



MIAMI-DADE COUNTY

OFFICE OF HISTORIC PRESERVATION

HISTORIC SITE VULNERABILITY ASSESSMENT



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VULNERABILITY STUDY INTRODUCTION

The built landscape of Miami-Dade County spans just over 150 years, from the whitewashed brick walls of Cape Florida Lighthouse to the whimsical brise-soleil screens of MiMo condominiums. As the County continues to experience the strain of ceaseless growth amplified by the threats imposed by sea level rise, maintaining a realistic and informed historic preservation strategy is more important now than ever. This strategy requires an investigation of sea level rise vulnerability among the County's 128 historic sites and eight historic districts. By analyzing the state of landscape vulnerability, Miami-Dade County Office of Historic Preservation is laying the foundation for an actionable policy of climate change adaptation and mitigation for its treasured and diverse built landscape.

As a founding member of the Southeast Florida Regional Climate Change Compact and Resilient305, Miami-Dade County is well-positioned to lead coastal communities towards a future in which climate resilience is an automatic facet of any policy conversation. This study was undertaken within that context to provide the Office of Historic Preservation with the data and insight needed to approach resilience planning for Miami-Dade County's historic landscape.



VULNERABILITY MATRIX

The Sea Level Rise Vulnerability Matrix represents a critical information tool for Miami-Dade County Office of Historic Preservation. The Matrix contains concise descriptions of each site's architectural style, construction materials, cultural context, significance criteria, level of documentation, inclusion in the National Register, related geographic and cultural communities, possible stakeholders, assessed property value, and current use. All administrative and cultural factors (except for current use category) are not scored, and thus do not play a role in the final vulnerability formula. They are included to provide context for each site without distorting the vulnerability score.

Building from this narrative data, the matrix provides physical siting information including FEMA flood zone, Coastal Zone designation (produced by the Office of Historic Preservation in an internal EAR document), Coastal High Hazard Area designation (FEMA), King Tide vulnerability, proximity to water, elevation, and projected risk of inundation from sea level rise and storm surge at stepped scales. Sea level rise vulnerability was scored according to the Southeast Florida Regional Climate Change Compact Unified Sea Level Rise Projection produced in 2015 and based on IPCC (Intergovernmental Panel on Climate Change), ACE (Army Corps of Engineers), and NOAA (National Oceanic and Atmospheric Administration) data. Environmental factor input was sourced from the County's Vulnerability Viewer GIS tool, a valuable resource for projecting risk onto the physical landscape.

The matrix was constructed to house all data relevant to site vulnerability in one place, while providing an approximately objective perspective on the County's historical landscape based on geographic site attributes alone, avoiding the interference of subjective cultural significance. The tool is formatted so users can collapse the grid, remove categories, edit scoring, input new site information, and mine data at will.

The Vulnerability Matrix establishes a detailed image of which sites are most threatened by sea level rise and storm surge impacts in Miami-Dade County. In a county as thoroughly exposed as Miami-Dade, it is necessary for resource managers to understand vulnerability before developing sea level rise strategies and distributing limited resources. This tool will be an asset for the Office of Historic Preservation in determining site security, working with owners of endangered sites on stabilization and adaptation measures, informing grant applications, and communicating to other agencies the threat to Southeast Florida's historic landscape.

Summary: The Vulnerability Matrix is an Excel-based tool that provides a generally objective standard to evaluate architectural, cultural and historic properties in relationship to geographic and environmental data. It is a tool that can be updated and recalibrated as necessary to address changing circumstances. The matrix is designed to be utilized in helping determine priorities for addressing vulnerable historic properties in Miami-Dade County.

ASSESSMENT RESULTS

The Vulnerability Assessment, represented by the Vulnerability Matrix, produced a final vulnerability score for each historic site and district. This score ranges from four to 32 and was reached by aggregating the scores of seven factors (Coastal High Hazard Area (0/5), King Tide Vulnerability (0/5), Proximity to Water (0-5), Elevation Rank (0-5), Vulnerability to Sea Level Rise (0-5), Vulnerability to Storm Surge (0-5), and Use Category (1-5)) for each site. The scoring system (0/5, 0-5, and 1-5) denotes the range of individual scores available for each factor, translated into comparative severity rankings. All ranking information is laid out in the associated Vulnerability Matrix Legend. The final vulnerability score is intended to represent an overall assessment of physical vulnerability to sea level rise impacts at each historic site. Additionally, the Matrix is set up to automatically adjust the vulnerability score if a site's factors are edited, making it reactive to OHP managers' input should geographic attributes significantly shift.

Some of the County's most vulnerable sites include resources sited in and around water, like the Atlantic Isle Bridges (32), the Charles Deering Estate Historic District (31), El Portal/Little River Seawall (31), and Cape Florida Lighthouse (30). Higgs House, a small, one-story residence built in High Ridge Park, and Palm Lodge, a pioneer-era wood frame vernacular residence in Homestead, received the lowest vulnerability scores (3 and 4 respectively). Other sites graded as less vulnerable include similar early 20th century rural structures like the Silver Palm School House (5), Mindermann House (5), and Krome House (5). A full ranking can be found in the associated Vulnerability Assessment Site Ranking.

5 Most Vulnerable Sites

- 1) Atlantic Island Bridges
- 2) Deering Estate
- 3) El Portal/Little River Seawall
- 4) Cape Florida Lighthouse
- 5) 1885 US Coast Survey Monument

5 Least Vulnerable Sites

- 1) Higgs House
- 2) Palm Lodge
- 3) Silver Palm School House
- 4) Van Cooten Bungalow
- 5) Montgomery House





RECOMMENDATIONS

POLICY INTEGRATION

Miami-Dade County should pursue, where possible, a strategy of integration with other County staff involved in resilience planning. The County's historic resources are essential to both its economic welfare and cultural character, making the Office of Historic Preservation a critical member of any conversation about resilience. This is a gradual action item, but one that is important to the paradigm of resource managers. Miami-Dade's historic resources are not simply passive, aesthetic assets. They serve the community in an array of economic and cultural ways and must be prioritized as the County begins to actively combat sea level rise. With the help of this Vulnerability Assessment, Miami-Dade County Office of Historic Preservation has the opportunity to demonstrate how resilience is being integrated into their management tactics and how they are contributing to broader county resilience goals.

DOCUMENTATION

Awareness is not enough to save these sites from sea level rise. Funding, resources, time, support from property owners and other stakeholders, and successful physical adaptation strategies are required to effectively preserve. The complexity and cost of preservation in a threatened environment raises the uncomfortable reality that some sites will be damaged or lost, despite managers' best efforts, and intensifies the need for documentation. The Office of Historic Preservation may seek to make the most vulnerable sites a priority for supplemental documentation in order to proactively preserve their place in history.

RECOMMENDATIONS

DEERING ESTATE

Understanding the political challenges of a sea level rise initiative, working with Deering Estate to educate tourists on the issues facing County historic resources could be a valuable way to highlight both the significance of these sites and their vulnerability in a changing climate. As a primary tourist attraction and one of the County's most exposed sites, Deering may provide an excellent platform to develop sea level rise outreach to an audience receptive to the goals of historic preservation.

GRANTS

The following are several suggestions for future grant applications.

- (1) *Developing the Vulnerability Assessment into an outreach tool for private property owners and stakeholders.* The matrix could be developed into a publicly-accessible resource, informing property owners of their vulnerability and how they might make appropriate mitigation and adaptation measures to their properties.
- (2) *Implementing a sea level rise adaptation plan at a County-owned historic property.* This would serve to protect an important resource and provide a visible case study for the rest of the County's historic property owners.
- (3) *Contracting an architectural firm to design historically-appropriate adaptation measures for use by proactive property owners seeking to mitigate their vulnerability.* These designs could be used by the Historic Preservation Board to verify the appropriateness of adaptation measures applied for by property owners.
- (4) *Developing an alert system for property owners in advance of storm season or as other elements of sea level rise begin to shift.*
- (5) *Contracting a consultant or researching the vulnerability of construction materials used in County historic structures to greater inform vulnerability data.*
- (6) *Acquiring resources to undergo cooperative adaptation with property owners.* With funding, the Office of Historic Preservation could enact greater outreach to owners of the most vulnerable properties and work with them to implement adaptation strategies.
- (7) *Working with other Miami-area preservationists to develop a visualization tool showing historic site loss caused by sea level rise.* This could be a useful outreach tool for resilience staff and the public, a way to visually demonstrate what is at risk and what our landscape would look like without historic resources.

CONCLUSIONS

Miami-Dade County is in a vulnerable position, with growing financial assets and resident communities stretched along its exposed and low-lying coastline. Despite the risk, this precarious landscape, combined with international visibility, a relatively progressive local political climate, and the resilience paradigm initiated by Resilient305 puts Miami-Dade County into a unique position to lead similarly imperiled global communities. The Vulnerability Assessment is a foundational first step in a tactical policy of resilience for Miami-Dade County Office of Historic Preservation and better equips them to defend Miami-Dade's landscape from rising seas and participate in the broader resilience conversation.

ADDITIONAL RESOURCES

Due to the prevalence of historic communities both along the coast and in flood-prone areas, the intersection of historic resources, flooding, and sea level rise has garnered more attention throughout the preservation community in the last five years. Multiple resources are available to help communities through the pre- and post-disaster planning horizons. The following are a sampling of planning resources from around the country that can be used as guidance for Miami-Dade County in preparing for sea level rise and flooding impacts:

- FEMA Publication 386-6: Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning
- FEMA P-467-2: Floodplain Management Bulletin: Historic Structures
- UF Law School: Protecting Florida's History from Hazards: A Guide to Integrating Cultural Resources into Disaster Planning
- 1000 Friends of Florida: Disaster Planning for Florida's Historic Resources
- 1000 Friends of Florida: Disaster Mitigation for Historic Structures: Protection Strategies
- National Trust for Historic Preservation: Treatment for Flood-Damaged Historic Buildings
- Resilient Heritage: Protecting Your Historic Home from Natural Disasters
- National Park Service Guidelines on Flood Adaptation for Rehabilitating Historic Buildings
- Elevation Design Guidelines for Historic Homes in the Mississippi Gulf Coast
- Elevation Design Guidelines for Historic Homes in the Louisiana GO Zone
- Charleston Design Guidelines for Elevating Historic Buildings
- Texas Historical Commission Disaster Resources for Historic Properties

APPENDICES

- Vulnerability Matrix Data
- Vulnerability Assessment Matrix Legend
- Vulnerability Assessment Site Rankings

APPENDIX A: VULNERABILITY MATRIX DATA

The Vulnerability Matrix is an Excel-based tool that provides a generally objective standard to evaluate architectural, cultural and historic properties in relationship to geographic and environmental data. It is a tool that can be updated and recalibrated as necessary to address changing circumstances. Information for the Matrix is gathered from the County's historic designation reports, other internal documents, internet searches, and an internal GIS tool called the Vulnerability Viewer. The information is input into the Matrix to generate a site vulnerability score.

Designation Report, Internal Documents and Internet Information

The following are included in the Matrix for informational purposes:

- County historic property designation reports are utilized to input the following information: site location, current use, associated communities, site description, primary construction materials, evidence of previous environmental damage, condition, cultural context, significance criteria, significance detail, designation, level of documentation
- National Register of Historic Places designation - yes or no
- Property Appraiser data - current assessed value
- Economic value - whether property generates revenue or income
- Useful links - any relevant web links are included in the Matrix for information

Environmental and Cultural Data

Environmental and cultural data is utilized to generate a site vulnerability score. The Matrix utilizes the County's Vulnerability Viewer, an internal County Geographic Information System (GIS)-based map that collates a variety of environmental information in one map. This information is available through other publicly accessible maps as well. The environmental information input into the Matrix includes: Coastal Zone, FEMA Flood Zone, Mean Parcel Elevation, Coastal High Hazard Area, King Tide Vulnerability, Sea Level Rise, and Storm Surge.

Cultural data that is included for scoring purposes involves assessing the property use. Property use includes single family residence; multi-unit private residence or district comprised of private residences; public access with passive public benefit, recreational; public access with heritage, cultural, military, religious, ritual and/or educational element; and tourism driver.

APPENDIX B: VULNERABILITY ASSESSMENT MATRIX LEGEND

The Vulnerability Assessment Matrix Legend illustrates the scoring factors utilized in the Matrix to make determinations of risk for historic sites in Miami-Dade County. County-designated sites were assigned a Vulnerability Score based on the criteria in the Matrix. The Vulnerability Score is a comprehensive score based on the following seven vulnerability factors intended to provide a realistic projection of vulnerability to water intrusion and damage associated with sea level rise.

Factor 1

Coastal High Hazard Area: 0/5 Binary Score

FEMA designation identifying coastal areas subject to high velocity wave action.

Factor 2

King Tide Vulnerability: 0/5 Binary Score

From Miami-Dade County Mapping

Factor 3

Proximity to Water: 0-5

From Miami-Dade County Mapping

0 - More than 2 Miles

1 - Within 2 Miles

2 - Within 1 Mile

3 - Within 1/2 Mile

4 - Site Affronts Water

5 - Site Partially Submerged

Factor 4

Elevation: 0-5

From Miami-Dade County Mapping/

Given Parcel Mean in Feet and Score:

0 - 19 feet and higher

1 - 13-18 feet

2 - 8-13 feet

3 - 5-8 feet

4 - 1.5-5 feet

5 - Below sea level - 1.5 feet

APPENDIX B: VULNERABILITY ASSESSMENT MATRIX LEGEND CONTINUED

Factor 5

Sea Level Rise: 0-5

Data from Miami-Dade County mapping, organized by Southeast Florida Regional Climate Change Compact Unified Sea Level Rise Projections. Given individual projection score, composite score (aggregate individual scores), and composite rank (based on composite score)

Key:

Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5)

- 2060 Median (14 inches)
- 2100 Median (31 inches)

US Army Corps of Engineers (USACE)

- 2060 High (26 inches)
- 2100 High (61 inches)

National Oceanic and Atmospheric Administration (NOAA)

- 2060 High (34 inches)
- 2100 High (81 inches)

Individual Projection Score

0 - No inundation within 1/2 mile

1 - Inundation within 1/2 mile

2 - Site less than 50% inundated at new low

3 - Site less than 50% inundated at new high

4 - Site more than 50% inundated at new low

5 - Site more than 50% inundated at new high

Composite Rank (Scores 0-35)

0 - 0-5

1 - 6-11

2 - 12-17

3 - 18-23

4 - 24-30

5 - 30 and higher

APPENDIX B: VULNERABILITY ASSESSMENT MATRIX LEGEND CONTINUED

Factor 6

Storm Surge: 0-5

Data from Miami-Dade County mapping, organized by Saffir-Simpson Scale. Given individual projection score, composite score (aggregate individual scores), and composite rank (based on composite score)

Individual Projection Score	Composite Rank (Scores 0-35)
0 - No inundation within 1/2 mile	0 - 0-1
1 - Inundation within 1/2 mile	1 - 2-5
2 - Inundation at 0-5 feet	2 - 6-9
3 - Inundation at 5-10 feet	3 - 10-13
4 - Inundation at 10-15 feet	4 - 14-17
5 - inundation at 15-20 feet	5 - 18-20

Factor 7

Use Category: 0-5

- 1 - Single Family Private Residence
- 2 - Multi-Unit Private Residence, District Comprised of Private Residences
- 3 - Public Access with Passive Public Benefit, Recreational
- 4 - Public Access with Heritage, Cultural, Military, Religious, Ritual, and/or Educational Element
- 5 - Tourism Driver

APPENDIX C: VULNERABILITY ASSESSMENT SITE RANKINGS

This is a complete list of Miami-Dade County Historic Sites and Districts ranked from most to least vulnerable according to their scores yielded by the Vulnerability Matrix. Only sites designated by Miami-Dade County are included in this ranking; it does not include sites in the cities of Miami, Miami Beach, Coral Gables, Hialeah, Miami Springs, Opa Locka, South Miami, Homestead, Miami Shores, or Sunny Isles Beach. These cities have their own historic preservation programs and could adopt this methodology to assess the vulnerability of their historic resources.

Site Rank	Site Name	Score
1	Atlantic Island Bridges	32
2	Charles Deering Estate Historic District	31
3	El Portal/Little River Seawall	31
4	Cape Florida Lighthouse	30
5	1885 U.S. Coast Survey Monument	30
6	Crandon Park Carousel	30
7	Key Biscayne Beach Club	29
8	Matheson Worker's Cottage	29
9	Calusa Playhouse	28
10	William K. Vanderbilt, Jr. Estate	28
11	Greynolds Park	27
12	Lake Belmar Canal Historic District	27
13	Sunny Isles Pier	27
14	American Czech-Slovak Cultural Club	26

APPENDIX C: VULNERABILITY ASSESSMENT SITE RANKINGS

Site Rank	Site Name	Score
15	Water Court Villa and Pergola	26
16	Harbor Bay Condominium	25
17	Parrot Jungle and Gardens	25
18	Phillips Residence	25
19	Coral Gables Wayside Park and Towers, Schenley Park Neighborhood	23
20	Sweetwater Bridge	23
21	The Surf Club	21
22	Bay Harbor Club (partial, Birdcage feature)	20
23	The Lido Condominium	20
24	Seaway Villas	20
25	Majestic Isles Condominium	19
26	Golden Beach Pavilion	18
27	Spanish Monastery	18
28	Killian Drive	17
29	Collins Avenue Historic District	14
30	Gossman House	14
31	Biscayne Park Village Hall	13

APPENDIX C: VULNERABILITY ASSESSMENT SITE RANKINGS

Site Rank	Site Name	Score
32	Florida Pioneer Museum	13
33	Fulford-By-the-Sea Monument	13
34	Goulds Historic District	13
35	James E. Scott Homes Building (Scott-Carver Buildings)	13
36	Mary Heinlein and Preston B. Bird Fruit and Spice Park	13
37	Mays Middle School	13
38	Arch Creek Road	12
39	Bethel House	12
40	Bougainvillea Apartments	12
41	Castle Residence	12
42	Doc Thomas House	12
43	Sunset Elementary	12
44	Whilden-Carrier Cottage	12
45	Coral Castle	11
46	Coral Rock Chapel	11
47	Coral Rock Wall	11
48	Dade County Hospital Annex (Kendall Hospital)	11

APPENDIX C: VULNERABILITY ASSESSMENT SITE RANKINGS

Site Rank	Site Name	Score
49	Moody House	11
50	NAS Richmond Building #25	11
51	North Shore Crest Historic District	11
52	Pioneer Guild Hall	11
53	Princeton Station (Gold Coast Railroad Museum)	11
54	Richmond Naval Air Station	11
55	Schenley Park Entrance Features	11
56	Sunshine State Industrial Park Arch of Industry	11
57	Barrentine House	10
58	Burr House	10
59	Cauley Square Historic District	10
60	Fulford-By-The-Sea Wall	10
61	Graham House	10
62	Green Acres Villas	10
63	Orchid Jungle	10
64	People's Gas System	10
65	Perrine Community House	10

APPENDIX C: VULNERABILITY ASSESSMENT SITE RANKINGS

Site Rank	Site Name	Score
66	Robert Frost's Winter Home (Pencil Pines)	10
67	Sherwood Forest House	10
68	Staehele House	10
69	Store Porch	10
70	William Jennings Bryan Elementary	10
71	Anderson Rock House	9
72	Bush House	9
73	Coral Rock Wall	9
74	Cornell House	9
75	Cucchiella Home	9
76	Dice House	9
77	Edwards House	9
78	Florida City Limestone	9
79	Hazenthorpe House	9
80	Hervey Allen Study	9
81	Howell House	9
82	Irons Manor Fountain	9

APPENDIX C: VULNERABILITY ASSESSMENT SITE RANKINGS

Site Rank	Site Name	Score
83	Laesch/Bartram House	9
84	Lindgren House	9
85	MacDonell House and Walls	9
86	Pan American Regional Headquarter Building	9
87	Redland Elementary School	9
88	Richards-Erwin Homestead	9
89	Wheeler House	9
90	Burwell House	8
91	Devonwood	8
92	D.S. Campbell House	8
93	El Portal House	8
94	Enrico Farmhouse	8
95	Evergreen Memorial Park Cemetery	8
96	Hickson House	8
97	Lee-Cunningham House	8
98	Lincoln Memorial Park Cemetery	8
99	Madue Black House	8

APPENDIX C: VULNERABILITY ASSESSMENT SITE RANKINGS

Site Rank	Site Name	Score
100	Merritt House	8
101	Mobley-Wood House	8
102	Richmond Heights Historic District	8
103	Snell/Davis House	8
104	Stonegate	8
105	Talbott Estate	8
106	Tebbetts Residence	8
107	Walker's Coral Castle	8
108	William Lyman Phillips Residence	8
109	Zimmerman House	8
110	Anderson's Corner	7
111	Schenley Park Entrance Towers/La Luneta	7
112	Flipse/O'Donnell House	7
113	King's Highway Banyan Trees	7
114	Silver Palm Historic District	7
115	Smook Cottage	7
116	Allen Chandler House	6

APPENDIX C: VULNERABILITY ASSESSMENT SITE RANKINGS

Site Rank	Site Name	Score
117	Charles Graham House	6
118	Dan Roberts House	6
119	Fairholm House	6
120	Hampton House	6
121	Kiem House	6
122	Luther Chandler House	6
123	Smith/Wulf House	6
124	Walton/Blanco House	6
125	Williams House	6
126	317 Mendoza Avenue	5
127	Fuchs Homestead	5
128	Georgette's Tea Room	5
129	Hugh M. Matheson, Jr. House	5
130	Krome House	5
131	Mindermann House	5
132	Montgomery House	5
133	Van Cooten Bungalow	5

APPENDIX C: VULNERABILITY ASSESSMENT SITE RANKINGS

Site Rank	Site Name	Score
134	Silver Palm School House	5
135	Palm Lodge	4
136	Higgs House	3

The vulnerability assessment matrix is intended to be a living document, to be added to as new sites are designated and refined as more data becomes available. The ranking itself can also be further refined, with additional methodology created to determine how to prioritize sites that achieved the same ranking score.

