



**Village of Key Biscayne
Resilient Infrastructure & Adaptation Program**

Key Biscayne Rotary Club

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Resilience Studs

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US Army Corps
of Engineers®



Key Biscayne - Who We Are



Key Biscayne is a vibrant, residential community on a seven-mile-long, two-mile-wide barrier island only minutes from downtown Miami. It is on the southernmost barrier island in the United States and the community enjoys a high quality of life, a thriving commercial district, and an increasingly resilient environment. Incorporated in 1991, the Village of Key Biscayne celebrated its 30th anniversary in 2021.

The diverse, active and highly engaged population has a median household income of \$151,410; while the average home value ranges above \$1.2M.

Key Biscayne is a safe, active and engaging community with a strong sense of pride and place



15,000 residents – 20% growth from 2010 to 2020



1,300 single family homes/duplexes



7,500 condominium units



1,000+ business and professional licenses



7,000,000+ visitors per year



Our Vision for the Future



Our vision for Key Biscayne has been thoughtfully coined **“Elevating our Island Paradise.”** We will continue to build a vibrant community with a high quality of life, a strong sense of place, a thriving commercial district and a resilient environment.

Working together our residents and the Village are **united to enhance our infrastructure and are committed to building a stronger, more resilient future.**



What Are Our Risks?

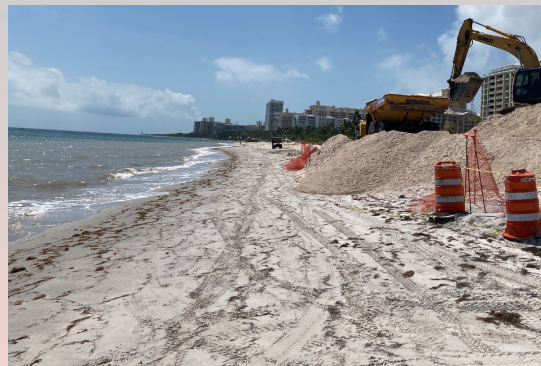
Threats

Rainfall induced flooding
Tidal and ground water flooding
Sea-level rise
Storm surge
Coastal erosion
Wind



Vulnerabilities

Low lying island
Unprotected shorelines
Aging stormwater systems
Exposed infrastructure
Limited space to build
Haphazard previous work
Incompatible regulations



Risks

Increase in property damage
Decrease in property values
Rise in insurance costs
Decrease in insurability
Decline in economic activity
Surge in infrastructure cost with a decreasing tax base



Not acting now will magnify the risks!!

Our Commitment to our Residents



The Village of Key Biscayne, through *deliberate action, focused investment and partner engagement*, is dedicated to *safeguarding our residents, property and way of life* from the projected storm surge, sea-level rise and related environment changes confronting the island in the coming decades



Our Commitment to our Residents



-  Develop a comprehensive infrastructure plan that **protects our way of life**
-  Plan and execute projects to **minimize disruption**
-  Focus on solutions to **preserve our environment and provide multiple benefits**
-  Develop partnerships to include the **best talent and best practices**
-  Clearly communicate with our residents and **meaningfully include them** in the conversation
-  Pursue external funding to **maximize the investment in our community**



What We Have Accomplished to Date

- Analyzing existing conditions to prioritize improvements
- Completed Village-wide LiDAR survey to measure elevations
- Designing the K-8 School Stormwater Basin upgrade
- Working with USACE for a Beach & Back Bay Feasibility Study
- FPL designing electrical undergrounding
- Crafting a JPA with Miami-Dade Water & Sewer Department
- Creating a seawall ordinance
- Developing streetscape design standards
- Executing immediate flood control and mitigation projects

INSTALLED BACKFLOW PREVENTERS



BEACH RENOURISHMENT POST IRMA



Moving Forward

Resilient Infrastructure & Adaptation Program 5 Lines of Effort:



Shoreline Protection



Stormwater System Upgrade



Roadway Improvements



Utility Hardening and Resilience

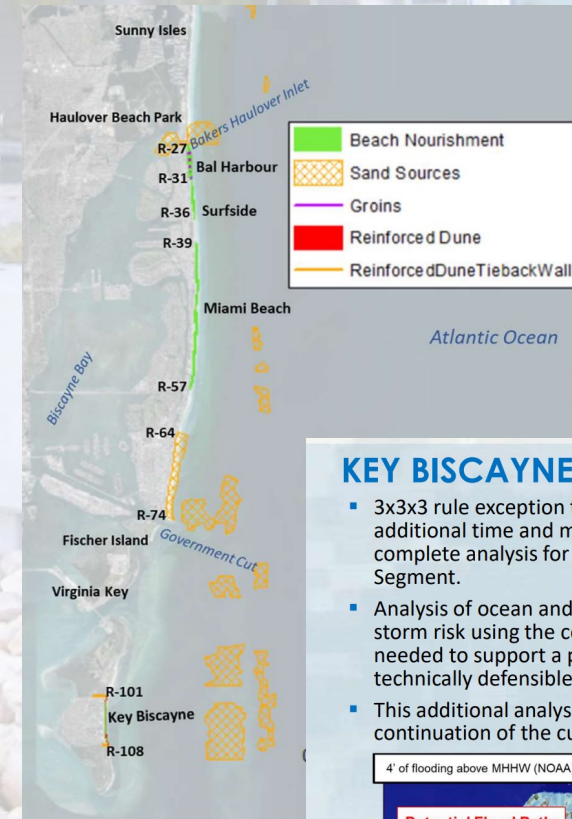


Changes to Codes, Plans, Zoning and Building Standards



Shoreline Protection (Oceanside and Bayside)

- Post Hurricane Ian/Nicole beach replacement → FDEP BMFAP
- Oceanside shoreline protection (1.2 miles) → pursuing inclusion in the Army Civil Works FY23 Work Plan
- Biscayne Bay shoreline protection (6.9 miles)
 - USACE FRM Back-Bay Study → requires waiver
 - Seawalls and living shoreline ordinance(s)
- Northwest village boundary protection (.4 mile) → partner with Miami-Dade County
- Southwest village boundaries protection (.6 mile) → partner with Florida DEP



KEY BISCAYNE SEGMENT

- 3x3x3 rule exception to be requested for additional time and money to conduct a complete analysis for the Key Biscayne Segment.
- Analysis of ocean and back bay coastal storm risk using the correct tools is needed to support a policy compliant and technically defensible plan.
- This additional analysis is considered a continuation of the current study.

4' of flooding above MHHW (NOAA)



Stormwater Systems Upgrade

- Install pumps and pipes
- Include swales – gray and green solutions
- Harmonize with private property
- Increase water storage
- Improve outfalls
- Enhance water quality
- Include sensors and consider maintenance

2050 Sea Level Rise Projection

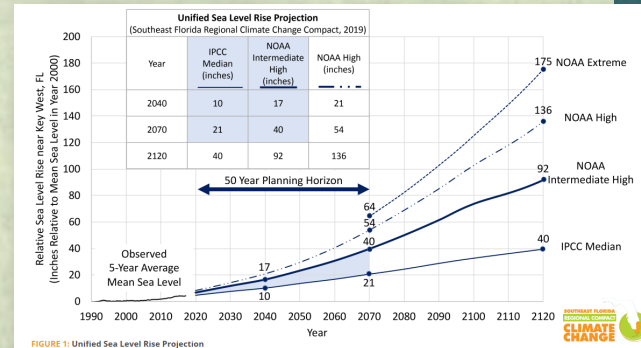


FIGURE 1: Unified Sea Level Rise Projection



VILLAGE OF KEY BISCAIYNE GREEN INFRASTRUCTURE OPTIONS

BASED ON "CATALOG OF GREEN INFRASTRUCTURE TOOLS"
PREPARED BY GIT CONSULTING, INC. FOR THE VILLAGE IN 2015

PAVING	CHANNELING	STORAGE
<p>CELLULAR CONCRETE PAVER</p> <ul style="list-style-type: none"> • MODULAR CONCRETE BLOCKS WITH GRAVEL-FILLED VOIDS • STRUCTURALLY FLEXIBLE • DRAINS AT RATE OF 80-90% OF NATURAL GRASSLAND • UNDERDRAIN RECOMMENDED • ON-STREET PARKING • LIMITED STREET-SIDE VESSE • ALLEYS, DRIVEWAYS, LOADING ZONES • MODERATE INCREASED COST COMPARED TO STANDARD CONCRETE PAVING 	<p>VEGETATIVE SWALE</p> <ul style="list-style-type: none"> • 4-8 FEET WIDE WITH SLOPES < 1:1 • 1'-2' DEPTH • SHEET FLOW FROM ADJACENT SURFACES • NATIVE PLANTINGS TOLERANT OF SALT, AEROSOLS, AND GROUND INTRUSION • STREET-SIDE VESSE ON RESIDENTIAL STREET WITH LIMITED CROSSING • LOW COST OPTION 	<p>LANDSCAPED TREE WELL</p> <ul style="list-style-type: none"> • 14-18 FEET WIDE WITH VERTICAL SIDES • 1'-2' DEPTH • CURB & PLUMB, 1/2" SET FROM 8 FEET • 1/2" TO 1" DEPTH OF COVERED PERVIOUS AGRI-CULTURAL AND GROUND INTRUSION • UNDERDRAIN RECOMMENDED • COVERED STREET-SIDE AREAS • 60" IN DEPTH/VOIDS CONDITION • HIGH COST OPTION
<p>PERVIOUS ASPHALT</p> <ul style="list-style-type: none"> • IMPROVED SEED AGGREGATE WITH LESS BINDER THAN STANDARD • INCREASED VOID ALLOW PERCOLATION TO BASE COURSE • UNDERDRAIN RECOMMENDED • ON-STREET PARKING • ALLEYS, DRIVEWAYS, LOADING ZONES • MODERATE INCREASED COST COMPARED TO STANDARD ASPHALT PAVING • REQUIRES VACUUM MAINTENANCE 	<p>VEGETATIVE / STONE SWALE</p> <ul style="list-style-type: none"> • 4-8 FEET WIDE WITH SLOPES < 1:1 • 1'-2' DEPTH • SHEET FLOW OR CHANNELLED FROM ADJACENT SURFACES • SMALLER PORTIONS OF NATIVE PLANTINGS TOLERANT OF SALT • AEROSOLS AND GROUND INTRUSION • STREET-SIDE VESSE ON VARIOUS STREET TYPES • SLIGHTLY INCREASED COST COMPARED TO VEGETATED SWALE 	<p>RAIN GARDEN</p> <ul style="list-style-type: none"> • 10-15 FEET WIDE WITH SLOPES < 1:1 • 1'-2' DEPTH • 1/2" TO 1" DEPTH OF COVERED PERVIOUS SPECIAL SOIL MEDIA • 1/2" TO 1" DEPTH OF COVERED PERVIOUS SPECIAL SOIL MEDIA • 1/2" TO 1" DEPTH OF COVERED PERVIOUS SPECIAL SOIL MEDIA • 1/2" TO 1" DEPTH OF COVERED PERVIOUS SPECIAL SOIL MEDIA • BROAD-STREET-SIDE VESSE WITH • LOW COST OPTION