

City of Hallandale Beach

Floodplain Management  
and Hazard Mitigation Plan  
5-Year Update



**Hallandale Beach**  
PROGRESS. INNOVATION. OPPORTUNITY.

City Commission

Mayor Joy Cooper  
Vice Mayor Alexander Lewy  
Commissioner William Julian  
Commissioner Michele Lazarow  
Commissioner Anthony Sanders

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## INTRODUCTION

The City of Hallandale Beach was incorporated in 1927 as the City of Hallandale. Located in the center of a tri-county metropolitan area in southeast Florida, the city is bordered by the Atlantic Ocean to the east, Interstate 95 to the west, Pembroke Road to the north and the Miami-Dade County Line to the south. The city covers 4.1 square miles with a population of 37,800 (US Census – 2011 Estimate).

The City Commission is the legislative and policy setting body of the city and consists of five elected officials: a mayor, a vice mayor and three commissioners. The Commission is responsible for the municipal services in the areas of planning and community development, police, fire rescue, sanitation, water, wastewater and stormwater services, street maintenance, street and facility landscaping, community services, and parks and recreation.

## BACKGROUND AND PURPOSE

This Floodplain Management and Hazard Mitigation Plan was prepared to:

- ❑ Identify the city's flood hazards and address the community's flood problems more effectively
- ❑ Produce a program of activities that will most effectively address the community's vulnerability to the hazard of flooding
- ❑ Ensure that the most appropriate solutions are used to address the hazard of flooding
- ❑ Identify and recommend solutions to mitigate damage from other natural hazards
- ❑ Ensure that a comprehensive review of possible activities and mitigation measures is conducted
- ❑ Educate residents about the hazards, loss reduction measures, the natural and beneficial functions of floodplain
- ❑ Build public and political support for projects that prevent new problems, reduce losses, protect the natural and beneficial functions of the floodplain
- ❑ Protect the public and private entities in the City
- ❑ Qualify as a floodplain management plan under the CRS program

Though flooding hazard is the main emphasis of this plan, a number of other natural hazards are also addressed. These hazards are identified both by the State of Florida and Broward County as those hazards that are most likely to impact this community.

The City of Hallandale Beach has adopted a floodplain ordinance, which enables City residents to participate in the National Flood Insurance Program (NFIP). Residents throughout the City, especially those that live in flood-prone areas, are able to purchase flood insurance through the federal government or private companies authorized by the Flood Insurance Administration (FIA) in order to cover their properties during future storms. City residents and businesses have made numerous claims over the past years. The City Commissioners, recognizing that these costs to both public and private property are significant, view mitigation measures as a solution to lessen these damages and hardships for their residents.

In addition to serving as a guide recommending mitigation solutions to natural hazards, this document has also been prepared to qualify as a "floodplain management plan" under the Community Rating System (CRS) of the National Flood Insurance Program (NFIP).

Because of the City's many repetitive loss properties over the past years and because of its participation in the Community Rating System, the City is required to have a Floodplain Management Plan. To fulfill this requirement, the City had been an active participant in Broward County's Local Mitigation Strategy (LMS). Over the past decade, the City of Hallandale Beach has identified major drainage projects in Broward County's LMS. With the adoption of the 2007 Floodplain Management Plan, the City implemented its own plan specifically concentrating on this community's unique needs. This version represents a 5-year update of the original 2007 Plan. It includes a description of the process by which the original Plan was developed, it incorporates updates that have transpired over the past five years and it outlines a new Action Plan, which sets forth a course of action for the next five years.

Along with this plan, the City of Hallandale Beach will implement other activities that go beyond the minimum NFIP requirements. Through the CRS Program, residents of the City have seen, and will continue to see, a reduction in their flood insurance premiums, in addition to increased property and personal protection.

The National Flood Insurance Program (NFIP) currently designates approximately three-fourths of the land in the City of Hallandale Beach as a Special Flood Hazard Area (SFHA). A recent FEMA study has resulted in a new map, which reduces the SFHA to approximately 50% of the area in Hallandale Beach. (It is anticipated that this new map will be adopted in late 2013.) There are numerous city-maintained roads that are located in flood prone areas as well as county and state roads subject to flooding. The City's barrier island includes a one-mile stretch of shoreline on the east side and frontage to the Intracoastal Waterway on the west. In the event of major storm surges, this area is in immediate danger of flooding conditions. There are fourteen recreational centers and/or parks, scattered throughout the City, many of which are located in areas affected by storms and floods. Flooding in certain areas within the City has been a recurring problem that has resulted in many repetitive flood insurance claims by businesses and residents. At this writing, 150 properties have been identified as repetitive loss properties. Repetitive loss properties are those properties for which two or more claims of more than \$1,000 have been paid by the NFIP within any 10-year rolling period since 1978. Nation-wide, these properties represent only 1% of all the NFIP's insurance policies, but they have accounted for nearly one-third of the claim payments. Hallandale Beach is clearly designated by the Community Rating System (CRS) as a Category C community as there are more than 10 repetitive loss properties in the community.

As a result of the implementation of the City's Floodplain Management Plan, and the Broward County LMS, the City has reaped the benefits of significantly reduced flooding in the areas listed below. Over the past twelve (12) years, the City has been particularly proactive in addressing the flooding hazards in the community and has spent millions of dollars to implement capital projects for flood mitigation. Not only has the City identified several major flood mitigation projects, but it has also proceeded to follow through with implementation of these capital improvement projects. Since 2001, the City has completed major drainage improvements in the following repetitive loss areas:

- Ansin Boulevard area
- West of Federal Highway area
- Schaffer Canal area
- Northeast Quadrant area

The Plan is intended to identify problems, define solutions, and recommend specific activities with the ultimate goal of reducing the fiscal burden and human hardship as a result of flooding and other natural disasters.

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## I. PREPARATION OF THE PLAN

### 2007 Floodplain Management Plan

The City of Hallandale Beach has been an active participant for many years in the development and implementation of the Broward County Local Mitigation Strategy (LMS). This plan had also served as the community's floodplain management plan. Though the City had been able to make significant progress using this plan, in 2006 the City determined to formulate its own Floodplain Management Plan. On November 20, 2006, the City Commission officially authorized the formation of a Floodplain Management Plan Committee to develop a plan formulated specifically for this community.

### Formation of the Floodplain Management Committee

At the City staff's recommendation, the Commission approved the following committee members. Most of these individuals had previously been members of the CRS committee and were familiar with this initiative:

<b>Earl King, Chair</b> Assistant Director of Public Works, Utilities and Engineering	<b><u>Staff</u></b>
<b>Tony Gonzalez</b> Building Official, CRS Coordinator	<b><u>Staff/Resident</u></b>
<b>Bruce Griswold</b> Assistant Fire Chief	<b><u>Staff/Resident</u></b>
<b>Joe Sher</b> Vice Chairman of Public Transportation/Flood Mitigation Board	<b><u>Resident</u></b>
<b>Patricia Brennan</b> Member of Public Transportation/Flood Mitigation Board	<b><u>Resident</u></b>
<b>Monique Serres</b> Resident who has been impacted by flooding	<b><u>Resident</u></b>

## Formation of the Floodplain Management Committee, continued

The committee met on the following dates:

- October 12, 2006
- November 22, 2006
- December 20, 2006
- January 24, 2007
- February 21, 2007
- March 21, 2007
- April 25, 2007
- May 30, 2007
- September 12, 2007
- September 19, 2007

### **2013 Floodplain Management Plan - 5-Year Update**

In accordance with the requirements of the Community Rating System Program, an update of the Floodplain Management Plan is required every five years. With the approval of the City Manager, a Floodplain Management Plan Task Force was formed in 2012 to fulfill this requirement. In consideration of the fact that the City had succeeded in accomplishing virtually all of the programs specified in the Action Plan of the 2007 floodplain management plan, the updating of the City's Plan was a most appropriate and timely activity.

### **Formation of a Floodplain Management Plan Task Force**

With the approval of the City Manager, a Floodplain Management Plan Task Force was formed in 2012 to develop the required 5-Year update. The members of the task force represented both a wide range of departments within the City as well as a wide range of key stakeholders within the City. Some of these individuals had previously been members of the original Floodplain Management Plan Committee and were familiar with this initiative:

<b>Earl King, CFM, Chair</b> Deputy Director of Public Works, Utilities and Engineering CRS Coordinator	<b><u>Staff</u></b>
<b>Alex Baird</b> Assistant Fire Chief	<b><u>Staff</u></b>
<b>Mary Francis Jeannot, CFM</b> Administrative Analyst II, Public Works, Utilities and Engineering	<b><u>Staff</u></b>
<b>Edward Leonhardt</b> Building Division Permit Administrator	<b><u>Staff</u></b>
<b>Patricia Brennan</b> Member of Public Transportation/Flood Mitigation Board Resident	<b><u>Stakeholder</u></b>
<b>Lawrence Grimson</b> Chairman of Public Transportation/Flood Mitigation Board Resident/Realtor	<b><u>Stakeholder</u></b>
<b>Armin Lovenvirth</b> Banker	<b><u>Stakeholder</u></b>
<b>Robert McColgan</b> Resident/Utilities Engineering	<b><u>Stakeholder</u></b>
<b>Joe Sher</b> Vice Chairman of Public Transportation/Flood Mitigation Board Resident/Realtor	<b><u>Stakeholder</u></b>

The task force met on the following dates:

- June 21, 2012
- July 26, 2012
- August 30, 2012

The task force succeeded in reviewing and analyzing the floodplain management program of the City of Hallandale Beach and devising an Action Plan to effectively improve the City's current floodplain management program.

## II. PUBLIC INVOLVEMENT

### Planning Committee with Members of the Public

The planning process of the original Plan was conducted through a planning committee that included three members of the public, which was one-half of the planning committee. These committee members were involved in committee meetings as well as the two separate public meetings. The involvement of the public and community stakeholders is encouraged because their activities can impact natural hazards and they can participate in or support the recommendations of the plan. The three residents included on the committee are as follows:

<b>Joe Sher</b> Vice Chairman of Public Transportation/Flood Mitigation Board	<b><u>Resident</u></b>
<b>Patricia Brennan</b> Member of Public Transportation/Flood Mitigation Board	<b><u>Resident</u></b>
<b>Monique Serres</b> Resident who has been impacted by flooding	<b><u>Resident</u></b>

Both Tony Gonzalez and Bruce Griswold are also residents, in addition to being Staff members. The committee met and held a sufficient number of meetings that involved these resident members.

### Public Meetings

Two public information meetings were held at the beginning of the planning process. Though the guidelines suggest that the meetings be held in the affected area, there were no appropriate venues for such a meeting in the area. Therefore, the meetings were held in a venue as close as possible to the affected area. Flyers were delivered to all affected stakeholders, including residents and business owners. Both meetings were held for the public toward the beginning of the planning process, separately from the planning committee meetings, on the following dates:

December 11, 2006  
(Specifically to address concerns of affected area of Northeast Quadrant)

January 11, 2007  
(Specifically to address concerns of affected area of Northeast Quadrant)

## **The Public Meeting on the Draft Plan**

The meeting with the public was held on November 6, 2007. The planning process was completed and a plan was submitted and adopted by the Community's governing body on November 21, 2007. In order to advise as many residents as possible of this public meeting, many different media were utilized, including: the City's website, the water bills, the City's marquee, the City's cable station, the City's radio station, and numerous personal telephone calls.

## **Questionnaire Distributed to the Public**

A questionnaire was developed and sent to the entire City population via the City's *Annual Flood Hazard Newsletter*, and was also placed on the City's website. The questionnaire sought the public's input regarding any past flood problems that personally affected them or their surrounding neighborhoods.

## **Comments Solicited From Neighborhood Organizations**

Letters were sent to a number of stakeholders in the affected areas seeking their input, comments and recommendations. The City staff solicited information about past flooding and how it affected the schools, residential associations and businesses. Following is a list of stakeholders that represent the public in the affected areas, from which comments and recommendations were solicited:

Ms. Peggy Cannis  
Captain's Paradise Condominium Association  
136 Golden Isles Drive  
Hallandale Beach, Florida 33009

Ms. Suzanne Friedman  
President  
Hallandale Beach Area Chamber of Commerce  
P.O. Box 2774  
Hallandale Beach, Florida 33009

Salinas Santiago  
Parkside Manor "B" Building Association  
230 Southwest 11<sup>th</sup> Avenue  
Hallandale Beach, Florida 33009

Hallandale Beach High School  
Attention: PTSA President  
720 NW Ninth Ave.  
Hallandale Beach, Florida 33009

Hallandale Beach Middle School  
Attention: PTSA President  
120 SW 4<sup>th</sup> Avenue  
Hallandale Beach, Florida 33009

## **Explain the Planning Process to the Public**

The City distributed a citywide newsletter, *Hallandale Happenings*, in which public information was disseminated to explain the planning process and encourage input to the planning committee. Information was also included on the City's website, specifically outlining the ten steps of the Floodplain Management Plan.

### III. COORDINATION WITH OTHER AGENCIES

#### Needs, Goals and Plans

The following narrative delineates the actions that the City of Hallandale Beach has taken to address flooding in the City's repetitive loss areas and the progress that has been made in meeting the needs, goals and plans for the most affected areas. Over the past twelve (12) years, the City has been very proactive in addressing the flooding hazards in the community and has spent millions of dollars to implement capital projects for flood mitigation. Please see the attached (Exhibit 1) FIRM map of Hallandale Beach with the following enlarged repetitive loss areas designated:

##### **A. Ansin Boulevard Area**

For many years, businesses in the vicinity of Ansin Boulevard, located in the northwestern part of the City, were particularly subject to flooding. The root problem was traced to the construction of Interstate 95, immediately adjacent to this area. The storm water from I-95 and from some of the properties in the area was conveyed to Chaves Lake. However, there was insufficient collection capacity in Chaves Lake. From 2001 through 2003, the City of Hallandale Beach worked together with the Florida Department of Transportation and the Town of Pembroke Park to implement a major drainage improvement. Massive pumps and accompanying pipes were installed to pump water from Chaves Lake to the C-10 Canal in neighboring Hollywood. This major project cost over \$11 million. The City shares the ongoing cost of operations for this project with the Town of Pembroke Park.

In 2003-2004, the City contracted additional drainage improvements in the area, enhancing stormwater collection and flow to Chaves Lake. With the completion of these capital improvements, there is no longer a major flooding problem for the Ansin Boulevard area. Major rainfall in recent years has confirmed that the flooding problem has indeed been resolved.

##### **B. Southwest Quadrant Area**

Over the past ten years, the City of Hallandale Beach has both planned and implemented many capital improvement projects in the southwest quadrant designed to mitigate flooding. Each year the City has made application for grants and received Community Development Block Grants (CDBG) through Broward County averaging approximately \$300,000 annually. Additionally, the City secured a South Florida Water Management District Grant for \$300,000 and

implemented major swale improvements in the Southwest Quadrant in 2009 and 2010. Over \$3 million has been spent over the past eleven years to enhance stormwater drainage in the area. In addition, a major drainage project is being funded through the Hazard Mitigation Grant Program, costing approximately \$12,000,000.

As with the Ansin Boulevard Area, the major flooding problems that characterized the area in previous years have been substantially improved through all of these major capital improvements.

### **C. West of US 1 Area**

After conducting an engineering analysis of the drainage deficiencies in the area west of US1, the City budgeted over \$3 million to address these issues under a capital improvement program entitled “West of US 1 Drainage Improvements”. Most of the \$3 million entailed City funding, though the City was also able to receive funding and in-kind participation from Florida Department of Transportation.

This project was completed in the 2005/2006 Fiscal Year. As with the other two areas discussed above, the improvement has been significant.

### **D. Northeast Quadrant Area**

Of all areas in the City of Hallandale Beach, none have a greater number of repetitive loss properties than the northeast quadrant. Not only are there many low-lying areas, but there are very few bodies of water in the area to which stormwater can flow. Since its establishment in 1998, a capital improvement program entitled “Community Redevelopment Agency Drainage Improvements” has funded several drainage improvement projects in the northeast quadrant, costing over \$1 million. In fiscal year (FY) 2005/2006, finishing touches were completed on several of the projects from previous years.

The most significant accomplishment for the northeast quadrant in FY 2005/2006 was the securing of a Flood Mitigation Assistance (FMA) drainage improvement grant for \$798,870. This project was completed in 2010. Of significant consequence, the City has been successful in securing a Hazard Mitigation Grant for \$6 million to effect needed drainage improvements that will further reduce the flooding hazard in the Northeast Quadrant. This project, whose total cost is over \$8 million, began in 2013 and is scheduled to be completed early 2014. Clearly, the City has prioritized this area for future drainage improvements.

**E. Parkview Drive Area**

In FY 2005/2006, the City of Hallandale Beach completed designs for drainage improvements on Parkview Drive. Construction of these drainage improvements were completed in the 2007/2008 Fiscal Year.

**F. South Ocean Drive Area**

One of the two repetitive loss properties has recently been demolished and rebuilt. Its new elevation provides considerably more protection from flooding than its previous elevation. The other property has not had a property loss in over twelve years.

Not all damage from flooding can be traced to the need for drainage enhancements. Some flooding damage is due to insufficient maintenance of stormwater management facilities. In the 2005/2006 Fiscal Year, the City of Hallandale Beach passed an ordinance to revise its code to require maintenance of private stormwater management facilities. In FY 2006/2007, the City began implementation of this ordinance and has continued it ever since. It is anticipated that this measure will further reduce repetitive losses in the City.

**Solicitation of Input from Other Agencies and Organizations**

In an effort to glean additional information, letters were sent to neighboring communities and local and regional agencies giving them an opportunity to be involved in the planning process and to give any and all input pertinent to the City's flood mitigation plan:

Mr. Jaye Epstein, Director  
Office of Planning  
City of Hollywood  
2600 Hollywood Boulevard  
Hollywood, Florida 33020-4807

Ms. Joann Carr  
Planning Director  
City of Aventura  
19200 West Country Club Drive  
Aventura, Florida 33180

Mr. Todd Larson  
Director of Public Works  
Town of Pembroke Park  
3150 SW 52<sup>nd</sup> Ave.  
Pembroke Park, Florida 33023

Ms. Linda Epperson, Director  
Building and Zoning Department  
Town of Golden Beach  
Golden Beach, Florida 33160-2296

Ms. Rosemary Chambers  
Principal  
Hallandale Beach High School  
720 NW Ninth Ave.  
Hallandale Beach, Florida 33009

Mr. Mark Antonio  
Hallandale Historic Preservation Board Advisor  
400 South Federal Highway  
Hallandale Beach, Florida 33009

Dr. Linda Lopez  
Hallandale Adult Center  
1000 SW Third Street  
Hallandale, Florida 33009

Ms. Debra Patterson  
Principal  
Hallandale Beach Middle School  
120 SW 4<sup>th</sup> Avenue  
Hallandale Beach, Florida 33009

Dr. Kendrick Pierre  
Director, Community Redevelopment Area  
400 South Federal Highway  
Hallandale Beach, Florida 33009

The following agencies were contacted to solicit their support and input into the City of Hallandale Beach's Floodplain Management Plan, and to inquire if they are doing anything that may affect the community's program:

Mr. Tony Carper, Director  
Broward Emergency Management Agency  
201 NW 84<sup>th</sup> Avenue  
Plantation, Florida 33324

Mr. Jose L. Lopez, PE, PMP  
South Florida Water Management District  
8211 W. Broward Boulevard  
Plantation, Florida 33322

Mr. Leonard Vialpando  
Engineer IV  
Broward County Environmental Protection Department  
1 North University Drive  
Plantation, Florida 33324

Florida Coastal Management Program  
Ms. Lynn F. Griffin  
Coastal Program Administrator  
The Department of Environmental Protection  
3900 Commonwealth Boulevard MS 47  
Tallahassee, Florida 32399-3000

NFIP Florida State Coordinator  
NFIP Regional Office  
PO Box 1046  
Zephyrhills, Florida 33539-1046

Ms. Susan W. Wilson, CFM  
DHS/FEMA Region IV  
Federal Insurance and Mitigation Division  
3003 Chamblee Tucker Road  
Atlanta, Georgia 30341

The American Red Cross  
Broward County Chapter  
6710 W. Sunrise Boulevard  
Suite 111  
Plantation, Florida 33313

Mr. Steven Cooper, Acting Director  
National Weather Service  
Southern Region Headquarters  
819 Taylor Street  
Room 10AD6  
Fort Worth, Texas 76102

US Army Corp of Engineering  
Jacksonville  
PO Box 4970  
Jacksonville, Florida 32232-0019

## **Meetings with Other Agencies and Organizations**

On October 1, 2007, the FMPC Chair, Earl King, met with Jose Lopez, PE, PMP, of the South Florida Water Management District (SFWMD). The purpose of the meeting was to review common problems, development policies, mitigation strategies, inconsistencies and conflicts in policies, plans, programs and regulations between the FMP and the SFWMD.

Mr. King also spoke with Susan Wilson, with FEMA's Atlanta office, and discussed the single claim repetitive loss properties in Hallandale Beach. They also discussed the fact that the most recent Flood Insurance Study for the City of Hallandale Beach was conducted in 1992.

In a telephone meeting with Leonard Vialpando, Engineer IV, Broward County Environmental Protection Department, it was learned that Broward County is re-starting a program to maintain the elevation reference marks in the county. How the Hallandale Beach Floodplain Management Plan relates to the County was also discussed.

A telephone meeting was conducted with Ben Weiger representing the National Weather Service on October 2, 2007. Mr. Weiger provided direction for accessing helpful information both from the NOA website and from the local National Weather Service in Miami.

Correspondence was received from the Planning Division, Watershed Planning Section of the Department of the Army, in reply to the FMPC's request for support of the community's floodplain management efforts. The Jacksonville District Corps of Engineers offered to be included in the plan development efforts as another source for general floodplain information. Under their Flood Plain Management Services Program, the Corps of Engineers is available to Hallandale Beach to provide technical information on flood zones, available flood elevation, flood proofing, and the National Flood Insurance Program. The City is urged to contact Mr. Royce Tipton for more information.

## **Solicitation of Input on the Draft Action Plan**

A draft of the 2007 FMP Action Plan was sent to all of the other agencies and organizations that had been contacted, asking them to comment by a certain date.

## IV. ASSESSMENT OF THE HAZARD

### Flood Insurance Rate Map

The Flood Insurance Rate Map (FIRM) was used to identify the flood prone areas in the City. The map predicts the Special Flood Hazard Areas (SFHA) inundated by the 100-year storm and the 500-year storm. Please see attached FIRM map for the City of Hallandale Beach.

The various FEMA flood zones are indicated on the map and are color-coded for identification. Each zone is defined as follows:

- ZONE AE:** Base flood elevation determined.
- ZONE AO:** Flood depths 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined for areas of alluvial fan flooding. Velocities also determined
- ZONE VE:** Coastal flood with velocity hazard (water action). Base flood elevation determined.
- ZONE X:** Areas determined to be outside 500-year flood plain.
- ZONE X500:** Areas of 500 year flood; area of 100- year flood with average areas less than 1 square mile; and areas protected by levees from 100-year flood.

The adoption of a new FIRM is anticipated in 2013.

### Existing Flood Studies

The following documents, plans, studies, etc., were used in the development of the 2007 Floodplain Management Plan:

- Drainage Study Area west of U.S. 1 from 7<sup>th</sup> St. to the Miami/Dade County Line
- Hydraulic Evaluation for SE 14<sup>th</sup> Ave. Canal
- Evaluation of the Chaves Lake Drainage Basin, the I-95 Backbone Drainage System from Pembroke Road to the Snake Creek Canal, and Development of Recommendations
- Broward County Local Mitigation Strategy
- 2007 Hallandale Beach Floodplain Management Plan Evaluation Report
- 2006 Hallandale Beach Floodplain Management Plan Evaluation Report

## Existing Flood Studies, continued

- Broward County Flood Insurance Study
  - The most recent Flood Insurance Study for the City of Hallandale Beach was conducted in 1992.
- State of Florida Hazard Mitigation Plan
- Integrating Hazard Mitigation Information, Comprehensive Planning, Broward County Profile

In 2000, the Commission authorized a consultant analysis of the Ansin Boulevard drainage area. It was determined that the solution to the flooding in the area required additional drainage to Chaves Lake. The findings of this report led to a major drainage project in cooperation with the Florida Department of Transportation (FDOT). As a result of the drainage improvements made, the hazards of flooding in the area has been significantly reduced.

In 2002, the City's consultant, R.J. Behar and Company, submitted a report analyzing the flooding conditions of an area west of U.S. 1 that had been subject to significant flooding. A subsequent report demonstrated that the SE 14<sup>th</sup> Avenue Canal has sufficient capacity to accommodate the flooding in this area. As a result of these reports, the City worked with FDOT to implement significant drainage improvements in this area and divert flows to the SE 14<sup>th</sup> Avenue Canal.

The data used to develop the 5-Year Update was obtained primarily from the following sources:

- Enhanced Broward County Local Mitigation Strategy
- 2008 Hallandale Beach Floodplain Management Plan Evaluation Report
- 2009 Hallandale Beach Floodplain Management Plan Evaluation Report
- 2010 Hallandale Beach Floodplain Management Plan Evaluation Report
- 2011 Hallandale Beach Floodplain Management Plan Evaluation Report

## Flood Hazards

The known flood hazards for the City of Hallandale Beach can be categorized as follows:

Tropical Cyclone  
Freshwater Flooding  
Storm Surge  
Thunderstorms

The *Broward County Local Mitigation Strategy* describes these hazards as follows:

### **Tropical Cyclones**

A tropical cyclone is a low-pressure system that forms over warm waters and has an organized circulation. It is characterized by a warm core, steep pressure gradient and strong cyclonic (counterclockwise in the northern hemisphere) flow near the Earth's surface. Tropical cyclones with a maximum sustained wind speed of less than 39 mph are called tropical depressions. When the maximum sustained wind speed ranges between 40-73 mph they are tropical storms. When the maximum sustained wind speed exceeds 74 mph they are called hurricanes.

Hurricanes vary greatly in size, intensity, behavior and movement. Hurricanes are destructive because they produce damage due to high winds, large amounts of rainfall and storm surge. Storm surge is simply water that is pushed toward the shore by the force of the winds swirling around the storm. This advancing surge combines with the normal tides to create the hurricane storm tide. An intense hurricane can send a dome of water more than 18 feet deep ashore as the storm hits land.

All hurricanes are dangerous, but some are more so than others. The way in which storm surge, wind and other factors combine; determine the hurricane's destructive power. To make comparisons easier and to make the predicted hazards of approaching hurricanes clearer, the National Oceanic and Atmospheric Administration's hurricane forecasters use a disaster-potential scale that assigns storms to five categories. This can be used to give an estimate of the potential property damage and flooding expected along the coast with a hurricane.

The scale was formulated in 1969 by Herbert Saffir, a structural consulting engineer, and Dr. Bob Simpson, director of the National Hurricane Center. The World Meteorological Organization was preparing a report on structural damage to dwellings due to windstorms, and Dr. Simpson added information about storm surge heights that accompany hurricanes in each category.

South Florida has a long history of exposure to Tropical Cyclones. Geographically speaking South Florida is on the western end of the Atlantic Basin. Tropical waves are propagated through the basin from east to west. Occasionally a closed area of surface low pressure evolves from one of these tropical waves and a tropical cyclone is created. The tropical cyclogenesis, or a low-pressure, tropical cyclone formation, can take place in the Atlantic Ocean or in the Gulf of Mexico. In either case South Florida may be threatened and since the City of Hallandale Beach is located on the ocean, it is one of the municipalities that is especially vulnerable.

Officially, hurricane season runs from June 1 through November 30 with the peak of the season in the month of September. However, there have been recorded tropical storms as late as the month of February (1952).

With the migration of people relocating to Florida coastal communities in general, and Hallandale Beach specifically, the risk of exposure to the hazards of hurricanes and tropical storms continues to increase, as does the dollar amount of damages each time a tropical cyclone makes landfall. As a coastal community, Hallandale Beach is highly susceptible to storm surge from a hurricane.

### **The Saffir/Simpson Hurricane Scale**

The Saffir-Simpson Hurricane Scale is a 1-5 rating based on the hurricane's present intensity. This is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall. Wind speed is the determining factor in the scale, as storm surge values are highly dependent on the slope of the continental shelf and the shape of the coastline in the landfall region. A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water in close proximity to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. This is the situation along most of the Atlantic Ocean side of the state. Note that all winds are using the U.S. 1-minute average.

- Category 1** Winds 74-95 mph. Storm surge generally 4 to 5 feet above normal. No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs. Also some coastal road flooding and minor pier damage.
- Category 2** Winds 96-110 mph. Storm surge generally 6-8 feet above normal. Some roofing material, door and window damage of buildings. Considerable damage to shrubbery and trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane center. Small craft in unprotected anchorages break moorings.
- Category 3** Winds 111-130 mph. Storm surge generally 9 to 12 feet above normal. Some structural damage to small residences and utility buildings with a minor amount of curtain wall failures. Damage to shrubbery and trees with foliage blown off trees and large trees blown down. Mobile homes and poorly constructed signs are destroyed. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the center of the hurricane. Flooding near the coast destroys smaller structures with larger structures damaged by battering from floating debris. Terrain lower than 5 feet above mean sea level may be flooded inland 8 miles or more. Evacuation of low-lying residences within several blocks of the shoreline may be required.

**Category 4** Winds 131-155 mph. Storm surge generally 13-18 feet above normal. More extensive curtain wall failures with some complete roof structure failure on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be cut by rising water 3 to 5 hours before arrival of the center of the hurricane. Major damage to lower floors of structures near the shore. Terrain lower than 10 feet above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles.

**The Saffir/Simpson Hurricane Scale, continued**

**Category 5** Winds greater than 155 mph. Storm surge generally greater than 18 feet above normal. Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut by rising water 3 to 5 hours before arrival of the center of the hurricane. Major damage to lower floors of all structures located less than 15 feet above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles of the shoreline may be required. Only three Category Five Hurricanes have made landfall in the United States since records began.

**SAFFIR-SIMPSON HURRICANE DAMAGE POTENTIAL SCALE**

Category	Central Pressure (inches)	Minmum Surface Pressure (Millibars)	Winds (mph)	Surge (ft.)	Damage
1	>28.94	> 980	74-95	4-5	Minimal
2	28.50-28.91	979-965	96-110	6-8	Moderate
3	27.91-28.47	964-945	111-130	9-12	Extensive
4	27.17-27.88	944-920	131-155	13-18	Extreme
5	<27.17	< 920	>155	>18	Catastrophic

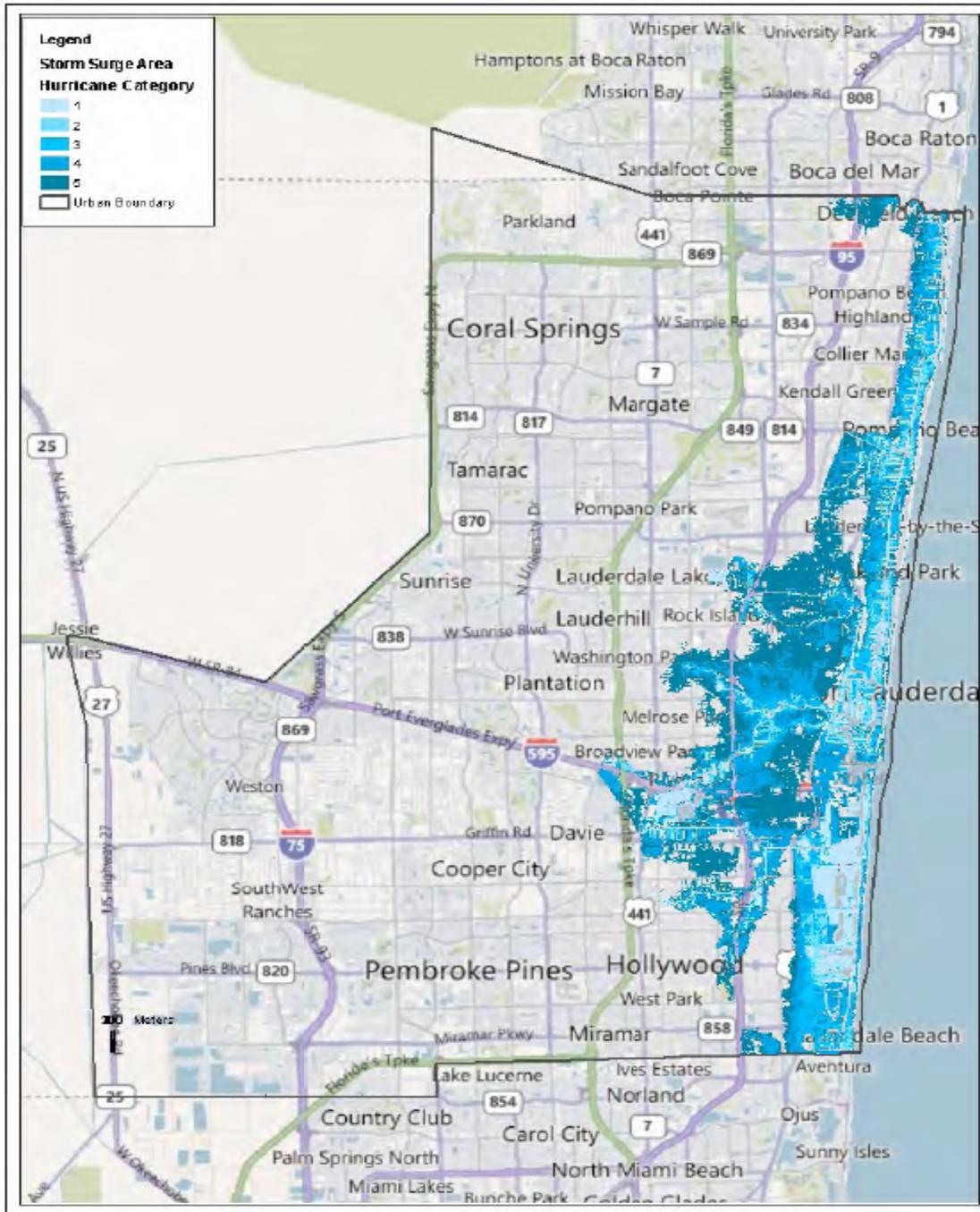
Storm Category	Damage Level	Description of Damages	Photo Example
1	MINIMAL	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage.	
2	MODERATE	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected moorings may break their moorings.	
3	EXTENSIVE	Some structural damage to small residences and utility buildings, with a minor amount of curtain wall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures, with larger structures damaged by floating debris. Terrain may be flooded well inland.	
4	EXTREME	More extensive curtain wall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.	
5	CATASTROPHIC	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.	

Sources: National Hurricane Center; Federal Emergency Management Agency

### Storm Surge

A storm surge is the rise of water levels along a coastline caused by wind and pressure forces of a hurricane. The height of a storm surge at a given location depends on many factors including hurricane intensity, size, forward speed, the orientation of winds relative to the coast, the shape of the coastline, and near shore bathymetry (depth of ocean bottom).

As part of a statewide study, the Division of Emergency Management (DEM) managed a separate contract for the production of updated LIDAR elevation data, which was completed for about 28,000 square miles across the State of Florida. New Sea, Lake, and Overland Surge from Hurricanes (SLOSH) modeling was then completed for 2 SLOSH basins involved in the update for South Florida: Biscayne Bay for Miami-Dade and Broward Counties, and Florida Bay for Monroe County. SLOSH is a modeling tool used to estimate storm surge for coastal areas resulting from historical, hypothetical, or predicted hurricanes taking into account maximum expected levels for pressure, size, forward speed, track, and winds. Therefore, the SLOSH data is best used for defining the potential maximum surge for any particular location. The map below illustrates storm surge inundation zones for Broward County derived from Florida DEM’s effort to update Regional Evacuation Studies.



Source – Florida Division of Emergency Management (Storm Surge Zones from Regional Evacuation Studies)

## Freshwater Flooding

There are many different types of flooding that occur, and there are many factors that affect the type and severity of a flood. The following are some of the more common types of floods experienced in South Florida including the City of Hallandale Beach.

**URBAN FLOOD:** As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization increases runoff two to six times over what would occur on natural terrain. During periods of urban flooding, streets can become moving rivers, while basements can become death traps as they fill with water. Although there are few basements in Hallandale Beach, the effects of urban flooding are evident in the repetitive loss properties.

**RIVER/CANAL FLOOD:** Flooding along rivers and canals is a natural and inevitable part of life. Some floods occur seasonally when rains fill river basins with too much water, too quickly. Torrential rains from decaying hurricanes or tropical systems can also produce river flooding. The many canals in the Hallandale Beach community make it particularly susceptible to canal flood. However, the close proximity to coastal waters makes canal floods typically unlikely apart from storm surges. The exceptions to this rule are the Schaffer Canal and the SE 14<sup>th</sup> Avenue Canal.

**FLASH FLOOD:** A flash flood is any sudden, severe flood event, usually triggered by large sudden downpours. The effects of a downpour are worsened when terrain will not absorb water. Reasons vary: soil type, lack of vegetation, steepness, extensive pavement (urban areas), or the saturation of soil by previous rains. The history of flooding in Hallandale Beach demonstrates that flash floods are frequent and destructive.

Flooding in Hallandale Beach generally is caused by an over abundance of rainfall in a short time frame. The rainfall can be associated with tropical cyclone activity, or can be a simple buildup of thunderstorms. “Training” is a term used by meteorologists to refer to a line of thunderstorms that move over the same land area in a ‘training’ effect. These storms track over the same area dumping rain on already saturated ground.

Hallandale Beach faces the threat of freshwater flooding because of many factors. Possibly the two biggest contributors to the threat are low elevation and the abundance of moisture in the atmosphere. During the summer, tropical waves move through in addition to any tropical cyclones that form. On a smaller scale sea breeze fronts are commonplace. In the fall and spring months, cold fronts drop down across the southeast and are another mechanism for squeezing the abundant moisture out of the air.

In order to assess flood risk, two distinct vulnerability assessment approaches were applied for Broward County in order to assess exposure and potential losses to flood hazard events. This includes (1) a Hazus-MH analysis for riverine (or “non-coastal”)

flood events; and (2) a GIS-based analysis for riverine and coastal flood events using FEMA’s digital Q3 flood data (as shown in Map 4.11) in combination with Broward County’s local tax assessor records. First, riverine flood hazards were modeled using Hazus-MH for the 10-, 50-, 100-, and 500-year flood events. Flood depth was estimated at the pixel level for affected areas, along with proportion of the area affected within the census block. Hazus-MH was utilized to estimate floodplain boundaries, potential exposure for each event frequency, and loss estimates based on probabilistic scenarios using a Level 1 analysis <sup>1</sup>. Table 1 below shows potential building losses for 10- and 50-year riverine flood events for the City and its neighboring jurisdictions, and Table 2 shows potential building losses for 100- and 500-year riverine flood events for the City and its neighboring jurisdictions.

Jurisdiction	Total Exposure	10-Year			50-Year		
		Residential	Commercial	Industrial	Residential	Commercial	Industrial
Dania Beach	\$1,878,435,580	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>
Hallandale Beach	\$3,836,691,130	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>
Hollywood	\$10,029,588,340	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>
Fort Lauderdale	\$22,130,694,710	\$10,703,830	\$184,520	\$92,120	\$16,108,420	\$782,980	\$829,050
West Park	\$331,537,990	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>

Jurisdiction	Total Exposure	100-Year			500-Year		
		Residential	Commercial	Industrial	Residential	Commercial	Industrial
Dania Beach	\$1,878,435,580	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>
Hallandale Beach	\$3,836,691,130	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>
Hollywood	\$10,029,588,340	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>
Fort Lauderdale	\$22,130,694,710	\$19,225,060	\$919,290	\$1,050,810	\$23,874,870	\$1,787,050	\$2,285,860
West Park	\$331,537,990	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Negligible</i>

**Thunderstorms**

Heavy rainfalls not associated with a tropical storm are capable of dropping significant rain in a short period of time causing freshwater flooding. Actual events over the past ten years identify some municipalities in Broward County as being more prone to freshwater flooding than others. Hallandale Beach is one of those municipalities highly susceptible to thunderstorms.

To estimate potential losses due to severe thunderstorms, NOAA historical hail loss data was used to develop a severe thunderstorm stochastic model. In this model:

- Losses were scaled for inflation
- Average historic severe thunderstorms damageability was used to generate losses for historical severe thunderstorm events where losses were not reported
- Expected annualized losses were calculated through a non-linear regression of historical data

<sup>1</sup> According to FEMA’s Hazus Web site, “a Level 1 analysis yields a rough estimate based on the nationwide database and is a great way to begin the risk assessment process and prioritize high-risk communities.”

- Probabilistic losses were scaled to account for would-be losses where no exposure/instrument was present at the time of the event

The table below shows potential annualized property losses for thunderstorm wind for Hallandale and its neighboring jurisdictions.

Jurisdiction	Total Exposure		Annualized Expected Property Losses (\$)	Annualized Percent Loss Ratio	
Dania Beach	\$1,878,435,580		Negligible	0.00%	
Hallandale Beach	\$3,355,758,950		Negligible	0.00%	
Hollywood	\$10,029,588,340		Negligible	0.00%	
Fort Lauderdale	\$22,130,694,710		\$27,290	0.00%	
West Park	\$331,537,990		Negligible	0.00%	

## Other Natural Hazards

Much of the information, tables, and data in the next two sections have been gleaned from the public documents of the Broward County Enhanced Local Mitigation Strategy (ELMS) and the Florida State Hazard Mitigation Plan.

### History of Natural Hazards and Probability of Future Events

Florida continues to be one of the fastest growing states and is currently the fourth largest state based on population. This trend, coupled with the fact that a high percentage of the population lives within 10 miles of the coastline, makes Florida’s population extremely vulnerable to the impacts of natural, technological and man-made hazards. Due to the state’s unique geographical setting it is vulnerable to a wide array of hazards that threaten its communities, businesses, and environment.

This section of the plan will provide an overview of the specific natural, technological and man-made hazards that can affect the City of Hallandale Beach, including information on historical occurrences and the probability of future occurrences.

The following natural hazards are identified as potential risks for Broward County, in which the City of Hallandale Beach is located, and are analyzed both in the County’s Enhanced Local Mitigation Strategy (ELMS) and in this report:

Natural Hazards	Human Caused Hazards
<p><b>Atmospheric</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Extreme Heat</li> <li><input type="checkbox"/> Freeze</li> <li><input checked="" type="checkbox"/> Lightning</li> <li><input checked="" type="checkbox"/> Severe Thunderstorm (hail and wind)</li> <li><input checked="" type="checkbox"/> Tornado</li> <li><input checked="" type="checkbox"/> Tropical Cyclone (wind and storm surge)</li> <li><input type="checkbox"/> Winter Storm</li> </ul> <p><b>Hydrologic</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Coastal Erosion</li> <li><input checked="" type="checkbox"/> Drought</li> <li><input checked="" type="checkbox"/> Flood</li> <li><input checked="" type="checkbox"/> Rip Current</li> <li><input checked="" type="checkbox"/> Sea Level Rise/Climate Change</li> </ul> <p><b>Geologic</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Earthquake</li> <li><input type="checkbox"/> Expansive Soils</li> <li><input type="checkbox"/> Sinkhole / Land Subsidence</li> <li><input type="checkbox"/> Tsunami</li> <li><input type="checkbox"/> Volcano</li> </ul> <p><b>Other</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Wildfire</li> </ul>	<p><b>Biological</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Agricultural Disease</li> <li><input checked="" type="checkbox"/> Infectious Disease</li> </ul> <p><b>Societal</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Civil Disturbance</li> <li><input checked="" type="checkbox"/> Mass Migration</li> <li><input checked="" type="checkbox"/> Terrorism</li> </ul> <p><b>Technological</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Computer Virus</li> <li><input type="checkbox"/> Dam / Levee Failure</li> <li><input checked="" type="checkbox"/> Hazardous Material Incident</li> <li><input type="checkbox"/> Nuclear Power Plant Accident</li> <li><input type="checkbox"/> Structural Fire</li> </ul>

Of these hazards, freshwater flooding, tropical cyclone-wind, tropical cyclone-storm surge, and lightning were ranked the four highest priority natural disasters. Flood is not covered in this section as it is covered in the previous section of this report as the major hazard in the City of Hallandale Beach.

**Heat**

According to the State of Florida Hazard Mitigation Plan, Florida averages 12 heat related fatalities per year. Major historical events in the state include 241 deaths in a 1993 heat wave, and another 68 during a 1999 heat wave. Recent events in Broward County, as recorded by the National Climatic Data Center, include the following (no significant extreme heat events have occurred since 2009):

***Winter 2003 – Extreme Heat***

During February 27 through March 23, 18 daily heat records were set in southeast Florida. There were more heat records during this 25-day period in southeast Florida than at any time of year and at any time in history. The warmest temperature ever in March in Fort Lauderdale was recorded at 93 degrees on the 22nd. The entire month of March was the warmest on record in Fort Lauderdale.

***June 2006 – Extreme Heat***

On June 16, 2006, a 20 year old male died of apparent heat exposure in the Everglades in extreme northern Broward County. High temperatures that day were in the lower 90s and

lowest relative humidity values were around 55%, producing maximum heat index values of near 105 degrees.

#### ***June 21-22, 2009 – Extreme Heat***

On Sunday June 21 and Monday June 22, unusually high temperatures affected interior and eastern sections of South Florida. High temperatures reached the upper 90s in a few locations on June 21. The hottest day was June 22, in which an all-time record high was tied at Fort Lauderdale at 100 degrees.

Heat casualties are usually caused by lack of adequate air conditioning or heat exhaustion. The most vulnerable population to heat casualties are the elderly or infirmed, who frequently live on low fixed incomes, and cannot afford to run air conditioning on a regular basis: They may experience power outages, and may be isolated, with no immediate family or friends to look out for their well-being.

The probability of future extreme heat waves in Broward County is considered “likely”. In the future Broward County could be expected to be impacted by periodic extreme heat events with temperatures up to the all-time record high of 100 degrees.

#### **Lightning History and Future Probability**

Lightning strikes are a frequent impact associated with thunderstorms. Based on the 10 year average (1999-2008) reported by the National Weather Service, an average of 42 people are killed each year by lightning strikes in the United States. Florida has, by far, more lightning deaths than any other state. Annually lightning kills more people in Florida than all-weather hazards combined.

The National Climatic Data Center has recorded 1126 lightning events from 1993 to 2011, of which 103 that have resulted casualties in Broward County in the same period. These events account for 14 deaths and 75 injuries, the majority of which have occurred during the summer months. One (1) of these lightning events occurred in Hallandale Beach which resulted in one (1) injury.

The probability of future lightning events in Broward County is considered “highly likely”, due mainly to a historical 8% event occurrence rate. Further, Broward County remains susceptible to lightning deaths and injuries due to its flat terrain and large number of people who engage in outdoor activities. In the future Broward County could be expected to be impacted by 62 to 63 lightning events with 5 to 6 of these events causing injuries and/or death.

The peak of thunderstorm season is the month of July and therefore, the threat of lightning strikes, damage and deaths increases during this time. Lightning occurs randomly, therefore it is impossible to predict where it will strike. It is assumed that all of Broward County is uniformly exposed to lightning which strikes in very small, specific geographic areas.

### **Thunderstorms History and Future Probability**

As Florida is the thunderstorm capital of the United States, it is a rare occasion when thunderstorms are not observed somewhere in the state during the summer rainy season, generally at the end of May through the beginning of October. Severe weather impacts Florida every day during the summer months. Also, extensive severe weather events occur about five times annually, mostly in the spring and fall.

According to the National Climatic Data Center, there have been 418 recorded severe thunderstorm events (including hail and high wind) in Broward County since the early 1950's. These included:

- 277 high wind events since 1955 that resulted in 3 fatalities, 12 injuries, and \$2.37 million in property damages. The costliest event occurred on August 1, 1993 when a downburst flipped over an airplane at the Fort Lauderdale Executive airport causing approximately \$500,000 in damages.
- 141 hail events since 1955 that resulted in no reported fatalities, 1 injury, \$12,000 in property damages, and no reported crop.

The probability of future severe thunderstorm events in Broward County is considered “highly likely”. In the future Broward County could be expected to receive severe thunderstorm events with straight-line winds that exceed 58 mph winds and hail size up to 3 inches in diameter.

### **Tropical Cyclone History and Future Probability**

Hallandale Beach is very susceptible to hurricanes and tropical storms that form over the Caribbean Sea and Atlantic Ocean. Hurricanes and tropical storms probably represent the most serious catastrophic threat to Hallandale's population. Of the state's 67 counties, 35 have coastlines that either front the Atlantic Ocean or the Gulf of Mexico. Hallandale Beach is in one of these 35 counties. The proximity to the Atlantic Ocean, coupled with the generally low coastal elevations and the fact that 100% of Hallandale Beach's population resides within three miles of the coastline, all contribute to the City's vulnerability to this natural hazard.

The Broward County Enhanced Local Mitigation Strategy (ELMS) states that according to NOAA historical storm track records, 102 hurricane or tropical storm tracks have passed within 75 miles of Broward County since 1850. This includes: three Category 5 hurricanes, 8 Category 4 hurricanes, 13 Category 3 hurricanes, 15 Category 2 hurricanes, 18 Category 1 hurricanes, and 45 tropical storms. Of the 102 recorded storm events, 22 had tracks that traversed directly through Broward County.

Sixty (60) hurricanes have made landfall in Florida from 1900 through 2002. Between 1992 and 2001, the State of Florida has received 14 Presidential Declarations for tropical cyclones, totaling over \$1.8 billion in federal funds. Hurricane activity increased from

2004-2005 with 4 presidential declarations in 2004 and another 3 presidential declarations for hurricanes in 2005. There has only been 1 hurricane/tropical storm presidential declaration in Broward County from 2006 to 2011.

By virtue of its geographic location in South Florida, all areas of Broward County are highly susceptible to hurricanes and tropical storm-force winds. Further, the immediate coastal zone and areas along the canals of Broward County are extremely susceptible to potential storm surge inundation resulting from hurricanes and tropical storms.

### **Previous Hurricanes**

A number of these hurricanes came ashore at Miami but they are mentioned here due to the fact that Hallandale Beach is in such close proximity to Miami, and the reach of the hurricanes can extend for miles in either direction from the center of the storm.

**October 11-20, 1906 Hurricane:** A hurricane moved across the Florida Keys and passed over Miami on October 18, resulting in the loss of 134 lives.

**September 6-22, 1926 Hurricane:** The eye of the hurricane moved directly over Miami on the morning of September 18, leaving approximately 100 dead. The storm continued northwestward across south Florida and entered the Gulf of Mexico at Fort Myers. Northeast winds from the storm raised Lake Okeechobee water levels above the low dike on the south end of the lake near Moore Haven. Approximately three miles of dike failed, sending 10 to 12 foot floodwaters into Moore Haven and at least five-foot deep floodwaters into Clewiston, 16 miles to the southeast.

**August 24, 1992 Hurricane Andrew:** Hurricane Andrew made a memorable landfall in south Dade County, causing an estimated \$26.5 billion in damages. Andrew produced approximately seven inches of rain, 165 mph sustained winds, a maximum storm tide of 16 feet and a total of 96 deaths (including Louisiana). In all, Andrew destroyed 25,000 homes and significantly damaged more than 100,000 others in South Florida.

Evacuations were ordered for 300,000 in Broward County. Though landfall was in south Dade County, Broward still experienced Andrew's wrath with 78-87 mph peak gusts, three deaths attributed indirectly and \$.1 billion dollars worth of damage. Though Hurricane Andrew did not directly hit Hallandale Beach, its peripheral strong winds caused significant debris damage. Interestingly enough, hours before Hurricane Andrew's landfall, it was predicted to make landfall at Hallandale Beach.

Andrew dropped sufficient rain to cause local floods even though the hurricane was relatively small and generally moved rather quickly. Rainfall totals in excess of seven inches were recorded in southeast Florida. Andrew was a compact system. A little larger system, or one making landfall just a few nautical miles further to the north, would have been catastrophic for heavily populated, highly commercialized and no less vulnerable areas to the north such as Miami, Miami Beach, Key Biscayne, Hallandale Beach, Hollywood and Fort Lauderdale.

**August 25, 2005, Hurricane Katrina:** Katrina was one of the most devastating hurricanes in the history of the United States. It is the deadliest hurricane to strike



the United States since the Palm Beach-Lake Okeechobee hurricane of September 1928. It produced catastrophic damage estimated at \$75 billion in the New Orleans area and along the Mississippi coast. Before making its historic landfall in Mississippi, Katrina became a hurricane just before making landfall at Hallandale Beach during the evening of August 25. The hurricane moved southwestward across southern Florida into the eastern Gulf of Mexico on August 26. Katrina then strengthened significantly, reaching Category 5 intensity on August 28. Katrina became a hurricane just before making landfall at Hallandale Beach during the evening of August 25. The hurricane moved southwestward across southern Florida into the eastern Gulf of Mexico on August 26. Katrina then strengthened significantly, reaching Category 5 intensity on August 28.

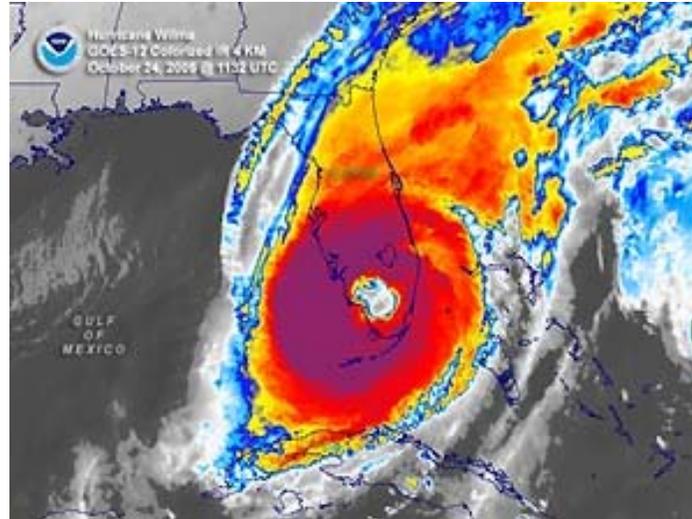
Hurricane conditions also occurred over southern Florida and the Dry Tortugas. The National Hurricane Center reported sustained winds of 69 mph with a gust to 87 mph. Katrina caused 10 to 14 inches of rain over southern Florida, and thirty-three tornadoes were reported from the storm.

Katrina is responsible for seven deaths in southern Florida. The hurricane also caused wind and water damage in Miami-Dade and Broward counties.



**October 2005, Hurricane Wilma:** On October 23, 2005, Wilma accelerated northeastward from the southeastern tip of Mexico toward southern Florida. With its windfield expanding, and the eye increasing to a very large 50-miles wide, Hurricane Wilma intensified to category 3 status with wind speeds of 115 mph. Continuing to intensify to a very strong category 3 storm with wind speeds of 125 mph, Wilma made landfall on the southwest coast of Florida, near Naples around 7am on the 24th. Due to the increased forward speed of Wilma, the hurricane exited the coast of Florida near Palm Beach, about 50 miles north of Hallandale Beach, just four hours later with the eye completely intact and wind speeds of 100 mph. . Ten

tornadoes occurred in Florida due to Wilma. Five deaths have been directly attributed to Wilma in Florida, and widespread damage estimated at \$16.8 billion in southern Florida.



Rainfall in parts of Florida exceeded nine inches, despite the rapid movement of the storm. Over six million people were without power in Florida, including the entire stretch of the Florida Keys after Wilma made landfall on October 24th. The full electric power restoration took weeks.

### **Current and Future Exposure to Tropical Cyclones/Hurricanes**

The probability of future tropical storm/hurricane events in Broward County is considered “likely”. According to statistical data provided by the National Hurricane Center, the annual probability of a hurricane and tropical storm affecting the area is between 48 and 54% per year. This empirical probability is fairly consistent with other scientific studies and observed historical data made available through a variety of federal, state, and local sources. Additional data made available through NOAA indicate that the return period for a Category 3 hurricane in Broward County is between 9 and 15% per year. In the future Broward County could be expected to be hit by tropical storms/hurricanes with wind speeds up to 160 mph and storm surge with storm tide heights up to 9 feet and inundation depths up to 6.5 feet at Moffett Street/NE 14th Avenue in Hallandale Beach [from the 2010 Florida Statewide Regional Evacuation Study Program Storm Tide Atlas for Broward].

The threat of hurricanes has been converted into an increased level of vulnerability over the years as more people have moved into the state and chosen to live in proximity to the coast. Hallandale Beach’s farthest point west is a mere three miles from the Atlantic Ocean, and situated in those three miles is the Intracoastal Waterway and miles of canals.

The population and property of the residents and businesses in Hallandale Beach are extremely vulnerable to hurricanes.

### **Storm Surge History and Future Probability**

Storm surge (storm tide) is perhaps the most dangerous aspect of all the hazards that can accompany a hurricane. Storm surge heights, and associated waves, are dependent upon the configuration of the continental shelf (narrow or wide) and the depth of the ocean bottom (bathymetry). A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water in close proximity to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. This is the situation along most of the Atlantic Ocean side of the state.

The impacts of climate change, global warming, and sea level rise will likely exacerbate the severity of future storm surge events. Additional factors that could mitigate storm surge include the construction of additional structures on the canal system closer to the Atlantic Ocean that would block even more inland storm surge penetration via the canals. One interesting factor from the 2011 SFWMD report is that, due to increased wind shear over the Atlantic basin, the number of tropical storms and hurricanes may decrease 6-34%.

### **Erosion History and Future Probability**

The high winds of coastal storms produce higher tide levels and the wave energy, which induce an offshore transport of beach and dune sediment. Under storm conditions the beach profile lowers and the dune line recedes with the loss of sediment. During normal wave and tide conditions following a storm, sediment is transported inland by the wind to accrete new dunes. Imprudently sited and designed coastal construction may impede this natural recovery process. Natural inlets, modified for navigation purposes by deepening and construction of jetties, have caused a substantial amount of Florida's erosion, especially along the east coast. Hallandale Beach is customarily subject to significant coastal erosion as a continuing effect of these factors.

Recognizing the importance of the state's beaches, the Florida Legislature in 1986 adopted a posture of protecting and restoring the state's beaches through a comprehensive beach management-planning program. Under the program, the Department of Environmental Protection's Bureau of Beaches and Coastal Systems evaluates beach erosion problems throughout the state seeking viable solutions.

Broward County's beaches are in a state of chronic erosion. The State of Florida has estimated that 21 of the 24 miles of Broward's beaches are critically eroded, and in some areas there is little beach left at high tide. Beach erosion threatens the very resource that residents and visitors enjoy. The beach at the City of Hallandale Beach has been labeled one of "critical erosion", a level of erosion that threatens substantial development,

recreational, cultural, or environmental interests. While some of this erosion is due to natural forces and imprudent coastal development, a significant amount of coastal erosion in Florida is directly attributable to the construction and maintenance of navigation inlets. Florida has over 60 inlets around the state, many have been artificially deepened to accommodate commercial and recreational vessels and employ jetties to prevent sand from filling in the channels. A by-product of this practice is that the jetties and the inlet channels have interrupted the natural flow of sand along the beach causing an accumulation of sand in the inlet channel and at the jetty on one side of the inlet, and a loss of sand to the beaches on the other side of the inlet. Unfortunately, Hallandale Beach is located south of the Port Everglades entrance where it is subject to consistent loss of sand.

There are 21 miles of critically eroded beach in Broward County, of which 13.5 miles are restored and maintained. Erosion is attributed to frequent winter northeasters, occasional tropical storms and hurricanes, and the effects of Hillsboro Inlet, Port Everglades Entrance, and Bakers Haulover Cut. The most erosive storms in recent years were Hurricane Andrew (1992), Hurricane Wilma (2005) and Tropical Storm Sandy (2012).

Broward County has conducted six beach nourishment projects prior to 2000. Two of these six were in Hallandale Beach prior to 2000. In 1979, the City of Hallandale first nourished the southernmost 4,000 feet of Broward County with 350,000 cubic yards of sand from an offshore borrow site.

**Broward County Beach Restoration/Nourishment Projects in the Twentieth Century**  
(Costs in millions)

Year	Project	Quant. (c/y)	Length (mi.)	Total Cost (\$M)	Federal Share (\$M)	State Share (\$M)	County Share (\$M)	City Share (\$M)
1970	Pompano (Seg. II)	1.08 million	2.8	1.76	.88	0.44	0.33	0.11
1971	Hallandale (Seg. III)	360,000	.75	.78	0	0.59	0.15	0.04
1976	John U. Lloyd S.P (Seg. III)	1.09 million	1.5	2.96	1.97	0.84	0.15	---
1979	Hollywood / Hallandale (Seg. III)	2.0 million	5.2	7.83	3.33	2.82	0.88	0.80
1983	Pomp\ Laud-By-The-Sea (Seg. II)	1.8 million	5.3	9.99	4.80	3.49	1.40	0.30
1989	John U. Lloyd S.P. (Seg. III)	604,000	1.6	5.68	3.97	1.71	---	---
1991	Hollywood / Hallandale (Seg. III)	1.1 million	5.2	9.47	4.17	3.88	1.07	0.35
Total		8.034 million	22.35	38.47	19.12	13.77	3.98	1.60

Most beaches in South Florida are eroding to some degree due to various causes such as stabilized inlets, encroaching development, storms, and poor sediment management, the alternatives are clear: make the commitment to maintain the beach infrastructure, restore it when it's gone, or lose it. Regular, planned maintenance is less expensive than restoration, and the evolution of coastal engineering means that beach restoration and nourishment projects can be constructed to be more durable than in the past.

The beach and dune system of the Hallandale Beach coast is very dynamic. Hallandale Beach has been included on the list of those beaches that are critically eroding. Beach nourishment in Hallandale Beach, neighboring Hollywood Beach and John U. Lloyd State Park were completed in March 2006 using 1,540,000 cubic yards of sand from offshore borrow sites. The beach fill design of Hollywood-Hallandale consisted of a 50 foot extension of the MHW shoreline seaward of the Erosion Control Line plus fill material equivalent to six years of advance nourishment. The project included construction of 89 acres of artificial reef as mitigation for impacts to 7.6 acres of nearshore hardbottom. A physical and environmental monitoring program is being conducted to verify avoidance of impacts to nearshore hardbottom. The Florida Department of State will continue to monitor this restoration and periodically nourish using sand from offshore sources and/or sand hauled from other areas in Florida.

Despite the County's historical successes at stemming the erosion of Broward beaches, there are steps that can be taken to improve Broward's beach management program. Beach restoration and beach nourishment are expensive and to a degree temporary, and require a continuing supply of economically accessible sand. Unfortunately, projects cost are increasing, and economical sources of sand are dwindling. Therefore, future plans for beach erosions control in Broward County must include ways to increase the lifespan of beach nourishments, and lower the long-term financial exposure of all participants. Beach revegetation through planting sea oats on dunes serves to help protect against erosion. The City of Hallandale Beach completed a beach revegetation project in August 2007.

Beginning in 2009, the City of Hallandale worked together with the City of Hollywood to permit an additional beach renourishment project. The permit was subsequently obtained, and the City of Hollywood proceeded to perform renourishment of a portion of its beach in 2011. The City of Hallandale Beach is setting aside funds on an annual basis to implement beach renourishment on its beaches.

### **Wildfire History and Future Probability**

Wildfires have burned across the woodlands of Florida for centuries and are part of the natural management of Florida's ecosystems. Forest fires from natural causes such as lightning account for only a small percentage of Florida's wildfires, whereas people are by far the leading cause. While there is a risk of wildfire occurring in Broward County, this hazard was given a low level of priority in the Local Mitigation Strategy ranking and it was given a very low probability in the City of Hallandale Beach. Hallandale Beach

itself and the surrounding area is built out and urbanized; therefore, there is little forestland, woodland brush and grassland that would be susceptible to wildfires.

There is always a threat of lightning-caused fires in the City. The largest number of lightning-caused fires occurs in July, coinciding with the peak of the thunderstorm season.

According to the Florida Division of Forestry, there have been 17 significant fires in Broward County since 1981 (burning 10,000 acres or more). Most of these large wildfire events occur in the undeveloped, western portions of Broward County, including the Everglades, and most have occurred during Broward County's dry season which extends from January through May. Common causes of wildfires within the county are drought, lightning, arson, carelessness by smokers, debris burning, equipment operation, and children playing with matches.

During May 2007, at least 233 fires burned roughly 100,000 acres in 52 of the 67 Florida Counties, mostly in the northern, central, and southwest. Although most of the acreage burnt by these fires occurred outside of Broward County, the county was blanketed with smoke. This resulted in the closure of major roads and forced many people indoors. On May 9th, the Air Quality Index reached an "unhealthy" range of 154, meaning that the air was unhealthy for sensitive people who have asthma and heart disease. No significant wildfires have occurred in Broward County since 2007.

Because Hallandale Beach is an urban area, the probability of future large wildfire events is considered "unlikely". However, in case of wildfire in neighboring counties, traveling smoke may be a health hazard to the City's most vulnerable groups (people with asthma and heart disease).

### **Severe Storms, Tornadoic History and Future Probability**

All areas of the state are vulnerable to severe storms and tornadoes. The potential for damage and loss of life increases as a function of population density. As the number of structures and population increase, the probability that a tornado will cause property damage or human casualties also increases. When compared with other states, Florida ranks:

- #4 in the number of tornado events
- #19 in tornado deaths
- #11 in tornado injuries
- #18 in damages.

Florida's susceptibility to wind disasters is further compounded by the fact that certain areas of the state have a large concentration of mobile home residents. Mobile homes are extremely susceptible to wind damage due to light construction materials, flat sides, flat roofs, and lack of permanent foundations. Recent development trends, however, have

seen the demise of many mobile home parks throughout Broward, as the land continues to be sold to developers.

Based upon historical trends, Florida can expect over 50 tornadoes and two deaths attributed to tornadoes in any given year. Florida remains one of the fastest growing states in the country and with this rapid growth comes the realization that the state's risk exposure will increase with this population. Common damages from tornadoes include fallen trees, downed power lines, damage to automobiles and boats and destruction of mobile homes and recreational vehicles. The most common type of damage to conventional homes results from a loss of ancillary structures (porches, patios, etc.), roof damage and the failure of windows and doors.

Although the Midwest has the reputation for the worst tornadoes, Florida is the state that experiences the highest number of tornadoes per square mile of all states. Florida has averaged approximately 75 tornadoes per year since 1950, with an average of 3 deaths and 60 injured per year. According to the National Climatic Data Center, the state experienced 3,983 tornado events from 1950 through February of 2003.

Tornadoes, heavy rainfall and severe thunderstorm activity are frequent companions of hurricanes and tropical cyclones. The heaviest rainfall in Florida in connection with a hurricane occurred at Yankeetown in September of 1950, when 38.5 inches fell in a 24-hour period. In recent years, tornadoes have been associated with the majority of tropical cyclones in Florida. In every case, they were documented to occur in the outer portion of the hurricane circulation and near the central vortex. It has been discovered that much of the wind damage in hurricanes attributed to tornadoes has, in reality, been the result of "down bursts."

The State of Florida has two tornado seasons: The Summer Season, from June until September, and the Spring Season, from February through April. The Spring Season is characterized by more powerful tornados than the Summer Season because of the presence of the jet stream. When the jet stream digs south into Florida and is accompanied by a strong cold front and a strong squall line of thunderstorms, the jet stream's high winds of 100 to 200 mph often strengthen a thunderstorm into what meteorologists call a supercell mesocyclone. These powerful storms can move at speeds of 30 to 50 mph, produce dangerous down winds, large hail and the most deadly tornadoes. Florida climatology demonstrates that strong to violent tornadoes are just as likely to occur at midnight as they are in the afternoon. This unique feature makes these tornadoes more dangerous because most people are asleep after midnight and cannot receive weather warnings relayed by commercial radio or television stations. The solution to this is to have a NOAA Weather Radio in each home with a tone alert feature. This will allow residents to receive warnings issued by the local National Weather Service office.

### Broward tornadoes from 1950 to 2012

County	Number of events	Deaths	Injured	Property Damage
Broward	109	1	92	\$173,700,000

Events include F-0 through F-5 tornadoes and do not including funnel clouds and waterspouts.

Source: Broward County Enhanced Local Mitigation Strategy (ELMS) - September 2012

On December 16-17, 2009, the City of Hallandale Beach experienced its greatest flooding event in recorded history. Within a 24-hour period of time, 18-20 inches of rainfall was recorded in portions of the City. The Northeast quadrant was especially impacted. This event resulted in a record total of 177 flood insurance claims awarded for this singular event. The fact that the event took place in the dry season was particularly surprising. The remaining months of the 2009-2010 “dry” season were also notably much wetter than usual.

### Drought History and Future Probability

Drought poses substantial risks for Florida generally, and for Hallandale Beach, specifically, due to the threat to the state’s water supply. In Florida, groundwater is the source of drinking water for 90 percent of the population, and the state has been impacted by drought on a repeated basis over the last century.

From 1891 to the present, there have been fifty-four recorded instances of drought in the state. These major droughts all resulted from lack of rain during the period from June through September, the period in which normally higher rainfall is received. Most droughts are limited to one year, and produce two immediate results. First, the aquifers fall to dangerously low levels through excessive drawdown. In coastal areas this increases the potential for saltwater intrusion. At this present time, the City and the South Florida Water Management District are closely monitoring the wells of Hallandale Beach for saltwater intrusion. South Florida is under strict water restrictions due to a drought at the time of this writing. The second immediate problem with drought stems from the fact that sandy soils cannot support agricultural production because of their low moisture holding capacities.

Within the fifty-four recorded instances of drought in Florida, there have been four major hydrologic droughts that resulted in periods of below-normal stream flow and/or depleted reservoir storage due to prolonged lack of rainfall. Areas of the state most severely affected by these droughts were the panhandle and the south-central peninsula from 1932 to 1935; statewide from 1949 to 1957; in the peninsula from 1970 to 1977; and statewide from 1980 to 1982.

Included in the sustained drought of 1949-1957 was an acute drought during 1954-1956, which is the period of the most extreme drought of record in Florida. Statewide runoff during 1955 was estimated to be only 6 inches, compared to the annual average of 14 inches. Millions of dollars were lost to Florida’s economy due to the small yield and

poor quality of citrus fruits and crops. Between January and May 1955, more than 300,000 acres of timber was destroyed by fire, as well as thousands of acres of muck soil that burned in the Everglades.

The drought of 1980-1982 affected the entire state. Extreme rainfall deficiencies in southeastern Florida ranged from 22.1 to 31.3 inches from June 1980 to February 1982. Water levels in Lake Okeechobee, a major water-storage area for southeastern Florida, declined steadily from November 1980 to July 30, 1981, and then they reached the lowest level ever recorded (9.74 ft.).

South Florida relies on its summer rains for its year-round water demands. According to the State of Florida Mitigation Plan, there have been 10 drought cycles in Florida (typically 2-year periods) since the year 1900. In Central and South Florida, severe droughts were reported in 1932, 1955–1957, 1961–1963, 1971–1972, 1973–1974, 1980–1982, 1985, 1988–1989, 1990, 2000–2001, 2006–2007, 2008-2009, and 2010-2011.

According to the National Drought Mitigation Center, from January 1, 1850 to September 19, 2007, there were 134 reported drought impacts for Broward County. There were 17 agricultural, 34 fire, 32 water/energy, 18 social, and 21 other specific drought impacts. The potential magnitude of the impact of drought on Florida is growing each year, and a drought of less severity can have a greater adverse effect now than even 10 years ago. This is because of the increased population and industry in areas of the state where potable water supplies are in short supply. Between 1975 and 1985, the population of Florida increased about 30 percent, while ground water withdrawals from public supplies increased 46 percent. While the impact of drought is less visible on groundwater than on stream flow, it is important to recognize that groundwater provides 90 percent of the public water supply in Florida, making drought a hazard that poses major risk for the state and for the individual communities. Hallandale Beach is particularly vulnerable to drought, which tends to increase saltwater intrusion and threaten the City's water supply.

### **Winter Storms and Freezes History and Future Probability**

Florida does not have an extensive history of winter storms, but is quite susceptible to freezes. A freeze is marked by low temperatures, especially those below the freezing point. Florida's agricultural production is seriously affected when temperatures remain below the freezing point. A moderate freeze may be expected in Florida every one to two years. Severe freezes, where the greatest numbers of winter crops are lost, may be expected on average once every 15 to 20 years. Florida has a history of severe freezes. Since December 1889, there have been at least 20-recorded severe freezes.

Hallandale Beach, located on the southeast coast, is not very vulnerable to severe freezes. Areas located near the ocean usually have warmer temperatures and the communities farther inland can experience colder temperature drops. Also, Hallandale Beach is an urban community and has little to no agriculture to be affected by a severe freeze.

### Previous Occurrences Affecting South Florida

**February 5, 1996:** Cold temperatures caused \$74.9 million in damage to fruit and vegetable crops in south Florida. Minimum temperatures were in the lower to mid-30s over the southern Florida peninsula. Strong winds caused wind chill values in the teens and disrupted electrical service to over 20,000 customers.

**January 19, 1997:** Extreme cold in Collier, Miami-Dade, Glades, Hendry, and Palm Beach Counties caused \$200 million in crop damage.

**December 20, 2000:** Temperatures fell into the mid-20s over Glades, Hendry, eastern Collier, and western portions of Palm Beach and Broward counties and fell to 32 degrees in the farming areas of south Miami-Dade County.

**January 1, 2001:** The second and coldest night of a two-night freeze in south Florida saw minimum air temperatures ranging from 25 to 30 degrees over interior sections of the peninsula. In the metropolitan areas of Miami-Dade, Broward and Palm Beach counties temperatures were in the middle 30s over the western suburbs.

**January 5, 2001:** A freeze occurred throughout the interior sections of South Florida, causing an estimated \$78 million in damage to certain crops.

Florida will continue to be impacted by freezes, but Hallandale Beach's vulnerability as it relates to population and structures is very low.

### Tsunami History and Future Probability

Though tsunamis are more likely to affect Pacific Rim states, historical evidence does show that tsunamis have affected the Eastern United States, including Florida. There are no known tsunami studies or documentation on this hazard in South Florida. Forty tsunamis and tsunami-like waves have been documented in the Eastern United States since 1600.

There were four previous occurrences documented on tsunami activity in Florida by the National Geophysical Data Center from 1886 to 1992. All four were in the northeastern part of the state. No tsunami-like waves have been recorded in the south Florida area.

Though tsunamis were not included on the hazard lists of the State or County, it was included briefly in this study. The evidence on tsunami occurrence in the State of Florida is very limited, therefore it was determined that the state's vulnerability, thus, Hallandale Beach's vulnerability to this event is very low.

### **Agricultural Pests and Diseases History and Future Probability**

Significant outbreaks of pests and crop diseases that have posed a threat to Florida's agriculture include the Mediterranean fruit fly, citrus canker, brown citrus aphid, Asian Gypsy moth, red ring disease of coconut, golden nematode, chrysanthemum white rust, exotic plant feeding snails, other exotic citrus diseases, and numerous scaled insect organism. Since 1970, exotic pests and diseases have been an increasing problem requiring expenditures of over \$158 million on eradication programs in Florida.

If these pests and diseases are not detected, controlled and eradicated, they have the potential to devastate the state's multi-billion dollar agriculture industry.

Because agricultural activities are conducted throughout the state, every section of Florida is vulnerable to the effects of an exotic pest or disease infestation. For instance, the citrus canker outbreak of 1985 affected citrus tree nurseries in 33 of the state's 67 counties.

Over the last several decades, the Florida Department of Agriculture and Consumer Services has detected, eradicated or controlled some 15 different exotic pests and disease infestations. The 1985 citrus canker outbreak resulted in over \$100 million being expended on eradication. Some of the more important efforts to control infestations have included eight medfly eradication programs, response to three swarms of African honeybees and the ongoing citrus canker eradication effort.

### **Technological Hazards History and Future Probability**

As a well-developed, industrialized state, Florida's communities are exposed to a wide range of circumstances, materials and substances that could, under accidental or emergency conditions, pose a human safety or health risk or could threaten the state's many valuable environmental resources. This section summarizes, first, the current situation regarding the two principal categories of technological hazards that are of substantial concern to Florida: radiological materials and hazardous materials. In addition, however, the section notes that other significant technological hazards facing the state also pose a risk to public safety or the economic vitality of the community. These types of technological hazards include a major transportation accident involving numerous injuries or fatalities and a widespread, prolonged failure of utility or telecommunications networks.

### **Terrorism, Sabotage History and Future Probability**

It is recognized that Florida has many facilities that could be considered as likely targets for such acts. There are numerous federal and state government facilities, as well as

several large military installations and major ports that could be considered vulnerable to terrorist attack or sabotage. Port Everglades for example, is located within ten miles of Hallandale Beach. Such actions pose a risk of human safety and health impacts, property damage, and the potential for secondary impacts, such as the release of hazardous materials into the environment. Recent events, i.e. the destruction of the World Trade Center in New York and the subsequent discovery of cultivated anthrax released in this and other states, have driven home the point that we are all much more vulnerable to this hazard than previously believed.

Florida is also a point for immigration of large numbers of immigrants and refugees from politically troubled nations in the Caribbean and Latin America. The state's communities and infrastructure could become impacted by terrorist or sabotage actions that may be an outgrowth of this situation.

### **Mass Migration History and Future Probability**

Florida's location as the nearest United States land mass abutting the Caribbean basin makes it a chosen point of entry for many of the refugees attempting to enter the nation illegally. Even though all of Florida's counties are subject to receiving illegal arrivals, the most vulnerable counties are Monroe, Dade, Broward, Palm Beach, St. Lucie, Indian River, Lee and Collier. The consequences of a mass arrival of illegal entrants include the threat of health, safety and welfare problems if these individuals must be detained in the state for a prolonged period. Such arrivals can also be very disruptive to the routine functioning of the impacted community, resulting in significant expenditures that are directly or indirectly related to the situation.

An example of this hazard occurred in 1994, when the state responded to two major mass immigration incidents. In May 1994, there was an unexpected immigration of approximately 100 Haitian refugees, while in August 1994 there was an influx of 700 Cuban refugees. On March 28, 2007 a boat with Haitian refugees washed up on the shores of Hallandale Beach. The City worked together with other agencies to successfully meet this challenge and effectively address the physical needs of the refugees.

### **Florida Statewide Hazard and Risk Assessment Summary**

The State Hazard Mitigation Plan Advisory Team's (SHMPAT) qualitative rankings were based on a combination of factors:

- Probability of the hazard occurring in the jurisdiction.
- Potential magnitude and severity of the hazard in the area.
- Size of the population at risk in the jurisdiction.
- Growth and development trends for the jurisdictions, especially in areas that are affected by the hazard.

- Existence of large populations with special needs such as the elderly, the poor, and the non-English speaking communities.
- Critical facilities and infrastructure that are vulnerable to the hazard.

Hazards were ranked for each county based on the following ranking scale:

- H - High Hazard Ranking - Mapped in red
- MH - Medium/High Hazard Ranking – Mapped in pink
- M – Medium Hazard Ranking – Mapped in yellow
- L – Low Hazard Ranking – Mapped in green
- Not Identified – Mapped in base color of tan

Statewide Matrix

• FL – Flooding	• FR – Freezes				
• DF – Dam Failure	• ER – Erosion				
• HU – Hurricanes	• SH – Sinkholes				
• TO – Tornadoes	• LS – Landslides				
• SS – Severe Storms	• SM – Seismic Events				
• WF – Wildfires	• TR – Terrorism				
• DR – Drought	• TC – Technological Events				
• EH – Extreme Heat	• MM – Mass Migration				

County	FL	DF	HU	TO	SS	WF	DR	EH	WS	FR	ER	SH	LS	SM	TR	TC	MM
Broward	H	L	H	H	H	L	L	MH	M	M	L	L	L	L	L	L	L

## V. ASSESSMENT OF THE PROBLEM

### Vulnerability to Natural Hazards

One adverse impact on our City within the last decade has been the alarming trend of major storms affecting the City. Over three fiscal years (2004-2006), the City of Hallandale Beach was greatly impacted by major storms. The most damaging of these events was Hurricane Wilma, in October 2005, costing the City \$4.5 million. Fortunately a portion of these costs was reimbursable. However, non-reimbursable City costs for four storms in 2004-2005 impacting the City totaled \$686,000.

Hazards that can potentially affect Broward County in general and Hallandale Beach specifically have been identified in the chart below. Also included is the City's vulnerability to each hazard. This list was compiled from both the Broward County Local Mitigation Strategy and from the Florida Division of Emergency Management.

#### Hazard Identification and Vulnerability Analysis

	High – 5 Low - 1			
Hazard	Probability	Human Impact	Property Impact	Business Impact
Freshwater Flood	5	5	5	5
Tropical Cyclone-Wind	4	5	5	5
Tropical Cyclone Surge	4	5	5	4
Lightning	5	5	4	2
Tornado & Waterspout	4	3	4	3
Heat	5	3	4	2
Insect Born Diseases	3	5	1	3
Freezes	4	4	3	2
Agricultural Diseases	3	1	2	4
Hail	5	1	4	1
Rip Current	5	3	1	1
Sink Holes	1	1	4	2
Drought	3	2	2	2
Earthquakes	1	1	1	1

All of the hazards named above could impact the City’s tourism industry, construction industry, marine industry, technology industry, and overall economy depending on their duration and severity.

Because Hallandale Beach is built out and becoming more dense, and because its total population is within 3 miles of the coastline, this increases the City’s vulnerability and magnifies the impact if a disaster were to occur. The most common disaster in the area is due to tropical weather. The probability of landfall of a hurricane in any given year is 1 in 20. Although a hurricane has the most potential for becoming a major disaster, Hallandale Beach is also susceptible to other events that could interrupt business and personal lives.

**Risk Analysis**  
**Likelihood of Events (Frequency)**

Hazard	Magnitude	Duration	Onset	Distribution	Area Affected	Frequency of Event
	(L)ow (M)ed (H)igh	(S)hort (M)ed (L)ong	(S)hort or (N)o Warning Extended	(S)ingle or (M)ultiple Locations	(L)ocal (C)ounty (R)egional (N)ational	Yearly Occurrence
Hurricane	M	S	S	M	R/N	1/10 years
Tornado	L	S	N	M	L	1/year
Tropical Storm	L	S	S	M	C	1/year
Lightning	L	S	N	S	L	1/year
Drought	L	M	N	M	R/N	1/10 years
Severe Weather	L	S	N	M	C	1/year
Mass Migration	L	L	S	M	R/N	1/10 years
Terrorism	L-H	M	N	S	R/N	No occur

**Key to Risk Analysis Table**

**Magnitude – Size and intensity of disaster**

- Low – No or few deaths, injuries and some property loss
- Moderate – Several to numerous deaths, injuries and much property loss
- High – Mass deaths, injuries and property loss

**Duration – Loiter time of the disaster agent**

- Short – Several minutes to twenty-four hours
- Medium – Twenty-four hours to one week
- Long – One week to months

**Onset – Speed a disaster event begins**

- No warning – Several minutes to twenty-four hours
- Short warning – Twenty-four hours to one week
- Extended warning – One week to months

**Distribution – Disaster effects are spatially separated or in cluttered location**

- Single or multiple locations

**Area Affected – Geographic area of the disaster**

- Region/Nation

County  
Localized  
**Frequency of a disaster event**  
No occurrence  
Number of occurrences per year

### **Hurricane/Tropical Cyclones**

Due to Florida's geographic location, the entire state is vulnerable to damage from hurricane winds and impact from coastal storms. Coastal cities such as Hallandale Beach are more vulnerable than inland areas.

The annual probability for wind speed of 115 mph or higher to impact communities in Broward County is 2.0% to 3.0%.

### **Tornado**

Historical evidence shows that most of the state is vulnerable to tornadic activity. This hazard can result from severe thunderstorm activity or may occur during a major tropical storm or hurricane. Based on historical data, Broward County experienced 70 to 100 tornados (F0 or greater) per year, over the period of record from 1950 to 2002. This frequency is not expected to change in the future.

### **Lightning**

During the summer tropical waves pass through Broward County. On a smaller scale, sea breeze thunderstorms take place regularly. These factors all contribute to more thunderstorm formation, which coincides with more lightning strikes. Also, most children are out of school and vacationers are on holiday. These factors compound the threat of lightning injuries and deaths because a higher number of people mean a higher exposure to this hazard.

### **Heat**

No city in Florida has recorded more than three days per year with a maximum temperature of 100 degrees Fahrenheit or above. The Broward County area has never recorded temperatures above 100 degrees Fahrenheit. This is due to strong summer cooling effects of sea breezes. The maximum temperature average for Broward County during the summer months is between 90 and 92 degrees Fahrenheit.

Heat casualties are usually caused by lack of adequate air conditioning or heat exhaustion. The most vulnerable population to heat casualties are the elderly or infirmed, who frequently live on low fixed incomes, and cannot afford to run air conditioning on a regular basis: Then may experience power outages, and may be isolated, with no immediate family or friends to look out for their wellbeing.

Broward County experienced nine heat casualties from 1979 to 1998 and one heat casualty in 2001. On Sunday June 21 and Monday June 22, unusually high temperatures affected interior and eastern sections of South Florida. High temperatures reached the upper 90s in a few locations on June 21. The hottest day was June 22, in which an all-time record high was tied at Fort Lauderdale at 100 degrees. With predictions of global warming, climate changes and as the median age of the population increases, county and city emergency management personnel will closely monitor their citizens to see that greater numbers do not fall prey to this hazard.

### Freeze

Because of the location of Hallandale Beach, the temperatures are usually a few degrees warmer than inland communities during the coldest months due to sea breeze warming. Also, because of widespread development within Broward County and because Hallandale Beach is not an agricultural area, crop damage losses are anticipated to be minimal now and in the future. Again, as the population ages, county and city emergency management personnel will need to closely monitor the citizens as the elderly are the most vulnerable population to extreme temperatures. On average, cold weather shelters are open 10 times during a winter season. If a wind chill at or below 45 degrees Fahrenheit is expected for 3 hours or more, cold-weather shelters will be opened.

With the considerable discussion on climatic changes, emergency management personnel will continue to monitor those changes and respond accordingly. The table below shows the number of days the City of Hallandale Beach can anticipate temperatures below 32 degrees Fahrenheit and 25 degrees Fahrenheit:

Area	# of days at 32°F or below from 1950 to 2001	# of days at 25°F or below from 1950 to 2001
Miami/Ft. Lauderdale	6	0
West Palm Beach	24	2
Tampa	128	14
Orlando	133	17

### Sinkholes

It is very rare for Broward County to have a natural occurring sinkhole. There have been no reports of natural sinkholes for the county over the last 25 years. There have been no reported naturally occurring sinkholes in the City of Hallandale Beach. Emergency management personnel do not anticipate this statistic will change.

### **Agriculture Disease**

There is now very little commercial agriculture in Hallandale Beach. The most prominent of agriculture diseases that affects the south Florida region is citrus canker. Other than homeowners having citrus trees on their property, the Florida Agricultural Statistics Service lists no citrus production for Broward County.

Though the trees on private property can be susceptible to citrus canker and can ultimately threaten the citrus industry, the Florida Department of Agriculture has an aggressive program in place for the cutting down and removal of infected citrus trees within Florida.

### **Insect Borne Disease**

Measures are being taken through state, county and local governments to limit exposure to the most frequent and serious disease carrier in this area, which is the mosquito. Mosquitoes spread West Nile disease and other encephalitis viruses. The emergency management personnel continue to closely monitor the reported outbreaks and deaths from these diseases and they continue to urge residents to take precautions to limit their exposure to mosquitoes.

### **Mass Migration**

Every coastal community in south Florida is susceptible to mass migration due to political unrest in foreign countries. Mass migration events can have an economic, social and medical impact on a community. Though the latest mass migration was in 1994, Florida cities continue to remain susceptible to this hazard. With hundreds of miles of coastline to protect, officials must continue to be vigilant to monitor the unrest in other countries.

### **Terrorism**

Even prior to September 11, 2001, the U.S. Department of Justice and the FBI had identified Broward County as a highly volatile area for terrorism activity. Broward County has received numerous grants to help prepare for terrorism incidents. With the growth in the area, the growth in diversity and an additional 7.5 million tourists visiting every year, this area is a perfect place for terrorists to keep a low profile. Port Everglades in Fort Lauderdale, the Port of Miami, large sports venues, Miami International Airport and the Fort Lauderdale/Hollywood International Airport make the area susceptible to an attack. Hallandale Beach is located within fifteen miles of these possible targets. A severe haz-mat attack could severely strain the city and county's resources.

The Florida Department of Law Enforcement (FLDE) in conjunction with the FBI, local and state law enforcement officials and Emergency Management has been actively working to promote domestic security. These entities have created seven Regional Domestic Security Task Forces and they continue to share information among the seven task forces.

## **Impact of Natural Hazards**

### **Warnings and Evacuations**

The City of Hallandale Beach maintains a *Comprehensive Emergency Operations Plan*. Supervisory personnel from each department are charged with insuring that all employees are knowledgeable of policies and procedures. Briefings occur before May 1<sup>st</sup> of each year. Department Directors submit a memo by May 7<sup>th</sup> of each year to the City Manager indicating that the briefings have occurred, and the Department is prepared for a hurricane or other emergency. By May 7<sup>th</sup> of each year, each Department Director submits any necessary revisions to the *Comprehensive Emergency Operations Plan* to the Fire Department. By June 1<sup>st</sup> of every year, the Fire Department, in conjunction with the City Manager's office, conducts a Department Director's meeting to review the *Comprehensive Emergency Operations Plan*. Revisions are distributed at this meeting.

The Hallandale Police Department is responsible for disseminating flood warnings to the general public. Different means may be used to communicate the warning, including loudspeakers in police vehicles, using the Emergency Communications Network's CodeRed phone calling system, and door-to-door notification when time permits.

All Hallandale Beach Fire Stations have emergency notification systems connected with Broward County Dispatch. All Fire Rescue crews have pagers also connected with dispatch. The dispatch center transmits all flood warnings received from Broward County Emergency Management, including unexpected storms that may generate flood conditions. It is the responsibility of Hallandale Beech Fire Rescue to initiate operations.

Hallandale Beach residents are informed of the following methods of communication with the City in the event of an emergency or natural disaster:

- City of Hallandale Beach Website  
During emergencies, the City will publish the latest information on its website.
- City of Hallandale Beach Radio Station 1620 AM (WQFA)

The City of Hallandale Beach manages its own AM radio station for up-to-date City information. Residents can tune their radio to channel 1620 AM for information regarding events held in the City at all times. During emergency situations, the City will utilize this station to provide residents with all necessary information to help them remain safe during and after the event.

- Comcast Government Access Channel – Channel 78  
The Government Access Channel on Comcast Cable television will be utilized during emergencies to provide up-to-date information regarding the event including shelter openings, emergency phone numbers, sandbag distribution, water distributions sites, and more.
- City of Hallandale Beach Marquee  
The City’s Marquee is situated outside of the City Hall Complex on South Federal Highway at 3<sup>rd</sup> Street. This marquee will be updated during emergencies reminding residents to tune to Station 1620AM or Comcast TV channel 78 for more information regarding the event.

Watkins Elementary School in Pembroke Park has been designated as a storm shelter for emergency situations affecting Hallandale Beach. City residents are advised to find information about shelter openings on the city website during emergencies in addition to the radio channel 1620AM, TV channel 78 and local news stations. Each emergency event dictates which shelters are opened and when. Also, for information during an emergency, residents may contact the Broward County Hotline at (954) 831-4000, and the City of Hallandale Hotline at (954) 458-3251.

The City of Hallandale Beach also utilizes the CodeRED Emergency Notification System. This is a communication service available for emergency and non-emergency notifications. CodeRED employs intranet mapping capable of geographic targeting of telephone calls, coupled with a telephone calling system capable of delivering a pre-recorded message directly to homes and businesses at the rate of up to 60,000 calls per hour. The system’s main purpose is to notify citizens or groups of citizens in emergency situations.

In an effort to protect human health and safety in the coastal area, the City has adopted the hurricane evacuation times developed by the South Florida Regional Planning Council and maintains the following hurricane evacuation times:

Storm Category	Evacuation Time
1 – 3	6.77 hours
4 – 5	6.94 hours

The City participates with Broward County in the development of evacuation plans and strategies to provide adequate public transportation for residents during evacuation, with

particular emphasis towards senior citizens and handicapped residents. According to figures from the 2010 Census, 25.1% of the population of Hallandale Beach is over the age of 65 and 20.2% of the households in the City had someone 65 years of age or older living alone.

The Hallandale Beach Police Department will direct the evacuation of critical areas, and coordinate the evacuation of the infirm and disabled as well as persons without transportation along with the Fire/Rescue and other departments as well as with Broward County Emergency Management.

The Hallandale Beach Public Works Departments will provide personnel and equipment to keep evacuation routes open until it is unsafe for vehicles and equipment to operate.

To help first responders better plan for Broward County's most vulnerable residents in an emergency, the County, in cooperation with all municipalities, including the City of Hallandale Beach, has launched a Vulnerable Population Registry. The Registry is for residents who do not qualify for a Special Needs shelter, or choose not to evacuate to a mass care shelter, but are disabled, frail, or have health issues that would make coping after an emergency difficult. Caregivers, relatives, neighbors, and friends should suggest this registry to those who might be considered vulnerable during an emergency or storm.

The Broward County Emergency Operations Center (EOC) will be responsible for coordinating all transportation needs. The Broward County EOC will assist in procuring buses for mass evacuation. Mass transit and school buses will be used.

The City requires that proposed developments, which would result in a concentration of elderly and/or handicapped residents, provide plans and methods of evacuation as part of their development planning. Any development within the coastal area must not impede traffic flow along the primary evacuation routes.

The City requests participation in the development of schedules for major construction and maintenance activities conducted by the State, County or Municipal transportation departments along primary evacuation routes. This is to avoid scheduling of major work during seasons of highest hurricane incidents that would hamper evacuation of the coastal area.

Hallandale Beach endeavors to assist in the development and implementation of local public information programs to annually advise residents of high-risk areas of evacuation routes and evacuation schedules. In addition, the City participates in regular reviews and revisions to Broward County's adopted Emergency Preparedness Plan, including providing data regarding City evacuation facilities to the County to be used in the County's evacuation efforts for South Broward and North Dade County areas.

It is the policy of Hallandale Beach to follow the recommendations included in the Hazard Mitigation Annex of the Local Peacetime Emergency Plan and applicable

existing interagency hazard mitigation reports to reduce the exposure of human life, public and private property to natural hazards.

### **Impact on Critical Facilities and Infrastructure**

Critical facilities in Hallandale Beach fall into two categories:

- Buildings or location that, if damaged could create secondary disasters:
  - Hallandale Elementary School, 900 SW 8<sup>th</sup> Street
  - Hallandale High School, 720 NW 9<sup>th</sup> Ave
  - Gulfstream Middle School, 120 SW 4<sup>th</sup> Ave
  - Hallandale Adult Community Center, 1000 SW 3<sup>rd</sup> Street
  - Private Schools
  - The City of Hallandale Beach maintains a listing of buildings that have acquired a “Hazardous Material Permit”. As of October 2012, there are 54 such buildings in the City.
  
- Buildings or locations vital to the emergency response effort:
  - Municipal Complex
  - City of Hallandale Beach Public Works Compound
  - Bell South Transfer Station
  - Florida Power and Light substation
  - Intracoastal Waterway Bridge
    - In the event of an emergency, the Hallandale Beach Fire Department will interface with bridge tender when bridge will be opened or closed to vehicles and marine traffic. Bridge tender notified to instruct EOC when bridge is locked in closed position.
  - Three fire stations in the City

As stated in Hallandale Beach’s *Comprehensive Emergency Operations Plan*, it is the responsibility of the Fire Department to annually update a critical facilities phone list and review any flood response plans that privately owned critical facilities might possess.

The City Manager, or the appointed designee, will be responsible for declaring a State of Emergency. When a disaster is declared, or when the City Manager believes a disaster is about to occur, the Emergency Operations Center (EOC) will be activated. The City Manager will direct and coordinate operations from the EOC. The City Manager will confer with affected Department Heads and implement emergency plans from the EOC. The location of the current City of Hallandale Beach Emergency Operations Center is:

Water Treatment Plant  
630 NW 2 Street  
Hallandale Beach, Florida 33009

This modern new plant meets and exceeds current and future standards and requirements for water treatment and capacity. The new water plant has been designed to provide an emergency operations center for the City's Emergency Management Team. The building has been hardened to be able to withstand a Category 5 hurricane.

In the event of circumstances in which the EOC cannot be located at the Water Treatment Plant, the main Fire Station will house the EOC at:

Alternate Emergency Operations Center  
Main Fire Station  
121 SW 3<sup>rd</sup> Street  
Hallandale Beach, Florida 33009

All the affected Department Heads, after being notified by the City Manager, shall notify their personnel and direct them to their operation posts or to the staging area located at:

City Garage  
630 NW 2<sup>nd</sup> Street  
Hallandale Beach, Florida 33009

Watkins Elementary School in neighboring Pembroke Park has been designated as a storm shelter for emergency situations affecting Hallandale Beach. Emergency managers regularly identify facilities (especially schools) to serve as short-term and long-term shelters. Schools are attractive sites for shelters because they have kitchen facilities designed to serve many people, restroom facilities likely to be adequate for many people, plenty of space for cots in gymnasiums, cafeterias, and in the wide corridors.

The City of Hallandale Beach is prepared to deal quickly with storm damage and all related storm activities. To ensure the welfare, health and safety of our community, the City will continue to be prepared in the future and has taken steps to implement even more emergency planning.

The City of Hallandale Beach considers protecting critical facilities during and after a disaster a vital part of any emergency services effort. If a critical facility is damaged, workers and resources may be unnecessarily drawn away from their emergency response responsibilities. If such a facility is prepared, it will be better able to support the community's emergency efforts.

### **Impact on Economy and Tax Base**

While the concern for human life is always of most importance in preparing for a natural disaster, there also are large economic impacts to local communities, regions, and even the State when property damages are incurred. To be truly sustainable in the face of natural hazards, the City of Hallandale Beach must work to protect the residents and also

to limit, as much as possible, property losses that slow down a community's ability to recover from a disaster.

Flooding and flood damage could have substantial negative effect on the economy of Hallandale Beach. The same can be said of many of the other hazards discussed in this plan. In assessing the economic vulnerability, there are three general phases of impact: Immediate economic impact, a short or long-term disruption of the economy, and income losses both personal and company. The City will incur costs and/or lose income during each phase of recovery.

Our neighbor, the Greater Fort Lauderdale Convention and Visitors Bureau, has reported record-breaking tourism figures in recent years. Any major flood damage inflicted during the tourist season could have an especially negative effect, as businesses depend on making the majority of their income at that time. The severity of this effect would depend on the extent and duration of flooding. The greatest threat of flooding to Hallandale Beach comes from large amounts of rainfall in a short period of time, and hurricanes, which occur predominantly between June and November. If Hallandale Beach was forced to evacuate and the stores, pari-mutuels, restaurants and hotels were closed for part of the tourist season, the tourism and the retail/service industry could stand to lose a significant amount of income.

Floods cause problems that are not as easy to identify as damage to buildings and critical facilities. Some of the adverse effects of flooding in the City of Hallandale Beach include closing of businesses that are disrupted by floods. Businesses can lose inventories, customers and employees as a direct or indirect result of flooding. In addition to lost income, there are costs for fighting the floods, finding temporary housing, and cleaning up. Repetitively flooded areas tend to deteriorate over time and property values plunge. Roads and railroads could be closed for days or weeks during high water, which could have a regional as well as local economic impact.

Experience has shown that struggling businesses often close permanently after a flood or other natural disaster. Many businesses are not properly insured to protect against natural hazards. While most businesses have liability, property and casualty and fire insurance, many are not insured for loss of revenue or floods. The City of Hallandale Beach's participation in the National Flood Insurance Program enables City residents and businesses to purchase flood insurance in order to cover property damage. While property damage to the City's businesses may account for only a small percentage of total property damage, the loss of services, products, employment and taxes has a relatively larger effect on the local economy than has damage to residences.

The zip code business patterns reveal the major areas of employment and the dollar impact that the loss of these businesses would have on the local economy. This study shows the importance of identifying and protecting these properties and identifying alternative locations for operation should the present location be closed due to a disaster.

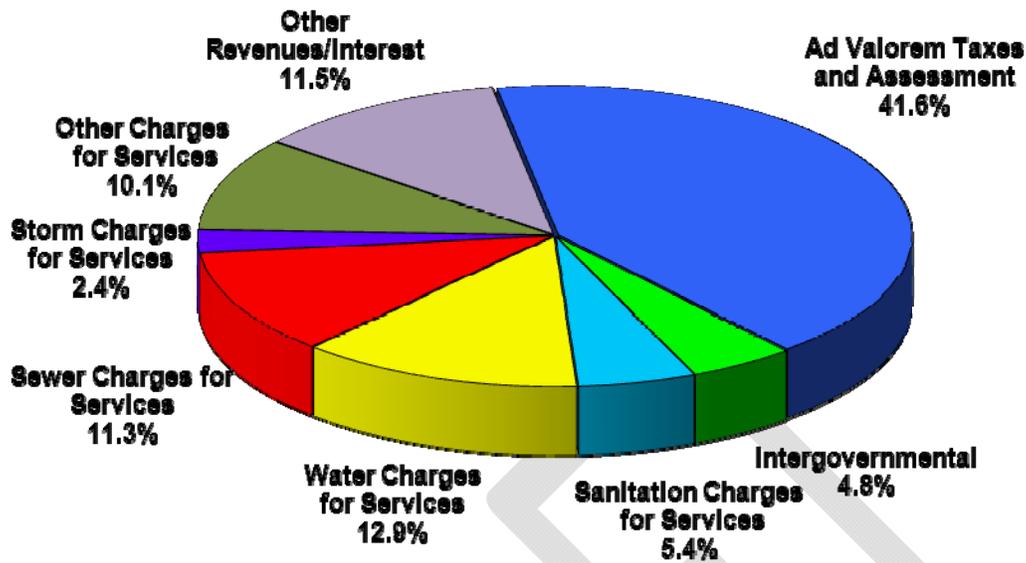
### Zip Code Business Patterns for Hallandale Beach

City	Zip Code	Number of Establishments	Number of Employees	Annual payroll in \$1,000's
Hallandale Bch	33008	36	98	1,690
Hallandale Bch	33009	1121	10786	206,865

The City's income is generated from a variety of sources. Some highlights of the City's finances, all of which could be affected by major flood damage in the city:

- Property taxes decreased by \$3.4 million or 13.8% from the prior year. This decrease was due mainly to the reduction in the City's taxable assessed valuation while maintaining the millage rate at the same level as the prior year.
- Hallandale Beach property values increased 24.8% from tax year 2005 to 2006, representing the highest rate of growth in Broward County.
- The principal property taxpayers in the City of Hallandale Beach are ranked in order as follows:
  - Gulfstream Park Racing Association
  - Omnipoint Holdings
  - Three Islands Association Residential
  - Diplomat Properties Ltd. Partnership
  - Florida Power & Light Co.
  - Mardi Gras Race Track and Gaming Center
  - TRG-Hallandale Beach Ltd
  - 17070 Collins Ave. Shopping Center
  - Southern Bell Tel. & Tel.
  - Ocean Marine Yacht Club LLC
  - Wal-Mart Stores, Inc.
  - Chaves Lake Apts. Inc.
  - Hasam Realty
  - Florida DOT Credit Union
  - E.M. Loew's Theaters, Inc.

Fiscal Year 2010-2011 by Major Revenue Source



The effect of natural disasters on population growth depends on prior expectations. If disasters occur with the expected frequency, they will have no significant impact on economic activity. If they occur more frequently than expected, they will induce the out-migration of both labor and capital. Consequently, if Florida were to experience several highly destructive hurricane seasons in a row, the number of people moving into the state may decline and the number moving out might increase. Given the evidence that global warming is raising the intensity and frequency of hurricanes, this is a possibility that should not be overlooked. Higher housing costs created by more stringent construction requirements and rising insurance rates could lead to slower population growth as well.

Protecting the community's industries and employers from natural hazards will minimize the impact on Hallandale Beach's overall economy. Mitigation will result in savings for businesses and residents, in addition to insurance companies and government agencies.

### **Buildings Subject to Natural Hazards**

In the City of Hallandale Beach there are 5,481 buildings, of which 3,668 are structures in the Special Flood Hazard Area (SFHA). Sixty seven percent (67%) of the buildings in Hallandale Beach are in the SFHA.

In Hallandale Beach there are over 26,000 dwelling units. The average price of a single-family dwelling is \$368,000, and the median price is \$275,000. The price for annual rentals ranges from \$700 to \$6000 monthly, with seasonal rentals priced from \$1300 and up monthly.

## Flood Insurance Claims

Currently there are 18,467 flood insurance policies in-force in the city of Hallandale Beach. The dollar amount of property insured by these policies is over \$3 million. Since 1978 there have been a total of 1,238 loss claims filed by Hallandale Beach properties.

A repetitive loss property is one for which two or more National Flood Insurance Program (NFIP) losses of at least \$1,000 each have been paid in any ten year rolling period since 1978. According to information received from FEMA, there were 420 repetitive loss claims in the City of Hallandale Beach dating from July 1987 through January 2011. All of the repetitive loss claims were paid to addresses within the Special Flood Hazard Area (SFHA).

The highest numbers of claims paid in this period were on NE 2<sup>nd</sup> Street, with a total of 45, followed by South Federal Highway and Ansin Boulevard, each with 22 claims paid. The highest numbers of claims paid were on the following dates:

**October 3<sup>rd</sup> – 5<sup>th</sup>, 2000:** There were 69 repetitive loss claims paid for flooding events on the dates of this “No-Name” storm. On October 2<sup>nd</sup> and 3<sup>rd</sup>, 2000 a broad area of low pressure in the gulf of Mexico off the southwest Florida coast moved northeast across central Florida and eventually became subtropical depression number 1 then tropical storm Leslie off of the northeast Florida coast. A band of heavy rain along its southern flank became nearly stationary across southeast Florida and produced a 10-mile wide swath of 10 to 20 inches of rain in Miami-Dade and extreme southeast Broward counties. The swath was centered from Golden Beach to Opa Loca to Miami Springs to Sweetwater to West Kendall. About 2 to 3 inches of the rain fell on Monday, October 2 and another 12 inches fell during the late afternoon and evening of October 3, finally tapering off on Wednesday morning.

Flooding of poorly drained urban areas quickly followed during the evening of October 3 and lasted into midday October 4. Some flood waters lingered for up to a week. Flood damage was particularly severe in the neighboring communities of Sweetwater, West Miami, Hialeah, Opa Loca and Pembroke Park that is adjacent to Hallandale Beach. An estimated 93,000 houses with about 214,000 persons were isolated by floodwaters. Power was cut to 13,000 people. Gov. Jeb Bush toured the area and declared a state of emergency for South Florida and submitted a letter to President Clinton asking for federal aid. There was \$4.5 million in property damage and \$5 million in crop damage in southeast Florida attributed to this storm. In Hallandale Beach the recorded rainfall for the three-day period was 12.85 inches. The ocean tide was low and on the way out at the height of the rainfall. If the tide had been high – and October and November tides are among the most extreme – water levels would have been as much as three feet higher in the canals and the Intracoastal Waterway, where much of the city’s storm water drains. In Hallandale Beach, the area was reported as being flooded for several weeks after the storm passed.

**June 20<sup>th</sup> – 26<sup>th</sup>, 1995:** There were 44 repetitive loss claims paid in Hallandale Beach for flooding events on these dates. Foul weather affected all of South Florida in this time period. Southeast Broward County was the hardest hit, with approximately 13.18 inches of rain falling in Hallandale Beach. Storms pounded all of South Florida, but were at their worst in Hallandale Beach, Hollywood, Pembroke Park and portions of north Dade County. The rain was a result of a low-pressure system stuck over Georgia most of the week. The system moved slowly to the north, eventually clearing local skies.

**October 15<sup>th</sup> – 16<sup>th</sup>, 1999:** There were 31 repetitive loss claims paid in Hallandale Beach for flooding events on these dates. Widespread flooding from Hurricane Irene inundated most of the metropolitan areas of Miami-Dade, Broward and Palm Beach counties. After crossing Florida Bay the center of Irene made landfall on the peninsula near Cape Sable as a Category 1 intensity hurricane. It moved northeast across central Miami-Dade and Broward counties before exiting into the Atlantic just after midnight on October 16 near Jupiter in northeast Palm Beach County. Rainfall totals in southeast Florida ranged from 6 to 17 inches with many areas getting 10 to 15 inches. Locally in Hallandale Beach, the recorded rainfall was 12.34 inches on October 15 and 16. Damage in southeast Florida, mainly from flooding, was estimated near \$600 million, which included \$445 million in agricultural losses. Flooding in a few residential areas lasted for a week displacing several hundred people and isolating thousands more in southeast Florida.

**May 22<sup>nd</sup> – 28<sup>th</sup>, 2003:** There were 17 repetitive loss claims paid in Hallandale Beach for flooding events on these dates. A weak tropical wave extending north from the west Caribbean Sea in combination with a mid/upper level trough of low pressure in the east Gulf of Mexico caused locally extreme rainfall over portions of the Broward/Miami-Dade metropolitan areas. The most rain occurred in a swath from Hollywood to Pompano Beach. Locally in Hallandale Beach, 10.68” of rain fell in the period. Of that total, 7.36 inches fell from 6 to 8 PM, which exceeds the 100-year maximum rate for that time period. Approximately 492 homes and business suffered some flood damage and many roadways were impassable in the region. Locally in Hallandale Beach, 10.68” of rain fell in the period.

**December 16<sup>th</sup>-17<sup>th</sup>, 2009:** There were 177 insurance claims awarded in Hallandale Beach for flooding events on these dates. The City recorded 18-20 inches of rainfall within a 24-hour period. The Northeast quadrant was mainly impacted. The fact that the event took place in the dry season was unexpected. The remaining months of the 2009-2010 “dry” season were also notably much wetter than usual.

### **Natural and Beneficial Functions**

Keeping a hazardous area free from development is the best approach to preventing damage from that hazard. Using flood-prone areas for parks and conservation purposes is a strong flood mitigation strategy since development can be limited in these areas and

the natural hydrology can be left in place. Existing vacant land allows the County and municipalities an opportunity to regulate or limit development before it occurs.

Floodplains should be considered in their natural context. They are more than just hazardous locations. Open and natural areas absorb much more rain and floodwaters than urbanized areas, reducing flood flows on downstream properties. Wetland plants filter stormwater runoff, making it cleaner for those downstream. One of the City’s primary drainage canals, the SE 14<sup>th</sup> Avenue Canal, is lined with numerous mangrove trees, which are particularly important in maintaining the ecosystem of the area. In recent years, the City of Hallandale Beach has invested in the improvement of wetland habitats in other areas of Broward County. Floodplains can also be beneficial in their ability to recharge the Biscayne Aquifer and so help to reduce some of the negative effects of drought.

The City Commission of Hallandale Beach continues the implementation of the long-range parks improvement program for citywide parks improvements and development. These include major improvements planned for Foster Park, including construction of a building and two pavilions, a walking track and exercise stations, additional parking spaces, and improved street lighting. General park enhancements and improvements include construction of new athletic fields adjacent to the Hallandale Adult Community Center and renovations to fields at Peter Bluesten Park and Oreste Blake Johnson Park.

On September 7, 2007 the City purchased property adjacent to Bluesten Park to expand this major park.

In the City of Hallandale Beach:

- 1154.6 acres are in the Coastal Hazard Zone, of which 393 acres are vacant
- 1154.6 acres are in the Hurricane Vulnerability Zone, of which 393 are vacant
- 2164.9 acres are in a Flood Zone, of which 568.7 are vacant
- 0.2 acres are in the Wildfire Susceptible Area, of which 0 acres are vacant
- Approximately 19%, or 456.29 acres of the Special Flood Hazard Area (SFHA) in Hallandale Beach is preserved as Open Space.

The open space in the City is utilized as follows:

Property Usage	Acreage	In Flood Zone?
City Parks		
City Beach	1.3	Yes

Golden Isles Park Tennis Facility	4.9	Yes
Golden Isles Park	1.25	Yes
Three Islands Park	7.2	Yes
South Beach	3.4	Yes
Ingalls Park	4.9	Yes
Foster Park	1.2	No
O.B. Johnson Park	3.73	No
B.F. James Park	2.35	No
Sunrise Park	0.32	Yes
Sunset Park	0.43	Yes
Bluesten Park	7.06	No
Private Recreation Facilities		
Gulfstream Park Racetrack	207.3	Yes
Mardi Gras	50.0	Yes
Diplomat Golf Course	107.0	Yes
Other		
Hallandale High School	20.8	Half
Hallandale Adult Center	22.9	Yes
O.G. Lake	6.5	Yes
Utility Stations	4.5	Half

Sand Dunes in Hallandale Beach are nature's protection to inland areas from the waves and tides accompanying major coastal storms. Dunes provide a reservoir of sand that is available to feed the profile when undergoing erosion. Native dune vegetation plays the major role in the dune stabilization and accretion process. The most prolific and valuable dune species is sea oats. The City of Hallandale Beach completed a beach revegetation project in August 2007. The topography and vegetation seaward of established coastal construction control lines is protected by Florida law.

The City's beaches serve as important nesting habitat for several species of threatened and endangered sea turtles. Pursuant to Chapter 161, the Florida Beach and Shore Preservation Act, the Department of Environmental Protection may condition the nature, timing and sequence of coastal construction to protect nesting sea turtles and native salt resistant vegetation.

Chapter 161 also calls for the establishment and periodic reestablishment of coastal construction control lines on a county basis along the sandy beaches of the state fronting on the Atlantic Ocean and the Gulf of Mexico. The legislative intent is to define that portion of beach/dune system which is subject to severe fluctuations resulting from the 100-year design storm event, so as to define the area within which special siting and design consideration are required. All construction seaward of established coastal construction control lines requires a permit from the Department of Environmental Protection. This regulatory program is administered to assure that all coastal construction seaward of the established control line is designed and performed to protect beach and dune areas from damage, to ensure that construction at one location will not cause

accelerated beach erosion on adjacent properties, and to enhance the survivability of structures under storm conditions.

In Broward County, there are many policies intended to protect coastal resources that could, in turn, decrease the risk from storm surge and flooding. Policies in the Broward County Hazard Mitigation Comprehensive Plan that protect and conserve coastal wetlands, coastal barriers, dunes, beaches, beach vegetation, and berm areas may also act to preserve natural drainage functions of coastal areas as well as natural surge barriers. Policies that protect these natural resources by restricting or prohibiting development also limit the potential risk of coastal flooding and erosion.

### **Development, Redevelopment and Population Trends**

It is essential for the City of Hallandale Beach to continue to implement programs which will take the City one step further towards reaching a stable economy, and hence improve the quality of life within the community. Progressive economic development and redevelopment efforts are essential in obtaining this stability, as they will offer supportive and financial assistance to property owners. The evaluation of planning needs and tools necessary to facilitate the City's development and redevelopment activities is part of the Citywide Comprehensive Master Plan. These include, but are not limited to, the creation of a Local Activity Center (LAC), a Regional Activity Center (RAC), Transit Oriented Corridor and/or a Transit oriented Development.

Hallandale Beach must be careful to plan for the future. With gaming established at existing pari-mutuel sites, it is extremely important to evaluate all future developments so as to lessen the impact, along with gaming, will have on our community. The City Manager and her staff have spent many hours reviewing numerous proposed projects and have outlined various conditions that developers must meet prior to building in Hallandale Beach. Such conditions include, but are not necessarily limited to traffic reduction programs, park enhancements, streetscape projects, affordable housing contribution, and other conditions that are targeted to improve the quality of life in the community. It has always been the City Commission directive to ensure that any development that will have an adverse impact on the City and its residents must mitigate these impacts to guarantee the quality of life of our community is not diminished.

Through the adoption of the Community Redevelopment Agency (CRA) District, the City is experiencing an improvement in its residential neighborhoods as a result of the Neighborhood and Commercial Improvement Loan programs and other public works capital improvements. Financial and technical assistance will continue to be offered to allow both residential and commercial property owners to improve, upgrade and/or expand their properties.

The City Commission through establishing the CRA has also provided a method of funding substantial infrastructure improvements. Funds were specifically appropriated through the CRA and Community Development Block Grants (CDBG) to provide

stormwater drainage, sidewalk, swale, street, and landscaping improvements, as well as public facility upgrades, throughout various sections of the western portion of the City. These improvements will not only continue to reduce the amount of flooding in most of the City, but will result in more aesthetically appealing residential areas.

Broward County policy states that the County will limit impacts of development and redevelopment by allowing the review of development by the Department of Management, Broward County Department of Planning and Environmental Protection, and the Broward County Safety and Emergency Services Department. Involving emergency management officials in the development process is a strong strategy and can help regulate development in a manner that reduces risks to natural hazards. There is a policy that specifically states development and redevelopment shall not degrade or destroy beaches or berm areas, which often provide a natural barrier to storm surge during a hurricane or tropical storm.

## VI. SET GOALS

**Goal 1.** Protect people from the safety and health hazards caused by natural forces.

Objective 1.1 Ensure that residents are given adequate warning of floods, hurricanes and tornadoes.

Objective 1.2 Minimize the hazardous effects of natural forces, including drought, heat, lightning and thunderstorms.

Objective 1.3 Provide and assure appropriate instruction and assistance before, during and after major natural hazardous events.

**Goal 2.** Protect public and private property from damage by natural hazards.

Objective 2.1 Protect the buildings from flooding in the following repetitive loss areas:

1. Ansin Boulevard Area
2. Southwest Quadrant Area
3. West of US 1 Area
4. Northeast Quadrant Area
5. Parkview Drive Area
6. South Ocean Drive Area

Objective 2.2. Ensure that new development reduces the possibility of property damage from flooding by retaining and managing stormwater and by enforcing all NFIP regulations.

Objective 2.3. Ensure that new development reduces the possibility of property damage from other natural disasters.

Objective 2.4. Reduce flooding hazard through strategic planning and implementations.

Objective 2.5. Reduce windstorm hazard through strategic planning and implementation.

Objective 2.6. Reduce damage from other natural disasters.

**Goal 3.** Improve the quality of life in Hallandale Beach.

Objective 3.1. Protect by regulation, acquisition and/or restoration, existing natural areas, particularly in the floodplain.

Objective 3.2. Ensure preservation of open space.

Objective 3.3. Seek expansion or addition of open space

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## VII. REVIEW OF POSSIBLE ACTIVITIES

The Floodplain Management Plan Committee considered a number of different floodplain management and hazard mitigation activities. They were organized under six primary categories:

### 1. **Preventative:**

These items keep problems from getting worse. The use and development of flood prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or enforcement offices.

- Assure bus shelters are all properly grounded against lightning
- Include elevations as a necessary consideration on plan review checklist
- Include base flood finished floor elevations on Certificate of Occupancy
- Develop and implement program for assuring the private maintenance of stormwater management facilities.
- Address Code requirements for lightning protection in new development
- Review building codes to assure proper drainage requirements
- Update repetitive loss forms and remove properties from Repetitive Loss List
- Zone all current parks as perpetual open space
- Purchase more parks and increase open space, especially in Special Flood Hazard Areas (SFHA)
- Encourage responsible redevelopment, considering the stormwater drainage requirements for new development are higher than older developments
- Plant beach vegetation to protect erosion of beachfront
- Include form for signature acknowledging the requirements of securing of site, equipment and materials from high wind events at issuance of permit
- Review, update and enforce notification for construction sites in anticipation of storm events
- Prioritize addressing of flooding issues in repetitive loss areas and implement capital projects to mitigate flooding

### 2. **Property Protection:**

These items are usually undertaken by property owners on a building-by-building or parcel basis.

- Include elevations as a necessary consideration on plan review checklist

- Include base flood finished floor elevations on Certificate of Occupancy
- Prioritize use of Community Redevelopment Area Funding to address flood mitigation

### **3. Natural Resource Protection:**

These activities preserve or restore natural areas or the natural functions of floodplain and watershed areas. They are usually implemented by parks, recreation, or conservation agencies or organizations.

- Encourage percolation-oriented drainage
- Plant beach vegetation to protect erosion of beachfront
- Maintain strong enforcement of South Florida Water Management District regulations, especially in times of drought

### **4. Emergency Services**

These measures are taken during an emergency to minimize its impact. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

- Assure bus shelters are all properly grounded against lightning
- Assure emergency management plans of condominiums are in place
- Address City Code requirements for lightning protection in new development
- Encourage more frequent use of Code Red, including:
  - Using Code Red at every hurricane warning
  - Using Code Red immediately before being hit by hurricane
- Assure that all citizens have registered for Code RED with an active phone number
- Assign individual to keep information pertaining to natural disaster warnings on radio station 1620 AM, Comcast Government Access Channel 78, City of Hallandale Beach marquee and city website updated
- Install lightning detectors at all City parks
- Recommend City follow the Emergency Procedures Manual
- Include form for signature acknowledging the requirements of securing of site, equipment and materials from high wind events at issuance of permit
- Review, update and enforce notification for construction sites in anticipation of storm events
- Coordinate meetings of Fire Department with condominiums
- Make public aware of heat waves through radio station and website
- Continue to maintain the Vulnerable Population Registry for residents who do not qualify for a Special Needs shelter, or choose not to evacuate to a mass care

shelter, but are disabled, frail, or have health issues that would make coping after an emergency difficult.

## **5. Structural Projects**

These activities keep floodwaters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff.

- Prioritize addressing of flooding issues in repetitive loss areas and implement capital projects to mitigate flooding
- Actively seek grant funding to assist in capital improvements for flood mitigation

## **6. Public Information**

These activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains. They are usually implemented by a public information office.

- Assign individual to keep information pertaining to natural disaster warnings on radio station 1620 AM, Comcast Government Access Channel 78, City of Hallandale Beach marquee and website updated
- Coordinate meetings of Fire Department with condominiums
- Assure dissemination of information concerning the City's shutter program. (Suggestions – water bills, website, *Hallandale Happenings*, marquees, etc.)
- Assure dissemination of location of local hurricane shelters
- Maintain strong enforcement of South Florida Water Management District regulations, especially in times of drought
- Make public aware of heat waves through radio station and website

## VIII. ACTION PLAN

The Floodplain Management Plan Committee reviewed and discussed many possible activities to address the goals and objectives of this plan. After determining which activities would be most appropriate, these activities have been incorporated into the following action plan, which is organized according to the individual or authority responsible for each set of activities; the twenty-three (23) activities are numbered in order of priority. While the plan emphasizes the flooding hazard, it also addresses other natural disasters. Realizing that floodplains have natural and beneficial characteristics, the action plan also includes recommendations of responsible environmental activities.

Most of the specific activities incorporated into the action plan do not require funding. They can be implemented simply by using current human resources working for the City. For those activities that do require funding, recommendations for funding are included. However, it is beyond to scope of this plan to determine the source or the extent of funding.

### ➤ City Commission

#### 6. **Action: *Acquire more property for parks.***

In recent years, the Commission has acquired property for parks in each of the City's quadrants. Continual prioritization of park acquisition is encouraged over the next five years

**Benefit:** In addition to recreational benefits, parks provide floodplain management benefits by increasing open space and improving percolation of floodwaters. Purchase of property for parks within the Special Flood Hazard Areas where it would be especially beneficial.

**Funding:** Funding source options for this acquisition of property should include the following:

- Fund reserves
- Community Redevelopment Agency funds
- Bond funds
- Grants

### ➤ City Engineer

#### 1. **Action: *Prioritize addressing of flooding issues in repetitive loss areas and implement capital projects to mitigate flooding.***

Particular concentration of capital expenditures is being applied to the City's Northeast Quadrant west of NE 14<sup>th</sup> Avenue, considering this is the area with the highest number and concentration of repetitive loss properties.

**Benefit:** Flood mitigation projects have proven to be an effective way to address the drainage issues in the repetitive loss areas. These projects have significantly reduced level of flooding and the extent of the damages in these areas.

These projects continue to be prioritized in the capital improvement program, particularly in repetitive loss areas. This is an ongoing program that requires a long term investment.

**Funding:** Because municipal funding is limited, the City continues to be proactive in obtaining funding for this program. The following sources are recommended:

- Community Development Block Program
- Community Redevelopment Agency
- Flood Mitigation Assistance Grant
- Hazard Mitigation Grant Program
- Community Budget Improvement Requests

The City has secured approximately \$15 million in funding through FEMA FMA and HMG Programs.

**2. Action: *Continue to encourage percolation-oriented drainage.***

**Benefits:** Drainage that seeps into the soil, rather than being directed out to the ocean, provides multiple benefits. Not only does it mitigate flooding, but it also recharges the aquifer and enhances water quality.

**Funding:** Possible sources include the South Florida Water Management District and the Florida Department of Environmental Protection. Pursuit of various funding sources for water quality improvements is also encouraged.

**3. Action: *Implement increased utilization of stormwater injection technology.***

**Benefits:** This technology is very effective in areas that lack positive drainage outfalls. The City is currently implementing this technology in many areas that experience repeated flooding. Furthermore, it is anticipated that stormwater injection may serve to produce a salinity barrier to protect the City's wellfield from saltwater intrusion.

**Funding:** Because municipal funding is limited, the City continues to be proactive in obtaining funding for this program. The following sources are recommended:

- Community Development Block Program
- Community Redevelopment Agency
- Flood Mitigation Assistance Grant
- Hazard Mitigation Grant Program
- Community Budget Improvement Requests

**4. Action: *Update repetitive loss forms and remove properties from Repetitive Loss List.***

**Benefit:** This shows the effectiveness of the City's flood mitigation projects. Due to significant capital improvements in most of the City's Repetitive Loss areas, a number of properties that were formerly at risk of flooding are no longer so vulnerable.

The City Engineer should continue to quantify the improvements to demonstrate the need to reclassify these properties. This should be accomplished soon after the Hazard Mitigation Grant Program projects are complete (December 2014).

**Funding:** Staff Time (operating fund).

**5. Action: *Enhance the City's Community Rating System classification through pursuit of credit under Activity 530 Flood Protection.***

**Benefit:** Because the structural flood control projects which have been and will be utilized to mitigate flooding in the community are so substantial, the City can – with the required documentation – obtain a significant increase in its points total by applying for credit under this activity.

This documentation should be submitted after December 2014.

**Funding:** Staff time (operating fund).

**23. Action: *Install lightning prediction system at all restored City parks.***

With the implementation of the Master Parks Plan, the lighting prediction systems will be placed at each park that does not already include one. This should be completed before December 2015.

**Benefit:** Considering lightning is a major natural hazard in South Florida, lightning detectors should be installed at City parks to warn patrons of the impending danger.

**Funding:** Capital Improvement Program Fund - Parks Master Plan Project.

➤ **Director of Development Services**

**7. Action: *Enforce responsible redevelopment.***

Responsible redevelopment is required through the City's Code of Ordinance.

**Benefit:** Considering the stormwater drainage requirements for new developments are stronger than the drainage requirements that were in effect when older developments were built, responsible redevelopment is typically beneficial to the City from the perspective of floodplain management.

**Funding:** Staff time to educate and enforce.

**8. Action: *Ensure the preservation of City-owned open space in the SFHA (floodplain).***

Assure that parks and other City-owned properties within the floodplain are not eventually converted into developments. Appropriate land development and zoning considerations are in place to achieve this.

**Benefit:** Open space preservation is an important component of floodplain management. If, for example, one park property is traded with another property to make a new park, the open space in the floodplain should not be reduced. This should be an ongoing activity.

**Funding:** Staff time (operating fund)..

**13. Action: *Maintain strong enforcement of South Florida Water Management District (SFWMD) regulations, especially in times of drought.***

**Benefit:** One of the major natural hazards in Florida is drought. By strongly enforcing the South Florida Water Management District water restrictions, the hazardous effects of drought can be minimized. This recommendation is applicable whenever the District's water restrictions are in place.

**Funding:** Staff time (operating fund).

**21. Action: *Continue to enforce the City's Code of Ordinance by conducting inspection of all newspaper rack to ensure compliance with the code.***

**Benefit:** Newspaper containers that are not firmly attached to pavement could be displaced by strong winds and become dangerous projectiles. To avoid this threat, newspaper vendors need to either be required to attach their containers

to pavement or to remove them in advance of an impending hurricane. This recommendation should be implemented by December 2013.

**Funding:** Staff time to enforce (operating fund).

➤ **Building Official**

**20. Action:** *Modify the existing permit card to include a signature line for contractor/sub-contractor to acknowledge the requirements of securing site, equipment and materials from high wind events.*

**Benefit:** If not properly secured, construction sites can become sources for dangerous projectiles during hurricane events. This recommendation, which should be implemented by February 2014, alerts all developers to their responsibilities in the event of hurricanes and other major storm events.

**Funding:** Staff time (operating fund).

**11. Action:** *Include flood-related information in all Building Division Community Education Forums.*

**Benefit:** The Building Division's new Community Education Forum initiative is intended to educate the community concerning matters pertaining to the Building Division. The Division needs to include flood-related matters, such as elevation certificates and flood zone determinations. This activity should be ongoing.

**Funding:** Staff time (operating fund).

**12. Action:** *Enhance training for Structural Inspectors and Plan Reviewers to include basic training pertaining to the National Flood Insurance Program.*

The City's Building Official is a Certified Floodplain Manager (CFM) and at least one other member of this staff is a CFM. The inspectors and reviewers are knowledgeable of the NFIP requirements.

**Benefit:** Staff is better able to address issues related to flood protection and mitigation and better assist residents and developers.

**Funding:** Staff time (operating fund).

**9. Action:** *Ensure that flood-related provisions in the 2010 Florida Building Code are incorporated in the City of Hallandale Beach Code of Ordinances.*

**Benefit:** The incorporation of these provisions in the City's Code of Ordinance will assure that building projects in the City follow the appropriate flood related provisions to mitigate future damages from flood.

**Funding:** Staff time (operating fund).

This recommendation should be implemented by the end of 2013.

➤ **Fire Chief**

**14. Action: *Ensure emergency management plans of condominiums are in place.***

The City has been particularly proactive in requiring condominiums to be prepared for hurricanes and other major storm events.

**Benefit:** Ensuring that condominiums follow through on their emergency preparation requirements will mitigate against hazards resulting from these storm events. This should be ongoing and the extent of compliance should be reported as a part of each annual evaluation.

**Funding:** Staff time (operating fund).

**15. Action: Encourage frequent use of Code Red, including:**

- i. Using Code Red for flood warnings**
- ii. Using Code Red at every hurricane warning**
- iii. Using Code Red immediately before being hit by hurricane.**

Code Red is a telephone advisement system that can be used to warn residents of impending danger.

**Benefit:** This recommendation is intended to ensure that this effective warning tool is used as often as it is needed. This recommendation should continue to be implemented.

**Funding:** Staff time (operating fund).

**16. Action: *Encourage citizens to register for Code Red with an active phone number.***

This is done by educating the community during the City's Annual Community Forum on Hurricane Preparedness and other similar events.

**Benefit:** This recommendation is intended to make the Code Red system current and thus more effective.

**Funding:** Staff time (operating fund).

**17. Action:** *Ensure that City's Public Relations Official continually updates information pertaining to natural disasters, including hurricane and flood warnings.* This update responsibility will include, but not be limited to the following media:

- i. Radio station 1620 AM
- ii. Comcast Government Access Channel 78
- iii. City of Hallandale Beach marquees
- iv. City website

**Benefit:** To keep the public informed and prepared during an emergency.

**Funding:** Staff time (operating fund).

**10. Action:** *Continue to require City staff to follow the City's Comprehensive Emergency Management Plan.*

**Benefit:** The City's **Comprehensive Emergency Management Plan** is intended to provide an effective framework for preparation for, response to, and recovery from emergency events. While it may be impractical to expect full compliance by all City staff to all of the procedures, continual requirement to do so should be one effective means to maximize the effectiveness of the City's emergency response. This activity is ongoing.

**Funding:** Staff time (operating fund).

**19. Action:** *Continue to maintain the Vulnerable Population Registry.*

**Benefit:** This registry is for residents who do not qualify for a Special Needs shelter, or choose not to evacuate to a mass care shelter, but are disabled, frail, or have health issues that would make coping after an emergency difficult. Continued maintenance of this registry will help to protect some of the most vulnerable individuals in the community.

**Funding:** Staff time (operating fund).

**22. Action:** *Assure dissemination of location of local hurricane shelters.*

This information is located in the material distributed at the City's Annual Community Forum on Hurricane Preparedness and is available on the City's website.

**Benefit:** Among the most crucial items of information that need to be disseminated prior to a hurricane is the location of local hurricane shelters. This recommendation highlights this essential item of information.

**Funding:** Staff time (operating fund).

**18. Action:** *Conduct the following emergency management meetings, in addition to the meetings held immediately prior to, during and following a major storm event:*

- a. Briefing at least 2 days prior to event*
- b. Post disaster meeting following the event*

**Benefit:** The former meeting would serve to motivate all responsible departments to begin preparation and communication. The latter meeting would enable all participating departments to learn from the event, highlighting the things that were successful and the things that could be improved. This recommendation should be implemented immediately.

**Funding:** Staff time (operating fund).

### **Comprehensive Emergency Operations Plan Policies and Procedures (CEOP)**

The Hallandale Beach CEOP is regarded as a “living document” which shall be reviewed annually by the Emergency Coordinator for Disaster Preparedness. The City of Hallandale Beach will ensure that its emergency preparedness planning and programming remain consistent with that of Broward County, the State of Florida, and the requirements of the National Incident Management System (NIMS).

The Hallandale Beach City Commission shall formally approve and adopt the CEOP once every four years. Modifications made between formal approvals by the City Commission will constitute an administrative update and not require formal approval.

## **IX. ADOPTION OF THE PLAN**

The Hallandale Beach City Commission adopted the Floodplain Management and Hazard Mitigation Plan on November 21, 2007, renewing their dedication to the safety and well-being of the citizens and businesses of the City.

The Hallandale Beach City Commission is scheduled to adopt the Floodplain Management and Hazard Mitigation Plan 5-Year Update on May 15, 2013.

## X. IMPLEMENTATION, EVALUATION AND REVISION

### Monitoring the Plan

In an effort to ensure that there is a continuing and responsive planning process, the following procedure is included in the City of Hallandale Beach Floodplain Management Plan:

The Floodplain Management Plan Committee responsible for the development of this plan shall meet annually in the month of August. Prior to the meeting, the Committee Chair is responsible to prepare a draft Floodplain Management Plan Evaluation Report that will be presented at the annual August meeting. The Committee will review and discuss the report, after which it may be revised before the committee adopts it. The report shall include:

- A review of the original plan
- A review of any floods that occurred during the previous calendar year
- A review of the action items in the original plan, including how much was accomplished during the previous year
- A discussion of why any action items were not completed or why implementation is behind schedule
- Recommendations for new projects or revised action items. Such recommendations shall be subject to approval by the City Commission as amendments to the adopted plan

Following adoption of the annual FMP Evaluation Report, it will be submitted to the City Commission by September 21, released to the media and made available to the public. Should the Commission adopt any recommended plan revision(s), the plan will be updated accordingly.

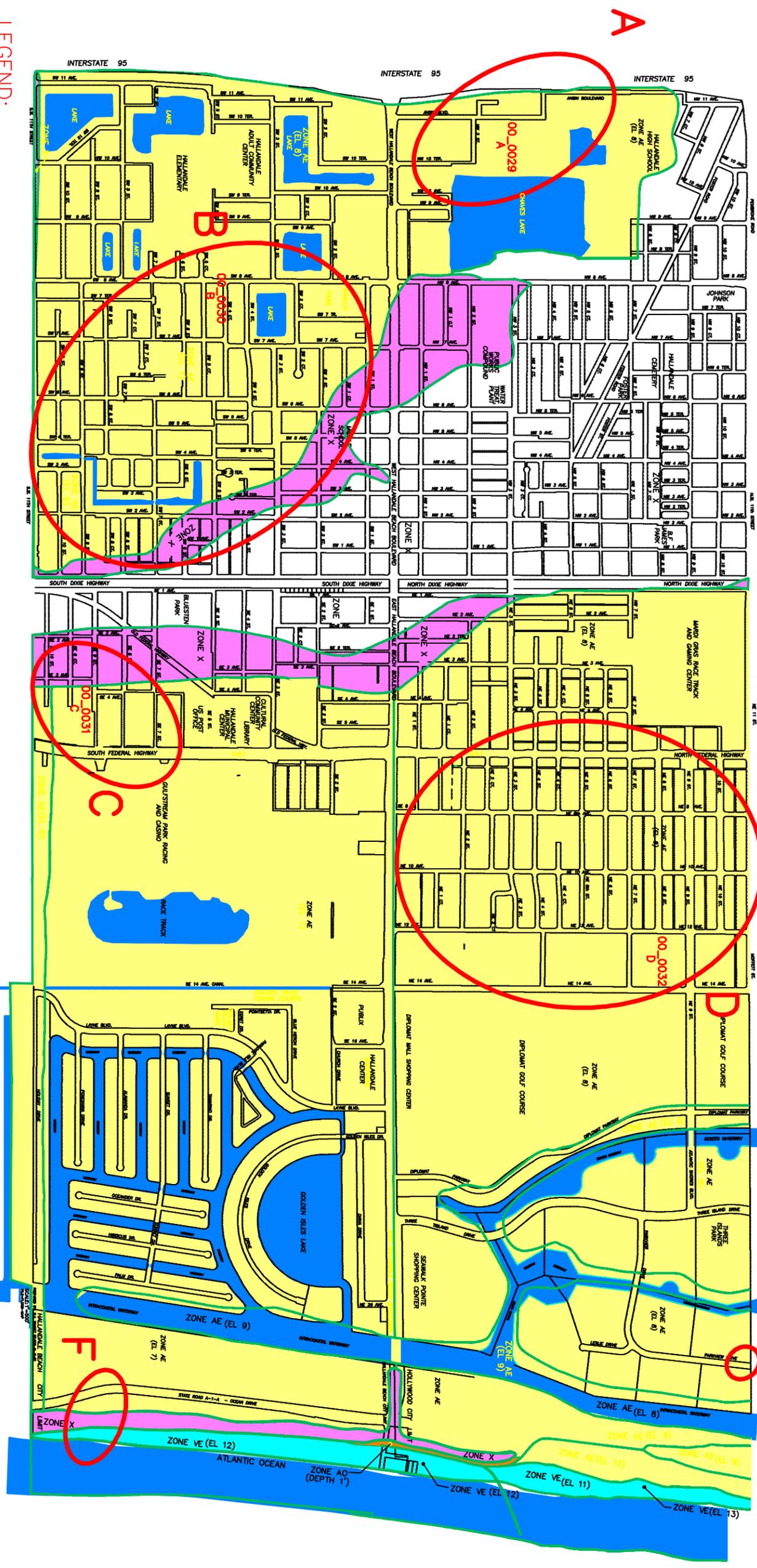
The City Manager will be responsible to assure that the Floodplain Management Plan Committee continues to be comprised of three high-level staff members and three community residents.

### Evaluation of the Plan

The Annual Floodplain Management Plan Evaluation Report will be prepared and approved by the Floodplain Management Plan Committee, before it is presented to the City Commission.

# EXHIBIT 1

# CITY OF HALLANDALE BEACH BRACER FLOOD ZONING MAP



NOTE: ALL ELEVATIONS IN FEET

## LEGEND:

- ZONE VE: COASTAL FLOOD WITH VELOCITY HAZARD (WATER ACTION) BASE FLOOD ELEVATION DETERMINED.
- ZONE AE: BASE FLOOD ELEVATIONS DETERMINED.
- ZONE AO: FLOOD DEPTHS 1 TO 3 FEET (USUALLY SHEET FLOW ON SLOPING TERRAIN); AVERAGE DEPTHS DETERMINED FOR AREAS OF ALLUVIAL FAN FLOODING, VELOCITIES ALSO DETERMINED.

## SPECIAL FLOOD HAZARD AREAS

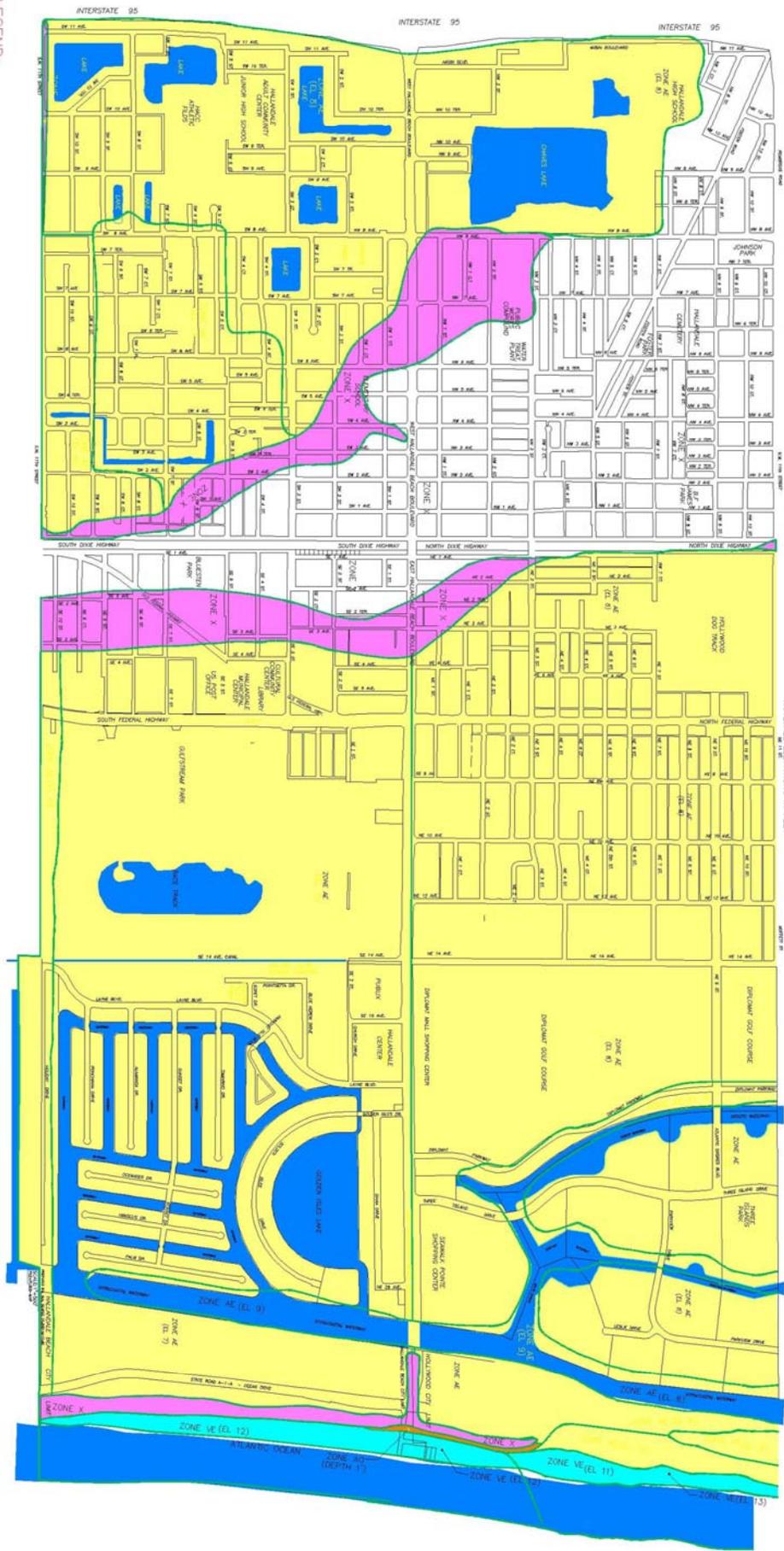
- ZONE X: AREAS DETERMINED TO BE OUTSIDE 500-YEAR FLOOD PLAIN.
- ZONE X500: AREAS OF 500 YEAR FLOOD; AREAS OF 100 YEAR FLOOD WITH AVERAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 100-YEAR FLOOD.
- ATLANTIC OCEAN & LAKES

- A = 00-0029
- B = 00-0030
- C = 00-0031
- D = 00-0032

# EXHIBIT 2



## CITY OF ATLANTA BEACH FLOOD ZONE MAP



- LEGEND:**
- ZONE VE:** COASTAL FLOOD WITH VELOCITY HAZARD (WATER ACTION)
  - ZONE AE:** BASE FLOOD ELEVATION DETERMINED.
  - ZONE AO:** BASE FLOOD ELEVATIONS DETERMINED.
  - ZONE AE:** FLOOD DEPTHS 1 TO 3 FEET (USUALLY SHEET FLOW ON SLOPING TERRAIN); AVERAGE DEPTHS DETERMINED FOR AREAS OF ALLUVIAL FAN FLOODING; VELOCITIES ALSO DETERMINED.

- ZONE X:** AREAS DETERMINED TO BE OUTSIDE 500-YEAR FLOOD PLAIN.
- ZONE X500:** AREAS OF 500 YEAR FLOOD; AREAS OF 100 YEAR FLOOD WITH AVERAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 100-YEAR FLOOD.
- ATLANTIC OCEAN & LAKES**

NOTE: ALL ELEVATIONS IN FEET