

## **DEO Coastal Resilience Vulnerability and Adaptation Pilot Study and Other Related City Initiatives**

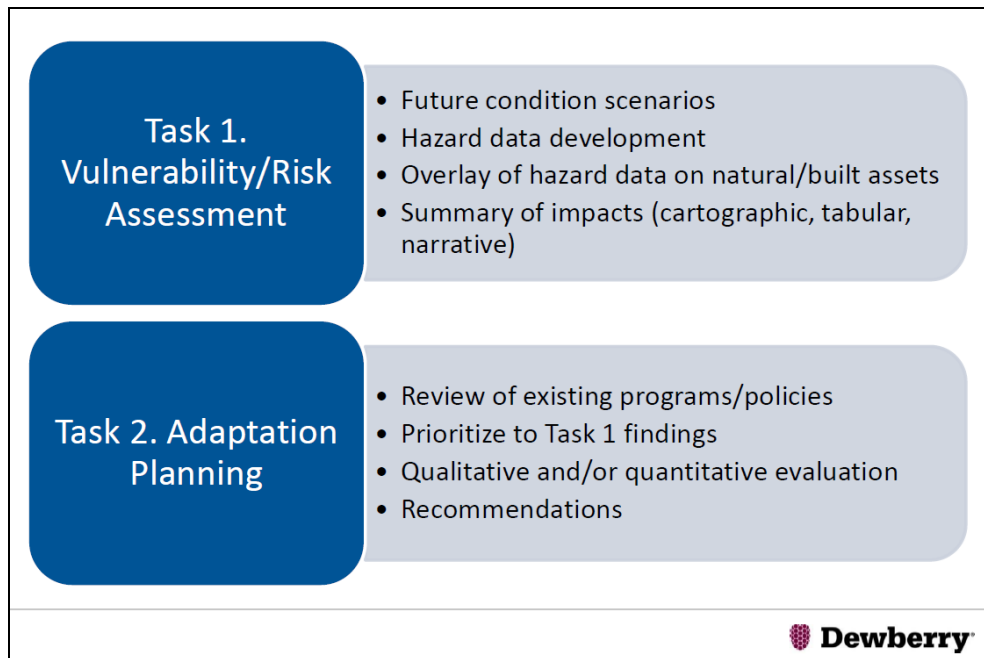
### **Background**

In September 2015 the City was selected by the Florida Department of Economic Opportunity (DEO) to be one of three communities participating in a DEO pilot study on vulnerability analysis and adaptation planning. The DEO contracted with Dewberry Consultants LLC (Dewberry) to work with the selected communities (City of St. Augustine, Escambia County and City of Clearwater) to complete two tasks related to local conditions, and a third task based on the cumulative work and experience of the overall initiative:

1. Develop coastal hazard vulnerability analyses and scenarios for the three pilot communities;
2. Use those vulnerability analyses and scenarios to complete coastal hazard adaptation plans for each of the three communities; and
3. Prepare a number of guidance tools, presentation materials, and case studies that clearly identify and explain all the information and resources needed and available to Florida communities for the completion of these same analyses, scenarios and adaptation plans for their own communities.

DEO and Dewberry recognized that there was no predetermined tool, problem, process or solution, so Dewberry's role was to work with the pilot communities to identify issues to address related to sea level rise and/or coastal flooding, and obtain the necessary data to evaluate those issues. The pilot communities would have input into the project's recommendations, and should incorporate aspects of the final plan's recommendations into their local comprehensive or hazard mitigation plans.

The overall project is managed by DEO, and the City's role is to identify goals, provide local data and information, review work products and provide input on the recommendations to the consultant. A known limitation of the project was the finite budget, which limited the overall scope and level of detailed analysis and reporting possible, and the project schedule, which was originally set by DEO to be complete by mid-December 2016. Dewberry's deadline was later extended due to the complexity of the project and time required for work product review. Locally, these constraints meant that the number of scenarios evaluated in Task One were limited in an effort to balance thoroughness and detail, as was the anticipated work product (Adaptation Plan) for Task Two. However, this does provide the City with an initial study and some localized data which can guide future projects and possible policy changes.

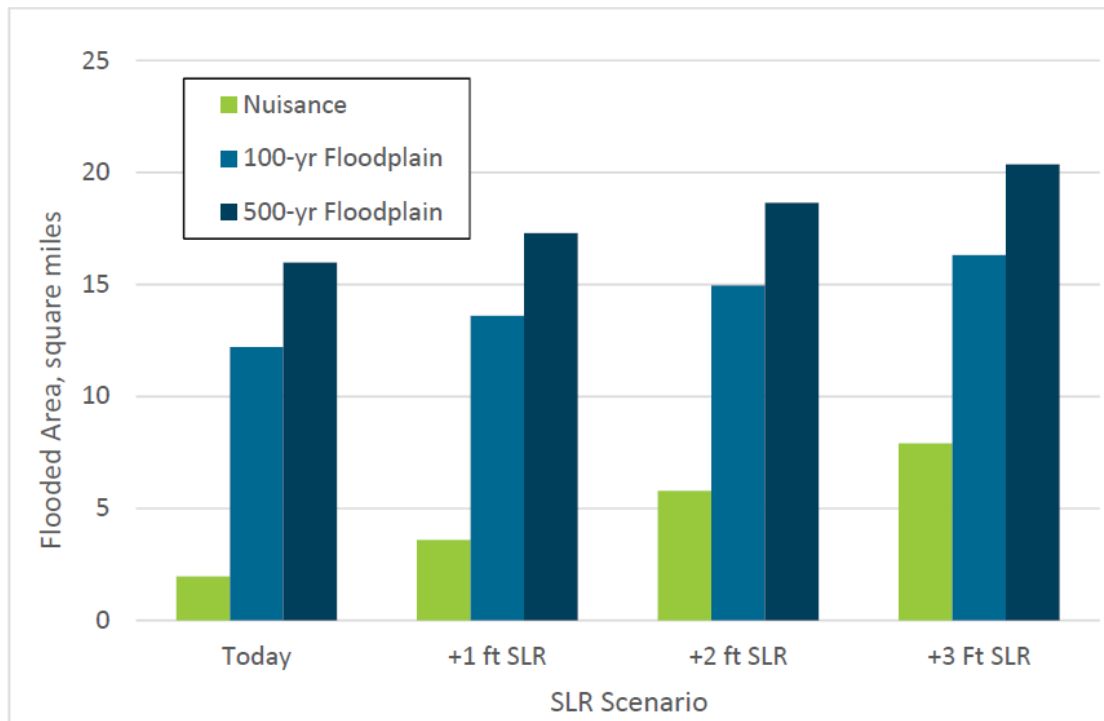


### **Task One: Vulnerability Assessment**

Task One of the project started in late October 2015. At a brief “kick-off” meeting held online, City staff and Dewberry set the overall goals of the project, discussed the project vision, and reviewed the project timeline. Prior to this meeting, City staff completed a survey which provided a baseline understanding of what the City was looking to achieve through the project, and the areas (i.e., geographical, infrastructure, etc.) that the City wished to focus on, which was also discussed at this meeting.

In mid-January 2016, Dewberry and DEO staff visited Clearwater for an all day meeting to develop an understanding of the City’s priorities and future vision which would affect the scope of the Vulnerability Assessment (Assessment). Representatives from the Planning and Development, Engineering, Public Utilities, Emergency Management, and Clearwater Gas Departments participated. Dewberry provided an overview of sea level rise science and context, best sources of sea level rise information, short and long term scenarios, and their initial sea level rise mapping for the City. Through a facilitated discussion, City staff established key problems based on their individual expertise and experience, and produced action items on which the vulnerability report would be based.

After this meeting, the consultants prepared the Assessment based on City data and conditions. This is a highly technical report, which utilized GIS identify the City’s baseline conditions for nuisance flooding, a 100-year storm event, and a 500-year storm event, and compares those results to the same events with a sea level rise of one, two, and three feet (excerpt of results below; complete results contained in Chapter 3 of Assessment).



**Figure 2. Changes in land area flooded by each flood type with 1, 2, and 3 feet of SLR as compared to existing conditions.**

These conditions were overlaid onto other City data to provide seven high-level data points later used in Task 2 (Chapters 4 and 5 of Assessment). Those were:

1. Flooding “Hotspots”: Identified hotspots are Clearwater Beach, Sand Key, Island Estates, and areas around Stevenson and Allen Creeks, as well as Cooper Bayou, which were confirmed and were anticipated by staff.
2. Additional Flooding Expected: Nuisance flooding is expected to increase the most over all levels of sea level rise, whereas the 100-year and 500-year storms are also expected to increase but not as exponentially as nuisance flooding.
3. Road Vulnerability: The road network’s vulnerability to flooding increases the most for nuisance flooding, while the increases for the 100-year and 500-year storms are relatively low.
4. Building Vulnerability: Since finished floor elevation data is not available, this only indicates when a building lies within one of the areas impacted by nuisance, 100-year and 500-year flooding at each level of sea level rise.
5. Bridge Vulnerability: Bridges will start to see impacts reducing passability during nuisance flooding events with 2 feet of sea level rise, while others may experience impacts during 100- and 500-year storm events with 1 foot of sea level rise.

6. Affected Essential Facilities: Two fire stations and two wastewater treatment facilities were found to be vulnerable to flooding in several of the scenarios, but no schools are vulnerable.
7. Shoreline Change: The shoreline on Clearwater Beach is expected to remain stable, with the potential for slight rates of growth, whereas the shoreline on Sand Key will likely see increased rates of erosion.

Additionally, the Assessment touched briefly on two additional factors known to also affect flooding: changes in heavy precipitation and anticipated changes to the water table (Chapter 6 of Assessment). However, due to the limited scope and issues with downscaling national data to a local level, the level of detail is limited.

### **Task Two: Adaptation Plan**

Task Two, Adaptation Planning, is currently underway. For this task, the consultant team also includes representatives from the Sabin Center for Climate Change Law at Columbia Law School and the St. Thomas School of Law. In October 2016, City staff from the Planning and Development, Engineering (Environmental, Stormwater Engineering and Stormwater Maintenance), Parks and Recreation, and Economic Development and Housing Departments met with DEO and the consultant team to discuss: the findings in the Assessment; policy context and how the City's efforts fit into state-wide efforts; options for adaptation and how the law enables or constrains their implementation; and possible local strategies and issue priorities. The final work product will be a standalone document that will guide future comprehensive or mitigation plan goals, objectives, and/or policies.

City staff received a first draft of the Adaptation Plan in mid-February, is currently reviewing a second draft. The Adaptation Plan includes the following: description of basic goals for adaptation; categories of adaptation measures; legal considerations for Florida localities looking to implement such measures; vulnerabilities particular to Clearwater; features of the Clearwater community and economy that will likely enable and/or constrain ambitions for local adaptation and priority setting. Additionally, the Plan includes potential responses to identified vulnerabilities based on local context, most of which are recommendations for policy changes, keeping in mind the legal context. For example, if the City were to implement *Option A*, the legal ramifications could be *these*.

The Plan does not identify specific Capital Improvement Projects, but rather identifies policy changes that could lead to specific Capital Improvement Projects, and includes general guidance on the types of projects that may be implemented. For example, based on recommendations in the Plan, the City might adopt a policy that says City infrastructure projects with anticipated life spans of 50 years (example only) should incorporate an evaluation of possible impacts from sea level rise or other coastal flooding events to determine what additional design upgrades should be incorporated.

A copy of the draft Executive Summary of the Plan is attached, which summarized potential responses described within the plan. The DEO Coastal Vulnerability Assessment and Adaptation Plan project will be completed no later than June 30, 2017 (per the updated agreement). The consultants anticipate the final Adaptation Plan will be complete in late April or early May.

### **Related City Projects/Tasks**

In addition to the work Planning and Development Department staff is involved in described above, two additional projects are in process that are related. The Adaptation Plan, the DEO Peril of Flood Technical Assistance Grant (accepted in January 2017), and updates to the city's floodplain management regulations contained within the Community Development Code all address flood risks and mitigation to differing degrees.

Work completed as part of the Peril of Flood grant examines the City's Comprehensive Plan and how to appropriately address the new statutory requirements signed into law in May 2015 through Florida Senate Bill 1094, "An Act relating to the peril of flood." This act requires specific components be included in cities' Coastal Management Elements, including the addition of a coastal redevelopment component addresses how to eliminate inappropriate and unsafe development in the coastal areas when opportunities arise. Additionally, cities must include redevelopment principles, strategies, and engineering solutions that reduce the flood risk in coastal areas which results from high-tide events, storm surge, flash floods, stormwater runoff, and the related impacts of sea-level rise. The City has contracted with HDR, Inc. to assist in the completion of the technical analysis and to draft amendments to the Comprehensive Plan to address these new requirements. These are anticipated to be presented to City Council in early summer.

Additionally, amendments are required to the City's floodplain management regulations to better coordinate with the Florida Building Code, which was amended to include flood provisions several years ago. There may be opportunities to incorporate language that also increases points earned towards the City's CRS score. Staff is currently drafting policy language on which Council direction will be requested prior to proceeding with public hearings on the Ordinance.

There may be recommendations in the Peril of Flood project that could be integrated into changes to the floodplain management regulations. And, since the Peril of Flood project is utilizing the results of the Assessment as part of its analysis, there is the likelihood that recommendations for policies in the Comprehensive Plan may also need to be codified within City Codes.

# Florida Community Resiliency Initiative Pilot Project

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## Adaptation Plan *for* Clearwater, Florida

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**DRAFT DATE MARCH 27, 2017**

The City of Clearwater is one of the three communities involved in the pilot phase of the Community Resiliency Initiative being conducted by the Florida Department of Economic Opportunity (DEO) and funded by the National Oceanic and Atmospheric Administration (NOAA). The Initiative seeks to assess vulnerabilities to projected increases in coastal flooding and develop strategies to make affected areas more resilient.

This document builds on the Coastal Vulnerability Assessment developed by Dewberry Consultants, LLC as part of Task 1. It describes key legal and policy constraints and supports for responses to vulnerabilities identified by Dewberry and identifies possible ways for Clearwater to respond to those vulnerabilities. Although it presents an array of potential responses and suggests steps for integrating them into the City's project planning and budgeting process, this document does not examine the feasibility, costs or benefits of particular responses, nor does it select or prioritize responses.

### ***The adaptation planning process***

The National Oceanic and Atmospheric Administration's U.S. Climate Toolkit describes adaptation planning as proceeding in five steps:

- 1) Identify climate-related changes and risks;
- 2) Assess vulnerabilities;
- 3) Investigate possible responses;
- 4) Prioritize responses to achieve near- and longer-term adaptation goals; and
- 5) Execute and evaluate outcomes.<sup>1</sup>

Clearwater completed steps 1 and 2 with Dewberry's help and is currently engaged in step 3. For Clearwater to complete steps 4 and 5, it should use the recommendations in this report to develop plans for specific projects, which can be assessed and prioritized based on analyses that consider their feasibility, costs, benefits, and cost-effectiveness relative to alternatives.

### ***Key features in adaptation planning***

After describing sea level rise (SLR) in Florida and the Community Resiliency Initiative, this document describes key features of the context in which Clearwater will adapt, including:

- General information about adaptation planning;
- The City's legal context;

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<sup>1</sup> U.S. Climate Resilience Toolkit, *Overview: Steps to Resilience*, <https://perma.cc/PAA4-3BMP> (last updated Nov. 16, 2016); *see also* Katherine Jacobs, Tom Wilbanks, et al., National Academies of Sciences, *Adapting to the Impacts of Climate Change* 135 fig. 4.1 (2010) (suggesting similar process), <https://perma.cc/D3DX-G3RR>. The Centers for Disease Control and Prevention (CDC) has developed a similar framework for improving community resilience. *See* Centers for Disease Control and Prevention, *CDC's Building Resilience Against Climate Effects (BRACE) Framework*, <https://perma.cc/E6PG-538W>, (last updated Oct. 22, 2015).

- Summaries of key vulnerabilities identified by Dewberry;
- Key features of Clearwater that will inform and limit adaptation decisions; and
- Potential responses to Clearwater’s vulnerabilities.

## ***Recommendations***

The following list summarizes the potential responses described at greater length in section 5 of the report:

### *Stormwater and Wastewater Management*

- ⇒ Making reference to SLR scenarios in Dewberry’s Vulnerability Assessment, examine the full array of options for hardening vulnerable wastewater treatment plants to storms and flooding, comparing net present value of short-term engineering solutions (e.g., erecting flood barriers around key structures, elevating electrical components) with more extensive redesign options (e.g., elevating an entire plant);
- ⇒ Address CSX activity that promotes erosion, either informally or by asking the City’s legal staff to develop a challenge to dumping that requires a Clean Water Act section 404 permit;
- ⇒ Request funding for a study to establish a “business as usual” baseline for comprehensive system maintenance budgets that assume no design changes under high and highest SLR scenarios on a 30-year time horizon; then explore design changes in areas vulnerable to flooding (currently or foreseeably) and compare their expected cost-effectiveness with “business as usual”;
- ⇒ Adopt a Capital Improvements Element policy that only permits additional maintenance spending on facilities or components repeatedly subject to SLR-driven impacts if the responsible department has examined alternative design standards and found that they would yield no net benefit over a 5, 10, or 20 year timeframe;
- ⇒ Evaluate the costs and benefits of installing green infrastructure / low impact development in rights of way as a means of reducing strain on stormwater system and improving compliance with water quality standards;
- ⇒ Explore possible acquisitions of land—including land that is partly or fully developed—for restoration of floodplain; evaluate cost of acquisitions against costs avoided in “business as usual scenario” (see above);
- ⇒ Explore areas where imposition of setbacks in advance of further development could avoid strain on stormwater management system;



- ⇒ Coordinate with Pinellas County regarding enforcing compliance with MS4 permit on parcels of the county that are surrounded by the City;
- ⇒ In collaboration with Pinellas County and other localities in SWFWMD’s jurisdiction, propose that SWFWMD revise its current approach to assessing funding proposals, which only credits outcomes relating either to quality or quantity, but not both.

### *Flood Insurance and Freeboard*

- ⇒ Impose freeboard requirements in all FEMA-designated flood zones and consider imposing them in areas expected to become vulnerable to storm surge over the next 25 years according to Dewberry’s Vulnerability Assessment;
- ⇒ Explore options for applying FEMA Hazard Mitigation funds to buyouts of properties that are especially vulnerable to repeated and severe flooding;
- ⇒ Revise the local criteria for “substantial damage” and “substantial improvement” to pertain to damage or improvements occurring over a period of five or ten years;

### *Coastal Management and Development*

- ⇒ Make freeboard a condition of permits for installation, modification, or maintenance of sea walls and other forms of coastal hard armoring;
- ⇒ Require sellers of private property in Clearwater to provide buyers with a summary description of expected SLR-related flooding impacts on property and infrastructure servicing that property;
- ⇒ Make conduct of analysis of SLR and flooding impacts on planned structures a condition of permits for development or redevelopment of coastal property;
- ⇒ Commission or conduct an inventory of all sea walls that assesses their expected useful life under the SLR scenarios described in Dewberry’s Vulnerability Assessment;
- ⇒ Commission or conduct an assessment of existing or planned infrastructure and buildings to determine whether they can accommodate expected flooding under the SLR scenarios described in Dewberry’s Vulnerability Assessment as likely to occur within their useful life.

### *Roads and Bridges*

- ⇒ Adopt ordinance authorizing reduced maintenance of roads and bridges under particular environmental and budgetary circumstances;
- ⇒ Link adoption of ordinance to establishment of AAA that encompasses portions of barrier islands and other coastal areas of Clearwater where roads are identified as vulnerable to nuisance flooding in a 2-foot SLR scenario.

### *Disaster Recovery*

- ⇒ Impose restrictions on post-disaster rebuilding in areas expected to become more vulnerable to coastal flooding, whether in the form of setbacks, design requirements (e.g., base flood elevation and freeboard), or simple prohibitions;
- ⇒ Condition permission to rebuild after a disaster on demolition of or agreement not to install sea walls or other forms of hard armoring;
- ⇒ Condition permission to develop or rebuild post-disaster on a covenant to abandon or remove the structures following a subsequent, similar natural disaster;
- ⇒ Promote the dedication of conservation easements in areas vulnerable to repeat flooding.

### **Conclusion**

This Adaptation Plan serves several purposes. It describes key features of the policy and legal frameworks that underlie adaptation efforts in Florida, highlights key vulnerabilities and circumstances relevant to any effort to address those vulnerabilities. Finally, it recommends various means of better adapting Clearwater to rising seas.