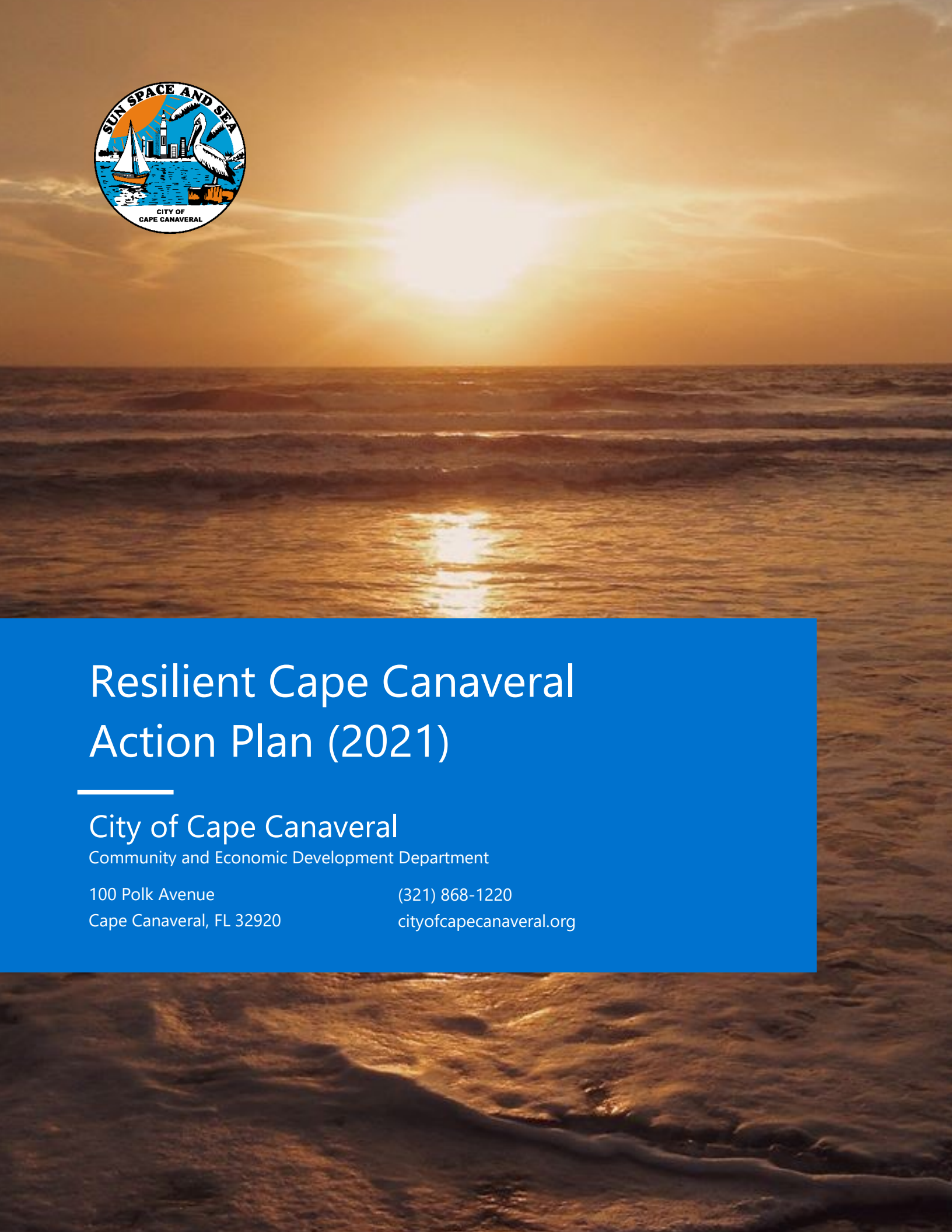

Resilient Cape Canaveral Action Plan (2021)

City of Cape Canaveral

Community and Economic Development Department

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Cape Canaveral, FL 32920

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A) City of Cape Canaveral Vision Statement

In 2009 the residents of Cape Canaveral engaged in a community-based, citizen-driven process to create a vision for the City's future. Over 200 citizens participated in six public workshops that resulted in a Vision Statement and a Visioning Report for Cape Canaveral. The Cape Canaveral Vision Statement envisions a vibrant community that meets the environmental, economic, recreational, social and retail needs of its citizens. The Vision is as follows:

We envision: A bikeable and walkable Cape Canaveral that retains and enhances its welcoming residential feel and celebrates its unique sense of place. A residential and business-friendly atmosphere that is livable, attractive, safe and inclusive. A sustainable coastal community that embraces the oceanside and riverside as key amenities, and supports and promotes local tourism, culture, recreation, resiliency, commerce, municipal civic interests and education.

We envision: Streetscapes with amenities such as low-impact development, bicycle facilities, covered transit stops and safe pedestrian crossings that encourage access to the beach, river, local neighborhoods and adjacent communities. Improved "complete streets" will allow pedestrians to travel to intimate waterfront destinations and a walkable uptown core with ease and safety. Generous tree lined and well-lighted multi-use paths for bikes and pedestrians so anyone can walk or bicycle safely anywhere in town, day or night.

We envision: A welcoming community entrance that creates a sense of arrival and unique community identity as The Space Between®. The "uptown core" and other areas will contain an architecturally rich and unique mix of uses, with wide tree-shaded sidewalks and umbrella-covered cafe tables at restaurants and bistros where family and friends gather, interact and enjoy refreshments and meals.

We envision: An engaged and compassionate Community that: transforms blighted and unfinished buildings into attractive structures, offers City-wide green spaces, provides exceptional parks with ample shade and supports businesses that enhance economic viability while serving our residents and visitors with goodwill.

We envision: Open shorelines and rivers accessible to the public, including amenities that showcase the coastline while providing art and entertainment venues, which support our historical and cultural identity.

B) Message to the Community

Leading by Example

The City of Cape Canaveral is synonymous with the United States' space program. Our City and its residents have had the privilege of witnessing humanity's greatest achievements in technology and space exploration, with each launch reminding us of what we can truly accomplish when we work together.

As we look to the stars, we must remember where we come from. Many astronauts have noted that when they view earth from space they often gain a new perspective of our planet's fragility as they gaze upon its white clouds, land formations and vast oceans. Set amongst the blackness and emptiness of space, one quickly realizes this is our only home and we must protect it for both the present and the future.

The City of Cape Canaveral is fortunate to be surrounded by natural beauty. To our west we have the Banana River and Indian River Lagoons, a vital economic resource filled with numerous ecosystem services to the entirety of Brevard County. To our east we have the beaches and the Atlantic Ocean. And, in The Space Between®, we have the Community.

Just as NASA and US industries led the world in the advancement of aerospace technologies, many cities are leading in the fields of sustainability and resilience. As threats of increased flooding, drought and hurricanes arise, the City wants to ensure its residents, businesses, visitors and infrastructure remain safe, prosperous and prepared for many generations to come.

Sustainable development has the ability to support resiliency, and is rooted in innovation and improved quality of life for all ages. It is our hope that we as a City, with this document, will lead by example as we look to the future. With this Action Plan, the City of Cape Canaveral further embraces its Vision and Mission statements while continuing its long tradition of embracing scientific advancement, environmental stewardship and cultural heritage.

C) Executive Summary

In 2019 the City of Cape Canaveral, in conjunction with the East Central Florida Regional Planning Council (ECFRPC), published a Vulnerability Assessment (Assessment) highlighting risks posed to the City by the impacts of sea level rise, storm surge, shallow coastal flooding areas and FEMA 100-year and 500-year flood zones. The Assessment indicates that the City of Cape Canaveral can expect significant impacts to its natural and built environment as it moves into the 21st century, from the effects of enhanced storm surge and sea level rise. Consistent and long lasting impacts could be felt as early as 2030 with projections of a foot of sea level rise, resulting in a flooding of City infrastructure and property. By 2100 it is estimated that the City could see between 5.15 and 8.48 feet of sea level rise, resulting in billions of dollars in economic losses if appropriate mitigation steps are not put into place.

As a barrier island municipality that already experiences threats from tropical cyclones and flooding, the City of Cape Canaveral will be on the frontlines of these adverse changes and should act accordingly in order to prepare its operations and infrastructure through resilience and sustainability. Proactive measures should include investments in coastal protection strategies, upgraded water and waste-management systems, hardened infrastructure, upgraded and alternative transportation systems, climate-resistant construction methods, and the protection of natural areas. Such measures will allow the City to become safer while reducing risks and financial burdens associated with recovery costs through efficient and less environmentally intensive operations.

In order to ensure and adaptively manage the protection of the City, this Action Plan has been developed using findings and recommendations produced by the Assessment and other reliable resources. This plan gives City leadership vision, direction and actionable items to work towards so as to improve resilience while also leading by example. Actionable items are broken down into eight Action Categories that cover a wide range of municipal operations and functions. They include:

1. Green and Resilient Economy
2. Natural Systems
3. Transportation
4. Energy
5. Built Environment
6. Equity and Quality of Life
7. Waste and Consumption
8. Storm Readiness and Sea Level Rise

Within each Action Category are a series of 56 Preparedness Targets, or targets that showcase initiatives the City intends to undertake in order to become better prepared for future challenges. Targets are chronologically listed based on implementation periods of ongoing or current (c), 5 years, 15 years or

30 years. These implementation periods were chosen because this places mitigation efforts ahead of expected worst impacts after the year 2050 based on findings of the Assessment.

This Resiliency Action Plan should be seen as a living document that evolves over time to best meet the needs and wishes of the Community. City Staff will conduct a review every five years after adoption, and amend as necessary. Community engagement should also be involved in this review process.

With this in mind, it is important to note that these efforts fall in line with numerous other Florida coastal municipalities and the governor's office—which recently created the Office of Resilience and Coastal Protection "to help prepare Florida's coastal communities and habitats for impacts from sea level rise by providing funding, technical assistance and coordination among state, regional and local entities" under Executive Order 19-12: *Achieving More Now For Florida's Environment*. The governor's office is also making preparations to increase preparedness and awareness of other environmental issues facing the state; including water quality and air pollution. Moving ahead, the City should cross collaborate, seek assistance and engage with other agencies such as non-governmental organizations (NGOs), local organizations, businesses and residents in its efforts to become a more resilient and sustainable Community.

Figure 1. Manatee Sanctuary Park, Cape Canaveral (2019).

D) Demographics

Social Vulnerabilities and Resilience

Social vulnerability is "how resilient a community is when confronted by external stresses on human health".[1] Stresses can include natural disasters, disease outbreak and human disturbance; all of which can cause economic loss and human health impacts. Nearly 36% of the population is over the age of 65, while 32% are between the ages of 44 and 64. The overall median age is 57.2 years (54.5 years for males, and 59.1 years for females)[2] and 28% of the population can be classified as very low-income. The population pyramid below compares the older adult population by gender which indicates current trends and those expected in the next decade. As a whole, the state of Florida is experiencing an increase in population, but the most notable increase includes those age 65 and older.

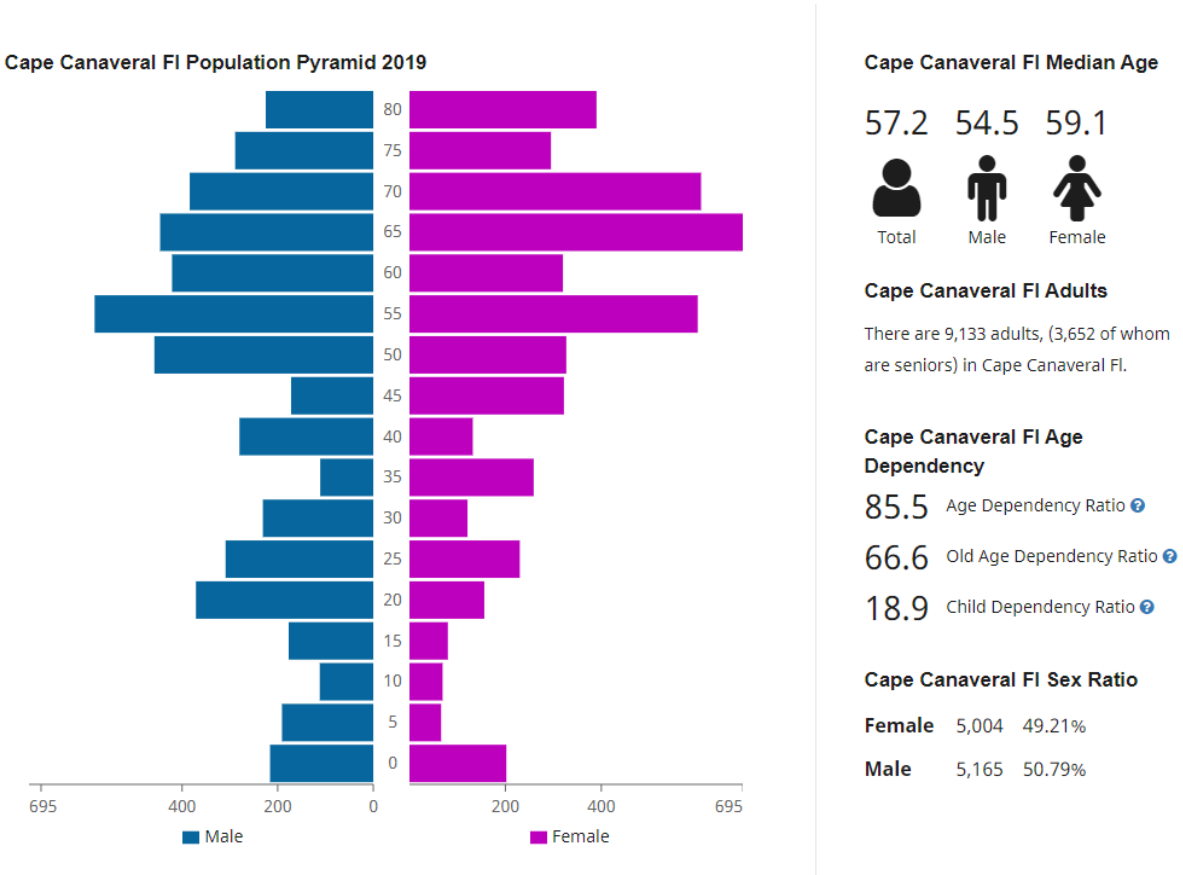

Figure 2. Cape Canaveral, FL Population Pyramid 2019 via the US Census 2017 ACS 5-Year Survey.

Approximately 17% of residents in the City are living with a disability, thus increasing the likelihood that these individuals will need assistance in evacuation, special needs shelters, storm preparedness and

[1] Source: U.S. Climate Resilience Toolkit; https://toolkit.climate.gov/tool/social-vulnerability-index

[2] Source: US Census 2017 ACS 5-Year Survey (Table S0101)

potential improvements to their property to improve resilience. These demographic changes will have a significant impact on the City and how it prepares its infrastructure.

Florida is no stranger to natural disasters. Hurricanes, tornados, fires, floods and other disasters could happen at any time. And given the increasing frequency and severity of intense weather-related events and other so-called natural disasters, it may not be a case of if, but when. Because the population is older, this will have an impact on taxes, wages and healthcare systems, since aging poses budgetary challenges to entitlement programs such as Social Security and Medicare, especially when coupled with natural disasters. In order to create a more sustainable community, long-term planning that includes anticipating these changes and being able to adapt to these changes by managing current needs while ensuring adequate resources is important.

While no one wants to contemplate the possibility of a natural disaster striking the City of Cape Canaveral—where a number of elderly individuals live—the City must consider its vulnerabilities and the impact they may have on the growing proportions of older adults in Cape Canaveral. As the City's older adult population grows, awareness of the issues the City faces is needed to ensure that older residents feel safe and continue to participate in the Community. According to the American Psychological Association, "older adults are not only the least prepared for disasters…are more at risk during all phases of a disaster, from life-threatening challenges during evacuation to negative psychological consequences during the recovery period."[3]

With advanced age, some older adults are at greater risk and may not be aware of disaster warnings or may be unable to comprehend evacuation instructions or escape disaster situations. Additionally, AARP notes that in a 2015 study, "researchers from the University of Iowa found that only 34% reported participating in an educational program or reading information about disaster preparedness. More recently, a 2018 study by Rand Health found that most age-friendly communities and senior villages in the U.S. do not place a high priority on promoting disaster preparedness."[4]

In recent years, the City has taken steps to become more prepared. This includes streamlined and more efficient emergency management operations, upgrades to critical infrastructure and greater community engagement. Because the City wishes to be resilient, it will continue to take steps that make Cape Canaveral safer while reducing risks and financial burdens associated with potential recovery costs.

[3] Source: https://www.apa.org/pi/aging/resources/caregivers-disasters.pdf

[4] Source: https://www.aarp.org/caregiving/basics/info-2019/preparing-for-emergency.html

E) Why Resiliency?

Within the last few years, the United States (US) has witnessed increasing damage and cost from natural disasters. According to the National Centers for Environmental Information (NCEI)—the Nation's historical scorekeeper for severe weather and climate events—in 2018, the US experienced 14 separate billion-dollar disasters totaling $91 billion. The US saw two significant cyclones make landfall in 2018: Hurricane Florence, which made landfall in North Carolina as a category 1, and Hurricane Michael, which made landfall in the Florida Panhandle as a category 5, together causing nearly $50 billion in damage. The previous year (2017), the US experienced 16 weather and climate disasters for a cumulative cost of $312.7 billion[5]. More recently, the impact of the COVID-19 pandemic has exposed enormous failures in numerous socio-economic systems across the country, with resulting damage and recovery costs estimated to be $7.9 trillion or 3% of the US's real GDP[6].

As a barrier island, the City of Cape Canaveral faces numerous weather derived challenges. Flooding, thunderstorms, heat and tropical activity (such as hurricanes) all exert annual stress on the City's operations and risk damage to life and property. The Congressional Budget Office (CBO) estimates that governmental costs for hurricane damage alone is $28 billion a year, with 55% of this cost contributed to Florida. This is expected to rise to $39 billion annually by 2075[7]. Preparing for these natural risks—and additional socio-economic risks now associated with COVID-19 pandemic—is vital to maintaining this vibrant Community, and this is where the concept of resilience becomes key.

Resilience is "the ability of people and their communities to anticipate, accommodate and positively adapt to or thrive amidst changing climate conditions and hazard events[8]." Guided by this concept, the City of Cape Canaveral intends to strengthen and secure its infrastructure systems, protocols and procedures, where feasible, to efficiently handle current and future challenges while continuing forward with its goals of providing a Community that is livable, attractive, safe and inclusive.

Figure 3. Flooding at the City's Water Reclamation Facility after Hurricane Irma in 2017 due to a lift station backup.

[5] Source: https://www.climate.gov/news-features/blogs/beyond-data/2018s-billion-dollar-disasters-context

[6] Source: https://www.forbes.com/sites/shaharziv/2020/06/02/coronavirus-pandemic-will-cost-us-economy-8-trillion/#36b71ef715e4

[7] Source: https://www.cbo.gov/publication/51518

[8] Source: Guide to Developing Resilience Hubs; http://resilience-hub.org/wp-content/uploads/2019/10/USDN_ResilienceHubsGuidance-1.pdf

F) Why Sustainability?

Sustainability is a complex concept that includes best management practices which have expanded throughout a number of public and private agencies. This is in response to numerous ecological and anthropogenic challenges that many communities face. A definition often used to describe the term comes from the World Commission on Environment and Development's (WCED) 1987 Brundtland Report, which states sustainability is "development that meets the needs of the present without compromising the needs of future generations to meet their own needs."[9]

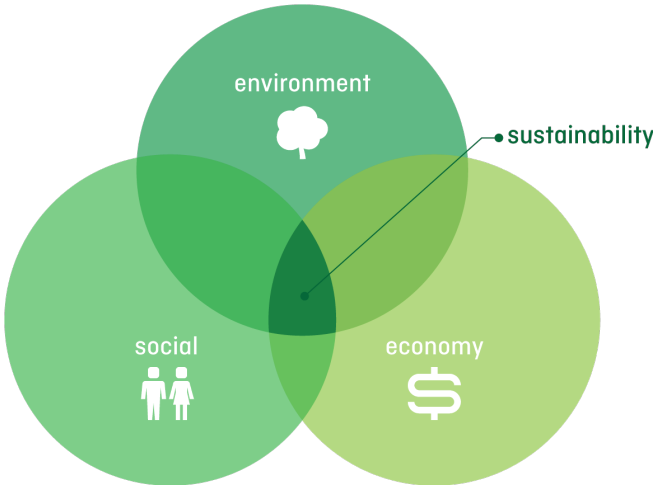

Figure 4. Sustainability Spheres

Interdisciplinary, sustainability-based practices are often categorized within three broad societal principals: environmental, economic and social capitals. These principles can be graphically represented as three overlapping circles (Figure 4), with each one heavily influencing the resources, needs and stressors of the other as they pertain to sustainability. Finding an appropriate balance among all three is key to achieving a stable, efficient and resilient future that can flourish without compromising the stability of any one particular principle.

Sustainable practices can help cities plan for resilience and mitigate multiple present day challenges while also easing risks and financial losses in the future with long term planning. Practices in preparedness and awareness can yield benefits to communities and their residents—and often reduce operating costs, increase efficiency and strengthen infrastructure.

Around the world, sustainability-based programs, projects and initiatives are rapidly being implemented in order to meet the demands of a changing climate, natural disasters, aging infrastructure and environmental stewardship. Due to the complexity of these issues—many of which stem from the expansion and impacts of cities themselves—our natural environment is losing its ability to sustain traditional energy production, agriculture, waste disposal, shipping and transportation methods and consumption habits. Without a healthy environment, viable economic and social assets cannot be maintained.

Today, 55% of the world's population (3.5 billion people) lives in cities[10]. By 2050, this number is estimated increase to 68% (5 billion people). This huge population change translates to cities producing

[9] Source: https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf
[10] Source: https://www.cnbc.com/2018/05/17/two-thirds-of-global-population-will-live-in-cities-by-2050-un-says.html

more greenhouse gas emissions (50 to 60%) and consuming about 75% of all the global energy produced[11]. By 2050 it is also estimated that urban areas will yield 3.75 billion tons of waste annually[12]. However, these massive impacts can be lessened. With proper policies and procedures cities can become centers of economic vitality, environmental rehabilitation and socio-cultural hubs that act to achieve sustainable development.

Hundreds of US cities—both large and small—are pursuing sweeping initiatives and strategies such as: renewable or alternative energy; green stormwater design for improved water quality; Complete Streets for pedestrian and bicycle safety; alternative fuel vehicles for reduced fuel costs; equitable and people-centered design for all ages and the discontinuation of single-use plastic to decrease litter and landfill overcrowding in favor of greener substitutes.

These aspects of sustainable development coincide with the City of Cape Canaveral Mission and Vision statements, and are grounded in safety, resiliency, stewardship and smart planning. The success of cities today is increasingly being defined by their environmental policies and ability to adaptively manage critical assets since these represent a proactive approach for managing resources.

Sustainability provides a framework for adaptation strategies that allow the City to respond to vulnerabilities. The ultimate goal is a Community that is organized to take action, has the tools to take action, and can adapt to impacts. For this reason, the City of Cape Canaveral will develop strategies that increase resilience, inspire action, and create awareness for environmental stewardship.

Figure 5. City Hall Building (built to LEED Silver equivalent specifications).

[11] Source: https://unhabitat.org/urban-themes/energy/
[12] Source: https://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management

G) From State to Local

Policies Already Driving Change

The state of Florida has developed an integrated comprehensive planning framework that is intended to ensure the coordinated administration of policies that address a multitude of issues posed by the state's continued growth and development. This framework calls for planning at all levels of government and includes statutory guidance for planning activities such as the Environmental Land and Water Management Act (Chapter 380), State and Regional Planning (Chapter 186), which provides direction for the integration of state, regional and local planning efforts; and the Local Government Planning and Land Development Regulation Act (Chapter 163), which directs local government planning and includes requirements for Evaluation and Appraisal Reports (EAR) that allow local governments to make amendments to their comprehensive plans.

Figure 6. Wave action off the lagoon at Banana River Park's coquina seawall during 2019's Hurricane Dorian.

The importance of comprehensive planning cannot be overstated, because it results in decisions regarding long-term issues such as environmental protection and economic development. Section 163.3177, F.S., requires that local government comprehensive plans provide the policy foundation for local planning and land use decisions on capital improvements, conservation, intergovernmental coordination, recreation, open space, future land use, housing, transportation, coastal management (where applicable) and public facilities.

More recently, State legislation including SB 1094 (Peril of Flood) and F.S. 163.3178 (Coastal Management) was passed in recognition of the importance of resources in coastal areas of the State. As a coastal municipality, the City of Cape Canaveral must consider policies that indicate the City's willingness to pursue adaptation planning strategies and reduce the risk of flooding. With the passing of Ordinance No. 10-2017, the City's Comprehensive Plan Coastal Management Element sought to use studies, surveys and data to create redevelopment components that outline principles used to eliminate inappropriate and unsafe development in the City. Moreover, the State has recently encouraged communities to take additional steps to develop strategies to become more resilient.

Generally, resiliency planning uses data generated by analyzing a city's key assets (economic, infrastructure, natural and social) and examining how they may be impacted by natural hazards or various sea level rise scenarios. Models used in these analyses are designed by organizations such as the US Army Corps of Engineers (USACE), University of Florida (UF) and the National Oceanic and Atmospheric Administration (NOAA).

Because of Cape Canaveral's size and challenges, the City applied for and was awarded a grant from the Florida Department of Environmental Protection (FDEP) through their Florida Resilient Coastlines Program (FRCP)—a NOAA approved program—to work with the ECFRPC to examine the impacts of sea level rise and flooding in Cape Canaveral. After months of analysis and outreach by City Staff and the ECFRPC, the City's Assessment titled Resilient Cape Canaveral, which employs models from the same agencies mentioned above was completed in May 2019. The report also examines key timeframes (2040, 2070, and 2100) to aid in future development planning and explores recommendations based on the analysis. Using these recommendations as a basis, the City will create resiliency goals and strategic policy changes (also known as an Action Plan) and ask stakeholders to consider these recommendations in order to better position the City for economic, environmental and social resiliency. These may include initiatives such as requiring more green infrastructure via low impact development (LID) regulations, increased flood-resistant construction requirements and the funding of shore hardening efforts while also setting target dates and timeframes that anticipate, to the best of our ability, the potential challenges brought on by climate change and sea level rise. Initiatives and targets are included in this document, the Resilient Cape Canaveral Action Plan.

FL IS DEVELOPING STRATEGIES TO ADDRESS IMPACTS OF CLIMATE CHANGE.

"Florida is ground zero for sea level rise."

Alex Reed, Director of Water Resource Management at the Florida Department of Environmental Protection (DEP)

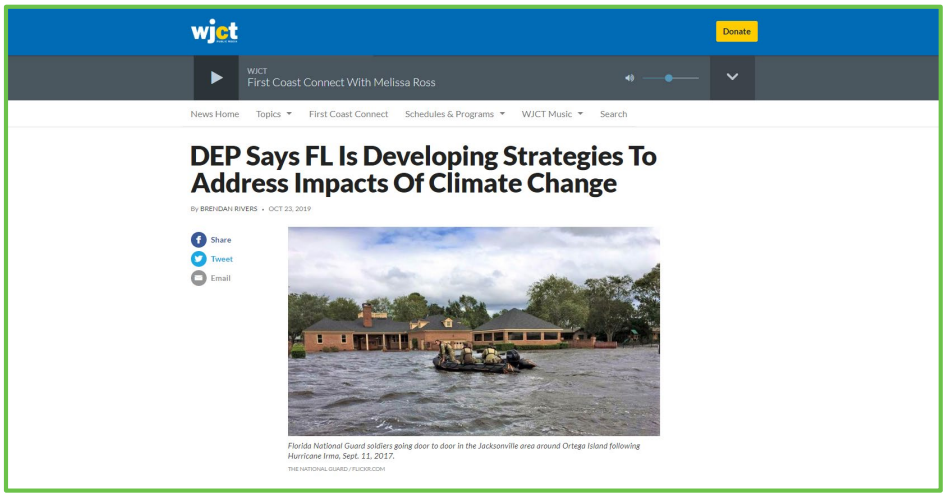

Figure 7. Image depicting online article with headline "DEP Says FL is Developing Strategies to Address Impacts Of Climate Change".

H) City of Cape Canaveral Vulnerability Assessment *(Resilient Cape Canaveral)*

In 2018, the FDEP's Florida Coastal Management Program (FCMP) and NOAA awarded the City of Cape Canaveral with a grant to assess current and future vulnerabilities in the City. The ECFRPC, in collaboration with City Staff, was then contracted to begin researching and drafting a vulnerability assessment. The over-arching goal of this report, which was presented to the Community in July 2019, was to identify coastal vulnerabilities that are specific to the City and provide recommendations to mitigate the effects of flooding, sea level rise and storm surge while also engaging with Community members to better understand their needs and desires, developing new strategies and providing an economic impact analysis of a "do-nothing" scenario. The Assessment's findings will be used as a framework to outline (both short- and long-term) targets and initiatives. Our goal is to help residents, business owners and future policymakers understand their vulnerabilities by developing efficient and robust strategies for the future. What follows is a summary of the Assessment's findings.

Vulnerabilities

SEA LEVEL RISE

In the US almost 40% of the population lives in coastal areas[13]. As atmospheric temperatures continue to rise, terrestrial glaciers and ice sheets melt and raise global sea levels and seawater temperature[14]. Sea level rise, derived from anthropogenic climate change[15], is one of the greatest threats to coastal communities since sea level rise plays a role in flooding, shoreline erosion, and hazardous storms. Many US cities have already been impacted, with some prominent examples being Galveston (TX), New Orleans (LA), New York (NY), Fort Lauderdale and Miami (FL).

The *Resilient Cape Canaveral* report includes three planning periods; 2040, 2070 and 2100. Two projection scenarios were used to model sea level rise in the City (Figures 8) using data from NOAA's Digital Coast Sea Level Rise Viewer and the UF's GeoPlan Center. Each projection is mapped above the Mean Higher High Water (MHHW), which is the average height of the highest tide recorded at a tide station each day during a recording period. It is important to note that adverse effects from sea level rise can occur before mean levels reach the MHHW mark in the form of coastal erosion, stormwater outfall backflow and increased groundwater table height.

According to each of the two projections, the ECFRPC recommends that, "no one projection rate curve should be used for planning purposes across all projects and programs. Instead, a range of rise should

[13] Source: https://coast.noaa.gov/states/fast-facts/economics-and-demographics.html
[14] Source: https://climate.nasa.gov/vital-signs/sea-level/
[15] Source: https://climate.nasa.gov/causes/

be considered based upon the vulnerability, allowable risk, project service life and the forecast project "in-service" date of a facility or development. The range should include a minimum rise of 5.15 feet by 2100 (2013 USACE High) with an upper range of 8.48 feet by 2100 (2017 NOAA High). Short-term planning should consider impacts out to 2040 (20-year planning horizon), medium-term planning should consider impacts out to 2070 (50-year planning horizon), and long-term planning should extend out to 2100 (80-year planning horizon)."

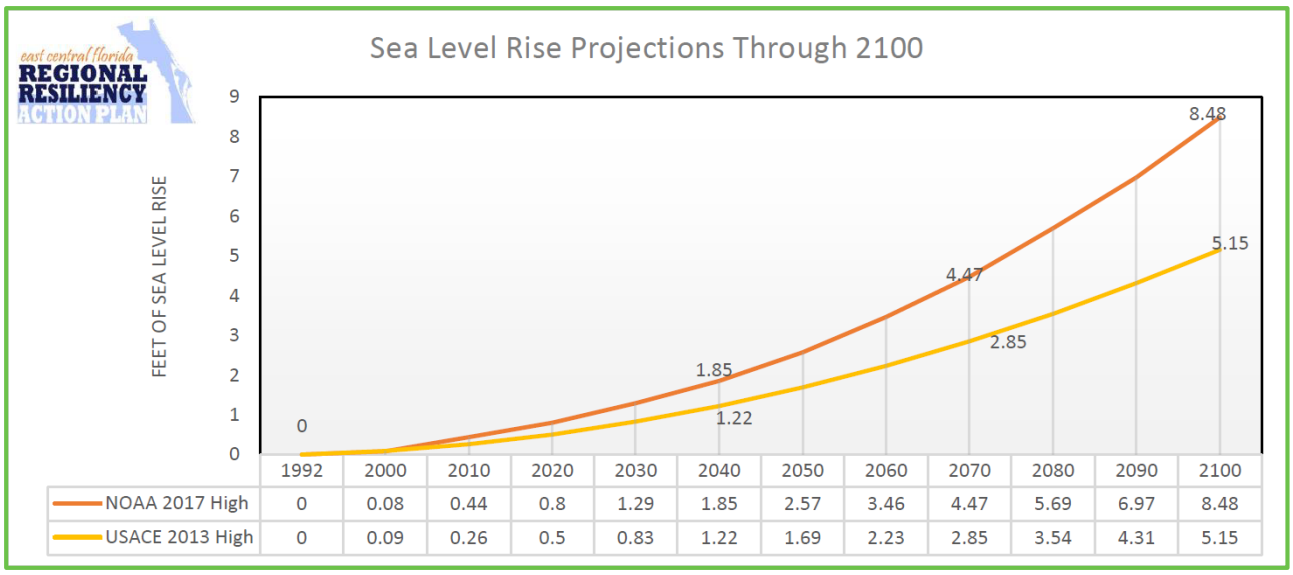

Figure 8. ECF Regional Resilience Action Plan Regional Approach to Sea Level Rise Planning.

However, portions of the City are expected to experience the effects of sea level rise as early as 2040. These areas include the Banana River Lagoon coastline, the Central/Canaveral Ditch, and the Atlantic Ocean coastline. These impacts could include stormwater infrastructure blockages as outfalls become overwhelmed by water, high tide coastal flooding, higher storm surge and an increased height in the water table.

The 2040 projections show that sea level rise will impact between 150–309 acres of land and 17–77 buildings (2,319 dwelling units). Upwards of 71% of these impacted areas are residential properties currently valued between $204–$327 million. Additionally, according to both USACE and NOAA projections, 6–31 miles of roadways within the City will be flooded.

STORM SURGE

According to NOAA, storm surge is an abnormal rise of water generated by a storm[16]. It is caused by water being pushed toward the shore by wind during a storm. Under current sea level conditions, the City of Cape Canaveral can expect storm surge related impacts from every category of hurricane. The tipping point in severity and significance occurs during a category 3 hurricane (111–129 mph winds), with an estimated 97% of the City being vulnerable to storm surge.

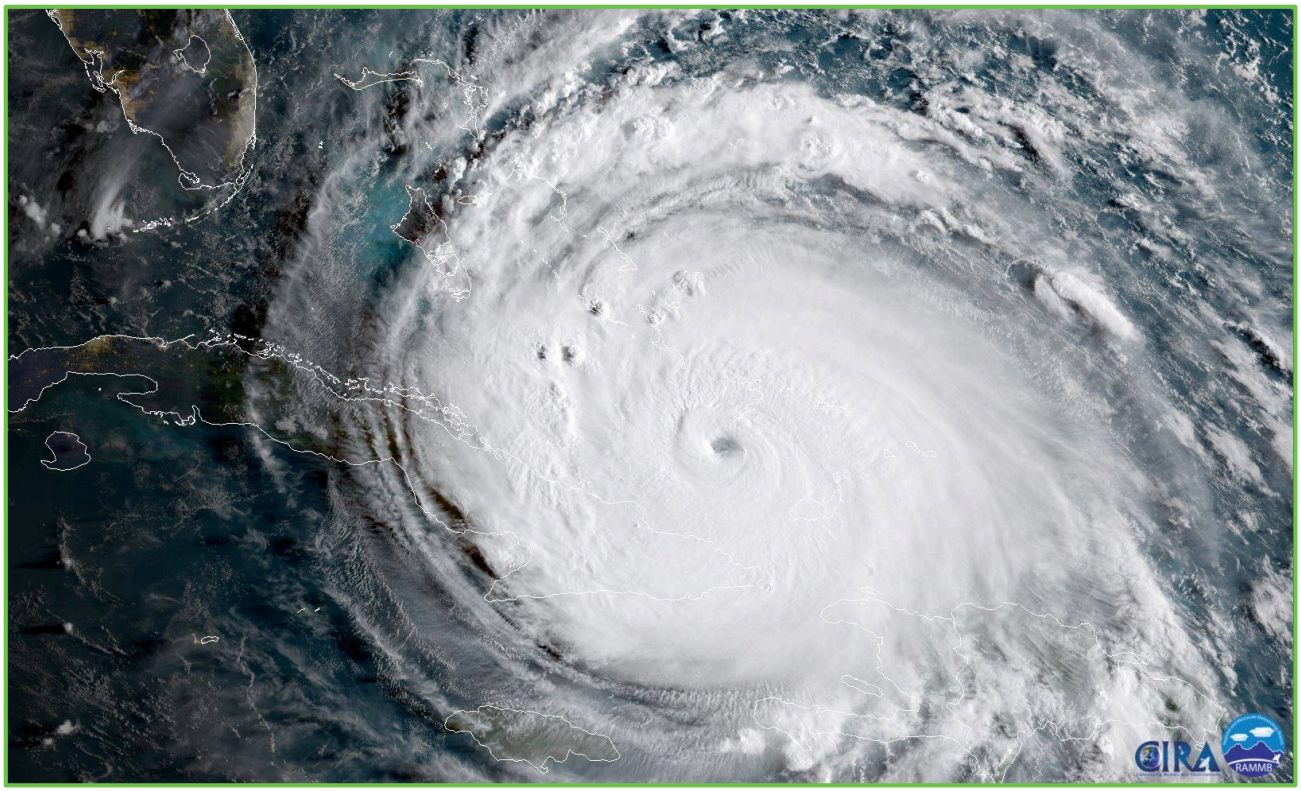

Figure 9. Hurricane Irma geocolor image taken from the NOAA's GOES – 16 satellite on September 8th, 2017. Image Credit: NOAA/CIRA.

City roadways are at risk during a category 2 hurricane (96–110 mph winds), with an estimated 0.16 miles of roadway vulnerable to flooding from a category 2 hurricane storm surge. Three miles of roadway could be flooded from a category 3 hurricane, 5 miles from a category 4 hurricane (130–156 mph) and 6 miles from a category 5 hurricane (156 mph+).

FUTURE STORM SURGE AND SEA LEVEL RISE

As sea level rise increases, storm surge impacts from coastal storm systems is expected to intensify[17]. The Assessment makes clear that with the addition of sea level rise, category 1 storm surges of today could become equivalent to a category 2 or even category 3. As a result, a category 3 storm surge was used as a baseline to analyze USACE and NOAA sea level rise projections for the years 2040, 2050, 2070 and 2100. Today, a category 3 hurricane has a storm surge potential of 16 feet. Under the two 2040 sea

[16] Source: https://oceanservice.noaa.gov/facts/stormsurge-stormtide.html
[17] Source: https://www.govtech.com/em/disaster/Rise-in-Sea-Level-Makes-Hurricanes-Worse.html

level rise projections (1.22–1.85 feet), areas impacted by a category 3 hurricane could increase 38–42%. By 2070, a category 3 storm surge could increase to between 17.5 and 18.7 feet and by 2100 a category 3 storm surge could cover nearly the entire City if high end projections are realized. Today, only a category 5 storm surge is capable of this.

Figure 10 shows current category 3 storm surge levels (denoted in yellow) with 1.70 feet (USACE) and 2.5 feet (NOAA) of sea level rise in the year 2050. Even at current levels, multiple critical City facilities would see meaningful impacts. This is illustrated in Table 16 in Appendix T, which shows the projected depth of inundation of critical facilities based on each of the two projections.

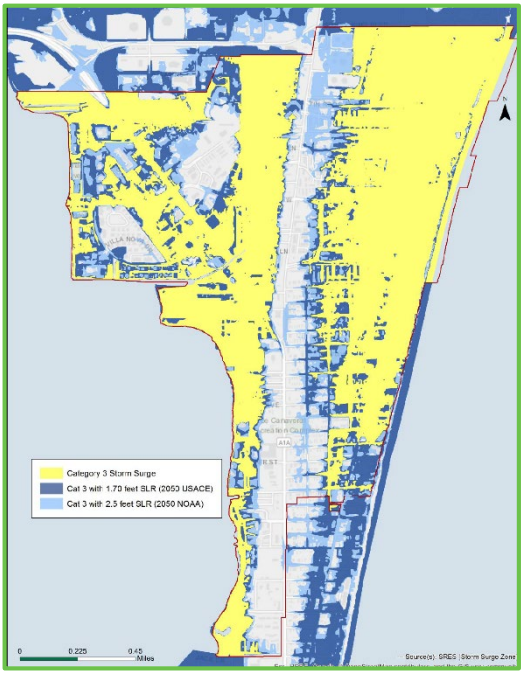

Figure 10. Storm Surge Areas in Cape Canaveral.

SHALLOW COASTAL FLOODING

Shallow coastal flooding, also known as high tide flooding or nuisance flooding, is defined by NOAA as recurrent flooding that takes place at high tide and is not necessarily associated with a storm surge or heavy rain event; hence the name sometimes given to this phenomenon, "sunny day" flooding[18]. This particular type of flooding can cause community inconveniences such as road closures, compromised infrastructure and overwhelmed storm drains. Shallow coastal flooding has increased on average in the US by about 50% in the last 20 years and 100% in the last 30 years in relation to overall rising sea levels.

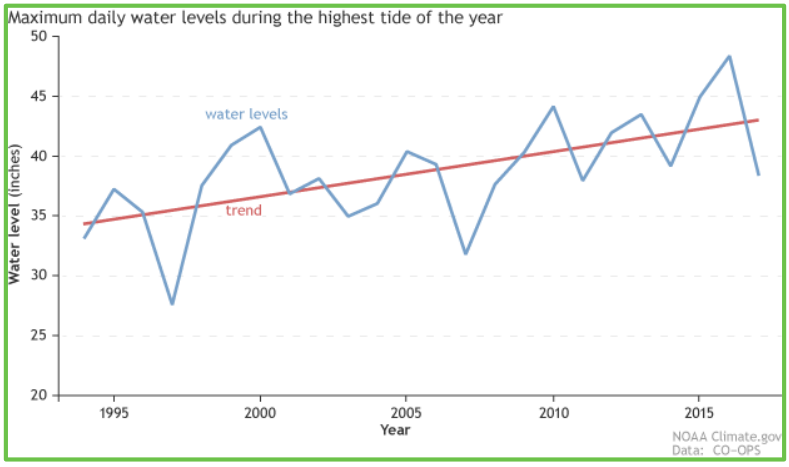

Figure 11. Trident Pier (Port Canaveral Tide Gauge).

Shallow coastal flood data employed within the Assessment was obtained from NOAA's Coastal Flood Exposure Mapper, via the national flood thresholds from the NOAA Technical Report NOS CO–OPS 086: Patterns and Projections of High Tide Flooding along the US Coastline Using a Common Impact Threshold. The City's vulnerability to shallow coastal flooding were assessed from tide gauge data taken from Trident Pier (Port Canaveral). The NOAA NOS CO–OPS 086 report indicates

[18] Source: https://oceanservice.noaa.gov/facts/nuisance-flooding.html

that the derived threshold in this area for minor flooding is 1.8 feet above MHHW. As seen in Figure 11, NOAA data also shows the historical yearly flood events at Trident Pier and the trend of rising water levels during the highest tide of the year since 1995.

Flooding is expected to impact at least 63 parcels with 38 structures with a current taxable value of nearly $155 million. Impacts due to coastal flooding include: increased beach erosion on the City's shoreline; along the Central/Canaveral Ditch; at Long Point Road; Banana River and Manatee Sanctuary Park; and the Water Reclamation Facility (WRF). Residential properties comprise 55% of the affected properties.

100 AND 500-YEAR FLOOD

A 100-year flood (a flood that has a 1% chance of occurring in any given year) and a 500-year flood (a flood that has a 0.2% chance of occurring in any given year) were also considered in the Assessment. Infrastructure and assets located within these respective zones were mapped using the Federal Emergency Management Agency's (FEMA) Digital Flood Insurance Rate Maps (DFRIM) from 2014. This data was derived from Flood Insurance Studies (FISs), previously published Flood Insurance Rate Maps (FIRMs), flood hazard analyses performed in support of the FISs and FIRMs and new mapping data, where available.

Findings reveal the City's 100-year flood zones are generally located along its eastern and western shorelines, with some areas further inland. Four miles of local roadways—predominantly along the beach—could be affected by a 100-year flood. A total of 284 buildings, currently representing approximately $560 million worth of property, are located within the 100-year flood zone, with 71% of vulnerable parcels being residential. The City's 500-year flood zones encompass a larger area of the City along its eastern and northeastern sections and has a similar scope to a category 3 hurricane storm surge.

Community Engagement

Community engagement and citizen input is extremely important when it comes to outlining and progressing sustainability and resiliency-based programs. Community input can help to not only identify issues but also guide future policy and appropriate development. During the research and drafting process of the City's Assessment, numerous community engagement sessions were held in various forms, including: outreach sessions; online information disseminated through the City's website; the Weekly Update; the City's social media platforms; messaging on water bills; and a public survey. This was done to better understand the Community's views in regards to resiliency and to determine what initiatives and issues residents thought should be prioritized.

Two community engagement workshops were conducted through the course of the Assessment's drafting. One workshop asked attendees what they thought the word resilience meant in their own words, as well as what vulnerabilities they believed were most pressing. Recover, survival, safety and

mitigation were the most common words discussed. In no particular order flooding, hurricanes, politics, climate change, sea level rise and the Indian River Lagoon (IRL) were also all identified by attendees as some of the top vulnerabilities for the City.

These resident interactions were then complied into a city-wide survey to allow for further engagement across a broader constituency, determine more specific actions, policy changes or other sustainability and resiliency-based strategies. The survey was made available between January 14, 2019 and March 5, 2019. A total of 239 people participated in the survey, most of who were full-time City residents.

Participants were asked to rank their top 3 vulnerabilities in order of importance or priority. Options were directly based off of prior engagement sessions input, which included hurricanes and storm surge, the IRL, government and funding, climate change, sea level rise and flooding. Survey results show that the top three priorities, in order, were:

- The IRL
- Hurricanes and storm surge
- Climate change

The bottom 3 priorities were:

- Flooding
- Government and funding
- Sea level rise

Participants were then directed to choose from a list of mitigation and adaptation strategies relating to each respective vulnerability. These strategies were based off previous engagement sessions. The strategies participants chose from are as follows and are presented in the order of ranked importance:

INDIAN RIVER LAGOON

- Low Impact Development: encourage stronger low impact development guidelines for all development.
- Causeways: support the complete spanning of the lagoon with bridges.
- Vegetative Buffer: encourage a natural vegetative buffer between the lagoon and turf.
- Fertilizer Ordinance: develop a stronger fertilizer ordinance.
- Funding: create special assessment for City projects/programs to improve IRL health.

HURRICANES AND STORM SURGE

- Raise Elevations: higher minimum elevations for buildings and infrastructure, where feasible.
- Redirect Development (Surge): implement policies and code changes to direct development away from high risk areas.
- Infrastructure Resilience: identify gaps in critical infrastructure needs for storm preparedness/recovery.

- Green Infrastructure: encourage use of vegetative solutions along lagoon/beachside to reduce surge.
- Building Codes: accept building and land development codes for greater resilience standards.

CLIMATE CHANGE

- Sustainable Policies: assess City policies to address climate change and sustainability.
- Alternative Power: promote use of solar on private and public buildings as well as micro grids.
- Electric Vehicles: transfer City fleet to electric vehicles and provide incentives for private EVs.
- Education and Awareness: enhance educational programs for climate change to increase citizen ownership.
- Pedestrian Mobility: develop a bike/pedestrian plan and re-assess vehicle traffic patterns to improve pedestrian mobility.

FLOODING

- Code and Policy Changes: allow for innovative approaches for flood resilient structures and smart growth ordinances.
- Infrastructure Plan: develop infrastructure plan that incorporates gray and green best practices.
- Green Infrastructure: increase green spaces in areas where they can be used for stormwater detention.
- Parking Standards: reassess parking standards and require green infrastructure in parking design.
- Down Zone: down zone in vulnerable flood areas.

GOVERNMENT AND FUNDING

- Voting Practices: create avenue to make public aware of local candidate voting practices.
- Funding: develop special assessments or tax increases for specific resilience projects.
- Code Enforcement: increase code and penalty enforcement within the City.
- Increase Awareness: develop education program for public and elected officials concerning resilience.
- Public Engagement: enhance outreach to community to encourage greater participation in government.

SEA LEVEL RISE

- Adaptation Action Areas: special areas to consider sea level rise regarding infrastructure, zoning and building standards.
- Stormwater Management: creative, hybrid stormwater solutions including swales, permeable surfaces and green infrastructure.
- Redirect Development: update codes and policies to redirect development away from hazard areas.
- Land Development Codes: update codes to allow for elevation increases on buildings.
- Economic Opportunities: investigate economic opportunities and economic vulnerabilities as related to sea level rise.

According to survey results, the top 10 rated strategies were a stronger fertilizer ordinance, alternative power, creating sustainable policies in regards to climate change, requiring a vegetative buffer between the lagoon and turf, create a hybrid stormwater management plan, increasing pedestrian mobility, utilizing green infrastructure for flooding, improving resilience in infrastructure, requiring low impact development and education to citizens in regards to climate change. The complete results of this ranking can be found below in Figure 12.

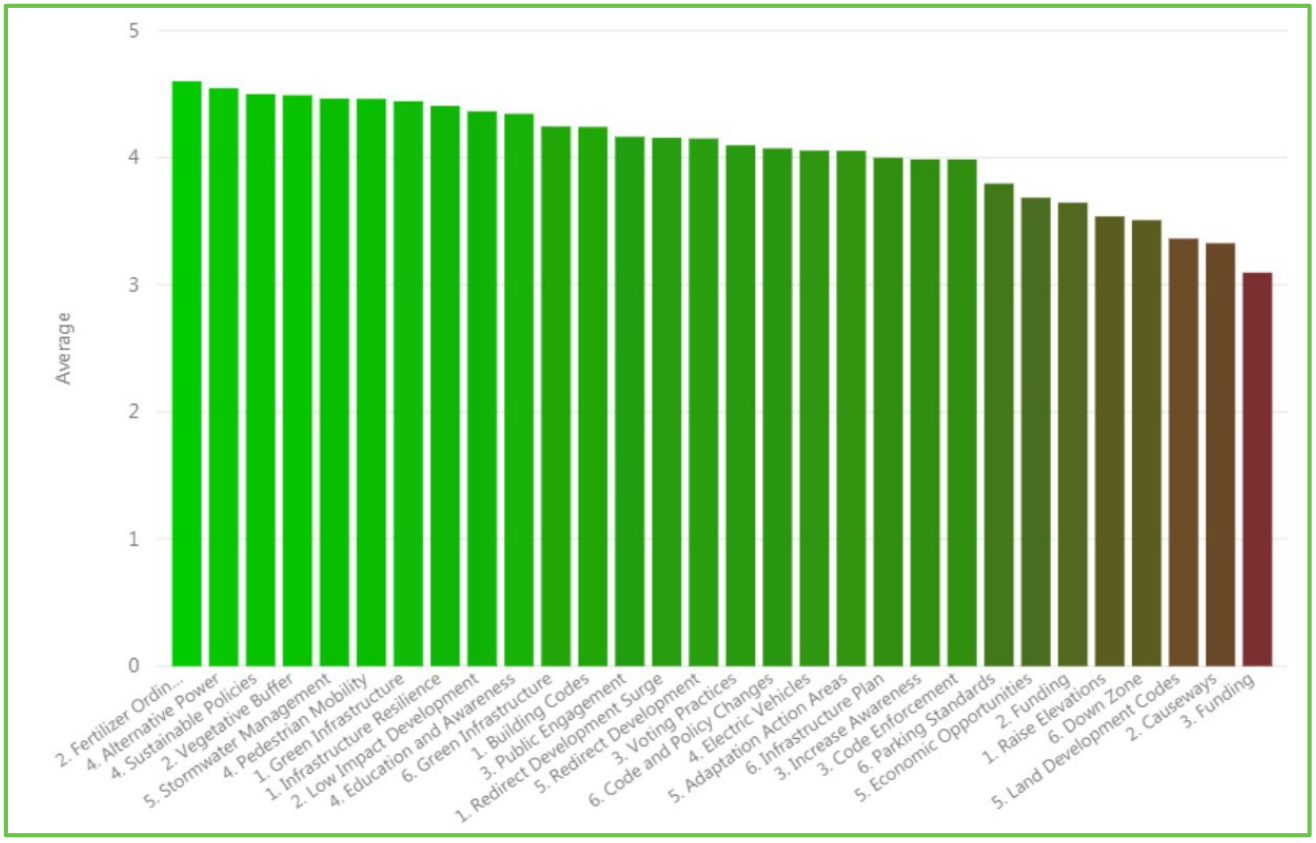

Figure 12. Resilient Cape Canaveral survey results with rankings.

Assessment Recommendations

A variety of recommendations were presented by the ECFRPC in light of community engagement sessions and the Assessment's findings. These recommendations—which include green infrastructure, lagoon protection, low impact development, business and home protection, community engagement and education and updates to the City's Comprehensive Plan—are summarized in the Resilient Cape Canaveral report. Many of these recommendations have either already been implemented by the City, are currently undergoing implementation or plan to be implemented in the near future. A summarization of the City's past and present sustainability and resiliency-based initiatives can be found on the City's sustainability section of its website and in the next section of this Plan.

Figure 13. Ramboll Group, Tanner Springs Park blue/green infrastructure concept.

Figure 14. Flood-Resilient Home Designs Seen at NYIT's 3C Comprehensive Coastal Communities Exhibit via ingabitat.com

"Cities will be on the frontlines of climate adaptation."

Taking the Heat: Making cities resilient to climate change, Goldman Sachs, September 2019.

I) A City of Stewardship

Past and Present

The City of Cape Canaveral has an expansive history of environmental stewardship, demonstrated through multiple past and ongoing sustainability and resiliency-based projects. The City is committed to delivering policies that are effective, efficient and forward thinking.

What follows is a list of initiatives the City has already undertaken. This is by no means comprehensive, as we are constantly building on our efforts to be more environmentally responsible and better stewards of our ecosystem services as made evident by this document. This list will be updated as new projects and initiatives are completed. For updates please visit the City's sustainability webpage.

AMERICAN FLOOD COALITION MEMBER

The American Flood Coalition (Coalition) is a nonpartisan group of political, military, business and local leaders that have come together to drive adaptation to the reality of higher seas, stronger storms, and more frequent flooding. The Coalition seeks to advance national solutions that support flood-affected communities and protect our nation's residents, economy and military installations — while advocating for proactive planning and smarter policies. Like the Coalition, the City believes that impacts from sea level rise and flooding are an important issue, one that requires regional and national coordination. Investing in adaptation planning and projects that reduce risk and protect home values, highways, ports and other essential infrastructure is vital to our Community. For more information on the American Flood Coalition, visit https://floodcoalition.org/.

ARBOR DAY AND TREE PLANTINGS

Figure 15. Tree Planting at Manatee Sanctuary Park.

For 30 years, the City of Cape Canaveral has been a designated "Tree City". This nationwide program provides a framework for guiding communities on how to manage and increase trees in public spaces. To qualify for the Tree City USA program, communities must meet four core standards. First, someone must be responsible for the care of all trees, this usually includes a professional forester or arborist (the City currently has an arborist); second, a Tree City must be guided by a tree care ordinance (Article II. - Tree Protection); next, a community must designate a portion of its budget toward planting, care and removal of City trees (Sec. 102-54. - Tree replacement standards); and last, a community must recite an official Arbor Day proclamation and demonstrate

support for Arbor Day. Every year, students from Cape View Elementary, City Staff and Council Members participate in the Arbor Day celebration. Students plant trees, learn about plant propagation and play games in honor of Arbor Day. Past plantings included a Rainbow Eucalyptus, Cedar tree, Jacaranda, and hundreds of trees and shrubs throughout the years. By participating in the Tree City USA program, the City continues to meet its goal of protecting and maintaining trees for environmental and aesthetic benefits, while also allowing opportunities for education. To learn more about the City's tree protection program, visit the City of Cape Canaveral Code of Ordinances via the links above. To learn more about the Arbor Day Foundation and the benefits of trees, visit: Arbor Day Foundation Benefits of Trees.

BAFFLE BOXES (SECOND-GENERATION)

As a traditional stormwater best management practice (BMP), baffle boxes use high-tech partitioned chambers that connect to stormwater drains in order to prevent trash or debris from moving into waterways. As water flows into the device, pollutants are filtered or settled out. These devices prevent sediments from exiting stormwater drains through an innovative nitrogen-removing bioreactor before flowing into the IRL system. The City's largest baffle box is located on West Central Blvd and was recently upgraded to a state-of-the-art second-generation box with funds from the Save Our Indian River Lagoon Project.

Figure 16. An example of a second-generation baffle box. Credit: St. Johns River Water Management District.

Baffle boxes are also present on all major outfalls throughout the City. For more information on the Save Our Indian River Lagoon Project Plan, visit Brevard County Save Our Lagoon.

THE BANANA AND INDIAN RIVER LAGOON

As part of a greater effort to better manage the City of Cape Canaveral's unique challenges with being a barrier island and the effect this has on the Banana River Lagoon (and the Indian River Lagoon system overall), the City is committed to developing plans aimed at reducing stormwater impacts while improving overall water quality. Currently, the City uses stormwater Best Management Practices (BMPs) to meet this goal. In addition, the City seeks to integrate creative low impact development (LID) practices that retain rainwater on-site and encourage it to soak into the ground rather than allowing it to run off into ditches, stormwater drains, or water bodies such as the Banana River Lagoon where it would otherwise contribute to flooding and pollution problems. The goal is to develop practices that do a better job of mimicking natural processes in order to lessen the impact of storm events. Lastly, it is important to note that while BMP and LID practices are environmentally beneficial, they can also enhance neighborhood beauty through landscaping that doubles as natural stormwater infrastructure. The University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS) and Keep Brevard Beautiful (KBB) both offer guidelines on how to promote Florida-friendly landscaping.

More information can be found at:

- UF/IFAS Low Impact Development
- UF/IFAS Lawn and Garden
- Keep Brevard Beautiful Lagoon Friendly Lawns program

BIKEABILITY AND WALKABILITY THROUGHOUT THE CITY

In keeping with the City's Vision Statement, creating a "bikeable and walkable Cape Canaveral that retains and enhances its welcoming residential feel" is important. Over the years, the City has worked to identify projects that develop "complete streets". Examples of this include the Ridgewood Avenue Streetscape Project and more recently, the North Atlantic Avenue Streetscape Project. The City continues to examine complete street guidelines as defined by Smart Growth America and works with the Space Coast Transportation Planning Organization (SCTPO) to integrate and advocate for projects that positively impact the City. Furthermore, the A1A Economic Opportunity Overlay District (EOOD) provides guidelines and standards encouraging development that focuses on pedestrian-friendly activity along State Road (SR) A1A. The goal is to create attractive outdoor spaces that allow residents and visitors of all abilities to move around the City of Cape Canaveral without relying on automobiles. Future endeavors include bicycle/pedestrian education, additional streetscaping and smaller measures such as using less toxic, soy-based traffic paint made from renewable and environmentally friendly sources for City roads and parking lots.

Figure 17. Crosswalk at N. Atlantic Ave.

CANAVERAL CITY PARK AND CITY HALL WATER EXFILTRATION SYSTEM

As part of the revised stormwater master plan (2014), the City completed a stormwater improvement project that included exfiltration tanks placed under the Canaveral City Park baseball fields. The project

Figure 18. Exfiltration projects, Canaveral City Park (left) and City Hall (right).

included the installation of stormwater chambers beneath two outfield areas and one infield area of Canaveral City Park that capture approximately 931,000 gallons of water. The contributing area of treatment is equivalent to 30.3 acres. Upon completion of the stormwater chamber installation activities, the Park was returned to its original land use while capturing runoff and preventing it from entering the BRL. Similar tanks were installed underneath the Cape Canaveral Volunteer Fire Station and the City's new City Hall to capture and detain site runoff. Additionally, the City has numerous proposed stormwater improvement projects listed in the revised stormwater master plan (City of Cape Canaveral Basin Management Action Plan Compliance Strategy), that when completed will allow the City to meet its target goal for further reducing nitrogen and phosphorus from stormwater runoff. See also, Stormwater and Wastewater Management Projects below.

CLIMATE MAYORS COALITION MEMBER

The City of Cape Canaveral is proud of its membership with Climate Mayors, a coalition of more than 400 mayors nationwide leading the way on climate change initiatives through meaningful actions in their communities. This coalition also includes an electric vehicle purchasing collaborative, which seeks to leverage collective buying power and accelerate the conversion of municipal fleets to electrics. The City looks forward to working with other Mayors nationwide to demonstrate leadership on climate change in our Community through sustainable policies and actions. Visit http://climatemayors.org/ to learn more.

COMMUNITY GARDEN

The Cape Canaveral Community Garden is an organic greenspace that contains 12 garden plots meant for residential and educational use. The goal of the garden is to serve the Community by providing an opportunity for gardeners of all experience levels to work, volunteer and learn from one another while growing food. Most of all, the Community-led garden is a partnership between the City of Cape Canaveral and area residents to help foster a sense of community while encouraging neighbors, friends and families to collaborate on fun activities and workshops aimed at making the garden a success. In March 2018, the garden became a member of the informal Community Garden Network of Brevard (CGNB). The CGNB serves to inspire, connect, and support local efforts in sharing knowledge and resources for the creation and maintenance of sustainable urban and suburban gardens. This unique network promotes volunteerism, awareness, inclusion and education to empower both citizens and municipalities to undertake their own environmental and agricultural projects. Its mission is to enhance and maintain the natural beauty of our County's ecosystems while helping others achieve best practices in meeting their economic, environmental and social needs. For those interested, please feel free to use the latest garden bed designs the City used at its own community garden, which can be seen in Figure 19.

Figure 19. Cape Canaveral Kairos Community Garden beds.

COMPREHENSIVE PLAN COASTAL MANAGEMENT ELEMENT

Development in Florida is guided by growth management legislation that was passed in 1985. Section 163.3177, F.S., requires that local governments' comprehensive plans provide policy for local planning and land use decisions on several issues such as capital improvements, conservation, intergovernmental coordination, recreation, open space, future land use, housing, transportation, public facilities, and coastal management (where applicable). Comprehensive planning is important because it results in decisions regarding long-term issues such as environmental protection and economic development, and ensures that cities work with the Florida Department of Economic Opportunity (DEO) to comply and coordinate with other state agencies for local development.

As a coastal municipality, the City of Cape Canaveral is required by Florida law, to include a coastal management element in the City's comprehensive plan. In 2017, the City passed Ordinance No. 10-2017 to update its Comprehensive Plan to include a coastal management element. The update includes policies that indicate the City's willingness to pursue adaptation planning strategies over the next few years. The element must set forth principles, guidelines, standards and strategies to reduce the risk of flooding. Notably, F.S.§163.3177 and 163.3178, require that coastal management activities use studies,

surveys and data to create redevelopment components that outline principles used to eliminate inappropriate and unsafe development in coastal areas. Moreover, the State encourages communities to take additional steps to develop strategies to become more resilient. Generally, resiliency planning uses data generated by analyzing a city's key assets (economic, infrastructure, natural, and social) and examining how they may be impacted by various sea level rise scenarios. Models used in these analyses are designed by organizations such as the USACE, UF and NOAA. With this in mind, the City has worked with the ECFRPC to develop a vulnerability assessment specific to the City of Cape Canaveral. These efforts, collectively known as adaptation planning, will allow the City to take steps to address current and future coastal planning in Cape Canaveral.

EAST CENTRAL FLORIDA REGIONAL PLANNING COUNCIL (ECFRPC) PARTNER

The ECFRPC was established in 1962 as an area-wide association of governments. It is represented by 32 Council Members and a skilled staff that provides technical assistance to governments and organizations within eight counties in the East Central Florida region. These counties include Brevard, Lake, Marion, Orange, Osceola, Seminole, Sumter and Volusia. The ECFRPC staff has expertise in a variety of areas including land use, environmental planning, comprehensive planning, resiliency and emergency management. Recently, the FDEP awarded the City a grant to work with the ECFRPC to develop a community based vulnerability assessment for Cape Canaveral, which was completed in May 2019. A summary of findings from the Assessment can be viewed above in Section D of this action plan. For more information, visit the ECFRPC's website at http://www.ecfrpc.org/ and the Florida Resilient Coastlines Program at https://floridadep.gov/fco/florida-resilient-coastlines-program/content/funded-projects.

ELECTRIC VEHICLES, EV CHARGERS, AND ALTERNATIVE FUEL VEHICLES

The City currently has six Level-2 electric vehicle (EV) charging stations (with 12 charging ports), which are available to residents and visitors free of charge in order to promote and incentivize further EV adoption across the Community. Locations include the Cape Canaveral Public Library, City of Cape Canaveral City Hall, Manatee Sanctuary Park and Banana River Park. A Level-2 mono charging station also resides at the Public Works Services administration building for City fleet usage. At least two more dual port EV chargers are planned and locations will be updated as they become available on the City's website. The City has one fully electric vehicle, a 2017 Ford Focus with 115 miles of range (Figure 20) and four 2019 Toyota RAV4 hybrids that have a 40+ mpg rating in a city environment. More alternative fuel vehicles will be added to the fleet as older vehicles are retired. To view charging station locations, visit http://www.plugshare.com/ or download the app to your mobile device.

Figure 20. The City's 2017 Ford Focus EV charging at Public Works Services administration building.

EMERGENCY PREPAREDNESS

Because of the City's barrier island location, Cape Canaveral is inherently more susceptible to tropical cyclones and their impacts (i.e., storm surge, strong winds, flooding rains, etc.). While storms can be unpredictable, the City has procedures in place that aim to: safeguard life, minimize injuries, protect property, ensure organized preparedness, and achieve an early return of services. The City of Cape Canaveral *Tropical Cyclone Preparedness and Recovery Plan* is in place to better position the City for resilience and most importantly, safety. Additionally, the City disseminates information through various channels and coordinates with the Brevard County Emergency Management Office to communicate a message of year-round preparedness in the event of a storm or natural disaster. The *Your Pathways to Preparedness* guide provides resources that residents and visitors can use in an emergency. For more information, visit the Brevard County Emergency Management Office web page and follow City-related updates on the City of Cape Canaveral website and social media.

FEMA CRS PROGRAM MEMBER

The National Flood Insurance Program (NFIP) Community Rating System (CRS) is a program designed by FEMA to recognize and encourage community floodplain management. According to FEMA, the program "credits community efforts beyond those minimum standards by reducing flood insurance premiums for the community's property owners." For CRS participating communities, flood insurance premium rates are discounted in increments of 5%. A Class 1 community would receive a 45% premium discount, while a Class 9 community would receive a 5% discount (a Class 10 is not participating in the CRS and receives no discount). The CRS classes for local communities are based on 18 creditable activities, organized under four categories: public information, mapping and regulations, flood damage reduction, and flood preparedness. The City of Cape Canaveral is currently a CRS Class 8 community

and all flood insurance premiums are reduced by 10% for all policy holders within the Special Flood Hazard area. To view flood zone information, visit the: Brevard County Flood Zone Map, http://gis.brevardcounty.us/flood_map/.

FERTILIZER ORDINANCE

The City of Cape Canaveral has a summer ban on fertilizer application from June 1st to September 30th. No applicator shall apply fertilizers containing nitrogen and/or phosphorus to turf and/or landscape plants during the prohibited application period, or to saturated soils. The City Code of Ordinances Chapter 92 – Fertilizer Land Application outlines all the specifics of this ban. In short, this chapter regulates and promotes the proper use of fertilizers by any applicator; requires proper training of commercial and institutional fertilizer applicators; establishes training and licensing requirements; establishes a prohibited application period; specifies allowable fertilizer application rates and methods; fertilizer-free zones; low maintenance zones; and exemptions. This chapter requires the use of best management practices which provide specific management guidelines to minimize negative secondary and cumulative environmental effects associated with the misuse of fertilizers. These secondary and cumulative effects have been observed in and on the City of Cape Canaveral's natural and constructed stormwater conveyances and surface waters. Collectively, these water bodies are an asset critical to the environmental, recreational, cultural and economic well-being of Cape Canaveral residents and the health of the public. Overgrowth of algae and vegetation hinder the effectiveness of flood attenuation provided by natural and constructed stormwater conveyances. Regulation of nutrients, including both phosphorus and nitrogen contained in fertilizer, help improve and maintain water quality.

FLOATING VEGETATIVE ISLANDS (FVIS)

The City of Cape Canaveral has constructed a number of wet detention ponds in order to reduce pollutant loads to the BRL. Wet detention ponds provide stormwater treatment through settling of heavy sediment particles and biological uptake within the pond's ecosystem. The City has enhanced the pollutant removal effectiveness of existing facilities by adding Floating Vegetation Islands (FVIs) to three existing ponds – one at Manatee Sanctuary Park (Figure 21) and four at the WRF. Nutrients removed from the water are stored in the plant mass and routinely harvested, preventing resuspension of nutrients when the plants die. There are approximately 1.9 acres of surface water in the three ponds selected for this project. Over 3% of the water's surface area is planted with FVIs to achieve 20% removal efficiency above and beyond treatment obtained in the ponds. FVIs are planted with several native plant species and secured in deep water areas until harvesting time, when the mats are pulled to shore and water quality improvements measured.

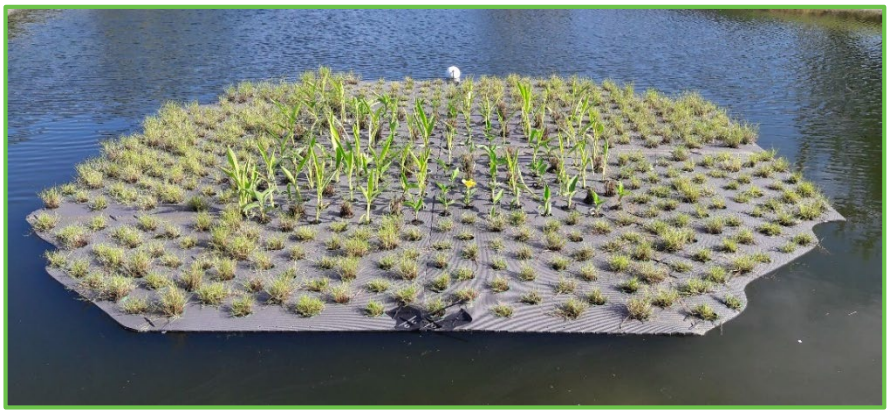

Figure 21. FVI located at Manatee Sanctuary Park.

KEEP BREVARD BEAUTIFUL TRASH BASH

Every year, the City participates in KBB's annual Trash Bash. As part of the Great American Cleanup, KBB's Trash Bash partners with local cities to help organize volunteers and remove trash from their areas. These volunteer efforts have helped to remove hundreds of pounds of litter from our beautiful community and beaches.

LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED) SILVER EQUIVALENT BUILDINGS

New City Hall, completed in 2018, was built to LEED Silver standards. LEED standards are one of the most popular green building programs used worldwide. Developed by the non-profit US Green Building Council (USGBC), it includes a set of ratings that account for design, construction, energy use and maintenance of buildings. Future City buildings, including the Multi-Generational Facility (MGF) and the CAPE Center, will also be built to adhere to LEED Silver standards. Please note: The City plans to build all future buildings to LEED standards, but will not necessarily pursue LEED certification as this requires additional recurring fees.

LITTLE FREE LIBRARY AND LITTLE FREE PANTRY PROGRAM

The Little Free Library/Pantry is a grassroots, crowdsourced solution which strives to meet immediate community needs. Whether it is a need for educational books, food, or a need to give, the Little Free Library/Pantry's goal is to facilitate neighbors helping neighbors. Long-term goals continue to be working with the Second Harvest Food Bank of Central Florida - Brevard Branch and local HOAs to ensure Little Free Pantries are continuously stocked. To date the City has seven Little Free Libraries and four Little Free Pantries.

MOBI-MATS® AND COMPOSITE DECKING IMPLEMENTATION

Mobi-mats are "a lightweight non-slip portable roll-out ADA/ABA/AODA beach access pathway for individuals of all abilities, pedestrians, wheelchair users, strollers, bicycles and ATVs." As the City works to become more accessible, the use of these recyclable and earth-friendly mats are a great way to achieve greater accessibility with minimal environmental impact. Mobi-mats can be found at beach crossovers at Monroe Avenue, Polk Avenue, Buchanan Avenue, and Ridgewood Avenue Beach Crossovers. Additionally, the City uses eco-friendly composite decking, made from an innovative blend of 95% recycled wood and plastic film for beach crossovers and will replace older wooden crossovers in the future. For more information, visit: https://www.mobi-mat-chair-beach-access-dms.com/.

PACE (PROPERTY ASSESSED CLEAN ENERGY) FINANCING

In 2017, the City of Cape Canaveral adopted Resolution No. 2017-01 that allows local governments to create PACE programs in order to provide access to upfront financing for energy conservation/efficiency, renewable energy, wind resistance, and other improvements. The program, approved by the State of Florida, uses third-party administrators to provide funding for clean energy projects. These programs not only assist residents and businesses in reducing their carbon footprint,

but can also stimulate the local economy by creating job opportunities. To learn more, visit: https://pacenation.org/.

RECLAIMED WATER

The City of Cape Canaveral's Reclaimed Water System is striving to meet a conservation goal by developing, expanding and promoting an alternative water system. Reclaimed water is a major component of the City's Water Conservation Program and overall sustainability and as a result, the City recently built a 2.5 million-gallon tank to lessen the amount of discharge into the BRL. The City of Cape Canaveral makes this resource available to as many residents as supply, demand and financial resources allow. For more information, visit the City's reclaimed water page.

Figure 22. Newly planted sea oats on Cape Canaveral's beaches.

SEA OAT PLANTINGS

As part of the City's annual Sea Oats Planting Project, volunteers attend and work to prevent erosion and enhance the aesthetic qualities of Community beaches. Between 2019 and 2020, volunteers planted 20,000 sea oats to help support the natural dune line. City Staff from the Public Works Services Department typically host the event. Refreshments and planting tools are provided to volunteers, and after a short how-to demonstration, volunteers head out to the beach. To date, the City has planted over 100,000 (see historical data below) sea oats on Cape Canaveral beaches. The City's social media platforms have been successful in reaching participants, and every year new volunteers become first-time sea oats planters.

Year	Number of Plants	Year	Number of Plants
2005	2,950	2013	7,200
2006	9,600	2014	7,700
2007	9,600	2015	7,700
2008	5,000	2016	7,200
2009	7,500	2017	7,200
2010	7,500	2018	7,200
2011	8,000	2019	10,000
2012	7,200	2020	10,000

SEA TURTLE PROTECTION & EDUCATION

In 2017, the City ramped up its sea turtle messaging on social media and at public events to engage the Community in environmental stewardship. Because the beaches of Brevard County are among the world's most important nesting areas for sea turtles, it is important to protect these animals. Each

summer, female sea turtles climb onshore to build nests and lay eggs. Later in the summer, baby sea turtles emerge and crawl to the safety of the ocean. In Brevard County, nesting season begins on March 1 and ends on October 31. During this time, it is important to turn off lights on houses and businesses near beaches to prevent turtles from becoming disoriented. In fact, the City's code enforces the protection of sea turtles through policy that minimizes light on or near beaches. We hope to increase this messaging in the future and continue to encourage activities such as keeping beach-facing lights off during sea turtle nesting season.

SOLAR GENERATOR

In December 2019 the City's first mobile solar generator arrived! It comes from a California-based company—Mobile Solar—and is the company's smallest unit type (the MS-150). The City wanted to start small with its first solar generator in order to train Staff and educate the Community on solar and battery technologies while also providing a usable service. It will be used at City events, for appropriate construction duties and—perhaps most importantly—for disaster relief operations after tropical storms and hurricanes.

Figure 23. Mobile Solar generator (2019).

The MS-150 unit is capable of powering and recharging numerous mission-critical devices at any given time, including cell phones, laptops, power tools, external lighting fixtures and certain appliances. This will help the City to maintain operations in the event of power outages, all without the need for traditional gasoline or diesel fuel.

The three 335 watt LG solar panels have a daily energy harvest of 6-kilowatt hours with an inverter output rated at 3.5 kilowatts (3,500 watts) with a surge of 6 kilowatts (6,000 watts). The included batteries are charged by the unit's solar panels, have an overall lifespan of 12 to 15 years, and can last up to two days on a single charge.

SOLAR TOGETHER

In January 2019 the City partnered with Florida Power and Light (FPL) to become one of the first municipal SolarTogether subscribers. SolarTogether is an offset program where the City agrees to pay a slightly higher utility rate in order to invest in large-scale solar arrays being deployed by FPL as a part of their 30 by 30 initiative, which intends to see 30 million solar panels deployed across the state by 2030 to generate up to 10 gigawatts of electricity. In exchange for this increased rate, the City will receive

bill credits that will - after six years - see a breakeven point and subsequently begin positive financial returns. Almost 3 million kilowatt-hours of municipal consumption will be offset.

Under the new program, FPL will build 20 new mainland solar plants (each with a 74.5-megawatt capacity) by mid-2021. Over the life of the 30-year program, the City will see over $385,000 in utility savings while helping to invest in a clean, renewable form of power abundant to the Sunshine State.

STORMWATER AND WASTEWATER MANAGEMENT PROJECTS

- Ongoing replacement of open-throat stormwater inlets with Type C inlets, which reduce the amount of debris entering the stormwater system, reducing debris backups.
- Construction of stormwater management systems at both Banana River and Manatee Sanctuary Parks.
- Underground stormwater exfiltration chambers at the Cape Canaveral Fire Station.
- Replacement of sewer pipes located along Banana River to eliminate leaks and back-up.
- North Atlantic Avenue Streetscape Project included the construction of a swale system to collect stormwater and reduce flooding.
- Armored the Banana River Lagoon shoreline at Banana River Park, Manatee Sanctuary Park and the City's Water Reclamation Facility to reduce erosion.
- Continued development and implementation of the City's Stormwater Master Plan (2014) as a guide for future infrastructure projects and a means to reach Total Maximum Daily Load (TMDL) goals.
- Exfiltration pipe installations at eight City intersections to help reduce flooding.
- Sewer pipes replaced located along the Banana River to eliminate leaks and back-up.
- The North Atlantic Avenue Streetscape Project included construction of a swale system to collect stormwater, which was not present before.
- Constructed a back-up oxidation ditch at the Water Reclamation Facility for system redundancy.
- Replacement of inefficient sanitary sewer lift stations with new stations.

J) Moving Forward

A Resilient and Sustainable Future

The City of Cape Canaveral is at the center of the Space Coast's revitalization. An ever expanding space program and increasingly modernizing global port pose opportunities and challenges that must be met with preparedness in the face of intensifying risk from costly weather-related disasters. Over the last few years, a number of communities have experienced tragic results from a lack of preparedness. For this reason, it is important to note that the impacts of sea level rise and climate change will not only impact a community's character, but its finances.

Figure 24. Traffic signal street sign with high water.

The results of sea level rise will likely burden residents and business owners. Therefore, the City of Cape Canaveral will work to become a leader in resiliency and sustainability in an effort to meet the demands

of the present while balancing the needs of the future. Leading by example, the City will establish goals for what a modern, sustainable and prosperous coastal municipality should be.

What follows are a series of resilience and sustainability-based development objectives—called Preparedness Targets—that breakdown into eight Action Categories that include elements necessary to sustainable municipal operations. It is also important to note that these objectives are in line with the ECFRPC's East Central Florida Regional Resiliency Action Plan (ECF RRAP) goals (below) which offer a regional approach to the challenges that all Brevard County municipalities face.

ECF RRAP ALIGNMENT—GOAL 1 (LEADERSHIP & STRATEGY)

- LS1: Incorporate resiliency into local and regional plans, policies and objectives.
- LS2: Plan fiscally to implement resilient and sustainable solutions to long-term impacts.
- LS3: Implement strategies to promote adaptive measures that keep people and property safe from natural hazards.
- LS4: Engage and educate private sector stakeholders, elected officials and other members of the community about strategies to increase resilience in the built, natural, and social environment.

ECF RRAP ALIGNMENT—GOAL 2 (ECONOMIC & SOCIETY)

- ES1: Protect high-value assets from natural hazards.
- ES2: Educate businesses about access to funding and financing services related to resiliency and sustainability.
- ES3: Facilitate and support the efficient recovery of business operations after an event.
- ES4: Increase skilled labor force.
- ES5: Improve social equity and justice in decision making process.

ECF RRAP ALIGNMENT—GOAL 3 (INFRASTRUCTURE & ENVIRONMENT)

- IE1: Prioritize the use of Green Infrastructure as a first line of defense.
- IE2: Promote interconnectivity of natural lands for habitat migration.
- IE3: Enhance stormwater systems to be more resilient.
- IE4: Improve water quality in surface water bodies.
- IE5: Incorporate resiliency into local and regional plan, policies and objectives.
- IE6: Preserve and adapt the built environment to keep people safe from and mitigate current and future natural hazards.
- IE7: Improve community mobility while improving vulnerable transportation infrastructure.

ECF RRAP ALIGNMENT—GOAL 4 (HEALTH & WELL-BEING)

- HW1: Improve capacity of jurisdictions to better respond to hazard events.
- HW2: Improve capacity of medical facility operations to prepare for and recover from natural disasters and future conditions.
- HW3: Promote sustainable practices in government owned facilities.
- HW4: Engage residents and business owners with locally relevant information about expected future changes in natural hazards and sustainable practices.
- HW5: Improve access to resources for the homeless, special needs, elderly, low income, and English-limited residents.

The following pages describe each of the City's eight Action Categories in detail and their relating Preparedness Targets. There are a total of 56 Preparedness Targets across each of the Action Categories, which are listed below:

ACTION CATEGORY 1—GREEN AND RESILIENT ECONOMY

- Preparedness Targets: 4

ACTION CATEGORY 2—NATURAL SYSTEMS

- Preparedness Targets: 10

ACTION CATEGORY 3—TRANSPORTATION

- Preparedness Targets: 10

ACTION CATEGORY 4—ENERGY

- Preparedness Targets: 9

ACTION CATEGORY 5—BUILT ENVIRONMENT

- Preparedness Targets: 3

ACTION CATEGORY 6—EQUITY AND QUALITY OF LIFE

- Preparedness Targets: 3

ACTION CATEGORY 7—WASTE AND CONSUMPTION

- Preparedness Targets: 8

ACTION CATEGORY 8—STORM READINESS AND SEA LEVEL RISE

- Preparedness Targets: 9

Each Preparedness Target is listed alongside an explanation of its purpose, implementation period, implementation strategy and measure of success—or the measure by which the City will know the target has been achieved.

Preparedness Targets are listed in chronological order across four different implementation horizons:

CURRENT, DENOTED BY A (C)

- Targets the City can/should undertake immediately

FIVE (5) YEARS

- Targets the City should undertake within the next five (5) years

FIFTEEN (15) YEARS

- Targets the City should undertake within the next 15 years

THIRTY (30) YEARS

- Targets the City should undertake within the next 30 years

According to these timeframes, each of the 56 Preparedness Targets should be researched, scoped and implemented by 2050. This proactively places the City's efforts of preparing policies/procedures and engineering its infrastructure ahead of the worst-case scenarios predicted for impacts from flooding, storm surge and sea level rise outlined in the City's Assessment. In the interim, increasing instances of unpredictable weather and climate-related events, as well as subsequent economic shocks, necessitate a recommendation for the City to increase the General Fund Contingency to be better positioned for unanticipated weather and climate-related response activities and unanticipated opportunity-based initiatives to mitigate impacts.

This Plan is a living document, meaning it can be adapted and refined over time to better meet the needs of the Community. There will be an assessment review conducted every five years after adoption, where City Staff will have the chance to examine the results of the Plan's targets and amend if necessary. This will help to ensure the action plan stays up-to-date and that results are formally assessed and shared with the Community. If Preparedness Targets are completed by the time an assessment review is conducted it will be removed from the document's listing. A new target can be included to either enhance the objective of the previous target or incorporate a different topic altogether if deemed necessary. Any new targets should however attempt to conform to the already established implementation timeframes. Being a living document, this action plan can continue to serve the City for decades to come.

With these targets, the City of Cape Canaveral can position itself to not only reduce costs via risk mitigation and disaster preparedness, but also improve the overall health and well-being of its residents, environment, and economy in order to become a Future-Ready city.

Figure 25. Example of green infrastructure incorporated into the built environment.

K) Action Category 1

Green and Resilient Economy

According to the US Economic Development Administration (EDA), economic resilience is the ability of a local or regional economy to anticipate risks, evaluate how these might impact key economic assets and to build a responsive capacity in order to respond[19]. This resilience must also be combined with a general greening of a City's economy, one that promotes improved human well-being and social equity while reducing threats to the environment in order to allow for sustainable growth.

Incorporating resilience into a local economy can reduce the financial impacts of disasters, improve economic profitability and performance, and improves the general atmosphere for investment. As redevelopment occurs, the City should focus on diversifying its portfolio of businesses, continue to support and encourage local businesses and promote businesses that exhibit sustainable practices that have a minimal impact on the environment.

This should occur in conjunction with maintaining natural areas within the City in order to encourage biodiversity and lagoon health—as well as ecotourism—a multi-million-dollar industry in the State of Florida[20]. Areas of urban development that are no longer of use or abandoned should be investigated and acquired by the City where feasible and appropriate to be made into natural areas and stormwater parks.

Figure 26. Image depicting "green growth".

The environment is a natural and economic asset, and must be preserved and maintained to the maximum extent possible. Mismanagement as seen in the Banana and Indian River Lagoons can result in significant financial losses. According to a 2016 economic valuation analysis prepared by the ECFRPC and the Treasure Coast Regional Planning Council, the total economic value of the lagoon system was over $7.6 billion across five counties[21]. If this resource should be lost due to continued environmental degradation or collapse it would impact the economy significantly. Thus, policies, eco-oriented business practices and infrastructure geared towards properly managing resources should always be promoted and prioritized.

[19] Source: https://www.eda.gov/ceds/content/economic-resilience.htm
[20] Source: http://floridajobs.org/community-planning-and-development/community-planning/community-planning-table-of-contents/ecotourism/the-economic-benefit-of-ecotourism
[21] Source: http://tcrpc.org/special_projects/IRL_Econ_Valu/FinalReportIRL08_26_2016.pdf

PREPAREDNESS TARGET 1

Encourage green (eco-friendly) industries within the City.

Purpose: Encouraging green industries to establish businesses within the City can help to diversify the City's economy, attract new 21st century jobs and spur innovation. These new green industries, which can range from energy efficiency engineering to local reusable cotton bag manufacturers, will allow the City to add capital while also providing a place for a modernizing workforce. It is estimated that as of 2018 the world's green economy, characterized by businesses who are efficient, clean, circular, collaborative and low carbon, is worth more than the fossil fuel sector at roughly 10% of the global market's capital. The fossil fuel sector currently makes up about 6%[22].

Implementation Period: Current (c).

Implementation Strategy: Encourage green industries by highlighting the City's sustainability initiatives, green and resilient best practices. The City should also purchase goods and services from local or regional businesses.

Measure of Success: An annual assessment should be completed by City Staff in order to determine the amount of businesses within the City that can be classified as "green" through their goods and services, verifying whether these businesses are being maintained in the Community and increasing in number. Such data should be made available to the public and promoted through the City's official social media pages, website and outreach programs.

PREPAREDNESS TARGET 2

Support clean energy industry jobs for residential and commercial projects, City facilities included.

Purpose: As of 2018, nearly 3.3 million Americans worked in the clean energy industry, outnumbering fossil fuel workers 3 to 1[23]. These green-collar jobs represent the future of American energy and should be supported as energy grids transition to renewable energy (solar, wind, geothermal, etc.) in an effort to make a greener and more sustainable economy. This will also encourage homegrown energy production, by encouraging local resiliency-based electricity.

Implementation Period: Current (c).

Implementation Strategy: Promote local clean energy jobs and engage the Community on clean energy programs that are available to property owners. The City should also work to convert its facilities to run off of renewable energy by mid-century and develop incentives for clean energy users. "Clean energy user guides" should also be made available to the Community to increase awareness and installation.

Measure of Success: The City should set a goal to encourage at least 50 private property owners to convert to renewable energy by 2030, and work to attract at least one local clean energy company to reside within its limits.

[22] Source: https://unfccc.int/news/green-economy-overtaking-fossil-fuel-industry-ftse-russel-report

[23] Source: https://www.forbes.com/sites/energyinnovation/2019/04/22/renewable-energy-job-boom-creating-economic-opportunity-as-coal-industry-slumps/#3fd768293665

PREPAREDNESS TARGET 3

Promote green business practices within the Community through the City's website, official social media pages, at events and through the Weekly Update.

Purpose: To serve as an education source for local business leaders aspiring to make their operations more efficient, resilient and environmentally friendly while also reducing costs.

Implementation Period: Current (c).

Implementation Strategy: Educational materials pertaining to green business practices will be distributed via the City's website, ongoing outreach sessions, official social media pages and through the Weekly Update. Information will be up-to-date, showcase successful examples of implementation elsewhere and highlight the successes of local green businesses, as well as other local businesses working towards these goals.

Measure of Success: Success will be measured via statistics from social media tracking, Weekly Update subscribers, website users and event attendees. Feedback through Community surveys can also be used as a measure of interest or success. The City should strive to reach at least 500 individuals on an annual basis through the channels mentioned above.

PREPAREDNESS TARGET 4

Promote and build attractions that encourage ecotourism.

Purpose: Given the natural beauty of Cape Canaveral's surroundings, ecotourism—a vital industry to the region—should be viewed as an economic asset that supports the preservation of the City's natural areas, including the Banana River/Indian River Lagoons. Of the lagoons estimated $7.6 billion value, $1.5 billion is estimated to be derived directly from tourism and recreation, with the average lagoon visitor spending $162 a day[24]. This industry could also help to further diversify the City's economy and promote local businesses whose livelihoods rely on the environment.

Implementation Period: Current (c).

Implementation Strategy: The City should make it a priority to purchase or preserve remaining undeveloped areas, where appropriate, to aide in the development of LID, stormwater parks, and lagoon restoration. Additionally, kayak trails should also be pursued to allow residents and visitors access to the BRL, potentially connecting each lagoon facing City park with the proposed port-located aquarium.

Measure of Success: City Staff should inventory current ecotourism-based businesses within the City and reevaluate this inventory every year in order to determine growth. The construction, remediation and completion of natural areas, park and other green infrastructure projects will also be viewed as a measure of success.

[24] Source: https://www.tcpalm.com/story/specialty-publications/progress-and-innovation/2016/11/14/new-study-shows-how-valuable-indian-river-lagoon-treasure-coast/92665478/

L) Action Category 2

Natural Systems

Natural systems are considered to be all land and water ecosystems and the organisms that reside within them. Many of these natural systems are under immense stress due to waste, pollution, and population growth. These natural systems play a complex and sustaining role in the health and well-being of not only the environment but people as well. It is also important to note that since much of the area's economy is built around environmental assets, they should be preserved and maintained to the maximum extent possible. An effort should also be made to restore habitat areas where feasible.

The Banana and Indian River Lagoons are probably the most prominent local examples of an endangered natural system. Throughout the last several years, numerous toxic algae blooms have led to seagrass die-offs and massive fish kills that have the potential to lead to the collapse of the lagoon system. More can be read about the lagoon in the Marine Resources Council's (MRC) Indian River Lagoon Report Card, which was published in 2018. This report card, which will be updated by the MRC as new data is collected and analyzed, is available for free download by the public via the MRC's website.

Natural assets can also be seen as green infrastructure, LID, or infrastructure that incorporates natural systems—trees and plants—into the everyday operations of a city's infrastructure. They can also help a city manage stormwater runoff and can add to the overall aesthetics of an area while rebuilding natural habitat. Green infrastructure can take the form of bioswales that help to collect and filter stormwater runoff, living shorelines that help to stabilize vulnerable coastlines against storm surge and erosion, or even include living walls on building facades that help reduce air pollution.

This category will help the City take actions in the preservation and mitigation of its surrounding natural systems—both land and water—while also improving its resiliency through the implementation of green infrastructure.

Figure 27. Large fish kill in the Indian River Lagoon, Associated Press March 2016.

PREPAREDNESS TARGET 5

Ban the use and application of glyphosate-based herbicide products at all City owned properties, parks and facilities by City Staff and contractors.

Purpose: Glyphosate has been an active ingredient in herbicide (weed killer) since 1974 with an estimated 18.9 billion pounds having been applied globally since its inception, with samples found in consumable foods and beverages. Scientific research has raised concerns about the compound's link to cancer[25]. This has resulted in numerous cities—and even countries—banning the substance[26]. It is also a water pollutant, with large amounts being found in watersheds across the country, including Biscayne Bay in Miami, leading to its ban across the municipality[27]. With this in mind, the City will work to eliminate the use of Glyphosate on City property.

Implementation Period: 5 years

Implementation Strategy: City Staff should first compile a detailed list of appropriate substitutes to replace any glyphosate-based herbicides. The City will work with businesses and contractors to recommend alternatives to aide in transitioning from glyphosate-based herbicides to environmentally-friendly herbicides. City Staff should make its glyphosate alternatives publically available in order to promote and encourage their adoption by Community members.

Measure of Success: Determined via the complete elimination of glyphosate-based herbicide products on City property and an ongoing effort to record alternative herbicides being used in the Community.

[25] Source: https://www.sciencedaily.com/releases/2016/02/160202090536.htm
[26] Source: https://www.baumhedlundlaw.com/toxic-tort-law/monsanto-roundup-lawsuit/where-is-glyphosate-banned/
[27] Source: https://www.miaminewtimes.com/news/city-of-miami-bans-use-of-herbicides-containing-glyphosate-11100953

PREPAREDNESS TARGET 6

Begin a volunteer outreach program that encourages the discontinuation of phosphorus and nitrogen-based fertilizers, with the goal of at least 1,000 Community members pledging to end applications on their properties.

Purpose: It is well documented that fertilizer applications can increase the amount of nutrient pollution in a watershed, leading to harmful algae blooms and fish kills. Algae thrives off nitrogen and phosphorus, which in high concentrations can accelerate the organisms' growth and can deprive water of its oxygen content, which leads to dead zones[28]. Reducing these nutrients is critical to maintaining lagoon ecosystem balance and water quality.

Implementation Period: 5 years

Implementation Strategy: Develop a voluntary pledge for Community participation to encourage the disuse of nitrogen and phosphorus-based fertilizers. An informational packet should be created to include education on the effects of fertilizers on the lagoon and a list of eco-friendly fertilizer alternatives. Outreach sessions should be offered to educate participants and recruit pledges. The City will also explore offering this program in conjunction with a local environmental group or agency. Additionally, Staff should explore and catalog eco-friendlier fertilizers for Council review to determine the possibility of enacting stronger fertilizer ordinances City-wide to reduce nutrients.

Measure of Success: Success will be determined by the City's ability to recruit 1,000 Community members to pledge their support for the program and voluntarily discontinue their use of nitrogen and phosphorus-based fertilizers, opting instead to showcase their alternatives in order to educate the rest of the City.

PREPAREDNESS TARGET 7

Increase the number of registered Lagoon-Friendly Lawns within the City by 60% over the current listed number. This will also support Target 6.

Purpose: How one maintains their lawn can greatly affect the amount of nutrient pollution that can runoff into the lagoon system. This nutrient runoff can cause harmful algae blooms and fish kills. Having a certified Lagoon Friendly Lawn—a program under KBB—can help to minimize nutrient pollution, reduce stormwater runoff and restore overall ecosystem balance by decreasing or eliminating the amount of maintenance intensive turf through Florida-friendly plants and permeable surfaces.

Implementation Period: 5 years

Implementation Strategy: The City should partner with KBB and the UF/IFAS Extension in Brevard County to promote and educate residents about the Lagoon Friendly Lawns program and its benefits. An online showcase could be established through the City's website and official social media pages of current City residents who have certified Lagoon Friendly Lawns. This showcase and its volunteer participants can give testimonials to the programs benefits and speak at outreach events if willing to do so in order to further education about the program.

Measure of Success: Certified properties with Lagoon Friendly Lawns will be inventoried through KBB's online mapping program in order to create a baseline. The City should work to increase the

[28] Source: https://phys.org/news/2018-08-florida-algae-crisis.html

number of Lagoon Friendly Lawns by 60% beyond the baseline within five years and include a link to the program on the City's website.

PREPAREDNESS TARGET 8

Conduct a survey that documents all trees in/on City property, parks and facilities.

Purpose: Properly documenting and cataloging all trees on City property is an important step in understanding where more trees are needed in order to increase the City's urban canopy; create more habitat and shade by decreasing the amount of urban heat island and improving the overall aesthetics of the City. This will also allow City Staff to know the location of any potentially harmful invasive species such as Brazilian Pepper[29].

Implementation Period: 5 years

Implementation Strategy: A City tree survey can be accomplished by City Staff using open source Google Maps software (and supplemented by ArcGIS) that allows for the geo-tagging and documenting of each tree identified on City property. The only tools necessary are a Wi-Fi enabled smartphone or device. This data can be made available to any City Staff member, as well as the public once completed.

Measure of Success: Success will be measured by the City's ability to complete this target within its five-year implementation period. The survey should involve all City parks, facilities, right of ways and properties upon completion.

[29] Source: https://plants.ifas.ufl.edu/plant-directory/schinus-terebinthifolia/

PREPAREDNESS TARGET 9

Increase mangrove habitats along the lagoon by at least 300 trees through a joint public-private program.

Purpose: Mangrove trees, sometimes called the "kidneys of the coast", are an incredibly important piece of Florida's coastal ecosystem. Due to their elevated and complex root structures they can act to stabilize a shoreline, reduce erosion and act as a wave break against fierce wind-driven waves. They also provide a home for countless aquatic and terrestrial species, adding to an area's biodiversity by filtering water and air to improve quality and clarity[30].

Implementation Period: 5 years

Implementation Strategy: The City should partner with a local environmental organization who grows and distributes mangroves to establish an annual mangrove tree planting program that is available to Cape Canaveral residents that live along the BRL. A waiting list will be created with volunteer sign-ups taking place on a quarterly basis. Once the waiting list is full, mangroves will be acquired from the City's organization partner and distributed to program volunteers for planting.

Measure of Success: Program volunteers will be given an informational guideline packet containing instructions on how to properly plant and manage mangrove trees. Program success will be determined through the amount of mangroves distributed and the City's ability to reach its goal of 300 trees.

[30] Source: https://www.nature.org/en-us/newsroom/mangroves-reduce-florida-flood-damages/?src=s_fbo.ch_fl.x.x.&sf111483038=1&fbclid=IwAR3nyo5sLe-X4maCcHNy-jbGq0B5SIK6w0N4IoniIrmc3zaXuzOe7xk3AMs

PREPAREDNESS TARGET 10

Increase urban tree canopy with a reforestation strategy striving to plant 2,000 new native and Florida-friendly trees/plants on City properties. Residential and business properties should be considered through a joint voluntary public-private planting initiative.

Purpose: Planting trees is one of the easiest and most cost effective resiliency initiatives a municipality can undertake in order to mitigate future challenges. Urban trees/plants can improve an area's biodiversity, create shade, reduce soil erosion through root stabilization, sequester carbon, lower ambient air temperatures, absorb stormwater runoff and improve air quality. According to the US Environmental Protection Agency, urban trees can reduce an area's temperature anywhere between 2°F and 9°F, which can reduce local energy cost by decreasing the demand for air conditioning[31].

Implementation Period: 10 years

Implementation Strategy: Using the results of Target 8 (a City-wide tree survey), the City will plant native and Florida-friendly trees in areas lacking tree coverage based on feasibility and survey findings. The City will strive to plant 2,000 new native and Florida-friendly trees/plants, but the ultimate number planted over the next 5 years is heavily dependent on the results of Target 8. This number may decrease or increase based on available square footage. The City can partner with a local organization or state entity to acquire an annual number of saplings that can be distributed in the Community on both public and private property to willing program participants. Forestry grants can also be used as a source of funding in order to procure new trees. Public-private partnerships can also supplement funding.

Measure of Success: Based on the City's tree survey findings, appropriate locations and the number of tree plantings will be determined by City Staff annually. Success will be measured by the number of trees planted and if it meets the set annual goal. Within 15 years of this action plan's adoption, 2,000 trees/plants should be planted. The City should also consider obtaining an average air quality measurement before implementation begins and after the target is completed in order to better determine success.

[31] Source: https://www.epa.gov/heat-islands/using-trees-and-vegetation-reduce-heat-islands

PREPAREDNESS TARGET 11

Continue annual sea oat plantings to double the amount of sea oats along the beach from the existing 110,000 to over 220,000 for increased dune stabilization.

Purpose: Sea oats are a hardy, salt and drought tolerant grass commonly found in the upper dunes of a beach. They are native to the southeastern US, from Virginia to Florida and across the Gulf region to Mexico. Sea oats have extensive deep root systems that act as rebar would in a concrete building, stabilizing dune systems, which help to reinforce a beaches natural defense against storm surge, wave action and tidal flooding[32]. As an example of green infrastructure, sea oats provide a more natural solution to beach stabilization and are considered so important to maintaining beach structures that they are protected under state law[33].

Implementation Period: 15 years

Implementation Strategy: In 2020, the City planted 10,000 sea oats. Since 2005, the City has partnered with Brevard County to plant thousands of sea oats for beachside maintenance and preservation. The City uses this partnership as an outreach program to engage the Community through an annual planting session. As a result, coordination with the County should continue, and Community outreach and volunteerism should be maintained until the City doubles its sea oats plantings.

Measure of Success: Annual sea oat plantings are tracked, and the data is available on the sustainability section of the City's website. These numbers will continue to be tracked and monitored across the 15-year implementation period until the target is met. The City should also attempt to acquire the maximum allowable amount of sea oats from the County each year to ensure the quickest implementation possible.

PREPAREDNESS TARGET 12

Strive to increase the amount of properties connected to reclaim irrigation to help reduce and potentially eliminate the need for direct reclaim discharges into the Banana River Lagoon from the City's Water Reclamation Facility (WRF).

Purpose: Currently it is estimated that about 50% of the Community receives reclaim irrigation from the City's WRF. When irrigated, reclaim water is filtered through soil where nutrients are absorbed naturally. Therefore, increasing the amount of properties using reclaim irrigation will allow for less direct discharges into the BRL.

Implementation Period: 15 years

Implementation Strategy: To determine a baseline, the City will map existing reclaim connections and work to increase these connections to 75% throughout the Community. Incentives should be developed to encourage more residents and business to utilize the resource.

Measure of Success: As reclaim connections advance, the City will track progress via Google maps or GIS maps, allowing for real time monitoring until the target is met.

[32] Source: https://plants.usda.gov/factsheet/pdf/fs_unpa.pdf
[33] Source: https://www.flsenate.gov/Laws/Statutes/2011/161.242

PREPAREDNESS TARGET 13

Establish annual oyster gardens at all current and future City-owned docks through the Brevard Zoo Oyster Gardening Program and showcase their benefits to the Community in order to encourage residents to participate in the program. A public-private partnership should be pursued in the maintenance of each oyster garden. Explore the feasibility of oyster mat and reef construction along the City's lagoon shoreline and implement as appropriate and possible.

Purpose: One adult oyster can filter 50 gallons of water per day, removing both organic and inorganic particles from water. This results in improved water quality and a healthier ecosystem[34]. When multiplied, the potential filtering power of oysters is infinite. The Brevard Zoo Oyster Gardening program empowers residents to become an active member in the restoration of the lagoon system, giving them one of the easiest and most cost effective ways to improve water quality. The City of Cape Canaveral should pursue the program for its municipal docks through a public-private partnership in the maintenance of each oyster garden.

Implementation Period: 15 years

Implementation Strategy: The City will work with the Brevard Zoo to freely acquire oyster garden cages and the necessary materials for each growing season. Cages filled with young oysters will be strung underneath City-owned docks via rope and left to incubate for 6 to 9 months; at which time the fully developed oysters will be transferred back to Brevard Zoo staff for implementation at various oyster reef locations across the lagoon. Signage will also be placed at each respective City dock in order to make users aware of the oyster gardens presence and purpose. Should an oyster reef be determined as a feasible infrastructure project the City will again work with the Brevard Zoo through their Restore Our Shores Program in order to scope, permit and implement a proper oyster reefs and mats. Implementation of such reefs and mats could be accomplished through volunteer work in the Community.

Measure of Success: Success for this target can be measured through the amount of oyster cages implemented each year and the amount of viable adult oysters that are collected at the end of each growing period. A successful harvest includes anywhere from 50 to 200 oysters from each cage. Metrics for each harvest should be made publicly available on the City's website and official social media pages.

[34] Source: https://www.fisheries.noaa.gov/national/habitat-conservation/oyster-reef-habitat#the-value-of-oyster-reef-habitat

PREPAREDNESS TARGET 14

When new City owned buildings, parks and roadways are being considered, or existing ones are redeveloped, LID or xeriscape practices should be implemented. All City operated buildings should dedicate 25% of the site to LID/xeriscape techniques.

Purpose: LID and xeriscaping is a form of landscaping that involves little to no irrigation and often involves the planting of native species that are best suited for the area they are being planted in, reducing the need for both water and fertilizers[35]. This in turn decreases the cost of maintenance and an area's environmental impacts.

Implementation Period: 15 years

Implementation Strategy: Upon the development or redevelopment of a City building, the amount of space dedicated to landscaping will be determined. At least 25% of this intended landscaped area should be set aside for LID/xeriscape techniques and native or Florida-friendly plants. Ground cover should consist of rocks or mulch in the place of sod. Florida native plants should be friendly to pollinator populations and be drought tolerant. Should it be feasible and appropriate, this landscaping practice should be incorporated at all City parks including pocket parks.

Measure of Success: Analyze the actual percentage of LID landscape implemented at City facilities. Each facility should have at least 25% of its landscaped area incorporate LID or xeriscaping. A great example can be seen at Cape Canaveral City Hall, which heavily features LID techniques.

[35] Source: http://livinggreen.ifas.ufl.edu/landscaping/xeriscaping.html

M) Action Category 3

Transportation

Accessible, clean and safe modes of transportation are key factors in designing a community that is "bikeable and walkable". The City's Vision Statement prioritizes a transportation system that does not solely rely on cars as the primary form of transportation, but instead encourages alternative modes. Because transportation design in the US is moving away from roadway designs that prioritize the automobile, the streets of tomorrow will be designed to safely and efficiently incorporate pedestrian, bike, scooter and vehicle traffic. Commonly known as Complete Streets, this type of transportation thinking allows for communities to plan for multiple modes of travel for all ages and abilities to include designs that utilize ADA compliant principals[36]. In the City of Cape Canaveral (1.9 square miles) walking and biking is vital and often utilized as a primary mode of transportation.

According to a 2019 report by the National Complete Street Coalition and Smart Growth America, Brevard County is one of the deadliest places in the entire nation for walkers and bicyclists, ranking third on the report's list of vulnerable locations[37]. In the City's 2018 Community Survey, pedestrian and roadway safety was an important topic to most respondents, with many being dissatisfied with the level of ease and safety when using roadways in the City, especially SR A1A. For this reason, the City will work with the SCTPO towards adopting Vision Zero policies for transportation design, which calls for zero traffic and pedestrian fatalities or serious injuries within the City of Cape Canaveral.

Figure 28. Health First Mayors' Fitness Challenge bike event.

[36] Source: https://smartgrowthamerica.org/program/national-complete-streets-coalition/publications/what-are-complete-streets/
[37] Source: https://smartgrowthamerica.org/dangerous-by-design/

Another important aspect of resilient and sustainable transportation involves transitioning the City's vehicle fleet to cleaner, alternative fueled vehicles in order to lower fuel costs, emissions and increase fuel efficiency in times of disaster where fuel supplies may be inaccessible. Of the available alternative fueled vehicles emerging in the national market, electric vehicles are by far the most technologically advanced and are already seeing mass deployment across numerous private[38] and public fleets nationwide[39]. Additionally, electricity used to recharge electric vehicles is significantly cheaper than fuels used in traditional internal combustion counterparts throughout their lifecycle[40].

The City must also prepare its infrastructure to meet the demands of a changing auto industry, which is rapidly deploying electric vehicles[41]. Installing appropriate EV charging station infrastructure to accommodate a transitioning market to electric vehicles is important to modernization, growth and resilience[42]. That being the case, the City will also explore renewable energy installations as an option for powering the City's EV charging stations, as this will support clean energy production in the event of a grid outage.

Figure 29. Electric vehicle (EV) charging stations.

[38] Source: https://www.greenbiz.com/article/pace-corporate-electric-fleet-commitments-picking
[39] Source: https://www.govtech.com/fs/transportation/Scores-of-Cities-Counties-Commit-to-Electric-Fleet-Future.html
[40] Source: https://www.energy.gov/eere/electricvehicles/saving-fuel-and-vehicle-costs
[41] Source: https://mashable.com/2017/10/03/electric-car-development-plans-ford-gm/
[42] Source: https://www.govtech.com/fs/infrastructure/Strong-Growth-Expected-in-EV-Charging-Stations.html

PREPAREDNESS TARGET 15

Continue to support, maintain and expand appropriate infrastructure along portions of the East Coast Greenway Trail that runs through the City along North Atlantic Ave. and SR A1A.

Purpose: This target is in line with the City's Vision Statement of becoming a bikeable and walkable community. It also allows for increased ecotourism and alternative transportation that is non-polluting and environmentally friendly.

Implementation Period: Current (c).

Implementation Strategy: An awareness campaign should be developed to include the trail and its amenities via a distributable map highlighting the trails route through the City. Further enhancements can include the installation of bike fix-it stations, bike racks, protected bike lanes, expanded sidewalks and pocket parks such as Wagner and the future Galactic, each of which run adjacent to the trail along North Atlantic Ave.

Measure of Success: Success will be determined by increased engagement and public awareness of the trail. The City will also identify and map amenities along the trail's route for public distribution. The trail should include at least three bike fix-it stations and have access to at least five bike racks.

PREPAREDNESS TARGET 16

Research and scope micromobility options for the City to increase transportation accessibility in and around the Community.

Purpose: Micromobility is a category of light-weight transportation designed for individual use on trips of five miles or less. Micromobility usually incorporates transportation methods that include e-bikes, e-scooters, traditional bicycles, cargo bicycles and door-to-door ride sharing services for those of all ages and abilities. These services can allow for those who do not have access to an automobile the ability to be better connected to basic services, increased food security and access to local government.

Implementation Period: 5 years.

Implementation Strategy: Staff will evaluate micromobility options deployed in other municipalities to try and identify commonalties in terms of needs and use. Areas most in need of more accessible transportation will be identified within the Community, and services reviewed that can effectively and equitably increase access to local basic services (i.e. supermarkets, community centers, government facilities, healthcare facilities, etc.) at little to no cost for users.

Measure of Success: Success will be determined by Staff's ability to identify effective and fiscally appropriate micromobility services that can be deployed within the City that can make a meaningful difference in transportation accessibility. At least three (3) options should be identified for consideration.

PREPAREDNESS TARGET 17

Establish a kayak trail along the City's lagoon shoreline to connect Banana River, Manatee Sanctuary, Long Point and Center Street Parks. Once established and if feasible, explore a partnership and connectivity with the proposed port-located aquarium project via the Brevard Zoo and points south into the City of Cocoa Beach.

Purpose: To expand ecotourism attractions in the City while also allowing for alternative modes of transportation for residents and visitors that is non-polluting and environmentally friendly.

Implementation Period: 5 years (for City-owned property; Port Canaveral and City of Cocoa Beach connection would be TBD).

Implementation Strategy: The City should explore grants as a funding source and determine feasibility in regard to sites appropriate for installation. If established, the City should promote the trail and its benefits through a social media campaign, community outreach and signage. The Brevard Zoo should also be engaged in this process as they will be responsible for the future port-located aquarium, the northernmost point along the proposed trail. Docks at each park should be made to withstand extreme weather conditions, should be made from sustainably sourced materials and be ADA compliant; where feasible.

Measure of Success: Success will be determined by the City's ability to establish additional kayak trails. At a minimum the City should strive to construct two more kayak accessible docks at Long Point and Manatee Sanctuary Parks within the five year implementation period.

PREPAREDNESS TARGET 18

Ensure all City facilities are universally EV accessible.

Purpose: Ensuring each City facility is universally EV accessible will not only support EV use in the Community but it will allow the City to continue building the infrastructure necessary for EV fleet deployment. This will increase the fleet's resiliency, as these charging stations will allow the City to run independently during storm operations or when traditional fuel maybe in limited supply. Even in an outage, these charging stations can become grid independent if they are connected to renewable energy systems and batteries. This also supports Target 19.

Implementation Period: 5 years.

Implementation Strategy: Renewable energy systems that aid in powering each charging station should be considered, especially in locations where existing electrical lines may not be feasible for connection. Of the remaining City facilities that are not EV accessible, appropriate locations should be evaluated for feasibility. Future charging stations should also be "smart" in that they can digitally inform Staff how much they are being used and enable payment abilities.

Measure of Success: Success will be determined by feasibility and appropriateness of site placement based on the remaining City facilities without EV accessibility. At a minimum, the MGF should be EV accessible as this building has already been designed to accommodate charging stations.

PREPAREDNESS TARGET 19

Implement a City vehicle fleet wide carbon dioxide emissions tracking program.

Purpose: Having a tracking program for fleet vehicle emissions will allow the City to baseline its transportation emissions load, and allow for a better understanding into which specific vehicles emit the most emissions. Knowing such specifics can allow Staff to better pinpoint vehicles that are the most emissions intensive and in turn better address conversion to cleaner alternative fuels.

Implementation Period: 5 years

Implementation Strategy: Staff will design and implement a tracking program based on fuel consumption, vehicle make and model and miles driven to determine an emissions portfolio for each individual fleet vehicle. This tracking program will apply to all vehicle types, including alternative fuel-based vehicles. The City could partner with a local university to have the initiative become a student design project to reduce Staff time and resources, while also enriching local awareness and education.

Measure of Success: Success will be determined based on whether or not a fleet wide carbon dioxide emissions tracking program can be designed and implemented within 5 years, and also continuously kept up-to-date by Staff.

PREPAREDNESS TARGET 20

Work with the Florida Department of Transportation (FDOT) and the Space Coast Transportation Planning Organization (SCTPO) to explore and research innovative policies and technologies that improve vehicular and pedestrian safety along State Road (SR) A1A and implement as feasible and appropriate.

Purpose: SR A1A is the City's most traveled thoroughfare and experiences frequent vehicular and pedestrian traffic accidents. The Community considers the road dangerous and unsafe and desires improvements that facilitate pedestrian activity. To this end, the City will continue to work with FDOT and the SCTPO in order to reduce the number of accidents and fulfill the City's Vision for a more walkable and bikeable Community. Such roadway improvements will also allow the City to meet Vision Zero policies that seek to eliminate traffic related deaths and serious injuries.

Implementation Period: 15 years.

Implementation Strategy: There are multiple ways in which SR A1A can be redeveloped into a safer roadway. All available technology and design solutions should be thoroughly reviewed by all agencies (City, SCTPO, and FDOT). Improvements that include raised medians, solar powered pedestrian crosswalks, roundabouts, protected bike lanes, reduced speed limits and turning lanes should all be considered. Staff will continue to work with agency partners and advocate for roadway designs that prioritize pedestrian activity and safety.

Measure of Success: Success should be determined after design or safety modifications are made to SR A1A. Surveys should be conducted to compare pre- and post-modification statistics regarding roadway related accidents, injuries and fatalities. This will be used to support SCTPO's Vision Zero goal of eliminating traffic fatalities and serious injuries.

PREPAREDNESS TARGET 21

Ensure all EV charging stations based at City facilities are powered by renewable energy and are made grid-independent through the use of battery storage systems.

Purpose: To power EV charging stations with renewable energy so they are grid-independent, self-powered and are not affected by power outages. Grid-independence will make each charging station more resilient and will allow for emissions-free EV infrastructure for residents and City Staff.

Implementation Period: 15 years.

Implementation Strategy: Review each EV charging station to determine energy requirements and public usage. Appropriate and feasible renewable energy generation methods should be scoped, in conjunction with battery storage options in order to allow for continuous off-grid operation. Solar power should be the primary consideration.

Measure of Success: Success will be determined by the ability to transition all City EV charging stations to renewable energy while ensuring 24/7 operation without interruption.

PREPAREDNESS TARGET 22

Convert all City fleet vehicles to alternative fueled vehicles.

Purpose: Transitioning the City to alternative fuel vehicles for its fleet will allow Cape Canaveral to lower its fuel and maintenance costs, reduce its environmental footprint and increase resilience.

Implementation Period: 15 years.

Implementation Strategy: As older internal combustion vehicles are retired, alternative fuel vehicles should be researched and procured. Types of alternative fueled vehicles with meaningful emissions reductions include hydrogen, biofuels, hybrids, plug-in hybrid electric vehicles and full electric vehicles (EV). EVs are gaining popularity in the market and their charging infrastructure is being provided by a number of entities. As a member of the Climate Mayors Electric Vehicle Purchasing Collaborative, the City has the opportunity to acquire new EVs at reduced costs. The City should remain a member of the collaborative so as new medium and heavy duty electric vehicles become available, the City is able to add them to its fleet.

Measure of Success: Success will be determined by the City's ability to completely transition its vehicle fleet to alternative fuel vehicles within the 15-year implementation period.

PREPAREDNESS TARGET 23

Ensure all City bus stops are covered and appropriately illuminated via solar powered lighting.

Purpose: Bus shelters with nighttime lighting add an element of safety and security to the Community and help to encourage the use of public transit.

Implementation Period: 15 years.

Implementation Strategy: The City should conduct a bus shelter audit to determine the number of uncovered bus shelters. Installations should be prioritized based on use frequency. This target can be co-developed with the SCTPO and the Space Coast Transit Authority (SCAT). As with existing City bus shelters, new ones can be acquired via grant programs or simply allocated within the City's annual budget, with the goal of installing at least one bus shelter per year.

Measure of Success: Success will be determined on the ability to install and maintain covered bus shelters at all City bus stops within the 15-year implementation period.

PREPAREDNESS TARGET 24

Where feasible, transition City roadways to bikeable and walkable Complete Street designs that follow the City's Vision Statement and include the installation of ADA compliant sidewalks.

Purpose: Complete Street designs offer increased safety and accessibility for all forms of transportation. If designed properly they can also support stormwater infrastructure via LID, planted medians, and permeable pavement.

Implementation Period: 30 years.

Implementation Strategy: As City roadways are redeveloped, they should be designed with Complete Street amenities. The City should produce a redevelopment plan that specifically identifies City-owned roadways in most need to replacement, budget requirements and appropriate upgrades; allowing for a methodical planning approach.

Measure of Success: Success will be determined by the City's ability to transition streets to Complete Street designs within the 30-year implementation period.

N) Action Category 4

Energy

Energy production and the systems used for distributing power are critical pieces of infrastructure. Without a steady and consistent flow of electricity, stable Community functions—ranging from communications to emergency services—would not be possible. As the market evolves, energy providers are rapidly transitioning to renewable energy. Wind, solar, geothermal, biomass, hydro, tidal and wave power are all considered renewable forms of energy–and generally less harmful to the environment[43].

Worldwide, renewable energy capacity quadrupled over the last 10 years, representing $2.6 trillion in investment[44]. Since 2008, renewable energy generation has nearly doubled in the US, from 382 million megawatt hours to 742 million megawatt hours in 2018. Most of this growth, nearly 90%, came from wind and solar power[45]. In 2009, solar power in the US produced enough electricity to power 227,983 homes. By 2019, solar energy in the US produced enough electricity to power over 9 million homes, a 40% increase. And, wind power alone now generates enough electricity to power 26 million homes in the US, triple the amount of power it produced in 2009[46]. To date, 139 US cities and 9 states, districts and territories have committed to transitioning to 100% renewable energy by 2050[47]. Much of this transition is due to technological advances in renewables, which have drastically decreased in costs when compared to traditional forms of energy like coal and nuclear[48].

The COVID-19 pandemic accelerated this transition with a record drop in petroleum demand across the world due to lockdowns and travel restrictions, forcing many oil and gas companies to diversify and invest in renewable energy developments. An example is BP, which in August 2020 announced it would reduce its oil and gas production by 40% and invest $5 billion per year into low carbon technology by 2030 to build at least 50 gigawatts of renewables[49]. This slump in fossil fuel demand has allowed renewable energy to rise significantly, now accounting for over 20% of the US energy grid[50]. This is more electricity share than coal production, which accounted 17.1% of generation[51].

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[43] Source: https://www.ucsusa.org/energy/renewable-energy
[44] Source: https://insideclimatenews.org/news/06092019/renewable-energy-global-growth-climate-change-goals-unep-global-trends-bnef
[45] Source: https://www.eia.gov/todayinenergy/detail.php?id=38752
[46] Source: https://environmentamerica.org/sites/environment/files/reports/Renewables-On-The-Rise/FRG-AME_Renewables-On-The-Rise_2019_v1a.pdf
[47] Source: https://www.sierraclub.org/ready-for-100/commitments
[48] Source: https://www.prescouter.com/2019/04/2018-was-a-record-year-for-renewable-energy-2019-could-be-the-same/
[49] Source: https://www.greentechmedia.com/articles/read/bp-to-invest-5b-a-year-on-low-carbon-and-cut-fossil-fuel-output-by-40-percent-by-2030
[50] Source: https://www.nytimes.com/2020/04/07/business/energy-environment/coronavirus-oil-wind-solar-energy.html
[51] Source: https://ieefa.org/renewables-beat-coal-in-u-s-power-generation-in-q1-2020/

Energy storage systems, such as battery backups, are also an important component of renewable energy. Recent price drops and increased capacity have allowed battery storage systems to become cost competitive for both residential and utility scale usage[52]. When combined with energy storage systems, renewables can offer a measure of resilience not possible with fossil fuels. Grid independence allows for decreased utility costs, power assurance and increased energy security, as electricity can be made onsite and stored for clean and continuous operations. On average, power outages cost the US economy $150 billion annually, with 87% of outages attributed to severe weather events such as hurricanes[53].

As a barrier island, Cape Canaveral is vulnerable to hurricanes and power outages. Incoming transmission lines are generally above ground and are susceptible to high winds and intense wave action. Renewable power in conjunction with energy storage systems will allow the City to safely and reliably maintain operations during outages and severe weather events for effective management during pre- and post-storm periods.

[52] Source: https://about.bnef.com/blog/battery-powers-latest-plunge-costs-threatens-coal-gas/
[53] Source: https://www.kohlerpower.com/home/common/pdf/RES_Infographic.pdf

PREPAREDNESS TARGET 25

Work with Florida Power and Light (FPL), industry experts and local universities to develop and implement smart and microgrid technologies where feasible.

Purpose: Implementing smart and microgrid technologies across the City's built environment and facilities will help to increase energy efficiency, reduce utility costs and increase resiliency. Smart and microgrid technologies can allow for intelligent energy management independent of human input and can allow for increased renewable capacity by allowing "islanding", where a building and its energy systems can safely be grid-independent for prolonged periods of time.

Implementation Period: 5 years.

Implementation Strategy: This target should be researched and scoped in conjunction with FPL and, if possible, local university assistance from entities such as the Florida Institute of Technology or the Florida Solar Energy Center. Explore grants from the state and federal government for funding and implementing upgrades. As new City buildings are constructed or redeveloped, smart and microgrid technologies should be reviewed before construction for feasibility and effectiveness.

Measure of Success: Success will be determined by the availability of smart or microgrid systems via research with coordinating partners. If grant opportunities present themselves they should be capitalized upon to expedite system installation.

PREPAREDNESS TARGET 26

Transition each of the City's mobile fuel-based light towers and generator units to electric, solar or wind powered equivalents.

Purpose: To achieve cleaner and quieter operations at City events and in post-disaster situations, while also significantly reducing or eliminating the need for traditional fueling requirements.

Implementation Period: 5 years.

Implementation Strategy: Inventory the City's current mobile light towers and generator units so that appropriate renewable substitutes can be researched and procured. Solar power should be a priority given its consistent availability in the region.

Measure of Success: Success will be determined by the City's ability to convert each of its mobile light towers and generator units to renewable alternatives within the 5-year implementation period.

PREPAREDNESS TARGET 27

Strive to become a SolSmart Program member with a "Gold" rating by encouraging solar use and providing resources to residents to make solar more affordable and easier to acquire.

Purpose: SolSmart is "a national designation program that recognizes cities, counties and regional organizations that foster the development of mature local solar markets". Becoming a designated SolSmart City will help the community become solar ready and allow for more resources to become available to residents and business owners through a streamlining of solar policies, no-cost technical assistance and access to local solar markets. Obtaining the designation could also attract clean energy businesses to locate in the City.

Implementation Period: 5 years.

Implementation Strategy: Create a list of City solar policies, projects and initiatives. Based on this list, no-cost technical assistance can then be obtained through SolSmart representatives in order to pinpoint solar ready policy changes that support the qualifications necessary to achieve a "Gold" rating in the City.

Measure of Success: Success will be determined by the City's ability to achieve a "Gold" SolSmart Program rating within the 5-year implementation period. The City can choose to incrementally achieve this Target, opting to first receive a "Bronze" rating—the lowest level of achievement—then a "Silver" rating, then "Gold", the final achievement level within the program.

PREPAREDNESS TARGET 28

Work with FPL and other partners to research and scope a utility scale battery storage facility to deliver emergency power or peak operations City-wide.

Purpose: Large public and private utilities—including FPL—are adding these systems to their operations in an effort to increase grid resilience and stability while reducing emissions. Battery storage systems of appropriate size can help reduce outage times and lower energy costs by coming online during peak hours and offsetting grid consumption. These systems can maintain a small footprint, are noiseless and have zero onsite emissions.

Implementation Period: 5 years.

Implementation Strategy: This target is not directly calling for the implementation of a utility scale battery storage system, but rather its research and development in order to determine if a system is feasible. City Staff should consult with FPL and various industry partners to scope possible battery systems. The end result should be a completed feasibility and financial assessment.

Measure of Success: Determine feasibility and conduct a financial assessment highlighting how a utility scale battery storage system could be implemented in the City of Cape Canaveral.

PREPAREDNESS TARGET 29

Convert at least 50% of the City's streetlights to solar power by 2035; while also working to convert 100% of the City's streetlights to solar power by 2050.

Purpose: Grid-independent solar powered street lighting can offer the City reduced energy costs, lower emissions and increased resilience.

Implementation Period: 15 years.

Implementation Strategy: An implementation strategy should be developed to facilitate installation. Factors should include which roadways are most utilized, lighting needs based on turtle regulations and existing lights most vulnerable to disasters. Self-powered solar lights should be installed on a street by street basis with a specific replacement goal per year. The City should also investigate non-energy reliant traffic control measures, such as roundabouts and speed humps.

Measure of Success: Success will be determined by the City's ability to convert 50% of its street lights by 2035 and 100% by 2050.

PREPAREDNESS TARGET 30

Ensure that all 12 City lift stations have backup power from renewable sources for at least 96 hours of grid-independent operations, complimenting existing diesel assets if necessary.

Purpose: Lift stations are vital infrastructure designed to move wastewater. Ensuring that each of the City's lift stations have renewable backup power sources is key to maintaining lift station operations in the event of a power outage. Power loss at any given lift station can cause wastewater backups, loss of pressure and flooding of surrounding areas. Renewable power systems, when combined with a battery storage backup, can run indefinitely without relying on traditional energy sources such as diesel fuel.

Implementation Period: 15 years.

Implementation Strategy: Prioritize lift stations that require backup power—since not all lift stations have emergency power capabilities—and transition from a diesel generator to a renewable system. Begin a systematic upgrade of each lift station based upon need and which renewable system would work best for which station. Solar and small-scale wind systems are likely the most practical renewable generation methods. Lift stations slated for upgrade or redevelopment should be transitioned first. Outreach to other cities that have already completed such systems should be conducted.

Measure of Success: Success will be determined by the City's ability to transition and/or upgrade all 12 City lift stations to renewable emergency power sources that last for up to 96 hours in the event of an outage.

PREPAREDNESS TARGET 31

Convert all City facilities to run off of renewable energy with associated battery storage systems.

Purpose: Ensuring that City facilities can generate their own power during normal operations and during emergency operations through renewable energy (and associated battery storage systems) will enable efficient operations, lower utility costs and increased resilience. This target will also allow the City to lower its municipal operational greenhouse gas emissions, which as of 2019 stand at 1,324 metric tons of carbon dioxide equivalent (CO_2e) according to the City's first ever municipal operations greenhouse gas emissions inventory, which was developed in early 2021 via the Audubon Florida + R2C Climate Cohort in conjunction with the ECFRPC and ICLEI – Local Governments for Sustainability USA. According to the EPA's Greenhouse Gas Equivalencies Calculator, this is value is equivalent to 1,463,395 pounds of coal burned or 159 homes' energy use for a single year.

Implementation Period: 15 years.

Implementation Strategy: Each facility should be properly scoped for appropriate renewable energy systems. Solar and small-scale wind installations are the most applicable given Cape Canaveral's location. Other considerations include building size, roof square footage and site shading. Facilities that are being constructed or redeveloped should be given priority when implementing renewable energy and battery storage systems. Numerous grant opportunities exists for the research, development and installation of such system and should be actively investigated before facility conversion.

Measure of Success: Success should be determined by the City's ability to ensure facilities: have a renewable energy and battery storage system; can efficiently and consistently maintain power each day during normal operations; and in the event of power outages.

PREPAREDNESS TARGET 32

Transition the City to renewable energy sources.

Purpose: Transitioning the entire City to renewable energy by 2050 is ambitious, but this has the potential to greatly improve the overall health and wellbeing of residents and the environment.

Implementation Period: 30 years.

Implementation Strategy: The ultimate goal is to power the City's facilities with renewable power by 2050. The Community should also work to transition to renewable sources. Since utility scale solar systems are rapidly being added to FPL's energy portfolio, the City should actively seek to ensure its Community members receive power from these utility scale solar systems through continued lobbying and discussions with FPL, new energy purchasing programs or legislation. It is important to note that with this target the City does not intend to become a provider of electricity, but rather seek to source its electricity in the cleanest possible manner from its utility provider.

Measure of Success: Success will be determined by the City's ability to receive 100% of its energy from clean, renewable sources with zero emissions by the designated implementation period.

O) Action Category 5

Built Environment

According to the US Environmental Protection Agency (EPA), the built environment is anything that provides people with living, working and recreational spaces[54]. As spaces are developed, energy and water use increase. In a community that is over 90% built out, the City can profoundly influence its built environment through innovative and sustainable land use policies that support redevelopment that is resilient. Sustainable buildings are the framework for enhanced community resilience, and transforming the way buildings and communities are designed and built can help ensure a more resilient future for all.

Because Florida is ground zero for seal-level rise, coastal communities must lead efforts that aim to mitigate the effects of natural disasters. Updates that include a built environment that is storm and flood ready will reduce impacts to the built environment and those who occupy it. With this in mind, the City will continue to engage regional partners and explore policy changes that make Cape Canaveral's built environment more resilient.

Figure 30. Aerial view of Cape Canaveral with the Banana River Lagoon on the west and the Atlantic Ocean on the east.

[54] Source: https://www.epa.gov/smm/basic-information-about-built-environment

PREPAREDNESS TARGET 33

Develop policies that are in line with Peril of Flood (SB 1094) legislation that discourages increase building density in the 100-year floodplain, the Coastal Construction Control Line (CCCL), areas vulnerable to at least a Category 2 storm surge and the 2070 USACE High Projection Rate Curve for sea level rise.

Purpose: To comply with the Peril of Flood legislation, which requires local governments to address development and redevelopment strategies to reduce flood risk.

Implementation Period: Current (c).

Implementation Strategy: Staff will work with the ECFRPC to secure technical guidance and grant funding through various sources in order to develop updates to the City's Comprehensive Plan and Code of Ordinances.

Measure of Success: Success will be measured by the City's ability to adopt meaningful policy changes to its Comprehensive Plan and Code of Ordinances that comply with SB 1094.

PREPAREDNESS TARGET 34

Explore amendments to the City Code that would allow for elevated or floodable development with living spaces that are higher off the ground[55].

Purpose: According to the City's Vulnerability Assessment, storm surge and flooding will be exacerbated by sea level rise; putting considerable amounts of the built environment at risk for prolonged periods of inundation. Residents and business owners must be educated on opportunities that allow them to develop floodable or elevated structures which aim to reduce flooding risks and impacts to life and property.

Implementation Period: 5 years.

Implementation Strategy: Staff will gather examples of case studies and ordinances that incorporate floodable or elevated building techniques. Materials will be shared with the Community via digital outreach or workshops.

Measure of Success: Success will be measured by Staff's ability to compile examples of building techniques and ordinances that showcase innovative built environment solutions to flooding and sea level rise.

[55] Source: https://therealdeal.com/miami/2018/12/21/in-miami-beach-buyers-and-builders-turn-to-elevated-homes-amid-rising-concerns-of-floods/

PREPAREDNESS TARGET 35

Explore amendments to the City Code of Ordnances that require more stormwater retention onsite.

Purpose: Increased stormwater retention onsite can reduce stormwater runoff through LID techniques. Onsite retention allows stormwater to naturally percolate into the soil and be filtered or to be evaporated without contributing to harmful runoff.

Implementation Period: 5 years.

Implementation Strategy: Staff will prepare Code amendments that seek to increase onsite stormwater retention for individual properties.

Measure of Success: Success will be measured by the adoption of these amendments which require increased onsite stormwater retention.

PREPAREDNESS TARGET 36

Ensure all City facilities have the ability to capture rainwater or stormwater for reuse through best management practices that include: stormwater chambers, rain barrels or green roofs.

Purpose: Capturing rainwater and stormwater for reuse can help reduce harmful runoff that negatively impacts the lagoon system. This can also help to reduce the risk of flooding since onsite retention can lessen the chances of stormwater systems being overwhelmed. These systems also reduce water consumption as collected rainwater and stormwater can be used in applications such as irrigation.

Implementation Period: 15 years.

Implementation Strategy: As new City buildings are scoped, built, or redeveloped ensure that low impact stormwater strategies are used to eliminate harmful discharges into the BRL. The Code of Ordinances currently allows the use of LEED equivalent design, however the stormwater requirements in the City's Code should also be evaluated and improved.

Measure of Success: Success should be measured on the City's ability to include innovative LID techniques as a means of stormwater management. The City should document such improvements and make them available via the City's website.

PREPAREDNESS TARGET 37

At least 25% of all new City roads, parking lots and sidewalks square footage should be permeable.

Purpose: Permeable surfaces are better at managing stormwater since they allow water to percolate and filter out pollutants. Traditional paved surfaces (i.e. asphalt) do not allow for water to flow through them which results in runoff. This means unfiltered pollutants are channeled into storm drains, which flow into the Lagoon. Increasing permeable surfaces will support a more natural system that also recharges the water table.

Implementation Period: 30 years.

Implementation Strategy: As new City roads, parking lots and sidewalks are scoped, replaced, or built, low impact stormwater strategies such as permeable surfaces should be explored. The City must first determine approximate measurements for roads, parking lots and sidewalks. Once a baseline has been established, the City should increase permeable surfaces based on feasibility and costs. Products should also be evaluated based on maintainability before implementation.

Measure of Success: Success will be determined by the City's ability to increase permeable surfaces to 25% within the target's date.

PREPAREDNESS TARGET 38

Ensure that all City owned buildings are at least LEED Silver equivalent upon new construction or redevelopment.

Purpose: LEED certification is a program by the USGBC that encourages and "assesses building design and construction in terms of energy efficiency, water usage, air quality and choice of building materials as well as environmental factors such as access to public transportation and responsible land use". While LEED certification can be costly, program design and construction requirements are publicly available and can be achieved for free. With this in mind, all future City owned buildings should be built to LEED certification equivalence.

Implementation Period: 30 years.

Implementation Strategy: As City buildings are built or redeveloped, LEED equivalency should be used along with other more innovative technologies that increase building and energy efficiency.

Measure of Success: Success will be determined by the City's ability to scope and ensure all new or redeveloped City buildings achieve LEED equivalency.

PREPAREDNESS TARGET 39

Ensure all City facilities are net zero or energy positive upon new construction or redevelopment.

Purpose: A net zero building produces the same amount of energy it consumes. An energy positive building produces more energy than what it consumes[56]. This allows a building to reduce its utility costs with reduced electricity consumption through more efficient heating and cooling systems. These systems also lower emissions and are more resilient since they are typically power grid-independent. Total building and facilities emissions calculated via the City's first ever municipal operations greenhouse gas emissions inventory stand at 1,105 metric tons of CO_2e as of 2019. According to the EPA's Greenhouse Gas Equivalencies Calculator, this is value is equivalent to 1,221,338 pounds of coal burned or 133 homes' energy use for a single year.

Implementation Period: 30 years.

Implementation Strategy: Buildings can achieve net zero or energy positive status through energy efficiency upgrades, battery storage systems and renewable energy generation installations. Each City facility should be reviewed in order to determine what renewable energy systems are best suited for its design and load requirements. Energy efficiency upgrades such as smart thermostats, LED lighting, variable speed drive air compressor air conditioning and heat pumps can be utilized to reduce energy demands. Design reviews can occur in conjunction with both private and public partners, including university researchers or consultants.

Measure of Success: If facilities become net zero or energy positive, audits should take place to monitor electricity demands after upgrades have occurred to see if the structures are either using the same amount of power they are producing or if they are producing more than they need to confirm either a net zero or energy positive status. Staff should also utilize results from the City's 2021 municipal operations greenhouse gas emissions inventory as a determinant of success regarding future emissions reductions in buildings and facilities related to energy efficiency and renewable energy improvements.

[56] Sources: https://thegrid.rexel.com/en-us/knowledge/energy-efficiency/w/wiki/81/achieving-net-zero-energy-or-net-positive-energy-building-operation

P) Action Category 6

Equity and Quality of Life

In order to better position the City of Cape Canaveral, it is important to recognize that climate change is likely to impact those in the Community who are lower-income, older, and will have a reduced capacity for adaptation. That being the case, the City wishes to create an environment that is responsive, socially connected, and can meet numerous goals while improving emergency management and reducing environmental impacts.

As part of the City of Cape Canaveral's larger sustainability efforts, working to create balance between the built and natural environment is critical to the Community. The built environment includes all physical aspects of where a person lives—neighborhood characteristics, parks, land use and infrastructure all have profound impacts on quality of life.

Overall, the City strives to be more resilient and equitable for all ages. AARP approaches the subject of quality of life through their Network of Age-Friendly States and Communities, and upholds the 8 Domains of Livability developed by the World Health Organization (WHO). AARP's framework includes: (1) outdoor space and buildings; (2) transportation; (3) housing; (4) social participation; (5) respect and social inclusion; (6) civic participation and employment; (7) communication and information; and (8) community and health services.

Similarly, the Urban Sustainability Directors Network (USDN), approaches quality of life and equity through community-centered planning process that can maximize the benefits of climate preparedness action among lower-income populations and vulnerable communities. Not to be confused with emergency preparedness, equity driven resilience is the ability for a community to enjoy a high quality of life with reliable systems, economic vitality and the conservation of resources through root causes that persists in society. Equitable, community-driven climate preparedness planning framework has several benefits because it can play an important role in developing policies and solutions that address community vulnerability and build climate resilience. Actions, like those listed in this document aim to: provide actions to reduce hazard risks, improve assistance after climate hazards, help communities adapt to changing conditions and reduce social inequalities.

As the City plans ahead, it will continue to seek solutions that build community resilience through hazard preparedness and climate change adaptation. In the end, the goal is to produce solutions that approach potential changes through holistic and comprehensive planning.

Figure 31. Community sea oats planting event, 2019.

Figure 32. Kairos Community Garden event, 2019.

PREPAREDNESS TARGET 40
Maintain monthly workshop series for residents to engage with Staff and various experts in regard to the environment, resiliency and local initiatives that may affect the City.

Purpose: Communication of environmental issues and new ideas is an important aspect of sustainability and preparedness. With this in mind, it is important to continue to inform residents of the challenges the City faces and the initiatives being undertaken as a result.

Implementation Period: Current (c).

Implementation Strategy: Continue monthly workshops as a communication method to engage residents and business owners on the City's environmental initiatives. This series should also be a bridge for other City sponsored outreach programs and documents that empower and help individuals boost their own access to sustainable and resilient initiatives such as native trees plantings, at-home EV charging stations, energy efficiency resources, home gardening, etc.

Measure of Success: Success will be determined by the City's ability to maintain a monthly workshop schedule and show increased engagement on environmental initiatives.

PREPAREDNESS TARGET 41

Continue to maintain and promote the City's Kairos Community Garden while ensuring resources such as water and electricity are self-sustaining.

Purpose: The garden is meant to serve the Community by providing an opportunity for gardeners to strengthen community ties while providing access to nutritional foods some may not otherwise have.

Implementation Period: Current (c).

Implementation Strategy: Continue to empower residents to be environmental stewards and provide resources and support for community garden needs.

Measure of Success: Success will be measured by garden participation/member retention and the ability of the garden to become self-sufficient without relying on external resources.

PREPAREDNESS TARGET 42

Develop an action plan that is in line with the World Health Organization's Global Network of Age-Friendly Cities and Communities' eight domains of livability. The domains are used as a framework for policy discussions for members of AARP's Network of Age-Friendly Communities. The domains provide a centralized source for information, examples and strategies about programs and policies that work to help communities become more livable places for all ages.

Purpose: As we look to the future, the City must develop and pursue goals that make the City of Cape Canaveral a better place to live. With the completion of the 2018 Community Survey, the *Resilient Cape Canaveral* vulnerability assessment and a number of completed sustainability projects, the City will use this Plan to determine goals and appropriate timeframes that are in line with AARP's 8 Domains of Livability and the City's overall resiliency.

Implementation Period: 5 years.

Implementation Strategy: Continue to engage AARP representatives and build relationships that allow the City to use AARP as a resource to help develop initiatives and pursue effective strategies during the Planning, Implementation and Evaluation phases of the age-friendly communities process.

Measure of Success: Because the development of an action plan is part of the AARP Network of Age-Friendly Communities membership, completion of this plan will be considered a measure of success. Following this, the City will have 5 years to implement parts of the plan and provide updates on successes and best practices.

Q) Action Category 7

Waste and Consumption

The US and by extension, the world, is facing a waste crisis. Since the 1950s, 8.3 billion tons of plastic have been produced, but only 9% has been recycled. Twelve percent has been incinerated and 79% is either in a landfill or littered in the environment.[57] If current trends continue, 3.7 billion tons of plastic will have been produced by 2050, which could lead to more plastic material in the ocean by weight than fish[58].

Each year, over 2 billion metric tons of solid waste is produced globally. This is enough to fill 800,000 Olympic sized swimming pools[59]. The US currently has a national recycling rate of about 35%[60], making it the only developed nation where waste generation outweighs its ability to recycle. The average American produces 1,704 pounds of waste per year; three times the average Chinese citizen[61].

Recently (2018), China—America's number one importer of recyclable goods since the 1990s—instituted new contamination restrictions for all incoming recycled materials. These requirements have been difficult for the US to meet.[62] As a result, recycling providers in the US have raised prices and have a surplus of materials with nowhere to go. This has led many private and public entities to either constrain or eliminate recycling programs altogether.

One of the easiest and most effective ways in which to reduce waste pollution is to simply stop using unsustainable and unrecyclable materials. According to a 2019 waste stream audit from WastePro—the City's primary waste contractor—Cape Canaveral's recycling contamination rate is 35%, meaning 35% of all materials produced by the City meant for recycling are contaminated with items that cannot be recycled. This Action Category is designed to help reduce waste produced from City operations, improve recycling contamination rates and decrease the amount going to landfills.

[57] Source: https://advances.sciencemag.org/content/3/7/e1700782
[58] Source: http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf
[59] Source: https://www.worldbank.org/en/news/press-release/2018/09/20/global-waste-to-grow-by-70-percent-by-2050-unless-urgent-action-is-taken-world-bank-report
[60] Source: https://resource-recycling.com/recycling/2018/07/30/national-statistics-show-stagnant-u-s-diversion-rate/
[61] Source: https://www.circularonline.co.uk/wp-content/uploads/2019/07/Verisk_Maplecroft_Waste_Generation_Index_Overview_2019.pdf
[62] Source: https://e360.yale.edu/features/piling-up-how-chinas-ban-on-importing-waste-has-stalled-global-recycling

Figure 33. Waste processing facility showing piles of corrugated cardboard, Brevard County.

Figure 34. Waste processing facility showing crushed aluminum cans, Brevard County.

Figure 35. Waste processing facility showing compressed laundry bottles (left) and staff sorting non-recyclable or contaminated materials (right), Brevard County.

PREPAREDNESS TARGET 43

Eliminate single-use plastics and polystyrene within City operations where appropriate and feasible and instead switch to reusable and eco-friendly alternatives. Vendors would be asked to participate by declining to sell and distribute single-use plastics and polystyrene at City events.

Purpose: Eliminating single-use plastics and polystyrene will help the City to reduce one of the most unsustainable waste streams while also decreasing plastic pollution within the environment[63].

Implementation Period: 5 years.

Implementation Strategy: First, determine which single-use plastic and polystyrene items are currently used by City Staff, and which are appropriate to switch to reusable, recyclable or compostable alternatives. Once a feasibility study has been completed, specific items can be selected and removed from circulation in favor of alternatives.

Measure of Success: Success will be determined by the City's ability to decrease the use of single-use plastics and polystyrene within the target's 5-year implementation period.

[63] Source: https://www.nationalgeographic.com/magazine/2018/06/plastic-planet-waste-pollution-trash-crisis/

PREPAREDNESS TARGET 44

Consider a feasibility study that determines the logistics and scope of a City-wide single-use plastics and polystyrene ban.

Purpose: Single-use plastics and polystyrene are unsustainable and are often non-recyclable items that have large and long lasting environmental impacts. They typically break down—but never degrade—into small pieces called microplastics, which can be ingested by humans and wildlife which can result in adverse health conditions[64].

Implementation Period: 5 years.

Implementation Strategy: A feasibility study should be conducted to identify impacts, how implementation would affect business operations and what appropriate alternatives exist. Discussions of a single-use plastics ban would include City Staff, residents, business leaders, as well as local organizations that specialize in waste reduction and environmental stewardship.

Measure of Success: Target success will be based on whether or not a feasibility study is conducted and results are formulated into a report that can be submitted to the City Council for review and consideration in order to take whatever course of action is deemed appropriate by the study's conclusions.

PREPAREDNESS TARGET 45

Increase educational signage at all City facilities and beach crossovers that promote litter awareness and proper recycling.

Purpose: Increasing public awareness of proper recycling habits and waste disposal methods can reduce the amount of litter in the environment and the City's recycling contamination rate.

Implementation Period: 5 years.

Implementation Strategy: Educational signage should be placed at City facilities that are frequented by Community members and visitors, including beach crossovers and parks. Signage should display messages and infographics that allow for quick and easy understanding.

Measure of Success: Success will be determined by the City's ability to display up-to-date educational signage relating to recycling and proper waste disposal at all City facilities frequented by the public. Locations should include City Hall, the MGF, the CAPE Center, beach crossovers, public parks, the Cape Canaveral Public Library, the Cape Canaveral Leisure Services and various other City facilities.

[64] Source: https://oceanservice.noaa.gov/facts/microplastics.html

PREPAREDNESS TARGET 46

Develop a pilot program to recycle cigarette butt litter while increasing the amount of cigarette receptacles within the City to 100 units.

Purpose: Cigarette butts are one of the most littered items on the planet. Once in the environment they can: leach harmful chemicals; be ingested by wildlife; and become a fire hazard[65]. Collecting these butts with appropriate receptacles and recycling their plastic filters can help reduce the City's environmental footprint but also keep waste out of landfills and turn that waste into usable goods.

Implementation Period: 5 years.

Implementation Strategy: The City has already acquired 50 lockable, metal cigarette receptacles from the Connecticut-based nonprofit Keep America Beautiful through their annual giveaway program in which they donate up to 10,000 units to US cities. The City should continue to apply for this annual donation and strive to have at least 100 receptacles installed within the next 5 years. The City can utilize TerraCycle in order to recycle collected butts, a New Jersey-based recycling company that specializes in cigarette butt recycling at no cost to program participants.

Measure of Success: Success will be determined by the City's ability have at least 100 cigarette butt receptacles installed and if the contents are successfully recycled into usable items. Statistics showcasing how many butts the City has collected and recycled are available to program participants via TerraCycle.

PREPAREDNESS TARGET 47

Establish a City-wide composting program for residents and business.

Purpose: According to the US Department of Agriculture, the average American wastes 225 to 290 pounds (20%) of food each year. Most of this waste is fruits and vegetables[66]. Offering a composting program to include composting bins designed for small scale residential use through a public-private partnership would help to reduce the City's overall food waste, keep materials out of landfills and allow for increased organic matter that can help with household gardening.

Implementation Period: 5 years.

Implementation Strategy: The City should determine an appropriate and financially feasible number of small scale composting bins that can be distributed each year. Acquisition of composting bins should be sought through local organizations, private donations or through available grants. A document outlining how to compost should also be developed and distributed with each composting bin. Composting bins should be no larger than 50 gallons and should be properly secured to avoid unwanted pests.

Measure of Success: Success will be determined by participation (at least 10 residents in year one) and if there is growth in the program each year after inception.

[65] Source: https://theconversation.com/cigarette-butts-are-the-forgotten-plastic-pollution-and-they-could-be-killing-our-plants-119958
[66] Source: https://www.forbes.com/sites/christinatroitino/2018/04/23/americans-waste-about-a-pound-of-food-a-day-usda-study-finds/#5eea7a454ec3

PREPAREDNESS TARGET 48

Decrease the City's recycling contamination rate from 35% to 10% or less.

Purpose: Recyclable items that are contaminated with food, liquid or non-recyclable materials are often taken to landfills. Decreasing the amount of contamination within the City's recycling stream can help to reduce waste and ensure that reusable materials are kept in circulation.

Implementation Period: 15 years.

Implementation Strategy: In concert with the City's solid waste contractor, improved signage installations and educational campaigns should be created to raise awareness about proper recycling practices. New recycling receptacles with designs to aid in proper recycling should be present at City facilities to appropriately inform users of which items are recyclable.

Measure of Success: Regular waste audits will be conducted by the City's primary waste contractor—currently Waste Pro—until the targeted contamination rate of 10% is reached.

PREPAREDNESS TARGET 49

Significantly minimize waste for all City operations and facilities by 2050.

Purpose: Decreasing waste will help to improve the quality of both the natural and built environments by reducing the City's carbon footprint and creating economic efficiency.

Implementation Period: 30 years.

Implementation Strategy: Waste should be defined as any materials that are generally sent to landfills. City operations and facilities must work to utilize compostable, recyclable or long lasting reusable materials that increase product life cycles. Construction activities associated with City facilities should also be considered in this goal, ensuring all usable materials are repurposed and reused.

Measure of Success: Success can be measured by beginning to track and catalog City waste operations. A baseline should be set to establish a starting point and the City should work to decrease its consumption by 20% every year. By 2050 such measurements should showcase a significant decrease in materials going to landfills.

R) Action Category 8

Storm Readiness and Sea Level Rise

The risks associated with flooding, tropical cyclones and sea level rise are examined in the City's Vulnerability Assessment. In the coming years, the City will likely face higher temperatures, more intense storms, and rising sea levels that will impact the efficiency of municipal operations. According to the Assessment, by 2040, the City could see up to 1.85 feet of sea level rise, and by 2100, it could see between 5.15 and 8.48 feet of sea level rise. This Action Category focuses on protecting and reinforcing the resiliency of the City's most critical and vulnerable assets. To appropriately prepare for increased risk and prolonged periods of inundation across the built environment, the City should strengthen its infrastructure and flood protection measures to accommodate a minimum of 5.15 feet of sea level rise by 2100. Moving forward, City leaders should continue to stay apprised of new sea level rise projections released by official accredited scientific sources.

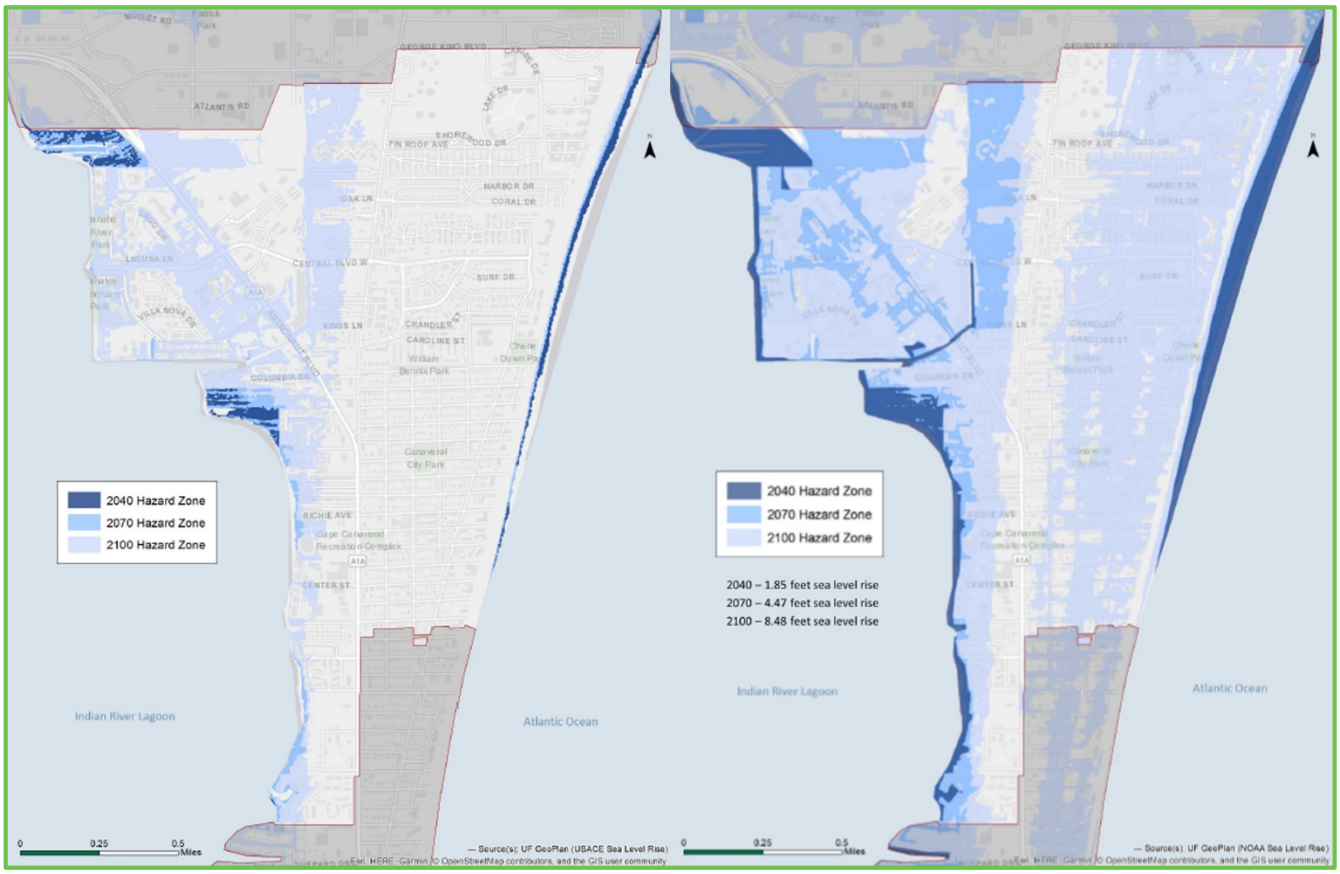

Figure 36. USACE Sea Level Rise High Curve Projections, 5.15-foot minimum (left) and NOAA Sea Level Rise High Curve Projections, 8.48-foot minimum (right).

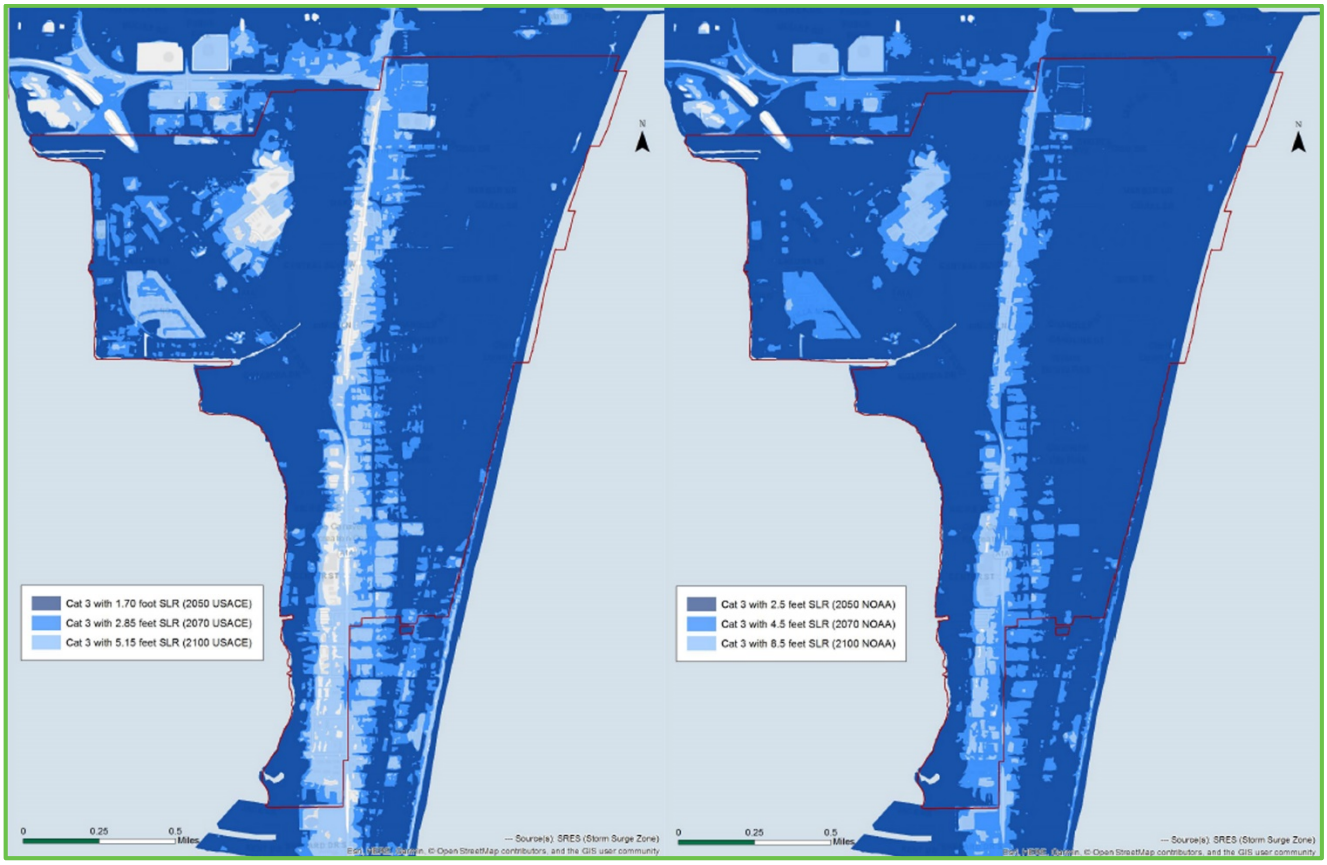

Figure 37. Category 3 Storm Surge with USACE High Sea Level Rise Scenarios (left) and Category 3 Storm Surge with NOAA 2017 High Sea Level Rise Projections (right).

Figure 38. Flooding from 2017 rain event in Cape Canaveral.

PREPAREDNESS TARGET 50

Build at least three (3) new stormwater parks where appropriate and necessary to manage flooding and continue to implement subterranean exfiltration systems as needed for increased storage capacity.

Purpose: As rain events become more intense it is important that the City increase its stormwater holding capacity in order to decrease the risk of flooding and reduce runoff. Stormwater parks allow for the capture, holding and passive natural treatment of stormwater while also offering engaging and aesthetically pleasing community environments. Underground exfiltration systems can also help to increase the City's stormwater capacity, especially when traditional stormwater ponds are not appropriate and feasible.

Implementation Period: 15 years.

Implementation Strategy: Feasibility studies should be conducted that take into account how stormwater projects could be implemented. State and Federal grants relating to municipal resilience and storm readiness should be utilized for project funding if possible. The City must also evaluate areas where more flooding is predicted in the future in order to accommodate increased demand on the stormwater system.

Measure of Success: Success will be determined by the City's ability to create three (3) new stormwater parks within the target's designated implementation period.

PREPAREDNESS TARGET 51

Pursue a partnership with Brevard County to build a stormwater park with associated amenities such as a perimeter walking trail, benches and water fountains at Cherie Down Park after conveyance of ownership.

Purpose: Redevelopment of Cherie Down Park will allow for enhanced sustainability and resiliency. Increasing stormwater capacity can reduce runoff and the risk of flooding. Adequately vegetated areas can also increase local wildlife habitat and Community aesthetics. The area around Cherie Down Park is also expected to be more vulnerable to flooding in the future based on FEMA flood maps and the City's Vulnerability Assessment.

Implementation Period: 15 years.

Implementation Strategy: Engage Brevard County on its willingness to partner with the City to fulfill both the City's resiliency goals and the ECF RRAP goals which the County adopted in March 2019.

Measure of Success: Success will be determined by the City's ability to partner with Brevard County and transform a section of the site into a stormwater park within the target's designated implementation period.

PREPAREDNESS TARGET 52

Implement appropriate semi-permanent flood defenses at City facilities for protecting open access points such as doorways and garage doors to replace sandbags.

Purpose: Installing flood defenses at City facilities will increase their resilience against anticipated higher flooding rates while also increasing the efficiency of Staff preparedness activities. Replacing sandbags with metal flood barriers, gates, and walls that can be easily removed and installed as needed will allow for more time and effort being diverted to other critical storm preparations.

Implementation Period: 15 years.

Implementation Strategy: Complete a flooding assessment for each city building to determine feasibility and scope of installing flood defenses at all entryways and exits. Based on the results of this assessment buildings considered to be the most vulnerable will be prioritized and appropriate upgrades undertaken to allow for the installation of flood defenses.

Measure of Success: Success will be determined based on whether appropriate flood defenses are installed at City buildings within this Preparedness Target's give timeframe.

PREPAREDNESS TARGET 53

Dredge and strengthen the Central/Canaveral Ditch to improve erosion control and increase capacity while creating shoreline stabilization and improved stormwater management.

Purpose: The Central/Canaveral Ditch is vulnerable to rain events, and without modifications, this lagoon connected waterway represents a large flood hazard due to storm surge and from sea level rise. Fortifying its banks has the potential to increase holding capacity while also preventing erosion. Additional green infrastructure can provide increased protection as well.

Implementation Period: 30 years.

Implementation Strategy: A feasibility study should be conducted to determine the best course of action for the Central/Canaveral Ditch. State and Federal grants relating to municipal resilience and storm readiness should be utilized for project funding if possible.

Measure of Success: Success will be determined by the City's ability to appropriately retrofit the Central/Canaveral Ditch within the guidelines recommended in this Preparedness Target and if they can be completed within the target's implementation period.

PREPAREDNESS TARGET 54

Work with FDOT and the SCTPO to redevelop SR A1A in order to reduce flood risks posed by minimum sea level rise projections (USACE 5.15 feet by 2100) depicted in the Assessment.

Purpose: SR A1A is an important component of the City's critical infrastructure, a major socio-economic engine for the region and a vital evacuation route during storm events. Raising roadways will enable SR A1A to be more resilient to storm surge and sea level rise which could otherwise close the road to all forms of transportation activity.

Implementation Period: 30 years.

Implementation Strategy: The City must continue to engage FDOT and the SCTPO in order to maintain its vision of a complete street design for SR A1A. Design discussions should involve elevating the road in vulnerable sections and increasing low impact development to manage stormwater. All efforts should be made on behalf of the City to see this target realized in a manner that is in the best interest of its residents, visitors and businesses.

Measure of Success: Success will be measured by FDOT's ability to redevelopment SR A1A to accommodate minimum sea level rise projections of 5.15 feet within the implementation period.

PREPAREDNESS TARGET 55

Research and implement climate-resilient engineering solutions such as wave attenuation devices, sea walls and berms in conjunction with green infrastructure around the perimeter of the City's Water Reclamation Facility.

Purpose: The City's WRF is a critical asset, the location of the Public Works Department and City's secondary emergency operations center during emergencies. Due to its proximity to the BRL, it is highly vulnerable to storm surge, sea level rise and coastal erosion. As a result, coastal protections will be vital to City operations.

Implementation Period: 30 years.

Implementation Strategy: Once feasible flood protections have been determined, State and Federal grants should be pursued for project funding, if possible. Partnerships with local environmental restoration groups should also be considered in the construction of living shorelines along vulnerable areas for further erosion control and shoreline stabilization. The City should also seek to implement a series of low-cost sensor sites along vulnerable waterways designed to measure water heights in order to better determine ongoing environmental conditions and further water rise.

Measure of Success: Success will be determined by the City's ability to develop a flood protection barrier of appropriate height and scope within the target's designated implementation period.

PREPAREDNESS TARGET 56

Complete a City-wide stormwater outfall sea level rise threat assessment and explore solutions that reduce the threat of flooding due to storm surge events and sea level rise that could cause stormwater backups.

Purpose: Stormwater outfalls—or points where stormwater discharges into water bodies from the built environment—will increasingly be at risk during rain events. Stormwater runoff may not be able to flow out into water bodies to properly drain and can result in increased flooding.

Implementation Period: 30 years.

Implementation Strategy: The City should determine which stormwater outfalls are at risk to storm surge events and sea level rise. If outfalls are identified preparations should be made to increase their elevation or increase capacity elsewhere within the Community most vulnerable to flooding to account for a sea level rise projection of at least 5.15 feet by 2100 according to the Assessment. City stormwater funds and State and Federal grants relating to municipal resilience and storm readiness should be pursued to fund this project.

Measure of Success: Success will be determined on the ability to raise stormwater outfalls to adequately accommodate a minimum sea level rise projection of 5.15 feet within the target's designated implementation period.

S) Preparedness Targets Summary

What follows is a bulleted summary of each Action Category and its associated Preparedness Targets, including each target's implementation period. Implementation periods range from continuous or "current" efforts (c), 5 years, 15 years and 30 years. There are a total of 56 Preparedness Targets across 8 Action Categories.

■ ACTION CATEGORY 1: GREEN AND RESILIENT ECONOMY

- Preparedness Target 1
  - Encourage green (eco-friendly) industries within the City. (c)
- Preparedness Target 2
  - Support clean energy industry jobs for residential and commercial projects, City facilities included. (c)
- Preparedness Target 3
  - Promote green business practices within the Community through the City's website, official social media pages, at events and through the Weekly Update. (c)
- Preparedness Target 4
  - Promote and build attractions that encourage ecotourism. (c)

■ ACTION CATEGORY 2: NATURAL SYSTEMS

- Preparedness Target 5
  - Ban the use and application of glyphosate-based herbicide products at all City owned properties, parks and facilities by City Staff and contractors. (5)
- Preparedness Target 6
  - Begin a volunteer outreach program that encourages the discontinuation of phosphorus and nitrogen based fertilizers, with the goal of at least 1000 Community members pledging to end applications on their properties. (5)
- Preparedness Target 7
  - Increase the number of registered Lagoon-Friendly Lawns within the City by 60% over the current listed number. This will also support Target 6. (5)
- Preparedness Target 8
  - Conduct a survey that documents all trees in/on City property, parks and facilities. (5)
- Preparedness Target 9
  - Increase mangrove habitats along the lagoon by at least 300 trees through a joint public-private program. (5)
- Preparedness Target 10
  - Increase urban tree canopy with a reforestation strategy striving to plant 1,000 new native and Florida-friendly trees on City properties. Residential and business properties should be considered through a joint voluntary public-private planting initiative. (5)

- Preparedness Target 11
  - Continue annual sea oat plantings to double the amount of sea oats along the beach from the existing 110,000 to over 220,000 for increased dune stabilization. (15)
- Preparedness Target 12
  - Strive to increase the amount of properties connected to reclaim irrigation to help reduce and potentially eliminate the need for direct reclaim discharges into the Banana River Lagoon from the City's Water Reclamation Facility (WRF). (15)
- Preparedness Target 13
  - Establish annual oyster gardens at all current and future City-owned docks through the Brevard Zoo Oyster Gardening Program and showcase their benefits to the Community in order to encourage residents to participate in the program. A public-private partnership should be pursued in the maintenance of each oyster garden. Explore the feasibility of oyster reef construction along the City's lagoon shoreline and implement as appropriate and possible. (15)
- Preparedness Target 14
  - When new City owned buildings, parks and roadways are being considered, or existing ones are redeveloped, LID or xeriscape practices should be implemented. All City operated buildings should dedicate 25% of the site to LID/xeriscape techniques. (15)

■ ACTION CATEGORY 3: TRANSPORTATION

- Preparedness Target 15
  - Continue to support, maintain and expand appropriate infrastructure along portions of the East Coast Greenway Trail that run through the City along North Atlantic Ave and SR A1A. (c)
- Preparedness Target 16
  - Research and scope micromobility options for the City to increase transportation accessibility in and around the Community. (5)
- Preparedness Target 17
  - Establish a kayak trail along the City's lagoon shoreline to connect Banana River, Manatee Sanctuary, Long Point and Center Street Parks. Once established and if feasible, explore a partnership and connectivity with the proposed aquarium project via the Brevard Zoo. (5)
- Preparedness Target 18
  - Ensure all City facilities are universally EV accessible. (5)
- Preparedness Target 19
  - Implement a City vehicle fleet wide carbon dioxide emissions tracking program. (5)
- Preparedness Target 20
  - Work with the Florida Department of Transportation (FDOT) and the Space Coast Transportation Planning Organization (SCTPO) to explore and research innovative policies and technologies that improve vehicular and pedestrian safety along State Road (SR) A1A and implement as feasible and appropriate. (15)
- Preparedness Target 21

    - Ensure all EV charging stations based at City facilities are powered by renewable energy and are made grid-independent through the use of battery storage systems. (15)
- Preparedness Target 22
    - Convert all City fleet vehicles to alternative fueled vehicles. (15)
- Preparedness Target 23
    - Ensure all City bus stops are covered and appropriately illuminated via solar powered lighting. (15)
- Preparedness Target 24
    - Where feasible, transition City roadways to bikeable and walkable Complete Street designs that follow the City's Vision Statement and including the installation of ADA compliant sidewalks. (30)

■ ACTION CATEGORY 4: ENERGY

- Preparedness Target 25
    - Work with Florida Power and Light (FPL), industry experts and local universities to develop and implement smart and microgrid technologies where feasible. (c)
- Preparedness Target 26
    - Transition each of the City's mobile fuel-based light towers and generator units to electric, solar or wind powered equivalents. (5)
- Preparedness Target 27
    - Strive to become a SolSmart Program member with a "Gold" rating by encouraging solar use and providing resources to residents to make solar affordable and easier to acquire. (5)
- Preparedness Target 28
    - Work with FPL and other partners to research and scope a utility scale battery storage facility to deliver emergency power or peak operations City-wide. (5)
- Preparedness Target 29
    - Convert at least 50% of the City's streetlights to solar power by 2035; while also working to convert 100% of the City's streetlights to solar power by 2050. (15)
- Preparedness Target 30
    - Ensure that all 12 City lift stations have backup power from renewable sources for at least 96 hours of grid-independent operations, complimenting existing diesel assets if necessary. (15)
- Preparedness Target 31
    - Convert all City facilities to run off of renewable energy with associated battery storage systems. (15)
- Preparedness Target 32
    - Transition the City to renewable energy sources. (30)

■ ACTION CATEGORY 5: BUILT ENVIRONMENT

- Preparedness Target 33

    - Develop policies that are in line with Peril of Flood (SB 1094) legislation that discourages increase building density in the 100-year floodplain, the Coastal Construction Control Line (CCCL), areas vulnerable to at least a Category 2 storm surge and the 2070 USACE High Projection Rate Curve for sea level rise. (5)
- Preparedness Target 34
    - Explore amendments to the City Code that would allow for elevated or floodable development with living spaces that are higher off the ground. (5)
- Preparedness Target 35
    - Explore amendments to the City Code of Ordnances require more stormwater retention onsite. (5)
- Preparedness Target 36
    - Ensure all City facilities have the ability to capture rainwater or stormwater for reuse through best management practices that include: stormwater chambers, rain barrels or green roofs. (15)
- Preparedness Target 37
    - At least 25% of all new City roads, parking lots and sidewalks square footage should be permeable. (30)
- Preparedness Target 38
    - Ensure that all City buildings are at least LEED Silver equivalent upon new construction or redevelopment. (30)
- Preparedness Target 39
    - Ensure all City facilities are net zero or energy positive upon new construction or redevelopment. (30)

■ ACTION CATEGORY 6: EQUITY AND QUALITY OF LIFE

- Preparedness Target 40
    - Maintain monthly workshop series for residents to engage with Staff and various experts in regard to the environment, resiliency and local initiatives that may affect the City. (c)
- Preparedness Target 41
    - Continue to maintain and promote the City's Kairos Community Garden while ensuring resources such as water and electricity are self-sustaining. (c)
- Preparedness Target 42
    - Develop an action plan that is in line with the World Health Organization's Global Network of Age-Friendly Cities and Communities' eight domains of livability. The domains are used as a framework for policy discussions for members of AARP's Network of Age-Friendly Communities. The domains provide a centralized source for information, examples and strategies about programs and policies that work to help communities become more livable places for all ages. (c)

■ ACTION CATEGORY 7: WASTE AND CONSUMPTION

- Preparedness Target 43
  - Eliminate single-use plastics and polystyrene within City operations where appropriate and feasible and instead switch to reusable and eco-friendly alternatives. Vendors would be asked to participate by declining to sell and distribute single-use plastics and polystyrene at City events. (5)
- Preparedness Target 44
  - Consider a feasibility study that determines the logistics and scope of a City-wide single-use plastics and polystyrene ban. (5)
- Preparedness Target 45
  - Increase educational signage at all City facilities and beach crossovers that promote litter awareness and proper recycling. (5)
- Preparedness Target 46
  - Develop a pilot program to recycle cigarette butt litter while increasing the amount of cigarette receptacles within the City to 100 units. (5)
- Preparedness Target 47
  - Establish a City-wide composting program for residents and business. (5)
- Preparedness Target 48
  - Decrease the City's recycling contamination rate from 35% to 10% or less. (15)
- Preparedness Target 49
  - Significantly minimize waste for all City operations and facilities by 2050. (30)

■ ACTION CATEGORY 8: STORM READINESS AND SEA LEVEL RISE

- Preparedness Target 50
  - Build at least three (3) new stormwater parks where appropriate and necessary to manage flooding and continue to implement subterranean exfiltration systems as needed for increased storage capacity. (15)
- Preparedness Target 51
  - Pursue a partnership with Brevard County to build a stormwater park with associated amenities such a perimeter walking trail, benches and water fountains at Cherie Down Park after conveyance of ownership. (15)
- Preparedness Target 52
  - Implement appropriate semi-permanent flood defenses at City facilities for protecting open access points such as doorways and garage doors to replace sandbags. (15)
- Preparedness Target 53
  - Dredge and strengthen the Central/Canaveral Ditch to improve erosion control and increase capacity while creating shoreline stabilization and improved stormwater management. (30)
- Preparedness Target 54
  - Work with FDOT and the SCTPO to redevelop SR A1A in order to reduce flood risks posed by minimum SLR projections (USACE 5.15 feet by 2100) depicted in the City's Vulnerability Assessment. (30)

- Preparedness Target 55
    - Research and implement climate-resilient engineering solutions such as wave attenuation devices, sea walls and berms in conjunction with green infrastructure around the perimeter of the City's Water Reclamation Facility. (30)
- Preparedness Target 56
    - Complete a City-wide stormwater outfall sea level rise threat assessment and explore solutions that reduce the threat of flooding due to storm surge events and sea level rise that could cause stormwater backups. (30)

T) Appendices

Acronym List

BMP	Best Management Practice
BRL	Banana River Lagoon
CBO	Congressional Budget Office
CCCL	Coastal Construction Control Line
CGNB	Community Garden Network of Brevard
CRS	Community Rating System
DEO	Department of Economic Opportunity
DFRIM	Digital Flood Insurance Rate Map
EAR	Evaluation and Appraisal Reports
ECFRPC	East Central Florida Regional Planning Council
EDA	Economic Development Administration
EOOD	Economic Opportunity Overlay District
EPA	Environmental Protection Agency
EV	Electric Vehicle
FCMP	Florida Coastal Management Program
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Studies
FPL	Florida Power and Light
FRCP	Florida Resilient Coastlines Program
FVI	Floating Vegetation Island
IRL	Indian River Lagoon
KBB	Keep Brevard Beautiful
MGF	Multi-Generational Facility
MHHW	Mean Higher High Water
MRC	Marine Resources Council
NASA	National Aeronautics and Space Administration
NCEI	National Centers for Environmental Information
NFIP	National Flood Insurance Program
NGO	Non-Governmental Organization
NOAA	National Oceanic and Atmospheric Administration
LEED	Leadership in Energy and Environmental Design
LID	Low Impact Development
SCAT	Space Coast Transit Authority

SCTPO	Space Coast Transportation Planning Organization
SR A1A	State Road A1A
UF	University of Florida
UF/IFAS	University of Florida, Institute of Food and Agricultural Sciences
US	United States
USACE	United States Army Corp of Engineers
USGBC	United States Green Building Council
WCED	World Commission on Environment and Development
WHO	World Health Organization
WRF	Water Reclamation Facility

Critical Facilities List

Table 16: Critical Facilities by Hazard

Facility	Facility Type	Storm Surge Zone	USACE SLR Horizon	NOAA SLR Horizon	Flood Zone	Shallow Flood Area
		Lowest	Earliest	Earliest		
Banana River Park Debris Staging Area	Waste Facility	Category 4	None	2100	None	No
Brevard County Sheriff's Office Canaveral	Law Enforcement	Category 4	None	None	500 year	No
Cape Canaveral City Clerk	Government	Category 5	None	None	None	No
Cape Canaveral City Hall	Government	Category 5	None	None	None	No
Cape Canaveral Culture and Leisure Services	Government	Category 5	None	None	None	No
Cape Canaveral Fire Department Station #52	Fire Service	Category 4	None	2100	500 year	No
Cape Canaveral Fire Department Station #53	Fire Service	Category 4	None	None	500 year	No
Cape Canaveral Public Library	Government	Category 4	None	2100	500 year	No
Cape Canaveral Community Services and Fleet Storage	Transportation Operations	Category 3	2100	2100	None	No
Cape View Elementary School	School	Category 3	None	2100	500 year	No
Columbia Electric Substation	Utility	Category 3	None	2100	500 year	No
Craig Technologies	HazMat Facility	Category 3	2100	2100	500 year	No
Lift Station 1 (Washington/Magnolia)	Utility	Category 3	None	2100	500 year	No
Lift Station 2 (Center Street)	Utility	Category 3	None	2100	None	No
Lift Station 3 (West Central)	Utility	Category 3	2100	2070	500 year	No
Lift Station 4 (Coquina)	Utility	Category 3	None	2100	500 year	No
Lift Station 5 (Columbia Drive)	Utility	Category 2	2100	2070	Zone AE	No
Lift Station 6 (Imperial Boulevard)	Utility	Category 4	None	2100	None	No
Lift Station 7 (Central/Thurm)	Utility	Category 3	2100	2070	500 year	No
Lift Station 8 (Manatee Bay/Thurm)	Utility	Category 3	2100	2100	None	No
Lift Station 9 (Banana River Drive)	Utility	Category 3	2100	2070	500 year	No
Lift Station 12 (Patriots Park)	Utility	Category 3	2100	2100	500 year	No
Lift Station 13 (Thurm Boulevard)	Utility	Category 3	2100	2100	500 year	No
Lift Station 14 (Villa Nova - Thurm)	Utility	Category 4	None	2100	None	No
Manatee Sanctuary Park Solid Waste Facility	Waste Facility	Category 4	None	2100	None	No
Pen Pals Childcare Center	Day Care	Category 3	None	2100	500 year	No
Transmontaigne Terminal Bulk Fuel Storage	HazMat Facility	Category 4	None	None	None	No
United Stated Post Office (Cape Canaveral)	Government	Category 4	None	2100	None	No

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Glossary of Frequently Used Terms

- **Alternative Fuel Vehicles:** Vehicle that runs on a fuel other than traditional gasoline or diesel; any method of powering an engine that does not solely involve petroleum.
- **Air Pollution:** The release of pollutants into the air that are detrimental to both human health and the environment.
- **Banana River Lagoon:** Is a 31-mile-long lagoon that lies between Cape Canaveral and Merritt Island in Brevard County, Florida. It is part of the Indian River Lagoon system, and connects at its south end to the Indian River.
- **Battery Storage System:** Is a technology developed for storing an electric charge by using specially developed batteries. The underlying idea being that such stored energy can be utilized at a later time as necessary.
- **Built Environment:** The human-made surroundings that provide the setting for human activity, ranging in scale from buildings and parks or green space to neighborhoods and cities that can often include their supporting infrastructure, such as water supply or energy networks.
- **Climate Change:** Describes a change in the average conditions—such as temperature and rainfall—in a region over a long period of time. In the context of this action plan, climate change refers to the rapid human-induced trend in warming across the planet currently being observed by scientists resulting in numerous effects such as extreme weather, sea level rise, melting ice sheets, and biodiversity loss.
- **Climate-Ready Infrastructure:** Infrastructure designed with climate-related stressors in mind, such as sea level rise and increased storm activity. Climate-ready infrastructure is often considered flexible, adaptable and smart; and is more resilient than traditional infrastructure that is designed for "business as usual" scenarios. This readiness reduces costs and build-back periods in the event of a disaster.
- **Electric Vehicle (EV):** All-electric vehicles (also known as battery electric vehicles or BEVs) derive all of their power from an electrical source. All-electric vehicles do not require any traditional fuels such as gasoline or diesel to function and therefore have zero tailpipe emissions.
- **Equity:** In the context of sustainability, the term equity has to do with fairness — whether all people have similar rights and opportunities, basic needs to maintain an acceptable quality of life.
- **EV Accessible:** Transportation infrastructure (i.e., parking lots, roadways, building electrical systems, etc.) that can support the recharging and/or maintenance of all-electric vehicles and plug-in hybrids.
- **Fossil Fuels:** An energy source formed in the Earth's crust from decayed organic material. The most common fossil fuels are petroleum, coal and natural gas. They are considered nonrenewable as fossil fuels can take millennia to form and replenish.
- **Gray Stormwater Infrastructure:** Traditional "gray" stormwater infrastructure is designed to move urban stormwater away from the built environment and includes curbs, gutters, drains, piping, and collection systems. Traditional gray infrastructure collects and conveys stormwater

from impervious surfaces, such as roadways, parking lots and rooftops, into a series of piping that ultimately discharges relatively untreated stormwater into a local water body.

- **Green Infrastructure:** the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater and reduce flows to sewer systems or to surface waters.
- **Green Space:** Is land that is partly or completely covered with grass, trees, shrubs, or other vegetation. Green space can include parks, community gardens, playgrounds, and vacant lots.
- **Hurricane:** Large, swirling storms that form over warm ocean waters. They produce damaging winds of 74 mph or higher, flooding rains and destructive storm surge.
- **Indian River Lagoon:** Stretching 156 miles from northwest to southeast, the Indian River Lagoon makes up 40% of Florida's eastern coast across six counties, including Brevard. Considered an estuary, it is home to over 4,000 plant and animal species and is a significant economic driver for the East Central Florida area.
- **Living Shorelines:** A protected and stabilized shoreline that is made of natural materials such as plants, sand, or rock. Living shorelines provide a natural alternative to 'hard' shoreline stabilization methods like rip rap or bulkheads, and provide numerous benefits including nutrient pollution remediation, essential fish habitat structure, and buffering of shorelines from waves and storms.
- **Microgrids:** A local energy grid with control capability, which means it can disconnect from the traditional grid and operate autonomously.
- **Nutrient Pollution:** Is the process where too many nutrients, mainly nitrogen and phosphorus, are added to bodies of water and can act like fertilizer, causing excessive growth of algae.
- **Plug-in Hybrid Vehicle (PHEV):** Vehicles which use batteries to power an electric motor or plug into the electric grid to recharge while also using a petroleum-based or alternative fuel to power a collocated internal combustion engine.
- **Renewable Energy (also known as clean energy):** Energy derived from sources that are naturally replenishing; renewable resources are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Major types of renewable energy include: biomass, hydropower, geothermal, wind, solar and tidal sources.
- **Resilience:** The capacity of a system, be it an individual, a forest, a city or an economy, to deal with change, continually develop sustainably and have the ability to rebuild stronger in order to mitigate the effects of future hazards.
- **Sea Level Rise:** An increase in the average level of the world's oceans due to the current trend of planetary warming being observed by scientists.
- **Solar Power:** Energy from the sun that is converted into thermal or electrical energy.
- **Solid Waste:** Any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, resulting from industrial, commercial, mining, and agricultural operations, and from community activities.

- **Storm Surge:** The abnormal rise in seawater level during a storm, measured as the height of the water above the normal predicted astronomical tide. The surge is caused primarily by a storm's winds pushing water onshore.
- **Stormwater Runoff:** Runoff generated from rain and snowmelt events that flow over land or impervious surfaces, such as paved streets, parking lots and building rooftops, and does not soak into the ground.
- **Sustainability:** Development which meets the needs of current generations without compromising the ability of future generations to meet their own needs.
- **Water Quality:** The suitability of water for a particular use based on selected physical, chemical, and biological characteristics.