CITY OF SATELLITE BEACH:
POLICY RECOMMENDATIONS FOR RESILIENCY

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I. Overarching Goals of Satellite Beach and the General Policy Directions They Create

Over the past three years, the City of Satellite Beach has engaged in a resilience planning process in partnership with experts from Florida Sea Grant, University of Florida, and Stetson University. Overall, the goals of Satellite Beach with this project are to more clearly understand the physical risks to the City's residents and infrastructure over time. This includes a goal to understand the City's options for using policy approaches (including, but not limited to, comprehensive plan amendments and ordinances) to balance the City's concern for the safety and well-being of its citizens with a desire to decrease long-term potential legal liability and inadvertent long-term increasing of risk to residents.

The technical data in the vulnerability assessment of this report indicates that the City of Satellite Beach has 10-30 years before the most serious impacts of rising seas become consistent problems.

However, increased storms and storm surge, as well as heavier precipitation events, may exacerbate sea-level rise problems sooner than the geographic information systems ("GIS") data might otherwise indicate.

Nonetheless, the City of Satellite Beach in some ways has the advantage of some amount of time before water consistently floods areas as is already happening, for example, in Norfolk, Virginia; Annapolis, Maryland; and parts of southeast Florida.

At the same time, the vulnerability assessment indicates a challenge for Satellite Beach: as the lagoon side of the City does not have a consistent tidal fluctuation, the lower lagoon side of the City will never have the "king tide" events that southeast Florida has as a warning that sea-level rise is getting worse. This means that once roads, drainage systems, and other infrastructure on Satellite Beach's west side begin to see saltwater flooding, it will move from new to a constant over a relatively short time.

As part of these challenges, the City seeks to maintain a realistic balance between desired quality of life and the fiscal and physical realities of increasing hazards from sea-level rise. As a city of modest financial means, Satellite Beach's approach must focus less on large, expensive infrastructure projects and more on how to manage the challenges of infrastructure that, with increasing sea levels and increased intensity of precipitation events, no longer provides the same level of service as the infrastructure historically provided.

The years-long engagement of the City with its citizens and partners such as the East Central Florida Regional Planning Council, Stetson University, and Florida Sea Grant has culminated in the desire of the City to take a pro-active stance in addressing the mid- and long-term future of the City *before* water is consistently flooding the City.

Public participation, further analysis of vulnerability, legal research, and discussions with City representatives has led to several general principles that inform the more specific policy recommendations that appear further below. These general principles include:

- Strong emphasis on the physical drivers (sea-level rise, stronger storms, and heavier rainfall events) that combine to create a future hazards scenario very different from the past or current scenario.

- Placing the strongest emphasis, whenever feasible, on protecting safety and property due to flooding impacts as these provide the strongest support in law. Courts tend to defer more to, and be less likely to find, a "taking" of property when the regulations challenged are to prevent flood harm/risk and are based on technical data.**1** Environmental protection

1 *See, e.g.* Dr. Jon A. Kusler, Esq., Association of State Floodplain Managers Foundation, *A Comparative Look at Public Li-*

may also be a strategy to protect human safety and protect property, such as protection of dunes. Environmental protection may also be cited as a motivation and reason for action, but, when factually appropriate, it should be secondary compared to protecting health and safety of people, property, and first responders from flooding whenever possible. In cases where environmental protection serves also to protect human health and safety and property from flooding/surge, this should be noted as well so that courts will likely give more deference to the policy/regulation.

- Clear statements in ordinances, when appropriate, that the underlying policy is driven by local government need/responsibility to make challenging decisions that balance important interests of property rights with the need for the community to responsibly manage its limited financial resources and protect the lives of residents and first responders. This should also note that the City, unlike private property owners, may not simply alienate property to relieve itself of its legal duties and responsibilities.

- All comprehensive plan language and ordinances should emphasize that an integral part of the policies is to provide as much possible advance notice to current, future, and potential property owners of the challenges on the horizon for the City of Satellite Beach and its residents. This helps ensure that investment-backed expectations are actually "reasonable" in light of changes occurring due to sea-level rise and climate change.

- Inclusion of effective processes in ordinances to promote and respect due process of property owners.

- Ensure that all comprehensive plan language, policies, and ordinances are working in conjunction to achieve the City's aims.

- Establish policies and ordinances that minimize the risk of "moral hazard" (i.e.—potentially rewarding risk-taking behavior by allowing those that take the risk of living in hazardous areas and then externalizing the costs [such as higher infrastructure costs or disaster losses] to others).

- Need to identify the existing and future data required to set policy and to implement desired policies, now and in the future.

Due to the large number of recommendations, they are separated below into two main sections: Section I provides a bare summary and/or proposed language for each policy recommendation; Section II provides, when relevant, additional analyses explaining and supporting the recommendations in the Section I summaries. Sections I and II are numbered in parallel for ease of reference. In other words, the recommendation summaries at Section I.A.1 have their longer analysis at Section II.A.1. Furthermore, Sections I and II are each broken down into three subcategories: A. Recommendations for Immediate Adoption or Implementation; B. Recommendations Requiring Further Development of Comprehensive Plan or Ordinance Language; and C. Recommendations Requiring Further Analysis and Consideration.

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ability for Flood Hazard Mitigation, p12 (undated) ("Floodplain regulations are part of a national regulatory scheme involving federal, state, and local regulations. Courts have offered this as a reason for supporting regulations in several cases.); ("Regulations are technically based. Courts tend to defer to regulations based on technical studies and generally defer to the decision-making of expert government agencies."); Dr. Jon A. Kusler, Esq. with Sam Riley Medlock, Association of State Floodplain Managers Foundation, *Flood Risk in the Courts: Reducing Government Liability While Encouraging Government Responsibility*, p33 (Nov. 24, 2011) ("Adopt clear and certain regulations for hazard areas as soon as possible.").

II. Summary of Policy Recommendations

A. Recommendations for Immediate Adoption or Implementation

1. Comprehensive Plan Language

- Modify Infrastructure Element Goal 1: Modify Infrastructure Element Goal 1 to read as follows (underlined text is new and ~~strikethrough text~~ is removed): "Systems of public facilities and services provided to the City of Satellite Beach, in accordance with Interlocal agreements with non-City entities and by the City, as appropriate, shall be provided in a manner which, considering the fiscal and physical challenges of sea-level rise and climate change, and the City's policies on sea-level rise and climate change, seeks ~~sufficient~~ to meet existing and future needs, assures healthful and safe living conditions, and is economically efficient as well as environmentally sound."

- Modify Infrastructure Element Objective 1.1: Modify Infrastructure Element Objective 1.1 to read as follows (underlined text is new and ~~strikethrough text~~ is removed): "The City ~~has taken actions needed to correct existing~~ seeks to avoid deficiencies in public facilities~~, and shall continue to~~ and assure ~~that they have~~ adequate capacity to serve existing, new development, and redevelopment while meeting Level of Service standards without exceeding facilities' design or operating capacities. The provision of infrastructure by the City shall be planned and constructed ~~, and~~ in a manner which is cost-effective, technologically and environmentally sound, ~~and~~ maximizes use of existing facilities, and balances design considerations for the current and future impacts of climate change and sea-level rise with the benefits and costs/challenges of infrastructure designs that incorporate climate change and sea-level rise impacts during the service-life utility of infrastructure. "

- Modify Infrastructure Element Policy 1.1.11: Modify Infrastructure Element Policy 1.1.11 to read (underlined text is new and ~~strikethrough text~~ is removed): "No public infrastructure or public buildings will be constructed seaward of the 1981 Coastal Construction Control Line (CCCL), with the exception of minor structures. Such structures are customarily provided to support recreation and open space activities, as well as pedestrian facilities (in accordance with dune protection design standards). Infrastructure and roadway improvements within already developed public rights-of-way will be maintained as determined feasible and reasonable by City policy in good-faith attempts ~~required~~ to meet minimum level of service standards."

- Modify Infrastructure Element Objective 1.2: Modify Infrastructure Element Objective 1.2 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City shall ~~continue its program of phased improvements to~~ manage its storm drainage system in way that seeks to provide balance in serving interests of ~~that shall provide for~~ the public health and safety, preventing property damage, protecting natural drainage features and functions of natural groundwater recharge, and acknowledging the challenges of sea-level rise and climate change ~~in order to achieve adopted Level of Service standards~~."

- Add a new Infrastructure Element Policy 1.1.13: Add a new Infrastructure Element Policy 1.1.13: "The City shall accept no dedications of any infrastructure for public use and maintenance, including, but not limited to, roadways, sidewalks, medians, drainage facilities, recreational facilities or any other type of infrastructure unless such infrastructure is proven by the dedicating party to meet all current City ordinances and standards that

would govern such infrastructure were it to be constructed on the date of its dedication. Bona fide emergency exceptions may apply to such dedications as determined by the City. This policy is not intended to prevent the City from accepting dedications of conservation easements or other green space or natural areas that either have no human-made infrastructure or where an agreement is included by the dedicating entity that it will hold the City harmless from any responsibility to maintain any human-made infrastructure on the property."

- Modify Infrastructure Element Policy 1.2.1: Modify Infrastructure Element Policy 1.2.1 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City shall implement the comprehensive stormwater management plan. The City's priorities shall be established on a drainage basin basis. The stormwater management plan shall also prioritize stormwater management, design, and construction based upon the City's policies on sea-level rise and climate change.~~and shall be aimed at correcting the worst problems initially, followed by lesser problems as technical and financial means are available.~~"

- **Modify Coastal Management-Conservation Element Goal 1:** Modify Coastal Management-Conservation Element Goal 1 to read as follows (underlined text is new and ~~strikethrough text~~ is removed): "Enhancement of the City's natural character by protecting, conserving, and maintaining natural resources while safeguarding human life, property, and public expenditures, as physically, fiscally, and practically feasible in light of sea-level rise and climate change from the effects of natural processes in the Coastal High Hazard Area (CHHA) and City-initiated Adaptation Action Areas (AAAs). The City of Satellite Beach designates the Coastal High Hazard Area as "the area defined by the SLOSH model to be inundated from a Category 1 Hurricane."

- **Modify Coastal Management Element Policy 1.4.2:** Modify Coastal Management Element Policy 1.4.2 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City requires that any ~~non-residential~~ structure, including those abandoned, ~~or~~ sustaining damage in excess of ~~67~~50% of its assessed value, or improved at a cost exceeding 50% of the building's assessed value comply ~~due to storm conditions or erosion, be demolished or reconstructed in accordance~~ with all City ordinances applicable to new construction. ~~Remaining structures shall be protected to the greatest ext*ent possible from adverse impacts due to such demolition or reconstruction.~~"[2]

- **Add Coastal Management-Conservation Element Policy 1.5.4:** Add Coastal Management-Conservation Element Policy 1.5.4: "Given the projected infrastructure needs of the City in the future and the consistent attempts by the State of Florida to reduce local revenue sources and the potential for moral hazard, the City does not anticipate having meaningful funds available for purchase of or cost-sharing for purchase of at-risk properties to reduce the hazards to property or property owners. This does not affect the City's intentions for use of public money to acquire private property for purposes other than primarily for hazard mitigation."

- **Eliminate Coastal Management-Conservation Element Policy 1.9.10:** Eliminate Coastal Management-Conservation Element Policy 1.9.10: ~~"If full scale beach renourishment is not feasible on all or part of eth City's ocean shoreline, the City shall seek to have funds equal to what would have been spent made available for purchase of at-risk oceanfront properties.".~~

- **Create Clear IFAAA Boundary- Conservation Element Policy 1.14.3:** Utilize the GIS data behind Figure 5-1 in City of Satellite

2 This change is consistent with Ordinance No. 1160's modification of Satellite Beach City Code Section 30-107's definitions of "substantial damage" and "substantial improvement."

Beach Comprehensive Plan, Coastal Management-Conservation Element, Policy 1.14.3 to develop an outline of the IFAAA boundary. Add resulting map to the Comprehensive Plan to replace Figure 5-1 and to Master Stormwater Plan.

- **Eliminate Coastal Management-Conservation Element Policy 1.15.1:** Eliminate Coastal Management-Conservation Element Policy 1.15.1: ~~"The City shall review its zoning ordinances and zoning and land use maps at least once every three years to determine and implement possible ways to reduce the number of dwelling units that may be built within the City."~~ and renumber appropriate following policies.

- **Modify Intergovernmental Coordination Policy 1.2.7:** Modify Intergovernmental Coordination Policy 1.2.7 to read as follows (underlined text is new and ~~strikethrough text~~ is removed): "After a major storm event, the City shall coordinate with service providers to assess ~~replace and mitigate~~ damaged infrastructure~~,~~ as appropriate within the Coastal High Hazard Area and other vulnerable areas within the City per comprehensive plan policies."

- **Modify Capital Improvements Element Goal 1:** Modify Capital Improvements Element Goal 1 to read (underlined text is new and ~~strikethrough text~~ is removed): "Provision of public facilities which are the responsibility of the City, so as to enable the City to: (1) accommodate the needs of present and future populations in a timely and cost-effective manner; (2) maximize the use of existing facilities; and (3) maintain or enhance the City's services, physical environment, and fiscal integrity, all while considering the current and future changes due to climate change and sea-level rise."

- **Add a New Capital Improvements Element Objective 1.1:** Add a New Capital Improvements Element Objective 1.1 and renumber existing Objectives (and subsequent Policies) accordingly. The new 1.1 should read: "The City will establish a 'Community Fiscal & Resilience Balancing Test' method by which to incorporate consideration of sea-level rise into all capital improvements and infrastructure decisions."

- **Modify Capital Improvements Element Policy 1.1.3:** Modify Capital Improvements Element Policy 1.1.3 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City shall, as appropriate, request the Space Coast TPO to give the highest priority for traffic facility improvements in accordance with the severity of service level deficiency, ~~and~~ the highest volume-to-capacity ratio, and consideration of the TPO's and the City's policies on sea-level rise and climate change and road maintenance and improvements."

- **Modify Capital Improvements Element Policy 1.1.4:** Modify Capital Improvements Element Policy 1.1.4 Modify Capital Improvements Element Policy 1.1.4 to read (underlined text is new and ~~strikethrough text~~ is removed): "~~After~~ When annually prioritizing the need for drainage improvements, the City must use the 'Community Fiscal & Resilience Balancing Test' established pursuant to Objective 1.1 ~~shall fund, to the extent that funding is available, those conditions with the greatest Level of Service deficiencies, the greatest hazardous street flooding, and the highest negative impacts on the Indian River Lagoon~~."

- **Modify Capital Improvements Element Policy 1.1.6:** Modify Capital Improvements Element Policy 1.1.6 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City will provide funding for capital improvements in a manner which eliminates public hazards, reduces capacity deficits, addresses locational needs based on growth patterns, accommodates new development and redevelopment facility demands, is financially feasible given funding sources available to the City, considers the City budget, is aligned with City plans and policies regarding sea-lev-

el rise, climate change, and limitations on subsidizing development in hazardous areas, recognizes the future increased impacts of larger and stronger storms, and is consistent with the plans of state agencies and the St. Johns River Water Management District."

- **Modify Capital Improvements Element Policy 1.1.9:** Modify Capital Improvements Element Policy 1.1.9 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City of Satellite Beach will ~~adopt and/or~~ revise its 5-Year Capital Improvements Schedule consistent with State law ~~and Rule 9J-5~~ requirements."

- **Modify Capital Improvements Element Objective 1.3 :** Modify Capital Improvements Element Objective 1.3 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City shall prohibit public expenditures that subsidize land development and redevelopment in areas subject to hazards such as storm surge, rain-induced flooding, and sea-level rise, including east of the Coastal Construction Control Line (CCCL) and limit public expenditures that increase densities or intensities in ~~the Coastal High Hazard Area~~ either the IFAAA or EAAA, other than improvements required to implement the objectives and policies identified in the Coastal Management Element."

- **Modify Capital Improvements Element Objective 1.4:** Modify Capital Improvements Element Objective 1.4 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City shall manage its debt so as to retire any debt service in a timely manner. This is expected to preserve the City's ability to meet future capital improvements needs associated with an aging infrastructure, climate change and sea-level rise impacts, and continued development and redevelopment in the City. The development of the Capital Improvement Schedule will be coordinated with future land use."

- **Modify Future Land Use Element Policy 1.2.1:** Modify Future Land Use Element Policy 1.2.1. to read (underlined text is new and ~~strikethrough text~~ is removed): "The City's efforts ~~shall continue~~ to minimize or eliminate conditions which would adversely affect land use categories, adjacent land uses, signage, identified hazards, and areas subject to periodic flooding~~. This~~ shall also consider the City's policies related to resilience, sustainability, climate change, and sea-level rise~~be done as required by revisions of the City's Land Development Regulations~~."

2. Code of Ordinances

- Modify Code of Ordinances, Article VII., Div. 3A, Sec. 30-723(c): Modify Code of Ordinances, Article VII., Div. 3A, Sec. 30-723(c) to read (underlined text is new and strikethrough text is removed): "Shall maintain existing public access to the beach in the ocean bluff protection zone, including both perpendicular and lateral customary access as the latter is protected by Section 26-1 of this Code."

- **Modify Code of Ordinances, Article VII., Div. 3B, Section 30-729 (d):** Modify Code of Ordinances, Article VII., Div. 3B, Section 30-729 (d): In the estuarine shoreline protection zone, new armoring shall not be allowed without evidence from a licensed engineer that a project that qualifies as a "living shoreline" eligible for permitting by the U.S. Army Corps of Engineers under "Nationwide Permit (54) Living Shorelines" is not capable of offering sufficient protection to the property; in this case, "evidence" must consist of parcel-specific data and analysis demonstrating that consistently and frequently recurring wave heights would prevent use of a living shoreline. If evidence demonstrates that a living shoreline is not sufficient to protect a property, additional structural elements, such as a seawall or bulkhead, may be added but must be accompanied by living shoreline elements. ~~sloping coquina revetment or other alternative determined by the city and the~~

~~Florida Department of Environmental Protection to be at least equally environmentally acceptable. For such new armoring, the toe of the revetment shall extend no farther than necessary to construct a stable revetment, up to a maximum of three feet waterward of the mean low-tide line. However, in no event shall it extend farther than one-foot waterward of any platted property line.~~

3. Minimum Floor Elevations

- Maintain existing Ordinance 1160 sections modifying: 30-738(f)(1): Maintain existing Ordinance 1160 sections modifying: 30-738(f)(1) [applies to the CHHA (All area east of Hwy A1A) that states properties will be elevated a minimum of 3' above the Base Flood Elevation] and 30-739 (e) [applies "when any property is granted a variance allowing a new or replacement structure to be built less than 15 feet landward of the CCCL." In such cases, the structure must be a pile-constructed structure with the lowest floor elevated to a minimum of 10 feet above BFE].

- **Eliminate Ordinance 1088 Language for R322.3.2:** Eliminate Ordinance 1088 [Flood Ordinance] language for R322.3.2 [~~All properties in a SFHA only minimum freeboard 1' above BFE when lowest horizontal member is parallel to wave run-up, 2' above BFE when lowest horizontal member is perpendicular to wave run-up~~.].

- **Modify code "Section 30-555. - Floor Level":** Modify code "Section 30-555. - Floor Level" to read (<u>underlined text</u> is new and ~~strike-through text~~ is removed): "The floor level of the living area of residential buildings and the level of the first floor of commercial, institutional and industrial buildings or structures must be a minimum of <u>the higher of either 7 feet NGVD or</u> ~~18~~ <u>30</u> inches above the highest point of any abutting street."

B. Recommendations Requiring Further Development of Comprehensive Plan or Ordinance Language

- **Develop a "Community Fiscal & Resilience Balancing Test"**

- **Integration of the Develop a "Community Fiscal & Resilience Balancing Test" into the Capital Improvement Plan**

- **Prioritize Living Shorelines in the IFAAA and Ensure Their Maintenance**

- **Develop a Template Lateral Access Beach Easement:** For now, modify Coastal Management Element Policy 1.1.5 as noted above. This should then be followed up with development of a specific easement template for use as part of the special conditions in City armoring permits.

- **Provide Notice of Sea-Level Rise & Expected Future Impacts:** Develop & Implement Projects to Provide Increased Awareness of Future sea-level rise Impacts and Challenges for the City of Satellite Beach's Infrastructure. The City should provide notice of coastal hazards such as storm surge, rain-induced flooding, and erosion through markers and information in public places.

- **Develop & Implement Notice Requirements for Permit Applicants:** The City should provide extensive information related to sea-level rise, erosion, rain-induced flooding, and storm surge to permit applicants that it has developed. The information should include scientific information, expected impacts to the City and its infrastructure, and the policies of the City in addressing such hazards now and in the future. Permit applicants should be required to acknowledge receipt and understanding of provided information and this should be recorded in the public record.

C. Recommendations Requiring Further Analysis and Consideration

- Develop new "Level of Service Standards"
- Consider the Future of At-Risk Public Facilities
- Work with Community to Evaluate Desirability of Special Assessments in the IFAAA
- Increase the "Tailwater Elevation" Used in Stormwater Design Calculations
- Evaluate Whether and How to Apply the "Community Fiscal & Resilience Balancing Test" to Private Infrastructure Development
- Institute Additional Rebuild Limitations
- Consider Modifying Capital Improvements Element Policy 1.2.5
- Evaluate Options for Closer Coordination Between Brevard County & Satellite Beach
- Evaluate Use of Modified AAAs in Retreat Policy
- Undertake Review of Current Options for Elevating Structures
- Requirement that Potential Property Purchasers Receive "Notice" of Coastal Hazards
- Seawalls
- Ensure continued existence of lateral beach access in City permitting of seawalls
- Financing for Clean-Up of Abandoned Properties
- Resilient and Sustainable Housing

III. Analysis and Legal Issues Supporting Policy Recommendations

The following segments contain legal and policy information related to the specific policy recommendations in the preceding sections. For ease of reference, the numbering for the policy recommendations from the previous section is included.

A. Recommendations for Immediate Adoption or Implementation

1. Comprehensive Plan Language

Many of the recommendations in the Comprehensive Plan Language section relate to infrastructure decisions. As wastewater, electric, and potable water are not controlled exclusively by the City, the greatest focus for the City of Satellite Beach remains on roads and drainage infrastructure in this section and throughout the recommendations related to infrastructure. The recommendations in the following section are the same as those in Section I. However, this section adds, when appropriate, additional explanation and analysis supporting the recommendation. Those that are more self-explanatory do not include additional analysis.

- **Modify Infrastructure Element Goal 1:** Modify Infrastructure Element Goal 1 to read as follows (<u>underlined text</u> is new and ~~strikethrough text~~ is removed): "Systems of public facilities and services provided to the City of Satellite Beach, in accordance with Interlocal agreements with non-City entities and by the City, as appropriate, <u>shall be provided</u> in a manner which<u>, considering the</u>

fiscal and physical challenges of sea-level rise and climate change and the City's policies on sea-level rise and climate change, seeks ~~sufficient~~ to meet~~s~~ existing and future needs, assures healthful and safe living conditions, and is economically efficient as well as environmentally sound."

The existing language in Infrastructure Element Goal 1 fails to recognize the impending challenges of providing infrastructure under the constraints of sea-level rise and climate change. This language makes clear that provision of public facilities and services will be provided subject to such constraints and frees the City from guaranteeing that it can meet "existing and future needs" for infrastructure.

- **Modify Infrastructure Element Objective 1.1:** Modify Infrastructure Element Objective 1.1 to read as follows (underlined text is new and ~~strikethrough text~~ is removed): "The City ~~has taken actions needed to correct existing~~ seeks to avoid deficiencies in public facilities~~, and shall continue to~~ and assure ~~that they have~~ adequate capacity to serve existing, new development, and redevelopment while meeting Level of Service standards without exceeding facilities' design or operating capacities. The provision of infrastructure by the City shall be planned and constructed ~~, and~~ in a manner which is cost-effective, technologically and environmentally sound, ~~and~~ maximizes use of existing facilities, and balances design considerations for the current and future impacts of climate change and sea-level rise with the benefits and costs/challenges of infrastructure designs that incorporate climate change and sea-level rise impacts during the service-life utility of infrastructure. "

  As with the Infrastructure Element Goal 1, the recommended modification for Infrastructure Element Objective 1.1 seeks to soften the obligation to which the City commits itself for provision of public facilities as the City confronts sea-level rise and climate change.

- **Modify Infrastructure Element Policy 1.1.11:** Modify Infrastructure Element Policy 1.1.11 to read (underlined text is new and ~~strike-through text~~ is removed): "No public infrastructure or public buildings will be constructed seaward of the 1981 Coastal Construction Control Line (CCCL), with the exception of minor structures. Such structures are customarily provided to support recreation and open space activities, as well as pedestrian facilities (in accordance with dune protection design standards). Infrastructure and roadway improvements within already developed public rights-of-way will be maintained as determined feasible and reasonable by City policy in good-faith attempts ~~required~~ to meet minimum level of service standards."

- **Modify Infrastructure Element Objective 1.2:** Modify Infrastructure Element Objective 1.2 to read (underlined text is new and ~~strike-through text~~ is removed): "The City shall ~~continue its program of phased improvements to~~ manage its storm drainage system in way that seeks to provide balance in serving interests of ~~that shall provide for~~ the public health and safety, preventing property damage, protecting natural drainage features and functions of natural groundwater recharge, and acknowledging the challenges of sea-level rise and climate change ~~in order to achieve adopted Level of Service standards~~."

  The recommended changes in Infrastructure Element Objective 1.2 recognize that it will become impossible at some point in the future for the City to necessarily achieve current Level-of-Service standards for drainage in all areas of the City due to increased intensity of rain events and sea-level rise.

- **Add a new Infrastructure Element Policy 1.1.13:** Add a new Infrastructure Element Policy 1.1.13: "The City shall accept no dedications of any infrastructure for public use and maintenance, including, but not limited to, roadways, sidewalks, medians, drainage facilities, recreational facilities or any other type of infrastructure unless such infrastruc-

ture is proven by the dedicating party to meet all current City ordinances and standards that would govern such infrastructure were it to be constructed on the date of its dedication. This policy is not intended to prevent the City from accepting dedications of conservation easements or other green space or natural areas that either have no human-made infrastructure or where an agreement is included by the dedicating entity that it will hold the City harmless from any responsibility to maintain any human-made infrastructure on the property."

As maintenance of even existing infrastructure will pose increasing problems for the City in the future, the City can protect itself from additional costs and infrastructure liabilities by establishing a clear policy that the City will not burden itself with accepting infrastructure not constructed to current City standards. This will prevent developers, developments, or property owners from seeking to avoid increasing private infrastructure maintenance by pushing them onto the City.

- **Modify Infrastructure Element Policy 1.2.1:** Modify Infrastructure Element Policy 1.2.1 to read (underlined text is new and ~~strike-through text~~ is removed): "The City shall implement the comprehensive stormwater management plan. The City's priorities shall be established on a drainage basin basis. The stormwater management plan shall prioritize stormwater management, design, and construction based upon the City's policies on sea-level rise and climate change. ~~and shall be aimed at correcting the worst problems initially, followed by lesser problems as technical and financial means are available.~~"

  Current Infrastructure Element Policy 1.2.1 specified that the City would prioritize "the worst problems initially, followed by lesser problems." However, as sea levels rise, storm intensities increase and heavy precipitation events increase, some of the worst problems may eventually reach the point that the City will not have the financial means to fix them without spending so much that it drastically impacts potential infrastructure spending in higher areas that will remain more reasonably defensible for a longer period. In other words, the recommended policy change seeks to help the City avoid "throwing good money after bad" by spending all its infrastructure money on the lowest-lying areas that will likely have to be the first to be abandoned. The recommended policy change accords well with Satellite Beach policies against subsidizing development in high hazard areas.

- **Modify Coastal Management-Conservation Element Goal 1:** Modify Coastal Management-Conservation Element Goal 1 to read as follows (underlined text is new and ~~strike-through text~~ is removed): "Enhancement of the City's natural character by protecting, conserving, and maintaining natural resources while safeguarding human life, property, and public expenditures, as physically, fiscally, and practically feasible in light of sea-level rise and climate change, from the effects of natural processes in the Coastal High Hazard Area (CHHA) and City-initiated Adaptation Action Areas (AAAs). The City of Satellite Beach designates the Coastal High Hazard Area as "the area defined by the SLOSH model to be inundated from a Category 1 Hurricane." Stronger, and perhaps more frequent storms will increase erosion regardless of sea-level rise."

- **Modify Coastal Management Element Policy 1.4.2:** Modify Coastal Management Element Policy 1.4.2 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City requires that any ~~non-residential~~ structure, including those abandoned, ~~or~~ sustaining damage in excess of ~~67~~50% of its assessed value, or improved at a cost exceeding 50% of the building's assessed value comply ~~due to storm conditions or erosion, be demolished or reconstructed in accordance~~ with all City ordinances applicable to new construction. ~~Remaining structures shall be protected to the greatest ext*ent possible from adverse~~

~~impacts due to such demolition or reconstruction.~~"

This change is consistent with Ordinance No. 1160's modification of Satellite Beach City Code Section 30-107's definitions of "substantial damage" and "substantial improvement."

- **Add Coastal Management-Conservation Element Policy 1.5.4:** Add Coastal Management-Conservation Element Policy 1.5.4: "Given the projected infrastructure needs of the City in the future and the consistent attempts by the State of Florida to reduce local revenue sources and the potential for moral hazard, the City does not anticipate having meaningful funds available for purchase of or cost-sharing for purchase of at-risk properties to reduce the hazards to property or property owners. This does not affect the City's intentions for use of public money to acquire private property for purposes other than primarily for hazard mitigation."

  This recommended change recognizes the City's limited funding base prohibits spending significant amounts of City funds for protecting private property or private property owners from loss. Rather, the City may use the policy as part of the City's overall effort to inform private property owners of the risks inherent in at-risk properties and allow property owners and market forces to allocate risk and loss. The last sentence notes that *not* spending money specifically for private-property risk reduction does not mean the City will not continue to buy properties that have ecological or recreational value for the City, regardless of whether the purchase reduces risk to private property or private property owners. A general policy of not using public funds to rescue owners of at-risk properties also helps avoid moral hazard, or the idea that potential future public payments to owners of at-risk private properties will increase the number of people willing to take the risk of purchasing such properties. Ultimately, if moral hazard arises, the inflation of private property values due to public backing also increases the amount of public money that will be required to conduct such buyouts.

- **Eliminate Coastal Management-Conservation Element Policy 1.9.10:** Eliminate Coastal Management-Conservation Element Policy 1.9.10 ("If full scale beach renourishment is not feasible on all or part of the City's ocean shoreline, the City shall seek to have funds equal to what would have been spent made available for purchase of at-risk oceanfront properties.").

  Recommended deletion of Coastal Management-Conservation Element Policy 1.9.10 frees the City from any obligation to spend City funds on at-risk oceanfront properties due to the unavailability of large-scale beach nourishment. This aligns with the previous recommendation to modify Coastal Management-Conservation Element Policy 1.5.4. It also aligns with the City's focus on not subsidizing development in high-hazard areas, such as along the beach.

- **Create Clear IFAAA Boundary:** Utilize the GIS data behind Figure 5-1 in City of Satellite Beach Comprehensive Plan, Coastal Management-Conservation Element, Policy 1.14.3 to develop an outline of the IFAAA boundary. The final IFAAA boundary should be all inundated areas in the referenced map plus a 50-foot buffer and including all areas that would then be surrounded by flooded areas plus the 50-foot buffer. This GIS boundary should then be crossed with the GIS database of property boundaries so that the IFAAA corresponds to property boundaries, eliminating any uncertainty about the impacts of the IFAAA on specific properties. Add resulting map to the Comprehensive Plan to replace Figure 5-1 and to Master Stormwater Plan.

  The current map at Figure 5-1 in City of Satellite Beach Comprehensive Plan, Coastal Management-Conservation Element, Policy 1.14.3, is a GIS-based map showing future inundation levels. However, to make the map useful as the regulatory tool for which the City wishes

to use the map, it must have clearer, cleaner boundaries. This recommendation creates such boundaries. The proposed boundary methodology of adding a buffer and including areas that are "islands" in the projected flooding areas recognizes the reality that land uses and supporting infrastructure will already be heavily impacted by flooding and sea-level rise long before the land is permanently inundated by salt water.

- **Eliminate Coastal Management-Conservation Element Policy 1.15.1:** Eliminate Coastal Management-Conservation Element Policy 1.15.1 ("The City shall review its zoning ordinances and zoning and land use maps at least once every three years to determine and implement possible ways to reduce the number of dwelling units that may be built within the City.") and renumber appropriate following policies.

  As sea levels rise, the City is already contemplating a future need to contract with those rising seas. To maintain population and tax base during adaptation, the City may need to densify development along the highest parts of the City. Deleting this provision from the comprehensive plan ensures that the City will not be obligated to seek to reduce the possible number of dwelling units when it may, in fact, seek to increase them to maintain fiscal viability.

- **Modify Intergovernmental Coordination Policy 1.2.7:** Modify Intergovernmental Coordination Policy 1.2.7 to read as follows (underlined text is new and ~~strikethrough text~~ is removed): "After a major storm event, the City shall coordinate with service providers to assess ~~replace and mitigate~~ damaged infrastructure~~,~~ as appropriate within the Coastal High Hazard Area and other areas within the City per comprehensive plan policies."

  As currently drafted, Intergovernmental Coordination Policy 1.2.7 could be interpreted to require mitigation and replacement of infrastructure in the CHHA. The modification supports the City's desire to move towards a planning regime that recognizes that climate change and sea-level rise will, in some instances, likely require decisions not to replace damaged infrastructure. The modification aligns with state law requiring coastal local governments' comp plans to address the strategies the local governments will use to "Limit public expenditures that subsidize development in coastal high-hazard areas." (Fla. Stat. § 163.3177(6)(g)6 (2018)). The modification also fits well with the City's increasing focus on implementing Capital Improvements Element Objective 1.3, which notes that the "City shall prohibit public expenditures that subsidize land development and redevelopment" in hazardous areas.

- **Modify Capital Improvements Element Goal 1:** Modify Capital Improvements Element Goal 1 to read (underlined text is new and ~~strikethrough text~~ is removed): "Provision of public facilities which are the responsibility of the City, so as to enable the City to: (1) accommodate the needs of present and future populations in a timely and cost-effective manner; (2) maximize the use of existing facilities; and (3) maintain or enhance the City's services, physical environment, and fiscal integrity, all while considering the current and future changes due to climate change and sea-level rise and the goals, objectives, and policies that recognize their importance in the City's planning processes."

  The current Capital Improvements Element Goal 1 sets the overall goal for infrastructure policy for the City. As the City recognizes that sea-level rise will eventually become a primary determinant of the health and well-being of the City's infrastructure, this Goal should reference sea-level rise. In addition, as sea-level rise and climate change should be integrated into many other policies in the Capital Improvements Element, it makes sense to ensure that the element overall recognizes the importance of sea-level rise going forward.

The recommended change addresses that the current Goal 1 places too much emphasis on the responsibility of the City to "accommodate the needs of present and future populations in a timely and cost-effective manner." However, the vulnerability assessment and current sea-level rise trends indicate it is unrealistic to assume that obligatory and "timely" provision of public facilities will come into direct conflict with the idea of doing so in a "cost-effective manner." Thus, the City should modify Goal 1 to acknowledge and address this future conflict and challenge.

- **Add a New Capital Improvements Element Objective 1.1:** Add a New Capital Improvements Element Objective 1.1 and renumber existing Objectives (and subsequent Policies) accordingly. The new 1.1 should read: "The City will establish a 'Community Fiscal & Resilience Balancing Test" method by which to incorporate consideration of sea-level rise and climate change into all capital improvements and infrastructure decisions."

  The recommendation above for Capital Improvements Element Objective 1.1 is for the City to develop and adopt a "Community Fiscal & Resilience Balancing Test" (CFRBT) as proposed below in the section on recommendations requiring further language development. Once the City does this, comprehensive plan Goals, Objectives, and Policies referencing sea-level rise and climate change and the need for its consideration in infrastructure decisions should be amended to directly reference the CFRBT.

- **Modify Capital Improvements Element Policy 1.1.3:** Modify Capital Improvements Element Policy 1.1.3 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City shall, as appropriate, request the Space Coast TPO to give the highest priority for traffic facility improvements in accordance with the severity of service level deficiency, ~~and~~ the highest volume-to-capacity ratio, and consideration of the TPO's and the City's policies on sea-level rise and road maintenance and improvements."

- **Modify Capital Improvements Element Policy 1.1.4 :** Modify Capital Improvements Element Policy 1.1.4 Modify Capital Improvements Element Policy 1.1.4 to read (underlined text is new and ~~strikethrough text~~ is removed): "~~After~~ When annually prioritizing the need for drainage improvements, the City must use the method established pursuant to Objective 1.1 ~~shall fund, to the extent that funding is available, those conditions with the greatest Level of Service deficiencies, the greatest hazardous street flooding, and the highest negative impacts on the Indian River Lagoon~~."

  As noted with other recommendations, as sea level increases and rainfall intensities increase, it will make less and less practical or economic sense for the City to always seek to remedy the worst drainage problems first as such a policy could drive the City to spend inordinate amounts on parts of the City that will be virtually impossible for the City to afford to protect. Such action would present a high opportunity cost for the City as the City misses opportunities to make drainage investments with far greater overall community and temporal benefits.

- **Modify Capital Improvements Element Policy 1.1.6:** Modify Capital Improvements Element Policy 1.1.6 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City will provide funding for capital improvements in a manner which eliminates public hazards, reduces capacity deficits, addresses locational needs based on growth patterns, accommodates new development and redevelopment facility demands, is financially feasible given funding sources available to the City, considers the City budget, is aligned with City plans and policies regarding sea-level rise, climate change, and limitations on subsidizing development in hazardous areas, recognizes the future increased impacts of larger and stronger storms, and is consistent

with the plans of state agencies and the St. Johns River Water Management District."

- **Modify Capital Improvements Element Policy 1.1.9 :** Modify Capital Improvements Element Policy 1.1.9 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City of Satellite Beach will ~~adopt and/ or~~ revise its 5-Year Capital Improvements Schedule consistent with State law ~~and Rule 9J-5~~ requirements."

  This simple modification acknowledges that the City has already adopted a 5-Year Capital Improvements Schedule and that Rule 9J-5, F.A.C. no longer exists in state regulations.

- **Modify Capital Improvements Element Objective 1.3:** Modify Capital Improvements Element Objective 1.3 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City shall prohibit public expenditures that subsidize land development and redevelopment in areas subject to hazards such as storm surge, rain-induced flooding, and sea-level rise, including east of the Coastal Construction Control Line (CCCL) and limit public expenditures that increase densities or intensities in ~~the Coastal High Hazard Area~~ either the IFAAA or EAAA, other than improvements required to implement the objectives and policies identified in the Coastal Management Element."

- **Modify Capital Improvements Element Objective 1.4:** Modify Capital Improvements Element Objective 1.4 to read (underlined text is new and ~~strikethrough text~~ is removed): "The City shall manage its debt so as to retire any debt service in a timely manner. This is expected to preserve the City's ability to meet future capital improvements needs associated with an aging infrastructure, climate change and sea-level rise impacts, and continued development and redevelopment in the City. The development of the Capital Improvement Schedule will be coordinated with future land use."

- **Modify Future Land Use Element Policy 1.2.1:** Modify Future Land Use Element Policy 1.2.1. to read (underlined text is new and ~~strikethrough text~~ is removed): "The City's efforts ~~shall continue~~ to minimize or eliminate conditions which would adversely affect land use categories, adjacent land uses, signage, identified hazards, and areas subject to periodic flooding~~. This~~ shall also consider the City's policies related to resilience, sustainability, climate change, and sea-level rise~~be done as required by revisions of the City's Land Development Regulations~~."

  The recommended change to Future Land Use Element 1.2.1 acknowledges that it will not, at some point, be feasible for the City to commit to "minimize or eliminate . . . areas subject to periodic flooding."

2. Code of Ordinances

- **Modify Code of Ordinances, Article VII., Div. 3A, Sec. 30-723(c):** Modify Code of Ordinances, Article VII., Div. 3A, Sec. 30-723(c) to read (underlined text is new and strikethrough text is removed): "Shall maintain existing public access to the beach in the ocean bluff protection zone, including both perpendicular and lateral customary access as the latter is protected by Section 26-1 of this Code."

  This code modification reflects the suggested modification in Sections I.B and II.B to comprehensive plan Coastal Management-Conservation Element Policy 1.1.5 regarding lateral public access. Please refer below for further analysis of the recommended changes to Coastal Management-Conservation Element Policy 1.1.5. This recommended change also furthers the purposes for which Satellite Beach passed Ordinance Number 1158 (2018).

- **Modify Code of Ordinances, Article VII., Div. 3B, Section 30-729 (d):** Modify Code of Ordinances, Article VII., Div. 3B, Section 30-729 (d): In the estuarine shoreline protec-

tion zone, new armoring shall not be allowed without evidence from a licensed engineer that a project that qualifies as a "living shoreline" eligible for permitting by the U.S. Army Corps of Engineers under "Nationwide Permit (54) Living Shorelines" is not capable of offering sufficient protection to the property; in this case, "evidence" must consist of parcel-specific data and analysis demonstrating that consistently and frequently recurring wave heights would prevent use of a living shoreline. If evidence demonstrates that a living shoreline is not sufficient to protect a property, additional structural elements, such as a seawall or bulkhead, may be added but must be accompanied by living shoreline elements. ~~sloping coquina revetment or other alternative determined by the city and the Florida Department of Environmental Protection to be at least equally environmentally acceptable. For such new armoring, the toe of the revetment shall extend no farther than necessary to construct a stable revetment, up to a maximum of three feet waterward of the mean low-tide line. However, in no event shall it extend farther than one-foot waterward of any platted property line.~~

This policy recommendation reflects changing science, practice, and permitting for shoreline protection. Increasingly "living shorelines" have demonstrated their ability to provide significant protection with far fewer negative environmental impacts. This recommended change leverages relatively new U.S. Army Corps of Engineers permitting processes for living shorelines.

3. Minimum Floor Elevations

The City of Satellite Beach comprehensive plan and code contain multiple references to minimum floor elevations and when these requirements apply. These requirements developed over time, but they do not always match nor are they always easy to understand or apply. Now offers a time to consider whether to standardize or simplify these requirements while seeking to maintain the current and future flood and safety protection for which minimum building elevations are set.

Currently comprehensive plan and code elevation provisions for floor heights include:

- Ord 1160 sec. 30-738(f)(1) [Resiliency Ordinance] applies to the CHHA (All area east of Hwy A1A) that states properties will be elevated a minimum of 3' above the Base Flood Elevation.

- Ord 1160 sec. 30-739 (e) [Resiliency Ordinance] applies "when any property is granted a variance allowing a new or replacement structure to be built less than 15 landward of the CCCL." In such cases, the structure must be a pile-constructed structure with the lowest floor elevated to a minimum of 10 feet above BFE.

- Ord 1088 [Flood Ordinance] R322.3.2 All properties in a SFHA only minimum freeboard 1' above BFE when lowest horizontal member is parallel to wave run-up, 2' above BFE when lowest horizontal member is perpendicular to wave run-up.

- 30-555 [Floor Level] finished floor of lowest habitable space shall be 18" above highest adjacent road crown.

It would be far simpler to have just a single elevation standard across the entire jurisdiction. However, there are good reasons that different areas have different standards. The one foot of extra elevation above BFE in the Special Flood Hazard Area (SFHA) is an important way to help keep down flood insurance costs for properties built to that standard; and Satellite Beach must at least require building above the BFE to continue to have flood insurance available to its citizens.

It also makes sense to have a higher "freeboard" elevation above BFE for properties built based on a variance allowing the property to be closer to the water than normally permissible; one of many reasons to build further back from the ocean is to avoid both surge and wave action during storms. A building attacked by wave action often will let

loose debris that then becomes a danger to people and other property as it is moved at high velocity by wind and water. Significant elevation above the Base Flood Elevation helps ensure the safety of the property built according to the variance and other properties.

Initially it also seems good to ensure that new buildings are at least 18 inches above the crown of the nearest road so that in a flood, the road serves as flood storage area rather than the home. As many roads are already either flooded or very close to flooding at extreme tide events or even modest weather events, requiring new structures to be elevated only 18 inches above them seems to be a very poor way to ensure the resilience of those new structures in light of the sea-level rise curve that Satellite Beach has committed to using for adaptation to sea-level rise.

Thus, we confront the frequent conundrum in law and regulation: the more precisely regulation is based on physical reality, the more burdensome and complex it becomes. All of this context must be viewed in light of recent changes to the Florida Building Code related to freeboard and base floor elevation. Thus, it becomes a matter of policy preferences as to how to balance simplicity with the "ideal" regulation. In the case of new (or substantially damaged/substantially improved) structures in Satellite Beach, the recommendation from this project is as follows:

- Maintain existing special elevation requirements for all buildings east of A1A (the CHHA) and for all buildings built/rebuilt pursuant to a variance allowing them closer than 15 feet landward of the CCCL. While these may pose some extra burden, both requirements are tightly focused on a small number of properties subject to extraordinary hazards.

- For the rest of Satellite Beach (outside of the CHHA), all new or substantially damaged/improved structures would have to have their lowest floor elevated to the higher of 7 feet NAVD88 or 2.5 feet above the highest adjacent crown of road.

Seven feet above NAVD88 represents a compromise in protection of property and life between the estimated 1% storm flood levels based on the model used by FEMA for development of its Flood Insurance Rate Maps and FEMA's HAZUS model.

While a higher number would be more protective of buildings and people, it may be problematic to go to a higher minimum requirement as this would create the possibility of new development built on pyramids of fill. This would look very out of place in interior neighborhoods with existing slab-on-grade structures as low as 3-4 feet NAVD88 and could also cause legal problems if lots with sufficient fill to elevate to a higher standard alter surface flow and cause flooding to neighboring structures.

To accomplish this Report's recommendations, we suggest:

- **Maintain existing Ordinance 1160 sections modifying: 30-738(f)(1):** Maintain existing Ordinance 1160 sections modifying: 30-738(f)(1) [applies to the CHHA (All area east of Hwy A1A) that states properties will be elevated a minimum of 3' above the Base Flood Elevation] and 30-739 (e) [applies "when any property is granted a variance allowing a new or replacement structure to be built less than 15 landward of the CCCL." In such cases, the structure must be a pile-constructed structure with the lowest floor elevated to a minimum of 10 feet above BFE]

- **Eliminate Ordinance 1088 Language for R322.3.2:** Eliminate Ordinance 1088 [Flood Ordinance] language for R322.3.2 [All properties in a SFHA only minimum freeboard 1' above BFE when lowest horizontal member is parallel to wave run-up, 2' above BFE when lowest horizontal member is perpendicular to wave run-up.].

- **Modify code "Section 30-555. - Floor Level":** Modify code "Section 30-555. - Floor Level" to read (<u>underlined text</u> is new and ~~strike-through text~~ is removed): "The floor level of the living area of residential buildings and the level of the first floor of commercial, institu-

tional and industrial buildings or structures must be a minimum of the higher of either 7 feet NAVD88 or ~~18~~ 30 inches above the highest point of any abutting street."

B. Policy Recommendations Requiring Additional Comprehensive Plan or Ordinance Language

- **Develop a "Community Fiscal & Resilience Balancing Test":** Citizens depend on local governments for provision of infrastructure services. While most of us may not know who owns or maintains specific sections of road or sewer or drainage, when infrastructure fails, we typically reach out first to our local governments, not state or federal government. And infrastructure maintenance and liability represent key issues in adapting to climate change and sea-level rise. The City of Satellite Beach understands the importance of addressing infrastructure, and the City also knows that as a relatively small city with limited property tax, fee, sales tax, and other income to support the City, the City will be extremely limited in its ability to plan for large-scale infrastructure projects designed to protect public and private property from the increasing impacts of sea-level rise and climate change.

  Currently the fields of climate change and sea-level rise adaptation focus on convincing government of the need to ensure that all infrastructure work be designed and constructed for the conditions predicted to occur during the viable life span of the infrastructure. At one level, this makes great intuitive sense: Why build infrastructure that will fail sooner than it should due to likely changing conditions? However, further consideration raises questions about whether this necessarily represents the best policy in all cases. For example, if building a new bridge to a barrier island that is very narrow and very low with only 100 residents and $800 million in property value, is it necessarily worthwhile to look 100 years out and build the bridge—and the approaches to the bridge—5 to 8 feet higher due to sea-level rise? What if sea-level rise curves reaching 5-8 feet 100 years out

would already have drowned virtually all of the barrier island? In such a case it might be foolish to so significantly elevate the new bridge and approaches since what the bridge serves—the barrier island—will be underwater by the end of the useful life span of the bridge. Maybe the calculus would be different if the barrier island had thousands of residents, tens of billions of dollars in property value, and tens of millions of dollars in annual tourism tax receipts, large portions of which could be used to prolong the life of the barrier island despite sea-level rise. But assuming that all infrastructure should be upgraded to address sea-level rise and climate change impacts or that all new infrastructure should be built to such standards only makes sense assuming that everything served by such infrastructure will remain. Particularly for small- and medium-sized local governments at very low elevations, this assumption is dubious at best when considering infrastructure with long lifespans whose cost would dramatically increase due to design and construction to address sea-level rise. At worst, assuming such upgrades could waste public resources on infrastructure projects whose services will not be needed as the very landscape and communities they were designed to serve change, realign, or disappear.

These contrasting scenarios demonstrate that rather than assuming that all new infrastructure should be constructed to continue to provide desired levels of service throughout its normal design life span, local governments, especially smaller local governments with smaller income streams, need to consider whether and when infrastructure upgrades and protective measures make sense from a larger perspective. For example, within the specific context of the City of Satellite Beach, extensive areas west of Patrick Drive represent some of the lowest areas of the City that will be first subject to the impacts of increased flooding. These areas are largely residential properties. While the City understands its maintenance responsibilities for infrastructure, the City will need to carefully evaluate what level of potential infrastructure upgrades, such as to roads and drainage, might be feasible west of Patrick Drive.

Such an approach is already supported by existing comprehensive plan policies. For example, Infrastructure Element Policy 1.1.7 ("The City shall determine how to identify the circumstances, timeframe or other conditions necessary to justify the expenditure of public funds to maintain infrastructure.") and Infrastructure Element Policy 1.1.8 ("The City shall develop a methodology for prioritizing infrastructure project expenditures based on cost-benefit analysis, feasibility, determination of applicability to City policies, and short-term versus long-term benefits.") strongly support finalizing and adopting the process recommended here.

Some criteria the City will want to consider when evaluating whether to upgrade or construct new infrastructure are captured in the proposed "Community Fiscal & Resilience Balancing Test" (CFRBT). The CFRBT is not a mathematical formula; rather, it includes numerous factors to consider and balance in making a decision. Factors recommended for the CFRBT include:

- potentially exacerbating flooding on other parcels;
- potential harmful environmental impacts to groundwater, surface water, wildlife, or ecosystems, especially ecosystems that provide storm and flood buffering;
- in addition to the specific infrastructure under consideration, what other types of infrastructure would also require upgrades to maintain serviced parcels as viable;
- amount of time that upgraded infrastructure would provide serviceable conditions to properties it serves;
- the amount of increased cost for designing for future conditions versus current

conditions, including comparisons to costs similar work that did not need to consider climate change or sea-level rise impacts;

- the current elevation of adjacent properties as well as other properties served by the infrastructure at issue;

- number of residents and number of visitors historically served by the infrastructure at issue and anticipated numbers for the future considering increased sea level as appropriate as well as whether the service provided by the infrastructure project under consideration can be accessed by or provided to users through an alternate route or service;

- future maintenance needs and costs including staffing requirements;

- whether designing to future conditions results in the project being subject to permitting or mitigation requirements of a state or federal agency for activities that would not subject to such permitting requirements for a design for current conditions;

- if the infrastructure primarily serves residents, whether affected residents choose to impose on themselves a MSBU to cover increased infrastructure costs over and above a certain design standard;

- whether the infrastructure serves as a key or indispensable adjunct to critical infrastructure or services likely to remain in their existing location for an extended period.

Potential inclusion of such a broad array of criteria should not occur due to routine maintenance since injecting such a large number of considerations into what might previously have been fairly simple routine infrastructure maintenance decisions—decisions that might previously have even occurred at the staff level—could overwhelm the limited administrative capacity of the City of Satellite Beach. Instead, activities classified as routine maintenance should continue to be prioritized and performed by staff based on existing practice.

At the same time, to adequately consider all involved interests and serve the requirements of procedural due process and substantive due process, the City may need to consider the above under some circumstances, such as when contemplating periodic maintenance of infrastructure already experiencing difficulties due to climate change or sea-level rise impacts, development of new or replacement infrastructure.

Due to the significant administrative burden that would accompany full, detailed analysis of all potential data sources for so many criteria for numerous infrastructure decisions, the City should have a two-step process for the depth of analysis it conducts for periodic infrastructure maintenance or infrastructure development/redesign.[3] Initially, it should be reiterated that the recommendation is that none of this applies to routine maintenance decisions. The following 2-step process is only recommended for new or fully rebuilt infrastructure or when conducting periodic maintenance of infrastructure already substantially impacted by sea-level rise or flooding or that might likely be impacted during the life span of the contemplated periodic maintenance (i.e.—maybe 20 years for a road milling and resurfacing project).

The first step should be a cursory consideration by the appropriate staff and director of the department in charge of the infrastructure at issue. This first step does not require extensive data analysis nor specific record keeping. Rather, this first step focus-

3 This two-step process has some analog at the federal level in the National Environmental Policy Act's (NEPA) review process, which dictates that if an activity is not categorically excluded from NEPA, the activity should be subject to an initial "environmental assessment" or EA. If the EA results in a "finding of no significant impact," then the analysis stops. If the EA does not result in a "finding of no significant impact," then a full-scale—and much more detailed—Environmental Impact Statement is developed.

es on ensuring that relevant City staff have exercised their best professional judgment in deciding whether, in general consideration of the factors listed in the "Community Fiscal & Resilience Balancing Test," the infrastructure maintenance/construction/design can feasibly be done considering sea-level rise and climate change during the infrastructure's planned life span. Decisions based on initial staff consideration of the CFRBT factors shall be made in publicly noticed meetings. If City staff determine that upgrading the infrastructure in question to the sea-level rise curve adopted by the City and other climate change considerations for the design life of the infrastructure is easily feasible according to the CFRBT, the analysis concludes at this stage, and the City will design and construct the infrastructure considering sea-level rise and other climate change factors." If City staff decide that upgrading the infrastructure to account for sea-level rise is clearly prohibitive in cost and difficulty, staff shall, in a publicly noticed meeting, send a recommendation to the Satellite Beach City Council with the approach recommended by staff to appropriately balance the interests and CFRBT factors at play.

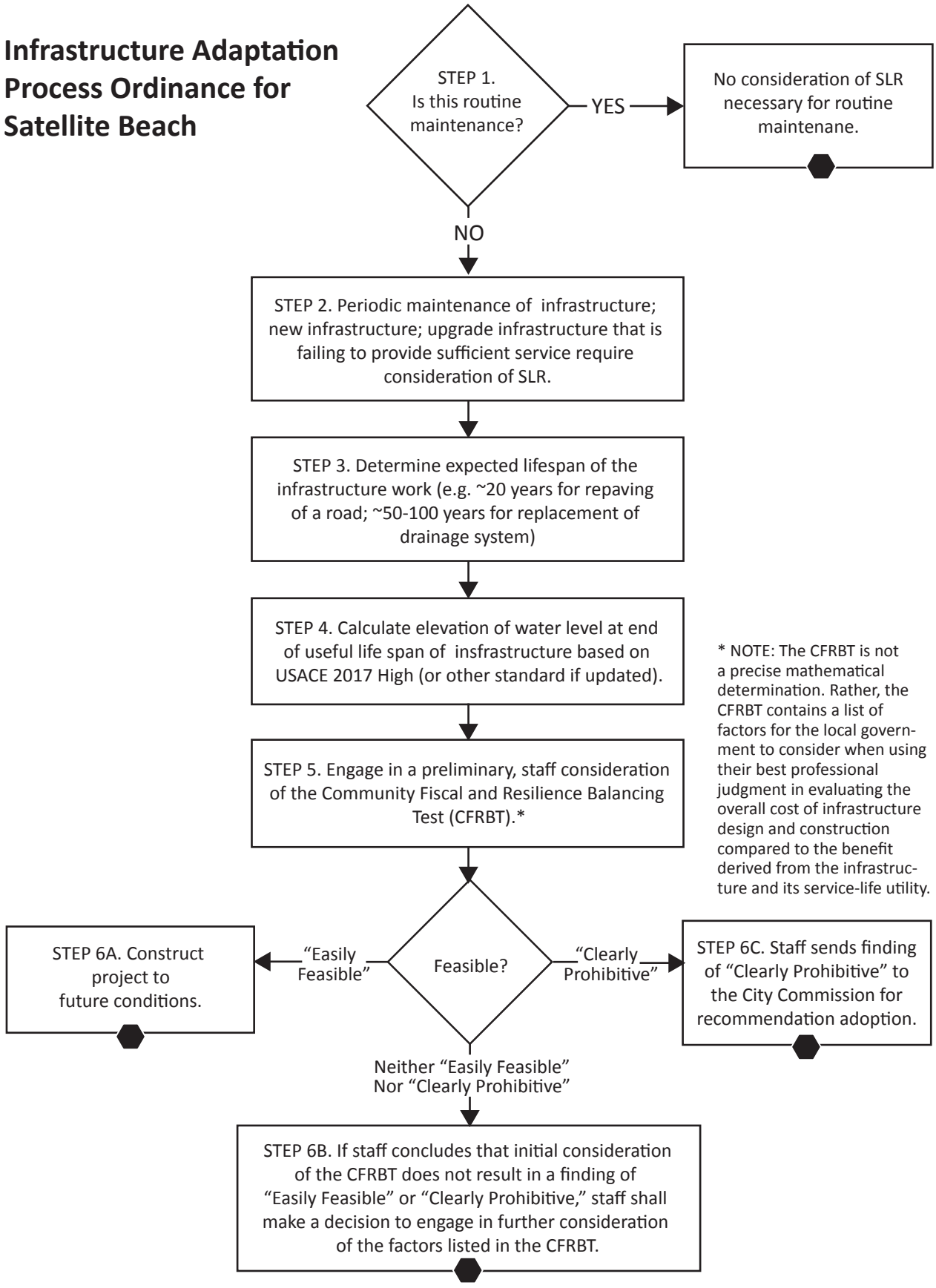
If staff does not conclude that accounting for sea-level rise is either "clearly feasible" or "clearly prohibitive," staff then will conclude that it should engage in more careful consideration of the CFRBT factors. This work should include more data review and tracking of data as well as specific written comments addressing relevant CFRBT factors. Staff should conclude this analysis with a recommendation that represents the best professional judgment of staff on how to balance the specifics of the situation at hand, relevant CFRBT factors, and the City's finances in making a final recommendation to the City Council. The final recommendation to City Council may include individualized findings for each of the CFRBT factors and a recommended decision on what level of upgrade above current conditions, if any, to which the infrastructure should be designed.

- **Adoption of the proposed "Community Fiscal & Resilience Balancing Test":** This is supported by existing comprehensive plan provisions such as Infrastructure Element Policy 1.1.7 ("The City shall determine how to identify the circumstances, timeframe or other conditions necessary to justify the expenditure of public funds to maintain infrastructure."); Infrastructure Element Policy 1.1.8 ("The City shall develop a methodology for prioritizing infrastructure project expenditures based on a cost-benefit analysis, feasibility, determination of applicability to City policies, and short-term versus long-term benefits."); and Infrastructure Element Policy 1.1.8. (requiring consideration of sea-level rise in "all storm water management projects"). The recommended comprehensive plan and ordinance changes in this report further support development of the "Community Fiscal & Resilience Balancing Test." For example, the recommendation above for Capital Improvements Element Objective 1.1 is for the City to develop and adopt the "Community Fiscal & Resilience Balancing Test."

- **Integration of the "Community Fiscal & Resilience Balancing Test" into the Capital Improvement Plan:** Integrate the "Community Fiscal & Resilience Balancing Test" into the Capital Improvement Plan process for making road maintenance/design/construction decisions to promote the possibility of taking advantage of the statutory exemption for the "operation, maintenance, or expansion of transportation facilities" from Bert Harris claims.

- **Prioritize Living Shorelines in the IFAAA and Ensure Their Maintenance:** The recommendation above to modify Code of Ordinances, Article VII., Div. 3B, Section 30-729 (d) to put the burden on property owners to demonstrate that a living shoreline would not provide sufficient protection to the owner's property should also be supported by similar

Infrastructure Adaptation Process Ordinance for Satellite Beach



* NOTE: The CFRBT is not a precise mathematical determination. Rather, the CFRBT contains a list of factors for the local government to consider when using their best professional judgment in evaluating the overall cost of infrastructure design and construction compared to the benefit derived from the infrastructure and its service-life utility.

language added to the Comprehensive Plan's Coastal Management-Conservation Element. In addition, both the Comprehensive Plan and ordinances should be modified to require on-going maintenance by the property owner. A condition for such a permit should require written by the owner for a special assessment if the property owner fails to correct the code violation and impose a lien on the property for the costs incurred by the City per the process in current Sect. 30-735 (Article VII, Division 3C) of the Satellite Beach City Code of Ordinances.

- **Develop a Template Lateral Access Beach Easement:** For now, modify Coastal Management Element Policy 1.1.5 as noted above. This should then be followed up with development of a specific easement template for use as part of the special conditions in City armoring permits.

- **Provide Notice of Sea-Level Rise & Expected Future Impacts:** An important and common theme running through private property protections is protecting private property owners from losses that the owners did not expect.[4] This presents challenges, because different owners may expect different things. Laws protecting private property also take the expectations of property owners into account when evaluating whether a specific governmental action may represent a "taking" of private property in contravention of constitutional private property protections.[5] Specifically, a "takings" analysis will often include an evaluation of the "reasonable investment-backed expectations" of the property owner.[6] Importantly, "reasonable investment-backed expectations in the legal context are assessed based on a mix of *both* the personal knowledge and activity of the specific property owner *and* on what a reasonable person should have known or expected.[7] In the coastal context in light of rising seas, some property owners have begun to understand that their property may suffer diminution in value or even become inundated and virtually valueless. However, many more property owners still do not fully appreciate the impacts that sea-level rise will have on coastal communities and the significant physical and financial challenges that communities will face in their attempts to protect property.

Thus, out of fairness to these property owners and to help local governments have the maneuvering room to focus how they spend their resources, local governments should make all reasonable efforts to ensure that property owners and citizens generally understand the challenges local governments face in protecting private property in the face of sea-level rise and other impacts of climate change and that it will not be physically or financially feasible to protect all property in perpetuity. This information should be presented at every available opportunity.

- **Develop & Implement Projects to Provide Increased Awareness of Future Sea-Level Rise Impacts and Challenges for the City**

4 For example, the U.S. Constitution's Fifth Amendment seeks to protect property owners from arbitrary government action by providing, in part, that takings law often protects property owners' "reasonable, investment-backed expectations." *See, e.g.* Kaiser Aetna v. United States, 444 U.S. 164, 175 (1979); Thomas Ruppert, *Reasonable Investment-Backed Expectations: Should Notice of Rising Seas Lead to Falling Expectations for Coastal Property Purchasers?*, 26 J. Land Use & Envtl. Law 239, 246-56 (2011) (detailing development and application of the idea of "reasonable investment-backed expectations in Fifth Amendment takings jurisprudence); Annie Siders, Managed Coastal Retreat: a Legal Handbook on Shifting Development Away from Vulnerable Areas, p. iv, https://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/Fellows/ManagedCoastalRetreat_FINAL_Oct%2030.pdf]

5 *See, e.g.* discussion in Thomas Ruppert, *Reasonable Investment-Backed Expectations: Should Notice of Rising Seas Lead to Falling Expectations for Coastal Property Purchasers?*, 26 J. Land Use & Envtl. Law 239, 246-56 (2011) (detailing development and application of the idea of "reasonable investment-backed expectations" in Fifth Amendment takings jurisprudence).

6 *Id.*

7 *Id. at* FN 45 and accompanying text.

of Satellite Beach's Infrastructure: In addition, the inherent level of notice provided to its constituents by the City's activities in planning for sea-level rise and other impacts of climate change and amending its comprehensive plan and ordinances, the City may also provide some level of notice to the public by installing markers at public sites of past storm surge levels, rainfall flooding levels, and projected future water levels or storm surge levels. Markers could be placed at locations such as City Hall, The Schecter Center, the library, etc. This form of notice has been done in many different jurisdictions, from the federal level to the local level. Markers should include interpretive materials that provide references to and/or summaries of City policies and plans for addressing sea-level rise going forward.

- **Develop & Implement Notice Requirements for Permit Applicants:** In addition to general outreach and education to the public, such as through markers, another opportunity to help property owners understand the challenges that sea-level rise and climate change poses to their local government and to property they own presents itself during permitting. We recommend that the City develop specific language for notice requirements to applicants for any permit applications related to development/redevelopment/modification. The notice package to permit applicants should include at least:

  - Current flooding risk (based on NFIP FIRMs and HAZUS analysis);
  - The maps of USACE sea-level curves for 2040 and 2070 utilized by the City in its planning processes;
  - Erosion rates and information on past and current beach nourishment efforts;
  - IFAAA and EAAA maps;
  - Statements by City of the challenges it faces in long-term preservation of infrastructure and the potential for parts of the infrastructure system to eventually be abandoned by the City;
  - A list of ordinances, resolutions, and Comprehensive Plan policies that indicate how the City plans to adapt to rising seas and increasingly intense weather events;
  - A statement that, based on changing coastal, drainage, and flooding conditions, state, federal, and local laws may alter what development/redevelopment/modification activities may be allowed;
  - An "awareness of the risk"[8] form that indicates that the permit applicant has received, read, and understands the provided information.

  After receiving this package of the information, permit applicants should be required to sign the notice and return to City for recording of the awareneness-of-the-risk form

8 This is intentionally not styled as an "assumption of the risk" form since requiring the property owner to "assume the risk" through a contract could potentially be characterized as an exaction. If found to be an exaction, the process would then be subject to review under "takings" jurisprudence developed under the U.S. Constitution's Fifth Amendment. For minor development, such "assumption of the risk" exactions might be inappropriate. However, it might still be appropriate to consider "assumption of the risk" agreements for major rebuilding/redevelopment activities.

C. Recommendations Requiring Further Analysis and Consideration

- Develop new "Level of Service Standards": Develop new "Level of Service Standards" as current ones are based on the "period of record," but they do not sufficiently account for how things have already changed and will continue to change going forward.

- **Consider the Future of At-Risk Public Facilities:** Many publicly owned properties are highly vulnerable at the 2070 sea-level rise scenario (2.85-ft), where permanent flooding is projected to be more widespread at mean water levels. At high water levels (seasonal and annual), the projected flooding extent is pushed further inland. Of particular concern is the southeast corner of South Patrick Drive and Cassia Blvd, which includes City Hall and civic complex, the FPL electric substation, ballfields, and elementary school. Decisions regarding adaptation strategies (protect, accommodate, or relocate) for these facilities will need to be considered with detailed cost-benefit analyses. Potentially evaluate options such as modifying current Capital Improvements Element Policy 1.1.9 and examining possibility of acquisition of higher land on which to develop a government-services complex that could replace at-risk public facilities.

- **Work with Community to Evaluate Desirability of Special Assessments in the IFAAA:** Engage property owners in the IFAAA to evaluate whether they support and wish the City to develop a special assessment for properties located within the IFAAA to conduct cost-benefit and feasibility studies for infrastructure projects. If they support such an undertaking, the City should work with them to identify the scenarios that they would like to evaluate with the funding from the special assessment. For example, would they like a scenario based on three feet of sea-level rise and a 2070-2080 life span or a six-foot sea-level rise scenario in 2100?

- **Increase the "Tailwater Elevation" Used in Stormwater Design Calculations:** Regardless of any future the changes the City does or does not decide to make in the design storm used for stormwater design, the City should increase the "tailwater elevation" used in private and public design of stormwater systems to meet the existing level of service. Such requirements for construction of public stormwater infrastructure should be subject to the "Community Fiscal & Resilience Balancing Test" as presented in other recommendations in this report.

- **Evaluate Whether and How to Apply the "Community Fiscal & Resilience Balancing Test" to Private infrastructure Development:** Just as it makes sense for the City of Satellite Beach to examine whether it really makes social, cultural, and economic sense to build or maintain infrastructure to account for the full possible amount of sea-level rise during the infrastructure's projected usual service life, the same idea could be applied to private infrastructure. Alternatively, it may actually be desirable to impose higher standards on private infrastructure than those required of public infrastructure. The City should carefully evaluate the significant differences between the interests, responsibilities, available options, and legal liabilities between public and private entities constructing infrastructure before determining whether the City wishes to apply the "Community Fiscal & Resilience Balancing Test" to private-sector infrastructure development.

- **Institute Additional Rebuild Limitations:** Limitations on rebuilding have been talked about for decades in Florida, usually with little actual implementation. The City should consider developing limits on the number of times structures may be rebuilt due to natural disasters at the same time that the City creates a robust non-conforming use and amortization policy to help protect property owners'

rights. Ordinance No. 1160, which limits buildings in the CHHA to a single variance and includes a non-conforming use policy, partly accomplished this, but clarification of language and intent would be useful as the City evaluates whether to expand the geographic scope of the rebuild limitation.

- **Consider Modifying Capital Improvements Element Policy 1.2.5:** Consider whether to modify current Capital Improvements Element Policy 1.2.5, which reads, "Recognizing that the City is 98% built-out, and has no substantial facilities deficiencies, the City Concurrency Management System methodology will ensure that public facilities are available for development orders which were issued prior to the adoption of the City's comprehensive plan." The City may want to evaluate modifying this policy to recognize that the City either already has, or may soon have, public facilities deficiencies in roadways and drainage. Furthermore, it may no longer make sense for the City to maintain language ensuring facilities for development orders issued before comp plan adoption.

- **Evaluate Options for Closer Coordination Between Brevard County & Satellite Beach:** In conjunction with Brevard County, evaluate options and ways that Satellite Beach might coordinate more closely and align its actions with Brevard County's long-term beach management plan.

- **Evaluate Use of Modified AAAs in Retreat Policy:** Evaluate whether Satellite Beach would, resources permitting, like to consider creating "zones" of anticipated vulnerability and protection based on elevation, ability to upgrade public and private infrastructure, public safety, safety of first responders, environmental issues, return-on-investment calculations, and other criteria, as necessary. The goal of such an undertaking would be to provide even greater clarity to property owners and markets on the future of Satellite Beach and its infrastructure. If the City chooses to take this approach, the City could do so by modifying its existing Adaptation Action Areas (AAAs), by overlay zoning, or by other methods. Such information could be integrated into the CIP along with projected "tipping points" of sea-level rise and/or infrastructure damage/replacement costs that will serve as expected points at which the City might choose to no longer either upgrade infrastructure, replace infrastructure, or will only allot a limited budget to create the level of service possible for the infrastructure at issue with the allotted funds. Categorization of differing areas of the City according to their relative safety from sea-level rise and more intense precipitation events or storm surge will also allow the City to promote increased density of development in the safest areas

- **Undertake Review of Current Options for Elevating Structures:** The City of Satellite Beach currently allows fill as a method for elevating structures to meet minimum floor elevations. As other policies contained herein recommend increasing minimum floor elevations, this could lead to problems if property owners seek to raise new structure 4, 6, or 8 feet using fill. Such amounts of fill could create buildings on top of pyramids of fill, causing changes in surface flows and drainage. These changes could potentially expose property owners and the City to legal liability. Furthermore, buildings on fill are more exposed to erosion forces and potential structural failure during erosive events such as over wash on the barrier island on which the City sits. Thus, the City should analyze the possibility of limiting or eliminating the option to elevate buildings by use of fill and require that all required elevation take place through use of stem walls and/or pile-supported construction. This is encouraged as best practice by the National Oceanic and Atmospheric Administration and Association of State Floodplain Managers in their publication "Coastal No Adverse Impact Handbook" (2007) in Chapter 4. Satellite Beach may wish to consider potential benefits (greater resistance to "wave effects, velocity flows, erosion, scour or combinations of these

forces") and potential drawbacks (increased construction costs, difficulty/impossibility of garages at/near height of first floor, impact on neighborhood appearance) of such a regulatory change.

- **Requirement that Potential Property Purchasers Receive "Notice" of Coastal Hazards:** Due to the importance of property owners and the public understanding the challenges and limitations that sea-level rise and a changing future imposes on the City, the City may also wish to consider whether the City would like to require that notice be provided to potential property purchasers. The information that could be required to be provided to potential property purchasers could be similar or even identical to the information provided to permit applicants. The rationale and potential processes for such notice have already been developed elsewhere.[9] Information provided in such a notice and the process for the notice could be established by local ordinance.

  The possibility of injecting the City into the potential purchases of property could be challenging. While the City very likely has the authority to do this under its home rule authority, as evidenced by specific disclosures required by Miami-Dade County,[10] it may provoke strong reaction from the Florida Association of Realtors and others. Such political considerations, practical implementation issues, and other potential issues require further evaluation and research prior to making a recommendation on how or whether the City should move forward. Another avenue to investigate would be whether the City could record a notice for all properties or selected properties within the City that would then appear in any property's title search, thus providing some level of notice to potential property purchasers when they conduct a title search without putting a specific burden on a property seller or sellers' agents to ensure that notice is provided to potential property purchasers.

- **Seawalls:** Satellite Beach, like many coastal communities in Florida, has many seawalls. These may be either private or public. Whether public or private, seawalls represent an important infrastructure element. Furthermore, Satellite Beach has drainage infrastructure, which is public, that oftentimes discharges through privately owned seawalls, creating another challenge if the private owner needs to repair, replace, or upgrade the private seawall. Going forward, Satellite Beach will likely want to examine its policies on seawall elevation and performance, particularly on the west side of the City, to evaluate whether new standards should be adopted. To further consideration of this, we provide the following information from other local governments in that are working on the issue of seawalls and sea-level rise.

  - **1. Case Study: Broward County**

    On November 13, 2018, the Broward County Commission approved the initiation of a land use plan amendment to establish a seawall and top-of-bank elevation for tidally-influenced waterways, in accordance with sea level rise predicted through 2070. The proposed regional resilience standard includes requiring a minimum elevation of 4 feet NAVD88 by 2035 and 5 feet NAVD88

9 Thomas Ruppert, *Reasonable Investment-Backed Expectations: Should Notice of Rising Seas Lead to Falling Expectations for Coastal Property Purchasers?*, 26 J. Land Use & Envtl. Law 239 (2011).

10 *See, e.g.* Miami-Dade County, Fla., Code of Ordinances § 11C-17(a) (2018) ("In any contract for the sale of improved real estate located in unincorporated Metropolitan Miami-Dade County which is in a Coastal High Hazard Area, the seller shall include in the contract or a rider to the contract the follow-ing disclosure in not less than ten-point bold-faced type: THIS HOME OR STRUCTURE IS LO-CATED IN A COASTAL HIGH HAZARD AREA. IF THIS HOME OR STRUCTURE IS BELOW THE APPLICABLE FLOOD ELEVATION LEVEL AND IS SUBSTANTIALLY DAMAGED OR SUBSTANTIALLY IMPROVED, AS DEFINED IN CHAPTER 11C OF THE METROPOLITAN Miami-Dade COUNTY CODE, IT MAY, AMONG OTHER THINGS, BE REQUIRED TO BE RAISED TO THE APPLICABLE FLOOD ELEVATION LEVEL.").

by 2050 for seawalls and shorelines. Furthermore, the amendment would require local governments to adopt a local ordinance implementing this regional standard, within a suggested 2-year timeframe. The proposed regional standard will be informed by the technical work undertaken with the support and expertise of the U.S. Army Corps of Engineers (USACE) as part of the joint Broward County/USACE Flood Risk Management Study for Tidally Influenced Costal Areas authorized under the Planning Assistance for States Program. The Environmental Planning and Community Resilience Division (EPCRD) will prepare the draft amendment to the County's land use plan. The EPCRD will provide outreach through municipal workshops and roundtable discussions with industry stakeholders. It is anticipated that stakeholder outreach will occur through early spring 2019, allowing for feedback and refinement of proposed amendments through early summer 2019. At that time, it may be forwarded to the Broward County Planning Council for preparation, analysis, and recommendation.

- **2. Case Study: Delray Beach**

  The City of Delray Beach is considering updating its public and private seawall height requirements based on sea level rise projections. A vulnerability study was recently completed for the city by Aptim, which advised a 30-year planning elevation of between 3.9 - 4.4 feet NAVD by 2048 and a 5.3 – 7.4 feet NAVD by 2093. (Water Level Infrastructure Vulnerability Study, p.21). Low range values were based on the USACE High Curve for sea level rise, while the higher range values were based on the IPCC curve. The city received recommendations on how to address private seawall repairs and heights, considering public seawall improvements may be ineffective to prevent flooding if private seawalls are not also raised.

- **3. Case Study: Fort Lauderdale**

  In 2016, the City of Fort Lauderdale passed ordinances that guide residents on how and when seawalls must be raised. The city does not mandate a specific date for achieving compliance, but ongoing seasonal high tides, storm surges, and sea level rise will trigger citations under their ordinance that require seawall raising, as the city's ordinances require property owners to keep seawalls in good repair and prohibit property owners from allowing tidal waters to impact public rights of way and adjacent properties. If cited, the property owner has 60 days to demonstrate progress towards making a repair, and one year to fully remedy the situation. The ordinance also states that if there is any required seawall repair that meets the substantial repair threshold, it must be constructed to meet the minimum elevation requirements established by the City of Fort Lauderdale (see table below).

- **4. Case Study: Hillsboro Beach**

  In 2017, the Town of Hillsboro Beach enacted a new seawall ordinance to prevent adverse impacts on State Road A1A caused by tidal waters from the Intracoastal Waterway, requiring improvements to private property to impede tidal waters flowing on to private and public property and causing damage to adjacent properties.

  The top surface of a newly constructed seawall must have a minimum elevation of 4.0 feet NAVD. For properties with a base flood elevation of 4.0 feet NAVD, the minimum seawall elevation must meet 4.0 feet NAVD and the maximum seawall elevation is 5.0 feet NAVD. For waterfront properties with a habitable finished floor elevation of less than 4.0 feet NAVD, a seawall may be constructed at less than the stated minimum elevation if a waiver is granted by the Town Commission. For properties within an X zone, the minimum seawall

elevation must meet 4.0 feet NAVD and the maximum shall meet the definition of grade defined as the base flood elevation requirement for the lowest floor as shown on the flood insurance rate map published by FEMA. Property owners choosing to construct seawalls at less than 5.0 feet NAVD are strongly encouraged to have the foundation designed to accommodate a future seawall height extension up to a minimum elevation of 5.0 feet NAVD.

The town follows a model similar to Fort Lauderdale in terms of requirements to maintain a seawall in good repair and to prevent tidal waters from trespassing neighboring properties and the public right of way. The enforcement mechanisms are also similar, in terms of citations, a 60-day period to initiate mitigation, and a 365-day period to complete same.

- **5. Case Study: Longboat Key**

  On June 4, 2018, the Town of Longboat Key on Florida's west coast passed an ordinance to allow private residents to raise their seawalls and extend them farther into the water. The ordinance was a response to an increase in demand for permits by property owners seeking to raise their seawalls and protect their properties. Ordinance 2018-10 was passed by the Longboat Key Town Commission providing for a 12-inch projection beyond existing seawalls, allowing owners to make necessary repairs to their seawalls without significant impact on the width of canals or shoreline aesthetics. The Town Commission also included a provision to allow 4.5 feet above NAVD for maximum allowable height for a seawall cap to be consistent with other coastal cities in Florida. This is the first in a two-phase approach to shoreline inundation protection in Longboat Key. The second phase of the approach is a comprehensive overhaul of the Town's shoreline construction and sea wall ordinance.

- **6. Case Study: Miami Beach**

  The City of Miami Beach recently amended its Public Works Manual to require the raising of seawall heights in certain situations. As amended, the manual now requires that new private and public seawalls be constructed to a minimum elevation of

Ft. Lauderdale - Minimum Elevation Requirements

Property's FEMA Flood Insurance rate Map Location	Minimum Allowable Height (FT NAVD88)	Maximum Allowable Seawall or Dok Elevation (FT NAVD88)
In floodpain with base flood elevation greater than or equal to 5.0 ft. NAVD88	3.9	Base flood elevation of the property
In floodplain with base flood elevation equal to 4.0 ft. NAVD88	3.9	5
In an X zone, not in floodplain	3.9	Meet the definition of grade as detrmined by Section 47-2.2(g)(1)(a)

5.7 feet NAVD (from 3.2 feet previously). Existing seawalls that are not being repaired or replaced are permitted to remain so long as they meet the minimum 4.0 feet NAVD with the structural design to accommodate extension to 5.7 feet NAVD in the future. This new height is informed by sea level rise projections, design storm events, and coincides with the typical lifespan of a seawall.

- **7. Case Study: Punta Gorda**

  In Punta Gorda, the seawall maintenance program falls under the authority of the City's Canal Maintenance Assessment Districts: the Canal Maintenance Division is responsible for the maintenance & repair of all seawalls in the canal system which relieves private property owners from the worry and financial burden of a seawall failure. Another benefit of this public management program provides for a uniform seawall height, ensuring that one owner's decisions regarding seawall height and design do not negatively impact neighboring properties and the public right of way. An estimated 52,916 feet of seawall was damaged during Hurricane Irma, but nearly 70% of this seawall has been replaced with new wall. More information is needed regarding the design criteria for the new seawalls.

- **Ensure continued existence of lateral beach access in City permitting of seawalls: Potentially modify Coastal Management-Conservation Element Policy 1.1.5.** This could be done, possibly, by adding the following language at the end of existing Coastal Management-Conservation Element Policy 1.1.5: "For all armoring proposed on properties fronting the Atlantic Ocean in Satellite Beach, the City shall impose the condition of a conditional lateral public easement across the property behind the proposed armoring; the easement shall only be accessible and used by the public should the water come to the base of the constructed seawall. The property owner will have the burden of ensuring safe public access to and use of the easement for the purposes of protecting the public's existing customary right of access to the shoreline in Satellite Beach that has been compromised by the issuance of a permit for the seawall."

- Increasingly lateral public access has become a challenging topic in Florida. In 2018, the Florida Legislature passed House Bill 631, which is codified at Florida Statute Section 163.035. Due to extensive confusion caused by this legislation, bills have already been proposed in 2019 to "fix" such confusion.[11] As lateral access will only increase in importance as an issue as sea levels continue to rise, local governments whose economies and quality of life depend on beaches should be considering how to protect their beaches and later access for the public on those beaches currently subject to customary use by the public.

- As Satellite Beach already has an ordinance noting that all Atlantic Beaches in Satellite Beach are subject to a customary use easement in favor of the public (Ordinance #1158, March 21, 2018), it seems reasonable for the City to seek to protect this public right from the harm that armoring could do to it. The question is how local governments may do this. One example comes from state statutes addressing beach access in permitting processes at the Florida Department of Environmental Protection (DEP).

  Florida Statutes provide DEP, not local governments, the authority to require access when construction along the beach will harm public access.[12] As it seems unlikely that these statutory grants of authority could be

11 See, e.g. Senate Bill 54 (2019 Florida Legislative Session).

12 See, e.g. FLA. STAT. § 161.041 (2018) ("The department may require, as a condition to granting permits under this section, the provision of alternative access when interference with public access along the beach is unavoidable. The width of such alternate access may not be required to exceed the width of the access that will be obstructed as a result of the permit being

construed as preempting local government authority to require protections of beach access, Satellite Beach could consider exacting a lateral access easement. However, such a policy requires careful analysis and drafting to ensure that it does not run afoul of takings law jurisprudence protecting property owners from certain types of "exactions" of property rights in exchange for a permit.[13] For this reason and for reasons of design of the easement, this recommendation requires further analysis and consideration.

- **Clean Up of Abandoned Properties:** As sea levels rise, the City anticipates an eventual point at which some properties will no longer be desirable or tenable places to live. As this occurs, properties may essentially be abandoned by their owners, particularly after disasters that could represent the acute turning point for a property or neighborhood already long subject to the chronic stresses of increased tidal and freshwater flooding.

  Property abandonment, however, leaves behind structures, infrastructure, and garbage which can become serious pollutants and hazards within the encroaching littoral zone. Local governments will need to clean up these properties if the local governments want to maintain the water quality, quality of life, and aesthetics of their communities. How will local governments fund such clean ups?

  Involuntary liens against the properties may provide limited utility, but have been used by local governments in cases of cleaning up abandoned properties or those with significant nuisances (such as those proliferating during the mortgage crisis). If a property still has significant value, a lien on the property based on the local government's cost to clean up structures and garbage may be possible. However, if the property has already been abandoned, the property's market value may have already dropped so low that no one would be willing to take ownership of the property as the outstanding lien is higher to pay than the property is worth. Thus, local governments would be wise to consider how to fund future clean-ups of abandoned properties.

  There are numerous other resources that local governments may have available to assist in funding the clean-up of abandoned properties. These could include use of State Revolving Loan Funds, financing tools available through the Florida Development Finance Corporation, funds available through FEMA, the Florida Municipal Loan Council (bond pools or other sources), granting, bonding and/or some type of use of assessment structures.

  In terms of assessments, another potential option would be to research the viability of developing a system whereby the City proactively creates an assessment process for threatened properties before they are rendered valueless or abandoned. To do this, the City could establish guidelines for how much it estimates that clean-up of each property in the IFAAA and EAAA (or other identified areas, such as any "zones" created based on suggestion above) would cost should the property owner abandon the property. Based on the sea-level rise curve that the City is

granted."); FLA. STAT. § 161.052(12) (2018) ("This subsection does not limit or abrogate the right and authority of the department to require permits or to adopt and enforce environmental standards, including but not limited to, standards for ensuring the protection of the beach-dune system, proposed or existing structures, adjacent properties, marine turtles, native salt-resistant vegetation, endangered plant communities, and the preservation of public beach access."); and FLA. STAT. § 161.053(4)(e) (2018) ("The department shall limit the construction of structures that interfere with public access along the beach. However, the department may require, as a condition of granting permits, the provision of alternative access if interference with public access along the beach is unavoidable. The width of the alternate access may not be required to exceed the width of the access that will be obstructed.").

13 Nollan v. Cal. Coastal Commn, 483 U.S. 825 (1987); Dolan v. City of Tigard, 512 U.S. 374, (1994); and Koontz v. St. Johns River Water Management District, 133 S. Ct. 2586 (2013).

using and the vulnerability of the property to permanent inundation, the City establishes an estimated date at which the City assumes the property will be rendered valueless or abandoned and creates an assessment structure based upon that remaining viability of the property.

- **Resilient and Sustainable Housing:** Housing Element Objective 1.8 provides support for potentially incorporating a type of energy/ resilience points. An example of such a system is the one implemented in Norfolk, Virginia (https://www.norfolk.gov/index.aspx-?NID=3910). However, the system developed in Norfolk is likely too complex and administratively burdensome for the City of Satellite Beach to implement. Thus, further analysis and consideration is warranted to determine whether or not a simpler version would be both administratively workable and yet remain effective at providing flexibility in the provision of more resilient and sustainable housing in Satellite Beach.

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