Date: October 29, 2018
To: Commissioner-Elect Marvin Wilmoth, Harbor Island, North Bay Village
From: Ralph Rosado, PhD, AICP
Subject: Item #3: A Strategy, Based upon Best Practices, for Initial Efforts to Address Sea Level Rise in NBV

Sea level rise (SLR) is a major concern for cities near coastlines and river systems. For the State of Florida and especially for Miami-Dade County, SLR is a critical problem that must be addressed by all coastal local governments.[1] Although this is a developing research area, current modeling underestimates the future risks of SLR to local communities. The impact of climate change through greater extremes of heat and cold, SLR and an increase in extreme weather events will have a significant effect on the built environment. These impacts will be physical, financial and social, and will place a substantial burden on the region's economic stability. To begin to understand the implications for property stakeholders, owners, occupiers, planners and government, there are several steps that will require the private and public sector to take comprehensive strategies and adapt by:

- building awareness about local sea level rise threats,
- undertaking analyses of local vulnerabilities, and
- developing planning policies to deal with these vulnerabilities along with understanding the extent of risk exposure that they would present if applied, because, at present, there is, as yet, no consensus on the 'best practice' approach. [2]

Background

Today, even a small increase in SLR makes rare floods more common by adding to tides and storm surge. Climate Central is a non-for-profit organization that previously estimated risks for the area of North Bay Village by combining local sea level rise projections with historic flood statistics from the NOAA water level station at Vaca Key, FL. Climate Central studies in 2016 indicated that the "100- year" flood height will rise 2.6 feet above local Mean Higher High Water (high tide line). Based on the National Climate Assessment, intermediate high sea level rise scenario is projected to rise close to 4.2 feet by 2100. Climate Central analysis translates this to 17% multi- year risk of at least one flood exceeding 3 feet from 2016 to 2030, a 59% risk from 2016 to midcentury, and a 100% risk by 2100. Under the Assessment's highest scenario, these chances increase to 20%, 98%, and 100%, respectively, and at least one flood exceeding 6 feet by the end of the century.[3] **[See Appendix A.]**

[1] Miami-Dade Sea Level Rise Task Force Report and Recommendations (July 2014) *Miami-Dade County*. Retrieved from: http://www.miamidade.gov/planning/library/reports/sea-level-rise-final-report.pdf

[2] Warren-Myers, Georgia., Aschwanden, Gideo., Fuerst Franz & Krause Andy (2018).*Estimating the Potential Risks of Sea Level Rise for Public and Private Property Ownership, Occupation and Management*, Vol 6 (2). Retrieved from: https://www.mdpi.com/2227-9091/6/2/37

[3]North Bay Village Assessment Report (2017) *South Florida Regional Planning Council*, p.34. Retrieved from: http://sfregionalcouncil.org/wp-content/uploads/2017/06/D_3.2-Assessment-Report.pdf?lbisphpreq=1&x47410

Figure 1. Surging Seas Risk Finder > Explore sea level and coastal flood risks > North Bay Village City - under three feet above current sea level.
https://riskfinder.climatecentral.org/place/north-bay-village.fl.us

Recommendations

It is necessary to make use of the vast number of case studies, data and analysis available provided by public and private entities. This is an essential requirement for any adaptation strategy NBV decides to engage on. Research must be applied thoroughly on this topic because many of the direct strategies that are used to target SLR are expensive and if mismanaged, they might vulnerate the city's plans on funding allocation and also affect real estate property value as well as discourage prospects for local investment. Another consequence is that adaptation strategies often conflict with the city's current urbanistic models due to the fact that these short- and long-term solutions require infrastructure remodeling (E.g., Base floor elevation for commercial or residential purposes). Adaptation models must be reviewed before mitigating any resolution. These Items below will help understand the actions local governments have made to approach SLR.

As a first step, it is recommended to look back at the **two reports** completed in 2017 by the City of North Bay Village alongside the Florida Department of Economic Opportunity (FDEO), and the South Florida Regional Planning Council (SFRPC). **Coastal Flood Risk Analysis Report**[4] is the first of the two. The report includes an analysis report on North Bay Village coastal flood zones, storm surge risks of the area, current tidal flooding hotspots, and an overview of North Bay Village public infrastructure. The second report is the **Coastal Flood Risk Mitigation Assessment Report,**[5] which consists of a review of the City of North Bay Village on

[44] North Bay Village Analysis Report (2017) *South Florida Regional Planning Council*. Retrieved from: http://sfregionalcouncil.org/wp-content/uploads/2017/06/D_3.1-Analysis-of-Risk.pdf?lbisphpreq=1&x47410
[5] North Bay Village Assessment Report (2017) *South Florida Regional Planning Council*. Retrieved from: http://sfregionalcouncil.org/wp-content/uploads/2017/06/D_3.2-Assessment-Report.pdf?lbisphpreq=1&x47410

site development techniques, a follow-up on the RCAP recommendations for the city, and also a separate set of recommendations pertinent to the adoption of available funding sources and public research resources for the city. [6] **(Please See Appendix F – G)**

After analyzing the available data, any step forward made by the City of North Bay Village will be considered part of the City's SLR adaptation strategies. The main responsibility for the City's officials involves determining what are the short-term measurements plausible for the City's staff to carry on with, and also reviewing what kind of work previous officials have set in place and deciding if such tasks are a positive input for the new set of adaptation strategies.

Rosado & Associates met with Elizabeth Wheaton to discuss what were the focus points the City of North Bay Village would have to engage-in first in order for the City to actively address the SLR problematic. Ms. Wheaton is the Director for the Environment and Sustainability Division of the City of Miami Beach. Director Wheaton suggested that one of the first steps that could be taken by City of North Bay Village would be to hire a specialist to work side by side with the city's designated official. The suggestion comes from the fact that environmental sciences are a technical field which requires specific expertise, especially if the result of their work is subject to government use. It will also alleviate the work load for the City official that will be in charge of developing and implementing recommendations for the City's adaptation strategies. This appointee will also work alongside the city, the county and the private sector to:

- **Create the first City of North Bay Village Sea Level Rising Task Force/Panel:** This body will have the duty of **running a flood vulnerability and risk assessment** on the City of North Bay Village. As mentioned before, the body will work based on the relevant data and prior studies, assessment reports, and evaluations that have been made regarding the potential impact of sea level rise on vital public services and facilities, real estate (significantly waterfront property), ecological resources, and infrastructure. This is aimed for the created body to provide the City with a comprehensive and realistic assessment and a set of recommendations of the likely and potential impacts of sea level rise and storm surge over time to the City of North Bay Village. [7]

  As a reference, The Miami-Dade Sea Level Rise Task Force, created in 2013(Resolution R-599-13), is a potential source of information on how to compose and implement a SLR task force on North Bay Village City. They delivered a report with a set of important recommendations which have been followed since then by the County and have helped to set the ground for Miami's local governments on how to address the SLR issue. [See report and recommendations in the endnotes[8]] [See Resolution R-599-13 in the endnotes[9]).

[6] North Bay Village Assessment Report (2017) *South Florida Regional Planning Council*. Retrieved from: http://sfregionalcouncil.org/wp-content/uploads/2017/06/D_3.2-Assessment-Report.pdf?lbisphpreq=1&x47410

[7] Miami-Dade Legislative Item - File Number: 131459. Resolution R-599-13 – Control: Board of County Commissioners http://www.miamidade.gov/govaction/matter.asp?matter=131459&file=false&yearFolder=Y2013

[8] Miami-Dade Sea Level Rise Task Force Report and Recommendations (July 2014) *Miami-Dade County*. Retrieved from: http://www.miamidade.gov/planning/library/reports/sea-level-rise-final-report.pdf

[9] Miami-Dade Legislative Item - File Number: 131459. Resolution R-599-13 – Control: Board of County Commissioners http://www.miamidade.gov/govaction/matter.asp?matter=131459&file=false&yearFolder=Y2013

- **Establish new connections:** Miami-Dade County's Task Force also provides a range of selected policies and legislation related to sea level rise and climate change. [10] These laws have been enacted working with organizations like **The Southeast Florida Regional Climate Change Compact.** The organization, through their **Regional Climate Action Plan – RCAP**, provided a series of resiliency-guided recommendations to the City of North Bay Village in 2016. For the City, these recommendations are an element of importance since they are based on well-composed case studies that not only cover the regional approach to SLR but also Florida's Natural Systems, Risk Reduction Strategies, Emergency Management, Sustainable Community Planning, and Transportation, just to name a few.[11] **(Please see Appendix F – E)**

Below, there are some of the many helpful analyses developed by the Compact which will be essential to set on track the City's initiatives dealing with SLR.

- Sea-Level Rise and U.S. Coasts: Science and Policy Considerations[12]
- Emerging Legal and Institutional Responses to Sea-Level Rise in Florida and Beyond[13]
- Unified Sea Level Rise Projection. [14]
- Integrating the Unified Sea Level Rise Projection into Local Plans[15]
- Legal Considerations Surrounding Adaptation to the Threat of Sea Level Rise[16]
- Essential Tools: Integrating the Southeast Florida Sea Level Rise Projections into Community Planning[17]
- Designate adaptation action areas[18]

- **Gaining knowledge:**

[10] Miami-Dade County: selected policies and legislation related to sea level rise and climate change (n.d.) *Miami-Dade County*. Retrieved from: http://www.miamidade.gov/greenprint/planning/library/resolutions.pdf
[11] Case Studies (n.d) *Southeast Florida Regional Compact.* Retrieved from: http://www.southeastfloridaclimatecompact.org/case-studies/
[12] Sea-Level Rise and U.S. Coasts: Science and Policy Consideration. (September 2016). *Federation of American Scientists.* Retrieved from: https://fas.org/sgp/crs/misc/R44632.pdf
[13]Emerging Legal and Institutional Responses to Sea-Level Rise in Florida and Beyond.(n.d.) *Southeast Florida Regional Compact.* Retrieved from: http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2017/05/markell-web.pdf
[14]Unified Sea Level Rise Projection. (October 2015). *Southeast Florida Regional Compact.* Retrieved from: http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2015/10/2015-Compact-Unified-Sea-Level-Rise-Projection.pdf
[15] Integrating the Unified Sea Level Rise Projection into Local Plans. (n.d.) *Southeast Florida Regional Compact.* Retrieved from: http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2017/01/SLRGuidance-Doc.pdf
[16]Legal Considerations Surrounding Adaptation to the Threat of Sea Level Rise. (September 2016) *Southeast Florida Regional Compact.* Retrieved from: http://www.southeastfloridaclimatecompact.org/wp-content/uploads/2016/12/Legal-Considerations-Surrounding-Adaptation-to-the-Threat-of-Sea-Level-Rise.pdf
[17]Essential Tools: Integrating the Southeast Florida Sea Level Rise Projections into Community Planning. (n.d.) *Southeast Florida Regional Compact.* Retrieved from: http://www.southeastfloridaclimatecompact.org/event/essential-tools-integrating-southeast-florida-sea-level-rise-projections-community-planning/
[18]ST-4: Designate adaptation action areas. (n.d.) *Southeast Florida Regional Compact.* Retrieved from: http://www.southeastfloridaclimatecompact.org/recommendations/designate-adaptation-action-areas/

- **Coastal Training Program (CTP):** Having a well-informed staff and task force is essential to be able to craft the best adaptation strategy for the City of North Bay Village. The CTP is part of the National Oceanographic and Atmospheric Administration's (NOAA) and the National Estuarine Research Reserve System (NERRS). The program provides training and technical assistance to individuals who are responsible for making decisions that affect coastal resources. [19] The CTP has been an essential partner along with the ICLEI (USA Local Governments for Sustainability) of the San Diego County, CA. San Diego Bay is running with the same problem as North Bay Village. San Diego County is approaching the SLR issue with help of the CTP and the ICLEI for the development of their adaptation strategies.[20]

- **ICLEI: Local Governments for Sustainability USA (ICLEI)** is a membership association of more than 500 local governments in the United States committed to advancing climate protection and sustainability. They provide technical assistance, innovative tools, training, and networking opportunities. Their platform ClearPath is an online software platform for completing greenhouse gas inventories, forecasts, climate action plans, and monitoring at the community-wide or government-operations scales and it is the most widely used software tool for managing local climate mitigation efforts.[21]

Communities need adaptation **strategies** and **tools** to minimize the long-term economic, environmental and social impacts of sea level rise on development in coastal areas. ICLEI's work in San Diego delivered a few tips that summed up a general result that should be the aimed of local government's short-term adaptation strategies:

1. Create a staff-level regional sea level rise (SLR) adaptation working group consisting of representatives from public agencies around the city to implement an adaptation strategy.
2. Provide regular opportunities for stakeholder engagement around the implementation of the Adaptation Strategy.
3. Create and enhance existing outreach, education, training, and peer exchange programs tailored to public agency staff, stakeholders, and the general public.
4. Establish and promote a regional research agenda to advance understanding of sea level rise impacts, vulnerabilities, and adaptation responses in the region.
5. Engage regulatory agencies to advocate for clear and consistent regulatory guidance on how to address sea level rise impacts in development permitting.
6. Engage the Federal Emergency Management Agency (FEMA) to encourage the incorporation of future risks from sea level rise into non-regulatory maps associated with upcoming Flood Insurance Studies (FIS).
7. Institutionalize or mainstream sea level rise adaptation by incorporating sea level rise and associated impacts into relevant local and regional plans and projects.
8. Perform more detailed vulnerability assessments at a site-specific level as significant plans or capital projects are undertaken.

[19] Training. (n.d.) *Digital Coast.* Retrieved from: https://coast.noaa.gov/digitalcoast/training/
[20] Sea Level Rise Adaptation Strategy for San Diego Bay. (January 2012) *ICLEI – USA,* p.2. Retrieved from: http://icleiusa.org/wp-content/uploads/2015/08/San-Diego-Sea-Level-Rise.pdf
[21] Clear Path (n.d.). *ICLEI – USA.* Retrieved from: http://icleiusa.org/clearpath/

9. Develop decision-making frameworks in your own jurisdiction for selecting and implementing appropriate management practices in places vulnerable to inundation or regular flooding, utilizing such frameworks as risk management and cost/benefit analysis. [22]

Considering medium- and long-term strategies, it is important to learn from what other cities around us have done regarding SLR. These include:

- **City of Miami Sea Level Rise Committee:** Recognizing its acute vulnerability to the effects of sea level rise (SLR), in 2015 the City of Miami established its Sea Level Rise Committee (Resolution: R-15-007)[23]. Its purpose is to study the effects of SLR on the City and recommend changes to City policy to help better combat the deleterious effects of SLR. The Committee meets monthly in the Commission Chambers at Miami City Hall and it consists of 7 members[24] [See Resolution: R-15-007 in the end notes] [See Sea Level Rise Committee Ordinance 1017 for more details on the composition and qualification members should have to be part of the Committee.][25] [See Sea Level Rise Committee 2017 Annual Report].[26] The creation of a committee would be the step that would follow once the Task Force recommendations are delivered. Meeting on a monthly basis, the figure of a Committee would be beneficial for the continuity of the City's adaptive strategies and to keep updated our vulnerability and risk assessment.

- Regarding infrastructure and policy-making, the **City of Miami Beach adaptation strategies** are a great source of information. Their ordinances on Base Flood Elevation (Ordinance No.2016-4009) [27], Sea Level Rise and Resiliency (Ordinance No. 2017-4123) [28] , Development Regulations – Grade Elevations and Height (Ordinance No. 2016-4010) just to name a few [29] will be an essential tool for North Bay Village approach to SLR and a great way to understand the City's responsibility with the community. Also, it will be beneficial for the City's first steps on dealing with the SLR problematic, requesting the City of Miami Beach and the City of Miami assistance in each part of North Bay Village adaptation strategies.

Rosado & Associates met with the **Office of Resilience of Miami-Dade County** to discuss about the existing vulnerability data on SLR and the City's infrastructural risks. They provided us with a set of recommendations and offered their services to the City of North Bay Village. (See Appendices C – E.)

---

[22] Sea Level Rise Adaptation Strategy for San Diego Bay. (January 2012) *ICLEI – USA*, p. vii. Retrieved from: http://icleiusa.org/wp-content/uploads/2015/08/San-Diego-Sea-Level-Rise.pdf

[23] *City of Miami Legislation*. Resolution R-15-0072. Retrieved from: http://miamigov.com/sealevelrise/docs/R-15-0072SeaLevelRiseCommittee.pdf

[24] About. (n.d.) *The City of Miami Sea Level Rise Committee* http://miamigov.com/sealevelrise/

[25] *City of Miami Ordinances. (*2016) File ID #1017. Retrieved from: http://miamigov.com/sealevelrise/docs/resources/Sea%20Level%20Rise%20Committee%20Ordinance%201017.pdf

[26] Sea Level Rise Committee 2017 Annual Report (2018). *The City of Miami.* Retrieved from: http://miamigov.com/sealevelrise/docs/resources/2017%20Sea%20Level%20Rise%20Committee%20Annual%20Report.pdf

[27] *City of Miami Beach.* Base Flood Elevations Ordinance No. 2016-4009 (2016). Retrieved from http://www.mbrisingabove.com/wp-content/uploads/2017/11/2016-4009-Ordinance.pdf

[28]*City of Miami Beach.* Sea Level Rise and Resiliency Review Criteria. Ordinance No. 2017-4123 (2017). Retrieved from: http://www.mbrisingabove.com/wp-content/uploads/2017/11/2017-4123-Ordinance.pdf

[29] *City of Miami Beach.* Development Regulations – Grade Elevations and Height. Ordinance No. 2016-4010. (2016) Retrieved from: http://www.mbrisingabove.com/wp-content/uploads/2017/11/2016-4010-Ordinance.pdf

- **Funding** will be key for North Bay Village infrastructural strategies; at the federal level grant programs such as the **Pre-Disaster Mitigation Grant Program (PDM) by FEMA** will help alleviate the burden of the costs for stakeholders. The PDM program, authorized by Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, is designed to assist States, U.S. Territories, Federally-recognized tribes, and local communities in implementing a sustained pre-disaster natural hazard mitigation program. The goal is to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters.[30]

[30]Pre-Disaster Mitigation Grant Program. (n.d.) *Federal Emergency Management Agency.* Retrieved from: https://www.fema.gov/pre-disaster-mitigation-grant-program

Appendix A
City of North Bay Village Factsheet by Climate Central

Risk Finder's forecast tool allows exploration of a wide range of other flood heights (1-10ft), risk statistics (e.g., annual flood risk), and localized sea level projections (with choice of scientific models and climate pollution scenarios). It is essential to look at this fact sheet and also the local report.

COASTAL RISKS FOR NORTH BAY VILLAGE, FL

Selected water level: 3 feet. May occur from sea level rise, coastal flooding, or both.

What's at risk on land below 3 feet?[1,2]

- Homes: 950
- Population: 1,600
- Property value: $260 Million
- Miles of road: 4 miles
- Local roads: 4 miles

3 feet in historical context [3,4]

- Highest observed area flood: 5.8 feet in 2005
- Statistical 1-in-100 year flood height: 2.6 feet

Unnatural Coastal Floods[5]

About two-thirds of U.S. coastal flood days since 1950 would not have met the National Weather Service's local definition of flooding without the few inches so far of human-caused, climate-driven sea level rise.

Rising seas = more floods[4]

- North Bay Village, FL has already experienced about 5 inches of sea level rise over the last 34 years of records. Climate change is projected to drive much more rise this century.
- This raises the starting point for storm surges and high tides, making coastal floods more severe and more frequent.

When could a 3-foot flood happen?[3,4,6]

- Likelihood by 2030: 17% – 32%
- Likelihood by 2050: 45% – 100%
- Likelihood by 2100: 100% – 100%

The ranges shown derive from the intermediate low vs. intermediate high global sea-level scenarios from a 2017 NOAA technical report for use in the U.S. National Climate Assessment, which point to projected local rises of 1.9 vs. 6.4 feet by 2100. The more heat-trapping pollution emitted, the higher that sea-level rise is likely to be.

Find more places, water levels and downloads at riskfinder.org

Land and population below 3 feet in North Bay Village, FL

Land below 3 feet is colored according to the legend. Surging Seas uses high-accuracy lidar elevation data supplied by NOAA. Map reflects a uniform sea level and/or flood height. Individual storm surge, tidal or rainfall events cause more complex and uneven water surfaces.

31

[31] North Bay Village Assessment Report (2017) South Florida Regional Planning Council, p.34. Retrieved from: http://sfregionalcouncil.org/wp-content/uploads/2017/06/D_3.2-Assessment-Report.pdf?lbisphpreq=1&x47410

Appendix B
Unified Sea Level Rise Projection

Intergovernmental Panel on Climate Change – IPCC
U.S. Army Corps of Engineers – USACE
National Oceanic and Atmospheric Administration – NOAA

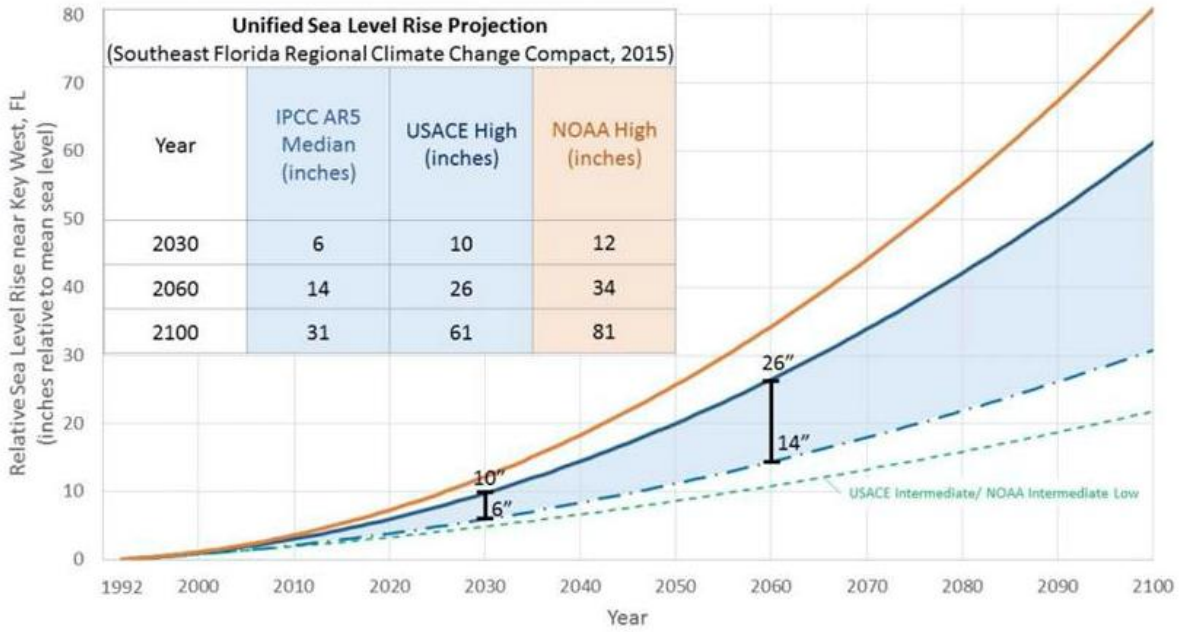
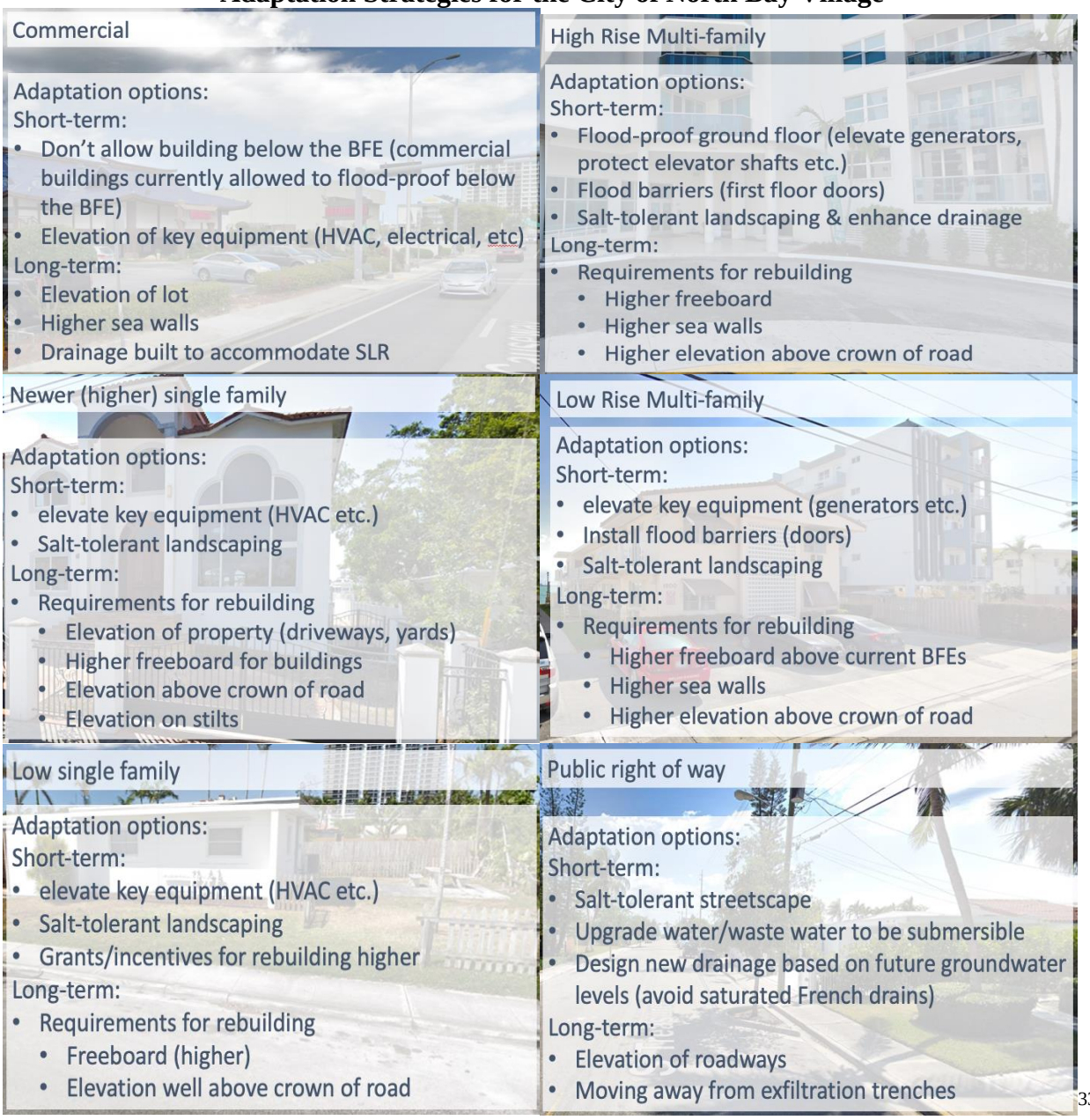


Figure 1: Unified Sea Level Rise Projection. These projections are referenced to mean sea level at the Key West tide gauge. The projection includes three global curves adapted for regional application: the median of the IPCC AR5 RCP8.5 scenario as the lowest boundary (blue dashed curve), the USACE High curve as the upper boundary for the short term for use until 2060 (solid blue line), and the NOAA High curve as the uppermost boundary for medium and long term use (orange solid curve). The incorporated table lists the projection values at years 2030, 2060 and 2100. 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.

32

[32] North Bay Village Analysis Report (2017) *South Florida Regional Planning Council*, p.10. Retrieved from: http://sfregionalcouncil.org/wp-content/uploads/2017/06/D_3.1-Analysis-of-Risk.pdf?lbisphpreq=1&x47410

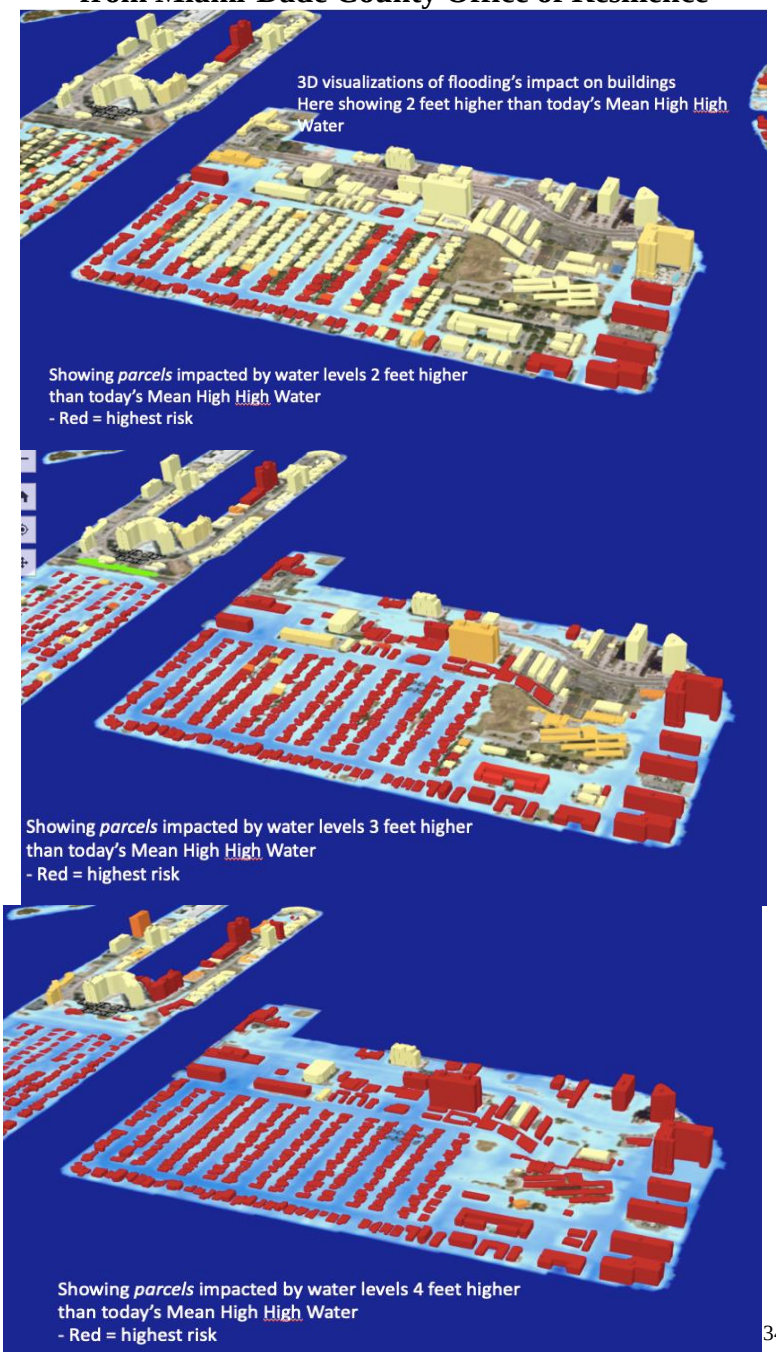
Appendix C
Recommendations from Miami-Dade County Office of Resilience
Adaptation Strategies for the City of North Bay Village



[33]

[33] Hagemann, Katherine., Gregory, Monica., Castillo, Karina & Murley James. (2018) Sea Level Rise: North Bay Village. Miami-Dade County Office of Resilience. [PowerPoints]

Appendix D
Zoning and vulnerability data of the City of North Bay Village from Miami-Dade County Office of Resilience



[34]

[34] Hagemann, Katherine., Gregory, Monica., Castillo, Karina & Murley James. (2018) Sea Level Rise: North Bay Village. Miami-Dade County Office of Resilience, Florida. [PowerPoints]

Appendix E
Resources from Miami-Dade County Office of Resilience

Figure2.https://riskfinder.climatecentral.org/place/north-bay-village.fl.us?comparisonType=place&forecastType=NOAA2017_int_p50&level=3&unit=ft

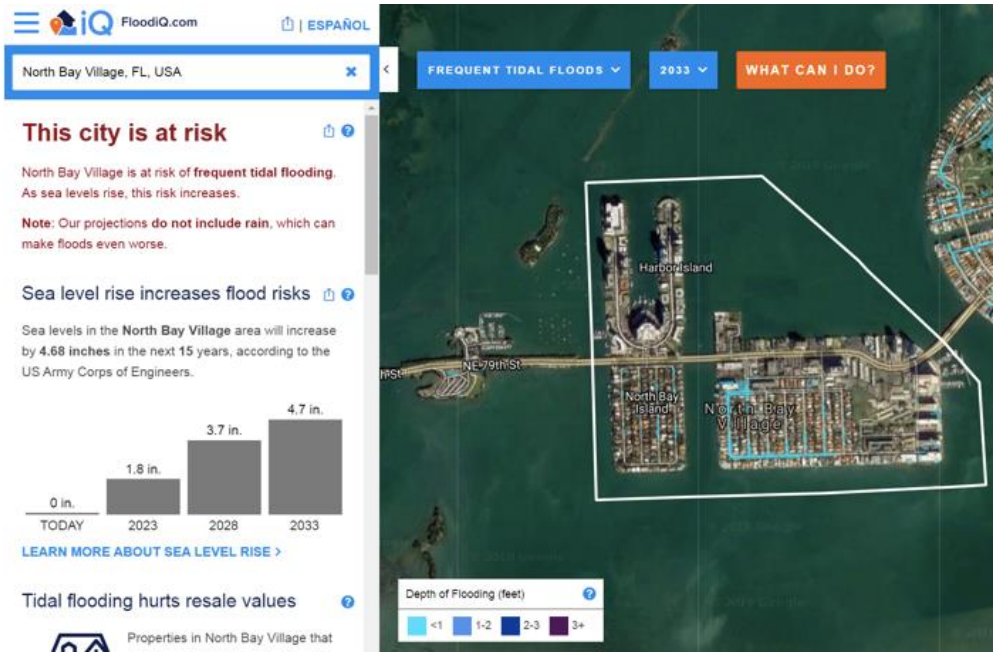


Figure 3. https://floodiq.com/poi/e5638ea638db91b4cc855b5c116e88d0

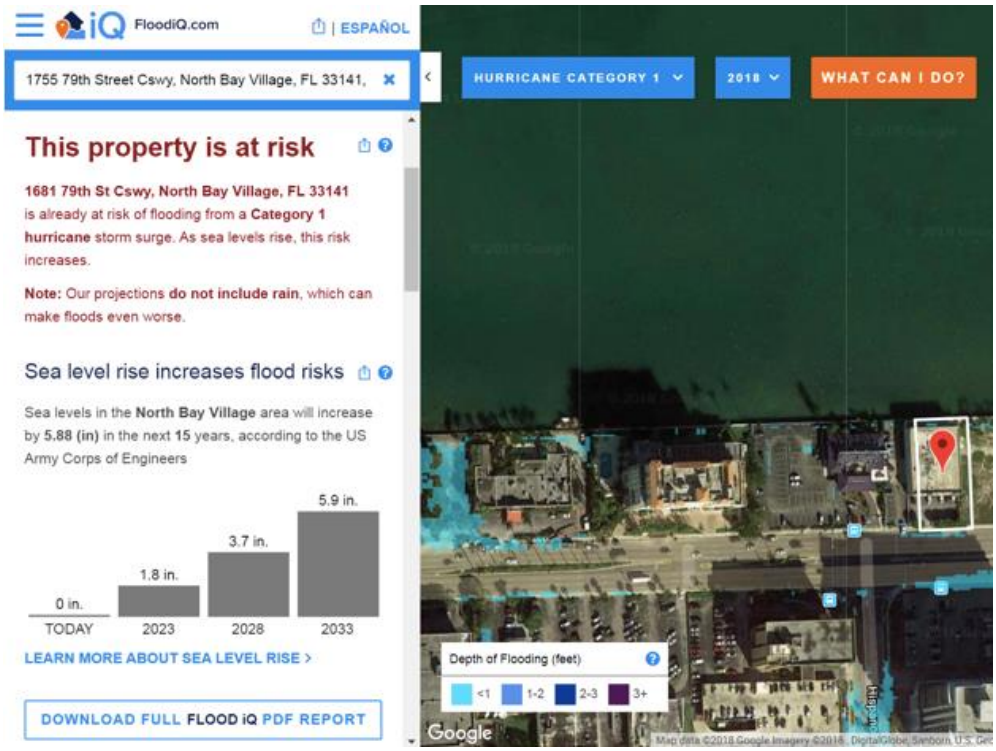


Figure 4. https://floodiq.com/poi/e5638ea638db91b4cc855b5c116e88d0

[35]

[35] Hagemann, Katherine., Gregory, Monica., Castillo, Karina & Murley James. (2018) Sea Level Rise: North Bay Village. Miami-Dade County Office of Resilience. [PowerPoints]

Appendix E
Miami-Dade County Office of Resilience Contact Information

James Murley
Chief Resilience Officer
MDC Office of Resilience
James.Murley@MiamiDade.gov

Karina Castillo
Resilience Coordinator
MDC Office of Resilience
Karina.Castillo@MaimiDade.gov

Katherine Hagemann
Resilience Program Manager (Adaptation)
MDC Office of Resilience
Katherine.Hagemann@MaimiDade.gov

Monica Gregory
Resilience Coordinator (Adaptation)
MDC Office of Resilience
Monica.Gregory@MiamiDade.gov [36]

[36] Hagemann, Katherine., Gregory, Monica., Castillo, Karina & Murley James. (2018) Sea Level Rise: North Bay Village. Miami-Dade County Office of Resilience. [PowerPoints]

Appendix F
Coastal Flood Risk Mitigation Assessment Report- North Bay Village

The assessment report contained an overview of the South Florida Regional Climate Compact – Regional Climate Action Plan (RCAP) Recommendations for the City of North Bay Village

Current Implementation of Regional Climate Action Plan

In 2012, the Southeast Florida Regional Climate Compact (Compact) produced the Regional Climate Action Plan (RCAP), a strategic roadmap for the region to address a multitude of identified issues associated with climate change. Within this publication, the Compact explicitly outlined over 100 recommendations, from broad sustainability measures to specific infrastructure improvements. In 2016, the Compact released an update to their *Implementation Guidance Series*, assessing municipal implementation of the Compact's recommendations in the region. Table 1 was distilled from this publication[3]; categories included in the table were chosen based upon the goals of this report: SP= sustainable planning, WS=water supply, management, and infrastructure, NS=natural systems, and RR=risk reduction and emergency management.

Table 1: North Bay Village's RCAP implementation matrix, as of 2016, as reported by the Compact.

Regional Climate Action Plan Implementation Matrix
North Bay Village, 2016

SP-1	SP-2	SP-3	SP-4	SP-5	SP-6	SP-7	SP-8	SP-9
SP-10	SP-11	SP-12	SP-13	SP-14	SP-15	SP-16	SP-17	SP-18
SP-19	SP-20	SP-21	SP-22	SP-23	SP-24	SP-25	SP-26	SP-27
SP-28	SP-29	SP-30	SP-31	SP-32	SP-33	WS-1	WS-2	WS-3
WS-4	WS-5	WS-6	WS-7	WS-8	WS-9	WS-10	WS-11	WS-12
WS-13	WS-14	WS-15	WS-16	WS-17	WS-18	NS-1	NS-2	NS-3
NS-4	NS-5	NS-6	NS-7	NS-8	NS-9	NS-10	NS-11	NS-12
NS-13	NS-14	RR-1	RR-2	RR-3	RR-4	RR-5	RR-6	RR-7

= Implemented
= Not Implemented

Many of these recommendations directly address infrastructure vulnerabilities to tidal flooding and sea level rise, including transportation networks and water infrastructure. While a full assessment of these implementations is beyond the scope of this work, this progress report may be helpful in gauging what comes next.

Based on this table, it's apparent that North Bay Village has begun making considerable progress in implementing many of the suggestions laid out in 2012 through the RCAP. A sample of some of these implemented recommendations is discussed on the next several pages; these recommendations were chosen as items to highlight based upon their relevance to the goals of this project.

37

[37] North Bay Village Assessment Report (2017) *South Florida Regional Planning Council*, p.14. Retrieved from: http://sfregionalcouncil.org/wp-content/uploads/2017/06/D_3.2-Assessment-Report.pdf?lbisphpreq=1&x47410

Appendix G
Coastal Flood Risk Mitigation Assessment Report - North Bay Village

The assessment report reviewed the status of some of the recommendations made by the South Florida Regional Climate Compact – Regional Climate Action Plan (RCAP).

The following recommendations are considered implemented in North Bay Village per the Compact's 2016 update to their *Implementation and Guidance* series, and serve to highlight some of the work that has already been done in the community to enhance infrastructure protections through resiliency-guided planning.

Sustainable Communities and Transportation Planning – SP2

Develop policies, strategies and standards that will serve as guidance for climate change related planning efforts. Municipal and County planning authorities are encouraged to develop policies to improve resilience to coastal and inland flooding, salt water intrusion, and other related impacts of climate change and sea level rise…

~Southeast Florida Regional Climate Action Plan~

The Village has been proactive in addressing a variety of sea-level rise related issues, including more dramatic King Tides, groundwater intrusion, and transportation infrastructure flooding. Several policies include attention to maintaining clear drainage structures and the implementation of pumps to reduce road inundation.

Sustainable Communities and Transportation Planning – SP8

Identify locations within Adaptation Action Areas or similarly vulnerable areas where targeted infrastructure improvements, new infrastructure, or modified land use and/or development practices could reduce vulnerability and/or improve community resilience.

~Southeast Florida Regional Climate Action Plan~

While The Village has not yet implemented Adaptation Action Areas, citing the necessity of garnering substantial public input before the implementation[4], a great deal of interest exists in defining the Coastal High Hazard Area, including Policy 8.8.13, which identifies protocol to guide post-storm redevelopment[5]. The investigation done in this project serves to validate and enhance existing storm surge zone delineation mapping for The Village. Policy 8.7.1 identifies the necessity of periodic collaborations with stakeholders to identify "risks, vulnerabilities and opportunities" over various planning horizons, and 8.7.2 highlights the need to address vulnerable facilities and other assets, two additional examples of The Village's proactive approach to meeting the recommendations outline in SP8.

North Bay Village is currently in the process of assessing the condition of existing water and wastewater infrastructure, making repairs where necessary. The findings in Part 3A

[38]

[38] North Bay Village Assessment Report (2017) *South Florida Regional Planning Council*, p.15. Retrieved from: http://sfregionalcouncil.org/wp-content/uploads/2017/06/D_3.2-Assessment-Report.pdf?lbisphpreq=1&x47410

of this project recommend continuing this process, as updates are likely to increase resilience to salt water intrusion.

Water Supply, Management, and Infrastructure – WS2

Develop a regional saltwater intrusion baseline and utilize saltwater intrusion models to identify wellfields and underground infrastructure at risk of contamination/infiltration by saltwater with increases in sea level.

~Southeast Florida Regional Climate Action Plan~

The results of this project will provide additional details to support the recommendations made in WS3—most noteably, the inclusion of King Tide flooding estimates, which serve as a useful proxy for future sea-level rise scenarios.

Water Supply, Management, and Infrastructure – WS3

Utilize existing and refined inundation maps and stormwater management models to identify areas and infrastructure at increased risk of flooding and tidal inundation with increases in sea level, to be used as a basis for identifying and prioritizing adaptation needs and strategies.

~Southeast Florida Regional Climate Action Plan~

In alignment with RR7,The Village's Comprehensive Plan Ammendment includes the following additions to Objective 8.1 on evacuation and hazard mitigation strategies:

- Policy 8.1.10: Implement County's Hurricane Procedures, to identify immediate actions necessary to protect the health, welfare, and safety of its residents.
- Policy 8.1.11: Monitor updates to the Miami-Dade County Local Mitigation Strategy (LMS) and the Miami-Dade County Emergency Operations Plan procedures

Risk Reduction and Emergency Management – RR7

Continue to implement and enforce strong building codes that require new construction and substantial improvements to existing structure to mitigate again the impacts of flooding, severe winds, and sea level rise, and which are consistent with Climate Change Adaptation policy.

~Southeast Florida Regional Climate Action Plan~

39

[39] North Bay Village Assessment Report (2017) *South Florida Regional Planning Council*, p.16. Retrieved from: http://sfregionalcouncil.org/wp-content/uploads/2017/06/D_3.2-Assessment-Report.pdf?lbisphpreq=1&x47410

The SP5 and SP12 Recommendations are very similar to SP8 and has been mapped for NBV in supplementary reports.

Sustainable Communities and Transportation Planning – SP12

Develop new community flood maps reflective of a 100-year storm event under future sea level rise scenarios and use this information, in conjunction with similarly updated storm surge models for revising required elevations for new and redevelopment, and in the permitting/licensing of transportation projects, water management systems, and public infrastructure.

~Southeast Florida Regional Climate Action Plan~

Sustainable Communities and Transportation Planning – SP5

Conduct new or utilize existing vulnerability analysis and other technical tools as they are developed as a means for identifying Adaptation Action Areas as well as other areas requiring adaptation improvements related to coastal flooding and sea level rise, to provide guidance for adaptation planning efforts in areas especially at risk to sea level rise, tidal flooding and other related impacts of climate change.

~Southeast Florida Regional Climate Action Plan~

40

[40] North Bay Village Assessment Report (2017) *South Florida Regional Planning Council*, p.17. Retrieved from: http://sfregionalcouncil.org/wp-content/uploads/2017/06/D_3.2-Assessment-Report.pdf?lbisphpreq=1&x47410