

## Contents

General Overview and Policy Discussion .....	1
Components of this Report.....	1
Vulnerability Assessment.....	1
Comprehensive Plan Assessment .....	2
Public Engagement.....	3
Online Survey .....	4
Overview of Sea Level Rise Risks.....	5
Rational of Policy Development.....	6
Incorporating Resilience into the City Plans, Policies and Programs.....	7
Post Disaster Redevelopment Plan .....	10
Comprehensive Plan Actions to Address Resiliency .....	10
Peril of Flood Legislation.....	10
Adaptation Action Areas .....	12
Other Comprehensive Plan Considerations .....	12

## General Overview and Policy Discussion

The City of New Smyrna Beach was awarded a Florida Department of Environmental Protection (FDEP) grant to assess sea level rise, storm surge and flooding impacts on the City, engage the public and develop strategies and policies aimed to mitigate, adapt and plan for the impacts. The City contracted with the East Central Florida Regional Planning Council (ECFRPC) to develop the vulnerability assessment, engage the public and develop the policies and recommendations.

### Components of this Report

#### Vulnerability Assessment

A vulnerability assessment was conducted by Dr. Jason Evans, Phd., from Stetson University, and the resulting report served basis for many of the recommendations from the report. The report describes technical methods, datasets, and results for the flood vulnerability assessment conducted for the City of New Smyrna Beach. The assessment specifically focuses on possible flood exposure risks for public and

essential infrastructure, private property, and the local human population to several types of flood hazards: 1) shallow coastal flooding and inundation regular tidal events; 2) extreme coastal flooding due to large storm surge events; and 3) future exacerbation of such risks at two projected sea-level rise scenarios – the United States Army Corps of Engineers (USACE) High (2013) and NOAA High (2017) – for the years 2040, 2070, and 2100. The report also develops some recommendations for more detailed study and adaptation policy development.

### **Comprehensive Plan Assessment**

An analysis of the City’s comprehensive plan was conducted by Dr. Claire Knox, Phd. from the University of Central Florida. This report summarizes the methods and results of a comprehensive plan review for the City of New Smyrna Beach and Volusia County. The primary analysis was the city and county comprehensive master plans (CMP) with a secondary analysis of the county’s emergency management plans. Resilience is a community's “ability to prepare and plan for, absorb, respond, recover from, and more successfully adapt to adverse events”. Measuring a community’s resilience is challenging but essential. Various measures exist and for this analysis, 85 indicators of resilience were obtained from multiple sources including the planning literature, disaster resilience literature, and best practices.

In this analysis, the City of New Smyrna Beach’s CMP scored well for resiliency (38.27 out of 50). Of the 85 indicators, 54% (n=45) were discussed throughout the plan in great detail, 32% (n=27) were discussed in the plan but not in depth, and 15% (n=13) were rarely or not discussed in plan. The majority of these indicators were in the Policies, Tools, and Strategies component, which also scored the lowest in the analysis. This section of the full report details the literature, methods, results, and recommendations of the full analysis completed for this grant.

The primary recommendations from the comprehensive plan assessment are listed below, and a more detailed explanation for these recommendations are contained in the full report by Dr. Knox. The City should consider incorporating these into their next update to their Comprehensive Plan.

1. Include a list of “critical infrastructure” and “critical facilities and services” in the City’s Comprehensive Master Plan (CMP) that aligns with the list in the County’s Comprehensive Emergency Management Plan (CEMP). The city’s plan primarily focuses on “critical habitat”. We recommend expanding the plan to include details of all critical infrastructure, facilities, and services in the city.
2. Include mandatory words for affordable housing, which also was not included in Volusia County’s CEMP. After hurricanes Irma and Maria in 2017, transitioning individuals from short-term to long-term housing was an issue with the lack of affordable housing in Central Florida.
3. Many of the hazard-related indicators need to be more detailed in the CMP to increase the disaster resilience of the City.
4. One indicator, “Formal education/training of staff” from the Policies, Tools, and Strategies category, is included in the city’s CMP but is missing from the county’s plan. This is an important element of internal organizational resilience for the city and we recommend the county add it to its plan as well.
5. “Public Education” from the Policies, Tools, and Strategy category could be strengthened by adding details from the public education of the CMP itself.

6. Include specific details regarding the defined coastal zone boundary and include of a map within the CMP.
7. Review the indicators in Table 6 of the report (Indicators Rarely or Not Discussed Thoroughly), which were either rarely or not discussed in the City's CMP.
8. Include information about collaboration efforts with faith-based organizations, which was never mentioned in the City's CMP, and add mandatory language to ensure these efforts continue.
9. Overall, change as many of the "should" words to "shall" to strengthen the resiliency of New Smyrna Beach.

## Public Engagement

Two public meetings were held and an on-line survey was developed to provide public input. Residents were asked about their thoughts regarding resilience and what areas of the City they thought were most vulnerable. Breakout groups identified four areas of concern:

1. Hurricanes.
  - a. Enhanced education and preparedness training.
  - b. Protection of the shoreline vegetation to help fight surge impacts. Create larger vegetative buffers.
  - c. Building and dock fortification
  - d. Innovative ways to manage stormwater such as low impact development actions.
2. Sea Level Rise
  - a. Education for citizens and elected officials
  - b. Seek funding for purchase of open space
  - c. Ensure septic tanks and sanitary sewer systems are fortified or relocated.
  - d. Set time frames for migration out of vulnerable areas.
  - e. Preserve existing wetlands and impervious surfaces, stop clear-cutting, buy lands for conservation. Create more living shorelines.
  - f. Relocate the hospital.
3. Development
  - a. Invest in areas that are not vulnerable to sea level rise and hurricane surge.
  - b. Provide incentives for people to move to less vulnerable areas.
  - c. Find grant money to make sewer connections.
  - d. Revise codes to require more preservation and buffers.
  - e. More innovative designs for stormwater management and development techniques.
  - f. Higher floor levels.
4. Salt Water Intrusion
  - a. Model the impacts.
  - b. Assess alternatives to protect the water supply.

Mapping exercises were conducted as a part of the public engagement where residents could identify areas that they felt should have more green infrastructure and other resilience measures. There were three areas of interest in the City for green infrastructure and other resilience measures: the western side of the City next to I-95, land along Turnbull Creek and the barrier island. Participants pointed out

that woodlands along Interstate 95 are being destroyed for subdivision development. They were concerned that the destruction of the City's natural greenspace would erode the unique identity held by New Smyrna Beach. The second cluster of stickers focused on Turnbull Creek, an issue that is front and center in the public eye. As the land surrounding Turnbull Creek is vulnerable to extensive inundation, the participants described the importance of preserving the natural land along the water to create a "sponge effect" for future flooding. Next, the group identified additional greenspace preservation concerns along Callalisa Creek, where residential development has been encroaching on natural waterways and vegetation. Lastly, the group identified the need for an additional cell tower to be placed on the barrier island to strengthen the community's communication in the event of a hurricane.

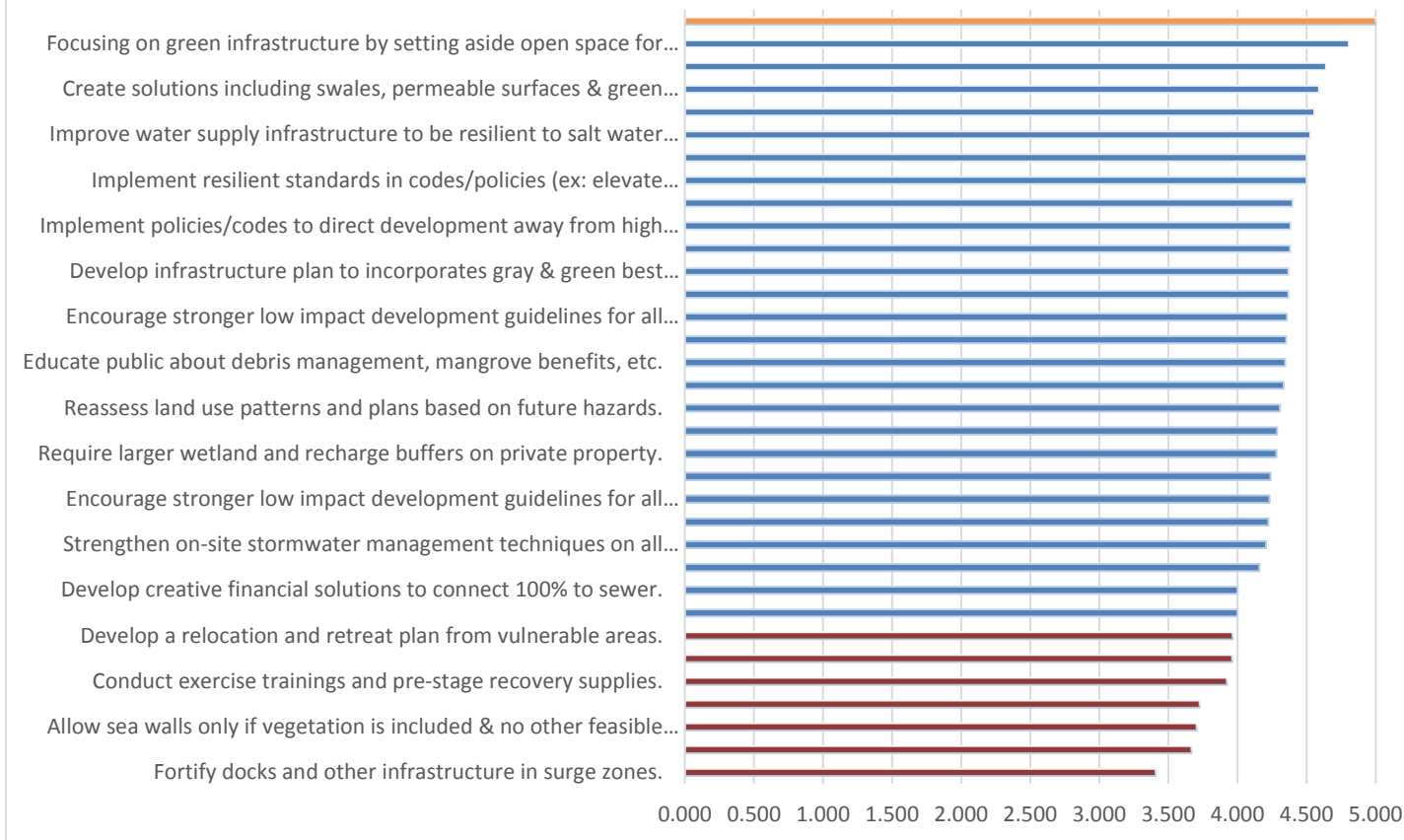
The second question asked "Thinking about vulnerabilities and 50-75 years in the future, where would you like to see future development and open space concentrated?" The groups during this exercise expressed concerns regarding sea level rise in their City and the need to ensure future development is located outside of the sea level rise zones portrayed on the maps. Development is currently occurring in the western portion of the City, where many participants expressed support to continue future development. However, it was discussed that this development should be mixed-use residential combined with green space throughout developed/ing areas. There was also discussion about converting more vulnerable areas of the City, especially along U.S. 1 and on the coastline, into green space areas for recreation and eco-tourism. Redevelopment of the Canal Street downtown area was also a topic of conversation and focused on the creation of a more vibrant mixed-use downtown that is beneficial to residents as well as tourists. Another note was to work with the City to move setback lines inland and not allowing rebuilding in certain areas.

### **Online Survey**

The information derived from the workshop was combined with best practice strategies to develop a city-wide survey aimed to gauge from a broader constituency, support for specific actions, policy changes or other strategies to address resilience. The survey was made available from March 3-April 2, 2019. A total of 86 respondents participated in the survey. The survey questions allowed residents to rank the vulnerabilities and how to best address these threats. The resulting ranking for the best opportunities for the City, from highest to lowest are: low impact development, pre and post storm planning, green infrastructure, adaptation action areas, more mixed-use development, a resilience action plan, additional funding and mangrove. A full discussion of the findings from the survey is in the accompanying report.

The average ratings for actions that were identified through the Metroquest survey are listed below. Several of the higher ratings stress green infrastructure, open space, stronger building codes and resilient standards. The average ratings are listed below.

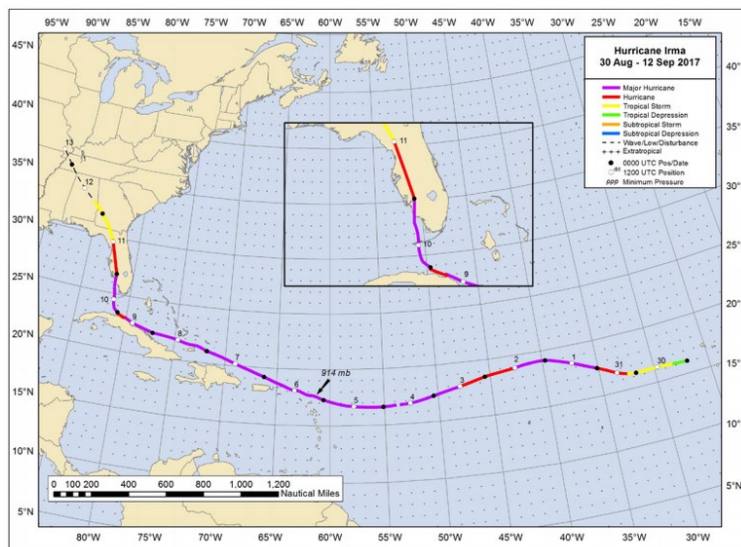
## Average Rating



## Overview of Sea Level Rise Risks

In order to comprehend the physical risks to the infrastructure, residents and businesses of the City over time, a vulnerability assessment was conducted. While the impacts of sea level rise inundation will not impact New Smyrna Beach until later in the century, putting mechanisms in place well ahead of time will make the transitions required in the future easier to implement. The goals adopted by the City should include policy approaches that maintain the safety and well-being of the community and preservation of municipal infrastructure while also minimizing the long-term potential legal liabilities and unintended future risks to residents from the perils of flood.

Currently, two fire stations, #50 located on SR 44, and #52 located on East 3<sup>rd</sup> Street, may be currently vulnerable with the 100 year coastal flood model from FEMA, which simulates a 6.6 foot storm surge, similar to what was experienced with Hurricane Irma in September of 2017, even though the path of Irma was not near New Smyrna Beach. Besides the two fire stations, there are five



health facilities and five schools that are potentially impacted from the 100 year coastal storm model.

By acting now, the City can get ahead of many future flood impacts which will have an increasing influence over the daily lives of residents and business owners over time. While the completed modeling depicts the rising waters from sea level rise, it does not account for storm surge nor the likelihood of heavier and more frequent precipitation events that can have a strong impact on flooding. A warmer climate may portend stronger and more frequent hurricanes as well, according to the Geophysical Fluid Dynamics Laboratory at Princeton University.

Impacts to the City will initially be from the Indian River Lagoon (IRL) and Turnbull Bay, since elevations are lowest in these areas. It is recommended that the City assess outfall elevations and impacts to the complete stormwater system to determine impacts from elevating lagoon waters which can cause stormwater system failure.

The City is challenged with maintaining a balance between the current quality of life and the physical realities of increasing hazards from higher water. As a medium size municipality, New Smyrna Beach needs to concentrate on managing the challenges to infrastructure that will continue to be impacted. The City will need to consider the impacts of a reasonable lower level of service than has been provided in the past due to financial capacity of the City to construct large and expensive infrastructure projects to protect from the perils of flood. It is important that the City take a pro-active stance in addressing the mid and long-term future of the City.

New Smyrna Beach is fortunate that there is developable land that is less impacted by future flooding so that new development can occur away from areas projected to flood. Areas along parts of US 1 and SR 44 can be developed or redeveloped while areas west of I-95, some of which have been more recently annexed into the city, are areas that will not immediately be impacted by rising waters, so long as development in FEMA 100 year floodplain is avoided. Also, critical infrastructure can be relocated to these areas as well as residents whose homes have sustained irrevocable damage. Undeveloped areas in future flooding areas should either be reconsidered for future conservation land or have stricter building requirements that minimize the damage from the perils of flood such as higher freeboard levels, breakaway walls and other hardened infrastructure to protect the safety of residents and their investments.

## **Rational of Policy Development**

Recommendations are the result of interaction with the residents, survey results, opinions by experts (Thomas Ruppert, Esq (Florida Sea Grant) and Erin Deady, Esq. (Erin Deady Law)) and the vulnerability assessment. The principles that have been discussed as the policy recommendations have been developed include;

1. There will be an increase in flood potential in the City from sea level rise and associated intensification of storms and rain events due to climate change.
2. The protection of safety and property due to the risk of flooding impacts should be emphasized. This better protects the City in a legal challenge against a taking of property when the regulations to protect property are challenged. The regulations must be based on technical

data, such as the information provided in the vulnerability assessment. The regulations can also include environmental regulations such as protection of dunes or a living shoreline as a strategy to protect human safety and protect property.

3. A statement should be included in ordinances that the City's policy mandates that the local government has a need and responsibility to make challenging decisions that balance the important interests of property rights with the need for the community to responsibly manage its limited financial resources and protect the lives of residents and first responders. Included should also be a note that the City, unlike private property owners, cannot simply alienate property to relieve itself of its legal duties and responsibilities.
4. Highlight the fact that the comprehensive plan and ordinances are to give residents and businesses adequate current and advanced notice of future conditions of potential property impacts due to the perils of flood. This may ensure that investment-backed expectations are actually reasonable in light of changes occurring due to sea level rise and climate change.
5. Ensure that the processes in ordinances respect due process of property owners.
6. Strive to have comprehensive plan language, polices and ordinances work in conjunction to accomplish the City's aims.
7. Include policies and ordinances that minimize the risk of "moral hazard". This is where risk taking behavior is potentially rewarded by allowing those who take the risk of living in hazardous areas having other tax payers incur the higher costs to maintain the infrastructure necessary to service or protect them.
8. Identify the existing and future data required to set policy and to implement desired policies, now and in the future.

## **Incorporating Resilience into the City Plans, Policies and Programs**

The strategies presented in this report are based on input from public engagement activities, findings from the vulnerability analysis, review of the coastal element of the comprehensive plan and best practice research.

Through the vulnerability assessment, numerous facilities were identified as being critical to pre and post-storm preparedness and recovery including lift stations, gas stations, and stores that provide food, water, ice and other necessary goods. Working with these businesses, and internally, to provide opportunities to minimize risk and speed recovery efforts, would be beneficial. It will be essential for the City to have an ample supply of gasoline or propane for at least 2 weeks to maintain City complex generators. Solar power may be an option since it will lower the municipal operating expenses year-round, provide power for daylight operations directly from the panels and provide power for batteries to use for night time operations or when overcast.

Through the public engagement process, numerous facilities were identified as being critical to pre and post-storm preparedness and recovery including lift stations, gas stations and stores that provide food, water, ice and other necessary goods. It is recommended to obtain generators for each lift station and traffic lights at major intersections. Ultimately, it will be essential for the City to have an ample supply of gasoline or propane for at least 2 weeks to maintain these generators. Solar power may be an option

since it will lower the municipal operating expenses year-round, provide power for daylight operations directly from the panels and provide power for batteries to use for night time operations or when overcast.

Working with businesses to identify and provide opportunities to minimize risk and speed recovery efforts would be beneficial. Generators for critical businesses such as those identified in the public workshops, especially gas stations and the health clinic, are critical. The City could develop and implement a program to help businesses become “disaster resilient” through structure fortification, development of business continuity plans, ensure employees have a disaster response plan and educate business about the variety of funding and financing tools available for fortifying their properties.



There are many tools and resources available to help fund resilient and sustainable buildings. The City may wish to investigate programs such as PACE and SELF to aid businesses, and homeowners, as well as the City itself, in financing improvements to property to make them more energy efficient and storm resilient.

<https://www.floridapace.gov> and <http://cleanenergyloanprogram.org/>. Also, the Florida Green Building Coalition (FGBC) is another resource that helps not only businesses and homeowners build to new standards but also offers a certificate for local governments that “set goals and implements environmental practices that can lead to tangible reductions in operation cost and capital outlays”. FGBC not only leads and promotes sustainability but also provides recommendations to fortify homes for resilience through “disaster mitigation” points. These points are based on the “Fortified for Safer Living Standards” administered by the Institute for Business and Home Safety and provides new ways to build homes in hazard-prone areas. The Fortified Builders Guide and Designation criteria can be found at [www.disastersafety.org/fortified](http://www.disastersafety.org/fortified). Many tools and strategies can be found here including a checklist



A common Midwest home and a gold-level Fortified home are subjected to 100mph winds at an Insurance Institute for Business and Home Safety testing facility.

for reroofing with steps such as nail types, flashing deck and standards for roofs within 3000 feet of salt water. According to the IBHS, a “fortified designation increases property appraised value by 7% and even more, closer to the Coast”.

(<http://disastersafety.org/wp-content/uploads/2018/01/What-Is-FORTIFIED-Home-Hurricane.pdf>)

The City could host a forum for these resources to educate both businesses and residents on strategies, techniques and available funding and benefits associated with sustainable and resilient building. Pilot or “showcase” homes/businesses can be completed in the City by working with a willing business and homeowner to secure funding to implement a variety of these “fortified building” and sustainable building practices, including low impact/Florida Friendly landscaping and solar, and serve as pilot or showcase buildings. Leading by example and instituting changes in government buildings that ultimately save tax payers money for years to come is a direction the City should embrace. Requiring all City buildings to install solar for their



electrical needs and utilize Florida Friendly landscaping and other strategies such as cisterns, rain barrels, rain gardens, in order to capture the greatest amount of stormwater on-site are actions that will help fortify the City sustainable against the perils of flood and serve to educate residents. As facilities are built or refurbished, greater standard techniques such as building materials can be included. The City may wish to investigate the requirements and feasibility of the Florida Green Local Government Designation Standard.

In order to ensure that no barriers exist to allow businesses and homeowners to implement the Florida Green Building Code standards for sustainability and disaster mitigation, the City should review all land development codes and the comprehensive plan. Landscape requirements, required buffers and setbacks, and parking standards are a few areas that may create barriers to implementing these standards in the City.

The City's natural areas such as the Indian River Lagoon and Turnbull Creek and Bay are jewels, economic resources and also the conduits for flooding and surge. As evident from the survey and public workshops, these natural areas are of great importance to the community. The City should prioritize projects that serve multiple functions: 1) protect the health of these systems by limiting direct run off into them 2) provides a mechanism to reduce surge impacts 3) provide opportunities to capture stormwater or serve as a buffer to mitigate future flooding. In order to accomplish this, the City should begin to develop new and innovative approaches to their stormwater master plan for its next update. The update should include a hybrid approach to stormwater through the use of both gray and green infrastructure that is aimed to capture water prior to discharge to the river allowing for additional filtration. The plan should also examine strategic locations for using open space for green infrastructure projects. This may need to include the acquisition of private property, if over the long-term, the benefits to the City outweigh the cost of acquisition. Various mechanisms exist for acquiring essential property including donation of easements, bonds, transfer of development rights and others. The City will need to investigate the potential options if they wish to develop an acquisition program.

The stormwater master plan should be integrated with the City's conservation element and the parks and recreation plan. Utilizing open space for stormwater use during the wet season or storms while serving the community as an eco-tourism or area of activity for the remainder for the year is a win-win for the community. Hosting experts in the area of this specialty to help identify feasibility and locations for projects would be beneficial. The City is currently completing the Central Beach Phase III Flood Mitigation and Utilities Improvements project to reduce stormwater flooding in the Central Beach area. Other innovative opportunities may arise in the future that will help mitigate flooding impacts.

When assessing projects in the plan, the City's goal should be prioritize projects, both gray and green, that will be sustainable in future conditions through the operation life span of the project, and ultimately reduce the cost of the overall stormwater system by off-setting demand on the system through the use of increased green space and more on-site capture by private property. Assessing the budget to ensure adequate funding for appropriate maintenance for green infrastructure functionality will also be important as is developing a process or checklist to ensure that future flooding, storm surge

and sea level rise has been assessed for each project and appropriate techniques are implemented based on the findings.

### **Post Disaster Redevelopment Plan**

Volusia County has adopted a Post Disaster Redevelopment Plan (PDRP) which is primarily a function of their Emergency Management Division. A disaster is any occurrence that causes damage, ecological disruption, loss of human lives and deterioration of health and health services on a scale sufficient to warrant extraordinary response from outside the affected community (World Health Organization). Mitigation involves activities aimed at eliminating or reducing the occurrence of a disaster and reducing the effects of unavoidable disasters (FEMA 2001). Recovery includes activities to return vital life support systems to minimum operating standards and long-term activity designed to return life to normal or improved levels, including some form of economic viability. Recovery measures include, but are not limited to, crisis counseling, damage assessment, debris clearance, decontamination, disaster application centers, disaster insurance payments, disaster loans and grants, disaster unemployment assistance, public information, reassessment of emergency plans, reconstruction, temporary housing, and full-scale business resumption.

It is recommended that the City develop a PDRP in conjunction with the County PDRP to ensure a seamless chain of disaster relief for City residents.

## **Comprehensive Plan Actions to Address Resiliency**

### **Peril of Flood Legislation**

The City is currently compliant with 2015 Florida Peril of Flood Act (SB 1094), as it updated its comprehensive plan to include goals, objectives and policies to address sea level rise, flooding and storm surge. With the information provide through this analysis, the Coastal Element of the New Smyrna Beach Comprehensive Plan can be updated to reflect how the City decides to move forward. To dovetail with the peril of flood language, the City can include policies to direct growth and redevelopment to areas less prone to the impacts from sea level rise, parigean or king tides and storm surges. This update should include data and analysis derived from the vulnerability analysis completed by the East Central Florida Regional Planning Council, which illustrates areas of impact as well as infrastructure and facilities vulnerable to coastal hazards. A reference should be made in the comprehensive plan to the vulnerability assessment for further information. Goals, objectives and policies in the coastal element of the comprehensive plan not only should check each item in the box for legislative compliance as per Section 163.3178 (2)(f) as listed below, but should also include language that considers future conditions in planning decisions and processes to the extent financially feasible and appropriate. As discussed in the next section, an Adaptation Adaption Area or a Coastal Planning Area may be appropriate for some portions of the city, particularly where additional study and deliberation occurs. Additionally, ensuring language addresses the objectives presented are based on the premise of the protection of life and property is of great importance. A redevelopment component outlines the principles that must be

employed to eliminate inappropriate and unsafe development in the coastal areas when opportunities arise. The component must:

1. Include development and redevelopment principles, strategies, and engineering solutions that reduce the flood risk in coastal areas which results from high-tide events, storm surge, flash floods, stormwater runoff, and the related impacts of sea-level rise.
2. Encourage the use of best practices development and redevelopment principles, strategies, and engineering solutions that will result in the removal of coastal real property from flood zone designations established by the Federal Emergency Management Agency.
3. Identify site development techniques and best practices that may reduce losses due to flooding and claims made under flood insurance policies issued in this state.
4. Be consistent with, or more stringent than, the flood-resistant construction requirements in the Florida Building Code and applicable flood plain management regulations set forth in 44 C.F.R. part 60.
5. Require that any construction activities seaward of the coastal construction control lines established pursuant to s. 161.053 be consistent with chapter 161.
6. Encourage local governments to participate in the National Flood Insurance Program Community Rating System administered by the Federal Emergency Management Agency to achieve flood insurance premium discounts for their residents.

The City participates in the NFIP CRS program and through their land development code, currently requires buildings and structures to be designed and constructed to comply with the more restrictive applicable requirements of the Florida Building Code, Building Section 3109 and Section 1612 of Florida Building Code, Residential Section R322. Hence, the City's main challenge will be to, in the Coastal Element, include or enhance development and redevelopment strategies, principles and solutions and site development techniques to reduce flood risk and encourage best practice use to remove coastal real property from flood zone designations.

As mentioned above, much of the land west of I-95 is within the current FEMA 100 year floodplain, and as such, requires additional flood insurance. Development approvals should be avoided in these areas. The likelihood that there will be even greater flooding potential in the future is high, since ground water tables will rise over time with the rising sea levels. If development occurs, clustering and conservation subdivisions may offer the ability to transfer development rights into a smaller footprint that is located on the higher areas west of the interstate. Allowing unfettered development in the floodplain will increase potential exposure to the perils of flood.

When considering engineering solutions and site development techniques, the City should consider both gray and green engineering solutions for infrastructure as well as site and building design. Such solutions could include larger stormwater pipes, stormwater parks, first floor elevation increases, floatable structures, green streets, and various low impact development techniques. Due to the barrier

island community exposure to water from both the Atlantic Ocean and the Lagoon, it is recommended that many of these recommendations be implemented City-wide.

It will be of most importance to begin to guide development out of the most vulnerable areas and manage infrastructure and development in these areas to the extent that protects life and property from natural hazards. It is also recommended that the City prohibit an increase in density vulnerable areas. Many communities prohibit an increase in density in the Coastal High Hazard Area (Category 1 Storm Surge). However, as sea level rises, the extent of storm surge and depth will increase. To plan for this, it is recommended that the City prohibit density increases in areas vulnerable to at least a category 2 storm surge and sea level rise by 2070 using the USACE High projection rate curve (the lower/minimum projection of the regional approach to sea level rise planning as recommended by the East Central Florida Regional Resilience Action Plan. These areas of impact can also be translated to the designation of an Adaptation Action Area.

### **Adaptation Action Areas**

An Adaptation Action Area (AAA) is an optional comprehensive plan designation for areas that experience coastal flooding and that are vulnerable to the related impacts of rising sea levels for the purpose of prioritizing funding for infrastructure and adaptation planning.

It is recommended that the City designate portions of the city as an Adaptation Action Area (AAA). This optional designation is allowed for in Section 163.3177(6)(g)(10), Florida Statutes, and allows the local government to designate an AAA for those low lying coastal zones that are experiencing coastal flooding due to extreme high tides and storm surge and are vulnerable to the impacts of rising sea level. Local governments that adopt an Adaptation Action Area may consider policies within the coastal management element to improve resilience to coastal flooding resulting from high tide events, storm surge, flash flood, stormwater runoff, and related impacts of sea level rise. Criteria for the Adaptation Action Area may include, but need not be limited to, areas for which the land elevations are below, at, or near mean higher high water, which have a hydrologic connection to coastal waters, or which are designated as evacuation zones for storm surge.

It is recommended that the City undertake the following steps:

1. It is recommended that the City immediately adopt a Coastal Planning Area for the portion of the city east of Interstate 95 for the purpose of initiating more immediate actions to address the impacts from the perils of flood.
2. Undertake a visioning process to develop one or more Adaptation Action Areas. It is recommended that the visioning process begin within one year and that the AAAs be adopted to coincide with the next Evaluation and Appraisal Report.
3. Development within the 100 year floodplain should be prohibited.

### **Other Comprehensive Plan Considerations**

The Transportation and Future Land Use elements of the comprehensive plan should be updated to include reference to findings from the vulnerability assessment and include associated policies that

ensure sea level rise, current and future flood risks, and enhanced surge are considered in planning decisions.

Based upon the findings of the vulnerability assessment, it would be advantageous for City staff (planning, stormwater, building official, etc.) to reassess required elevations of properties, especially in areas identified as vulnerable to sea level rise, flooding and storm surge such as the Coastal High Hazard Area (CHHA) or other designated zones. Many local governments are updating ordinances to increase the base floor elevation of the lowest floor. Examples include: elevating the lowest habitable floor to 10 feet above BFE in CHHA areas; elevating first floor to a minimum of either 7 feet NGVD or 30 inches above the highest point of any abutting street. The Vulnerability Assessment can guide City officials to address elevation requirements, and the ordinances should be adjusted accordingly.

The Capital Improvement Element should be updated to include a policy(ies) that requires projects funded by the City to include an assessment of sea level rise, future flood risks, and elevated storm surge to determine acceptable risk and associated costs for adapting or mitigating those risks.

It is recommended that the City develop a “Community Fiscal and Resilience Balancing Test” that will examine and promote the planning and construction of infrastructure in a cost-effective, technologically and environmentally sound manner that balances the benefits, costs and challenges of infrastructure with design considerations for future impacts during the service-life of the project.

Finally, Volusia County has developed a website for the beach environment that is an excellent reference that discusses the coastline environment, habitat conservation and other educational materials and useful links. See the URL below for the Volusia County website.

<https://www.volusia.org/services/growth-and-resource-management/environmental-management/natural-resources/sea-turtles/beach-environment.stml>