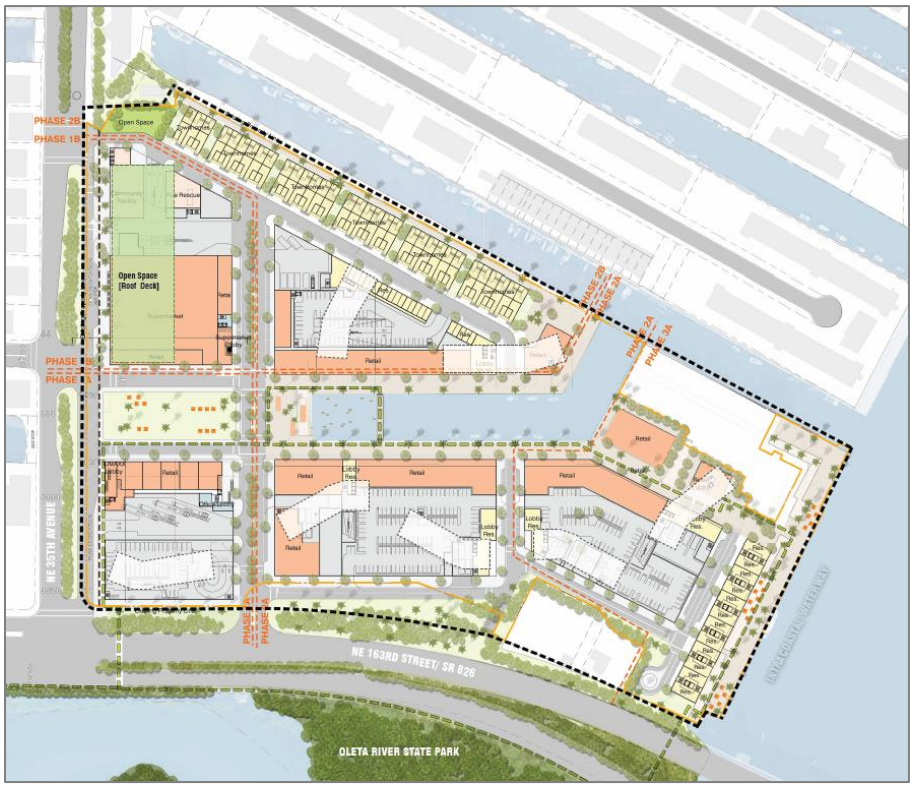
TAB 9

Hurricane Preparedness
for Submittal to the
City of North Miami Beach

Intracoastal Mall Redevelopment

North Miami Beach, Florida



Kimley»Horn

December 2019
043796003

Hurricane Preparedness
for Submittal to the
City of North Miami Beach

Intracoastal Mall Redevelopment
North Miami Beach, Florida

Prepared for:
Dezer Intracoastal Mall, LLC

Prepared by:
Kimley-Horn and Associates, Inc.

Kimley»Horn

December 2019
043769003

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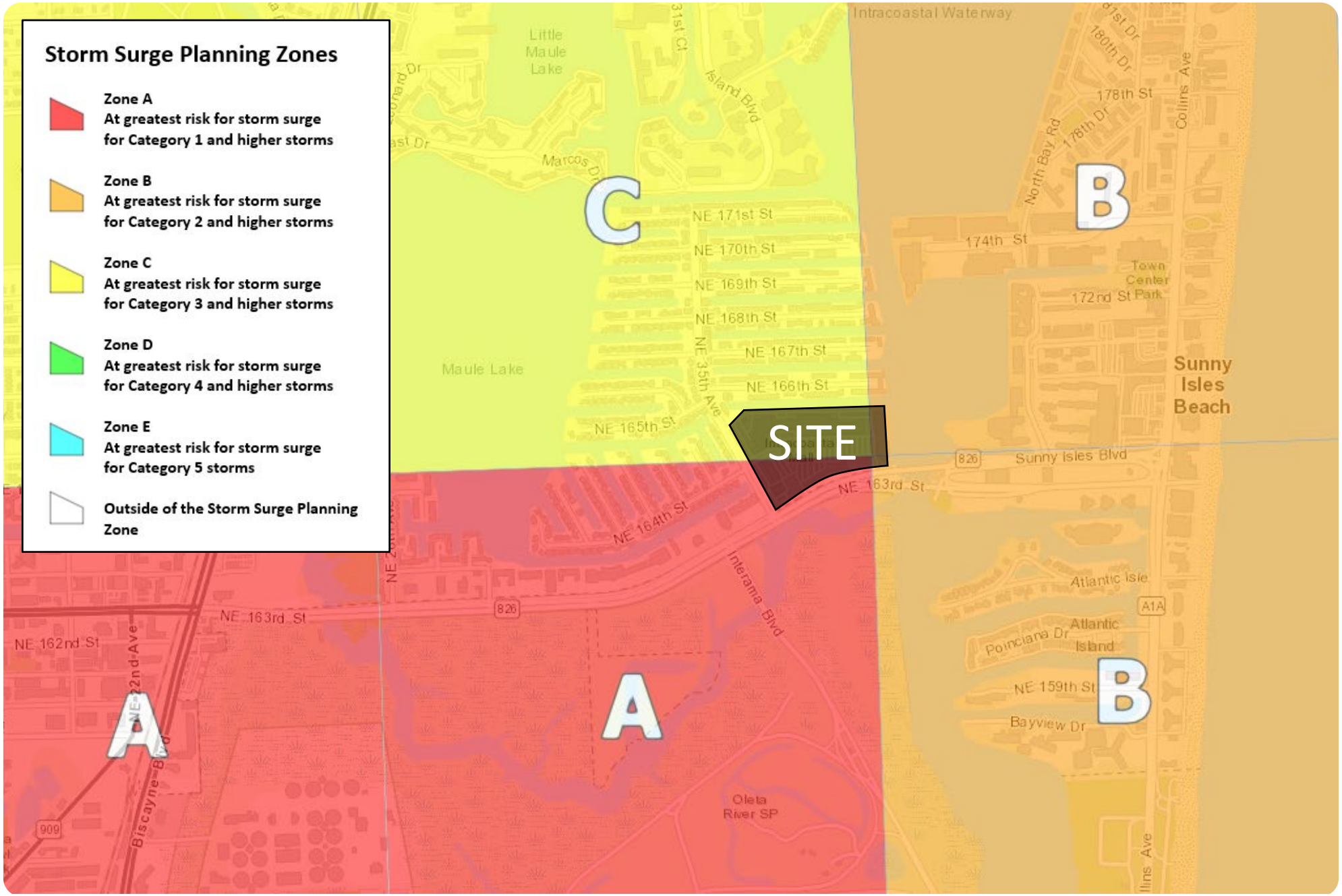
INTRODUCTION

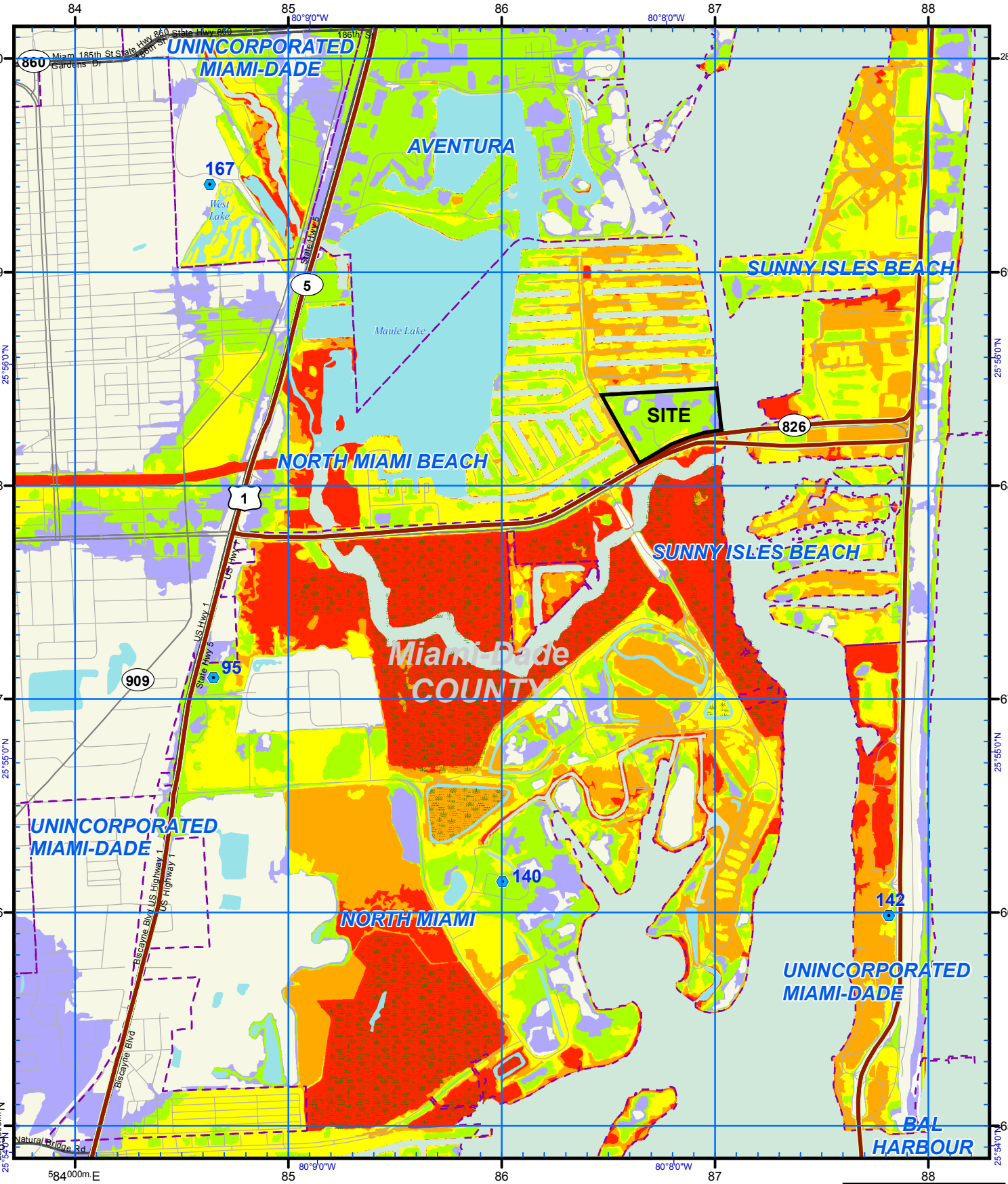
The Intracoastal Mall redevelopment is located at 3789 NE 163rd Street in North Miami Beach, Florida. The redevelopment is generally bounded by the Eastern Shores community to the north, SR 826/NE 163rd Street to the south, NE 35th Avenue to the west, and the Intracoastal Waterway to the east. The redevelopment is located within Traffic Analysis Zone (TAZ) 91. In accordance with the Miami-Dade County Department of Emergency Management's *Storm Surge Planning Zones Map*, shown as Figure 1, the redevelopment is located within the Miami-Dade County Department of Emergency Management Hurricane Storm Surge Planning Zones.

Using the *Storm Tide Zones Map*, shown as Figure 2, the redevelopment may experience storm tides during Category 1 to 5 storms. The proposed redevelopment consists of 2,000 multifamily residential dwellings units (35 low-rise, 48 mid-rise, and 1917 high-rise units) and a 250-room hotel, representing a net increase of 2,000 multifamily residential dwelling units and 250 hotel rooms that fall within the Storm Tide Zone. The most severe storm tides may be experienced on the northeast side of the redevelopment where the redevelopment is bounded by the Intracoastal Waterway. Figure 3 illustrates that the proposed redevelopment is not located in a coastal high hazard area as shown on the City's Future Land Use Map. Additionally, Figure 4 illustrates the storm surge height based on the Statewide Regional Evacuation Study Project Depth Analysis Study. The graphic indicates that a maximum of 0 feet of storm surge may be expected for a Category 1 storm in the vicinity of the project site.



Kimley»Horn

Figure 1
Miami-Dade County Storm Surge Planning Zones
Intracoastal Mall Redevelopment
North Miami Beach, Florida



US National Grid
100,000-m Square ID
NJ
Grid Zone Designation
17R
Datum = NAD 1983, 1,000-m USNG

GN
Diagram Not to Scale

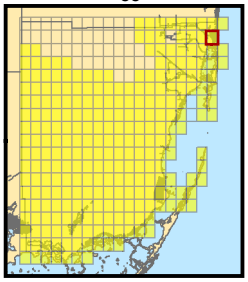
Notes:
1. Surge limits are based on still water storm tide height elevation above NAVD88 at high tide with no wave setup.
2. Total Storm Tide limits were derived from Maximum of Maximums surge heights over LIDAR based digital elevation.
3. The Points of Reference are locations determined to be relevant to emergency management officials.

ATLAS LEGEND

HOSPITAL	
Points of Reference	
Evacuation Route	
City Limits	
NHD Lakes	
NHD Major Water	

Cat
1
2
3
4
5

Storm Tide Zones
Miami-Dade County, 2010
Scale - 1:24,000
Feet
0 2,000
USNG Page **17R NJ 84 65**
Map Plate **291**

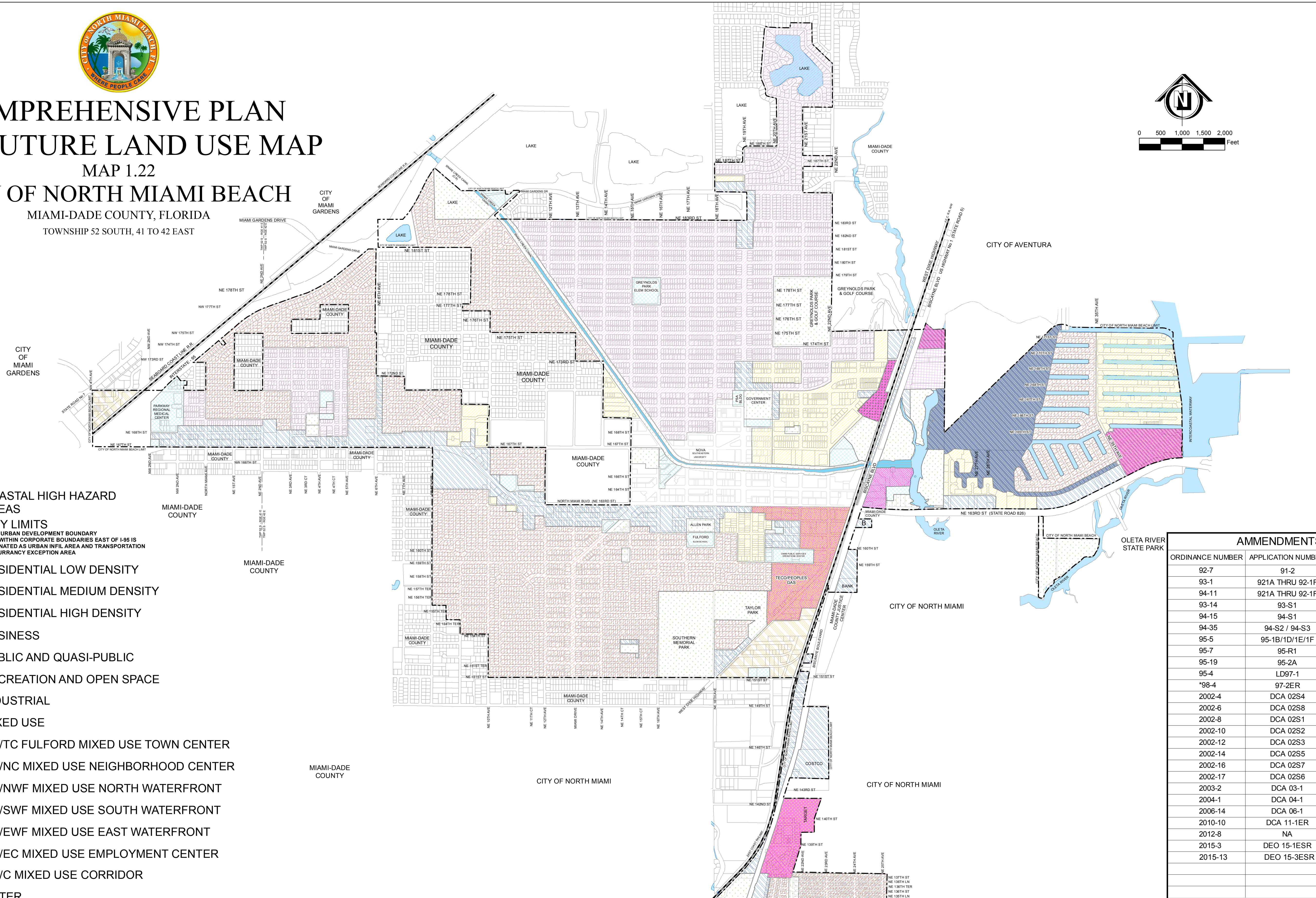


This map is for reference & planning purposes only. Hurricane evacuation decision-making and growth management implementation are local responsibilities. Please consult with local authorities.

Produced by South Florida Regional Planning Council for Florida Division of Emergency Management, 2009-2010

COMPREHENSIVE PLAN
2015 FUTURE LAND USE MAP
MAP 1.22
CITY OF NORTH MIAMI BEACH
MIAMI-DADE COUNTY, FLORIDA

TOWNSHIP 52 SOUTH, 41 TO 42 EAST



LEGEND:

- COASTAL HIGH HAZARD AREAS
- CITY LIMITS
  NOTE: URBAN DEVELOPMENT BOUNDARY AREA WITHIN CORPORATE BOUNDARIES EAST OF I-95 IS DESIGNATED AS URBAN INFIL AREA AND TRANSPORTATION CONCURRANCY EXCEPTION AREA
- RESIDENTIAL LOW DENSITY
- RESIDENTIAL MEDIUM DENSITY
- RESIDENTIAL HIGH DENSITY
- BUSINESS
- PUBLIC AND QUASI-PUBLIC
- RECREATION AND OPEN SPACE
- INDUSTRIAL
- MIXED USE
- MU/TC FULFORD MIXED USE TOWN CENTER
- MU/NC MIXED USE NEIGHBORHOOD CENTER
- MU/NWF MIXED USE NORTH WATERFRONT
- MU/SWF MIXED USE SOUTH WATERFRONT
- MU/EWF MIXED USE EAST WATERFRONT
- MU/EC MIXED USE EMPLOYMENT CENTER
- MU/C MIXED USE CORRIDOR
- WATER

AMMENDMENTS

ORDINANCE NUMBER	APPLICATION NUMBER	DATE
92-7	91-2	5/19/1992
93-1	921A THRU 92-1F	1/19/1993
94-11	921A THRU 92-1F	5/17/1994
93-14	93-S1	12/21/1993
94-15	94-S1	6/21/1994
94-35	94-S2 / 94-S3	10/18/1994
95-5	95-1B/1D/1E/1F	4/18/1995
95-7	95-R1	8/15/1995
95-19	95-2A	12/5/1995
95-4	LD97-1	4/21/1998
*98-4	97-2ER	4/21/1998
2002-4	DCA 02S4	9/3/2002
2002-6	DCA 02S8	9/3/2002
2002-8	DCA 02S1	9/3/2002
2002-10	DCA 02S2	9/3/2002
2002-12	DCA 02S3	9/3/2002
2002-14	DCA 02S5	9/3/2002
2002-16	DCA 02S7	9/3/2002
2002-17	DCA 02S6	9/3/2002
2003-2	DCA 03-1	4/15/2003
2004-1	DCA 04-1	2/3/2004
2006-14	DCA 06-1	10/3/2006
2010-10	DCA 11-1ER	4/26/2011
2012-8	NA	6/5/2012
2015-3	DEO 15-1ESR	3/17/2015
2015-13	DEO 15-3ESR	10/20/2015

* EAR ADOPTED FLUM ON 4/12/98

MAP ADOPTION: APRIL 21, 1998
REVISED BY: COMMUNITY DEVELOPMENT DEPT. - OCTOBER 2015
REVISED: OCTOBER 26, 2015, MAP REPRINTED: OCTOBER 26, 2015

NOTICE: THE ACCURACY OF THIS MAP IS NOT WARRANTED. CONTACT THE COMMUNITY DEVELOPMENT DEPARTMENT FOR A FURUTRE LAND USE MAP DETERMINATION AT (305) 948-2966

DRAWN BY: D BLALOCK
MAP NAME: GIS\Users\SharedWorkSpace\Projects\CommDev\FLUM20151026.mxd

Figure 3

US National Grid	
100,000-m Square ID	NJ
Grid Zone Designation	17R

Datum = NAD 1983, 1,000-m USNG

GN

Notes:
1. Surge limits are based on still water storm tide height elevation above NAVD88 at high tide with no wave setup.
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3. The Points of Reference are locations determined to be relevant to emergency management officials.

ATLAS LEGEND
- HOSPITAL
- Points of Reference
- Evacuation Route
- City Limits
- NHD Lakes

CATEGORY 1 GRIDCODE

Dry
0 - 0.5 ft
0.5 - 1.5 ft
1.5 - 3 ft
3 - 5 ft
5 - 7 ft
7 - 10 ft
10 - 15 ft
15 - 20 ft
20 - 42 ft

Storm Tide Depth

Miami-Dade, 2012

Scale 1:24,000

0 — 2,000 Feet

Map Plate **291**

This map is for emergency planning purposes only. Hurricane evacuation decision-making and growth management implementation are local responsibilities. Please consult with local authorities.

Produced by the South Florida Regional Planning Council for the Florida Division of Emergency Management, 2011-2012

Figure 4

PUBLIC SHELTER DEMAND

Based on Miami-Dade County's 2018 *Emergency Preparedness Report*, in the event of an evacuation, 84 Hurricane Evacuation Centers are available county-wide. These facilities provide a total of 122,901 public shelter spaces. The Shelter/Evacuation Center section of Miami-Dade County's 2018 *Emergency Preparedness Report* is included in Appendix A. Based on the data provided in the *Statewide Regional Evacuation Study Program*, shown in Table IV-11 contained in Appendix A, for Year 2015, there was expected to be a shelter demand of 30,116 under Evacuation Level C and 64,247 under Evacuation Level E. Therefore, Miami-Dade has a public shelter space surplus of 92,785 under Evacuation Level C and a public shelter surplus of 58,654 under Evacuation Level E for Year 2015 for non-project evacuation.

In addition to an increase in evacuation vehicles added to the surrounding roadway network, a percentage of these vehicles will travel to an evacuation shelter. Table MDTAZ in the *Statewide Regional Evacuation Studies Program* indicates that 2.86 people occupy each residential high-rise dwelling unit and 1.46 people occupy each hotel room. Additionally, Table MDTAZ indicates that 75.1 percent (75.1%) of hotel units are occupied during hurricane season. This analysis assumes that all hotel guests would evacuate to a shelter during a Category 3 evacuation. Table IIIB-1 in the *Statewide Regional Evacuation Studies Program,* included in Appendix A, indicates that 65 percent (65%) of residents are assumed to leave their homes to go to a safer location in a Category 3 evacuation. Table IIIB-4 contained in Appendix A, indicates that 5 percent (5%) of permanent resident evacuees will travel to a local public shelter. Based on these assumptions, it is estimated that the proposed redevelopment will create a demand of 460 shelter spaces [(2,000 residential du X 2.86 ppl/du X 65% evacuees X 5% travel to a shelter) + (250 hotel rooms X 1.46 ppl/room X 75.1% occupied during hurricane season)]. This represents a net increase of 460 in shelter demand for the proposed redevelopment. Therefore, Miami-Dade has a public shelter space surplus of 92,325 (92,785 – 460) under Evacuation Level C and a public shelter space surplus of 58,194 (58,654 – 460) under Evacuation Level E with the proposed redevelopment in place. A summary of the public shelter demand calculations is presented in Table 1 in Appendix B.

HURRICANE EVACUATION ANALYSIS

The redevelopment is located within TAZ 91 and in accordance with the Miami-Dade County Department of Emergency Management *Storm Surge Planning Zones Map*, shown as Figure 1, the redevelopment is located within the Miami-Dade County Office of Emergency Management Hurricane Storm Surge Planning Zones.

In the event of an evacuation, the redevelopment will generate a percentage of evacuation trips to the adjacent roadway network. Table IIIB-1 in the *Statewide Regional Evacuation Studies Program,* included in Appendix A, indicates that 65 percent (65%) of residents are assumed to leave their homes to go to a safer location in a Category 3 evacuation. Additionally, Table MDTAZ indicates that there are 1.65 vehicles per residential dwelling unit, 1.05 vehicles per hotel room, and that 75.1 percent (75.1%) of hotel units are occupied during Hurricane Season. Table IIIB-3 in the *Statewide Regional Evacuation Studies Program*, included in Appendix A, indicates that 80 percent (80%) of vehicles available to the evacuating household will be used in evacuation. It was assumed that 100 percent (100%) of vehicles will be used in evacuation for each hotel room. Based on these assumptions, a net of 1,913 evacuation vehicles ((2,000 residential du X 1.65 veh/du X 65% evacuees X 80% of available vehicles) + (250 hotel rooms X 1.05 veh/room X 75.1% evacuees X 100% of available vehicles)) are expected to be added to the surrounding roadway network by the proposed redevelopment. A summary of the evacuation vehicle calculations is presented in Table 1 in Appendix B.

The designated evacuation routes in the vicinity of the redevelopment are SR 826/NE 163rd Street, SR 826, Biscayne Boulevard, Collins Avenue, I-95, and the Homestead Extension of Florida's Turnpike (HEFT). Evacuation routes are illustrated in Figure 5. An analysis was prepared to determine if the net increase in residential and hotel units associated with the redevelopment would utilize 25 percent (25%) or more of an evacuation route's LOS E hourly directional maximum capacity volume. Based on a 65 percent (65%) evacuation participation rate for Category 3 storms, projected traffic distributions along the designated evacuation routes are provided in Figure 6 for the proposed redevelopment. Table 2 included in Appendix B provides the net new increase in evacuation trips by route. The highest hourly contribution of evacuation

traffic as a percentage of total evacuation traffic was calculated based on the normal response curve illustrated in Figure 1 in the *Florida Statewide Regional Evacuation Study Program: Regional Behavioral Analysis,* Volume 2-11, contained in Appendix A. As shown in the figure, the highest contribution of evacuation traffic as a percentage of total evacuation traffic was determined to be 30 percent (30%) over a two hour period. However, to provide a conservative analysis, a 30 percent (30%) highest hourly percentage of evacuees loading the roadway network was assumed. Additionally, Table 2 included in Appendix B provides the calculations of evacuation redevelopment traffic as a percent of the level of service E hourly directional maximum service volumes. The following provide the results of the evacuee traffic distribution and associated calculations:

- SR 826/NE 163rd Street east of US-1/Biscayne Boulevard: 11.36% of LOS E Hourly Directional Service Volume
- SR 826/NE 163rd Street west of SR A1A/Collins Avenue: 3.36% of LOS E Hourly Directional Service Volume
- SR A1A/Collins Avenue north of SR 826/NE 163rd Street: 4.49% of LOS E Hourly Directional Service Volume
- Biscayne Boulevard/US-1 north of SR 826/NE 163rd Street: 4.26% of LOS E Hourly Directional Service Volume
- SR 826/NE 163rd Street west of US-1/Biscayne Boulevard: 11.21% of LOS E Hourly Directional Service Volume
- SR 826 west of I-95: 1.05% of LOS E Hourly Directional Service Volume
- Homestead Extension of Florida's Turnpike (HEFT) north of SR 826: 2.35% of LOS E Hourly Directional Service Volume
- I-95 north of SR 826: 0.69% of LOS E Hourly Directional Service Volume

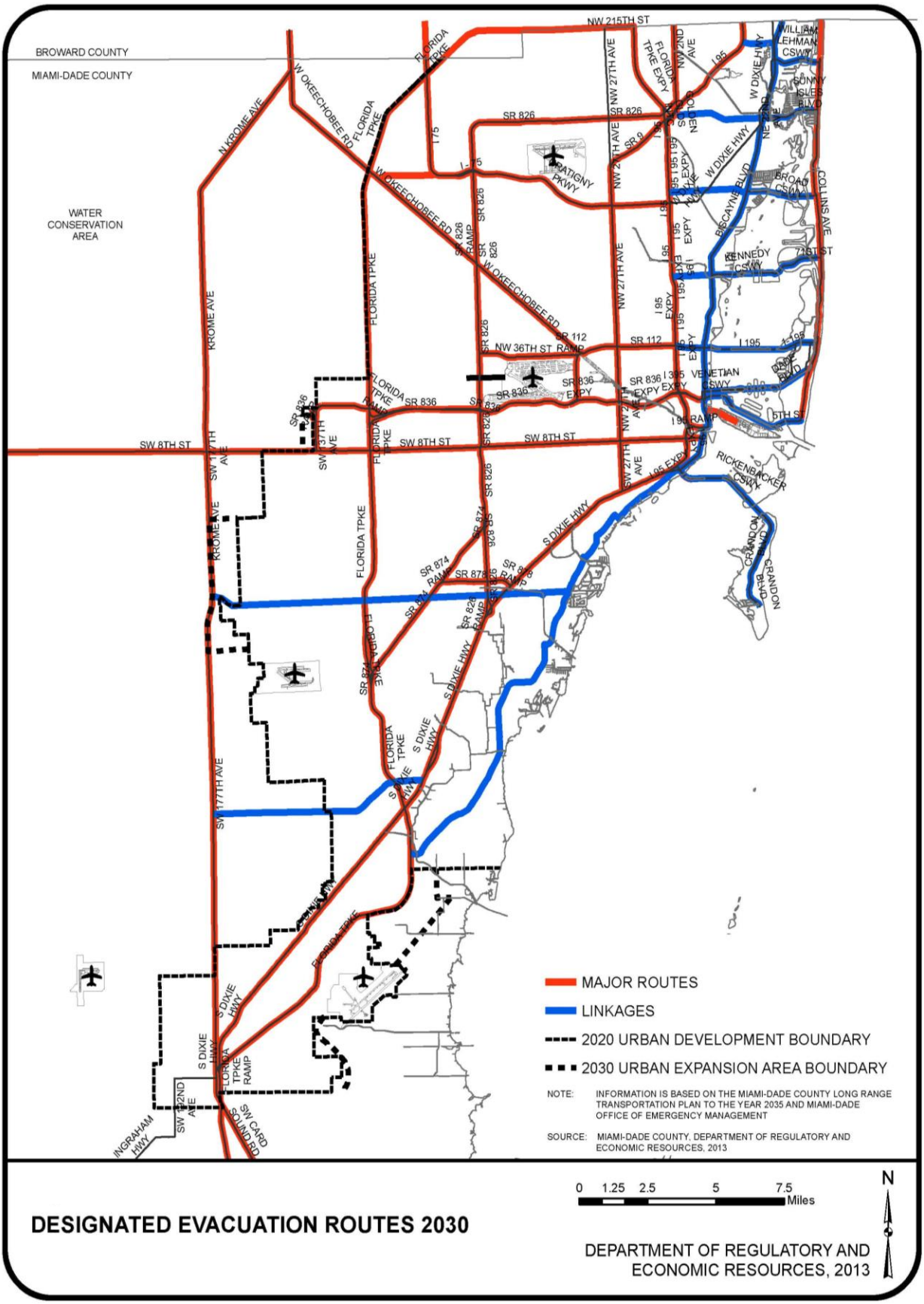
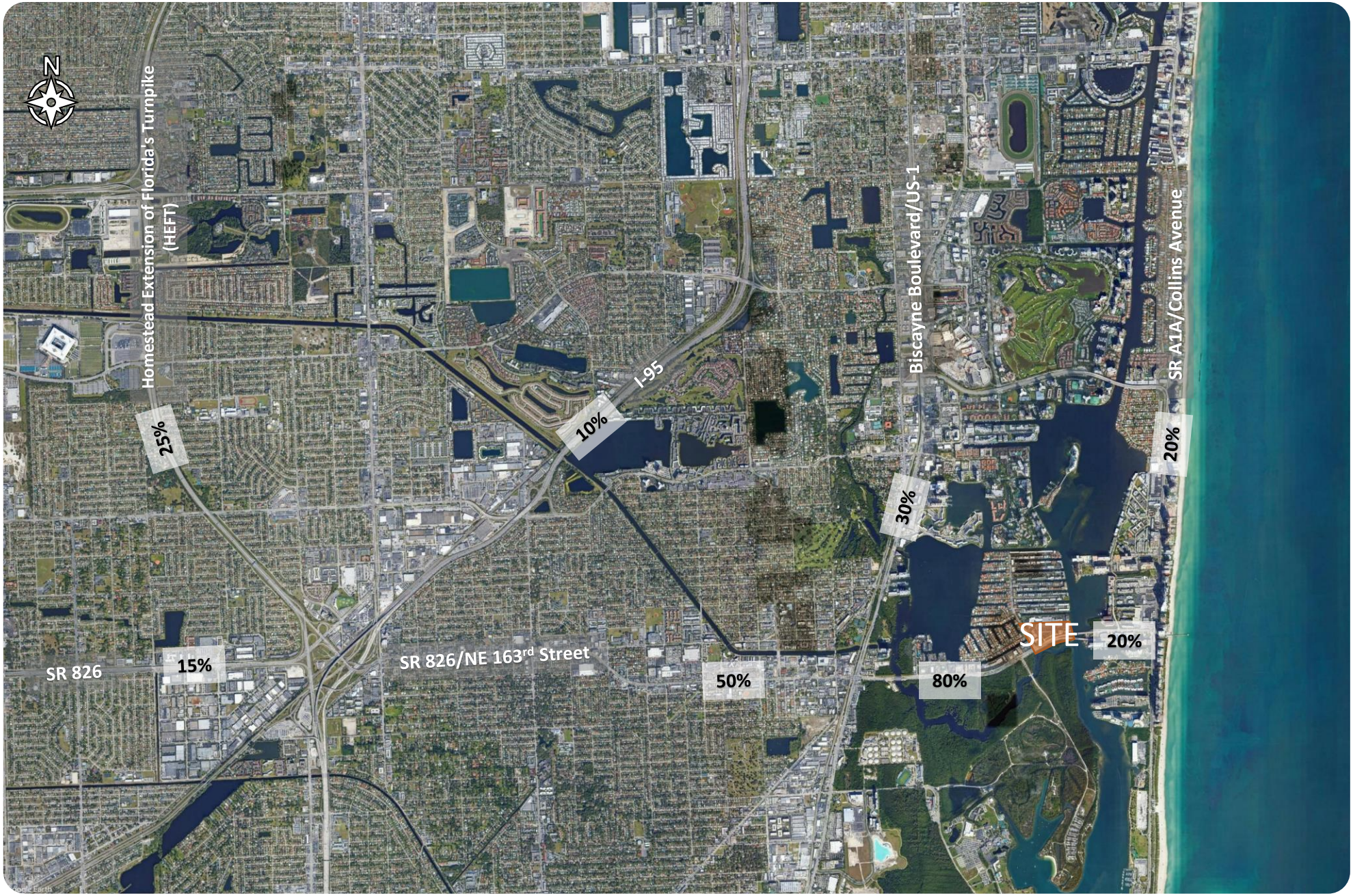

BROWARD COUNTY
MIAMI-DADE COUNTY
WATER CONSERVATION AREA
NW 215TH ST
SR 826
SR 836
SR 112
NW 36TH ST RAMP
SW 8TH ST
SW 177TH AVE
SW 137TH AVE
KROME AVE
N KROME AVE
W OKEECHOBEE RD
FLORIDA TPKE
FLORIDA TPKE EXPY
NW 27TH AVE
NW 2ND AVE
I 95
I 75
I 195
SR 874
SR 874 RAMP
SR 826 RAMP
SR 836 EXPY
I 195 RAMP
S DIXIE HWY
W DIXIE HWY
NE 6TH AVE
SW 152ND AVE
INGRAHAM HWY
SW CARD SOUND RD
FLORIDA TPKE RAMP
GOLDEN GLADES INTERCHANGE
PALMETTO EXPY
GRATIGNY PKWY
BISCAYNE BLVD
COLLINS AVE
KENNEDY CSWY
VENETIAN CSWY
RICKENBACKER CSWY
CRANDON BLVD
74ST ST
5TH ST
WILLIAM LEHMAN CSWY
SUNNY ISLES BLVD
BROAD CSWY
MAJOR ROUTES
LINKAGES
2020 URBAN DEVELOPMENT BOUNDARY
2030 URBAN EXPANSION AREA BOUNDARY
NOTE: INFORMATION IS BASED ON THE MIAMI-DADE COUNTY LONG RANGE TRANSPORTATION PLAN TO THE YEAR 2035 AND MIAMI-DADE OFFICE OF EMERGENCY MANAGEMENT
SOURCE: MIAMI-DADE COUNTY, DEPARTMENT OF REGULATORY AND ECONOMIC RESOURCES, 2013
0 1.25 2.5 5 7.5 Miles
N
DESIGNATED EVACUATION ROUTES 2030
DEPARTMENT OF REGULATORY AND ECONOMIC RESOURCES, 2013

Figure 5



Kimley»Horn

Figure 6
Hurricane Evacuation Distribution
Intracoastal Mall Redevelopment
North Miami Beach, Florida

CONCLUSION

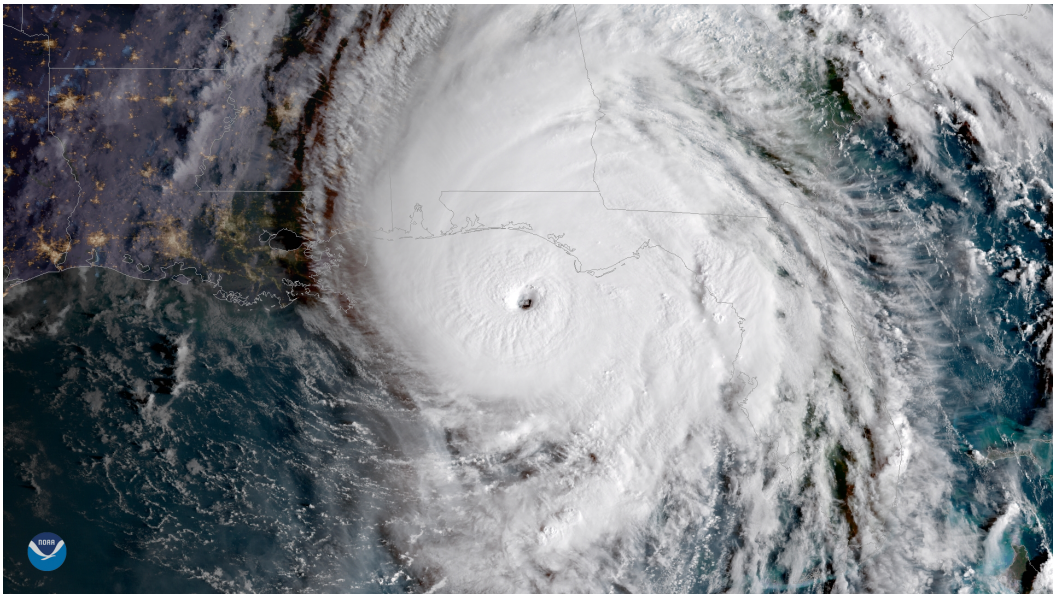
The redevelopment is located within the Storm Surge Evacuation Zones identified by the Miami-Dade County Office of Emergency Management. An analysis was prepared for the residential and hotel land uses of the proposed redevelopment. The analysis determined that sufficient public shelter space and excess capacity on designated evacuation routes is provided to accommodate the proposed redevelopment. Therefore, no mitigation is required.

Appendix A

Reference Documentation

2018 Emergency Preparedness Report

This story was made with Esri's Story Map Journal.
Read the interactive version on the web at https://arcg.is/1bfv5q.



Prepared by Miami-Dade Fire Rescue, Office of Emergency Management

Shelters/Evacuation Centers

OEM, in collaboration with Miami-Dade County Public Schools and the American Red Cross, locates and assesses facilities to be utilized as evacuation centers and shelters. Evacuation Centers are for the general population and are meant to be utilized as a refuge of last resort, when the option to evacuate locally to the home of a friend or family is not possible. Evacuation Centers are not designed for comfort and individuals are allotted 15-20 square feet and evacuees must bring their own comfort items. Pet-Friendly Evacuation Centers (PFEC) have been pre-assigned for residents who will evacuate with their pets. Only PFECs allow animals. Service animals are not considered pets, they are welcome in all evacuation centers. Medical Evacuation Centers (MEC) are evacuation centers for individuals with functional and access needs.

Facilities that are used after a disaster are called shelters. Shelters often accommodate fewer people, have more amenities, such as cots/bedding and are geared for individuals who have been displaced due to their homes being damaged after an event. At a shelter, individuals are usually allotted 40-60 square feet and are provided with an assortment of social services and federal assistance to assist in facilitating the identification of permanent housing. Shelters are expected to be open for days or months.

In 2017, Hurricane Irma presented a threat that Miami-Dade County had not seen in almost two (2) decades. The National Hurricane Center (NHC) forecast prompted Miami-Dade County and its stakeholder agencies into an unprecedented response not seen since Hurricane Andrew in 1992. Over 750,000 residents and visitors were under an evacuation order and over 30,000 evacuees utilized any of the 42 general evacuation centers that were

opened. This mobilization identified resource challenges which facilitated the need to streamline processes for activating evacuation centers.

Per the County Mayor's directive, OEM has worked through improvement planning to enhance our Countywide Emergency Shelter Plan. The plan's enhancement describes the framework for evacuating residents and visitors under any evacuation scenario independent of resources outside the county. This evacuation center enhancement strategy accomplished the following:

- Updated and revised evacuation center plans
- Identified and trained over 2,500 EOC Essential DAEs in evacuation center operations
- Identified appropriate quantities of evacuation center supplies
- Identified facilities to warehouse all evacuation center resources for seamless deployment
- Assessed existing evacuation space usage
- Identified additional evacuation center sites

OEM continues to assess the need to augment the current number of DAEs assigned to the various disaster roles. All evacuation centers will be managed and staffed by DAEs in conjunction with other partner agencies such as Miami-Dade County Public Schools, county and municipal police and fire personnel. Evacuation center staff is a critical role which requires a significant increase in county personnel. The over 2,500 EOC Essential DAEs OEM has trained will serve in various capacities to include shelter management. Additionally, OEM in cooperation with the American Red Cross and Miami-Dade County Public Schools, held a series of simulations focusing on shelter management for DAE assigned to evacuation centers. Year-round, OEM continues to engage DAEs and partner agencies in improving training and simulation opportunities.

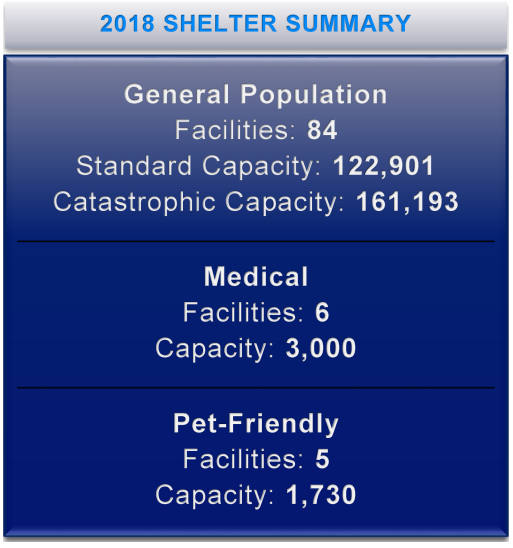


Table IV-11 – Shelter Demand by Base Scenario

	Evacuation Level A	Evacuation Level B	Evacuation Level C	Evacuation Level D	Evacuation Level E
2010					
Monroe – Key West	860	890	592	1,480	1,480
Monroe – Lower Keys	294	307	278	694	694
Monroe – Middle Keys	457	470	244	244	244
Monroe – Upper Keys	736	779	444	444	444
Monroe – Total	2,348	2,446	1,558	2,862	2,862
Miami-Dade County	22,762	27,659	29,419	46,163	61,894
Broward County	9,502	9,809	13,786	19,529	27,184
2015					
Monroe – Key West	870	901	616	1,541	1,541
Monroe – Lower Keys	302	318	302	755	755
Monroe – Middle Keys	463	475	257	257	257
Monroe – Upper Keys	744	792	474	474	474
Monroe – Total	2,377	2,486	1,648	3,027	3,027
Miami-Dade County	23,033	28,170	30,116	48,035	64,247
Broward County	9,894	10,216	14,350	20,365	28,338

Note: Shelter demand is the population in each county who will seek public shelter during their evacuation, either at an in-county shelter or an out of county shelter. See Chapter III, Section C for the source of the small area data.

Table MDTAZ. Dwelling Unit, Population and Vehicle Estimates and Projections, 2006, 2010 and 2015			
Population and Vehicles by Type of Dwelling Unit	2006	2010	2015
Site-Built Homes			
Total Units	923,279	951,961	992,852
Percent of Units Occupied during Hurricane Season	89.7%	89.8%	89.9%
Occupied Units	828,541	855,217	892,981
Persons per Occupied Unit	2.83	2.84	2.86
Population in Units	2,342,429	2,428,951	2,549,893
Vehicles per Unit	1.69	1.67	1.65
Vehicles in Units	1,398,596	1,430,457	1,477,844
Mobile Homes			
Total Units	12,467	12,536	12,701
Percent of Units Occupied during Hurricane Season	91.7%	91.7%	91.6%
Occupied Units	11,429	11,492	11,639
Persons per Occupied Unit	3.06	3.06	2.86
Population in Units	34,986	35,116	35,478
Vehicles per Unit	0.56	0.56	0.57
Vehicles in Units	19,631	19,769	20,046
Hotel-Motel Units			
Total Units	46,116	46,116	46,116
Percent of Units Occupied during Hurricane Season	75.1%	75.1%	75.1%
Occupied Units	34,618	34,618	34,618
Persons per Occupied Unit	1.46	1.46	1.46
Population in Units	50,545	50,545	50,545
Vehicles per Unit	1.05	1.05	1.05
Vehicles in Units	36,357	36,357	36,357
Group Quarters			
Population that would participate in general evacuation	0	0	0
Vehicles that would participate in a general evacuation	0	0	0
Totals			
Total Resident Population	2,377,415	2,464,067	2,585,371
Total Households	839,970	866,709	904,620
Total Vehicles	1,454,584	1,486,583	1,534,247

Table IIIB-1: Evacuation Rate for Residents Living in Site-Built Homes – Miami-Dade County

Evacuation Rate (%)	Storm Threat Scenario				
Site-Built Homes	**Cat 1**	**Cat 2**	**Cat 3**	**Cat 4**	**Cat 5**
Cat 1 Surge Evacuation Zone	40	50	65	80	90
Cat 2 Surge Evacuation Zone	30	45	60	80	90
Cat 3 Surge Evacuation Zone	20	25	60	80	85
Cat 4 Surge Evacuation Zone	10	15	30	70	85
Cat 5 Surge Evacuation Zone	8	8	15	55	80
Inland of Surge Evacuation Zones	5	5	5	10	20

Evacuation rate indicates the percent of residents who will leave their homes to go some place safer from each zone in each storm threat scenario. Figures are based on the assumption that officials order evacuation for surge evacuation zones corresponding to storm category, plus all mobile homes and manufactured homes. Figures also assume that that the actual storm track passes very close to the area being evacuated. Shaded cells indicate shadow evacuation – evacuation from areas not included in evacuation notices.

Table IIIB-2: Out-of-County Trip Rates for Residents Living in Site-Built Homes – Miami-Dade County

Out-of-County Trip Rate (%)	Storm Threat Scenario				
Site-Built Homes	**Cat 1**	**Cat 2**	**Cat 3**	**Cat 4**	**Cat 5**
Cat 1 Surge Evacuation Zone	50	50	50	50	50
Cat 2 Surge Evacuation Zone	50	50	50	55	55
Cat 3 Surge Evacuation Zone	50	50	50	55	55
Cat 4 Surge Evacuation Zone	40	40	40	45	45
Cat 5 Surge Evacuation Zone	40	40	40	45	45
Inland of Surge Evacuation Zones	40	40	40	45	45

Out-of-county trip rate indicates the percent of evacuees from each zone who will seek refuge outside their own county of residence in each storm threat scenario.

Table IIIB-3: Vehicle Use Rates for Residents Living in Site-Built Homes – Miami-Dade County

Vehicle Use Rate (%)	Storm Threat Scenario				
Site-Built Homes	**Cat 1**	**Cat 2**	**Cat 3**	**Cat 4**	**Cat 5**
Cat 1 Surge Evacuation Zone	80	80	80	80	80
Cat 2 Surge Evacuation Zone	70	70	70	70	70
Cat 3 Surge Evacuation Zone	70	70	70	70	70
Cat 4 Surge Evacuation Zone	65	65	65	65	65
Cat 5 Surge Evacuation Zone	65	65	65	65	65
Inland of Surge Evacuation Zones	75	75	75	75	75

Vehicle use rate indicates of percentage of vehicles available to the evacuating household from each zone that will be used in evacuation in each storm threat scenario.

Table IIIB-4: Public Shelter Use Rates for Residents Living in Site-Built Homes – Miami-Dade County

Public Shelter Use Rate (%)	Storm Threat Scenario				
Site-Built Homes	**Cat 1**	**Cat 2**	**Cat 3**	**Cat 4**	**Cat 5**
Cat 1 Surge Evacuation Zone	5	5	5	5	8
Cat 2 Surge Evacuation Zone	5	5	5	5	8
Cat 3 Surge Evacuation Zone	5	5	5	5	8
Cat 4 Surge Evacuation Zone	10	10	12	12	12
Cat 5 Surge Evacuation Zone	10	10	12	12	12
Inland of Surge Evacuation Zones	10	10	12	12	15

Public shelter use rate indicates the percent of evacuees from each zone who will seek refuge in public shelters, in each storm threat scenario.

Table IIIB-5: Friend / Relative Refuge Use Rates for Residents of Site-Built Homes – Miami-Dade County

Friend / Relative Use Rate (%)	Storm Threat Scenario				
Site-Built Homes	**Cat 1**	**Cat 2**	**Cat 3**	**Cat 4**	**Cat 5**
Cat 1 Surge Evacuation Zone	65	65	65	65	65
Cat 2 Surge Evacuation Zone	65	65	65	65	65
Cat 3 Surge Evacuation Zone	65	65	65	65	65
Cat 4 Surge Evacuation Zone	65	65	65	65	65
Cat 5 Surge Evacuation Zone	65	65	65	65	65
Inland of Surge Evacuation Zones	65	65	65	65	65

Friend / relative rate indicates the percent of evacuees from each zone who will seek refuge in the homes of friends and relatives, in each storm threat scenario.

Table IIIB-6: Hotel / Motel Refuge Use Rates for Residents of Site-Built Homes – Miami-Dade County

Hotel / Motel Use Rate (%)	Storm Threat Scenario				
Site-Built Homes	**Cat 1**	**Cat 2**	**Cat 3**	**Cat 4**	**Cat 5**
Cat 1 Surge Evacuation Zone	20	20	20	20	20
Cat 2 Surge Evacuation Zone	20	20	20	20	20
Cat 3 Surge Evacuation Zone	20	20	20	20	20
Cat 4 Surge Evacuation Zone	20	20	20	20	20
Cat 5 Surge Evacuation Zone	20	20	20	20	20
Inland of Surge Evacuation Zones	20	20	20	20	20

Hotel/motel rate indicates the percent of evacuees from each zone who will seek refuge in hotels and motels, in each storm threat scenario.

In other evacuations the "S" is stretched laterally and covers more of the length of the line on which it appears, with departures being distributed over a longer length of time. It looks "flatter." In those cases evacuation notices were issued well in advance of anticipated landfall of the storm, and residents were aware that they had the luxury of waiting longer before departing if they choose to do so. Some evacuees do wait longer before leaving, but not all do. Departures are distributed over a longer period of time than in the first example. This might be referred to as a "slow" response.

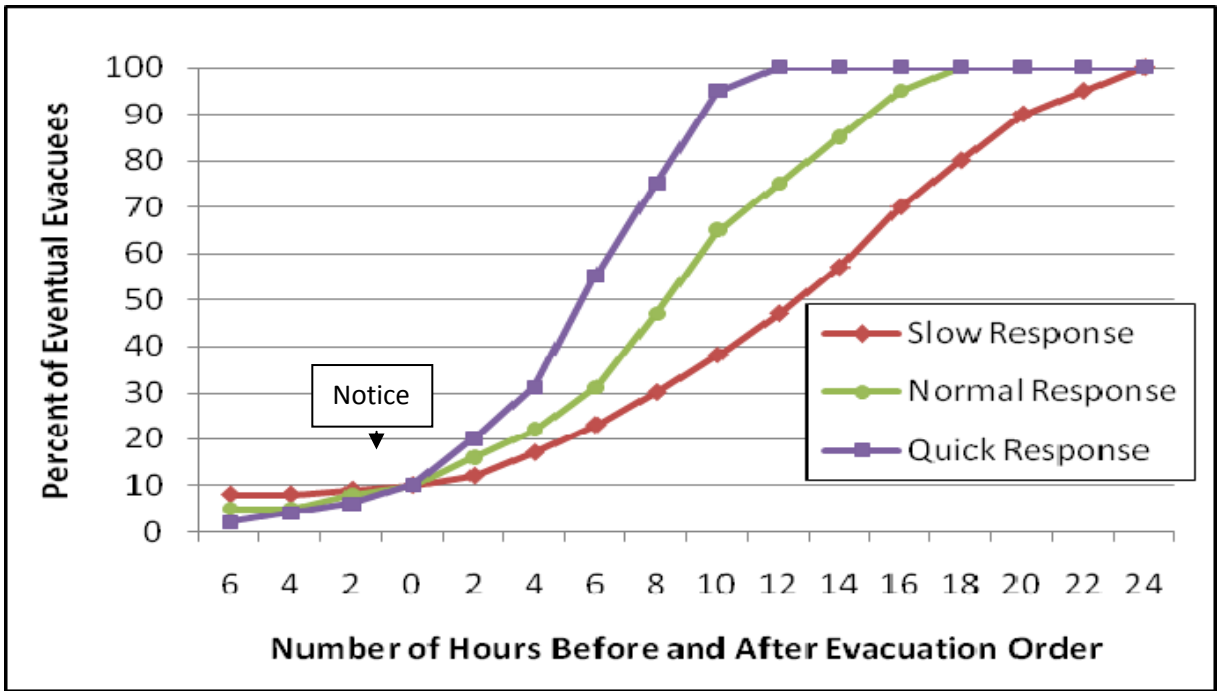
There are also evacuation timing curves that fall between those two, resulting in an "S" that is less compressed than the first, but less stretched than the second. This sort of evacuation results when evacuation notices are issued earlier than in the first example, but not as early as in the second case.

In all three scenarios evacuees collectively take as much time as they believe is available to them. Perceptions about the urgency of the evacuation account for variations in whether the evacuation is "quick," "slow," or in between ("normal").

2. Curves for Planning

The three evacuation timing scenarios described above are depicted graphically in Figure 1, reflecting the three versions of the letter "S." The slowest of the three curves assumes that evacuation notices were issued at least 24 hours before landfall. The fastest of the three assumes that evacuation notices were issued just 12 hours prior to the anticipated onset of hurricane conditions.

Figure 1. Evacuation timing curves for planning



Appendix B

Calculations

Table 1: Hurricane Evacuation Traffic Analysis	
Evacuation Vehicles Generated by Project under Category 3	
Dwelling Units	2,000
Hotel Units	250
Vehicles per Dwelling Unit	1.65
Vehicles per Hotel Room	1.05
Evacuation Participation Rate for Category 3 for Residential Units	65%
Evacuation Vehicle Usage Rate for Residential Units	80%
Evacuation Vehicle Usage Rate for Hotel Rooms	100%
Seasonal Hotel Unit Occupancy Levels	75.1%
Evacuation Vehicles Generated by Project	**1,913** **[(2,000 X 1.65 veh/du X 65% X 80%) + (250 X 1.05 veh/room X 100% X 75.1%)]**
Public Shelter Demand Generated by Project under Category 3	
People per Dwelling Unit	2.86
People per Hotel Room	1.46
Evacuation Participation Rate for Category 3 for Residential Units	65%
Seasonal Hotel Unit Occupancy Levels	75.1%
Percent of Residential Evacuees to Local Public Shelter	5%
Public Shelter Demand Generated by Project	**460** **[(2,000 X 2.86 ppl/du X 65% X 5%) + (250 rooms X 1.46 ppl/room X 75.1%)]**

Table 2: Evacuation Vehicles as Percent of LOS E Directional Service Volume under Category 3						
Designated Evaucation Routes						
	Percent of Evacuation Traffic Using Adjacent Evacuation Road Network (%)	Evacuation Vehicles by Route (veh)	Highest Hourly Contribution of Evacuation Traffic as a Percent of Total Evacuation Traffic Based on Normal Behavioral Response Curve (%)[(1)]	Highest Hourly Contribution of Evacuation Traffic by Route from Project (veh)	Maximum Directional LOS E Service Volume per Evacuation Route (veh/hr)[(2)]	Maximum Hourly Evacuation Vehicles as a % of LOS E Hourly Directional Service Volume (%)
SR 826/NE 163rd Street east of US-1/Biscayne Boulevard (8-Lanes)	80%	1,530	30%	459	4,040	11.36%
SR 826/NE 163rd Street west of SR A1A/Collins Avenue (8-Lanes)	20%	383	30%	115	3,420	3.36%
SR A1A/Collins Avenue north of SR 826/NE 163rd Street (6-Lanes)	20%	383	30%	115	2,560	4.49%
Biscayne Boulevard/US-1 north of SR 826/NE 163rd Street (8-Lanes)	30%	574	30%	172	4,040	4.26%
SR 826/NE 163rd Street west of US-1/Biscayne Boulevard (6-Lanes)	50%	957	30%	287	2,560	11.21%
SR 826 west of I-95/Homestead Extension of Florida's Turnpike (HEFT) (8-Lanes)	15%	287	30%	86	8,220	1.05%
HEFT north of SR 826 (6-Lanes)	25%	478	30%	143	6,080	2.35%
I-95 north of SR 826 (7-Lanes)	10%	191	30%	57	8,220	0.69%

Notes: (1) Based upon the behavioral assumptions illustrated in Figure 1 of the *Statewide Regional Evacuation Study Program,* Volume 2-11

(2) Based on the Table 7 from FDOT's *2013 Quality/Level of Service Handbook*