funded and provides for continuous beach and dune restoration on an as-needed basis.
- Incorporate Environmental Protection Agency (EPA) Green Streets concepts such as green infrastructure and drainage into medians, sidewalks, and landscaped areas during the planning and design of roadway transportation projects.
- Seek state and federal assistance, when available, to help pay for removing remaining septic tanks on the west side of the City, and work with COJ for removing septic tanks within the Public Utilities service area that fall outside the City's limits.
- Incentivize low-impact design (LID) practices. LID can include rain gardens, recessed planting beds, bio-swales, green roofs, or simply planning for a greater pervious surface in site design.
- Review minimum off-street parking requirements. Today, off-street parking minimums for residential and commercial developments artificially inflate the number of parking spaces; therefore, impervious surface areas must be developed. This contributes to the amount of stormwater runoff generated from developments and increases flooding potential, especially in areas that do not have space to add stormwater ponds.

- Consider revising minimum FFEs for areas in a 500-year flood zone on the current FEMA Flood Insurance Rate Map. The extents of a 500-year flood event are similar to the predicted extents of a 100-year flood event in 2044. Minimum FFEs in these areas could be revised to 2.5 feet above the nearest adjacent 100-year base flood elevation to provide for future protection. Building height limitations in these areas could also be revised to be based on the required FFE, similar to Sec. 24-81(n)(a). The current minimum FFE in an area impacted by a 100-year flood event (Special Flood Hazard Area) is 2.5 feet above the base flood elevation.

These recommendations are primarily near-term recommendations (i.e., within 12 months). A specific implementation schedule should be developed to further prioritize, evaluate, refine, and consider for implementation.

4.4.2 Areas West of Mayport Road

As verified by the Coastal Vulnerability Assessment, the marsh-facing areas west of Mayport Road will be particularly vulnerable to flooding events given higher sea levels in the future. Many residents in this area are already impacted by nuisance flooding that is projected to get worse.

- Commission a study within the next 12 to 36 months to evaluate the most cost-effective means of protecting this area of the City. This evaluation should result in the development of a 25-year plan for managing nuisance flooding and storm surge in this area to maximize protection of affected residential and commercial properties, critical facilities, and infrastructure and roadways. The plan shall include implementation triggers, expected timeframes, and probable costs for proposed improvements.

  Improvements that are expected to be evaluated include but are not limited to the following:

  - Strategically raising centerline road elevations to protect inland properties.
  - Installing check valves in drainage ditches to prevent storm surges from entering inland areas.
  - Extending water and sewer utilities where needed to ensure continuity of service.
  - Raising vulnerable structures to a safe elevation.
  - Identifying and conserving properties strategically located along the marsh edge to maintain or develop the ability to reduce wave impacts on the immediately adjacent upland areas.
  - Evaluate the rate and extent of marsh erosion and develop plans to stem the loss of marsh and commensurate loss of storm protection benefits.

- Complete a marsh baseline study within the next 12 months. Little quantitative information is available regarding the health of the marsh system within the City limits. As part of this

effort, the City should complete a marsh baseline study to determine the current condition, extent, and elevation of the marsh so that future changes can be monitored. Periodically monitoring changes in the marsh will provide valuable information regarding the speed and extent of local impacts of SLR and will be a useful tool for future adaptation planning.

4.4.3 Major Drainageways

Of significant importance to the City of Atlantic Beach residents east of Mayport Road is the performance of the major drainageways during severe storm events. Performance of these systems is crucial regarding limiting the extent and duration of a flooding event. The City completed a Stormwater Master Plan Update in 2018 and staff have been implementing the recommendations in this plan as funding allows.

The Coastal Vulnerability Assessment resulted in the prediction of future flooding associated with SLR and continued redevelopment within the City. This work was completed subsequent to the Stormwater Master Plan Update; therefore, the potential impacts from SLR are not wholly reflected in the recommended CIP resulting from the Stormwater Master Plan Update:

- Within the next 12 months, initiate a study to evaluate the major drainageway projects included in the current stormwater CIP regarding the increasing flooding due to SLR. This study should include development of a plan of action to account for these future conditions. This process will ensure that all major drainage infrastructure projects and improvements can be adapted to future conditions and will be complementary to potential future projects, such as stormwater pump stations, that may become necessary as sea level and flooding conditions change.
- Within the next 12 to 36 months, engage a consultant to develop a 50-year plan for managing the major drainageways to maximize protection of affected residential and commercial properties, critical facilities, infrastructure, and roadways. This plan should include a local, COJ, state, and federal agency coordination plan, implementation triggers, expected timeframes, and probable costs for proposed improvements.

The 2018 Stormwater Master Plan Update and subsequent Coastal Vulnerability Assessment concluded that the box culvert on SR A1A at Puckett Creek is severely undersized and contributes to poor performance of the Puckett Creek and Sherman Canal watersheds. This culvert is outside the City limits and is owned by FDOT; therefore, the City of Atlantic Beach has no jurisdiction over it. However, the City has initiated discussions with FDOT regarding upsizing the box culvert to improve drainage. City staff must continue communicating with FDOT and lobbying for the culvert's replacement.

4.4.4 Roadways

The roadways evaluated as part of this effort include major ingress and egress roads within the City limits, excluding Atlantic Boulevard and Mayport Road, which are controlled by FDOT. The

ranking presented in Section 3.3 provides a roadmap in order of importance regarding each vulnerable road segment. Recommendations related to these roadway segments are as follows:

- Review the current pavement management plan and update it as necessary to reflect the roadway segment ranking within the next 12 months.
- Before repaving or making major improvements to any vulnerable roadway segments, determine improvements that can be made to increase the roadway segment's resilience and ability to function during predicted 2044 100-year flooding conditions.
- Evaluate minor arterial roadways on a case-by-case basis to identify potential improvements resulting in better performance due to chronic and acute flooding conditions.
- Ensure that City staff share vulnerability data with FDOT to help inform their adaptation planning regarding Atlantic Boulevard and Mayport Road.

The initial planning required to implement these recommendations should commence within 12 months, and these recommendations should be implemented within 24 months or before any major capital expenditures relating to improvements of any ranked roadway segment.

4.4.5 Critical Utility Infrastructure

Vulnerable City-owned critical utility infrastructure within and outside the City limits include sewer pump stations, potable water plants, and several potable water wells. The Public Utilities Department shall implement the following recommendations to ensure continuity of service under all conditions:

- Within the next 12 months, retain a consultant to evaluate all identified exposed critical utility infrastructure with a ranking of 15 or higher to identify improvements required to protect these assets from expected 100-year event flood levels in 2044. These improvements shall be implemented within 12 months of completion of the evaluation or sooner as funding becomes available.
- Within the next 24 months, retain a consultant to evaluate all identified exposed critical utility infrastructure with a ranking of less than 15 to identify improvements required to protect these assets from expected 100-year event flood levels in 2044. These improvements shall be implemented within 36 months of completion of the evaluation or sooner as funding becomes available.

4.4.6 Critical Public Facilities

Several vulnerable critical public facilities must be addressed to ensure continuity of government and community services. The City shall implement the following recommendations:

- Within the next 12 months, evaluate all identified exposed critical public facilities with a ranking of 15 or higher to identify improvements required to protect these assets from

expected 100-year event flood levels in 2044. These improvements shall be designed and implemented as soon as possible after completion of the evaluation.

- Within the next 24 months, evaluate all identified exposed critical public facilities with a ranking of less than 15 to identify improvements required to protect these assets from expected 100-year event flood levels in 2044. These improvements are to be designed and scheduled for implementation as funding becomes available.

5.0 Recommended Actions

This Preliminary Adaptation Plan is the result of the first iteration of the City's adaptation planning process. This Plan contains general recommendations for adaptation strategies to be applied to exposed areas of the City as well as a recommended implementation schedule. Subsequent iterations of this living document will be completed after solicitation of public input and will contain additional objective data, more specific strategies, and updated implementation schedules as appropriate.

5.1 Summary of Recommended Actions and Schedule

Table 5-1 summarizes the recommendations for adaptation strategies identified in each focus area with a recommended timeframe for implementation. The timeframes for initiation are based on the following criteria:

- Ongoing ➔Actions currently being undertaken by staff
- Immediate ➔ Upon adoption of Adaptation Plan
- Near-Term ➔ <12 months
- Mid-Term ➔ 12-36 months
- Long-Term ➔ 36-48 months

Table 5-1 – Summary of Recommendations and Implementation Schedule

Recommendation	Action	Timeframe for Initiation
Review all capital projects in context of adaptation	Incorporate into project planning procedures	Immediate
Building and zoning code review	Initiate review process and produce report of recommended actions	Near-Term
Policies to encourage homeowner resiliency projects	Establish policies	Mid-Term
Reinforce value of trees for absorbing runoff	Develop educational materials; coordinate with COJ efforts	Near-Term
Real estate disclosures	Initiate discussions with Property Appraiser and develop approach for implementation	Mid-Term
Education and Public Engagement Tools	Develop/adapt educational materials	Near-Term
Low maintenance buffers on City property	Establish policy	Immediate
Marsh restoration partnering w/ COJ, JAXPORT, USACE	Begin planning, discuss with relevant agencies, determine funding sources	Long-Term
Work with COJ on vulnerability outreach program	Begin coordination and development of outreach materials	Mid-Term
Invasive species mapping in riparian areas	Complete map and develop eradication plan	Near-Term
Maintain federal authorization for beach renourishment	Maintain contact with USACE, COJ and FDEP to assure authorization is maintained	Ongoing

Incorporate EPA Green Streets into planning & projects	Incorporate in to Complete Streets program	Near-Term
Seek funding to phase out septic tanks	Initiate discussions with COJ, FDEP and SJRWMD to identify funding opportunities	Ongoing
Incentivize LID practices	Develop LID guide and update code as necessary to incentivize	Near-Term
Review minimum off-street parking requirements	Review and update applicable sections of code	Near-Term
Revise minimum FFEs in exposed areas	Evaluate impact of change and implement code change	Mid-Term

Table 5-2 – Areas West of Mayport Road Recommended Actions & Schedule

Recommendation	Action	Timeframe for Initiation
25-Year plan for SLR protection	Commission evaluation and present options to the community	Mid-Term
Marsh baseline study	Commission study	Near-Term

Table 5-3 – Major Drainageways Recommended Actions & Schedule

Recommendation	Action	Timeframe for Initiation
Evaluation of current CIPs	Initiate review of projects	Near-Term
50-year drainage plan	Engage consultant to develop 50-year plan; incorporate findings in to the CIP	Long-Term

Table 5-4 – Roadways Recommended Actions & Schedule

Recommendation	Action	Timeframe for Initiation
Rank roads in pavement management plan	Review & update pavement management plan	Near-Term
Improve resilience of vulnerable roadways prior to repaving or making major improvements	Evaluate roadway projects as they arise	Ongoing
Minor arterial roadway evaluation	Evaluate in response to inspections and complaints	Ongoing
Atlantic Boulevard and Mayport Road resiliency	Coordinate w/ FDOT	Ongoing

Table 5-5 – Critical Utility Infrastructure

Recommendation	Action	Timeframe for Initiation
Evaluate and upgrade exposed infrastructure w/ ranking >=15	Evaluate and implement recommended improvements	Near-Term
Evaluate and upgrade exposed infrastructure w/ ranking <15	Evaluate and implement recommended improvements	Mid-Term

Table 5-6 – Critical Public Facilities

Recommendation	Action	Timeframe for Initiation
Develop plan for exposed facilities with ranking >= 15	Complete plan; design and schedule recommended improvements	Near-Term
Develop plan for exposed facilities with ranking <15	Complete plan; design and schedule recommended improvements	Mid-Term

5.2 Monitoring and Evaluation

This Adaptation Plan is a living document and the recommendations and implementation schedule contained in the Plan must be routinely visited and updated as necessary. SLR predictions are subject to change as new information and data become available. These changes must be incorporated into the exposure and sensitivity analyses to reveal any significant changes that must be accounted for. This Plan is also expected to be revised as additional data, such as marsh baseline data, are obtained.

The analyses described in the Coastal Vulnerability Assessment should be revisited every 5 years at a minimum using the most recent sea levels and SLR predictions available. Subsequent to updating these analyses, this Adaptation Plan should be revised to add additional adaptation strategies as necessary and to move projects and actions listed in Section 4.3 to Section 4.4 as they are implemented or completed.

6.0 References

2015 Unified Sea Level Rise Projection for Southeast Florida, Southeast Florida Regional Climate Change Compact Sea Level Rise Work Group, 2015

Adaptation Action Area Workgroup Report and Recommendations, City of Jacksonville, November 2019

City of Atlantic Beach Coastal Vulnerability Assessment, Revision April 2021

City Council Special Committee on Resiliency Final Report, City of Jacksonville, April 2021

City of Jacksonville Storm Resiliency and Infrastructure Development Review Committee Final Presentation, June 25, 2019

Climate Science Special Report: Fourth National Climate Assessment, U.S. Global Change Research Program, 2017

Florida Adaptation Planning Guidebook, FDEP, June 2018

Global and Regional Sea Level Rise Scenarios for the U.S., NOAA Technical Report NOS CO-OPS 083, 2017

Global Sea Level Rise Scenarios for the United States, NOAA Technical Report OAR CPO-1 National Climate Assessment, 2012

Incorporating Sea Level Changes in Civil Works Programs, USACE Engineer Regulation (ER) 1100-2-8162, 2013

NOAA Tides & Currents – Water Levels (https://tidesandcurrents.noaa.gov/sltrends/)

Appendix A

Inundation Scenarios and Maps

Inundation scenarios and maps have been moved online as interactive maps for ease of access and viewing. This information can be accessed through the following link:

Resiliency and Adaptation - Current and Future Flood Mapping

Appendix B

Public Workshop Comments

No public comments have been received to date. As this is a living document that will be updated often as additional information becomes available, comments received from planned public meetings will be incorporated as appropriate in to the document and will be added to this appendix.