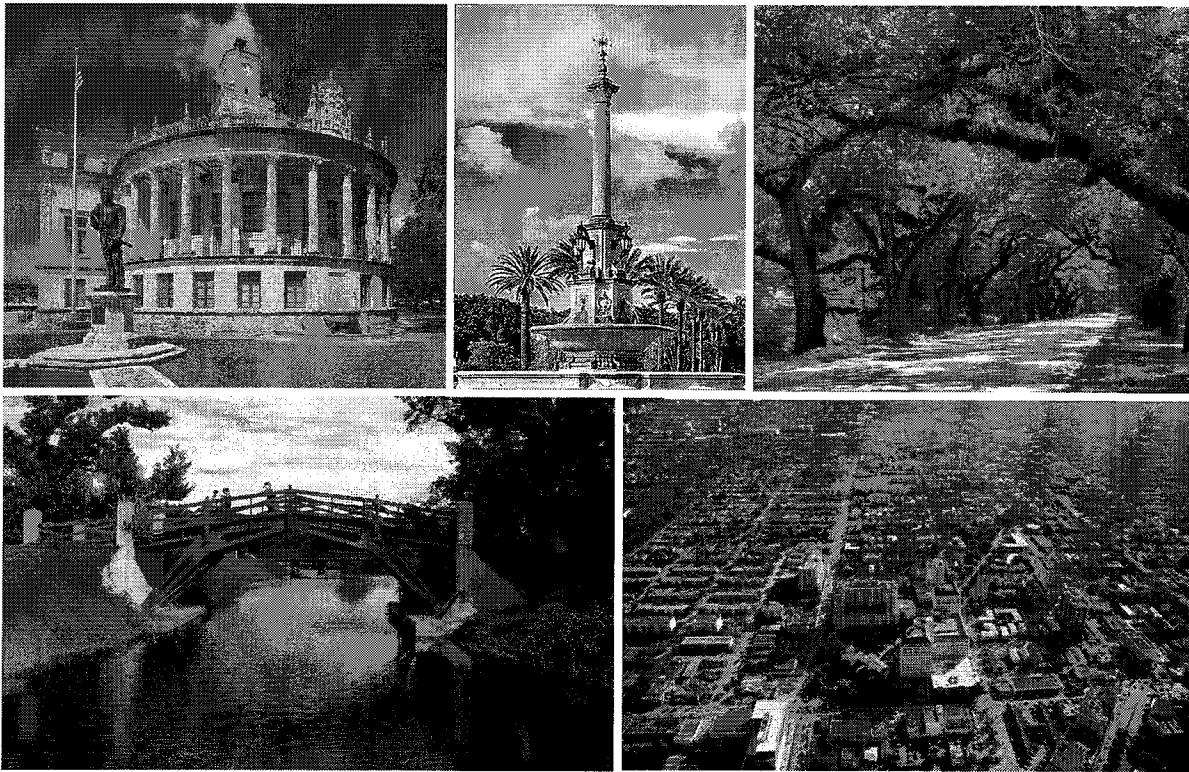


*Legal Considerations Surrounding the City of
Coral Gables' Adaptation to the Threat of Sea
Level Rise†*



*Draft version to be presented for the City Commission's review and for discussion
at the September 28, 2016 City Commission meeting.*

EXECUTIVE SUMMARY

Sea level rise is projected to be a growing threat to the future prosperity of South Florida, including the City of Coral Gables. The City's current leadership is mindful of this reality, and has requested that the City Attorney's Office, with the assistance of special counsel, as well as with the assistance of City staff, work together to draft this white paper which outlines various sea level rise adaptation options available to the City, with a focus on some of the key legal implications surrounding those adaptation options.

As set out in Section I ("Introduction") of this paper, the City has already begun to actively develop and implement measures designed to help adapt to the rising seas. A critical next step in sound adaptation planning, as set forth in Section II ("Gathering Actionable Data"), is for the City to obtain reliable data upon which rational and legally defensible planning and regulatory decisions can be made. Section II discusses the key data that is currently available, the scientific efforts underway in South Florida and across the world to measure the rising seas, the vulnerability assessments that are being utilized to predict the impact on specific communities (including ours), and what next steps the City should consider to improve the data that is available to assist in its planning and regulatory efforts.

Another critical step in making sound adaptation decisions is ensuring that stakeholders are informed and engaged in such efforts. This issue is discussed in Section III ("Informing and Engaging the Public"). Numerous specific suggestions relating to community engagement are presented, followed by a brief discussion of various benefits and risks associated with the notification and education efforts the City might consider.

Section IV ("City Infrastructure Adaptations") then considers important questions surrounding the City's infrastructure adaptation investments. The practical considerations surrounding the cost-benefits of these planning-level decisions are juxtaposed against liability-related considerations such as inverse condemnation concerns, regulatory takings litigation risk, sovereign immunity principles, and the obligation to act with due care. Section IV also discusses nine different financing options potentially at the City's disposal to pay for the costly infrastructure investment efforts that may have to be made in the future. The nine options discussed are: ad valorem taxation; special assessments; user fees & utility fees; developmental impact fees; municipal bonds; state, federal, and non-profit grants and subsidies; and public-private partnerships. Section IV also provides some examples of how other local governments, such as the City of Miami Beach and the Town of Longboat Key, have combined various funding options to begin implementing adaptation measures in their communities. Ex-ante risk financing tools are also referenced.

Part of a comprehensive sea level rise adaptation response will necessarily include revisions to the City's existing comprehensive plan. Section V ("Comprehensive Planning for Sea Level Rise") first contains suggestions regarding: logical planning horizons for sea level rise-related policies to be added to the City's comprehensive plan; how to rely on appropriate data and analyses to advance the City's policies; and when to amend the comprehensive plan. A new statutory provision specifically related to sea level rise, passed by the State Legislature in 2015, is then explained. Next, Section V discusses some of the key comprehensive plan elements for the City to consider either adding or amending to include policies relating to sea level rise. The text of specific Objectives and Policies are included as examples of how thought leaders across Florida are recommending that local governments incorporate sea level rise concepts and policies into

their comprehensive plans. Lastly, Section V discusses the important topic of including Adaptation Action Areas (“AAAs”) in the City’s comprehensive planning. AAAs are explained, including what inclusion criteria the City should consider when formulating AAAs, what type of subzones might be considered, examples of how other local governments have already begun implementing AAAs, and how municipality liability risks can be weighed in the context of implementing AAAs (and in the context of comprehensive planning for sea level rise generally).

Next, Section VI (“Regulatory Tools for Adaptation”) deals with: (1) the critical topic of what regulatory tools are at the City’s disposal to adapt to sea level rise, and (2) how consideration of liability risks should be incorporated into decisions about adopting each of those various regulatory tools – including takings issues, substantive due process principles, and Florida’s Bert J. Harris, Jr. Private Property Rights Protection Act. Zoning tools, such as the use of overlay zones and downzoning, are discussed, followed by a discussion of building code and resilient design adaptation options, such as elevation requirements, as well as historic preservation, accessibility, and aesthetic implications of new resilient design options. Regulations relating to setbacks and buffers are discussed next, followed by discussions of conditional development and exactions, rebuilding restrictions, and finally restrictions on coastline armoring.

Section VII (“Land Acquisitions and Conservation Easements”) discusses voluntary land acquisitions, eminent domain land acquisitions, and conservation easements – all of which will likely play important roles in the City’s sea level rise adaptation efforts.

Section VIII (“Market-Based Tools”) then discusses a number of market-based adaptation tools, such as the use of transferable development rights, tax incentives, other incentives such as payments for ecosystem services, and mandatory risk disclosures in real estate transactions. This section also discusses the importance of the City monitoring and working in concert with private sector forces, including anticipated changes to the real estate market, the mortgage industry, the insurance industry, and an anticipated increase in private litigation.

Section IX (“Long-term Retreat”) considers community retreat and shut-down planning issues, which ideally will never need to be addressed but which current sea level rise projections indicate should at least be considered as part of a comprehensive long-term adaptation plan. This section touches on questions such as the legal options involved in reducing any municipal services that can no longer be maintained, taxation issues when services are reduced to an area, options for assisting with the relocation of residents, and the clean-up of abandoned and submerged lands to avoid environmental, health, and safety problems.

Finally, Section X (“Next Steps”) lists some key next steps the City can take to develop and implement legally-sound adaptation polices.

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I. Introduction

A. The Purpose and Scope of This White Paper

The City Commission of the City of Coral Gables and Coral Gables Mayor Jim Cason have made it a top priority to consider and begin to implement policies that will prepare the City for the substantial rise in sea level and other effects of climate change that are predicted to affect the City in the coming decades. This white paper discusses many policy options at the City's disposal to adapt to sea level rise, and provides a framework to begin understanding the various legal issues that are likely to arise as such adaptive measures are implemented.

Because sea level rise adaptation is a rapidly changing and complex interdisciplinary issue, this white paper should be treated as a preliminary, living document that should be updated as the legal landscape evolves, as the available science improves, and as the facts on the ground change. In other words, each decision by the City and its residents in the years ahead will need to be based on carefully calculated, long-term cost/benefit analyses that factor in changing circumstances.

To understand the scope of this white paper, it is also important to understand the distinction between sea level rise mitigation efforts and sea level rise adaptation efforts. Sea level rise mitigation involves "human interventions to reduce the human impact on the climate system, [and it] includes strategies to reduce greenhouse gas sources," while sea level rise adaptation involves "necessary changes to protect oneself, structures and communities from the effects of sea level rise."² The focus of this paper is on the latter – the legal implications of actions the City can take to *adapt* to rising sea levels.³

Accordingly, it is beyond the scope of this paper to analyze the heavily politicized question of the extent to which human's addition of high levels of carbon dioxide and other greenhouse gases into the atmosphere will continue to cause warming and a corresponding melting of Earth's ice sheets. While there is a strong consensus among leading scientists on that important "why" question,⁴ it is not a debate that is necessary to engage in here. Rather, it is sufficient for the City's adaptation-planning purposes to recognize that sea levels are projected to rise substantially in the decades to come. Indeed, this increase has already begun. For the past several years, the daily high-water mark in our region has been increasing at an accelerating rate.⁵ The critical question facing the City is: At what rate will future sea level rise occur? Climatologists have been working to answer this complex question, and their current projections are included in Section II below.

B. Sea Level Rise Generally

For millions of years, when global sea levels were substantially higher than they are today, the City of Coral Gables, like the rest of South Florida, lay underwater.⁶ Now, like the rest of South Florida, the City appears to be in danger of again being submerged due to an uptick in global temperature. As the temperature of the Earth changes, so does its sea level. Temperature and sea level are linked for two main reasons: (1) ice on land (namely glaciers and ice sheets) melts, which increases the total volume of water in the ocean, and (2) as water molecules warm, they expand slightly – an effect that is cumulative and substantial across all of Earth's oceans.⁷

Rising sea levels can affect human activities in coastal areas like Coral Gables by: contributing to coastal flooding, making the region more vulnerable to damage from storms by amplifying the effects of storm surge, eroding shorelines, and increasing the flow of salt water into groundwater aquifers.⁸

C. Our Community's Vulnerability

Climatologists, academics, and political leaders around the world are referring to South Florida as “ground zero” for sea level rise and as “the poster child” for the impacts of climate change.⁹ Like much of South Florida, the majority of the City of Coral Gables – with its population of over 50,000 residents, over 20,000 homes and apartments, and over 13,000 businesses¹⁰ – lies only between 0 and 10 feet above sea level,¹¹ and the City has over 47 miles of coastline and waterway exposure.¹² When Hurricane Andrew struck South Florida in 1992, some coastal parts of the City saw storm-tide elevations of between 8.2 and 16.6 feet above sea level.¹³

Additionally, the bedrock foundation of our City is a porous limestone base – the remnants of ancient coral reefs. This fact has been described as South Florida's Achilles' heel when it comes to sea level rise vulnerability, because this porous limestone can act like a sponge, allowing water to flow up and through it, to bubble up through the ground, to flow up pipes and drains, to saturate infrastructure, and to encroach on fresh water supplies. For this reason, South Florida is not in a position like Venice, Italy or Amsterdam, Netherlands, where seawalls, dikes, and man-made canals provide an effective (albeit expensive) sea level rise adaptation solution. Building a seawall on top of porous limestone has been analogized to building a fence on top of an extensive network of tunnels – it may change the route of travel, but it is unlikely to significantly change the amount.¹⁴

D. The City's Adaptation Efforts To Date

Although the impact of sea level rise on the future of the City is uncertain, the City has already begun some sea level rise adaptation planning. Perhaps most notably, in August 2015, the City signed on as an official partner of the Southeast Florida Regional Climate Compact (the “Compact”), which is a partnership, formed with bipartisan support, that shares knowledge and resources to plan for changes due to climate change.¹⁵ The Compact includes 26 other local governments from Palm Beach, Broward, Miami-Dade, and Monroe counties. The Compact is the first of its kind throughout the country, and it represents “a new form of regional climate governance designed to allow local governments to set the agenda for adaptation while providing an efficient means for state and federal agencies to engage with technical assistance and support.”¹⁶ By actively participating in the Compact, the City has a seat at the table to promote strategies that will help our community.

The City has already begun to take action on recommendations coming out of the Compact. With the support of a variety of local, regional, state, and federal agencies, the Compact has prepared the Southeast Florida Regional Climate Action Plan (the “RCAP”). The RCAP is a framework of 110 recommendations to help guide climate change-related policies and projects, and its implementation is designed to be flexible to address specific local conditions.¹⁷ Coral Gables is a signatory to the Mayors' Climate Action Pledge,¹⁸ which outlines the City's commitment to integrate the RCAP's framework into existing and future municipal sustainability

action plans, comprehensive plans, and/or climate action plans where and when appropriate and financially feasible.¹⁹ So far, the City has implemented more than a dozen of these action items, and is actively pursuing efforts to implement many more. The RCAP also has a Municipality Working Group that has been formed to assist local municipalities on implementation, and the City's Sustainability Specialist attends those meetings.

Coral Gables is also one of five cities around the country – and the only Florida city – participating in a White House pilot project called the Climate Resilience Dialogues.²⁰ This project has allowed City staff to get answers to specific adaptation-related questions from climate resiliency experts from around the country.²¹

The City Commission has also approved funding to conduct a vulnerability assessment that will seek to objectively determine the relative risks to City-owned infrastructure due to sea level rise, and to recommend improvements to address those vulnerabilities. That assessment is discussed in Section II. B. below.

II. Gathering Actionable Data

A. The Need for Reliable Data

A critical first step in sound adaptation planning is for the City to obtain (and frequently update) reliable, actionable data. South Florida is fortunate to have some time to prepare for sea level rise, compared to the more limited time we often have to prepare for an incoming hurricane or tornado. This allows us time to gather accurate information and plan responsibly.

Working with the best available data is critical not only from a practical perspective but also from a legal perspective. As discussed throughout this white paper, important property rights will be affected by the decisions that the City (and other governmental agencies) make in the coming decades. As a matter of good governance and to defend against legal challenges, it is important to base those decisions on scientifically sound data and analysis.

B. Critical Data Available/Gathered To Date

There has been a substantial amount of research and published literature in recent years on the issue of sea level rise. Some of the key highlights of that information are set forth below.

1. Projections of Sea Level Rise

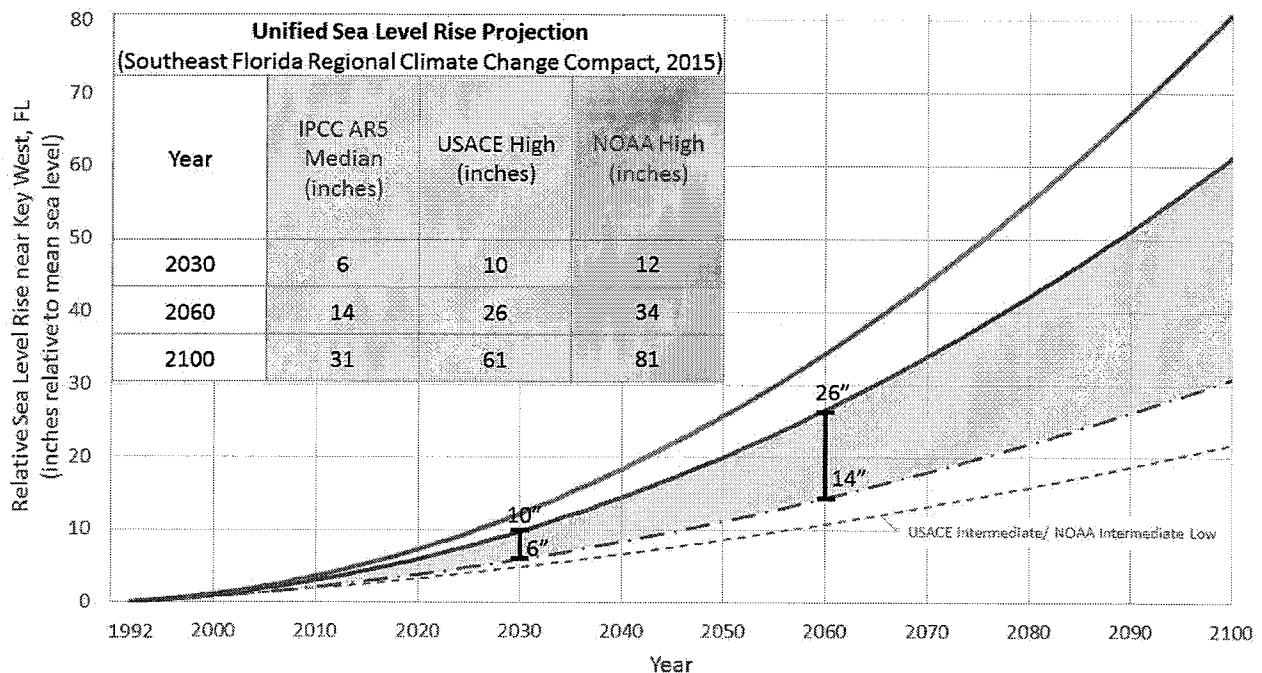
In 2012, the National Oceanic and Atmospheric Administration (“NOAA”) published the U.S. Government’s sea level rise projections as part of the National Climate Assessment. The projections estimated a range of 8 inches to 6.6 feet of sea level rise by the year 2100.²² Similarly, the U.S. Army Corps of Engineers (“USACE”) projects a rise of as much as 5 feet by 2100.²³ And the Intergovernmental Panel on Climate Change (“IPCC”) projects a rise of 1.5 to 2.7 feet by 2100.²⁴ However, some scientists caution that these projections are likely too conservative.²⁵

Closer to home, the Compact has released a Unified Sea Level Rise Projection tailored to Southeast Florida, which is designed to assist local governments in planning. This projection was

developed by more than 20 regional and national scientists and experts and is based on the most up-to-date scientific literature, and it is expected to be updated every five years.²⁶ It projects an anticipated range of sea level rise for our region between 1992 to 2100, and it highlights three planning horizons:

- Short term: By 2030, 6 to 12 inches above 1992 mean sea level,
- Medium term: By 2060, 14 to 34 inches above 1992 mean sea level, and
- Long term: By 2100, 31 to 81 inches above 1992 mean sea level.²⁷

These projects are illustrated in the following chart, which is referenced to the mean sea level at the tide gauge located in Key West, Florida.²⁸



As the Compact explains in the report that accompanies these projections, these projections have limitations: “The development of complex climate models is evolutionary and many processes and responses are yet to be incorporated.” The Compact’s report goes on to explain the impact of feedback loops that are expected to accelerate the rate of ice melt in the decades to come: “The numerous ice melt accelerating feedbacks not in the models are especially of concern as they are speeding up ice melt and sea level rise well beyond model projections.”²⁹

Despite these uncertainties about how the complex climate system will react in the future and whether human efforts might sufficiently reduce future greenhouse-gas emissions to slow future climate change, these projections still provide useful guidance for the City’s near-term decision-making. As the Compact’s report explains, “models do continue to offer useful approximations ... and are suitable for determining projected future ranges for planning and design efforts.”³⁰ However, “as scientists develop a better understanding of the factors and

reinforcing feedback mechanisms impacting sea level rise, the Southeast Florida community will need to adjust the projections accordingly and adapt to the changing conditions.”³¹

2. *Regional and National Sea Level Rise Assessments*

Geographic Information System (“GIS”) practitioners from the four counties that are members of the Compact have worked in collaboration with NOAA and the South Florida Water Management District to develop a consistent methodology to generate a set of inundation maps, which formed the basis for a South Florida regional vulnerability analysis.³² These tools were used to assess the region’s vulnerability at one, two, and three feet of sea level rise. Physical features like hospitals, airports, evacuation routes, and airports, as well as property values, were tested under the three scenarios. These maps and GIS databases are available from each of the four Compact counties, including Miami-Dade.³³

In addition, an extensive compendium of different sea level rise-related research projects, including vulnerability assessments by various state, local, and national groups has been compiled by the Florida Department of Economic Opportunity and is available on their website.³⁴

Numerous national and state organizations have also created tools that can help local governments and residents gather and analyze sea level rise-related data, including:

- NOAA’s Digital Sea Level Rise Viewer, which allows the user to test up to six feet of sea level rise;³⁵
- NOAA’s Coastal Flood Exposure Mapper, which provides a comprehensive view of assessing coastal hazard risks and vulnerabilities through a collection of maps that show people, places, and natural resources exposed to coastal flooding (included with the tool are tips for using the resultant maps in local communities);³⁶
- The “Eyes on the Rise” mapping toolkit, by Florida International University’s GIS Center, which allows users to visualize sea level rise in their neighborhood;³⁷
- The Florida Department of Transportation (“FDOT”) Sketch Tool, which creates inundation and affected-transportation-infrastructure layers to identify potentially vulnerable transportation facilities and help plan transportation projects;³⁸
- The Nature Conservancy’s Coastal Resilience 2.0 Tool, which identifies storm surge, sea level rise, natural resources, and economic assets, to help identify opportunities for green infrastructure;³⁹
- The U.S. Geological Survey, which provides groundwater wells information as impacted by sea level rise,⁴⁰ including models created for the Miami-Dade County Water & Sewer Department⁴¹;

- The U.S. Army Corps of Engineers (“USACE”) Sea-Level Change Calculator, which creates site-specific details regarding projected flood elevations for 5-year intervals from 2010 to 2100,⁴² and
- Climate Central’s Surging Seas tool, which allows the user to look at impacts of up to 10 feet of sea level rise. It is connected to databases that analyze financial, infrastructure, and sociopolitical impacts.⁴³

As one example of the application of these tools, the USACE’s information has been used to calculate that by 2030, the number of projected high-tide flood events in flood-prone coastal areas of Miami-Dade County will rise to around 80 per year, and that by 2045, that number may jump to a staggering 380 high-tide flood events per year in such areas.⁴⁴

3. *City-Specific Elevation and Vulnerability Assessments*

The City of Coral Gables recently engaged engineering consultants Hazen and Sawyer⁴⁵ to perform a detailed sea level rise vulnerability assessment of the City’s own infrastructure. The goal of the assessment is to identify key infrastructure such as flood gates, outfalls, storm and sewer pump stations, critical buildings and habitats, and city, county, and state roads. The assessment is intended to model future ‘king tides’ and storm surges, including statistics and probabilities of their occurrence, and will incorporate that data into sophisticated models for flooding and storm surge. Finally, an adaptation plan is to be developed for each critical asset based on technical feasibility, economic impact, and social and environmental factors. The adaptation scenarios will be reviewed and prioritized based on the estimated risk and will also include cost estimates. The assessment is estimated to be completed by early 2017. The results of this vulnerability assessment should help guide the City’s plans regarding infrastructure adaptation, which is discussed, from a legal perspective, in Section IV. below.

In the meantime, the City has begun creating Light Detection and Ranging (“LiDAR”) maps to evaluate the elevation of the entire City, and to identify critical infrastructure that will be affected by sea level rise. One such preliminary map, which is available on the City’s website,⁴⁶ shows basic elevation levels as well as key infrastructure such as roads, bridges, sanitary sewer lift stations, septic systems, FPL substations, and schools.

Local governments have often relied primarily on the Federal Emergency Management Agency (“FEMA”) to designate areas most at risk of flooding. FEMA updates and publishes Flood Insurance Rate Maps (“FIRMs”), which identify: Areas of Special Flood Hazard (Zones A, AE, AH, AO, AR, A99, V and VE), which are estimated to be subject to a 1% chance of flooding in a given year and were previously called 100 year flood zones; Zone X areas, which are estimated to be subject to a 0.2% chance of flooding in any given year and areas protected by levees from the 1% chance of flooding in any given year and were previously called 500 year flood zones; and Zone D areas, where flood hazards are undetermined.⁴⁷

As discussed in Section VIII. E. below, the FIRMs are also often used by private mortgage and insurance companies to determine if flood insurance should be required in an area. And properties in an Area of Special Flood Hazard must have flood insurance to be eligible for federally funded loans.⁴⁸

Numerous areas in the City of Coral Gables are within FEMA flood zones. As displayed on the GIS maps available on Miami-Dade County's website, areas in Coral Gables that are included within FEMA flood zones generally are near or border the Biscayne Bay coastline or the City's waterways. These areas include some of the City's highest property values and are part of a tax base that is critical to the City's ability to maintain its current level of services to all of its residents.⁴⁹ Currently, there are approximately 4,087 flood insurance policies in place for properties in the City, including approximately 3,932 residential flood policies.⁵⁰ And City staff is presently working on maps that calculate the gross assessed value of real property in each of the different FEMA flood zones in the City.

C. Next Steps in Gathering Data

In the years ahead, vast amounts of data will need to be gathered and analyzed in order to assist the City's decision making, and high-resolution elevation, storm-surge, flood-risk, and infrastructure maps will be important for tracking and monitoring the success of the City's adaptation efforts.⁵¹

The following are some examples of next steps in gathering data that the City may want to consider:

- Install surface-elevation table-marker horizon (RSET-MH) monitoring stations in some of the City's coastal inlets, as is currently being proposed to the City by Florida International University's Sea Level Solutions Center;
- Begin collecting data on the locations and the number per year of "nuisance" flooding events;
- Continue to create and improve the City's LiDAR elevation maps (possibly to a 1-inch accuracy level, like the maps created by the City of Key West);
- Create separate inundation mapping and hydrologic mapping, based on every six inches of sea level rise;⁵² and
- Create a map of the City that identifies sources of potential toxic pollutants such as underground gas-storage tanks, septic fields, sewer lines, and even cemeteries.⁵³

The City may also want to consider commissioning a comprehensive community resiliency plan. While Hazen and Sawyer's vulnerability assessment, discussed above, will obtain and analyze vital data regarding City infrastructure, a comprehensive community resiliency plan could also address private real estate investment vulnerabilities and even incorporate demographic and socio-economic information.⁵⁴ Such a comprehensive resiliency plan could help identify the most vulnerable areas of the City when creating "Adaptation Action Areas," as discussed in Section V. C. below.⁵⁵

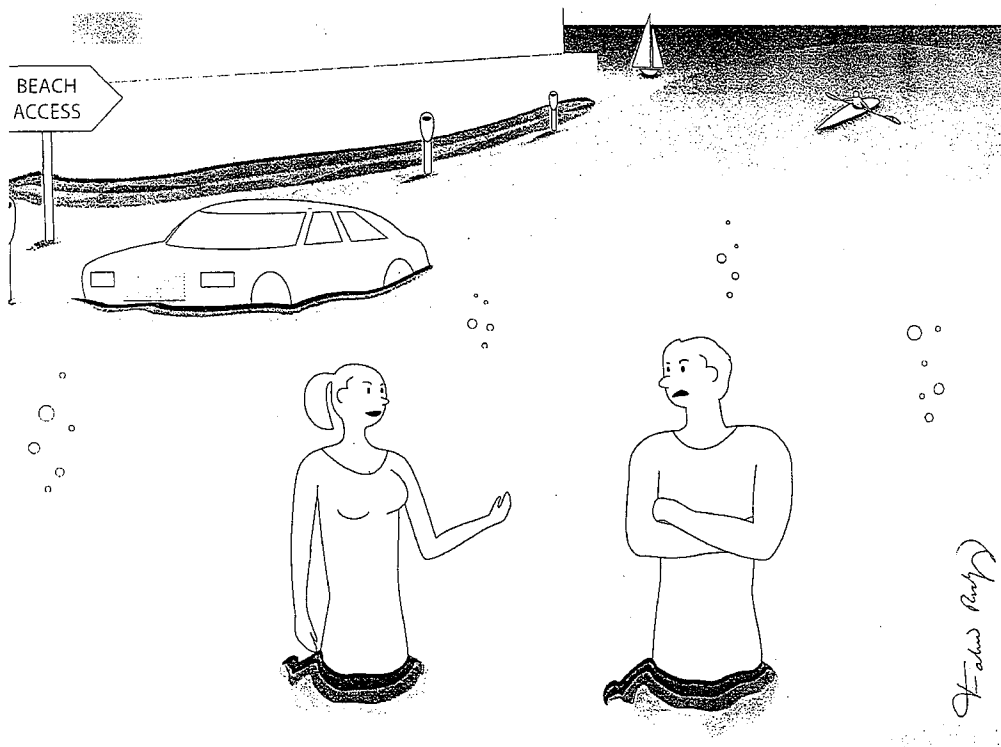
III. Informing and Engaging the Public

The next critical step in making legally-sound adaptation decisions is for the City to ensure that stakeholders, particularly our residents, business owners, and developers, are informed and engaged on this topic.

A. Community Engagement

Community education is critical in preparing and obtaining the buy-in of residents to the work to be done to adapt to sea level rise. Engagement of stakeholders leads to better acceptance and support of the necessary adaptation, and more informed decisions by City leaders. Buy-in from the community is also necessary to obtain and maintain adequate financial support for the important but costly adaptation efforts and infrastructure investments that should be made in the short term to avoid greater costs in the future. Moreover, as discussed throughout this white paper, concepts of notice, knowledge, and foreseeability are also critical to managing the City's risk of litigation regarding sea level rise adaptations.

One challenge when seeking to proactively address sea level rise is that future generations, who will likely bear the brunt of the effects from sea level rise, are not represented by decision makers in this generation. Compounding that challenge is the fact that it is often difficult for humans to recognize and fully appreciate slowly occurring phenomena – like the proverbial frog in boiling water that does not jump out of the pot if it was put in before the water starts boiling. Mayor Cason had the following cartoon drawn to demonstrate this challenge:



I wonder when the city is going to do something about trash pits.

Don't hold your breath. I'm still waiting for them to do something about the traffic circles.

Fortunately, the City has already begun the work of educating residents and other stakeholders about this issue and about the fact that if the City prepares appropriately, the long-term viability of our community can be extended. For example, in early 2016, the City held a three-part lecture series on the challenges associated with sea level rise.⁵⁶ And Mayor Cason has spoken out publicly about the issue extensively.⁵⁷ The City has also shared projection information directly with leaders of the City's homeowners' associations. More can be done, of course. For example, the South Florida Regional Planning Council recommends that local governments create and manage a formal "sea level rise outreach campaign" to "inform community residents and business owners of (1) the potential impacts of sea level rise, (2) the initiatives and programs the community will be or has implemented to address said impacts (such as an Adaptation Action Area designation), and (3) develop a relationship [with] and understanding of the community needs, including addressing vulnerable populations and health risks associated with sea level rise."⁵⁸ Residents can also be encouraged to educate themselves about their own property's vulnerability using some of the online tools discussed in Section II.B., *supra*.

B. Lobbying Other Levels of Government

Part of engaging stakeholders also means that the City can do its part to lobby for critical county, state, and federal action that the City cannot do alone. Such efforts might include: (1) promoting follow-through on the comprehensive Everglades restoration plan ("CERP"), which could help protect South Florida's fresh water source as sea level rise increases the likelihood of salt water intrusion into the Biscayne freshwater aquifer; (2) encouraging responsible management of the Turkey Point nuclear facilities, whose cooling canals are considered by many to be at risk from sea level rise;⁵⁹ and (3) ensuring that the Florida Department of Transportation continues to properly maintain low-lying State-controlled roads in the City, including Old Cutler Road and South Dixie Highway, which may become vulnerable to flooding.

C. Encouraging Responsible Self-Reliance

Although collaboration with federal, state, and county governmental agencies is important, the resources of those agencies are likely to be strained in the decades and centuries ahead. It is therefore important that the City as well as our residents and business owners do not rely on any assumptions of bailouts or assistance from other levels of government. Indeed, financial preparation for sea level rise must be every individual's responsibility.

Some community leaders are even exploring ways that residents themselves can be involved in finding adaptation solutions, to increase self-reliance. For example, the Alaska Institute for Justice has encouraged the development of assessment tools that residents can use to measure erosion rates, among other things, on their property.⁶⁰ As another concrete example, the organization Climate Access has used an innovative program in California to help stakeholders literally visualize sea level rise by strategically placing, in public areas, digital viewfinders (modeled after classic coin-operated binoculars often found at scenic viewpoints) that simulate, in 360-degree 3D, various levels of projected sea level rise in the surrounding area. The viewer also shows what two different responses to sea level rise could look like, to help residents visualize a future community that has adapted to a changing climate.⁶¹

Climate Access also has a helpful “Preparation Frame Guide,” which summarizes polling data on climate change issues, as well as social science research on effective risk communication, and gives examples of effective engagement efforts on this issue.⁶² Similarly, the Union of Concerned Scientists and Viewpoint Learning teamed up to create a useful “Citizen Dialogues on Sea Level Rise” report, which addresses how local leaders can overcome polarization among residents on the issue of climate change.⁶³

And, finally, NOAA’s Office for Coastal Management has a publication (as well as a 90-minute interactive webinar), which discusses best practices, techniques, and examples for how to effectively communicate about climate change hazards.⁶⁴ The following are a few interesting examples from that NOAA publication of case studies where community members were educated about climate change risks:

- Partners in the Great Lakes region condensed key findings from a 100-page vulnerability assessment document and made the information accessible to a diverse audience by creating storyboards using images, graphics, and concise messaging to tell a visual story of past flood events, anticipated future impacts, and options for addressing flooding problems. These posters are said to have proven extremely valuable for outreach and information sharing.⁶⁵
- The City of Milwaukee provides tours of their sewerage district building, which includes innovative stormwater flood management tools such as a recreated buffer, pervious pavement, a green roof, and new drainage systems, so that property owners can learn the benefits of such tools, see what these options look like in practice, learn to implement them, and avoid the pitfalls that city has encountered with some of these techniques.⁶⁶
- The Sierra Club partnered with the Detroit branch of the NAACP and a local bike shop to sponsor a bike tour of the city of Detroit where cyclists explored projects such as rain gardens, cisterns, rain barrels, bioswales, constructed wetlands, and permeable pavers designed to help mitigate flooding and sewage pollution in the Great Lakes.⁶⁷
- The New Hampshire Coastal Adaptation Workgroup, a collaboration of 21 organizations working to help communities prepare for extreme weather events and climate change, shared hazards information with their local community through monthly conversations at restaurants and breweries, field trips, photo contests, and formal workshops, as well as online.⁶⁸

D. Encouraging Local Investment of Resources

As with any challenge, there are opportunities that can be leveraged. There will be many job-creation opportunities in adapting to sea level rise.⁶⁹ And the City can encourage corporate, academic, and non-profit innovation in this area. Fortunately, we are surrounded by community partners eager to collaborate on this issue. This includes several universities. For example, Florida International University’s interdisciplinary Sea Level Solutions Center⁷⁰ has been working closely

with the City on public education events;⁷¹ the President of the University of Miami, Julio Frenk, has expressed a desire to help make UM a source of global thought leaders on this issue;⁷² and Florida Atlantic University recently hosted its third Sea Level Rise Summit.⁷³

Many other potential collaborators that are already involved in adaptation innovation planning include: the Compact, Miami-Dade County, the South Florida Water Management District, the Florida Division of Emergency Management, the Florida Department of Economic Opportunity, the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, NOAA, the U.S. Geological Society, NASA, the Miami Foundation, the Nature Conservancy, the Climate Leadership Initiative, Florida Sea Grant, the Institute for Sustainable Communities, the ICLEI Local Governments for Sustainability, 1000 Friends of Florida, and more.

E. Legal Considerations Relating to Sea Level Rise Notification

1. No Affirmative Legal Duty to Notify of Risk

In addition to educating the public about sea level rise through general community education and outreach efforts as discussed above, the City can also work towards ensuring that residents are provided with specific, targeted notices about the risks of sea level rise in a particular area. This might be accomplished in a number of creative ways that the City can explore – for example, in applications for a development permit⁷⁴ or in contracts for the sale of real property. (See Section VIII.D. *infra* for a discussion about the potential for state or local legislation mandating such disclosures by sellers of real property.) The City might even consider a general notice, incorporated into the City Code, about the risks of sea level rise; for example, the Code might reference, as an advisory document, the Compact’s periodically updated Unified Sea Level Rise Projections.

The practical reason why the City should inform owners informed about the specific risks of sea level rise to their property is self-evident, and as discussed below, there may also be some legal benefits to the City from providing such notices. But, first, the question of whether a Florida municipality has any affirmative legal *duty* to notify its residents generally of risks related to sea level rise should be considered.

Absent having affirmatively undertaken an obligation or being required to act by statute, local governments in Florida are unlikely to incur any liability for failing to provide a natural disaster warning system.⁷⁵ Accordingly, advance notification of rising sea levels and the anticipated ramifications thereof, should not, as a general rule, be required in legal sense, because this type of advance notification does not implicate any *special* legal relationship between the City and particular individual residents. In other words, the City likely owes no specific duty of care under civil tort law to provide such notices. Stated differently, providing advance warning of rising sea levels is the type of planning-level, policy decision that may invoke sovereign immunity. (The importance of the distinction between a municipality’s planning and operational functions is discussed in Section IV.B. below.)

2. Potential Benefits of Notice

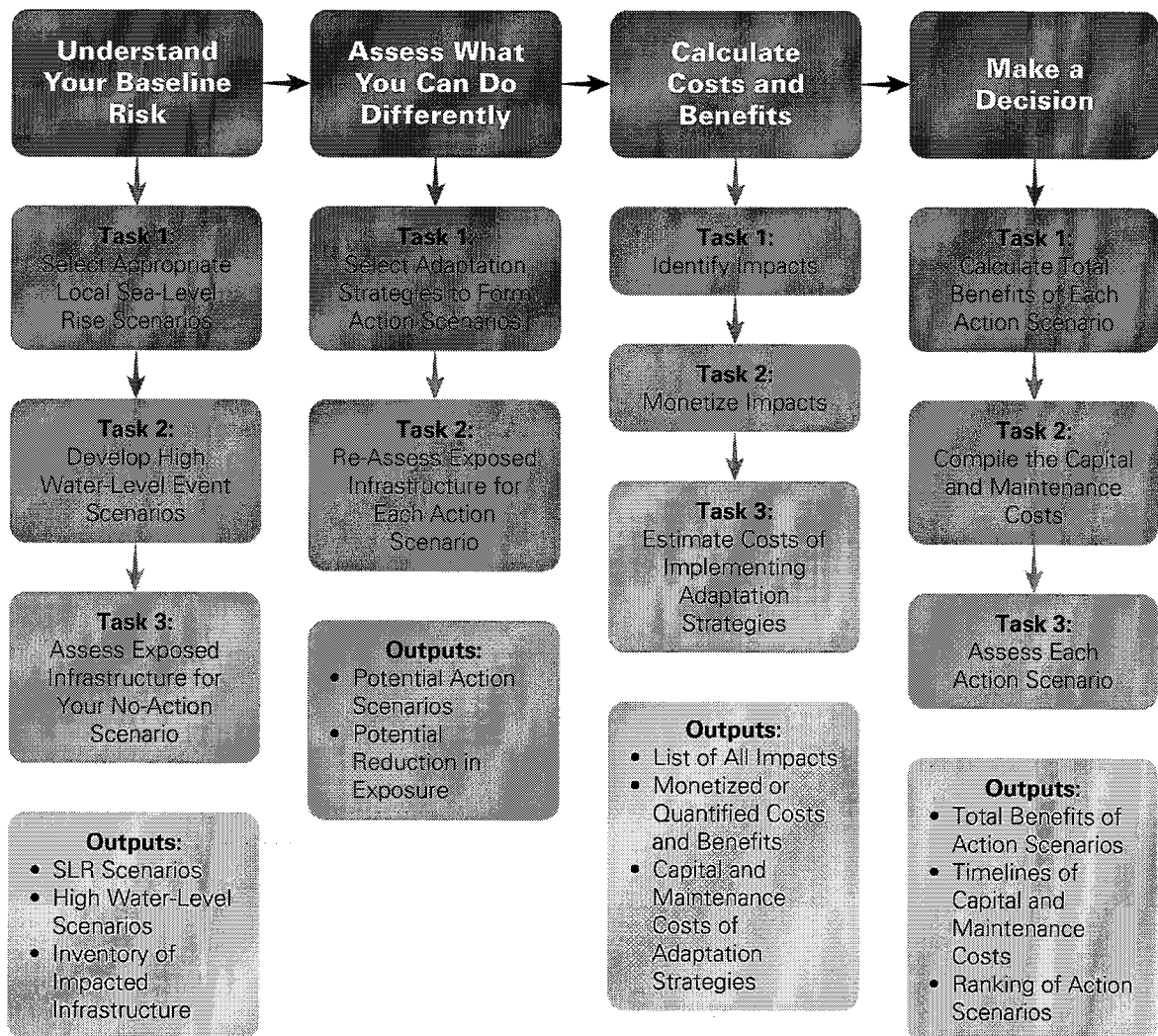
However, the City may nevertheless consider providing notice of specific risks relating to sea level rise, for policy reasons and also for reasons relating to the issue of regulatory takings claims, under the Fifth Amendment to the U.S. Constitution. The Fifth Amendment recognizes that property will sometimes be taken by the government for public use, but provides that no taking may be done “without just compensation.”⁷⁶ While typically associated with a government’s exercise of eminent domain,⁷⁷ a “taking” can be permanent or temporary and can occur by a physical occupation, by a regulation, or by the exaction of a real property interest.⁷⁸ A taking that occurs as the result of regulation is known as a “regulatory taking.” Generally speaking, a regulatory taking has occurred when a regulation, as applied to the very specific facts at issue, substantially deprives a property owner of his or her “reasonable investment-backed expectations” as to the use of the property, although there have been cases in which the government’s regulatory interest is so strong that no taking can be said to occur despite the owner’s loss of his or her reasonable investment-backed expectations.⁷⁹ These are important concepts here because advance notice of sea level rise – such as through disclosures in City-issued permits, in City ordinances, or in mandatory private sale disclosures, for example – would likely affect the *reasonableness* of a property owner’s future expected use of the property, thereby providing a benefit to the City in any future takings litigation.⁸⁰

This benefit might be more substantial if the relevant notices explained not only the risk of sea level rise but also the likelihood of increased governmental regulation over the property and the reasonable scientific data and analysis on which the notice’s contents are based. A further discussion of what might be included in a notice can be found in Section VIII. D. below.

IV. City Infrastructure Adaptations

A. Prioritizing Investments

Adapting the City’s infrastructure to the effects of sea level rise will be a costly and complex issue, as different priorities compete for limited public funds. It is vital that the City begin investing now with a long-term perspective in mind and that the City consider the anticipated lifespan of any projects when evaluating the costs and benefits of different projects. To that end, a 2013 report commissioned by NOAA provides a helpful framework – displayed in summary graphic form below – that can help local government leaders think about what investments to make, and when, in adapting to sea level rise.⁸¹



It is envisioned that the Hazen & Sawyer vulnerability assessment currently underway will set forth in detail the types of City-owned infrastructure that will likely require substantial modifications to address sea level rise, including:

- Stormwater management system – Stormwater control structures, including the City’s 2,419 catch basins and inlets,⁸² are the first line of defense for the City’s flood control system. Most of the major water control structures along the coastline in Miami-Dade County already maintain canal elevations very close to the upper end of the normal tidal elevation range.⁸³
- Sewer and septic systems – When the water table rises, the City is likely to lose some functionality of sewer and septic systems. Difficult cost/benefit analyses will need to be made about the allocation of resources to address these issues in any perpetually flooding areas. There are presently over 6,000 septic systems in the City limits.⁸⁴

- Waterways and bridges – Although the South Florida Water Management District manages the gates that lead to the flow of water through our City’s waterways, the City (with the advice of its Waterways Advisory Board) manages the waterways and the bridges inside the City. There are a total of 30 bridges in the City, including 19 vehicular bridges, 2 pedestrian bridges, and 9 golf cart bridges.⁸⁵
- Roads – There are approximately 242 miles of roadway in the City.⁸⁶ The City owns and maintains a large percentage of that roadway, including in some of the areas of the City that are most vulnerable to sea level rise. After the City receives the Hazen and Sawyer vulnerability assessment, the City will need to make strategic investment choices about how to maintain such roads as seas rise.
- City buildings, parks, etc. – As the manager of many acres of parks and other land, as well as numerous public buildings, the City, like any other property owner, will need to invest in responsible and effective protective strategies to address sea level rise.

B. Litigation Risk Surrounding Infrastructure Expenditures

1. Legal Framework

A Florida municipality’s litigation risk associated with implementing adaptive strategies relating to infrastructure projects are generally framed by four overarching legal concepts: affirmative public duties; the public duty doctrine; sovereign immunity; and takings. A brief explanation of these principles is set forth below, followed by a discussion of how those principles are likely to apply in the context of infrastructure expenditures to adapt to sea level rise.

Public Duties. First, as noted above, absent having affirmatively undertaken an obligation or being required to act by statute, the City generally has no affirmative legal duty, from a civil tort perspective, to provide particular services to residents. Municipal powers are generally defined in terms of what the City may do, not what it must do.⁸⁷ And under traditional principles of tort law, the absence of a duty of care between a defendant and a plaintiff generally results in a lack of liability – if the defendant owes no duty, it cannot be liable for “breaching” a duty.⁸⁸ The Florida Supreme Court in *Trianon Park Condominium Association v. City of Hialeah*, 468 So. 2d 912, 919-21 (Fla. 1985), provided a rough categorization for the types of activities which may or may not support a governmental duty: “(I) legislative, permitting, licensing, and executive officer functions; (II) enforcement of laws and the protection of the public safety; (III) capital improvements and property control operations; and (IV) providing professional, educational, and general services for the health and welfare of citizens.” Category I activities pertain to the public at large and generally fail to support the recognition of a duty of care owed by a governmental actor to an individual plaintiff.⁸⁹ Category II activities support liability only where the governmental actor owed the alleged tort victim a special duty of care – where the government and the individual stand in a special relationship.⁹⁰ And Category III and IV activities may subject a municipality to liability based on traditional tort principles; generally, it owes a duty commensurate with what a private entity conducting such activities would owe.⁹¹

Sovereign Immunity. Next, it must be understood that sovereign immunity may shield the government from suit *even if* it may otherwise have been liable to an injured party for tortious conduct.⁹² The so-called “discretionary-versus-operational function test” articulated by the Florida Supreme Court asks four questions to determine if the government action at issue involves “quasi-legislative policy-making” which is immune from suit: *First*, does the challenged act, omission, or decision necessarily involve a basic governmental policy, program, or objective? *Second*, is the questioned act, omission, or decision essential to the realization or accomplishment of that policy, program, or objective, as opposed to one which would not change the course or direction of the policy, program, or objective? *Third*, does the act, omission, or decision require the exercise of basic policy evaluation, judgment, and expertise on the part of the governmental agency involved? *Fourth*, and finally, does the governmental agency involved possess the requisite constitutional, statutory, or lawful authority and duty to do or make the challenged act, omission, or decision?⁹³ ‘Yes’ answers to all four of those questions indicates that the activity is a discretionary one, and mandates immunity. ‘No’ on any question indicates that the activity *may* be an operational one and requires further inquiry, but may still result in immunity.⁹⁴

Takings. As noted above, the U.S. Constitution recognizes that property will sometimes be taken by the government for public use, but provides that such takings should not be done “without just compensation.”⁹⁵ While a “taking” can occur by a physical occupation, by a regulation, or by the exaction of a real property interest,⁹⁶ *inverse* condemnation occurs when the value of property has been taken in fact by the governmental defendant, even though no formal exercise of the power of eminent domain has been attempted by the taking agency.⁹⁷ And sometimes, governmental *inaction* – in the face of an affirmative duty to act – may support a claim for inverse condemnation, as discussed in subsection 5 below.⁹⁸

2. *Deference to Investment Decisions*

Within this general legal framework, courts are generally highly deferential to governmental planning-level decisions regarding the implementation of infrastructure projects. First, there is generally no default legal duty of a local government to, in the first place, *provide* many services, such as, for example, road access and water drainage. Second, the decision to implement long-term infrastructure projects generally falls within the categories of activities as to which governmental actors owe no specific legal duty of care to individuals. Third, and most important, long-term infrastructure planning is precisely the kind of “planning” (as opposed to “operational”) activity that courts typically refuse to second guess. Overall, a legislature’s decisions about how to prioritize the use of limited public funds are given substantial deference.⁹⁹

3. *Obligation to Exercise Due Care*

While local governments have great legislative latitude in how they spend their capital improvement dollars, this discretion is not unbridled. If a local government takes on an affirmative duty, it generally must act with reasonable care to avoid harm to others.¹⁰⁰

Also, if a local government’s actions *create* a dangerous condition known to the government but not readily apparent to those who could be injured by the condition, the governmental entity must generally take steps to avert the danger or properly warn people of the danger. For example, in *City of St. Petersburg v. Collom*, the Florida Supreme Court expressed

doubt that the city defendant could be held liable for defects in its “overall plan” for its storm drainage system, after three individuals fell into an open drainage ditch, because such planning constitutes a discretionary function.¹⁰¹ The *St. Petersburg* court held, nonetheless, that the plaintiffs had stated a cause of action against the city for its failure to either warn people of the open drain hazard or to correct the dangerous condition by adding barriers around the ditches. According to the court, “a governmental entity may not create a known hazard or trap and then claim immunity from suit for injuries resulting from that hazard on the grounds that it arose from a judgmental, planning-level decision.”¹⁰²

Another example of this principle is that the fact that potential liability may arise from actions by a local government that affirmatively cause flooding (such as diverting flood water over private property) if, among other factors, the property owner suffers a substantial deprivation of the beneficial use of his or her property.¹⁰³

4. *Maintenance Versus Upgrading*

An important issue and area of legal confusion is what obligation a Florida municipality would have to maintain or upgrade stormwater systems, utilities, and roads that are inundated due to sea level rise. This could be a potential costly challenge for the City of Coral Gables in decades to come, particularly because so many City-maintained streets are in low-lying areas.¹⁰⁴

Related to the concept that a local government must generally act with due care is the critical distinction that Florida courts generally make between “upgrading” or building out infrastructure – which is a “planning” level activity as to which a local government would generally be immune from suit – and “maintenance” of existing infrastructure – which is an “operational” activity that does not invoke sovereign immunity and for which a local government could face liability.¹⁰⁵

So, while a Florida municipality might be legally required to properly maintain existing infrastructure – such as roads, drainage infrastructure, sewage systems, etc. – it would generally be immune from suit regarding decisions to *upgrade* (or not to upgrade) that same infrastructure, including if the infrastructure becomes obsolete in the face of rising sea levels. Unfortunately, the distinction between maintenance and upgrading is not always clear. Property owners may argue that even if new or updated stormwater infrastructure is required to deal with increased flooding conditions on a road, the failure to maintain drainage of the road is more equivalent to not maintaining the road than to not upgrading the road. This is an area of the law that Florida courts will need to develop and clarify in the future, and the City should carefully monitor case law developments in this area.¹⁰⁶

5. *Regulatory Takings and Inverse Condemnation*

As noted above, government inaction in the face of a duty to act, combined with the effects of substantial sea level rise, could raise issues relating to takings, including inverse condemnation issues.¹⁰⁷ One Florida case, *Jordan v. St. Johns County*, is notable in this regard. The case involved St. Johns County’s decision to cease maintaining a portion of Old A1A. The County had been spending an average of \$250,000 per mile/per year to maintain that road due to rising sea levels and erosion. The court explained that, after establishing and undertaking to maintain roads

dedicated to public use, which triggers an obligation to do so reasonably, a local government must provide a reasonable level of maintenance that affords meaningful access to adjacent property (unless or until formal abandonment of the road).¹⁰⁸ Failure to maintain the road, thereby cutting off meaningful access to real property, would constitute an inverse condemnation.¹⁰⁹ The court did not decide what precisely amounts to reasonable maintenance and did not dictate a particular manner or level of accessibility, but rather held that the County's discretion was not absolute and remanded the case for a determination of what would be reasonable maintenance. The case then settled. But these developing concepts are an area of the law requiring consideration when determining the risk of inverse condemnation suits for property owners who may lose access to their property due to perpetually flooded roads.

An important step the City may consider taking to help prepare property owners for the future is to set feasible 'level of service' standards for road drainage infrastructure and repairs (and other infrastructure related standards unrelated even to transportation) and to frequently update and adjust those levels of service to ensure that they are feasible – based not only on the environmental factors at play but also based on the City's current and projected financial capabilities.

Notably, the Florida Sea Grant program has developed a model ordinance to deal with environmentally compromised roads, which might help limit inverse condemnation lawsuits and provide more predictability for property owners.¹¹⁰ The model ordinance sets reasonable maintenance standards and levels of service to, in effect, gradually abandon roads that are rendered unable to be maintained due to the effects of sea level rise.¹¹¹ In brief, the model ordinance sets criteria under which a local government would designate certain roads in an environmentally challenged area (*i.e.*, a location where typical road construction, remediation, or repair criteria and standards are infeasible due to naturally occurring conditions such as sea level rise) as environmentally compromised where the maintenance costs for the road exceed, by some factor, the average cost to maintain similar roads.¹¹² The model ordinance also sets a maintenance standard for such roads limited to some fraction of the cost necessary to keep the road at its compromised state.¹¹³ An ordinance such as this that sets reasonable levels of service is attractive because it allows property owners a level of predictability, while also allowing the City to budget its future expenditures.

6. *Substantive Due Process Overlay*

Any City decisions relating to infrastructure investments must, of course, be consistent with substantive due process standards. Under Florida law, a legislative act will withstand a substantive due process challenge if the government identifies a legitimate state interest that it could rationally conclude would be served by the ordinance.¹¹⁴

7. *Takeaways*

Even in light of all of these legal principles, a Florida municipality has considerable leeway in planning and implementing long-term infrastructure projects. That said, the City should engage in a continuing evaluation of the risks associated with every project that it undertakes, or permits others to create, as well as in a continuous evaluation of the litigation risks of action or inaction. Keeping residents informed and setting reasonable maintenance standards and levels of

service will also provide more predictability to property owners and help inform their reasonable investment-backed expectations.

C. Financing Sea Level Rise Adaptation Costs

Sea level rise infrastructure adaptations in the decades ahead will be costly. The most attractive financing options available to the City for such measures are: ad valorem taxation, special assessments, user and utility fees, municipal bond issuances, grants and subsidies, impact fees, and public-private partnerships. Each of these is described below, followed by examples of how other governmental entities are using these tools in their adaptation efforts.

1. Ad Valorem Taxation

Ad valorem property taxes provide the City with the power to fund a broad variety of projects for “all municipal purposes,” for the benefit of the general public.¹¹⁵ Ad valorem taxes are levied “for the general benefit of residents and property and are imposed under the theory that contributions must be made by the community at large to support the various functions of the government.”¹¹⁶ Accordingly, ad valorem taxes may be imposed on citizens to fund any projects that “support a particular government function” regardless of whether particular taxpayers receive a special or direct benefit from the project funded.¹¹⁷

As of 2015, the City’s municipal millage rate was 5.590 mills.¹¹⁸ In the years ahead, if necessary, there could be a need for additional ad valorem taxes to be collected.¹¹⁹ However, the use of ad valorem taxation to address sea level rise infrastructure improvements might face political push back if residents of some areas of the City feel as if they are subsidizing costly and potentially ultimately unsustainable adaptations in other areas of the City.

2. Special Assessments

The Florida Statutes provide broad authority to municipalities to levy special assessments to fund, among other things: (1) guttering and draining of streets, boulevards, and alleys; (2) construction, reconstruction, repair, renovation, and upgrading of sewer, canal, drains, and stormwater management systems; (3) construction and reconstruction of water supply systems, including aquifer storage and recovery, and desalination systems; (4) construction and reconstruction of seawalls; and (5) drainage and reclamation of wet, low, or overflowed lands.¹²⁰ Additionally, municipalities are empowered to levy and collect “special assessments to fund capital improvements and municipal services, including, but not limited to, fire protection, emergency medical services, garbage disposal, sewer improvement, street improvement, and parking facilities.”¹²¹

Notably, a special assessment does not qualify as a tax and is not subject to the ad valorem taxation limitations under Florida law.¹²² However, to be valid, a special assessment must pass a two-prong test: (1) the property burdened by the assessment must derive a “special benefit” from the project or service funded by the assessment, and (2) the assessment for the project or service must be properly apportioned.¹²³ A special assessment “is imposed upon the theory that that portion of the community which is required to bear it receives some special or peculiar benefit in the enhancement of value of the property against which it is imposed as a result of the

improvement made with the proceeds of the special assessment.”¹²⁴ Therefore, a special assessment cannot generally be used as a proxy for ad valorem taxation to fund projects that provide a general benefit to the public at large.¹²⁵ General law enforcement activities, the provision of courts, and indigent health care services are functions that have been found to be required for an organized society and that therefore cannot be funded through a special assessment.¹²⁶ Conversely, Florida courts have held that fire protection services and mosquito control services, which do provide a direct, special benefit to real property, may be funded through a special assessment.¹²⁷

As recognized by the South Florida Regional Planning Council, special assessments could be used to help fund specific improvements that provide direct and special benefits to identified Adaptation Action Areas (which are discussed in Section V. C. below).¹²⁸

Special assessments might even be used, for example, to raise the height of some of the City’s fixed bridges which provide access to Biscayne Bay from the City’s waterways, *if* the two-prong test discussed above is satisfied.¹²⁹

3. *User Fees and Utility Fees*

The City could also finance some sea level rise adaptation projects through user fees or utility fees relating to the provision of stormwater utilities and other governmental services.

User fees are charged in exchange for “a particular governmental service which benefits the party paying the fee in a manner not shared by other members of society” and are typically, but not always, “paid by choice, in that the party paying the fee has the option of not utilizing the governmental service and thereby avoiding the charge.”¹³⁰ The distinction between a user fee and a special assessment is not always clear.¹³¹ Typically, a special assessment is a specific levy designed to recover the cost of an improvement that confers a particular benefit on a property, whereas a user fee is a charge to a person who actually uses a service for the cost of providing the service.¹³² User fees are not taxes and are not subject to the ad valorem taxation limitations applicable under Florida law.¹³³

A utility fee is a type of user fee.¹³⁴ Most relevant to sea level rise adaptation financing, the Florida Statutes expressly empower municipal governments to create one or more stormwater utilities and adopt stormwater utility fees to plan, construct, operate, and maintain stormwater management systems.¹³⁵ In setting utility rates, municipalities “enjoy a significant degree of latitude,” and courts will typically uphold the rates set by local governments so long as they are “not arbitrary, unreasonable, or discriminatory.”¹³⁶ Generally, however, a utility fee should be tied to the utility’s capital and operating requirements.¹³⁷

The Compact has a publication that discusses, in detail, potential funding options for stormwater programs, and that publication notes the following benefits of a stormwater utility:

- They are more fair than other revenue streams because users pay based on use of the system;
- The funding source is dedicated and not subject to shortfalls in other funds; and

- They provide increased opportunities for grant funding and bonding.¹³⁸

Currently, the City of Coral Gables already has a “Stormwater Utility Fund,” which is “used to account for the operation, maintenance, financing and capital improvement costs of a storm water collection system providing services to all residents of the City, and all commercial properties,” as well as a “Sanitary Sewer Fund,” which is “used to account for the operation, maintenance and capital improvement costs of a sanitary sewer collection system providing services to certain residents of the City, the University of Miami and certain non-resident sewer connections in areas adjacent to the City.”¹³⁹ These are both referred to in the City budget as “enterprise funds,” and are funded by service use charges.¹⁴⁰

4. *Developmental Impact Fees*

Regulators often impose conditions when issuing permits for new development or substantial redevelopment (*i.e.*, the renovation or expansion of existing structures). Conditions that require a property owner to convey a property interest are called exactions. Exactions can include impact fees, which offset costs associated with the development (such as infrastructure needs). Such impact fees may be another good source of funding for City infrastructure projects relating to sea level rise. For example, the City might require a developer to pay a fee to cover the cost of flood-proofing infrastructure that services the new development.¹⁴¹

However, care should be taken to ensure that any conditions of development satisfy the relevant legal criteria for such conditions, which is an issue discussed in Section VI. E. below.

Notably, some Miami-Dade County Commissioners are already suggesting the use of impact fees as a source of funding to pay for climate change-related costs.¹⁴²

Another alternative which might be explored is the possibility of creating an endowment that could receive *voluntary* proffers from developers -- and other private donations as well -- and place the funds into an interest-bearing trust fund to be used for sea level rise adaptation efforts (and possibly helping residents in need of adaptation assistance), similar to a municipal workforce housing trust fund program.¹⁴³

5. *Municipal Bonds*

Issuing bonds can be another option to finance capital improvement projects that address sea level rise. Types of municipal bonds include: (1) general obligation bonds, which are secured by the full faith and credit and taxing power of the municipality; (2) ad valorem bonds, which are secured by the proceeds of ad valorem taxes levied on real and tangible personal property; (3) revenue bonds, which are payable from revenues derived from sources other than ad valorem taxes and which do not pledge the property, credit, or general tax revenue of the municipality; and (4) improvement bonds, which are payable solely from the proceeds of special assessments levied for an assessable project.¹⁴⁴

Florida municipalities are empowered to issue bonds “to finance the undertaking of any capital or other project for the purposes permitted by the State Constitution and may pledge the funds, credit, property, and taxing power of the municipality for the payment of such debts and

bonds.”¹⁴⁵ Municipalities are vested with broad powers to issue bonds for the purpose of financing governmental undertakings approved by the municipality’s governing body “which the governing body of the municipality shall deem to be made for a public purpose.”¹⁴⁶ Moreover, a bond issuance may provide “incidental” benefits to private parties, so long as the primary purpose of the bond is to serve “a paramount public purpose[.]”¹⁴⁷

Notably, general obligation bonds and ad valorem bonds (but not revenue bonds and improvement bonds) must typically be approved by a vote of the electorate, because these bonds carry with them the potential for raising taxes on citizens’ real and tangible personal property – perhaps even above the baseline millage limits – to satisfy the municipalities’ debt obligations.¹⁴⁸

Some real world examples of the use of municipal bonds to fund sea level rise adaptation efforts are provided in subsection 8 below.

It should be noted that the City of Coral Gables currently enjoys very favorable municipal bond ratings. In fact, Standard & Poor’s Ratings Services recently raised the City’s issuer credit rating to AAA – the highest credit rating offered by S&P. Coral Gables is the only Miami-Dade municipality with AAA bond ratings from both Moody’s and Standard and Poor’s.¹⁴⁹ To date, sea level rise has not become a frontline issue in the municipal bond markets. However, some investors and ratings agencies are becoming more concerned with the effects that climate change may have on municipalities’ longer term finances.¹⁵⁰ Eventually, rating agencies may take steps to force the political will of any governmental entities that are slow to incorporate sea level rise adaptation policies. For example, last year, Moody’s Investors Service called on coastal cities in Virginia’s Hampton Roads region “to continue investing and planning to mitigate negative credit effects from weather-related and tidal flooding.”¹⁵¹ As Moody’s explained, “Annual planning and spending for stormwater management in the near term reduces the need for Hampton Roads municipalities to spend larger amounts later.”¹⁵²

6. *State, Federal, and Non-Profit Grants and Subsidies*

The City should also explore the possibility of state and federal grants and subsidies to help finance the costs of sea level rise adaptation projects, as well as possible grants from non-profit organizations.

Grants through federal agencies can be significant, although they tend to be highly competitive. FEMA, for example, operates a Pre-Disaster Mitigation Program to help states and local governments implement sustained pre-disaster natural hazard mitigation programs to reduce the overall risk to people and structures from future hazardous events, while also reducing the likelihood of reliance on federal funding in future disaster scenarios.¹⁵³

The U.S. Department of Housing and Urban Development (“HUD”) also provides grants – in January 2016, HUD announced awards in the aggregate amount of \$1 billion to fund resilient housing and infrastructure projects in communities impacted by natural disasters and climate change.¹⁵⁴ (Recently, seventeen mayors, including Mayor Cason of the City of Coral Gables, have been encouraging an effort to set up another Federal Resiliency Fund for retreat planning that benefits South Florida.)

Numerous other federal grant funding opportunities can be found in NOAA's U.S. Climate Resilience Toolkit, available on their website.¹⁵⁵

Other local governments in areas affected by sea level rise have been allocated funds through Florida Department of Environmental Protection ("FDEP") programs designed to safeguard critical natural resources. For example, FDEP's Everglades Restoration Revenue Bonds program provides aggregate annual funding of up to \$150 million to finance the costs of acquisition and improvement of land, water areas, and related property interests and resources, as contemplated under the Comprehensive Everglades Restoration Plan and the Keys Wastewater Plan (among other plans).¹⁵⁶

Despite the potential for grants as a supplemental revenue source to address these issues, uncertainty regarding the actions of other governmental entities may make planning difficult. If the current sea level rise projections come to fruition, resources will be strained in an unprecedented way. For example, it can be expected that the South Florida Water Management District ("SFWMD"), which controls the flow of water into and out of South Florida, could put a heavy strain on the State of Florida's finances. SFWMD operates the "world's largest water control system," including 2,300 miles of canals, 61 pump stations, and more than 2,000 "water control structures." And a 2009 study estimated that almost two-thirds of the SFWMD's 28 coastal control structures in Miami-Dade, Broward, and Palm Beach Counties would cease to operate due to even just 8 inches of additional sea level rise.¹⁵⁷

The City may not want to rely heavily on the federal government either. The federal government could have different priorities and decide that it cannot or will not provide adequate funding to numerous communities addressing this issue.

The City has already demonstrated a willingness to address these issues from a planning perspective and has set aside \$190,000 for the 2015-2016 budget to begin its efforts to prepare for sea level rise.¹⁵⁸ But it is expected that significantly more funding will be needed in the decades to come.

It should be noted that many non-profits are providing grants for planning in this area. For example, the Miami Foundation recently coordinated an effort by Miami-Dade County, the City of Miami, and the City of Miami Beach to receive a 100 Resilient Cities grant from the Rockefeller Foundation.¹⁵⁹ An extensive list of potential non-profit grant opportunities can be found in the NOAA's U.S. Climate Resilience Toolkit.¹⁶⁰

7. *Public-Private Partnerships*

Public-private partnerships ("P3s") may provide another funding source. P3s are contractual arrangements between governmental and private entities under which the private entities assume greater involvement in the financing and delivery of capital improvement projects that benefit the public in exchange for revenue-sharing opportunities and/or completion bonuses.¹⁶¹ P3s have typically been used in Florida to finance transportation infrastructure projects; however, in 2013, the legislature expanded the potential uses for P3s to other public purposes.¹⁶² This statute allows counties, municipalities, school boards, and other political

subdivisions of the state, to utilize public-private partnerships to finance qualifying facilities or projects that “predominantly [serve] public purposes.”¹⁶³

Due to the public need and the to-date inadequate public financing for “timely and cost-effective acquisition, design, construction, improvement, renovation, expansion, equipping, maintenance, operation, implementation, or installation of projects serving a public purpose,” such as transportation facilities, water or wastewater management facilities and infrastructure, roads, highways, bridges, and other public infrastructure and government facilities that serve a public need and purpose, the statute allows governments to partner with private entities to finance projects serving such public needs.¹⁶⁴ P3s allow governments to fund projects where public funds are lacking, despite traditional limitations prohibiting governments from commencing projects without available and allocated public funding. Under P3 arrangements, a private entity typically pays for the design, construction, and/or operation of the project or facility for a period of time, and, in return, receives revenues generated from the operation of the project or facility in order to realize a return on its investment. In this regard, the statute expressly authorizes private entities to impose fees on the public for use of qualifying projects or facilities funded in this manner.¹⁶⁵ The statute contemplates a competitive process for the solicitation of bids from potential private partners as well as the approval of prospective projects under criteria designed to protect the public interest.¹⁶⁶

Notable projects in South Florida that have been funded through the use of P3s include improvements to the Port of Miami Tunnel, I-95 express lanes, and I-595 – all between FDOT and private entities.¹⁶⁷ The I-595 project in Broward County has been heralded as a particularly successful example of a P3.¹⁶⁸ It can be anticipated that many potential sea level rise infrastructure projects might be amenable to a P3 structure, including sewer infrastructure projects, bridges, roads, and more, provided the projects have a corresponding continuing revenue stream from which the private entity could recoup its investment.

8. *Examples of Other Local Governments’ Funding Efforts*

Local governments in Florida are starting to use a number of various funding tools for sea level rise adaptation.

The City of Miami Beach is one of the first cities in the country to have commenced a large-scale project to address sea level rise. In 2014, the City commenced a two-step financing plan in excess of \$300 million to upgrade the City’s storm drainage system. First, the City’s stormwater utility (established pursuant to Section 403.0893 of the Florida Statutes) raised the equivalent residential unit stormwater utility fee from \$9.06 per residential household per month to \$16.67 – an 84% increase. Then, in 2015, the City Commission authorized an issuance of revenue bonds in a maximum amount of \$100 million, with a maximum interest rate of 5.25%, and a maturity date not later than September 2045, to fund upgrades to the City’s stormwater system, including the installation of new pump stations and the conversion of injection pumps. As part of the bond issuance, the City Commission authorized revenue from the increased stormwater utility fee to be pledged as security for the City’s obligations under the bonds. The City plans to authorize two additional \$100 million revenue bond issuances to fund additional upgrades to the City’s stormwater system, which will be made possible by additional raises in citizens’ equivalent

residential unit stormwater utility rates in the approximate amounts of 38% in 2017 and 19% in 2019.¹⁶⁹

The City of Key West, like Miami Beach, is installing pumps to drive seawater back from storm drains during high tides. The City of Key West has also benefited from capital projects undertaken by the Florida Keys Aqueduct Authority, which were financed by long-term bond issuances secured by net water revenues and to be supplemented by grants from the SFWMD, the State of Florida, and/or the federal government.¹⁷⁰ Additional projects benefiting the City of Key West have been funded by FDEP's Everglades Restoration Revenue Bonds as set forth in the Keys Wastewater Plan.¹⁷¹ Other funding has been obtained from private sources, including, for example, a \$28,250 Audubon Toyota TogetherGreen grant, which is funding two climate change mitigation projects.¹⁷²

The City of Satellite Beach obtained a \$25,000 grant from the U.S. Environmental Protection Agency 2009 Climate Ready Estuaries Program to produce a topographic map of the city and conduct a vulnerability assessment.¹⁷³

The Town of Longboat Key for many years has maintained a beach renourishment program financed by two erosion-control special taxing districts vested with the authority to, among things, levy property taxes, assess special assessments, and issue bonds for this purpose. The districts have funded the Town's beach renourishment program through a combination of ad valorem taxation and general obligation bond issuances. A recurring source of additional funding for the Town's beach renourishment projects has been provided through grants awarded under FDEP's Beach Management Funding Assistance Program, including a \$500,000 grant awarded in July 2015.¹⁷⁴

9. *Municipal Risk Financing*

The City may want to also consider whether insurance or other ex-ante risk management tools could help in its planning to adapt to the effects of climate change. Including tools such as reserve funds, catastrophe bonds, or parametric reinsurance in a local government's overall risk financing strategy could help manage financial exposure to major storm events, which may be exacerbated by the effects of sea level rise and climate change generally.¹⁷⁵

V. **Comprehensive Planning for Sea Level Rise**

Comprehensive plans (sometimes called "master plans") are a long-range tool by which a local government guides development based on the community's vision for its desired future. Under Florida law, a comprehensive plan designates areas for future development, for preservation, and for proposed public improvements, among other things.¹⁷⁶ Considering sea level rise in comprehensive plans is a key step by which local governments can begin to incorporate adaptation strategies into their decision-making framework.

A. **General Considerations**

1. *Planning Horizon*

Under Florida law, local governments must generally develop two planning horizons – a 5 year period after the comprehensive plan is adopted and then a longer period of at least 10 years (for most planning purposes -- some transportation and major infrastructure planning occurs on longer planning horizons).¹⁷⁷ However, Florida law does not *preclude* a longer planning horizon should a local government choose to utilize a longer horizon. This is important in the context of sea level rise, because a 5 or 10 year planning timeframe may not be far enough out to model for the potential impact of climate change. In contrast, a 15 or 20 year timeframe might be far enough out to make some decisions related to future flood risk, and a 50 year or longer timeframe might be most appropriate for certain longer-term planning such as major infrastructure projects.¹⁷⁸

As Florida attorneys Erin Deady and Thomas Ruppert have noted, a challenge with longer-term timeframes and with different planning timeframes for different types of actions will be to link major planning decisions together – such as how areas should be developed, where infrastructure should be placed or retrofitted, and what land should be acquired – by tying the “useful life” of zoning, infrastructure, or investment decisions with where the future flood impacts are expected to occur, and when.¹⁷⁹

2. *Appropriate Data for Planning*

The Florida Statutes require that a comprehensive plan must be based on “relevant and appropriate data and an analysis by the local government that may include, but not be limited to, surveys, studies, community goals and vision, and other data available at the time of adoption of the comprehensive plan or plan amendment.”¹⁸⁰ “To be based on data means to react to it in an appropriate way and to the extent necessary indicated by the data available on that particular subject at the time of adoption of the plan or plan amendment at issue.”¹⁸¹ That data must be taken from “professionally accepted sources.”¹⁸² Notably, “[o]riginal data collection by local governments is not required,” but is permitted.¹⁸³

Fortunately, the City has access to a large quantity of scientific data related to sea level rise and climate change (as set forth in Section II.B., *supra*), and the Hazen & Sawyer vulnerability assessment currently underway (and any future vulnerability assessments) will add further support for the City’s planning decisions by identifying particular vulnerabilities specific to our community.¹⁸⁴

It is important to note that Florida law is clear that a local government is “not limited to acting only where there is scientific certainty.”¹⁸⁵ Courts will generally defer to local government planning if there is professionally accepted science to back up a decision, even if it is *disputed* science. As one federal appellate court explained: “Where there are present or potential threats of serious damage, lack of full scientific certainty should not be a basis for postponing effective measures to prevent environmental degradation. Awaiting for certainty will often allow for only reactive, not preventive, regulatory action.”¹⁸⁶ That court went on to state that governmental decision makers must recognize the preliminary and incomplete nature of existing evidence and incorporate “elements of uncertainty and risk as part of its analysis.”¹⁸⁷ Furthermore, as the Florida Supreme Court has noted, “the police power of the state is not static. The courts are duty bound to recognize its expansion in proper cases to meet conditions which necessarily change as business progresses and civilization advances.”¹⁸⁸

3. *New Statutory Provision Regarding Sea Level Rise*

Local governments in coastal zones are required to incorporate into their comprehensive plan a number of coastal management-related provisions, including a “redevelopment component that outlines the principles that must be used to eliminate inappropriate and unsafe development in the coastal areas when opportunities arise...”¹⁸⁹ In 2015, the Florida Legislature passed SB 1094, which, for the first time, requires that sea level rise considerations be part of the coastal management element of any local government required to have such an element. Under SB 1094, the coastal-management redevelopment component must now contain: “... development and redevelopment principles, strategies, and engineering solutions that reduce the flood risk in coastal areas which results from high-tide events, storm surge, flash floods, stormwater runoff, *and the related impacts of sea-level rise.*”¹⁹⁰

How exactly this new requirement will be implemented in communities around the State remains to be seen. Notably however, it does not appear that SB 1094 requires that impacted municipalities immediately amend their comprehensive plans to come into compliance with this new law, but rather it appears that municipalities may amend when they would normally be reconsidering their comprehensive plan, which is the issue discussed in the next subsection below.¹⁹¹

Coral Gables does not have a specific coastal management element at this time; however, these principles can still, of course, be incorporated into its plan.

4. *When to Amend?*

The City’s current comprehensive plan, which was adopted in 2010, does not directly include sea level rise concepts.¹⁹² So when should the City amend its plan to address sea level rise? Municipalities must generally evaluate their plans every seven years to determine if amendments are needed to reflect changes in state law.¹⁹³ Also, the City still has the right, pursuant to Florida Statutes § 163.3191(2) (2016), to determine that amendments are necessary or appropriate at any time and amend the plan accordingly. Accordingly, new considerations relating to sea level rise can be worked into the City’s comprehensive plan, as soon as the Commission and City staff deem appropriate. An amendment by the end of the calendar year 2018 might provide a reasonable timeframe to craft and then gain consensus on proposed revisions to the plan. Not all changes need to be made at one time, of course. And the sea level rise aspects of the revised comprehensive plan should be reevaluated frequently (perhaps every five years), as the facts on the ground, the scientific projections, and even the applicable legal principles change. Indeed, the comprehensive plan could even state that the City’s policies relating to sea level rise adaptation are subject to change as additional scientific data becomes available. Such a caveat will provide property owners and other interested parties with express notice that these planning decisions are based on inherently dynamic data.

An important caveat is warranted here. The City should not incorporate specific sea level rise-related concepts into its comprehensive plan unless and until it is ready to codify and enforce those provisions. Florida courts consider a comprehensive plan to be a local government’s “land-use constitution” to which the City’s development decisions and land development regulations

should conform.¹⁹⁴ Moreover, courts recognize third-party rights to challenge local government land development decisions that do not conform to the local government's comprehensive plan.¹⁹⁵

B. Key Elements of Comprehensive Plan Implicated

Under Florida law, a comprehensive plan is broken into elements – some mandatory, some optional, as set out in Florida Statutes § 163.3177. The City could either add a separate “element” to the comprehensive plan related to sea level rise, or could weave sea level rise-related considerations into these (and other) relevant elements of the plan as appropriate. But in light of the systemic nature of the effects of sea level rise on City planning and operations, incorporating these considerations into the different elements is likely more appropriate than creating a single separate element. Some comprehensive plan elements that would likely be impacted by sea level rise issues are discussed below.

1. Infrastructure and Capital Improvements

Under Florida law, local governments are instructed to refrain from extending or rebuilding roads, water and sewer lines, and other infrastructure in certain projected vulnerable areas. *See, e.g.*, Fla. Stat. §163.3177 (6)(g)6 (2016) (providing, among other things, that comprehensive plans in coastal cities and counties are required to “[l]imit public expenditures that subsidize development in coastal high-hazard areas”).

This general principle is already included in Coral Gables' comprehensive plan as follows:

Objective SAF-2.1. Limit public expenditures in coastal areas to projects clearly in the public interest and which minimize the risk from storm damage. This objective shall be achieved through the implementation of the following policies.

Policy SAF-2.1.1. Public expenditures for infrastructure improvements shall be located outside flood prone areas, to the extent practicable, to keep floodways as unobstructed as possible.

Policy SAF-2.1.2. Limit public expenditures that subsidize development permitted in coastal areas as defined herein except for restoration or enhancement of natural resources.

Policy SAF-2.1.3. The City shall abide by the Coastal High Hazard Area (CHHA) defined as the area below the elevation of the category 1 storm surge line as established by a Sea, Lake, and Overland Surges from Hurricanes (SLOSH) computerized storm surge model (see SAF-1: Storm Tide Atlas Map).

Policy SAF-2.1.4. The Coastal Area within the City of Coral Gables shall be defined as the land south of the Coral Gables Waterway, east of Old Cutler Road, and north of the southern limit of the City.¹⁹⁶

Sea level rise will, of course, inform which areas are considered “high hazard” or “flood prone.” But the City should consider also more explicitly incorporating the concept of sea level

rise into this element, and expanding these concepts beyond only coastal areas and into *any* area of the City that may become more flood-prone due to sea level rise.

Although counsel should be retained to draft carefully tailored language for the City's comprehensive plan, the University of Florida's Conservation Clinic has crafted a "Model Comprehensive Plan Goals, Objectives and Policies, to Address Sea-Level Rise Impacts in Florida," which provides an annotated set of comprehensive plan language suggestions which could be used as a helpful starting point.¹⁹⁷ On the infrastructure element, the UF Model Comprehensive Plan includes the following model additions:

Policy 1.3.1: The City/County shall inventory all existing and planned infrastructure and land development within the vulnerable area for its capacity to accommodate projected sea-level rise over the life expectancy of the infrastructure and development.

Policy 1.3.2: No capital improvements within the vulnerable area shall be financed or constructed without having first been reviewed to determine the extent to which the proposed improvement is sea-level rise-ready, taking into account the sea-level rise adaptation zone in which it is located, and whether it will contribute to additional development within the vulnerable area.

Policy 2.1.1: The City/County shall develop a comprehensive shoreline stabilization strategy to address protection of the built environment where it has been determined to be feasible and in the best interest of the City/County to protect economic investment and public and private infrastructure.

Policy 2.1.2: Based on projected rates of sea level rise within the sea-level rise planning horizon the City shall inventory all existing shoreline stabilization structures and determine their capacity to maintain functionality throughout the SLR planning horizon.

Policy 2.1.3: The City/County shall inventory all public buildings and infrastructure that are vulnerable to sea level rise within the sea-level rise planning horizon and determine whether such buildings and structures should be protected through shoreline stabilization.

Policy 4.1.1: Within [the highest risk areas], the City/County shall eliminate new investment in public infrastructure likely to be subject to the impacts of sea level rise within the planning horizon.

Policy 4.3.2: Identify and establish a land bank for the purposes of relocating critically important infrastructure and municipal support facilities outside of the vulnerable area.¹⁹⁸

2. *Future Land Use*

The Florida Statutes require that the guidelines in a local government’s comprehensive plan about what can be built – including where and how – should be based on the character of the land (for example, its vulnerability to sea level rise) and on the availability of infrastructure and various services to that land. Specifically, Florida Statutes § 163.3177(6)(a) states that a comprehensive plan must include the “distribution, location, and extent of” land uses and “population densities and building and structure intensities,” “based upon ... [t]he character of undeveloped land ... [and] the availability of water supplies, public facilities, and services.” And land use amendments must be based on “the suitability ... for its proposed use considering the character of the undeveloped land, soils, topography, natural resources, ... on site.” A substantial amount of sea level rise in Coral Gables could affect all of those issues. Accordingly, a number of specific land use-related regulation options are analyzed in Section VI. below, and many are accompanied by corresponding model comprehensive plan language that could be considered for the Future Land Use Element of the City’s plan.

3. *Coastal Management*

As noted above, the Florida Statutes set out extensive requirements for comprehensive plans in coastal communities, to restrict development activities that would damage or destroy coastal resources.¹⁹⁹ For example, local coastal management plans must “control proposed development and redevelopment in order to protect the coastal environment and give consideration to cumulative impacts.”²⁰⁰ Some of these concepts are incorporated into Coral Gables’ existing comprehensive plan in the Public Safety or other elements, but sea level rise-related concepts are not yet directly incorporated into the comprehensive plan.²⁰¹

In addition to comprehensive plan requirements for coastal areas, the State also has a set of Coastal Construction Control Line (“CCCL”) regulations, which seek “to preserve and protect [Florida’s beaches] from imprudent construction which can jeopardize the stability of the beach-dune system, accelerate erosion, provide inadequate protection to upland structures, endanger adjacent properties, or interfere with public beach access.”²⁰² While the City of Coral Gables does not have much in the way of sandy beaches covered by the CCCL and its topography is not such that construction of sand dunes would feasibly protect development from the rising Bay or from storm surge, these natural resource protection concepts are still very important because some parts of the City’s Bay shoreline do have mangroves and sea grass beds, which help slow down the energy of waves and prevent erosion. *See* Section VI. G. below on regulations relating to “soft armoring.”

Of course, in making any decisions affecting the coastal and wetland areas of the City, it must be understood that Florida’s shorelines and wetlands are subject to a complex network of federal, state, and local regulations, all of which need to be carefully considered before the City adopts any proposed changes. By way of example, at the federal level, there is the Coastal Zone Management Act and the Endangered Species Act,²⁰³ and at the state level, there is the Florida Beach and Shore Preservation Act, the Coastal Zone Protection Act, and the Oceans and Coastal Resources Act.²⁰⁴

4. *Natural Resources and Wetlands*

Comprehensive plans must also direct future land uses that are incompatible with the protection of important natural resources, including protected wetlands, away from such areas; and this concept is not necessarily limited to wetlands that currently exist – it can include future wetlands that might migrate or be created due to the effects of sea level rise. *See Fla. Stat. § 163.3177(6)(d)2.k* (2016). Appropriate data and analysis that supports the need to maintain specific lands for habitat migration, such as a professional vulnerability assessment of the City’s wetland areas, would be important to support any land use restrictions in those areas.

As noted above, the City’s Bay shoreline contains important habitat, including mangroves. The City will likely want to work in tangent with federal and state laws to encourage and reward the planting and preserving of mangroves, in part to mitigate storm surge issues.

5. *Public Safety and Hurricane Evacuation*

Florida law also requires that coastal city comprehensive plans meet certain state goals, including protection of human life against the effects of natural disasters and limitation of public expenditures that subsidize development in high-hazard coastal areas.²⁰⁵ Comprehensive plans in those communities must also provide a mitigation plan that requires developers to contribute resources to hurricane shelters and evacuation capabilities if their projects would result in higher population concentrations within the coastal high hazard areas.²⁰⁶

Expected results of climate change include not only increased flooding but also an increase in the intensity of storms, increased effects from storm surge, and increased extreme periods of high precipitation and drought.²⁰⁷ Fortunately, the City has broad home rule and police powers to plan ahead to protect the health, safety, and welfare of its residents from such hazards.²⁰⁸ Hurricane evacuation and public safety requirements are not only important as a matter of public policy, they are also an important part of the legal defensibility of cautious limits on coastal development. The need to mitigate the public hazard risks associated with severe weather, which can be an issue in South Florida even without the effects of sea level rise, might provide a strong defense to legal challenges against the City’s adaptation efforts in the future.

In exercising its home rule powers, the City can develop, implement, and test evacuation policies and procedures. Notably, Miami-Dade County has a Local Mitigation Strategy (“LMS”) to reduce long-term risk to human life and property from disasters.²⁰⁹ (An LMS is a plan developed by a Florida county, in accordance with the Disaster Mitigation Act of 2000, to reduce and/or eliminate the risks associated with natural and man-made hazards.²¹⁰)

Another proactive step that the City can take to plan for long-term redevelopment and recovery from disasters is establishing a post-disaster redevelopment plan (“PDRP”). PDRPs provide an opportunity to begin addressing sea level rise considerations in terms of both pre-disaster preparations and post-disaster redevelopment. Coastal municipalities are encouraged by FEMA to prepare PDRPs. Coral Gables’ comprehensive plan contemplates a PDRP,²¹¹ but the City – like many local governments in Florida – has yet to develop one. Panama City, Florida has a comprehensive PDRP, which might be used as an example for consideration.²¹²

To encourage local governments to develop a PDRP, Florida’s Department of Community Affairs and the Division of Emergency Management launched an initiative in 2007 to support

several pilot projects that will generate guidelines for other local governments to use.²¹³ If the City does develop a PDRP, it may wish to do so in coordination with the regional Compact to ensure a coordinated approach with neighboring communities. Another great resource on this topic is a publication by the Department of Community Affairs called the “Post-Disaster Redevelopment Planning: A Guide for Florida Communities.”²¹⁴

Coral Gables already has historical experience in responding to damaging storms, and the City has world-class, fully-accredited police and fire departments, which will be vital in these efforts. In 1993, Coral Gables even became the first municipality ever to receive the National Emergency Management Award.²¹⁵ But, of course, working with federal and state emergency responders and planners will also be important.

C. Adaptation Action Areas

1. What are Adaptation Action Areas?

The use of Adaptation Action Areas (“AAAs”) is one potentially critical tool to address sea level rise adaptation in the City’s comprehensive plan. The relevant Florida statute that contemplates AAAs, which was enacted in 2011, states as follows: “At the option of the local government, develop an adaptation action area designation for those low-lying coastal zones that are experiencing coastal flooding due to extreme high tides and storm surge and are vulnerable to the impacts of rising sea level. Local governments that adopt an adaptation action area may consider policies within the coastal management element to improve resilience to coastal flooding resulting from high-tide events, storm surge, flash floods, stormwater runoff, and related *impacts of sea-level rise*.”²¹⁶ The enabling statute contemplates that a local government might designate an AAA “for the purpose of prioritizing funding for infrastructure needs and adaption planning.”²¹⁷

2. Inclusion Criteria for AAAs

Criteria for establishing what the physical boundaries would be of different AAAs might feasibly include, but need not be limited to, “areas for which the land elevations are below, at, or near mean higher high water, which have a hydrologic connection to coastal waters, or which are designated as evacuation zones for storm surge.”²¹⁸

As the Compact’s Built Environment Work Group recommends, the boundaries of an AAA should be based on vulnerability assessments that analyze the best available data to determine the areas most susceptible and vulnerable to rising sea levels, utilizing inundation mapping, modeling, and other similar tools.²¹⁹

The infrastructure vulnerability assessment that Hazen and Sawyer is currently working on for the City and/or a more comprehensive resiliency plan covering all private property in the City could be very useful in identifying areas to include in AAAs. The professionals working on these assessments will factor into their analyses not only elevation data but also the many other factors that affect a neighborhood’s vulnerability to flooding and storm surge, such as the quality of the stormwater infrastructure in place and the nature of the improvements on the land in that area.

3. Subzones

As the Compact’s Built Environment Work Group suggests, a city might then identify subarea overlay zones, such as the following:

- *Adaptation Areas* – areas within the AAA that include developed vulnerable land targeted for infrastructure improvements or modified land use and/or development practices in order to reduce risks and improve hazard mitigation. In these areas, the high cost of retrofitting, building, and maintaining infrastructure is outweighed by the return in investment.
- *Restoration Areas* – areas within the AAA that include vulnerable lands that may or may not be already developed and could include Coastal High Hazard Areas and high storm surge areas. Local governments should place priority on the acquisition of land in these areas for restoration, agriculture, or recreational open space.
- *Growth Areas* – areas *outside* of the AAA where growth is encouraged due to higher topographic elevations and the presence of existing transportation infrastructure. These designated areas should be developed with Urban Design guidelines that address character of urban place and provide a high quality pedestrian experience through landscaping, and the creation of public space.²²⁰

Alternatively, the University of Florida’s Model Comprehensive Plan for sea level rise adaptation recommends the following AAA subareas, albeit with potentially less politically palatable names than Regional Compact’s suggested categories above:

- *Managed Relocation Zones* – Areas where the local government will prohibit coastal hard armoring, limit or prohibit rebuilding of damaged structures, and/or require the removal or relocation of structures that become inundated.
- *Accommodation Zones* – Areas where local governments will allow new development but may limit the intensity and density of new development, limit hard shoreline armoring, and require that structures be designed or retrofitted to be more resilient to flood impacts.
- *Protection Zones* – Areas with critical infrastructure and dense urban development, where coastal armoring will be allowed; local governments could require that soft-armoring techniques be employed where feasible.²²¹

4. *Assistance with Implementing AAAs*

The State of Florida’s Department of Economic Opportunity partnered with the South Florida Regional Planning Council (“SFRPC”) to develop a comprehensive guide for local governments that are contemplating AAAs. The resulting document, entitled “Adaptation Action Areas: A Planning Guidebook For Florida’s Local Governments,” contains a significant amount of practical information and recommendations for policymakers implementing AAAs.²²²

By way of example, the SFRPC AAA Guidebook recommends that local governments align their AAAs with other comprehensive plan elements such as the Capital Improvements

Element and the Intergovernmental Coordination Element.²²³ And the Guidebook sets out a number of other local government documents into which AAAs can be integrated and “recommends that communities consider the completion of a checklist of regulatory documents and update times so that Adaptation Action Area strategies may be adopted on a schedule that conforms to the community’s existing or projected schedule of adoption and implementation activities.” The Guidebook then provides an example checklist as follows:²²⁴

| EXAMPLE DOCUMENTS | ADOPTION YEAR | DO INTEGRATION OPPORTUNITIES EXIST? |
|------------------------------------|---------------|-------------------------------------|
| Municipal Comprehensive Plan | | |
| All-Hazards Mitigation Plan | | |
| Floodplain Management Plan | | |
| Evacuation Plan | | |
| Emergency Response Plan | | |
| Continuity of Operations Plan | | |
| Disaster Recovery Plan | | |
| Post-Disaster Redevelopment Plan | | |
| Capital Improvements Plan | | |
| Economic Development Plan/Strategy | | |
| Coastal Plan or Element | | |
| Shoreline Restoration Plan | | |
| Open Space Plan | | |
| Stormwater Management Plan | | |
| Historic Preservation Plan | | |
| Zoning Ordinance | | |
| Flood Damage Prevention Ordinance | | |
| Subdivision Ordinance | | |
| Building Code | | |

D. Examples of Adaptation Incorporated into Comprehensive Plans

Many local governments in Florida have already begun to incorporate sea level rise issues, including AAAs, into their comprehensive plans. For example, the Village of Pinecrest (despite having almost no direct exposure to the Biscayne Bay coastline) has built a comprehensive approach to sea level rise adaptation into a recent addition to its comprehensive plan.²²⁵ As another example, the City of Satellite Beach designates, as AAAs, existing Coastal High Hazard Areas, as well as other areas of the city that may be identified by their city council in the future as being subject to coastal erosion, flooding, sea level rise, or damage to environmental systems.²²⁶

An attorney at the Florida Sea Grant program, Thomas Ruppert, has compiled the language from many of those municipal and county sea level rise-related comprehensive plan provisions, which are available on Florida Sea Grant’s website.²²⁷ As that analysis indicates, some of the most detailed analyses and incorporation of sea level rise issues in the state have been implemented by Miami-Dade County, Broward County, and the City of Fort Lauderdale. Mr. Ruppert notes that the comprehensive plans of those three local governments contain the following similarities:

- They seek to ensure coordination of activities between the local government and other governmental units and with educational or non-profit institutions;
- They are based on extensive supporting analyses of climate change and sea level rise impacts which allows them to understand current risk as well as potential future risk;
- They specifically address infrastructure, and the best ones ensure that *any* infrastructure decisions include sea level rise in the decision-making process (Fort Lauderdale and Miami-Dade County even indicate the need to analyze when infrastructure should be relocated due to sea level rise);
- Two of the three specifically indicate that future development and density increases should be focused in the least vulnerable areas; and
- Two of the three discuss criteria to identify AAAs.²²⁸

Also notable is the City of Fort Lauderdale’s community investment plan, implemented in 2015 under the State’s Community Planning Act, which identifies 16 AAAs and 38 projects within those AAAs for funding, each prioritized for infrastructure improvements in order to reduce risks to assets that are vulnerable to the effects of sea level rise, including areas experiencing or expected to experience coastal flooding or tidal flooding and areas with hydrological connections to coastal waters.²²⁹

Similar efforts exist outside the State of Florida as well. For example, the State of Maryland has established “The Chesapeake Bay Critical Area,” which creates overlay zones that “regulate development adjacent to the bay based upon the status of development in three types of areas: (1) intensely developed areas—developed areas with little habitat that are the preferred location for new development, (2) limited development areas—lightly developed areas where any new development must protect habitat, and (3) resources conservation areas—predominantly wetlands where only limited residential development is permitted.”²³⁰

E. General Litigation Risk Considerations

As discussed in Section IV.B. above (in the context of City infrastructure planning), pure planning decisions are generally considered to be legislative in nature and therefore subject to the most deferential standards of judicial review. Accordingly, local governments will be given substantial discretion to prohibit land uses that are inconsistent with projected sea level rise and storm-surge risk. And, as discussed in Section VI.A. below, there is generally no vested property right against reasonable increased land use planning restrictions, allowable uses, and development standards, unless there is no remaining economically viable use or unless there has been substantial good faith reliance on the expenditures to the point of creating a vested right.²³¹ This is important to remember, because it is far more efficient and effective to plan properly in the first instance – particularly when discussing long-term infrastructure and development – rather than trying to undo or modify existing development at a later time.

It should also be noted that one of the advantages of carefully crafted AAAs (and similar tools) is that regulatory policies and decisions that are tailored to a limited geographic area's specific vulnerabilities and other attributes are more likely to withstand judicial challenge than an approach that treats all areas of a city the same.

The risk of liability to the City surrounding placing a property within an AAA depends on what particular restrictions or other features are placed on properties in that AAA. As the SFRPC Guidebook notes, the designation of AAAs is flexibly written in the Florida Statutes, so "the benefits the Areas may confer relate to numerous ... growth management tools already in existence to protect the welfare of community residents," including, for example, transferable development rights, zoning and overlay zones, setbacks and buffers, building codes and design, impact fees, conservation easements, real estate disclosures, coastal land acquisition programs, and land trusts.²³² Those tools, which could be applied to AAAs (or otherwise), are explained and discussed in the following sections.

VI. Regulatory Tools for Adaptation

While incentivization tools that reward smart land use planning (such as those options discussed in Sections VII and VIII below) are likely to be less controversial and involve lower litigation risk, traditional regulatory tools will also be a part of any local government's adaptation efforts. A number of those options, and legal considerations surrounding each, are discussed below. But we begin with an explanation of some general legal principles that often come into play when imposing new regulations that potentially interfere with property rights.

A. General Legal Considerations When Utilizing Regulatory Tools

The primary legal principles that are likely to be raised by regulatory adaptation efforts are: constitutional takings issues, Florida's Bert Harris Act, and constitutional substantive due process considerations.

1. Takings Law

Sea level rise-related regulations that are subjected to a takings analysis would likely be analyzed under one of two rubrics. First, under state and federal law, if a regulation deprives a property owner of all economically beneficial use, it could be deemed a taking *per se*, which requires compensation, unless the governmental agency can show that the applicable use would have otherwise been prohibited at common law, such as a public nuisance.²³³ Second, if a regulation does not constitute a *per se* taking, a court then weighs three considerations, under a balancing analysis that the U.S. Supreme Court has set forth, to determine if the regulation nonetheless amounts to a taking.²³⁴ Those considerations are: (i) the character of the governmental action, (ii) the economic impact of the regulation, and (iii) the reasonable investment-backed expectations of the property owner.²³⁵

Notably, the reasonable investment-backed expectations of a property owner are determined in part by what laws were in place at the time the owner purchased the property.²³⁶ In other words, laws (include land use regulations) make up the background principles that affect owners' reasonable expectations for how they can use their property and, therefore, the potential

outcomes of takings lawsuits. Other factors that can affect one's reasonable investment-backed expectations include: the use of similarly-situated properties, nuisance law background principles, and the appropriateness of the property for the proposed use.²³⁷

Typically, the more imperative the governmental interest, the farther regulation can go without amounting to a taking. Accordingly, regulations that prevent public harm or public nuisances are less likely to amount to a taking.²³⁸

In short, if the City bases its adaptation regulatory decisions on sound scientific data, including predictive data of sea level rise, such decisions are likely to be upheld even against a takings claim provided that some economically viable use remains in the property. As the Florida Supreme Court has explained, the "degree of [constitutional property] guaranties must be determined in the light of social and economic conditions which prevail at a given time."²³⁹

2. *Florida's Bert Harris Act*

Florida's Bert J. Harris, Jr. Private Property Rights Protection Act is another law for the City to consider when enacting and applying sea level rise adaptation regulations. The Act provides, in relevant part, that "[w]hen a specific action of a governmental entity has inordinately burdened an existing use of real property or a vested right to a specific use of real property, the property owner of that real property is entitled to relief, which may include compensation for the actual loss to the fair market value of the real property caused by the action of government..."²⁴⁰

Many of the terms in this statutory language are the same as the key terms in U.S. constitutional takings jurisprudence. However, the Act does provide some additional substantive rights to property owners beyond constitutional takings and substantive due process principles.²⁴¹ Unfortunately, the Act's "inordinate burden" standard has not been defined clearly or well developed by Florida courts.²⁴² Accordingly, the application of the Act to actions stemming from local governments' efforts to redirect development away from areas that are likely to be affected by flooding, sea level rise, and storm surge is an issue for the City to watch carefully in Florida jurisprudence in the years to come.²⁴³ Notably, courts will often construe narrowly the Act's waiver of sovereign immunity and generally except from causes of action available under the Act a municipality's imposition of federal regulations (such as, for example, FEMA flood elevation regulations) where the municipality is delegated power to enforce them.²⁴⁴

The City of Coral Gables' Zoning Code has a "mini" Bert Harris Act ordinance, which provides, in part, that the City may grant a wide variety of forms of relief "when it is demonstrated that [an] applicant .. has been unfairly, disproportionately or inordinately burdened by a final order of the City that either denied development approval to the applicant or imposed one (1) or more conditions of approval on the applicant."²⁴⁵ "The process may also be initiated by the City to settle litigation in order to avoid unfairly, disproportionately, or inordinately burdening a party to that litigation..."²⁴⁶ Dispute resolution agreements entered into under this process run with the land and are recorded in the public records.²⁴⁷

3. *Substantive Due Process*

Of course, regulations imposed by the City must also not be arbitrary. Substantive due process requirements of the U.S. Constitution prohibit irrational and unreasonable regulations.²⁴⁸ However, courts in substantive due process suits have typically given regulating agencies substantial leeway to use their police powers, as long as the government action in dispute addresses a legitimate government concern and is supported by substantial competent evidence.²⁴⁹

By way of example, preventing flooding and protecting environmentally-sensitive areas are considered legitimate governmental concerns.²⁵⁰ The use of vulnerability assessments will aid the City in demonstrating how the regulations are rationally related to such legitimate public purpose(s). Notably, the more tailored a regulation is to the governmental concern, the stronger the argument will typically be that a rational basis exists to survive a substantive due process challenge.²⁵¹

4. *The Effect of Granting Permits and Other Approvals*

Litigation risk surrounding land use decisions and regulations is often associated with a government's decision to *prohibit* a property owner from taking some action. And it is true that the City is unlikely to be held liable for *granting* a permit or otherwise approving a request. Indeed, courts have consistently held that granting a permit or otherwise approving a project falls within the public duty doctrine and is a discretionary rather than operational function, and that immunity therefore typically attaches to such decisions (with the exceptions discussed above).²⁵² However, it might be contemplated whether sea level rise will increase the likelihood of takings and inverse condemnation suits against local governments where, for example, permits or other approvals are given to develop in flood-prone areas and those areas are then later abandoned by the government in terms of certain governmental services or infrastructure (such as road access).

The court in the *Jordan v. St. Johns County* case, discussed in Section IV.B.5. above, noted that that County had previously issued permits allowing development along the stretch of road that the County later stopped maintaining due to recurrent flooding.²⁵³ Although that fact was not necessarily a deciding factor in that case, it may be argued as being one relevant fact in future litigation, if a litigant can demonstrate that the granting of a permit affected his or her reasonable investment-backed expectations. For this reason, and as previously discussed, the City might explore the possibility of including notice provisions in certain permits, which provide notice that the new development (or redevelopment), although being allowed, is in a high-risk area and that City services may be reduced to the area in the future due to the effects of climate change or other weather-related events. Case law is sparse on how much weight would be given to such notices by the courts, but it is an issue to be seriously considered and another area of Florida jurisprudence to keep an eye on in future years.²⁵⁴ In the meantime, simply from a public policy prospective, such notices could help inform property owners of potential risks.

B. Zoning Tools

Zoning laws, which provide the regulatory framework that governs a community's use and development of land, is arguably the most powerful tool that local governments have to manage and prevent hazards stemming from sea level rise. That is because avoiding the construction of unsustainable development in the first place is often the most efficient way to deal with it.

1. *Overlay Zones*

Overlay zones allow local governments to superimpose additional regulatory requirements on top of existing zones to add supplemental regulations in areas that have special characteristics. Overlay zones allow greater flexibility because they do not require the locality to disrupt existing zoning classifications.²⁵⁵ The City of Coral Gables already uses overlay zones, including “preservation districts” to protect “natural and cultural resources and environmentally sensitive lands such as wetlands, tideland, mangroves, natural forest communities, marine and wildlife habitats and such other areas or terrain value in its present state as a natural area,” as well as “mixed used districts” to regulate mixed use developments.²⁵⁶

As discussed in Section V above, AAAs are one type of overlay district that could be very useful in implementing a wide variety of sea level rise adaptation tools, including the regulatory tools and initiatives set forth herein.²⁵⁷

2. *Downzoning*

Downzoning is a regulatory tool used to reduce the density and intensity of development.²⁵⁸ The University of Florida’s Model Comprehensive Plan recommends the following down-zoning policies, to be used in conjunction with AAA zones that have been identified as being at high risk due to sea level rise:

Policy 3.2.1 [Down-planning/Down-zoning] The City shall limit the residential density within the accommodation zone to no more that () units per acre.

Policy 3.2.2: [Limitation on Building Footprint] The City/County shall limit the building footprint for all new residential structures within the accommodation zone to () square feet and commercial structures to () square feet.

Policy 4.1.1: Within a Managed Relocation Zone, the City/County shall reduce residential land use densities to no more than () units per acre and commercial structures to () square feet per acre.²⁵⁹

One example of a comprehensive downzoning of a large area due to flooding occurred in St. Tammany Parish, Louisiana, after Hurricane Katrina. Flood-prone areas in St. Tammany that were previously zoned for residential or commercial development were down-zoned to lesser densities or rezoned for conservation and for land uses more compatible with periodic flooding.²⁶⁰

One option when considering downzoning is for the City to actually increase allowable density in less vulnerable areas of the City, while decreasing density in more vulnerable areas (while taking into account vested rights). This could be done through zoning updates or as part of a transfer of development rights program (discussed in Section VIII. A. below).²⁶¹

For any changes to the Zoning Code, it should be noted that many areas in the City are subject to Site Specific Zoning Regulations, which would also need to be updated.²⁶²

Specific Litigation Risk Considerations

A governmental action which downzones land is not necessarily invalid simply because it denies the owner the best and highest economic use of the property, so long as the increased regulation still permits some use that can be economically carried out, the principles codified in Florida's Bert Harris Act are not violated, vested rights are not inappropriately denied, and a rational basis exists for the change.²⁶³ Stated differently, there is no inherently vested property right to the continuation of one's existing zoning.²⁶⁴ However, even though many legal challenges to governmental downzoning efforts would likely ultimately fail on the merits, the City would still face many challenges to any downzoning, and cases challenging downzoning are often very fact-intensive and can create considerable expenses for the City to litigate, even if the City ultimately prevails.

Reductions in allowable densities by local governments have specifically been addressed as potential takings by Florida courts. For example, in *Glisson v. Alachua County*, 558 So. 2d 1030 (Fla. 1st DCA 1990), *rev. denied*, 570 So.2d 1304 (Fla. 1990), comprehensive plan amendments that reduced density from 1 unit/1 acre to 1 unit/5 acres were held not to be takings because economically viable uses remained and because the amendments were not arbitrary.²⁶⁵ Another case that evidences these principles is *Lee County v. Morales*, 557 So. 2d 652, 655 (Fla. 2d DCA 1990), *rev. denied*, 564 So. 2d 1086 (Fla. 1990), where the Second District Court of Appeals rejected a takings claim relating to a downzoning, because the resulting densities were still economically viable and the reductions were not made arbitrarily by the County, but rather were based on valid planning reasons and a reasonable study.

Of course, any downzoning action must also have a rational basis, under substantive due process principles. As noted previously, a governmental act will withstand a substantive due process challenge if the government identifies a legitimate state interest that it could rationally conclude would be served by the legislation or other governmental action.²⁶⁶

C. Building Codes and Resilient Design

Building codes and design standards establish minimum requirements for construction, many of which could be leveraged to prepare for sea level rise, including standards for placement, size, elevation, foundations, floor assemblies, roof structures, mechanical, electrical, plumbing, site drainage and storage, permissible usages, fixture standards, fire code, and other specific requirements for resistance to weather events like hurricanes and flood events.²⁶⁷

When making decisions about building and design approvals, the City will want to consider factors such as these, while also taking into account the likely life span of the structure(s) at issue juxtaposed against projected sea level rise for that particular location. For example, a building with an estimated useful life of 90 years but that is in a high-risk area of the City that has been identified to likely be below the mean high water line in only 60 years can and should be restricted much differently than a building or other structure with a 30-year estimated useful life in a less-vulnerable area of the City.

1. *Elevation and Related Options*

Just as when Hurricane Andrew struck South Florida in 1992, state and local building codes will likely be tightened and upgraded after major storms and other flooding events that are caused or exacerbated by climate change and sea level rise. The more steps the City can take before such disasters occur, the greater the reduction in long-term private and public losses. The City has the option to create some local amendments to the Florida Building Code to extend building code requirements in areas that may become vulnerable to flooding, provided there is no inconsistency with certain minimum standards.²⁶⁸

The Compact's Built Environment Work Group recommends that local governments work to revise building codes and require increased resiliency for new development and redevelopment.²⁶⁹ And the SFRPC recommends that local governments might do the following within a designated AAA:

- Require two or more feet of “freeboard” – i.e., elevation above FEMA’s base flood elevation level (“BFE”) – for structures located in tidally-influenced floodplains, foundations that are more resilient to erosion and wave impacts, and/or flood-resilient construction materials;
- Encourage the use of strategies in new development and redevelopment projects to maintain the form and function of natural resources, such as incorporating vegetative buffers; and/or
- Delineate the minimum technical and safety requirements for the design and construction of structures that are vulnerable to sea level rise impacts.²⁷⁰

Freeboard initiatives and elevation requirements generally are likely to be a critical part of property owners’ efforts to adapt to sea level rise and the increased storm surge effects expected to occur due to climate change. Elevation may occur either by elevating particular buildings or by elevating, through the use of fill, the ground level of entire areas, while also raising roads and other infrastructure.²⁷¹

Such efforts by the City may also save some residents money on their insurance premiums. Private insurance companies often look favorably on resilient design features (and will likely focus even more on these issues in the future). Additionally, for those property owners covered by FEMA’s National Flood Insurance Program (“NFIP”), their premiums could be adjusted downward based on an improvement in the City’s Community Rating System (“CRS”) score due to such changes. (*See* Section VIII. E.(3) below for more on the City’s CRS score.)

In order to participate in the NFIP, local governments must impose minimum regulations in floodplains, wherein structures must be constructed in a way to minimize flood damage. By way of example, currently, single-family home and small townhomes in Coastal A Zones must generally have the lowest floor elevated 1 foot above the FEMA-determined BFE.²⁷² However, additional regulations above those minimum standards can improve the City’s CRS score. Examples of such additional regulations include: increased elevation requirements for new or redeveloped structures above FEMA’s BFE, requirements that buildings be anchored in certain ways to withstand wind and wave action, and restrictions on the use or size of structures in high risk areas. These increased regulations could be, but need not be, limited to just FEMA A and V

Zones or to designated AAAs (assuming that those areas differed from the A and V Zones). Such efforts are likely to improve the City's CRS and therefore save residents money on their insurance premiums if they are covered under the NFIP.

Notably, elevation requirements need not be in the form of mandatory regulations. Rather, the City could, instead (or also), provide market-based incentives to property owners who develop or redevelop structures above the minimum requirements of the NFIP. *See* the discussion of several market-based tools in Section VIII. below.

2. *Accessibility, Historical Preservation, Aesthetic, and Environmental Considerations*

Any substantial changes to building codes and design requirements are likely to have ripple effects on several other issues.

As one example, changes in elevation must be coordinated with the applicable accessibility design standards for businesses, transportation providers, multi-family housing facilities, and local governments under federal and state laws, such as the Americans With Disabilities Act (ADA), the Fair Housing Act, and the Florida Accessibility Code.²⁷³ These standards apply to existing buildings and to new construction, and to pedestrian routes in the public right of way. For private entities, property owners generally pay for any accessibility compliance issues, but if an entire street is raised, the City may consider assisting property owners with these compliance efforts – for example by building ramps as part of the street elevation. This has been an issue in Miami Beach's Sunset Harbor neighborhood, where that city raised the elevation of an entire stretch of road by 2.5 feet.²⁷⁴

Historic preservation requirements may also come into conflict with the City's adaptation efforts. This is of particular concern in Coral Gables, which has a large number of treasured historic landmarks. The City may need to carefully balance these concerns in the years to come, and potentially modify the historic preservation portions of the Zoning Code, while still taking into account the strong local goals of preserving our history and cultural heritage.²⁷⁵

The City should also begin to prepare for likely conflicts between architectural aesthetic concerns – which Coral Gables has been masterful at maintaining – and the need for resilient building design. For example, drastic increases in base flood elevations can have significant aesthetic and practical effects, especially in dense areas where grandfathered-in existing buildings would have a much lower elevation than newly constructed or renovated buildings. And currently accepted, aesthetically desirable building practices (such as underground parking garages) may be unsustainable in the long term, depending on factors such as the elevation of the property and the likely life span of the project juxtaposed against projected sea levels and storm surge impacts.

Finally, environmental concerns may also arise. By way of example, if building code regulations call for raising the elevation of land, developers or other property owners may seek to raise the land by dredging from the environmentally sensitive Biscayne Bay or by bringing in fill from other unsustainable sources.²⁷⁶ Difficult policy decisions will have to be made, while balancing such considerations.

3. *Innovative Building Design Issues*

In the future, the City (and other regulating authorities at the state and local level) may want to consider and evaluate innovative and unprecedented building design options for managing sea level rise. Such options might include, for example: mechanisms to capture, reclaim, and harvest stormwater; the use of permeable pavement surfaces; or even the use of floating buildings or buildings on stilts in open water (and the accompanying issues of providing utility and other services to such structures). Engineering methods to address sea level rise will no doubt improve over time as monetary incentives increase and sheer necessity factors in. For example, Miami Beach's chief engineer, Bruce Mowry, believes human engineering may eventually find a way to resolve the permeability of South Florida's limestone base through either a resin or clay that could be injected into the limestone to fill the holes and set to form a seal, or perhaps by requiring builders, before constructing a new building, to lay a waterproof shield underneath.²⁷⁷ As such ideas are being worked on by private researchers and evaluated by environmental experts, the City may want to provide special assistance and work alongside those making efforts to develop effective engineering and design ideas, and then make appropriate modifications to City laws to accommodate the new efforts.

As one example of a local government in Florida already making such adjustments, under new changes in place in the City of Key West, most new residential buildings must be built 1.5 feet above the floodplain, be "green-certified," and have 1,000-gallon cisterns for irrigation and swimming pools.²⁷⁸

4. *Specific Litigation Risk Considerations*

Zoning or building code requirements that simply require that new or substantially redeveloped properties be elevated a reasonable amount higher than previously required are unlikely to create a substantial risk of liability from a constitutional takings perspective, as elevation requirements have long been common in flood-prone areas. However, increased litigation among private citizens can be anticipated if stricter elevation requirements are put in place. If property owners are only required to elevate when seeking a development or redevelopment permit, an entire neighborhood would only be elevated slowly, parcel-by-parcel. This can present a problem if private parcels that elevate their land cause flooding on adjacent parcels. Neighboring property owners may sue, under negligence or nuisance law principles, even if elevation of the property was required by law.²⁷⁹

One way to possibly mitigate such logistical problems and legal wrangling would be to elevate entire neighborhood blocks at once. This was once done in Galveston Island, Texas after a massive storm in 1900.²⁸⁰ And the City of Miami Beach seems to be contemplating this as well; as discussed above, they have already elevated some entire stretches of City roads. Of course, massive projects like this would be very costly. (And if the City were to do such an elevation project, the City would, of course, need to exercise reasonable care in such efforts to avoid the risk of tort liability. *See* discussion in IV.B.3. *supra*.)

Another tool to help prevent the issue of neighbors flooding neighboring land is to develop and enforce stringent Code criteria to be followed by property owners or developers who are

engaged in any construction or other modifications that might affect the flow on water onto a neighboring property.

D. Setbacks and Buffers

Setbacks require that development be set back a certain distance from a baseline, such as from a property line or from a shoreline feature (high water mark, vegetative line, etc.). And buffers require landowners to leave portions of property (such as existing wetlands) undeveloped. Buffers can provide protection from flooding and can also promote effective stormwater management, help preserve views, help maintain existing ecosystems, or even serve as alternatives to coastal hard armoring.²⁸¹

The City might consider establishing setbacks and/or buffer areas based on the projected shoreline locations by using the best available evidence of sea level increase and erosion rates over the life of a proposed structure.

The Regional Compact recommends that municipalities take the following actions with respect to setbacks and buffers, within designated Adaptation Action Areas:

- Establish mandatory construction setbacks to a specified distance from a seawall or mean high water line.
- Establish erosion-based setbacks requiring that the structure be set back by the projected shoreline position over a specific time frame -- could either be based on a sea level rise projection (such as two feet by 2060) or be determined by the life expectancy of the structure.
- Establish a tiered setback system that would allow for varying setbacks based on the size and risk of a structure and determined by the annual average rate of erosion over a specified number of years.
- Limit the development on a property if sufficient setback requirements cannot be met.
- Designate coastal buffer zones in areas that have existing important natural resources and/or that could be part of a mitigation corridor as shorelines erode or tidal habitats shift.
- Expand existing green buffer areas that are experiencing significant erosion or increased inundation.
- Reduce property exposure to erosion and storm damage through shoreline vegetative buffers. For example, a minimum of 25 feet of a vegetated buffer for all new beachfront development in the coastal zone, or a buffer of 100 feet from existing natural resource assets like protected wetlands, shores, or streams.²⁸²

The University of Florida's Model Comprehensive Plan recommends the following with regard to buffers and setbacks:

Policy 3.3.1: [Riparian Buffers] The City/County shall establish riparian buffers that reflect projected rates of sea level rise within the planning horizon for all tidally influenced water bodies. Such buffers shall be designed to allow the conversion of adjacent uplands to wetlands while retaining transitional ecotones where ecologically feasible.²⁸³

Specific litigation risk considerations: Because setbacks and buffers can limit the amount of property that can be developed, they may limit a property's development value. The City already has some regulations requiring setbacks or buffers,²⁸⁴ and is, therefore, familiar with the burdens required to administer such regulations. Erosion-based or sea level rise-based setbacks are potentially even more challenging because the City may need to obtain scientific data on projected increased sea level and erosion rates, and then map the areas with natural features where buffers will be required, and update those maps periodically to account for changes in sea level, and storm surge risk.²⁸⁵ Furthermore, setbacks could present potential taking challenges if they were to prohibit all economically viable use of the property. (*See* Section VI. A. above.)

E. Conditional Development and Exactions

Regulators often impose conditions when issuing permits for new development or substantial redevelopment (*i.e.*, renovation or expansion of existing structures). Conditions that require a property owner to convey a property interest are called exactions. Exactions can include impact fees, which seek to offset the infrastructure or other public costs associated with the development, but exactions can also include, for example, dedications of land for public uses or conditions on future land use. Exactions are typically negotiated between the property owners and the local government, and they often arise when zoning conditions are imposed.²⁸⁶

Local governments in Florida have general authority to impose exactions and other conditions based on the power they possess under the Florida Constitution's "home rule" principles, assuming of course that the conditions do not violate constitutional or other legal principles (some of which are discussed below). The City might consider updating the Zoning Code, consistent with the various state laws and the constitutional principles discussed herein, so that regulators can: impose additional appropriate restrictions on development in vulnerable areas, specify the types of conditions that may be imposed in those areas, and specify the types of mitigation measures that may be required.²⁸⁷

The Georgetown Climate Center has recommended that local governments consider the following types of conditions in vulnerable areas:

- Require developers to pay a fee to cover the costs of potential emergency response and future armoring, to mitigate impacts to natural resources from future armoring, or to flood-proof infrastructure that services the new development;
- Require landowners to remove certain structures as they become inundated due to land loss;

- Require that development and its supporting infrastructure (including, for example, its sewer lines) be more resilient to flood impacts, such as by requiring that it be built above the minimum requirements of flood protection;
- Require the dedication of easements to preserve natural buffers or floodways; and
- Restrict coastal hard-armoring as a form of flood protection, and instead authorize in the permit conditions the use of soft-armoring alternatives to protect the development.²⁸⁸

Specific litigation risk considerations: Due to their coercive potential, exactions and other development conditions need to be reviewed as potential regulatory takings. And the government – not the property owner – has the burden to prove an “essential nexus” between the purpose of the exaction and the impact that the exaction seeks to mitigate,²⁸⁹ as well as a “rough proportionality” between the exaction and the impact of the proposed development.²⁹⁰

Georgetown University Law Center professor J. Peter Byrne has written an article entitled “Climate Exactions” in which he analyzes, among other things, the rough proportionality test as applied to climate change adaptation-related impact fees.²⁹¹ As Professor Byrne explains, “rough proportionality for adaptation, (which is inherently forward-looking), may require more of a risk-mitigation analysis, which may be harder to calculate and monetize. There is work to be done to improve current tools and methodologies but the science in these areas is constantly progressing, and unfortunately, we learn more about the value of avoiding risk each time we see more damage from storms and sea-level rise. In any event, the amount of an adaptation fee probably should be discounted to reflect that it addresses climate harms that will occur at an uncertain time in the future.”²⁹²

However, it must be remembered that the constitutional requirement is only that the regulating government demonstrate rough proportionality (not mathematical precision). As the U.S. Supreme Court reiterated in *Koontz v. St. John’s River Management District*, 133 S. Ct. 2586 (2013), “[i]nsisting that landowners internalize the negative externalities of their conduct is a hallmark of responsible land-use policy, and we have long sustained such regulations against constitutional attack.”²⁹³

That said, any lawsuit alleging that an exaction or other development condition amounts to a taking would be highly fact-dependent. And to ensure that the conditions are tailored to address specific public interests (such as protection of natural resources and promoting safety from flood risks) in a proportional way, zoning ordinances might specify the facts and conditions to be weighed when the permit is issued in an order, lay out the analysis that the regulators should perform before requesting an exaction or condition, and limit the discretion of regulators to condition permits.²⁹⁴

F. Rebuilding Restrictions

In the context of sea level rise adaptation, local governments might limit, or even prohibit, the rebuilding of structures that have been damaged by recurrent flooding or storm surge effects. For example, if a high-risk area is downzoned, existing structures could remain but become

“nonconforming,” such that if a building is destroyed or damaged, reconstruction has to conform to the new, more stringent zoning and building requirements.²⁹⁵ Similarly, retrofitting requirements might be imposed on existing structures when a property owner applies for a permit to renovate or expand a structure.²⁹⁶

The Georgetown Climate Center has recommended that local governments consider the following types of rebuilding restrictions in vulnerable areas:

- Limit or prohibit rebuilding of structures damaged by flooding and sea level rise in vulnerable areas;
- Allow rebuilding but with the condition that the owners will not build protective armoring or that they will remove structures when threatened by erosion or inundation;
- Target sites that repeatedly are damaged from flooding for future public acquisition;
- Establish a post-disaster building moratorium to evaluate and plan redevelopment in vulnerable areas; and
- Establish post-disaster reconstruction criteria for size (compared to the original structure prior to the storm event), base floor elevation, and/or other design standards.²⁹⁷

The University of Florida’s Model Comprehensive Plan even recommends that the following “relocation covenant” be added to local governments’ comprehensive plans, to be applied in the most highly vulnerable zones of the community:

Policy 4.2.2: All permits for new development within a Managed Relocation Zone shall include, as a condition of development approval, a covenant or other real property instrument that runs with the land, that requires the abandonment and removal of structures and fixtures once they are inundated for at least () months per year, or are no longer habitable as determined by the building official, whichever comes first.²⁹⁸

And the U.S. Environmental Protection Agency (“EPA”) recommends that local governments: (1) treat as non-conforming those structures that are vulnerable to 100 centimeters (3.28 feet) of sea level rise over the next 100 years, and (2) prohibit expansion or intensification of current uses but allow ordinary maintenance and repair if damage to structures does not exceed 50 percent.²⁹⁹

Notably, rebuilding restrictions already exist federally as part of FEMA’s “50 Percent Rule.” That rule states, in general terms, that a structure is considered repairable when disaster damages do not exceed 50% of the cost of replacing the structure to its pre-disaster condition and when it is feasible to repair the structure so that it can perform the function for which it was being used immediately prior to the disaster.³⁰⁰ Most FEMA-covered structures built after the creation of the NFIP are subject to this rule and must be rebuilt to conform to NFIP minimum standards.³⁰¹

Specific litigation risk considerations: Although some landowners may challenge rebuilding restrictions under the takings clause, courts often uphold rebuilding restrictions if the restrictions are tied to well-documented public safety, health, and welfare considerations.³⁰² Moreover, well-crafted rebuilding restrictions provide property owners with time to adjust their reasonable economic expectations for the continued use of the property.

G. Hard and Soft Armoring

The protection of property and structures from flooding and erosion is typically referred to as “armoring.” Armoring can be either hard-engineered structures like bulkheads, sea walls, revetments, dikes, and tide gates (referred to as “hard-armoring”) or techniques that mimic natural buffers like wetland habitat restoration or beach renourishment (referred to as “soft-armoring”).³⁰³

One option that some municipalities are currently looking at is to require additional heights for sea walls on both public and private properties. The City of Fort Lauderdale is in the process of considering an ordinance to this effect.³⁰⁴ And, although not a cure-all in light of South Florida’s porous limestone base, well-constructed and maintained sea walls and bulkheads are likely to be one important part of Coral Gables’ adaptation to sea level rise, especially for the properties along the City’s inland waterways.

When it comes to the protection of sandy coastlines, however, hard armoring is typically disfavored by resiliency experts, because hard armoring often causes or exacerbates erosion as well as flooding on neighboring properties, and because hard armoring can prevent natural resources such as wetlands and beaches from migrating naturally.³⁰⁵ Hard armoring can also encourage unsustainable development in vulnerable areas and can increase risks to people and property in the event that the armoring fails.³⁰⁶

Conditions to development might also be imposed to require landowners to mitigate the impacts of any allowed coastal hard armoring. For example, developers might be required to pay impact fees to mitigate damage to natural resources such as the loss wetlands or beaches.³⁰⁷ In *Wald Corp. v. Metropolitan Dade County*, 338 So. 2d 863 (Fla. 3d DCA 1976), the court upheld a county ordinance imposing an impact fee on a subdivision development to cover the costs of protecting the development from flooding and to offset the impact on downstream owners of the effects of the development’s runoff. Impact fees for armoring have also been addressed by courts outside Florida. For example, in *Ocean Harbor House Homeowners Ass’n v. Cal. Coastal Comm’n*, a California court upheld a \$5.3 million mitigation fee imposed by the California Coastal Commission as a condition to a permit to build a seawall. The court found that the mitigation fee was roughly proportional to the impacts based upon “projected economic losses to local businesses and the tourist industry.”³⁰⁸

Wherever hard armoring *is* allowed, the City – working in the context of all applicable state and federal regulations – can begin taking into account future sea level rise when reviewing the design and construction of armoring structures, rather than simply basing the design criteria on *historic* flood measures (like FEMA’s 100-year flood event levels).

The University of Florida’s Model Comprehensive Plan recommends the following additions to local governments’ comprehensive plans on the issue of hard and soft armoring:

Policy 2.2.1: The City/County shall require adequate mitigation for shoreline stabilization through the construction of living shorelines in front of hard shoreline stabilization structures where it is feasible do so.

Policy 4.2.1: The City/County shall prohibit hard shoreline stabilization techniques within a Managed Relocation Zone.³⁰⁹

Sarasota County has restricted shoreline hardening or the construction of shore protection structures unless it is found to be in the public interest. Under their code, shoreline hardening or shore protection structures “must minimize adverse impacts to coastal processes and resources, neighboring properties, and the values and functions of the beaches and dune systems, and provide mitigation where determined ... to be appropriate.”³¹⁰

The federal government, the State of Florida, and the City all have rules regulating coastal armoring. By way of example, the City’s Zoning Code has the following relevant provision:

No bulkhead, retaining wall or similar installation along a water body shall be built or constructed unless such bulkhead, retaining wall or similar installation be constructed of reinforced concrete, pre-stressed concrete or gravity mass non-reinforced concrete, providing, however, that in those water bodies west of LeJeune Road and north of Sunset Road, bulkheads and retaining walls may be constructed of concrete block or native stone. All bulkheads and retaining walls shall be subject to the following conditions:

- All plans for such bulkheads and walls shall be designed by a registered engineer, qualified under the laws of the State of Florida, to prepare such plans.
- All such bulkheads and walls and components shall be designed to meet loads imposed by saturated backfill.
- The minimum elevation of such bulkheads and walls shall be plus five (5) and no hundredths feet, U.S.E.D. Bay Datum.³¹¹

Such restrictions may need to be enhanced, and the minimum height increased, based on the results of professional vulnerability assessments. And the City might also evaluate the feasibility of alternative soft armoring in particular locations, and set out requirements for the long-term maintenance of such soft armoring features.³¹²

Specific litigation risk considerations: Hard armoring regulations could result in litigation under various scenarios. For example, litigation might arise if property damage (due to flooding or erosion) is exacerbated due to a prohibition on hard armoring.³¹³ Additionally, litigation might also ensue for *allowing* armoring including where the armoring is done by the City itself and causes flooding to neighboring property or where the City’s own armoring construction efforts were allegedly not done with due care and damage results. Some of the key legal principles relevant to such suits are noted in Section IV. B. above.³¹⁴

VII. Land Acquisitions and Conservation Easements

A. Land Acquisitions (Voluntary)

One attractive sea level rise adaptation tool is the use of public funds to acquire private property for conservation purposes and/or to promote public health and safety. This might be done by the City acting on its own or in conjunction with the County, State, or other local governments, or with third parties such as private land trusts or non-profit organizations.³¹⁵

The City might acquire property that is at risk from sea level rise in order to provide flood buffers for other properties, to preserve coastal habitats and upland migration corridors, to preemptively remove at-risk structures, or to provide open spaces and corridors to “welcome” and make space for water to help manage inundation.³¹⁶ When identifying properties to acquire, the City might consider not only the current state of the property but also the *future* natural resource value of the property. For example, some currently dry land could provide room for wetlands to migrate inland in the future.³¹⁷

Based on detailed vulnerability assessments, the City could proactively begin to identify areas or parcels where such acquisitions should be encouraged. For example, a designated Adaptation Action Area might be a logical property base in which the City could focus its acquisition efforts. The City should also consider developing criteria for the prioritization of lands to be purchased, such as those lands that have been severely damaged by recent storms, that are at highest risk of being damaged in the future, and/or that are currently undeveloped.³¹⁸

The City is fortunate to have a ridge of relatively higher elevation land in the northern and central portion of the City.³¹⁹ With an eye towards maximizing the use of that land, the City could identify and establish a “land bank” where critically important infrastructure and municipal support facilities might be located outside of the most vulnerable areas.³²⁰

Fair market property values in Coral Gables are generally high, so voluntary land acquisition can be a costly option. The City can investigate possible funding sources for a land acquisition program or trust, such as applying for federal and state funding programs, providing tax or cash incentives for donated properties or land trades, selling government bonds, and/or charging appropriate permit fees for new construction and renovation in certain areas.³²¹ See Section IV. C. above.

The City can also encourage land acquisitions by the State of Florida in our City. Through the Florida Forever program, the State has acquired over 700,000 acres of land to-date since 2001 at a cost of approximately \$2.9 billion.³²²

The federal government also has conservation and buyout programs such as the following:

- NOAA’s Coastal and Estuarine Land Conservation Program provides federal matching funds to state and local governments to fund acquisitions of coastal properties. Properties that receive funding must be identified in a state coastal and estuarine land conservation plan and states must nominate the projects.³²³

- The U.S. Fish and Wildlife Service’s National Coastal Wetlands Conservation Grant Program “provides matching grants to States for acquisition, restoration, management or enhancement of coastal wetlands.”³²⁴
- FEMA’s Hazard Mitigation Assistance programs fund buyouts of property at risk of flooding through competitive grants to state and local governments. Buyouts must be voluntary. The grants can be used to acquire, demolish, or relocate threatened properties.³²⁵

Lease-backs are another option that may be easier to fund and that can be explored as a possibility. In a lease-back acquisition, the City (or other acquiring entity) would purchase vulnerable land from an interested property owner and immediately lease the property back to the former owner for a long period, such as 90 years. The property owner would be paid the value of a fee simple title to the property minus the value of the lease.³²⁶

The University of Florida’s Model Comprehensive Plan recommends the following addition to local government comprehensive plan regarding land acquisition:

Policy 3.3.2: The City/County shall develop priority areas for land acquisition based on their strategic capacity to absorb floodwaters and support coastal ecosystem migration.³²⁷

B. Land Acquisitions (Eminent Domain)

Although voluntary land acquisitions could be an excellent way for the City to acquire property, if a property owner refuses to sell land that there is a valid public need for, eminent domain is sometimes a viable (albeit costly) tool.³²⁸ “Just compensation,” even in a community with rising seas, could still be determined by comparable sales going on at that time; however, a local government utilizing eminent domain can nevertheless anticipate costly and time-consuming disputes with property owners over what just compensation should be for property that is severely compromised by acts of nature.³²⁹

This issue arose in the wake of 2012’s Superstorm Sandy where the State of New York sought to buy out homeowners in particularly vulnerable locations, turn those areas into parks or rehabilitated ecosystems, and allow the shoreline to migrate inland. The State initially proposed using \$400 million for a buyout.³³⁰ But even with the unprecedented destruction caused by Superstorm Sandy, many residents did not want to move and threatened litigation.³³¹ So, to avoid lengthy and costly eminent domain litigation, Governor Cuomo proposed the “New York Rising Community Reconstruction Program.” In Staten Island, the program offered “pre-storm” value to owners of damaged houses as an inducement to re-locate. Those in even more vulnerable areas were offered a bonus to sell; and in a small number of highly flood-prone areas, the State would double the bonus if an entire block of homeowners agreed to leave.³³²

C. Conservation Easements

Conservation easements can be another powerful tool in sea level rise adaptation, because conservation easements place restrictions on the use and/or allowable amount of development on a

property but still allow the owner to retain the property with limitations based on the terms of the easement.³³³ For this reason, conservation easements are a potential ‘win-win’ option for local governments and property owners.³³⁴

Pursuant to Florida Statutes § 704.06, conservation easements can be used to preserve property for habitat, open space, and recreation, among other things. Because the statute broadly allows for creation of easements that impose both affirmative and negative obligations, the types of restrictions imposed can vary greatly. But covenants could certainly be incorporated into a conservation easement that protect property from sea level rise, such as prohibiting the removal of protective mangroves, prohibiting certain shoreline hard armoring, or restricting land uses that would put public resources at risk. The easement is then recorded and binds future owners of the property.³³⁵

Interestingly, the Florida Statutes also provide that such easements can typically survive property tax lien foreclosures, which could be a key issue for perpetually flooded lands in years to come.³³⁶ Other important aspects of the conservation easement statute include:

- The creation of a conservation easement cannot be done through eminent domain powers;³³⁷
- The easements must be perpetual;³³⁸
- The holder of the easement (i.e., the City) is entitled to enter the land in a reasonable manner and at reasonable times to assure compliance;³³⁹
- The property might be eligible for reduced property tax valuation;³⁴⁰
- Liability protection may be available for the easement holder;³⁴¹ and
- The owner of the property encumbered by the easement must abide by the Marketable Record Titles to Real Property or any other similar law.³⁴²

Similar to land acquisition programs discussed above, the City could prioritize highly vulnerable properties and purchase conservation easements across parcels that have particular utility as habitat or natural buffers or for water management.

And as with conservation land acquisitions, there may be some available sources of matching funding for conservation easements. For example, NOAA’s Coastal and Estuarine Land Conservation Program provides matching federal funds for the purchase of conservation easements from coastal property owners.³⁴³

D. Rolling Conservation Easements

One form of conservation easement, which has been getting attention among lawyers and planners who are considering sea level rise adaptation efforts with respect to coastal properties, is the rolling conservation easement.³⁴⁴ The idea behind a rolling conservation easement is that as the sea advances on a property over time, the easement would automatically “roll” landward, allowing coastal habitat to migrate naturally. Property owners can still build upland on the property. And if the high water mark (or other indicator of the current sea level) migrates inland and destroys a structure, the structure can only be rebuilt landward of the rolling line.³⁴⁵

Under this concept, private landowners would receive up-front compensation for agreeing to limit development in specified ways in the future. Meanwhile, they could continue to develop and use their property until the seas threaten their development (impacts that may be decades in the future).³⁴⁶ In exchange, the City would be assured that development will not be maintained in those areas in a manner that will compromise public resources. Rolling easements also provide property owners with advance notice of what will happen when the sea reaches their property, so that the owners can develop realistic investment-backed expectations about the long-term available uses of their property.³⁴⁷

The easement terms would need to be drafted to ensure that public funds are not used to acquire easements that may someday be unenforceable or that were simply unnecessary. For example, under the public trust doctrine set forth in the Florida Constitution, the State of Florida already holds all lands on the Atlantic and Gulf coasts below mean high water in trust for the use and enjoyment of the public.³⁴⁸

The University of Florida's Model Comprehensive Plan recommends the following addition to a local government's comprehensive plan regarding land acquisition:

Policy 4.3.3: The City/County shall promote the acquisition of rolling conservation easements within a Managed Relocation Zone.³⁴⁹

VIII. Market-Based Tools

In addition to the voluntary acquisition options just discussed, the City may also want to consider the following tools which rely on incentives and market-based forces.

A. Transferable Development Rights

One tool with significant potential for use in sea level rise adaptation is a transferable development rights ("TDR") program. A TDR program is designed to achieve land preservation or promote less intensive use of property by allowing a landowner to sever development rights over ecologically valuable or sensitive land (the "sending area") and to sell them to an area where the local government wants to encourage development (the "receiving area").³⁵⁰ The development rights are monetized based on the level of development that the local government's base zoning code would allow, such as a certain number of units per acre, and the buyer can then use the credits to exceed the default density standards or building height requirements in the receiving area.³⁵¹ To ensure that property in the sending area is conserved, a permanent conservation easement is recorded against the sending property in conjunction with the sale of the development credit.³⁵²

The City of Coral Gables Zoning Code already contains one type of TDR program – for the transferring or sending of unused development rights in connection with "local historic landmarks."³⁵³ The stated purpose of that TDR program is "to encourage historic preservation and to provide an economic incentive to property owners to designate, protect, enhance and preserve historic properties."³⁵⁴ The City may want to consider utilizing this concept to decrease intensity and density standards in areas that are most vulnerable to sea level rise, while factoring in all of

the various precautions discussed above. Such a program could help mitigate the substantial expense involved in preserving land through conservation acquisitions.

As one implementation option, the City might consider establishing a voluntary TDR program in designated AAAs to provide incentives to landowners to develop at higher densities in lower-risk areas outside the designated AAAs.³⁵⁵

Miami-Dade County has used TDRs to preserve over 100,000 acres of everglades outside of the Everglades National Park. Properties adjacent to the park cannot be developed due to periodic flooding, so to provide some financial compensation to owners, the County allocated owners Severable Use Rights (a type of TDR) that can be sold to increase the intensity or density on upland parcels.³⁵⁶

Also, Sarasota County's comprehensive plan recognizes the potential use of TDRs to promote resettlement from high-risk coastal areas like barrier islands to inland areas that are less vulnerable to nature and natural disasters.³⁵⁷

The University of Florida's Model Comprehensive Plan recommends the following policy statement:

Policy 4.1.3: The City/County shall create a transferable development rights program within a Managed Relocation Zone that transfers densities and intensities outside of the Managed Relocation Zone.³⁵⁸

Notably, TDR programs have successfully been used to help insulate otherwise onerous land use regulations from takings challenges in Florida courts.³⁵⁹ The development credit is viewed as part of the retained property rights of the landowner, and courts will therefore typically consider the development credit when assessing the potential economic use of the property.³⁶⁰

B. Tax Incentives

Tax incentives are another tool that governments can use to discourage development in areas likely to be threatened by sea level rise. Such programs could take many different forms, many of which would have to be implemented by, or with the assistance of, other levels of government rather than by the City alone, depending on which level of government is imposing or administering the relevant tax.

With that caveat in mind, the following are some specific types of tax incentives that might be considered:³⁶¹

- Provide tax rebates to landowners who retrofit structures to be more resilient to flooding or storms;
- Provide business tax credits to developers who site new development in lower-risk areas;
- Provide a one-time tax credit to property owners who move structures out of at-risk areas (either relocating on the same or a different parcel);

- Provide a landowner with tax deferment if he or she legally restricts the use of the entire property for conservational uses;
- Provide tax credits when a landowner exceeds minimum resiliency standards required by existing ordinances such as the minimum required setbacks or building elevations; and
- Provide tax deductions to landowners who donate an easement on a portion of their land for conservation purposes, such as wildlife corridors and vegetative buffers. Notably, the federal government already provides a federal income tax deduction to landowners who donate an easement on their land “exclusively for conservation purposes.”³⁶² In addition, under Florida law, properties subject to conservation easements might be eligible for reduced property tax valuation based upon the diminution in the property’s value caused by the restrictions imposed by the easement.³⁶³

C. Other Incentives

The City might also consider offering other types of non-tax incentives, such as permitting and density incentives to developers and property owners who prioritize sea level rise adaptation in their plans. By offering fast-track review or reducing permit application fees, the City can encourage development of such projects.

The City could also look into the possibility of creating a Payment for Ecosystem Services (“PES”) program for land management, restoration, conservation, and sustainable use activities. PES programs have been implemented on the state level – most notably by the South Florida Water Management District (“SFWMD”) through its Dispersed Water Management Program (and its Florida Ranchlands Environmental Services Project, the preceded pilot program), which facilitated collaboration among governmental agencies, environmental organizations, ranchers, and researchers to address excess water levels in the Lake Okeechobee area.³⁶⁴ The Florida Fish and Wildlife Conservation Commission has also implemented PES pilot programs designed to protect threatened species.³⁶⁵ The City would likely need to coordinate with relevant state and federal agencies – like SFWMD and the EPA – if it is interested in creating a local PES program that provides payment incentives for private sea level rise adaption efforts.

D. Mandating Risk Disclosures in Real Estate Transactions

Numerous state and federal laws already require sellers of residential real estate to disclose certain information to potential buyers – for example, the property’s location in a flood zone area, the presence of lead-based paints, special property taxes, or information about radon gas risks – and in some instances, failure to disclose can lead to a lawsuit against the seller and/or the real estate licensee.³⁶⁶ The purpose of these disclosure laws is to ensure that buyers are fully informed about the conditions of the property prior to its purchase, which allows them to make decisions based on informed risks.

Similarly, potential buyers, especially of residential properties, in sea level rise-threatened zones might benefit from informed notice about these risks. Accordingly, and as noted in Section

III.E.2. above, local governments in Florida – or the State legislature – might consider enacting laws requiring sellers of properties in particularly vulnerable areas to alert potential buyers of the nature of the property’s vulnerability to the future impacts from sea level rise. Such a notice requirement might be applied, for example, to properties covered under a designated AAA or in FEMA-designated high risk flood zones.

Thomas Ruppert, an attorney with the Florida Sea Grant program, has written an article about this issue, in which he explains that a well-drafted notice might identify the following: the property’s inclusion in the high-risk area; the area’s projected rate of sea level rise-based flooding (with a reference to the scientific source of that projection); any special regulatory restrictions on the area such as special setback or buffer restrictions; the possibility of future additional regulation in the area; and the long-term possibility of discontinuation of certain City services in the event of substantial sea level rise.³⁶⁷ The disclosure might be required, for example, to be provided at or before the signing of the contract for purchase, and/or at or before the closing.³⁶⁸ Possible results of non-compliance that might be considered are a monetary penalty or allowing the purchaser to rescind the transaction prior to the time of recording.³⁶⁹

One somewhat analogous disclosure law already on the books is Florida’s coastal hazards disclosure law, Florida Statutes § 161.57, which could be used as a rough model for a sea level rise disclosure law. This coastal hazards disclosure law, which applies to property seaward of the Coastal Construction Control Line (“CCCL”), requires that certain sellers or sellers’ agents notify purchasers that the “property being purchased may be subject to coastal erosion and to federal, state, or local regulations that govern coastal property, including the delineation of the CCCL, rigid coastal protection structures, beach nourishment, and the protection of marine turtles.” The statute currently requires that notice be given “[a]t or prior to the time a seller and a purchaser both execute a contract for sale and purchase” of the coastal property. A CCCL affidavit or survey must then be given to the buyer “at or prior to the closing” on the property.³⁷⁰

Leon County, Florida has adopted another helpful model. Its ordinance requires disclosure to buyers of residential properties of any known flooding in the past or any knowledge that property is flood prone if not otherwise readily observable. Failure to provide the disclosure creates a rebuttable presumption that the failure to disclose materially affected the value of the property.³⁷¹

In terms of litigation risk, requiring disclosure of certain property hazards and attributes is a long-accepted practice in the real estate industry. Even if the required notice had an effect on one’s property value (which would depend on the circumstances), it is not clear that such a disclosure would be found to be a basis for a taking under the analysis that the U.S. Supreme Court has set forth for regulatory takings.³⁷² Furthermore, such notices would typically inform a new buyer’s reasonable investment-backed expectations regarding the future of the property – a fact that might help insulate local governments from future regulatory takings or inverse condemnation lawsuits.

However, rather than any one local government acting alone, it would arguably be more helpful and effective if a uniform, statewide disclosure law were enacted. For that reason, the City may want to work with state or regional leaders towards an appropriate state or regional disclosure

law. Regardless of which level of government were to enact such a disclosure law, it could be helpful to first obtain feedback from stakeholders who will be affected, including property owners and real estate professionals.

E. Monitoring and Working with Private Sector Forces

Private sector forces should be monitored by the City as it modifies its policies over time to address sea level rise. Some of the private sector forces that are likely to be most affected by sea level rise are discussed below.

1. Real Estate Market

Effects on South Florida's real estate market may be sudden or gradual. It is difficult to predict how the market will respond to a serious but relatively gradual issue such as sea level rise. The desirability of our South Florida location as a place to work and live may help to insulate the market, even as seas rise. That said, anecdotal evidence suggests that investors and residents are beginning to ask questions about this issue.³⁷³ And the view of real estate professionals appears to be changing as well. A recent Miami Herald article cited a survey of 100 major real estate industry players that revealed that 65% of the respondents were concerned about the effects of climate change (up from 56% just one year prior).³⁷⁴

If the real estate market does soften due to sea level rise concerns, the City's ability to fund necessary adaptations will obviously be affected by the decreased values of real property which are taxed on an ad valorem basis. The more prepared the City is in terms of well-planned infrastructure investments and smart land use planning, the better its tax base will be able to withstand the effects of sea level rise.

2. Mortgage Industry

Even before investors react to the risks associated with sea level rise, it is likely that the mortgage industry (along with the insurance industry, which is discussed below) will lead the way in considering the risks to lenders, in light of the long-range horizon of most mortgages (particularly residential mortgages). Indeed, if the current sea level rise projections (such as those from the Compact discussed in Section II. B. above) are accurate, then South Florida is as little as 10-20 years away from seeing the significant effect of sea level rise within the life of a 30-year mortgage.

One can expect that some property owners might attempt to escape the full impact of their mortgage obligations in the face of increased flooding and declining property values. As was demonstrated during the economic recession in the late 2000s, government-assisted mortgage modification efforts are often politically popular.³⁷⁵ And it is reasonable to assume that some owners of perpetually flooded properties may attempt to use the common law defense of "impossibility of performance" when faced with foreclosure suits. In general terms, that doctrine provides that when a meaningful purpose of a contract is not performed due to a major superseding event, a court can determine that the affected party should not be held to the initial bargain.³⁷⁶ The argument would be that substantial sea level rise undermined the intended purpose

of a mortgage obligation on a flooded property. While Florida courts have historically made the impossibility of performance defense inapplicable when the significant event which caused the impossibility was *foreseeable* at the time the mortgage relationship was entered into, there is uncertainty as to how a court would treat that defense in the context of sea level rise.³⁷⁷

In any event, property owners' financial obligations over flooded properties are likely to be enforced in the decades to come. In the meantime, the City should monitor developments in the mortgage industry, changing mortgage practices, and the potential for fluctuations in property values.

3. *Insurance for Residents*

Insurance coverage options will be another factor impacting whether (and how) people continue to live and invest in South Florida. Insurance providers are likely to more closely consider the longer term *prospective* risk factors associated with sea level rise in their premium rates. In fact, the executive director of the Academy of Risk Management and Insurance recently spoke about the development of an Actuaries Climate Index and an Actuaries Climate Risk Index, which are intended to measure changes in climate extremes, inform the insurance industry and the public about these changes, and contribute statistically to measuring how climate change will impact insurance rates and coverages.³⁷⁸

As mentioned previously, many Coral Gables residents living in FEMA flood zones obtain flood insurance through FEMA's National Flood Insurance Program ("NFIP"). The NFIP's FIRM maps are currently based on *historical* data, including historical rainfall patterns and sea levels that do not incorporate climate change effects. However, that may well change in the future, as the NFIP begins to consider this future risk as well.³⁷⁹

In the meantime, there are concrete insurance-related benefits available to property owners in cities with sophisticated municipal adaptation planning. Most notably, a local government's adaptation measures can save some residents money on their premiums. As noted previously, NFIP premiums are determined in part by FEMA's Community Rating System ("CRS"), which awards points to communities that go above and beyond minimum flood plain management standards. Based on the points the community earns, it is assigned a class rating of 1 to 10, with 10 being most desirable rating. Each point increase in a community's CRS results corresponds to a 5% premium discount for policy holders in that community.³⁸⁰ For this reason, the City may want to consider tying sea level rise planning to the CRS guidelines. The City's current CRS score is a 7.³⁸¹

There are 19 public information and floodplain management activities described in the CRS Coordinator's Manual. Flood insurance premiums are discounted to reflect the community's work to: reduce flood damage to existing buildings; manage development in areas not mapped by the NFIP; protect new buildings beyond the minimum NFIP protection level; preserve and/or restore natural functions of floodplains; help insurance agents obtain flood data; and help people obtain more cost-effective flood insurance.³⁸² Additionally, the 2013 Coordinator's Manual included new provisions related to credit for climate change and sea level rise planning. As Florida

attorneys Erin Deady and Thomas Ruppert recently summarized in an article, these considerations are:

- Credit is provided for communities that provide information about areas (not mapped on the FIRM) that are predicted to be susceptible to flooding in the future because of climate change or sea level rise.
- To become a Class 4 or better community, a community must (among other criteria) demonstrate that it has programs that minimize increases in future flooding.
- To achieve CRS Class 1, a community must receive credit for using regulatory flood elevations in the V and coastal A Zones that reflect future conditions, including sea level rise.
- Credit is provided when prospective buyers of a property are advised of the potential for flooding due to climate changes and/or sea level rise.
- Credit is provided when the community's regulatory map is based on future conditions, including sea level rise.
- Credit is provided if a community's stormwater program regulates runoff from future development.
- Credit is provided for a community whose watershed master plan manages future peak flows so that they do not exceed present values.
- Credit is provided for flood hazard assessment and problem analyses that address areas likely to flood and flood problems that are likely to get worse in the future, including (1) changes in floodplain development and demographics, (2) development in the watershed, and (3) climate change or sea level rise.³⁸³

The City of Ocala, Florida recently became the first Florida city to obtain a Class 3 rating – moving from a Class 8 rating by taking major steps to reduce flood risks beyond the minimum requirements of the NFIP, including increasing flood protection and implementing preparedness and mitigation activities.³⁸⁴ Those efforts by Ocala could provide inspiration and guidance to Coral Gables' efforts.

Notably, substantial sea level rise would not only affect homeowner's insurance and windstorm insurance, it would also likely affect vehicle insurance, commercial liability insurance, and title insurance. And even health insurance markets may be affected due to health risks associated with contaminated flood waters, mold, and possible increases in pest-borne diseases.³⁸⁵ The City will want to track developments in these industries to see if coordinated helpful action can be taken to protect citizens.

4. *Private Litigation*

Another driving private sector force in the decades ahead will be private litigation. As properties are damaged by sea level rise, owners will inevitably be asking themselves: "Who can I sue?" And governmental agencies will not be the only defendants. For example, property owners may sue their neighbors whose property causes runoff on to their property when the neighbors are attempting to address their own flooding problems, or neighbors may sue each other for weakening the lateral or subjacent support that was provided to their land before the neighbors

took actions to address flooding on their own property. Additionally, professionals, such as architects, planners, and realtors, may become frequent targets of litigation. City leaders may want to work with local chapters of professional organizations – and even with the boards of condominium associations and homeowners’ associations – to encourage such professionals and leaders to become informed on this issue as they plan for the future.³⁸⁶

IX. Long-term Retreat

If current projections come to fruition, sea level rise and the other effects of climate change could make much of South Florida a challenging place to live at some point in the future. However, doomsday scenarios do not take into account the substantial skill of humans to create solutions to complex and rapidly changing problems. Innovative solutions that we cannot even fathom today may help extend both the life of South Florida’s land and the quality of life of its residents. Nevertheless, for the sake of a more complete examination of the issue, we will briefly discuss issues associated with long-term retreat and shut-down planning on a City-wide scale in the event that portions of the City become unsustainable.

A. Precedent for Retreat

First, it should be noted that there is some precedent for community retreat and shut-down planning. For example, several island towns in the Chesapeake Bay area have disappeared in the last century, as a result of a combination of land subsidence, erosion, and sea level rise. For example, in 1962, Sharps Island, Virginia disappeared into Chesapeake Bay. And on Holland Island, in the same area, the last house disappeared in 2010. Most of the residents moved to the mainland, some barging their houses and reconstructing them on higher ground. The structures that were too damaged to be moved either stayed behind or slipped into the Bay.³⁸⁷

Another offshore island in the Chesapeake Bay region – Smith Island – still exists but is shrinking. It has lost land and population, and residents have been demanding government projects like seawalls and jetties to protect the remaining land. Those efforts have struggled against the public perception outside the island that the millions of dollars in public funds needed to protect so few people is simply not justifiable.³⁸⁸ After Superstorm Sandy, the State of Maryland, and the federal government offered \$2 million to buy out Smith Island residents who wanted to leave. The residents were offered the highest appraised value for their land. The land could then never be built on again. But if they refused the buyout, these owners were not likely to receive any funds for rebuilding, because the government had deemed their properties a zone of habitual flooding. Residents expressed anger at the state and local governments for “turn[ing] their backs on [us],” especially because permits had been issued to build in those areas in the decades before.³⁸⁹ After substantial political pressure, \$15 million in federal relief money is being provided to assist Smith Island – to finance a breakwater project, pay for a jetty, fix their docks, and fund a “visioning” study to plan for the island’s future.³⁹⁰ One can envision similar political and financing battles in South Florida.

B. Reduced Services and Related Taxation Question

1. Reducing Services

Dr. Harold Wanless, who has written a lot about the long-term future of South Florida, makes a grim recommendation that local governments should immediately establish sea level rise thresholds at which City services and infrastructure maintenance will be terminated to particular neighborhoods.³⁹¹ Indeed, there may come a point in the future at which local governments in South Florida can no longer feasibly provide some services to some areas.

As discussed earlier, it is possible that affected properties could be purchased through voluntarily acquisitions before the property is no longer maintainable in terms of government services and infrastructure. Alternatively, eminent domain powers may provide an option to depopulate an increasingly unsafe or unsustainable area.

However, under appropriate circumstances, Florida law would likely permit a municipality to discontinue providing municipal-run public utility services provided it did so after formal proceedings in which the public was sufficiently represented and so long as the municipality could demonstrate that the reduction in services is economically required (e.g., continued provision of the service would result in substantial losses).³⁹² And sea level rise likely gives rise to the type of economic loss which could justify either discontinuation of utility services or robust special assessments, as planning-level decisions by a municipality; however, in light of concerns about inverse condemnation suits when services are cut off, the City and its counsel will need to monitor case law developments on this issue.

With respect to transportation infrastructure services, Florida law generally permits municipalities to cede control over roads to the encompassing county; and there are also specific procedures and requirements for closing or abandoning roads.³⁹³ The recent Florida appellate decision in the *Jordan v. St. Johns County* case, discussed in Section IV. B.(5) above, which involved the effects of sea level rise and erosion on St. Johns County's ability to maintain a county road, specifically notes that that county's failure to formally abandon the road in adherence to those statutory provisions (as opposed to simply deciding not to maintain the road) supported the residents' claim for liability. Should the City desire to no longer maintain a perpetually flooded road in the future, any such applicable statutory procedures would need to be adhered to.³⁹⁴

It should also be noted that Florida law also provides several tools by which a Florida municipality can reduce its size and/or the scope of the services it provides. Incorporated Florida municipalities can dissolve or contract their physical boundaries in three discrete ways: secession, deannexation, or disincorporation. All three of these options are governed by Florida Statutes Chapters 165 and 171. Secession involves a single-step reorganization in which an enclave would withdraw from the City to form a new municipality. Disincorporation amounts to complete dissolution of the City, returning the entire municipality to unincorporated status.³⁹⁵ And deannexation would return a select part or parts of the City to unincorporated status within Miami-Dade County. Only secession and disincorporation would be likely available options for the City of Coral Gables and not deannexation, because an area which fits the criteria for annexation – namely contiguity to the municipality's boundaries, compactness, and development of part or all of the area for urban purposes – cannot be deannexed,³⁹⁶ and those criteria likely apply to all areas within our relatively compact and densely-populated City. Absent special legislative action on the state level, both secession and disincorporation would, in effect, require a majority vote of eligible voters within the City.³⁹⁷

2. *Taxation Issues Where Services are Reduced*

If the level of City services has been wound down in an area, can taxing continue when not all basic governmental services are being provided to the property? The answer to this question will generally depend, in the first instance, on the type of tax involved. Certain funding sources, such as special assessments, user/utility fees, and development impact fees, must relate to a service being provided, and therefore the City would likely be prohibited from continuing to collect such funding sources if the underlying services are not being provided.³⁹⁸ As for the City's portion of residents' general *property* taxes, those are paid on an ad valorem basis. And if a property's value suffers from the effects of sea level rise (including reduced capacity for government services), the fair market value of that property would almost certainly decrease, thereby decreasing the property tax obligation for that property owner. Stated differently, even if the City's ad valorem millage rate were to stay the same, these property owners would presumably be paying lower taxes, in part because of the decreased level of municipal services.³⁹⁹

C. **Relocating Residents**

In some areas of the world, it is becoming a critically important question to ask -- Where will persons displaced by the effects of climate change be relocated and how can governmental agencies help in that relocation? According to the United Nations University Institute for Environment and Human Security and the International Organization for Migration, between 50 million and 200 million people worldwide could be displaced due to climate change by 2050.⁴⁰⁰

Although governmental assistance with safe relocation may not be necessary for most Coral Gables residents compared to residents in some parts of the world (such as remote island countries), it is still instructive to consider the experiences of groups that have already faced such issues. And it must be remembered that climate change effects are not expected to occur simply on a slow, steady, more predictable basis, but also upon the increased intensity of storms which could have large, sudden impacts.

As with any retreat, relocation of residents due to climate change typically occurs in waves -- there are those who will leave early, those who will stay until things begin to worsen, and those who stay until they are physically or legally forced out. However, some geographically-isolated and culturally-insular groups have chosen to pursue mass relocation as a group. At least one climate relocation has already occurred -- the village of Vunidogoloa, in Fiji, was relocated inland last year by the Fiji government.⁴⁰¹ And here in the United States, a remote Alaskan village is dealing with the issue as a result of the effects of the melting Arctic ice. A rock erosion barrier was constructed there by the U.S. Army Corps of Engineers, but it is considered to be only a temporary solution.⁴⁰²

The political, financial, and human challenges that occur in these communities can be good examples to learn from. South Miami's Mayor Philip Stoddard, who is also a biology professor at Florida International University, recently commented, South Florida should "work toward a slow and graceful depopulation, rather than a sudden and catastrophic one."⁴⁰³

However, a graceful depopulation would be financially costly, and it is not at all clear who would pay for any organized mass relocation. As the Director of the Alaska Immigration Justice Project, Robin Bronen, has explained, “There’s no government agency that has the responsibility to relocate a community, nor the funding to do it.”⁴⁰⁴

The federal government would, no doubt, attempt to provide some assistance to communities in the U.S. that struggle with relocating. As noted in Section IV. C. above, HUD recently awarded federal grants totaling \$1 billion to help some communities adapt to climate change. And according to a recent *New York Times* article, one of those grants – \$48 million for a town in southeastern Louisiana named Isle de Jean Charles – is the first allocation of federal tax dollars to move an entire community dealing with the impacts of climate change.⁴⁰⁵ The homes and trailers in Isle de Jean Charles are mildewing and rusting due to increased flooding, and most of the trees are gone or dying because of saltwater intrusion. Under the terms of the federal grant, the island’s residents are to be resettled to drier land and to a new community that as of now does not exist. Marion McFadden, who is running the program at HUD, said, “We see this as setting a precedent for the rest of the country, the rest of the world.”⁴⁰⁶ But even a plan like this — which would move only about 60 people — has been difficult to implement. Three previous resettlement efforts since 2002 failed because of logistical and political complications, and many residents of Isle de Jean Charles do not want to leave. HUD officials are mindful that many experts see places like Isle de Jean Charles as lost causes. “We are very cognizant of the obligation to taxpayers to not throw good money after bad,” Ms. McFadden said. “We could give the money to the island to build back exactly as before, but we know from the climate data that they will keep getting hit with worse storms and floods, and the taxpayer will keep getting hit with the bill.”⁴⁰⁷

It should also be noted that FEMA has a permanent relocation fund that provides some support for work that is “required as the result of the emergency or major disaster event,” but generally only for work in relocating and restoring a facility that has already been substantially destroyed and should not be rebuilt at its previous location due to the risk of “repetitive heavy damage.”⁴⁰⁸ The funds are to be used to reconstruct facilities “as they existed immediately prior to the disaster”; or, if the applicant wishes to construct an alternate project instead, the applicant may receive 90 percent of the funds they would have received had they relocated and just reconstructed the facility.⁴⁰⁹

While a complete “relocation” of a city like Coral Gables may not be practical (particularly in light of the fact that the City is largely surrounded by even lower-lying land), the City is fortunate to have a ridge of relatively higher elevation land in the northern and central portion of the City.⁴¹⁰ In fact, City Hall and much of the City’s business center core are already on that relatively less vulnerable land, making it more feasible for the City to sustain its core functions farther into the future than some of the surrounding areas, even if current sea level rise projections do come to fruition. As previously noted, this higher elevation land also provides an opportunity to redirect critical facilities and population density to those less vulnerable areas of the City over time. The Hazen & Sawyer infrastructure vulnerability assessment currently underway should help inform that process.

D. Clean-up of Abandoned Land

Experts predict that toxic pollution of water and land will be caused by the remnants of inundated buildings (such as drywall, formaldehyde, and electrical components), damaged sewer lines, damaged septic tanks, landfills, gas pipelines, fuel tanks, electrical grids, and even cemeteries.⁴¹¹ The City may wish to consider now what steps can be taken to prevent such pollution as the seas rise and as climate change exacerbates the strength and intensity of storms and accompanying storm surge events.

With the help of the infrastructure vulnerability assessment currently underway, the City can begin to work to ensure that its own infrastructure and buildings are either designed or retrofitted to avoid such pollution problems. The City can also help to educate the public about this issue and about the wide array of federal, state, and local laws and regulations that prohibit even passive and unintentional pollution from one's property.⁴¹²

While certain laws (state and federal regulations, as well as nuisance and negligence principles) may require cleanup of toxins before a property is abandoned due to perpetual flooding,⁴¹³ a critical question is -- Who would have any incentive or ability to pay for a cleanup in such a circumstance? And, as a threshold question -- Who will even own these perpetually flooded properties? As noted in Section VII. D. above, under the public trust doctrine set forth in the Florida Constitution, the State owns all lands below mean high water on the Atlantic and Gulf coasts and holds it in trust for the use and enjoyment of the public.⁴¹⁴ However, for properties that are not below mean high water but that are perpetually inundated, the answer is not so clear. It can be reasonably presumed that many of those properties would eventually be abandoned by owners who owe more to mortgage holders than the property is worth. And even if a mortgage company could foreclose on the property, the mortgage company would likely not want to take title to flooded property. And while the property taxes may go unpaid, leading to the issuance of a tax certificate, it is unlikely that anyone would want to purchase a tax lien certificate on the property either. The tax lien would then likely result in ownership of the property by the County or other governmental entity.⁴¹⁵ Under such a chain of events, the cost of cleaning up abandoned would, most likely, fall onto governmental agencies at the end of the day. With this in mind, one way to ensure that Coral Gables is protected from such pollution and blight is to create a trust fund for the highest risk Adaptation Action Areas, which builds interest and can be used to clean up any abandoned land or land that has been acquired by the City for conservation.

Grant funding might be one source for such a trust fund, and ad valorem taxes could be another option. While a special assessment in the affected area might appear to be another logical funding choice, the City would have to take into account the legal requirements of special assessments, including ensuring that the property burdened by the assessment would be deemed to derive a "special benefit" from the project or service funded by the assessment and that the assessment for the project or service is properly apportioned. (*See* discussion in Section IV. C.(2) above regarding how Florida courts have traditionally interpreted the special benefit requirement.) Regardless of how it is funded, such a trust could be vital in ensuring that the City is positioned to address future expenses relating to the environmental, health, and safety consequences of sea level rise.

X. Next Steps

The following are some key next steps the City might consider, in light of all of the policy and legal considerations discussed herein:

- (1) Gather and frequently update actionable data from trusted and dependable sources;
- (2) Identify potential stakeholders and collaborators in the community with an interest in sea level rise adaptation;
- (3) Engage and inform the public and other stakeholders through educational efforts;
- (4) Consider more formal notices or notice requirements of sea level rise-related risks;
- (5) Lead by example by considering sea level rise when planning and investing in the City's own public infrastructure;
- (6) Research and pursue available sources of funding for adaptation efforts;
- (7) Implement the Southeast Florida Regional Climate Change Compact, which has some 1,200 action items to help insure the stability of affected individuals and communities;
- (8) Restrict long-term, infrastructure-intensive development in hazard-prone areas, by recognizing that permitting risky development now may lead to greater future costs; and
- (9) Make threshold decisions regarding the point at which public money in high-risk areas will be shifted from protection measures into trust funds to be used for voluntary buyouts of land.

Thinking longer-term now will position the City to make the best possible decisions for itself and the community as it faces the challenges presented by the anticipated effects of sea level rise.

¹ Prepared with the assistance of Abigail Corbett, Shareholder at Stearns Weaver Miller Weissler Alhadeff & Sitterson P.A., as well as Stearns Weaver Miller Weissler Alhadeff & Sitterson P.A. attorneys Jake Cremer, Jason Koslowe, and Matthew Graham. The paper was also created with the substantial assistance and support of Coral Gables Mayor Jim Cason, City Attorney Craig Leen, Assistant City Manager Peter Iglesias, Sustainability Specialist Matthew Anderson, Interim Development Services Director Charles K. Wu, and others on City staff.

² *Sea Level Change Glossary*, NASA.GOV, <https://sealevel.nasa.gov/glossary> (last visited Aug. 29, 2016).

³ However, it should be noted that the City is also making substantial efforts to do its part to be a leader on mitigation efforts as well. By way of example, the City is in the process of finalizing a 10-year sustainability master plan that includes proposed projects for City operations and an analysis of the overall community. See *Sustainability Master Plan*, CORALGABLES.COM, <http://coralgables.com/index.aspx?page=1116> (last visited Sept. 14, 2016). Descriptions of many other climate change mitigation efforts that the City is working on are available on the City's website. *Sustainable Coral Gables*, CORALGABLES.COM, <http://www.coralgables.com/index.aspx?page=346> (last visited Aug. 29, 2016). The City is also working to educate residents about what steps they can take to reduce their own carbon footprint. See, e.g., *Reduce Your Carbon Footprint*, CORALGABLES.COM, <http://www.coralgables.com/index.aspx?page=1124> (last visited Aug. 29, 2016).

⁴ JOHN COOK, ET. AL., QUANTIFYING THE CONSENSUS ON ANTHROPOGENIC GLOBAL WARMING IN THE SCIENTIFIC LITERATURE, ENVTL. RES. LETTS. 8 0240024 (IOP Publ'g Ltd 2013), available at <http://iopscience.iop.org/article/10.1088/1748-9326/8/2/024024> (last visited Aug. 29, 2016) (examining approximately 12,000 academic papers on climate change between 1991-2011, and finding that, of those papers expressing an opinion on human-caused global warming, "97.1 percent endorsed the consensus position that humans are causing global warming").

⁵ See, e.g., Brian McNoldy, *Water, Water, Everywhere: Sea Level Rise in Miami*, UM ROSENTHAL SCHOOL OF MARINE & ATMOSPHERIC SCIENCE, Oct. 3, 2014, available at <http://www.rsmas.miami.edu/blog/2014/10/03/sea-level-rise-in-miami/> (last visited Aug. 29, 2016) (based on measurements at Virginia Key). For a chart reflecting the global increases since 1880, see EPA, CLIMATE CHANGE INDICATORS IN THE UNITED STATES, 2014, at 50 (3d ed. 2014), available at <https://www3.epa.gov/climatechange/pdfs/climateindicators-full-2014.pdf> (last visited Aug. 29, 2016).

⁶ See *Florida's Geologic History*, FL Dep't of Env'tl. Protection, DEP.STATE.FL.US, <http://www.dep.state.fl.us/geology/geologictopics/geohist-2.htm> (last visited Aug. 29, 2016).

⁷ EPA, CLIMATE CHANGE INDICATORS IN THE UNITED STATES: SEA LEVEL 1 (3rd ed. June 2015), available at https://www3.epa.gov/climatechange/pdfs/print_sea-level-2015.pdf (last visited Aug. 29, 2016).

⁸ See FLA. OCEANS & COASTAL COUNCIL, CLIMATE CHANGE AND SEA-LEVEL RISE IN FLORIDA: AN UPDATE OF THE EFFECTS OF CLIMATE CHANGE ON FLORIDA'S OCEAN & COASTAL RESOURCES 19, 15, 8, 13, 11 (2010), available at <http://www.dep.state.fl.us/OceansCouncil/reports/default.htm> (last visited Sept. 14, 2016).

⁹ See, e.g., Elizabeth Kolbert, *The Siege of Miami*, THE NEW YORKER, Dec. 21 & 28, 2015, available at <http://www.newyorker.com/magazine/2015/12/21/the-siege-of-miami> (last visited Sep. 21, 2016); Peter Howard, *Miami Takes Center Stage as 'Ground Zero' for Climate Change*, UM NEWS AND EVENTS, Nov. 13, 2015, available at <http://news.miami.edu/stories/2015/11/miami-takes-center-stage-as-ground-zero-for-climate-change.html> (last visited Sep. 21, 2016); *South Florida Ground Zero For Climate Change Issues*, WIOD-AM LOCAL NEWS, May 6, 2014, <http://www.wiod.com/articles/wiodam-local-news->

[122821/south-florida-ground-zero-for-climate-12323601/](http://www.coralgables.com/modules/showdocument.aspx?documentid=122821/south-florida-ground-zero-for-climate-12323601/) (last visited Aug. 29, 2016); David Adams & Zachary Fagenson, *Florida Senator Holds Miami Beach Hearing on Rising Sea Level*, REUTERS, Apr. 22, 2014, available at <http://www.reuters.com/article/us-usa-florida-sealevel-idUSBREA3L1R120140422> (last visited Sep. 21, 2016); Bill O'Driscoll, *Florida is Poster Child for the Effects of Climate Change – and for the Denial of It*, PITT. CITY PAPER, Feb. 24, 2016, available at <http://www.pghcitypaper.com/pittsburgh/florida-is-poster-child-for-the-effects-of-climate-change-and-for-denial-of-it/Content?oid=1897289> (last visited Sep. 21, 2016).

¹⁰ *QuickFacts: Coral Gables City, Florida*, U.S. Census Bureau, CENSUS.GOV, <http://www.census.gov/quickfacts/table/PST045215/1214250> (last visited Aug. 29, 2016).

¹¹ City of Coral Gables – Sea Level Rise LIDAR Map (June 2016), available at <http://coralgables.com/index.aspx?page=1169> (last visited Aug. 29, 2016).

¹² CITY OF CORAL GABLES ECONOMIC AND CULTURAL DEV. DEP'T, CORAL GABLES THE CITY BEAUTIFUL, CELEBRATING 90 YEARS 11 (2015), available at <http://coralgables.com/Modules/ShowDocument.aspx?documentID=14817> (last visited Aug. 29, 2016).

¹³ MITCHELL H. MURRAY, STORM-TIDE ELEVATIONS PRODUCED BY HURRICANE ANDREW ALONG THE SOUTHERN FLORIDA COASTS, AUGUST 24, 1992, at 11-12 (1994), available at <https://pubs.usgs.gov/of/1994/0116/report.pdf> (last visited Aug. 29, 2016).

¹⁴ See Elizabeth Kolbert, *The Siege of Miami*, THE NEW YORKER, Dec. 21 & 28, 2016, available at <http://www.newyorker.com/magazine/2015/12/21/the-siege-of-miami> (last visited Aug. 29, 2016).

¹⁵ SEFLACLIMATECOMPACT.ORG, <http://www.southeastfloridaclimatecompact.org/> (last visited Aug. 29, 2016).

¹⁶ *Who We Are*, SEFLACLIMATECOMPACT.ORG, <http://www.southeastfloridaclimatecompact.org/who-we-are/> (last visited Aug. 29, 2016).

¹⁷ ARIEL ELYSE MOGER, 2014 MUNICIPAL IMPLEMENTATION SURVEY REPORT (Dec. 2014), available at <http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2015/02/RCAP-IGD-2014-Survey-Report-2-26-15-FINAL.pdf> (last visited Aug. 29, 2016).

¹⁸ Mayors' Climate Action Pledge – Signing Cities, available at <http://www.southeastfloridaclimatecompact.org/mayors-climate-action-pledge-signing-cities/> (last visited Aug. 29, 2016).

¹⁹ Regional Climate Action Plan, Mayor's Climate Action Pledge, available at <http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2014/09/mayors-climate-action-pledge.pdf> (last visited Aug. 29, 2016).

²⁰ Coral Gables Sustainability Advisory Board Meeting Minutes, February 24, 2016, at 6, available at <http://coralgables.com/modules/showdocument.aspx?documentid=17193> (last visited Aug. 29, 2016).

²¹ RESILIENCE DIALOGUES FOR THE CITY OF CORAL GABLES FINAL PILOT PROJECT REPORT, available at <http://coralgables.com/modules/showdocument.aspx?documentid=17835> (last visited Aug. 29, 2016).

²² NOAA TECHNICAL REPORT OAR CPO-1, GLOBAL SEA LEVEL RISE SCENARIOS FOR THE UNITED STATES NATIONAL CLIMATE ASSESSMENT 1-3 (Dec. 6, 2012), http://cpo.noaa.gov/sites/cpo/Reports/2012/NOAA_SLR_r3.pdf (last visited Aug. 29, 2016).

²³ SE. FLA. REG'L CLIMATE CHANGE COMPACT SEA LEVEL RISE WORK GROUP, UNIFIED SEA LEVEL RISE PROJECTION SOUTHEAST FLORIDA 5 (Oct. 2015), *available at* <http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2015/10/2015-Compact-Unified-Sea-Level-Rise-Projection.pdf> (last visited Aug. 29, 2016).

²⁴ IPCC, CLIMATE CHANGE 2014: SYNTHESIS REPORT. CONTRIBUTION OF WORKING GROUPS I, II AND III TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 13, *available at* <http://www.ipcc.ch/report/ar5/syr/> (last visited Aug. 29, 2016) (link to "Full Report"); *see also* MICHAEL D. MASTRANDREA & WILLIAM R.L. ANDEREGG, CLIMATE CHANGE FROM THE GLOBE TO CALIFORNIA 23, *in* BIODIVERSITY IN A CHANGING CLIMATE: LINKING SCIENCE AND MANAGEMENT IN CONSERVATION (Terry L. Root et al., eds. 2015).

²⁵ *See, e.g.*, Harold R. Wanless, *Rising Sea Levels Will Be Too Much, Too Fast for Florida*, THE CONVERSATION, May 28, 2014, *available at* <http://theconversation.com/rising-sea-levels-will-be-too-much-too-fast-for-florida-27198> (last visited Aug. 29, 2016); Brady Dennis & Chris Mooney, *Scientists Nearly Double Sea Level Rise Projections for 2100, Because of Antarctic*, WASHINGTON POST, Mar. 30, 2016, *available at* <https://www.washingtonpost.com/news/energy-environment/wp/2016/03/30/antarctic-loss-could-double-expected-sea-level-rise-by-2100-scientists-say/> (last visited Aug. 29, 2016).

²⁶ SE. FLA. REG'L CLIMATE CHANGE COMPACT SEA LEVEL RISE WORK GROUP, UNIFIED SEA LEVEL RISE PROJECTION SOUTHEAST FLORIDA 4 (Oct. 2015), *available at* <http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2015/10/2015-Compact-Unified-Sea-Level-Rise-Projection.pdf> (last visited Aug. 29, 2016).

²⁷ *Id.*

²⁸ *Id.* at 5. The Compact notes that the USACE Intermediate or NOAA Intermediate Low curve is displayed on the figure for reference (green dashed curve). This scenario would require significant reductions in greenhouse gas emissions in order to be plausible and does not reflect current emissions trends. The Compact also notes that the quadratic curves comprising the projection were selected for simplicity; however, it should be understood that sea level will not rise in the smooth manner illustrated by the quadratic curves but, may be punctuated by faster and slower rates. *Id.* at 8, 14.

²⁹ *Id.* at 8, 14.

³⁰ *Id.*

³¹ *Id.*

³² SE. FLA. REG'L CLIMATE CHANGE COMPACT INUNDATION MAPPING AND VULNERABILITY ASSESSMENT WORK GROUP, ANALYSIS OF THE VULNERABILITY OF SOUTHEAST FLORIDA TO SEA LEVEL RISE (August 2012), *available at* <http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2014/09/vulnerability-assessment.pdf> (last visited Aug. 29, 2016).

³³ SE. FLA. REG'L CLIMATE CHANGE COMPACT, RCAP IMPLEMENTATION GUIDANCE SERIES: REGIONAL IMPACTS OF CLIMATE CHANGE AND ISSUES FOR STORMWATER MANAGEMENT 17,

available at <http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2015/11/Stormwater-Guide.pdf> (last visited Aug. 29, 2016).

³⁴ FLA. DEP'T OF ECONOMIC OPPORTUNITY, HOW COUNTRIES, STATES, AND FLORIDA ADDRESS SEA LEVEL RISE: A COMPENDIUM OF CLIMATE ADAPTATION RESEARCH, *available at* <http://www.floridajobs.org/docs/default-source/2015-community-development/community-planning/crdp/compendiumnationalstatelocaladaptationprojects.pdf?sfvrsn=2> (last visited Aug. 29, 2016). For a summary of other important data collection efforts to-date at a county and regional level and as well as a report on a pilot project analyzing the region's vulnerabilities, *see* PARSONS BRINCKERHOFF, INC., SOUTH FLORIDA CLIMATE CHANGE VULNERABILITY ASSESSMENT AND ADAPTATION PILOT PROJECT 17 (Apr. 2015), *available at* <http://www.browardmpo.org/index.php/current-projects-studies/adapting-to-climate-change> (last visited Aug. 29, 2016).

³⁵ *Sea Level Rise Viewer*, NOAA.GOV, <https://coast.noaa.gov/digitalcoast/tools/slr> (last visited Aug. 29, 2016).

³⁶ *Coastal Flood Exposure Mapper*, NOAA.GOV <https://coast.noaa.gov/floodexposure/> (last visited Aug. 29, 2016); *Tips*, NOAA.GOV <https://coast.noaa.gov/floodexposure/> (follow "Start Collecting Maps" hyperlink; then follow "Flood Hazards" hyperlink; then select "Tips") (last visited Aug. 29, 2016).

³⁷ *The Sea Level Rise Toolbox*, EYESONTHERISE.ORG, <http://eyesontherise.org/app/> (last visited Aug. 29, 2016).

³⁸ *Sea Level Scenario Sketch Planning Tool*, UFL.EDU, <http://sls.geoplan.ufl.edu/> (last visited Aug. 29, 2016).

³⁹ *Coastal Resilience Mapping Portal*, COASTALRESILIENCE.ORG, <http://maps.coastalresilience.org/network> (last visited Aug. 29, 2016).

⁴⁰ *USGS Groundwater Information*, USGS.GOV, <http://water.usgs.gov/ogw> (last visited Aug. 29, 2016).

⁴¹ *Saline Intrusion Monitoring*, USGS Miami-Dade County, <http://www.envirobase.usgs.gov/FLIMS/SaltFront/viewer.htm> (last visited Aug. 29, 2016).

⁴² *Sea-Level Change Calculator*, USACE, <http://www.corpsclimate.us/ccaces/curves.cfm> (last visited Aug. 29, 2016).

⁴³ *Surging Seas Risk Zone Map*, CLIMATECENTRAL.ORG, <http://sealevel.climatecentral.org/maps> (last visited Aug. 29, 2016).

⁴⁴ UNION OF CONCERNED SCIENTISTS, ENCROACHING TIDES IN MIAMI-DADE COUNTY, FLORIDA: INVESTING IN PREPAREDNESS TO MANAGE THE IMPACTS OF RISING SEAS 1, 3 (Apr. 2016), *available at* <http://www.ucsusa.org/EncroachingTidesMiamiDade> (last visited Aug. 29, 2016) (projection determined by using USACE scenario and tide gauge data from Virginia Key).

⁴⁵ *Hazen and Sawyer*, <http://www.hazenandsawyer.com> (last visited Aug. 29, 2016).

⁴⁶ City of Coral Gables – Sea Level Rise LIDAR Map (June 2016), *available at* <http://coralgables.com/index.aspx?page=1169> (last visited Aug. 29, 2016).

⁴⁷ See *Understanding Your Risk*, FLOODSMART.GOV, THE OFFICIAL WEBSITE OF THE NATIONAL FLOOD INSURANCE PROGRAM, https://www.floodsmart.gov/floodsmart/pages/flooding_flood_risks/understanding_your_risk.jsp (last visited Sept. 19, 2016); Florida Division of Emergency Management, Floodplain Management in Florida, Quick Guide, available at http://www.floridadisaster.org/Mitigation/SFMP/Documents/FLQG_web.pdf (last visited Sept. 19, 2016).

⁴⁸ See *Understanding Your Risk*, *supra* note 47.

⁴⁹ See *Miami-Dade County GIS*, MIAMI-DADE.GOV, <http://gisweb.miamidade.gov/floodzone> (last visited Aug. 29, 2016). However, it is important that the City not rely too heavily on these maps in determining the vulnerability of various areas of the City. Among other reasons, FIRMs are created using only historical flood data, to evaluate current risk. They do not account for projected future sea level rise impacts.

⁵⁰ This information was provided by City staff, using data collected by the Federal Emergency Management Agency.

⁵¹ See ICLEI, INSTITUTIONALIZING CLIMATE PREPAREDNESS IN MIAMI-DADE COUNTY, FLORIDA 16, available at <https://www.miamidade.gov/green/library/iclei-case-study.pdf> (last visited Aug. 29, 2016).

⁵² See RCINEF, Northeast Florida Private Real Estate Investment Vulnerability Chart, available at http://www.rcinef.org/NE_FL_Private_RE_Investment_Vulnerability.pdf (last visited Aug. 29, 2016).

⁵³ City staff has already begun the work of identifying and mapping the numerous septic systems within the City limits.

⁵⁴ For examples of such plans, see NE. FLA. REG'L COUNCIL, SUMMARY AND REGIONAL ACTION PLAN, A REPORT OF THE EMERGENCY PREPAREDNESS COMMITTEE ON SEA LEVEL RISE (2013), <http://www.neffc.org/pdfs/Regional%20Action%20Plan.pdf> (last visited Aug. 29, 2016); CITY OF PUNTA GORDA ADAPTATION PLAN, TECH. RPT. NO. 09-4 (2009), available at <http://www.cakex.org/sites/default/files/Punta%20Gorda.pdf> (last visited Aug. 29, 2016).

⁵⁵ Such a comprehensive assessment could also be useful in the short run to help the City analyze the pros and cons of adding new areas to the City through annexation.

⁵⁶ See *City Partners with FIU to Offer a Sea Level Rise Discussion Series*, CORAL GABLES NEWS AND PRESS RELEASES (Feb. 2, 2016), <http://coralgables.com/index.aspx?recordid=2072&page=30> (last visited Sept 15, 2016). Videos of these lectures are available on the City's website at <http://www.coralgables.com/index.aspx?page=1169> (last visited Sept 15, 2016). See also Lance Dixon, *Coral Gables Partners With FIU For Sea-Level Rise Discussions*, MIAMI HERALD, Feb. 11, 2016, available at <http://www.miamiherald.com/news/local/community/miami-dade/coral-gables/article59939126.html> (last visited Sept. 16, 2016).

⁵⁷ See, e.g., Christopher Joyce, *Rising Sea Levels Made This Republican Mayor A Climate Change Believer*, National Public Radio, May 17, 2016, available at <http://www.npr.org/2016/05/17/477014145/rising-seas-made-this-republican-mayor-a-climate-change-believer> (last visited Sept. 16, 2016); Justin Worland, *Miami Is Beating The Sea*, TIME, June 30, 2016, available at <http://time.com/4389178/miami-is-beating-the-sea> (last visited Aug.

29, 2016); Jessica M. Castillo, *The City Beautiful Confronts Climate Change*, UM NEWS, <http://climate.miami.edu/politics-of-climate-change/the-city-beautiful-confronts-climate-change> (last visited Aug. 29, 2016); Maria Rosa Higgins Fallon, *Mayor Cason Joins Group Addressing Coastal Flooding And Sea Level Rise*, MIAMI'S CMTY. NEWSPAPERS, Nov. 10, 2015, available at <http://communitynewspapers.com/coralgables/mayor-cason-joins-group-addressing-coastal-flooding-and-sea-level-rise> (last visited Aug. 29, 2016); Jim Cason & Dawn Zimmer, *Flooding Is An Election Issue for 123 Million Americans*, SUN SENTINEL, Oct. 21, 2015, available at <http://www.sun-sentinel.com/opinion/commentary/fl-jccol-oped1022-20151021-story.html> (last visited Aug. 29, 2016).

⁵⁸ SO. FLA. REG'L PLANNING COUNCIL, ADAPTATION ACTION AREAS: POLICY OPTIONS FOR ADAPTIVE PLANNING FOR RISING SEA LEVELS 27 (Nov. 2013) [hereinafter "SFRPC AAA POLICY OPTIONS"], available at <http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2014/09/final-report-aaa.pdf> (last visited Sept. 20, 2016).

⁵⁹ See Christina Nunez, *As Sea Levels Rise, Are Coastal Nuclear Plants Ready?*, NAT'L GEOGRAPHIC, Dec. 16, 2015, available at <http://news.nationalgeographic.com/energy/2015/12/151215-as-sea-levels-rise-are-coastal-nuclear-plants-ready/> (last visited Aug. 29, 2016) (discussing the Turkey Point facility's potential vulnerabilities).

⁶⁰ Robin Bronen, *Climate-Induced Community Relocations: Using Integrated Social-Ecological Assessments to Foster Adaptation and Resilience*, ECOLOGY AND SOCIETY, Vol. 20, No. 3 (2015), available at <http://www.ecologyandsociety.org/vol20/iss3/art36/> (last visited Aug. 29, 2016).

⁶¹ Amy Huva, *Visualizing Climate Impacts: Here. Now. Us.*, CLIMATE ACCESS, Mar. 24, 2015, available at <http://www.climateaccess.org/campaign/here-now-us> (last visited Aug. 29, 2016).

⁶² CLIMATE ACCESS, THE PREPARATION FRAME: A GUIDE TO BUILDING UNDERSTANDING OF CLIMATE IMPACTS AND ENGAGEMENT IN SOLUTIONS (Mar. 2015), available at <http://www.climateaccess.org/preparation-frame> (last visited Aug. 29, 2016); Hunter Cutting, *Climate Change: Polling Analysis and Talking Points*, CLIMATE ACCESS (2012), <http://www.climateaccess.org/resource/climate-change-polling-analysis-and-talking-points> (last visited Aug. 29, 2016).

⁶³ ISABELLA FURTH & HEIDI GANTWERK, VIEWPOINT LEARNING, INC., CITIZEN DIALOGUES ON SEA LEVEL RISE: START WITH IMPACTS/END WITH ACTION (2013), available at <http://www.viewpointlearning.com/wp-content/uploads/2013/11/UCS-Sea-Level-Rise-Web.pdf> (last visited Aug. 29, 2016).

⁶⁴ *Seven Best Practices for Risk Comm'n*, NOAA Digital Coast, <https://coast.noaa.gov/digitalcoast/training/risk-communication> (last visited Aug. 29, 2016).

⁶⁵ *Stories From The Field*, NOAA Digital Coast, <http://www.coast.noaa.gov/digitalcoast/stories/duluth> (last visited Aug. 29, 2016).

⁶⁶ *Green Infrastructure, Milwaukee Metro. Sewage District*, <http://www.mmsd.com/gi/green-infrastructure> (last visited Aug. 29, 2016).

⁶⁷ CLIMATE ADAPTATION STORY: BRINGING STORMWATER MANAGEMENT DOWN TO THE NEIGHBORHOOD, FRESHWATER FUTURE, *available at* <http://www.ecoadapt.org/data/documents/DetroitStoryRS.pdf> (last visited Aug. 29, 2016).

⁶⁸ *NH Coastal Adaptation Workgroup*, <http://nhblog.stormsmart.org> (last visited Aug. 29, 2016).

⁶⁹ See Justin Gillis, *Flooding of Coast, Caused by Global Warming, Has Already Begun*, N.Y. TIMES, Sept. 3, 2016, *available at* http://www.nytimes.com/2016/09/04/science/flooding-of-coast-caused-by-global-warming-has-already-begun.html?_r=0 (last visited Aug. 29, 2016) (quoting Miami-Dade County’s Harvey Ruvin as saying, “I don’t see doom and gloom here; I see opportunity... We’re talking about the most robust possible jobs program you can think of, and one that can’t be outsourced.”).

⁷⁰ *FIU Sea Level Solutions Center*, <http://slsc.fiu.edu/solutions-center> (last visited Aug. 29, 2016).

⁷¹ See *City Partners with FIU to Offer a Sea Level Rise Discussion Series*, CORAL GABLES NEWS AND PRESS RELEASES (Feb. 2, 2016), <http://coralgables.com/index.aspx?recordid=2072&page=30> (last visited Sept 15, 2016).

⁷² See Julio Frenk, *UM President: Charting The Course To Our New Century*, MIAMI HERALD, Jan. 30, 2016, *available at* <http://www.miamiherald.com/opinion/op-ed/article57352998.html> (last visited Aug. 29, 2016).

⁷³ FAU 3rd Sea-Level Rise Summit: *Connected Futures from Alaska to Florida*, <http://www.ces.fau.edu/arctic-florida> (last visited Aug. 29, 2016).

⁷⁴ See Thomas Ruppert, *Reasonable Investment-Backed Expectations: Should Notice of Rising Seas Lead to Falling Expectations for Coastal Property Purchasers?*, 26 J. LAND USE & ENVTL. L. 239, 266 (2011) *available at* http://archive.law.fsu.edu/Journals/Landuse/vol26_2/ruppert.pdf (last visited Aug. 29, 2016).

⁷⁵ *Accord Clark v. City of Kansas City, Mo.*, 99 F. Supp. 2d 1064 (W.D. Mo. 2000) (“Certainly, it would be desirable for cities to warn their citizens of impending natural disasters and/or hazards... However, that which is desirable is not necessarily required.”).

⁷⁶ U.S. CONST. amend. V.

⁷⁷ *Kelo v. City of New London*, 545 U.S. 469 (2005).

⁷⁸ See *Loretto v. Teleprompter Manhattan CATV Corp.*, 458 U.S. 419 (1982); *Lucas v. S. Carolina Coastal Council*, 505 U.S. 1003, 1019 (1992); *Penn Central Transp. Co. v. City of New York*, 438 U.S. 104, 124 (1978); *Nollan v. Cal. Coastal Comm’n*, 483 U.S. 825 (1987).

⁷⁹ *Shands v. City of Marathon*, 999 So. 2d 718, 723 (Fla. 3d DCA 2008); *State v. Basford*, 119 So. 3d 478, 482 (Fla. 1st DCA 2013); *Taylor v. Vill. of N. Palm Beach*, 659 So. 2d 1167, 1171 & n.1 (Fla. 4th DCA 1995); *Palazzolo v. Rhode Island*, 533 U.S. 606, 617 (2001); *Lucas v. S. Carolina Coastal Council*, 505 U.S. 1003, 1019 (1992); *Penn Central*, 438 U.S. at 124.

⁸⁰ See Ruppert, *supra* note 74, at 246; *Severance v. Patterson*, 370 S.W.3d 705, 726 (Tex. 2012) (holding that Texas statute mandating disclosure to beachfront landowners of potential emplacement of rolling easement due to coastal erosion and storm events was germane to property owner’s expectations in taking context, but that notice was insufficient to immunize state from requirement to compensate property owner when it emplaced the easement). See also *Metro. Dade*

Cnty. v. Fontainebleau Gas & Wash, Inc., 570 So.2d 1006 (Fla. 3d DCA 1990) (holding that property owners are deemed to purchase property with constructive knowledge of the law including applicable land use regulations).

⁸¹ EASTERN RESEARCH GRP., WHAT WILL ADAPTATION COST? AN ECONOMIC FRAMEWORK FOR COASTAL COMMUNITY INFRASTRUCTURE (June 2013), available at <https://coast.noaa.gov/digitalcoast/training/adaptation-pub.html> (last visited Aug. 29, 2016). The NOAA report also provides citations to journal articles and reports about real-world examples of how governmental entities in the United States and around the world have applied these principles in making sea level-rise related investment decisions, such as how the Gulf of Mexico region is addressing flooding risk post-Hurricane Katrina and how the Scandinavian area of Europe is preparing for sea level rise. See *id.* at Appendix C: Relevant Case Studies.

⁸² Information from City staff, supporting this figure, is on file with the author.

⁸³ SE. FLA. REG'L CLIMATE CHANGE COMPACT, RCAP IMPLEMENTATION GUIDANCE SERIES: REGIONAL IMPACTS OF CLIMATE CHANGE AND ISSUES FOR STORMWATER MANAGEMENT 11, available at <http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2015/11/Stormwater-Guide.pdf> (last visited Aug. 29, 2016).

⁸⁴ Information, provided by City staff, supporting this figure, is on file with the author.

⁸⁵ *Id.*

⁸⁶ *Id.*

⁸⁷ See, e.g., *Ecological Dev., Inc. v. Walton Cnty.*, 558 So.2d 1069, 1071 (Fla. 1st DCA 1990) (“A county is not obligated, nor can it be compelled, to perform or provide for any particular level of maintenance, except as it voluntarily assumes to do.”); *Gargano v. Lee Cnty. Bd. of Cnty. Comm’rs*, 921 So.2d 661 (Fla. 2d DCA 2006) (“It is well established that decisions concerning the maintenance of and need to construct roadways, bridges, and other similar services are political questions outside the purview of the courts.”).

⁸⁸ See *Pollock v. Fla. Dep’t of Highway Patrol*, 882 So. 2d 928, 932-33 (Fla. 2004); *McCain v. Fla. Power Corp.*, 593 So. 2d 500, 502 (Fla. 1992); *Kaisner v. Kolb*, 543 So. 2d 732, 733-34 (Fla. 1989).

⁸⁹ See *Wallace v. Dean*, 3 So. 3d 1035, 1047 (Fla. 2009).

⁹⁰ See *Wallace*, 3 So. 3d at 1048; *Henderson v. Bowden*, 737 So.2d 532, 537 (Fla. 1999); *City of Pinellas Park v. Brown*, 604 So. 2d 1222, 1226 (Fla. 1992); *City of Daytona Beach v. Palmer*, 469 So. 2d 121, 122 (Fla. 1985); *Brown v. Miami-Dade Cnty.*, 837 So. 2d 414, 417 (Fla. 3d DCA 2001); *Moore v. Fla. Fish & Wildlife Conservation Comm’n*, 861 So. 2d 1251, 1253 (Fla. 1st DCA 2003); *Pierre v. Jenne*, 795 So. 2d 1062, 1064 (Fla. 4th DCA 2001).

⁹¹ See *Fla. Dep’t of Nat. Resources v. Garcia*, 753 So. 2d 72, 75 (Fla.2000) (a governmental entity operating a public swimming area owes the same operational-level duty to invitees as a private landowner – to maintain the premises in a reasonably safe condition and to warn the public of any dangerous conditions of which it knew or should have known); *Slemp v. City of North Miami*, 545 So. 2d 256, 258 (Fla. 1989) (duty to maintain and properly operate existing flood protection device); *Palm Beach Cnty. Bd. of Comm’rs v. Salas*, 511 So.2d 544, 545 (Fla. 1987) (maintenance of intersection). Note, while severe weather events such as hurricanes are often considered “acts

of God,” see *Goldberg v. Florida Power & Light Co.*, 899 So. 2d 1105, 1114 (Fla. 2005), the so-called “act of God” or *vis major* defense applies in Florida to limit liability for contractual obligations. See *Mailloux v. Briella Townhomes, LLC*, 3 So. 3d 394, 396 (Fla. 4th DCA 2009) (“In Florida, acts of God, impossibility of performance, and frustration of purpose are well-recognized defenses to nonperformance of a contract.”). By contrast, to what extent a weather or climate event relieves a tortfeasor of liability depends on the extent of the event’s reasonable foreseeability and whether the tortfeasor proximately contributed to the injuries or damages. See *Asgrow-Kilgore Co. v. Mulford Hickerson Corp.*, 301 So. 2d 441, 445 (Fla. 1974); see also *Insurance Co. v. Star Shipping*, 173 F. Supp. 2d 1228, 1243 (S.D. Ala. 2001) (the accident or damage must be unforeseeable and unavoidable to support the defense).

⁹² See generally Fla. Stat. § 768.14 (2016) (waiver of sovereign immunity in tort actions).

⁹³ *Commercial Carrier Corp. v. Indian River Cnty.*, 371 So. 2d 1010, 1019 (Fla. 1979).

⁹⁴ *Wallace*, 3 So. 3d at 1053-54. In addition, water management districts are statutorily immunized from suit for damages caused by the failure of a stormwater management system. See Fla. Stat. § 373.443 (2016) (immunizing “state or district. . . for the recovery of damages caused by the partial or total failure of any stormwater management system” or other works related to their management of water resources); Fla. Stat. § 373.403(10) (2016) (defining “stormwater management system” as one “designed and constructed or implemented to control discharges which are necessitated by rainfall events”); *Barnes v. Dist. Bd. of Trustees of St. Johns River State Coll.*, 147 So. 3d 102, 107-08 (Fla. 1st DCA 2014) (holding that “section 373.433 was intended to provide a broader scope of immunity” than that of the “[i]mmunity for . . . planning level activities [which] exists under section 768.28” under conditions “where a partial/total failure of a stormwater management system occurs and the failure arises from the control or regulation of the system”).

⁹⁵ U.S. CONST. amend. V.

⁹⁶ See *Loretto v. Teleprompter Manhattan CATV Corp.*, 458 U.S. 419 (1982); *Lucas v. S. Carolina Coastal Council*, 505 U.S. 1003, 1019 (1992); *Penn Central*, 438 U.S. at 124; *Nollan*, 483 U.S. 825.

⁹⁷ *Patchen v. Fla. Dep’t of Agr. & Consumer Servs.*, 906 So. 2d 1005, 1012 (Fla. 2005).

⁹⁸ *Jordan v. St. Johns Cnty.*, 63 So. 3d 835, 839 (Fla. 5th DCA 2011).

⁹⁹ Florida explicitly retains immunity from fraudulent misrepresentation claims. See *Fin. Healthcare Assocs., Inc. v. Pub. Health Trust of Miami-Dade Cnty.*, 488 F. Supp. 2d 1231, 1236 (S.D. Fla. 2007).

¹⁰⁰ *Slemp v. City of N. Miami*, 545 So. 2d 256, 257-58 (Fla. 1989) (holding that “city’s alleged failure to maintain and operate its pumps properly is an operational level activity and is thus subject to traditional tort analysis;” while city may not “in the abstract [have] a duty to protect individual property owners from flooding due to natural causes, [o]nce the city has undertaken to provide such protection, by building a storm sewer pump system, for example, it assumes the responsibility to do so with reasonable care,” such that “[i]f the city negligently fails to properly maintain or operate the system, it can be held liable for damage caused by that failure”); see also *Union Park Mem’l Chapel v. Hutt*, 670 So. 2d 64 66-67 (Fla. 1996) (“It is clearly established that

one who undertakes to act, even when under no obligation to do so, thereby becomes obligated to act with reasonable care.”).

¹⁰¹ *City of St. Petersburg v. Collum*, 419 So.2d 1082, 1085 (Fla. 1982) (“defects inherent in the overall plan for an improvement, as approved by a governmental entity, are not matters that in and of themselves subject the entity to liability”) (citing *Dep’t of Transp. v. Neilson*, 419 So. 2d 1071 (Fla. 1982)).

¹⁰² *Id.* at 1086.

¹⁰³ *Compare Drake v. Walton Cnty.*, 6 So. 3d 717 (Fla. 1st DCA 2009) (holding that Walton County engaged in a taking of private property when it diverted water across owner’s property because the water diversion substantially interfered with the owner’s property rights for more than a momentary period, it was continuous or reasonably expected to continuously recur, and it resulted in a substantial deprivation of the beneficial use of the property) *with Hansen v. City of Deland*, 32 So. 3d 654 (5th DCA 2010) (affirming trial court’s finding that city’s pumping of water into a dry drainage basin on private property was not a compensable taking even though property remained partially flooded for about 15 months, because owners were allowed full use of their homes during the flooding and only a fraction of their yards were under water).

¹⁰⁴ *See City of Coral Gables – Sea Level Rise LIDAR Map* (June 2016), *available at* <http://coralgables.com/index.aspx?page=1169> (last visited Aug. 29, 2016).

¹⁰⁵ *See Dep’t of Transp. v. Konney*, 587 So. 2d 1292, 1294-95 (Fla. 1991) (“The decision of whether to upgrade this intersection is a judgmental, planning-level function, to which absolute immunity applies.”); *Dep’t of Transp. v. Neilson*, 419 So. 2d 1071, 1077-78 (Fla. 1982) (“[T]he failure to properly maintain existing traffic control devices and existing roads may also be the basis of a suit against a governmental entity. We caution, however, that the maintenance of a particular street or intersection means maintenance of the street or intersection as it exists. It does not contemplate maintenance as the term may sometimes be used to indicate obsolescence and the need to upgrade a road by such things as widening or changing the means of traffic control.”).

¹⁰⁶ It should also be noted that a municipality can have *statutory* obligations to provide a “reasonable level of maintenance” to certain existing infrastructure which it has taken operational control over – such as county roads. *See Jordan v. St. Johns Cnty.*, 63 So. 3d 835, 838 (Fla. 5th DCA 2011); *Ecological Development, Inc. v. Walton Cnty.*, 558 So.2d 1069, 1072 (Fla. 1st DCA 1990).

¹⁰⁷ *See Anco Corp. v. Dade Cnty.*, 144 So. 2d 793 (Fla. 1962) (inverse condemnation caused by County digging ditches in front of access points); *Palm Beach Cnty. v. Tessler*, 538 So. 2d 846 (Fla. 1989) (inverse condemnation caused by constructing a retaining wall in front of property); *Drake v. Walton Cnty.*, 6 So. 3d 717 (Fla. 1st DCA 2009) (county diverted water across appellant’s land to alleviate flooding elsewhere.)

¹⁰⁸ *Jordan*, 63 So. 3d at 838.

¹⁰⁹ *Id.* at 839 (citing *Palm Beach Cnty. v. Tessler*, 538 So. 2d 846, 849 (Fla. 1989) to explain that access to land is a right within the set of rights attendant to property ownership, such that “substantial diminish[ment]” in access constitutes a taking).

¹¹⁰ See FLA. SEA GRANT, ENVIRONMENTALLY COMPROMISED ROAD SEGMENTS – A MODEL ORDINANCE (Oct. 2015), available at https://www.flseagrant.org/wp-content/uploads/Envirntly_Comp_Rds-FINAL_10.20.15_1.pdf (last visited Aug. 29, 2016).

¹¹¹ *Id.* at Recitals at 2-3.

¹¹² *Id.* § 3.

¹¹³ *Id.* § 5.

¹¹⁴ *City of Lauderdale v. Rhames*, 864 So.2d 432, 437 (4th DCA 2003).

¹¹⁵ See FLA. CONST. art. VII, § 9; *Gilreath v. Gen. Elec. Co.*, 751 So. 2d 705, 707 (Fla. 5th Dist. App. 2000).

¹¹⁶ *Sarasota Cnty. v. Sarasota Church of Christ, Inc.*, 667 So. 2d 180, 183 (Fla. 1995).

¹¹⁷ See *id.*

¹¹⁸ Miami-Dade County 2015 Adopted Millage Rates, available at http://www.miamidade.gov/pa/millage_tables.asp (last visited Aug. 29, 2016).

¹¹⁹ Pursuant to Article VII of the Florida Constitution, the City may raise the municipal millage rate to 10 mills as a general matter, and above 10 mills under certain circumstances where the increase is approved by a vote of the electorate. See FLA. CONST. art. VII, § 9; see also *Bailey v. Ponce de Leon Port Auth.*, 398 So. 2d 812, 815 (Fla. 1981).

¹²⁰ Fla. Stat. § 170.01(1) (2016).

¹²¹ Fla. Stat. § 170.201(1) (2016).

¹²² See *Desiderio Corp. v. City of Boynton Beach*, 39 So. 3d 487, 493 (Fla. 4th DCA 2010).

¹²³ See *Collier Cnty. v. State*, 733 So. 2d 1012, 1017 (Fla. 1999) (quotation omitted); see also Fla. Stat. § 170.01(2) (2016); Fla. Stat. § 170.201(1) (2016).

¹²⁴ *Desiderio Corp.*, 39 So. 3d at 493 (quoting *Klemm v. Davenport*, 129 So. 904, 907 (Fla. 1930)).

¹²⁵ See *Lake Cnty. v. Water Oak Mgt. Corp.*, 695 So. 2d 667, 670 (Fla. 1997); see also *Webb v. Scott*, 176 So. 442, 445-46 (Fla. 1936).

¹²⁶ See *Lake Cnty.*, 695 So. 2d 667.

¹²⁷ See *id.* (fire control services); *Quietwater Entm't, Inc. v. Escambia Cnty.*, 890 So. 2d 525, 527 (Fla. 1st Dist. App. 2005) (mosquito control services).

¹²⁸ SFRPC AAA POLICY OPTIONS, *supra* note 58, at 23.

¹²⁹ There are currently over 300 boats behind fixed bridges in the City, and many of those boats already cannot access the Bay except at low tide.

¹³⁰ *City of Gainesville v. State*, 863 So. 2d 138, 144 (Fla. 2003) (quotation omitted).

¹³¹ See *id.*

¹³² See *id.* at 144-45 (quoting 70C Am. Jur. 2d, *Special or Local Assessments*, at § 2 (2000)).

¹³³ See *id.* at 145.

¹³⁴ See *I-4 Commerce Ctr, Phase II, Unit I v. Orange Cnty.*, 46 So. 3d 134, 136 (Fla. 5th Dist. App. 2010).

¹³⁵ Fla. Stat. § 403.0893 (2016).

¹³⁶ See *I-4 Commerce Ctr*, 46 So. 3d at 136; see also Fla. Stat. § 180.13(2) (2016) (providing that municipalities are authorized to establish “just and equitable” utility rates).

¹³⁷ See generally THOMAS RUPPERT & ALEX STEWART, SEA-LEVEL RISE ADAPTATION FINANCING AT THE LOCAL LEVEL IN FLORIDA § V.C. (2015), available at https://www.flseagrant.org/wp-content/uploads/Local-Gov-Financing_FINAL_10.8.15_1.pdf (last visited Aug. 29, 2016).

¹³⁸ SE. FLA. REG’L CLIMATE CHANGE COMPACT, RCAP IMPLEMENTATION GUIDANCE SERIES: REGIONAL IMPACTS OF CLIMATE CHANGE AND ISSUES FOR STORMWATER MANAGEMENT 29, available at <http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2015/11/Stormwater-Guide.pdf> (last visited Aug. 29, 2016).

¹³⁹ CITY OF CORAL GABLES’ 2015-2016 BUDGET, at 65, available at <http://www.coralgables.com/index.aspx?page=737> (last visited Aug. 29, 2016).

¹⁴⁰ *Id.*

¹⁴¹ See JESSICA GRANNIS, ADAPTATION TOOL KIT: SEA-LEVEL RISE AND COASTAL LAND USE (Oct. 2011), available at <http://www.georgetownclimate.org/adaptation/toolkits/adaptation-tool-kit-sea-level-rise-and-coastal-land-use/introduction.html?full> (last visited Aug. 29, 2016).

¹⁴² Jessica Lipscomb, *Miami-Dade Could Ask Developers to Pay for Climate Change Costs*, MIAMI NEW TIMES, July 6, 2016, available at <http://www.miaminewtimes.com/news/miami-dade-could-ask-developers-to-pay-for-climate-change-costs-8576071> (last visited Aug. 29, 2016).

¹⁴³ See generally Robert H. Freilich & Neil M. Popowitz, *How Local Governments Can Resolve Koontz’s Prohibitions on Ad Hoc Land Use Restrictions*, 45 Urb. Law. 971, 983 (2013) (explaining why *voluntary* proffers made by developers to local governments to provide public facilities are not prohibited by the Supreme Court’s decisions in *Koontz v. St. Johns River Water Management District*, 133 S. Ct. 2586 (2013) and *Dolan v. City of Tigard*, 512 U.S. 374 (1994)).

¹⁴⁴ See Fla. Stat. § 166.101(2)-(5) (2016).

¹⁴⁵ Fla. Stat. § 166.111 (2016).

¹⁴⁶ Fla. Stat. § 166.101(8) (2016); Fla. Op. Atty. Gen. 075-185 (June 19, 1975).

¹⁴⁷ See *Miccosukee Tribe of Indians of Florida v. S. Florida Water Mgt. Dist.*, 48 So. 3d 811, 822 (Fla. 2010).

¹⁴⁸ See FLA. CONST. art. VII, § 12; Fla. Stat. § 200.181(1), (3) (2016); *S. Florida Water Mgt. Dist.*, 48 So. 3d at 823.

¹⁴⁹ *Coral Gables Regains AAA Credit Rating from S&P*, CORALGABLES.COM, Apr. 20, 2016, <http://coralgables.com/index.aspx?recordid=2138&page=30> (last visited Aug. 29, 2016).

¹⁵⁰ See Carol J. Clouse, *Many Municipal Bond Investors Overlook Climate Risk*, INSTITUTIONALINVESTOR.COM, Mar. 24, 2015, available at <http://www.institutionalinvestor.com/article/3439255/asset-management-fixed-income/many-municipal-bond-investors-overlook-climate-risk.html#.V1c7JNL2b5o> (last visited Aug. 29, 2016).

¹⁵¹ Paul Burton, *Advocates Say Climate Right For Resilience Ratings*, THE BOND BUYER, Aug. 7, 2015, available at <http://www.bondbuyer.com/news/regionalnews/advocates-say-climate-right-for-resilience-ratings-1081395-1.html> (last visited Aug. 29, 2016).

¹⁵² Tiffany Lee-Allen, *Flood Risk in Coastal Virginia Supports Need for Proactive Planning, Capital Investments*, MOODY'S, June 18, 2015, available at https://www.moodys.com/research/Moodys-Flood-risk-in-coastal-Virginia-supports-need-for-proactive--PR_328282 (last visited Aug. 29, 2016).

¹⁵³ FEMA HAZARD MITIGATION ASSISTANCE GUIDANCE: HAZARD MITIGATION GRANT PROGRAM, PRE-DISASTER MITIGATION PROGRAM, AND FLOOD MITIGATION ASSISTANCE PROGRAM (Feb. 27, 2015), available at http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf (last visited Aug. 29, 2016).

¹⁵⁴ See Press Release, HUD, No. 16-006, HUD Awards \$1 Billion Through National Disaster Resilience Competition, (Jan. 21, 2016), available at http://portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2016/HUDNo16-006 (last visited Aug. 29, 2016).

¹⁵⁵ *U.S. Climate Resilience Toolkit, Funding Opportunities*, TOOLKIT.CLIMATE.GOV, <https://toolkit.climate.gov/content/funding-opportunities> (last visited Aug. 29, 2016).

¹⁵⁶ See State of Florida, Department of Environmental Protection, Everglades Restoration Bond Program Summary, available at https://www.sbafla.com/BondFinance/portals/BondFinance/BondPrograms/Environmental/Everglades_Summary.pdf (last visited Aug. 29, 2016); see also Fla. Stat. § 215.619 (2016).

¹⁵⁷ BARRY N. HEIMLICH, *ET AL.*, FAU, SOUTHEAST FLORIDA'S RESILIENT WATER RESOURCES: ADAPTATION TO SEA LEVEL RISE AND OTHER IMPACTS OF CLIMATE CHANGE 41 (Nov. 2009), available at http://www.ces.fau.edu/files/projects/climate_change/SE_Florida_Resilient_Water_Resources.pdf (last visited Aug. 29, 2016).

¹⁵⁸ See 2015-2016 BUDGET, *supra* note 139, at 67.

¹⁵⁹ Press Release, City of Miami, 100 Resilient Cities and The Rockefeller Foundation Welcome Greater Miami and the Beaches into Global Resilience-Building Network (May 25, 2016), available at http://www.miamigov.com/comm/docs/Press_Releases/2016/05-25_100_Cities.htm (last visited Aug. 29, 2016).

¹⁶⁰ *U.S. Climate Resilience Toolkit, Funding Opportunities*, TOOLKIT.CLIMATE.GOV, <https://toolkit.climate.gov/content/funding-opportunities> (last visited Aug. 29, 2016).

¹⁶¹ Brian M. Rowson, *Public Private Partnerships: The Future of Public Construction in Florida?*, 86 FLA. B.J. 36 (July/August 2012).

¹⁶² See Fla. Stat. § 287.05712 (2013) (current version at Fla. Stat. § 255.065 (2016)).

¹⁶³ See Fla. Stat. § 255.065(1)(j), (2), (3)(d)(4) (2016).

¹⁶⁴ See Fla. Stat. § 255.065(2)(a) (2016).

¹⁶⁵ See Fla. Stat. § 255.065(8) (2016).

¹⁶⁶ See Fla. Stat. § 255.065(3)-(5) (2016).

¹⁶⁷ See Rowson, *supra* note 161, at 36 n.13.

¹⁶⁸ See *id.* at 36, 38-39. The winning private bidder, I-595 Express, LLC (“Express, LLC”), was selected from a field of four qualifying bidders. Express, LLC’s bidding package estimated total construction costs in an amount that was \$275 million less than FDOT’s own internal estimates and a delivery date of 5 years from commencement, as opposed to the 20 years estimated by FDOT. Under the agreement, Express, LLC assumed sole responsibility for the financing, construction, and operation of the I-595 corridor improvements and operation of toll roads for a 35-year term (with the cost of overruns to be born exclusively by the private entity). Upon completion of the project, FDOT was required to make to Express, LLC five lump sum payments in the aggregate amount of \$685 million and 30 annual “availability payments” from revenues generated from the operation of the toll roads each in the estimated amount of \$63.98 million. Estimates suggest that, under the arrangement, Express, LLC could be able to achieve an approximate return of 12 percent on its investment. *Id.*

¹⁶⁹ See SE. FLA. REG’L CLIMATE CHANGE COMPACT, RCAP IMPLEMENTATION GUIDANCE SERIES: REGIONAL IMPACTS OF CLIMATE CHANGE AND ISSUES FOR STORMWATER MANAGEMENT 33, available at <http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2015/11/Stormwater-Guide.pdf> (last visited Aug. 29, 2016). Details about this infrastructure work in Miami Beach can be found at *Rising Above*, MIAMI BEACH FL. GOV, <http://miamibeachfl.gov/risingabove/> (last visited Sept. 14, 2016). See also Fusion Interactive’s Info-graphics regarding Miami Beach’s sea level rise work, *Pump It*, INTERACTIVE FUSION.NET, <http://interactive.fusion.net/pumpit> (last visited Sept. 14, 2016).

¹⁷⁰ FLORIDA KEYS AQUEDUCT AUTHORITY 20-YEAR WATER SYSTEM CAPITAL IMPROVEMENT MASTER PLAN 8-1 (Dec. 2006), available at http://www.fkaa.com/fkaa_20yr_cimp_dec06.pdf (last visited Aug. 29, 2016).

¹⁷¹ KEYS WASTEWATER PLAN (Nov. 2007), available at <http://www.monroecounty-fl.gov/DocumentCenter/Home/View/478> (last visited Aug. 29, 2016).

¹⁷² For additional information on special assessments and local government financing of sea level rise adaption projections generally, see RUPPERT & STEWART, *supra* note 137.

¹⁷³ CIMR Symposium, *GIS Sea Level Rise Vulnerability Assessment* (May 26, 2011), available at [http://conference.ifas.ufl.edu/cimr/Presentations/Thursday/130%20pm/Session%2011-Boca%2011/0130%20\(4\)%20McCue.pdf](http://conference.ifas.ufl.edu/cimr/Presentations/Thursday/130%20pm/Session%2011-Boca%2011/0130%20(4)%20McCue.pdf) (last visited Aug. 29, 2016).

¹⁷⁴ See *DEP Provides \$500,000 to Longboat Key for Beach Renourishment*, DEP NEWS, July 27, 2015, available at <https://depnewsroom.wordpress.com/2015/07/27/dep-provides-500000-to-longboat-key-for-beach-renourishment/> (last visited Sept. 19, 2019).

¹⁷⁵ See Thomas Berghman, *A Market Under(Writing) the Weather: A Recommendation to Increase Insurer Capacity*, 2013 U. ILL. L. REV. 221 (2013); U.S. General Accounting Office, *Catastrophe Insurance Risks: The Role of Risk-Linked Securities and Factors Affecting Their Use*, Report to the Chairman, Committee on Financial Services, House of Representatives, 2002 WL 31303891 (Sept. 2002); SFRC Leadership Summit, *Climate Change and Resilience Building: A Reinsurer’s Perspective* 16 (October 2, 2014), available at

<http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2014/11/A-Kaplan-Climate-Change-Resilience-Building-A-Reinsurers-Perspective.pdf> (last visited Sept. 14, 2016).

¹⁷⁶ See Fla. Stat. §§ 163.3177, 163.3178 (2016).

¹⁷⁷ See Fla. Stat. §§ 163.3177(1)(f)(3), 163.3177(2), 163.3177(5)(a) (2016).

¹⁷⁸ See Erin L. Deady & Thomas Ruppert, *The Link Between Future Flood Risk and Comprehensive Planning*, 37 ELULS REPORTER 7, 10 (Sept. 2015), available at <http://eluls.org/wp-content/uploads/2015/06/September-2015-Edition-Final.pdf> (last visited Aug. 29, 2016).

¹⁷⁹ See *id.* at 10-11.

¹⁸⁰ Fla. Stat. § 163.3177(1)(f) (2016).

¹⁸¹ *Id.*

¹⁸² Fla. Stat. § 163.3177(1)(f)2 (2016).

¹⁸³ *Id.*

¹⁸⁴ See Deady & Ruppert, *supra* note 178.

¹⁸⁵ *Haire v. Fla. Dep't of Agriculture & Consumer Services*, 870 So.2d. 774 (Fla. 2004).

¹⁸⁶ See *Ethyl Corp. v. EPA*, 541 F.2d. 1, 29 (D.C. Cir. 1976).

¹⁸⁷ See *id.*

¹⁸⁸ *L. Maxcy, Inc. v. Mayo*, 139 So. 121, 131 (Fla. 1931).

¹⁸⁹ Fla. Stat. § 163.3178(2)(f) (2016).

¹⁹⁰ SB 1094, Florida Senate (2015), available at <https://www.flsenate.gov/Session/Bill/2015/1094/BillText/Filed/PDF> (last visited Aug. 29, 2016) (emphasis added).

¹⁹¹ Fla. Stat. § 163.3161(12) (2016) (“It is the intent of this part that new statutory requirements created by the Legislature will not require a local government whose plan has been found to be in compliance with this part to adopt amendments implementing the new statutory requirements until the evaluation and appraisal period provided in s. 163.3191, unless otherwise specified in law. However, any new amendments must comply with the requirements of this part.”).

¹⁹² See CITY OF CORAL GABLES COMPREHENSIVE PLAN (2010), available at <http://coralgables.com/modules/showdocument.aspx?documentid=11063> (last visited Aug. 29, 2016). The plan does, however, address some flooding issues. *Id.* at Policy FLU-1.10.2 (“The City shall continue to maintain regulations consistent with the Comprehensive Plan which ... regulate development and use in areas subject to seasonal or periodic flooding, provide for stormwater management.”); *id.* at Goal COM-4 (“Provide adequate stormwater drainage in order to protect against flood conditions and prevent degradation of quality of receiving waters.”); *id.* at Policy COM-4.1.3 (“Issue development orders only to projects that meet or exceed the minimum acceptable LOS standards for drainage and flood protection as reviewed through the City’s Concurrency Management Program.”); *id.* at Policy COM-4.1.4 (“Assist property owners with general information related to flood zone per Federal Emergency Management Agency (FEMA) maps and available flood-proofing technology. Flood prone areas which represent substantial risk

for occupants during disaster events should be considered for corrective action or targeted for special attention during disaster response actions.”); *id.* at Policy COM-4.1.5 (“The minimum acceptable Flood Protection LOS standards for the City shall be protection from the degree of flooding that would result for a duration of one day from a ten-year storm.”); *id.* at Policy SAF 2.1.1 (“Public expenditures for infrastructure improvements shall be located outside flood prone areas, to the extent practicable, to keep floodways as unobstructed as possible.”).

¹⁹³ Fla. Stat. § 163.3191(1) (2016).

¹⁹⁴ *See Rainbow River Conservation, Inc. v. Rainbow River Ranch, LLC*, 189 So. 3d 312, 313 (Fla. 5th DCA 2016); *Nassau Cnty. v. Willis*, 41 So. 3d 270, 276 (Fla. 1st DCA 2010). *See also* Fla. Stat. § 163.3161(6) (2016) (“[N]o public or private development shall be permitted except in conformity with comprehensive plans.”); Fla. Stat. § 163.3194(1)(a) (2016) (providing that, once a local government has adopted a comprehensive plan, “all development undertaken by, and all actions taken in regard to development orders by, governmental agencies in regard to land covered by such plan” must be consistent with that plan); Fla. Stat. § 163.3177(1) (2016) (providing that a comprehensive plan is to “provide the principles, guidelines, standards, and strategies for the orderly and balanced future economic, social, physical, environmental, and fiscal development of the area...” and to “establish meaningful and predictable standards for the use and development of land and provide meaningful guidelines for the content of more detailed land development and use regulations”). *But see* Fla. Stat. § 163.3167(5) (2015) (creating narrow exception for certain vested rights).

¹⁹⁵ *See Willis*, 41 So. 3d at 276-78.

¹⁹⁶ CITY OF CORAL GABLES COMPREHENSIVE PLAN, *supra* note 192.

¹⁹⁷ KRISTLE MACADANGDANG & MELISSA NEWMONS, SEA LEVEL RISE READY: MODEL COMPREHENSIVE PLAN GOALS, OBJECTIVES AND POLICIES, TO ADDRESS SEA-LEVEL RISE IMPACTS IN FLORIDA (May 2010), *available at* https://www.law.ufl.edu/_pdf/academics/centers-clinics/clinics/conservation/sea_level_rise.pdf (last visited Aug. 29, 2016).

¹⁹⁸ *Id.*

¹⁹⁹ Fla. Stat. § 163.3178(1) (2016). This requirement is based, in part, on a concern by the Legislature that, in the event of a natural disaster, the State may have to provide financial assistance to local governments for the reconstruction of roads, sewer systems, and other public facilities. *Id.*

²⁰⁰ Fla. Stat. § 163.3178(2)(j) (2016); *see also* Fla. Stat. § 163.3178(2)(a), (2)(b) (2016).

²⁰¹ *See, e.g.*, CITY OF CORAL GABLES COMPREHENSIVE PLAN, *supra* note 192, § Public Safety, at 1-4.

²⁰² Fla. Stat. § 161.053(1)(a) (2016); *see also* FLA. ADMIN. CODE ch. 62B-33.

²⁰³ For example, it has been reported that “[t]hree South Florida native plants are in imminent danger of extinction due to a complex of threats that are worsened by the effects of sea level rise.” *See Ramona Young-Grindle, Rising Sea Level Spurs Florida Plant Listings*, COURTHOUSE NEWS SERVICE, Oct. 25, 2013, *available at* <http://www.courthousenews.com/2013/10/25/62380.htm> (last visited Aug. 29, 2016).

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- ²⁰⁴ Fla. Stat. ch. 161 (2016).
- ²⁰⁵ Fla. Stat. § 163.3177(6)(g)6-7 (2016).
- ²⁰⁶ Fla. Stat. § 163.3178(8)(a)3 (2016).
- ²⁰⁷ See *The Consequences of Climate Change*, NASA.GOV, <http://climate.nasa.gov/effects> (last visited Aug. 29, 2016).
- ²⁰⁸ See *State v. City of Jacksonville*, 50 So. 2d 532 (Fla. 1951).
- ²⁰⁹ SE. FLA. REG’L CLIMATE CHANGE COMPACT COUNTIES, A REGION RESPONDS TO A CHANGING CLIMATE, REGIONAL CLIMATE ACTION PLAN, App. B, Work Group Recommendations at 40, App. B-2 (Oct. 2012), available at <http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2014/09/regional-climate-action-plan-final-ada-compliant.pdf> (last visited Aug. 29, 2016).
- ²¹⁰ *Local Mitigation Strategy*, FLORIDADISASTER.ORG, <http://www.floridadisaster.org/mitigation/Local/Index.htm> (last visited Aug. 29, 2016).
- ²¹¹ CITY OF CORAL GABLES COMPREHENSIVE PLAN, *supra* note 192, at § Public Safety, at 3.
- ²¹² POST-DISASTER REDEVELOPMENT PLAN, CITY OF PANAMA CITY (Sept. 2008), available at <http://www.floridadisaster.org/Recovery/IndividualAssistance/pdredevelopmentplan/documents/Toolbox/Panama%20City%20Post-Disaster%20Redevelopment%20Plan.pdf> (last visited Aug. 29, 2016).
- ²¹³ Barbara J. Lausche, JD, *Synopsis of an Assessment: Policy Tools For Local Adaptation to Sea Level Rise*, Tech. Rpt. #1419, at 15 (Oct. 2009), [https://mote.org/media/uploads/files/Synopsis-Policy_Tools_for_Local_Adaptation_to_Sea_Level_Rise\(fin\).pdf](https://mote.org/media/uploads/files/Synopsis-Policy_Tools_for_Local_Adaptation_to_Sea_Level_Rise(fin).pdf) (last visited Aug. 29, 2016).
- ²¹⁴ FLA. DEP’T OF CMTY. AFFAIRS, POST-DISASTER REDEVELOPMENT PLANNING, A GUIDE FOR FLORIDA COMMUNITIES (Oct. 2010), available at [http://www.floridadisaster.org/recovery/documents/Post Disaster Redevelopment Planning Guidebook Lo.pdf](http://www.floridadisaster.org/recovery/documents/Post_Disaster_Redevelopment_Planning_Guidebook_Lo.pdf) (last visited Aug. 29, 2016).
- ²¹⁵ CITY OF CORAL GABLES ECONOMIC AND CULTURAL DEV. DEP’T, CORAL GABLES THE CITY BEAUTIFUL, CELEBRATING 90 YEARS 18 (2015), available at <http://coralgables.com/Modules/ShowDocument.aspx?documentID=14817> (last visited Aug. 29, 2016).
- ²¹⁶ Fla. Stat. § 163.3177(6)(g)10 (2016) (emphasis added). See also Fla. Stat. § 163.3164(1) (2016).
- ²¹⁷ Fla. Stat. § 163.3164(1) (2016).
- ²¹⁸ Fla. Stat. § 163.3177(6)(g)10 (2016).
- ²¹⁹ A REGION RESPONDS TO A CHANGING CLIMATE, REGIONAL CLIMATE ACTION PLAN, *supra* note 209, at App. B, Work Group Recommendations.
- ²²⁰ *Id.*, at App. B-1 – B-2.
- ²²¹ See MACADANGDANG & NEWMONS, *supra* note 197 (citing the Town of East Hampton, New York – Coastal Erosion Overlay District); GRANNIS, *supra* note 141, at 39-40.

²²² SO. FLA. REG’L PLANNING COUNCIL, ADAPTATION ACTION AREAS: A PLANNING GUIDEBOOK FOR FLORIDA’S LOCAL GOVERNMENTS (Aug. 2015), [hereinafter “SFRPC AAA GUIDEBOOK”], available at <http://www.floridajobs.org/docs/default-source/2015-community-development/community-planning/crdp/aaaguidebook2015.pdf?sfvrsn=2> (last visited Aug. 29, 2016). See also SFRPC AAA POLICY OPTIONS, *supra* note 58.

²²³ SFRPC AAA GUIDEBOOK, *supra* note 222, at 67.

²²⁴ *Id.* at 72-73; see also *id.* at App. 3 (containing a more detailed checklist).

²²⁵ VILLAGE OF PINECREST, FLORIDA COMPREHENSIVE DEVELOPMENT MASTER PLAN GOALS, OBJECTIVES, POLICIES ch. 10, at 1-6 (2015), available at <http://www.pinecrest-fl.gov/Modules/ShowDocument.aspx?documentid=1218> (last visited Aug. 29, 2016).

²²⁶ CITY OF SATELLITE BEACH COMPREHENSIVE PLAN, POLICY 1.12A.2 (2014) available at <http://www.satellitebeachfl.org/Documents/2014%20Comp%20Plan%20GOPs%2002-19-14.pdf> (last visited Aug. 29, 2016).

²²⁷ See THOMAS RUPPERT, ESQ. & ALEXANDER STEWART, SUMMARY AND COMMENTARY ON SEA-LEVEL RISE ADAPTATION LANGUAGE IN FLORIDA LOCAL GOVERNMENT COMPREHENSIVE PLANS AND ORDINANCE (July 2015), available at https://www.flseagrant.org/wp-content/uploads/Ruppert-Updated-Sea-Level-Language_7.2.15.pdf (last visited Aug. 29, 2016).

²²⁸ *Id.* at 3.

²²⁹ See *Adaptation Action Areas*, GYR.FTLAUDERDALE.GOV, <http://gyr.fortlauderdale.gov/greener-government/climate-resiliency/innovative-pilot-projects/adaptation-action-areas> (last visited Aug. 29, 2016); CITY OF FORT LAUDERDALE ADOPTED COMMUNITY INVESTMENT PLAN, available at <http://www.fortlauderdale.gov/documents/FY2016-FY2020AdoptedCIPFinal.pdf> (last visited Aug. 29, 2016); SFRPC AAA GUIDEBOOK, *supra* note 222.

²³⁰ See MD. CODE ANN., NAT. RES. § 8-1802 (2015).

²³¹ See *Glisson v. Alachua Cnty.*, 558 So. 2d 1030 (Fla. 1st DCA 1990), *rev. denied*, 570 So.2d 1304 (Fla. 1990).

²³² SFRPC AAA GUIDEBOOK, *supra* note 222, at 50, 73.

²³³ See *Tampa-Hillsborough Cnty. Expressway Auth. v. A.G.W.S. Corp.*, 640 So. 2d 54, 58 (Fla. 1994).

²³⁴ See *Penn Central*, 438 U.S. at 124; *Kaiser Aetna v. U.S.*, 444 U.S. 164 (1979).

²³⁵ See *id.*

²³⁶ See *Shands v. City of Marathon*, 999 So. 2d 718, 723 (Fla. 3d DCA 2008) (analyzing “substantial deprivation of economic use or reasonable investment-backed expectations ... requires a fact-intensive inquiry of impact of the regulation on the economic viability of the landowner’s property by analyzing permissible uses before and after enactment of the regulation”); *Palazzolo v. Rhode Island*, 533 U.S. 606, 633 (2001) (O’Connor, J., concurring) (“[T]he regulatory regime in place at the time the claimant acquires the property at issue helps to shape the reasonableness of those expectations.”); *Rith Energy, Inc. v. United States*, 247 F.3d 1355, 1364 (Fed. Cir. 2001) (no taking where lessee did not have reasonable investment-backed expectations that it would not be subject to regulatory oversight at the time it acquired lease).

²³⁷ See *Lucas v. S. Carolina Coastal Council*, 505 U.S. 1003, 1031 (1992) (“The fact that a particular use has long been engaged in by similarly situated owners ordinarily imports a lack of any common-law prohibition (though changed circumstances or new knowledge may make what was previously permissible no longer so). So also does the fact that other landowners, similarly situated, are permitted to continue the use denied to the claimant.”).

²³⁸ See *Penn Central*, 438 U.S. 104; *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003 (1992); *Keshbro, Inc. v. City of Miami*, 801 So. 2d 864, 870 (Fla. 2001) (“Concisely stated, a regulation eliminating the value of private property effects a taking *unless* the purpose of the regulation is to control a public nuisance.”) (quotation omitted, emphasis added). Similarly, “[t]here is no cause of action based on nuisance or a request to abate activities which constitute a nuisance” under the Bert Harris Act (discussed below). *City of Jacksonville v. Smith*, 159 So. 3d 888, 889 (Fla. 1st DCA 2015); see Fla. Stat. § 70.001(3)(e) (2016) (“The terms ‘inordinate burden’ and ‘inordinately burdened’ ... [d]o not include ... remediation of a public nuisance at common law....”).

²³⁹ *Palm Beach Mobile Homes, Inc. v. Strong*, 300 So. 2d 881, 884 (Fla. 1974). See also *Lingle v. Chevron USA, Inc.*, 544 U.S. 528, 538 (2005) (“Government hardly could go on if ... [property] values could not be diminished without paying for every such change in the ... law.”).

²⁴⁰ Fla. Stat. § 70.001(2) (2016).

²⁴¹ See generally Richard Grosso & Robert Hartsell, *Old MacDonald Still Has a Farm: Agricultural Property Rights After the Veto of S.B. 1712*, 79 FLA. B. J. 41, 44 (March 2005).

²⁴² See *id.* at 44; see also *Royal World Metropolitan v. City of Miami Beach*, 863 So. 2d 320 (Fla. 3d DCA 2003) (making no ruling regarding what constitutes an “inordinate burden” but holding that sovereign immunity does not shield a local government from application of the Bert Harris Act).

²⁴³ See generally THOMAS RUPPERT, ESQ., CARLY GRIMM, & MICHAEL CANDIOTTI, SEA-LEVEL RISE ADAPTATION AND THE BERT J. HARRIS, JR., PRIVATE PROPERTY RIGHTS PROTECTION ACT 12-14 (2012), available at https://www.flseagrant.org/wp-content/uploads/2013/01/Ruppert_BH-Act_article.pdf (last visited Aug. 29, 2016).

²⁴⁴ See, e.g., *Bair v. City of Clearwater*, 196 So. 3d 577, 582-83 (Fla. 2d DCA 2016).

²⁴⁵ See CITY OF CORAL GABLES, FL, ZONING CODE art. 3, div. 17, § 3-1701, available at <http://coralgables.com/Modules/ShowDocument.aspx?documentID=7951> (last visited Aug. 29, 2016).

²⁴⁶ *Id.*

²⁴⁷ *Id.* at §§ 3-1706(C), 3-1707.

²⁴⁸ See, e.g., *In re Forfeiture of 1969 Piper Navajo*, 570 So. 2d 1357, 1359 (Fla. 4th DCA 1990) (“If a statute is unreasonable, arbitrary, and capricious, it violates substantive due process rights guaranteed by the United States and Florida Constitutions.”) (citing *State v. Saiez*, 489 So.2d 1125 (Fla. 1986)).

²⁴⁹ See, e.g., *Town of Hialeah Gardens v. Hebraica Community Center, Inc.*, 309 So. 2d 212 (Fla. 3d D.C.A. 1975); *Graham v. Estuary Properties, Inc.*, 399 So. 2d 1374, 1381 (Fla. 1981), *cert. denied, sub. nom., Taylor v. Graham*, 454 U.S. 1083 (1981).

²⁵⁰ See, e.g., *Graham*, 399 So. 2d 1374; see also *Glisson*, 558 So. 2d 1030.

²⁵¹ Courts will not, however, substitute their own judgment in place of legislatures' judgments when choosing among different rational options. As the Florida Supreme Court has explained: "The test to be used in determining whether an act is violative of the due process clause is whether the statute bears a reasonable relation to a permissible legislative objective and is not discriminatory, arbitrary or oppressive. It therefore becomes necessary for us to examine the objectives of the Legislature in enacting this statute in order to determine whether the provisions of the act bear a reasonable relation to them. In doing so, we do not concern ourselves with the wisdom of the Legislature in choosing the means to be used, or even with whether the means chosen will in fact accomplish the intended goals; our only concern is with the constitutionality of the means chosen." *Lasky v. State Farm Ins. Co.*, 296 So. 2d 9 (Fla. 1974).

²⁵² See, e.g., *Tomblin v. Town of Palm Beach*, 552 So. 2d 1182, 1183 (Fla. 4th DCA 1989)

²⁵³ *Jordan v. St. Johns Cnty.* 63 So. 3d 835, 837 (Fla. 5th DCA 2011).

²⁵⁴ Cf. *Ray v. Pensacola Sertoma Club, Inc.*, 809 So. 2d 81, 82-83 (Fla. 1st DCA 2002) (permittee must indemnify city where ordinance provided that applicant for permit agreed to indemnify and hold city harmless for any claims arising out of permitted activities, despite lack of written permit); *State Dep't of Transp. v. Florida Keys Elec. Co-op. Ass'n*, 831 So. 2d 713, 714 (Fla. 3d DCA 2002) (electric company not required to indemnify DOT, where DOT permit required indemnification, only because plaintiff had amended complaint to remove allegations of negligence by electric company).

²⁵⁵ Overlay zones and many other adaptation regulatory tools are discussed in detail in the Georgetown Climate Center's Adaptation Tool Kit publication, GRANNIS, *supra* note 141, at 19-44.

²⁵⁶ See CITY OF CORAL GABLES, FL, ZONING CODE art. 4, div. 2, available at <http://coralgables.com/Modules/ShowDocument.aspx?documentID=7951> (last visited Aug. 29, 2016).

²⁵⁷ SFRPC AAA POLICY OPTIONS, *supra* note 58.

²⁵⁸ Grosso & Hartsell, *supra* note 241.

²⁵⁹ MACADANGDANG & NEWMONS, *supra* note 197.

²⁶⁰ *Id.*

²⁶¹ See THOMAS RUPPERT, ESQ., PLANNING FOR SEA LEVEL RISE IN THE MATANZAS BASIN, APPENDIX H2: PLANNING FOR SEA LEVEL RISE TOOLKIT (June 2015), available at <https://planningmatanzas.files.wordpress.com/2012/06/h2-planning-for-sea-level-rise-toolkit.pdf> (last visited Aug. 29, 2016).

²⁶² See CITY OF CORAL GABLES, FL, ZONING CODE app. A, available at <http://coralgables.com/Modules/ShowDocument.aspx?documentID=7951> (last visited Aug. 29, 2016).

²⁶³ See *Penn Central*, 438 U.S. 104; *Goldblatt v. Town of Hempstead*, 369 U.S. 590 (1962); *Graham*, 399 So. 2d at 1380.

²⁶⁴ See *Martin Cnty v. Yusem*, 690 So. 2d 1288, 1295 (Fla. 1997); *Smith v. City of Clearwater*, 383 So. 2d 681 (Fla. 2d D.C.A. 1980), *aff'd*, 403 So. 2d 407 (Fla. 1981).

²⁶⁵ *Glisson*, 558 So. 2d 1030. See also *Grosso & Hartsell*, *supra* note 241, at 3.

²⁶⁶ *City of Lauderdale v. Rhames*, 864 So.2d 432, 437-38 (Fla. 4th DCA 2003).

²⁶⁷ See SFRPC AAA POLICY OPTIONS, *supra* note 58.

²⁶⁸ See Fla. Stat. § 553.73(5) (2016).

²⁶⁹ A REGION RESPONDS TO A CHANGING CLIMATE, REGIONAL CLIMATE ACTION PLAN, *supra* note 209, at App. B-2.

²⁷⁰ SFRPC AAA POLICY OPTIONS, *supra* note 58.

²⁷¹ See THOMAS RUPPERT, ESQ., FLORIDA SEA GRANT, ELEVATION, *available at* <https://www.flseagrant.org/wp-content/uploads/2012/01/Elevation.pdf> (last visited Aug. 29, 2016). Elevating structures may, of course, present substantial practical challenges. While not impossible, elevation of existing structures may not be financially feasible, for example, for many existing slab-on-grade and masonry structures. *Id.*

²⁷² See NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE MANUAL § Lowest Floor Guide (May 2011), *available at* http://www.fema.gov/pdf/nfip/manual201105/content/07_1fg.pdf (last visited Aug. 29, 2016). The City's FEMA ordinance is codified at Chapter 113 of the City Code. CORAL GABLES, FLA., CODE ch. 113 (1991), *available at* https://www.municode.com/library/fl/coral_gables/codes/code_of_ordinances?nodeId=SPBLADE_RE_CH113FLDAPR (last visited Aug. 29, 2016)). See also CITY OF CORAL GABLES, FL, ZONING CODE art. 5, div. 13, § 5-1301, *available at* <http://coralgables.com/Modules/ShowDocument.aspx?documentID=7951> (last visited Aug. 29, 2016) (providing that for areas not subjected to the FEMA BFE and other requirements, the minimum floor elevations of residential, duplex, or multiple-family structures shall generally be not less than sixteen (16) inches above the established grade).

²⁷³ See 42 U.S.C. § § 12132, 12182 (ADA); 28 CFR Pt. 35, Appendix A & B; 28 CFR Pt. 36, Appendix A; 42 U.S.C. §3601 et seq. (FHA); 2012 Florida Accessibility Code adopted pursuant to Fla. Stat. § 553.503.

²⁷⁴ See Joey Flechas & Jenny Staletovich, *Miami Beach's Battle to Stem Rising Tides*, MIAMI HERALD, Oct. 23, 2015, *available at* <http://www.miamiherald.com/news/local/community/miami-dade/miami-beach/article41141856.html> (last visited Aug. 29, 2016).

²⁷⁵ See CITY OF CORAL GABLES, FL, ZONING CODE art. 3, div. 11, *available at* <http://coralgables.com/Modules/ShowDocument.aspx?documentID=7951> (last visited Aug. 29, 2016).

²⁷⁶ The battle over the Port of Miami dredge project and its effect on rare coral in Biscayne Bay is a recent example of this issue. See Jenny Staletovich, *PortMiami Dredge Damages More Coral Than Feds Expected*, MIAMI HERALD, Aug. 17, 2015, *available at*

<http://www.miamiherald.com/news/local/environment/article31350266.html> (last visited Aug. 29, 2016).

²⁷⁷ See Elizabeth Kolbert, *The Siege of Miami*, THE NEW YORKER, Dec. 21 & 28, 2015, available at <http://www.newyorker.com/magazine/2015/12/21/the-siege-of-miami> (last visited Aug. 29, 2016).

²⁷⁸ See Justin Nobel, *Keeping A Rising Sea At Bay*, AUDUBON MAGAZINE, Sept.- Oct. 2014, available at <http://www.audubon.org/magazine/september-october-2014/keeping-rising-sea-bay> (last visited Aug. 29, 2016).

²⁷⁹ See *Westland Skating Center, Inc. v. Gus Machado Buick, Inc.*, 542 So. 2d 959, 962-63 (Fla. 1989).

²⁸⁰ See *To Combat Rising Seas, Why Not Raise Up The Town?*, National Public Radio (May 3, 2013), available at <http://www.npr.org/2013/05/03/180824410/to-combat-rising-seas-why-not-raise-up-the-town> (last visited Aug. 29, 2016).

²⁸¹ These, and many other adaptation tools, are discussed in the Georgetown Climate Center's Adaptation Tool Kit publication, GRANNIS, *supra* note 141, at 2-4.

²⁸² SFRPC AAA POLICY OPTIONS, *supra* note 58.

²⁸³ MACADANGDANG & NEWMONS, *supra* note 197. (An ecotone is a region of transition between two biological communities. See MERRIAM-WEBSTER ONLINE DICTIONARY (2015), MERRIAM-WEBSTER.COM, <http://www.merriam-webster.com/dictionary/ecotone> (last visited Aug. 29, 2016).)

²⁸⁴ See CITY OF CORAL GABLES, FL, ZONING CODE div. 3, § 4-101(D)(4); *id.* § 4-104(D)(5); *id.* § 4-203(B)(4); *id.* § 4-301(E)(5); *id.* § 4-302(D)(6)(e); *id.* § 5-602(A)(5) available at <http://coralgables.com/Modules/ShowDocument.aspx?documentID=7951> (last visited Aug. 29, 2016).

²⁸⁵ See GRANNIS, *supra* note 141, at 26-28.

²⁸⁶ *Id.* at 29.

²⁸⁷ See *id.*

²⁸⁸ See *id.*; see also SFRPC AAA POLICY OPTIONS, *supra* note 58.

²⁸⁹ *Nollan*, 483 U.S. 825 (holding that a government could, without paying compensation, demand an easement as a condition for granting a development permit the government was entitled to deny, provided that the exaction would substantially advance the same government interest that would furnish a valid ground for denial of the permit).

²⁹⁰ *Dolan v. City of Tigard*, 512 U.S. 374 (1992). See also *Koontz v. St. Johns River Water Management District*, 133 S. Ct. 2586 (2013) (holding that the government's demand for property from a land-use permit applicant must satisfy the requirements of *Nollan* and *Dolan* even when the government denies the permit and even when its demand is for money). See also CITY OF CORAL GABLES COMPREHENSIVE PLAN, *supra* note 192, Policy CIE-1.6.3 ("The City will collect funds through the authority of the impact fee ordinance to support public facilities which have a 'rational nexus' to and provide a benefit for new development on which impact fees are imposed.").

²⁹¹ J. Peter Byrne, *Climate Exactions*, 75 MARYLAND L. REV. 758 (2016), available at <http://scholarship.law.georgetown.edu/facpub/1668/> (last visited Aug. 29, 2016).

²⁹² *Id.* at 777.

²⁹³ *See also Graham*, 399 So. 2d 1374 (upholding a development order that required half of a mangrove forest to remain undeveloped, because the action served a legitimate governmental purpose and still allowed the landowner to enjoy an economically viable use on the property as a whole; and stating that “an owner of land has no absolute and unlimited right to change the essential natural character of his land so as to use it for a purpose for which it was unsuited in its natural state and which injuries [sic] the rights of others.”).

²⁹⁴ *See GRANNIS*, *supra* note 141, at 29. In the wake of the *Koontz* decision, the Florida Legislature amended Chapter 70 of the Florida Statutes to provide a new cause of action for relief from improper government exactions. *See Fla. Session Laws Ch. 2015-142*. Under this new law, a property owner can recover damages in addition to remedies otherwise available in law or equity, but the owner must send the government entity that imposed the exaction a written notice of claim at least 90 days before commencing litigation, but no later than 180 days after the exaction was imposed. *See Fla. Stat. § 70.45 (2016)*. These procedural requirements can help prevent some exactions disputes from resulting in costly litigation.

²⁹⁵ *GRANNIS*, *supra* note 141, at 32.

²⁹⁶ *Id.* at 31.

²⁹⁷ *Id.* at 32; SFRPC AAA POLICY OPTIONS, *supra* note 58.

²⁹⁸ *MACADANGDANG & NEWMONS*, *supra* note 197.

²⁹⁹ EPA, SYNOPSIS OF ANTICIPATORY PLANNING FOR SEA-LEVEL RISE ALONG THE COAST OF MAINE Summary-12 (1995), *available at* https://www1.maine.gov/dacf/mcp/downloads/sealevelrise-execsummary_sept95.pdf (last visited Aug. 29, 2016).

³⁰⁰ *See FEMA, ANSWERS TO QUESTION ABOUT THE NFIP, F-084*, at 25 (Mar. 2011), *available at* https://www.fema.gov/media-library-data/20130726-1438-20490-1905/f084_atq_11aug11.pdf (last visited Aug. 29, 2016).

³⁰¹ *Id.*

³⁰² *See, e.g., Esposito v. South Carolina Coastal Council*, 939 F.2d 165, 170 (4th Cir. 1991) (holding that no taking occurs when a regulation deprives an owner of the right to rebuild a house if it is ever destroyed by a storm, because existing uses are still permitted and the future impact on those uses remains speculative). *Cf. Handelsman v. Town of Palm Beach*, 585 So. 2d 1047, 1049 (Fla. 4th DCA 1991) (affirming trial court’s judgment that no taking occurred where town refused to grant exception to property owner who operated a restaurant that was a grandfathered non-conforming use, but who also wanted to change the restaurant to a retail store, which would have violated the zoning code); *Smith v. City of Clearwater*, 383 So. 2d 681, 685 (Fla. 2d DCA 1980) (“Appellants also argue that the ordinance which rezoned their wetlands as aquatic lands constituted a ‘taking’ for public use.... While there is no doubt that appellants will not be able to do much with their wetlands in the face of aquatic zoning, there wasn’t very much they could have done with this land without such zoning.... Also, as the trial court pointed out, there were serious environmental considerations which justified the placing of appellants’ wetlands within the aquatic lands zone.”). *See also James Titus, Rising Seas, Coastal Erosion, and the Takings*

Clause: How to Save Wetlands and Beaches Without Hurting Property Owners, 57 MD. L. REV. 1279, 1349-52 (1998) (explaining how “a regulation that eventually curtails the useful lifetime of real property is less likely to be a taking than a regulation requiring an immediate curtailment”).

³⁰³ GRANNIS, *supra* note 141, at 36-40.

³⁰⁴ See FREQUENTLY ASKED QUESTIONS – PROPOSED SEAWALL ORDINANCE (updated May 20, 2016), available at <http://gyr.fortlauderdale.gov/home/showdocument?id=15244> (last visited Aug. 29, 2016) (explaining scope of ordinance, which includes a new minimum height requirement of 3.9 feet NAVD88 for new seawalls, for damaged seawalls requiring substantial repair, and for areas cited for allowing tidal waters to enter property and impact adjacent properties).

³⁰⁵ See, e.g. NRC, MITIGATING SHORE EROSION ON SHELTERED COASTS 95 (2007), available at http://www.nap.edu/catalog.php?record_id=11764 (last visited Aug. 29, 2016); REBECCA STAMSKI, THE IMPACTS OF COASTAL PROTECTION STRUCTURES IN CALIFORNIA’S MONTEREY BAY NATIONAL MARINE SANCTUARY 3-12 (Feb. 2005), available at http://sanctuaries.noaa.gov/special/con_coast/stamski.pdf (last visited Aug. 29, 2016).

³⁰⁶ See John Gibeaut, *Up Against the Sea Wall*, ABA JOURNAL (Jun. 11, 2006), http://www.abajournal.com/magazine/article/up_against_the_seawall/ (last visited Aug. 29, 2016); EPA, SYNTHESIS OF ADAPTATION OPTIONS FOR COASTAL AREAS 12 (2009), available at <https://www.epa.gov/cre/synthesis-adaptation-options-coastal-areas> (last visited Aug. 29, 2016).

³⁰⁷ As noted in Section VI. E. above, Florida law requires a “rational nexus” or “reasonable connection” between a dedication or impact fee and the anticipated needs of the impacted community due to the new development (e.g., due to the armoring). See also *Volusia Cnty. v. Aberdeen at Ormond Beach, L.P.*, 760 So. 2d 126, 134 (Fla. 2000); *St. Johns Cnty. v. Ne. Florida Builders Ass’n, Inc.*, 583 So. 2d 635, 637 (Fla. 1991); *Hollywood, Inc. v. Broward Cnty.*, 431 So. 2d 606, 611 (Fla. 4th DCA 1983); *Town of Longboat Key v. Lands End, Ltd.*, 433 So. 2d 574, 576 (Fla. 2d DCA 1983); *Wald Corp. v. Metropolitan Dade Cnty.*, 338 So.2d 863 (Fla. 3d DCA 1976).

³⁰⁸ *Ocean Harbor House Homeowners Ass’n v. Cal. Coastal Comm’n*, 163 Cal.App.4th 215 (2008).

³⁰⁹ MACADANGDANG & NEWMONS, *supra* note 197.

³¹⁰ SARASOTA COUNTY CODE § 48-39-290(D)(1), available at <http://www.scstatehouse.gov/code/t48c039.php> (last visited Aug. 29, 2016).

³¹¹ CITY OF CORAL GABLES, FL, ZONING CODE art. 5, div. 8, § 5-806, available at <http://coralgables.com/Modules/ShowDocument.aspx?documentID=7951> (last visited Aug. 29, 2016).

³¹² To the extent soft armoring involves placing any fill in navigable waters – such as by expanding or creating sand dunes – such action may also require a U.S. Army Corp of Engineers permit in addition to other federal, state, and local permissions. See generally NRC, MITIGATING SHORE EROSION ON SHELTERED COASTS 104-108 (2007), available at http://www.nap.edu/catalog.php?record_id=11764 (last visited Aug. 29, 2016).

³¹³ See *Millender v. State DOT*, 774 So. 2d 767, 768 (Fla. 1st DCA 2000) (plaintiff was not barred by statute of limitations from bringing inverse condemnation action for land erosion due to

government's rerouting of river where one government agency forced plaintiff to remove sea-wall constructed to stop that erosion; remanded for consideration of that action).

³¹⁴ See also JON A. KUSLER, ASFPM, A COMPARATIVE LOOK AT PUBLIC LIABILITY FOR FLOOD HAZARD MITIGATION 4 (2009), available at

http://www.floods.org/PDF/Mitigation/ASFPM_Comparative_look_at_pub_liability_for_flood_hazard_mitigation_09.pdf (last visited Aug. 29, 2016).

³¹⁵ Fla. Stat. ch. 259 (2016) (Florida Land Conversation Act; Florida Preservation 2000 Act; Florida Forever Act).

³¹⁶ See NOAA, OFFICE OF OCEAN & COASTAL RESOURCE MANAGEMENT, ADAPTING TO CLIMATE CHANGE: A PLANNING GUIDE FOR STATE COASTAL MANAGERS 70 (2010), available at <https://coast.noaa.gov/czm/publications/> (last visited Aug. 29, 2016); FEMA, PROPERTY ACQUISITION HANDBOOK FOR LOCAL COMMUNITIES (October 1998), available at <http://www.fema.gov/media-library/assets/documents/3117> (last visited Aug. 29, 2016).

³¹⁷ GRANNIS, *supra* note 141, at 47.

³¹⁸ *Id.*

³¹⁹ City of Coral Gables – Sea Level Rise LIDAR Map (June 2016), available at <http://coralgables.com/index.aspx?page=1169> (last visited Aug. 29, 2016).

³²⁰ See MACADANGDANG & NEWMONS, *supra* note 197, at Policy 4.3.2.

³²¹ SFRPC AAA POLICY OPTIONS, *supra* note 58.

³²² See *Florida Forever*, FL Dep't of Environmental Protection, DEP.STATE.FL.US, http://www.dep.state.fl.us/lands/fl_forever.htm (last visited Aug. 29, 2016).

³²³ NOAA, OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT, COASTAL AND ESTUARINE LAND CONSERVATION PROGRAM FINAL GUIDELINES (Jun. 2003), <http://coastalmanagement.noaa.gov/land/media/CELCPfinal02Guidelines.pdf> (last visited Aug. 29, 2016).

³²⁴ Coastal Wetlands Planning, Protection and Restoration Act, 16 U.S.C. § 1394 (2010); see also U.S. Fish and Wildlife Serv. (USFWS), *National Coastal Wetlands Conservation Grant Program*, <http://www.fws.gov/coastal/CoastalGrants> (last visited Aug. 29, 2016); USFWS, NATIONAL COASTAL WETLANDS CONSERVATION GRANT PROGRAM FACT SHEET (Dec. 2009), http://www.fws.gov/coastal/CoastalGrants/docs/factsheets/2009/coastal_grant.pdf (last visited Aug. 29, 2016).

³²⁵ See JAMES FRASER, ET AL., IMPLEMENTING FLOODPLAIN LAND ACQUISITION PROGRAMS IN URBAN LOCALITIES, Center for Urban & Regional Studies, UNC Chapel Hill, report prepared for FEMA and National Science Foundation, at 7-8 (Dec. 2003), available at https://www.researchgate.net/publication/237546980_Implementing_Floodplain_Land_Acquisition_Programs_in_Urban_Localities (follow “Download Full-text PDF” hyperlink) (last visited Aug. 29, 2016). See also <http://www.fema.gov/government/grant/hma/index.shtm> (last visited Aug. 29, 2016).

³²⁶ See THOMAS RUPPERT, ESQ., USE OF FUTURE INTERESTS IN LAND AS A SEA-LEVEL RISE ADAPTATION STRATEGY IN FLORIDA 3, available at https://www.flseagrant.org/wp-content/uploads/2012/08/Use-of-Future-Interests_8.8.12.pdf (last visited Aug. 29, 2016).

³²⁷ MACADANGDANG & NEWMONS, *supra* note 197.

³²⁸ See *State v. Miami Beach Redevelopment Agency*, 392 So. 2d 875, 886 (Fla. 1980) (“The legislature has determined that projects using eminent domain to clear blighted areas and providing for the ultimate disposition of substantial portions of the acquired properties for use by private concerns in profit-making activities serve a public purpose. This determination, while not conclusive, is presumed valid and should be upheld unless it is arbitrary or unfounded unless it is so clearly erroneous as to be beyond the power of the legislature.”); *Florida Game & Fresh Water Fish Comm’n v. Flotilla, Inc.*, 636 So. 2d 761, 765 (Fla. 2d DCA 1994) (in eminent domain context, “protecting environmentally endangered species is a valid concern within our state’s police power, one that is generally beneficial to the welfare and quality of life of the people of the State of Florida”); *Broward Cnty. v. Ellington*, 622 So. 2d 1029, 1032 (Fla. 4th DCA 1993) (“[A] condemning authority satisfies its initial burden of proof concerning a reasonable necessity for condemnation by presenting evidence that it considered relevant factors, such as alternative sites, costs, long-range area planning, environmental and safety considerations, in making its decision.”).

³²⁹ See *Dade Cnty. v. Gen. Waterworks Corp.*, 267 So. 2d 633, 639 (Fla. 1972) (“The case law and treatises on eminent domain reveal a multitude of valuation methods which have been considered appropriate to value public service corporations in particular cases. The conclusion to be drawn is simply that the proper valuation method or methods for any given case are inextricably bound up with the particular circumstances of the case.”); see also Sorrell E. Negro, *Preparing, Adapting and Rebuilding: Rising Sea Levels Raise New Legal Concerns*, 27 PROBATE & PROPERTY MAGAZINE 6 (2013), available at http://www.americanbar.org/publications/probate_property_magazine_2012/2013/november_december_2013/2013_aba_rpte_pp_v27_6_article_negro_preparing_adapting_and_rebuilding.html (last visited Aug. 29, 2016).

³³⁰ Thomas Kaplan, *Cuomo Seeking Home Buyouts in Flood Zones*, N.Y. TIMES, Feb. 3, 2013, available at <http://www.nytimes.com/2013/02/04/nyregion/cuomo-seeking-home-buyouts-in-flood-zones.html?emc=eta1&r=2&> (last visited Aug. 29, 2016).

³³¹ Pete Brush, *Smaller Sandy Buyout Sparks Fears over Future Storm Costs*, LAW360, May 14, 2013, available at <http://www.law360.com/articles/441547/smaller-sandy-buyout-sparks-fears-over-future-storm-costs> (last visited Aug. 29, 2016).

³³² Kaplan, *supra* note 330.

³³³ GRANNIS, *supra* note 141, at 50-51.

³³⁴ *Id.*

³³⁵ *Id.*

³³⁶ Fla. Stat. § 704.06(4) (2016).

³³⁷ Fla. Stat. § 704.06(2) (2016).

³³⁸ *Id.*

³³⁹ Fla. Stat. § 704.06(4) (2016).

³⁴⁰ Fla. Stat. § 704.06(7) (2016).

³⁴¹ Fla. Stat. § 704.06(10) (2016).

³⁴² Fla. Stat. § 704.06(12) (2016).

³⁴³ *Coastal and Estuarine Land Conservation Program, Applying for a Grant*, COAST.NOAA.GOV, <https://coast.noaa.gov/czm/landconservation/applying/> (last visited Aug. 29, 2016).

³⁴⁴ Rolling easements are a type of coastal adaptation tool developed by Jim Titus, an expert on sea level rise for the EPA. See JAMES G. TITUS, *ROLLING EASEMENTS* (2011), available at <https://www.epa.gov/sites/production/files/documents/rollingeasementsprimer.pdf> (last visited Aug. 29, 2016).

³⁴⁵ GRANNIS, *supra* note 141, at 52-53; TITUS, *supra* note 344, at 118

³⁴⁶ GRANNIS, *supra* note 141, at 52-53.

³⁴⁷ *Id.*; TITUS, *supra* note 344, at 122

³⁴⁸ FLA. CONST. art. X, §11; FLA. CONST. art. II, §7(a); Fla. Stat. §161.088 (2016); see also *Stop the Beach Renourishment, Inc. v. Fla. Dep't of Environmental Protection*, 130 S. Ct. 2592 (2010); *McQueen v. South Carolina Coastal Council*, 580 S.E.2d 116 (S.C. 2003).

³⁴⁹ MACADANGDANG & NEWMONS, *supra* note 197. It should also be noted that there appears to be some confusion regarding how rolling easements would work in the event of a substantial change in the location of a shoreline. Some commentators seem to assume that rolling easements might bind the owners of more landward properties once the sea reaches their land even though those owners were never paid for the easement. To be clear, such a position is not what is being discussed here. See GRANNIS, *supra* note 141, at 44; Titus, 57 MD. L. REV. at 1313, 1342-47 (analyzing the takings implications of a permit condition that exacts a rolling easement); THOMAS RUPPERT, ESQ., *PLANNING FOR SEA LEVEL RISE IN THE MATANZAS BASIN*, APPENDIX H2: *PLANNING FOR SEA LEVEL RISE TOOLKIT 57* (June 2015), available at <https://planningmatanzas.files.wordpress.com/2012/06/h2-planning-for-sea-level-rise-toolkit.pdf> (last visited Aug. 29, 2016).

³⁵⁰ GRANNIS, *supra* note 141, at 57-59; see also Lincoln Institute of Land Policy, *Transfer of Development Rights for Balanced Development* 9-13 (May 1998), available at <http://www.rpa.org/pdf/transferdevelopment.pdf> (last visited Aug. 29, 2016).

³⁵¹ GRANNIS, *supra* note 141, at 57.

³⁵² *Id.* at 57-59; see also WILLIAM FULTON ET AL., BROOKINGS INST., *TDRS AND OTHER MARKET-BASED LAND MECHANISMS: HOW THEY WORK AND THEIR ROLE IN SHAPING METROPOLITAN GROWTH* 7 (2004).

³⁵³ CITY OF CORAL GABLES, FL, *ZONING CODE art. 3, div. 10*, available at <http://coralgables.com/Modules/ShowDocument.aspx?documentID=7951> (last visited Aug. 29, 2016).

³⁵⁴ *Id.* at § 3-1002.

³⁵⁵ SFRPC AAA POLICY OPTIONS, *supra* note 58.

³⁵⁶ Miami-Dade County, FL, Code of Ordinances § 33B-11 *et seq.*; *see also* Lincoln Institute of Land Policy, *supra* note 350, at 18-19.

³⁵⁷ Sarasota County Comprehensive Plan, Future Land Use Policy 1.1.4, *available at* <https://www.scgov.net/CompPlan/Comp%20Plan%20Amendments/Chapter%209%20-%20Future%20Land%20Use.pdf> (last visited Sept. 22, 2016) (“In the event that natural forces render a property located in the Coastal High Hazard Area unbuildable, or reduce the development potential of a property as allowed by the prior acreage and the underlying zone district, utilization of the Transfer of Development Rights concept will be encouraged.”).

³⁵⁸ MACADANGDANG & NEWMONS, *supra* note 197.

³⁵⁹ *See, e.g., Glisson*, 558 So. 2d 1030 (TDR program a factor in dismissing takings claim against wetlands regulation); *City of Hollywood v. Hollywood, Inc.*, 432 So. 2d 1332, 1337-38 (Fla. 4th DCA 1983) (holding that issuance of TDR (as to development density allowances) as to one portion of property in exchange for leaving other portion of property undeveloped or to preserve beachfront was proper and reasonably related to a valid public purpose, as well as economically beneficial to property owner, such that TDR was not a taking).

³⁶⁰ *See Penn Central*, 438 U.S. at 137; *Suitum v. Tahoe Reg'l Planning Agency*, 520 U.S. 725, 749-50 (1997) (Scalia, J., concurring) (“TDRs can serve a commendable purpose in mitigating the economic loss suffered by an individual whose property use is restricted, and property value diminished, but not so substantially as to produce a compensable taking.”); *but see Wilkinson v. St. Jude Harbors, Inc.*, 570 So. 2d 1332, 1333 (Fla. 2d DCA 1990) (concluding that TDR credits are not real property for tax purposes).

³⁶¹ *See* SFRPC AAA POLICY OPTIONS, *supra* note 58, at 19.

³⁶² 26 U.S.C. § 170(h).

³⁶³ *See* Fla. Stat. § 704.06(7) (2016).

³⁶⁴ *See Water Storage Strategies*, SFWMD, <http://www.sfwmd.gov/portal/page/portal/xweb%20protecting%20and%20restoring/water%20storage%20programs> (last visited Aug. 29, 2016); CARA BOTTORFF, PAYMENTS FOR ECOSYSTEM SERVICES: CASES FROM THE EXPERIENCE OF U.S. COMMUNITIES 15-16 (July 15, 2014), *available at* http://walker-foundation.org/Files/walker/2015/PESCases_Bottorffc_20140716.pdf (last visited Aug. 29, 2016).

³⁶⁵ KIMBERLY LOVE, COOPERATIVE CONSERVATION BLUEPRINT REGIONAL PILOT PROJECT: A STRATEGIC APPROACH TOWARD REGIONAL CONSERVATION CONNECTIVITY, *available at* <http://myfwc.com/media/2671373/StrategicApproach.pdf> (last visited Aug. 29, 2016).

³⁶⁶ *See* Ruppert, *supra* note 74, at 260-66.

³⁶⁷ *Id.* at 272-74.

³⁶⁸ *Id.*

³⁶⁹ *Id.*

³⁷⁰ *See* KEVIN WOZNIAK, ET AL, FLORIDA'S COASTAL HAZARDS DISCLOSURE LAW: PROPERTY OWNER PERCEPTIONS OF THE PHYSICAL AND REGULATORY ENVIRONMENT at v. (July 2012),

available at <http://nsgl.gso.uri.edu/flsgp/flsgps12001.pdf> (last visited Aug. 29, 2016). While the state's coastal hazards disclosure law may be a model in some ways, a sea level rise disclosure requirement should be crafted so as to be more effective. A report commissioned by Florida Sea Grant revealed that 85.7% of covered property purchasers did not receive or do not recall receiving the required disclosure. *See id.* at 2. Florida Sea Grant has made recommendations of how to make that disclosure law more effective, which could also be applied to a sea level rise disclosure. *See id.*

³⁷¹ Leon County Code of Laws § 12-8(d), available at https://www2.municode.com/library/fl/leon_county/codes/code_of_ordinances (last visited Aug. 29, 2016).

³⁷² *See generally* discussion in Section VI.A. *supra*. *See also* LARRY W. THOMAS, FAIR DISCLOSURE AND AIRPORT IMPACT STATEMENTS IN REAL ESTATE TRANSFERS, Airport Cooperative Research Program, at 8-15 (Nov. 2011), available at http://onlinepubs.trb.org/onlinepubs/acrp/acrp_lrd_012.pdf (last visited Aug. 29, 2016) (arguing, in an analogous context, that laws requiring a property owner to disclose the property's proximity to an airport do not effectuate regulatory takings, but rather are proper exercises of the police power).

³⁷³ *See, e.g.*, Erik Bojansky, *Miami Beach Property Values May Fall As Sea Levels Rise: Experts*, THE REAL DEAL, April 7, 2016, available at <http://therealdeal.com/miami/2016/04/07/miami-beach-property-values-may-fall-as-sea-levels-rise-experts/> (last visited Aug. 29, 2016); Katherine Kallergis, *Which Miami Condo Towers Will Be Most Affected By Sea Level Rise?*, THE REAL DEAL, Feb. 29, 2016, available at <http://therealdeal.com/miami/2016/02/29/which-miami-condo-towers-will-be-most-affected-by-sea-level-rise-map/> (last visited Aug. 29, 2016).

³⁷⁴ *See* Debora Lima, *The Real Real Estate Story*, MIAMI HERALD, June 5, 2016, available at <http://www.miamiherald.com/real-estate/article81971977.html> (last visited Aug. 29, 2016).

³⁷⁵ *See* Michelle Singletary, *Mortgage Modification Programs Still Have A Long Way To Go*, WASHINGTON POST, Jan. 26, 2013, available at https://www.washingtonpost.com/business/mortgage-modification-programs-still-have-a-long-way-to-go/2013/01/25/be47fed8-657e-11e2-85f5-a8a9228e55e7_story.html (last visited Aug. 29, 2016); Trulia Trends Team, *Asking What Our Country Can Do For Housing*, TRULIA.COM, Dec. 14, 2011, available at <http://www.trulia.com/blog/trends/trulia-housing-policy-survey> (last visited Aug. 29, 2016) (74% of Democrats and 61% of Republicans surveyed during the 2012 election supported policies encouraging mortgage modification that reduces principal balances).

³⁷⁶ *See Am. Aviation, Inc. v. Aero-Flight Serv., Inc.*, 712 So. 2d 809, 810 (Fla. 4th DCA 1998).

³⁷⁷ *See id.*

³⁷⁸ Don Jergler, *RIMS 2016: Sea Level Rise Will Be Worse and Come Sooner*, INSURANCE JOURNAL, Apr. 12, 2016, available at <http://www.insurancejournal.com/news/national/2016/04/12/405089.htm> (last visited Aug. 29, 2016).

³⁷⁹ *See* Justin Gundlach, *Incorporating Sea Level Rise Into Flood Maps: Advisory Council's Interim Report to FEMA*, COLUMBIA LAW SCHOOL CLIMATE LAW BLOG (Nov. 27, 2015),

available at <http://blogs.law.columbia.edu/climatechange/2015/11/27/incorporating-sea-level-rise-into-flood-maps-advisory-councils-interim-report-to-fema> (last visited Aug. 29, 2016).

³⁸⁰ See *National Flood Insurance Program Community Rating System*, FEMA.GOV, <http://www.fema.gov/national-flood-insurance-program-community-rating-system> (last visited August 29, 2016).

³⁸¹ LMS MIAMI-DADE, THE MIAMI-DADE LOCAL MITIGATION STRATEGY P7-60 (2016), available at <http://www.miamidade.gov/fire/mitigation.asp> (last visited Aug. 29, 2016).

³⁸² FEMA, NFIP CRS COORDINATOR'S MANUAL, FIA-15/2013, at 110-1 (2013 ed.), available at <https://www.fema.gov/media-library/assets/documents/8768> (last visited Aug. 29, 2016).

³⁸³ See Deady & Ruppert, *supra* note 178, at 12; see also THOMAS RUPPERT, REFERENCES TO CLIMATE CHANGE AND SEA-LEVEL RISE IN THE 2013 NFIP CRS COORDINATOR'S MANUAL (Mar. 2015), available at https://www.flseagrant.org/wp-content/uploads/SLR-and-CC-in-CRS-program_FINAL_3.3.15.pdf (last visited Aug. 29, 2016). Florida Sea Grant has prepared a host of resources for both property owners as well as real estate professionals to assist them in understanding changes to the National Flood Insurance Program in 2012 and 2014. See *Coastal Planning*, FLSEAGRANT.ORG, <https://www.flseagrant.org/climatechange/coastalplanning/insurance-issues-coast/additional-resources-2012-2014-nfip-changes/> (last visited Aug. 29, 2016).

³⁸⁴ OCALAFL.ORG, <http://www.ocalafl.org/COO3.aspx?id=18017> (last visited Aug. 29, 2016).

³⁸⁵ See FLA. INST. FOR HEALTH INNOVATION, HEALTH AND SEA LEVEL RISE: IMPACTS ON SOUTH FLORIDA (April 2016), available at <http://flhealthinnovation.org/sea-level-rise-mapping/> (last visited Aug. 29, 2016).

³⁸⁶ By way of example, planners might be mindful of AICP ethics rules, architects of AIA Code Rules (including Rule 2.104 and 2.106), realtors of NAR Article 2, attorneys of the Florida Bar ethics rules, and civil engineers of ASCE Canons 1 and 6.

³⁸⁷ Rona Kobell, *As Islands Slowly Submerge, Residents Rise Up, Refusing to Desert Their Homes, Heritage*, BAY JOURNAL (Oct. 26, 2014), available at http://www.bayjournal.com/article/as_islands_slowly_submerge_residents_rise_up_refusing_to_desert_their_homes (last visited Aug. 29, 2016).

³⁸⁸ *Id.*

³⁸⁹ *Id.*

³⁹⁰ *Id.*

³⁹¹ Harold R. Wanless, *The Coming Reality of Sea Level Rise: Too Fast Too Soon*, in ISGP CLIMATE CHANGE PROGRAM (ICCP): SEA LEVEL RISE: WHAT'S OUR NEXT MOVE?, at 11, 15 (2016), available at scienceforglobalpolicy.org/wp.../56e30928039ff-ISGP%20Sea%20Level%20Rise.pdf.

³⁹² Private companies which operate public utilities cannot discontinue services at will; rather, where an area would be left wholly without the previously provided public service, courts require a legal proceeding where the state and public are represented, and the utility must demonstrate not only that the service is operated at a loss but that such loss substantially affects the overall

operation of the company. *See State v. Bullock*, 82 So. 866, 867 (Fla. 1919); *Greyhound Corp. v. Carter*, 131 So. 2d 735, 736 (Fla. 1961); *Gainesville v. Gainesville Gas & Electric Power Co.*, 62 So. 919, 921 (Fla. 1913); *Winter Park v. Southern States Utilities, Inc.*, 540 So. 2d 178, 180 (Fla. 5th DCA 1989); *Williams v. Mount Dora*, 452 So. 2d 1143, 1145-46 (Fla. 5th DCA 1984).

Because of the common source of authority between municipalities and private companies to provide public utility services, courts are likely to hold municipalities to that same standard.

³⁹³ *See* Fla. Stat. §§ 316.006, 336.09, 336.10, 336.12, 336.125 (2016).

³⁹⁴ The ability to formally abandon a road is an authority that is arguably limited to counties, rather than municipalities. *See* Fla. Att’y Gen. Op. 2004-47 (2004). However, a municipality could typically cede control over unmaintainable roads to the encompassing county via interlocal agreement, and the county could then choose whether to formally abandon the roads. Fla. Stat. § 316.006(2)(c) (2016).

³⁹⁵ Disincorporation can precede a planned re-incorporation or re-formation of smaller, separate municipalities in place of the city (as was attempted with respect to the City of Miami in the mid-1990s). *See* Michelle Wilde Anderson, *Dissolving Cities*, 121 YALE L. J. 1364 (2012); Annette Steinacker, *Prospects for Regional Governance: Lessons from the Miami Abolition Vote*, 37 URB. AFF. REV. 100 (2001).

³⁹⁶ Fla. Stat. §§ 171.052, 171.043 (2016).

³⁹⁷ *See* Fla. Stat. § 165.051 (2016).

³⁹⁸ *See* Section IV.C. *supra*, for a discussion of the legal restrictions on those funding sources.

³⁹⁹ It appears to be an open question under Florida law whether a municipality could (or should) lower its millage rate to one area of the city (and not for the city as a whole) due to decreased services in some areas. Practically speaking, one could imagine an allocation based on a city’s budget expenditures, where the millage rate for a particular neighborhood is reduced in rough proportion to the percentage of the city’s general expenditure budget attributed to the particular services that are not being provided to property owners in that particular neighborhood. However, it is not clear whether that would be permissible, including under the provisions of the Florida Constitution and Florida Statutes that grant municipalities the power to set their millage rate.

⁴⁰⁰ Coral Davenport & Campbell Robertson, *Resettling the First American ‘Climate Refugees,’* N.Y. TIMES, May 2, 2016, available at <http://mobile.nytimes.com/2016/05/03/us/resettling-the-first-american-climate-refugees.html> (last visited Aug. 29, 2016).

⁴⁰¹ Press Release, *Vunidogoloa Relocation 2nd Phase Underway*, The Fijian Gov’t, Sept. 1, 2014, available at <http://www.fiji.gov.fj/Media-Center/Press-Releases/VUNIDOGOLOA-RELOCATION-2ND-PHASE-UNDERWAY.aspx> (last visited Aug. 29, 2016).

⁴⁰² Chris Mooney, *The Remote Alaskan Village that Needs to be Relocated Due to Climate Change*, THE WASHINGTON POST, Feb. 24, 2015, available at <https://www.washingtonpost.com/news/energy-environment/wp/2015/02/24/the-remote-alaskan-village-that-needs-to-be-relocated-due-to-climate-change> (last visited Aug. 29, 2016).

⁴⁰³ *See* Elizabeth Kolbert, *The Siege of Miami*, THE NEW YORKER (Dec. 21 & 28, 2015), available at <http://www.newyorker.com/magazine/2015/12/21/the-siege-of-miami> (last visited Aug. 29, 2016).

⁴⁰⁴ Chris Mooney, *The Remote Alaskan Village that Needs to be Relocated Due to Climate Change*, THE WASHINGTON POST, Feb. 24, 2015, available at <https://www.washingtonpost.com/news/energy-environment/wp/2015/02/24/the-remote-alaskan-village-that-needs-to-be-relocated-due-to-climate-change> (last visited Aug. 29, 2016). Bronen recommends development of some interesting adaptive governance frameworks to help relocate residents while keeping communities and cultures intact. See ROBIN BRONEN, CLIMATE-INDUCED COMMUNITY RELOCATIONS: CREATING AN ADAPTIVE GOVERNANCE FRAMEWORK BASED IN THE HUMAN RIGHTS DOCTRINE, N.Y.U. REVIEW OF LAW & SOCIAL CHANGE, 35 N.Y.U. 357 (2011), available at http://heinonline.org/HOL/Page?handle=hein.journals/nyuls35&div=15&g_sent=1&collection=journals (last visited Aug. 29, 2016).

⁴⁰⁵ Coral Davenport & Campbell Robertson, *Resettling the First American 'Climate Refugees,'* N.Y. TIMES, May 2, 2016, available at <http://mobile.nytimes.com/2016/05/03/us/resettling-the-first-american-climate-refugees.html> (last visited Aug. 29, 2016).

⁴⁰⁶ *Id.*

⁴⁰⁷ *Id.*

⁴⁰⁸ 44 C.F.R. §§ 206.223(a), 206.226(f), (g).

⁴⁰⁹ *Id.* §§ 206.226, 206.226(g)(4).

⁴¹⁰ See City of Coral Gables – Sea Level Rise LIDAR Map (June 2016), available at <http://coralgables.com/index.aspx?page=1169> (last visited Aug. 29, 2016).

⁴¹¹ See USAID, ADDRESSING CLIMATE CHANGE IMPACTS ON INFRASTRUCTURE: PREPARING FOR CHANGE 17-27 (Nov. 2012, rev. Dec. 2013), available at <http://www.adaptationlearning.net/sites/default/files/resource-files/Addressing-Climate-Change-Impacts-on-Infrastructure-report.pdf> (last visited Aug. 29, 2016); World Health Organization, *The Impact Of Cemeteries On The Environment And Public Health* (1998), available at [http://apps.who.int/iris/bitstream/10665/108132/1/EUR_ICP_EHNA_01_04_01\(A\).pdf](http://apps.who.int/iris/bitstream/10665/108132/1/EUR_ICP_EHNA_01_04_01(A).pdf) (last visited Aug. 29, 2016).

⁴¹² Simply by way of example, the Florida Air and Water Pollution Control Act, which is designed to prevent the discharge of toxins into water, lands, and coastal areas, creates strict liability. Fla. Stat. §§ 403.161(1), (2) (2016).

⁴¹³ See A. Mitchell Polinsky and Steven Shavell, *A Note On Optimal Cleanup And Liability After Environmentally Harmful Discharges*, 16 RESEARCH IN LAW & ECON. 17 (1994), available at http://www.law.harvard.edu/faculty/shavell/pdf/16_research_law_econ_17.pdf (last visited Aug. 29, 2016).

⁴¹⁴ Fla. Const. art. X, §11; Fla. Const. art. II, §7(a); Fla. Stat. §161.088 (2016).

⁴¹⁵ See Fla. Stat. §§ 197.432, 197.443, 197.592 (2016).