

City of Hallandale Beach

Floodplain Management and Hazard Mitigation Plan



City Commission
Mayor Joy Cooper
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November 2007

Prepared by
CRS Max Consultants, Inc.
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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 on the east, Interstate 95 on the west, Pembroke Road on the north and the Miami-Dade County Line on the south. The city covers 4.1 square miles with a population of 49,000 during winter season and 39,471 off-season.

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 City Manager implements policies as directed by the Commission and 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, and the natural and beneficial functions of floodplain
- ❑ Build public and political support for projects that prevent new problems, reduce losses and 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 ten 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 has been an active participant in Broward County's Local Mitigation Strategy (LMS). Over the past few years, the City of Hallandale Beach has identified major drainage projects in Broward County's LMS. With the adoption of this Floodplain Management Plan, however, the City will have its own plan specifically concentrating on this community's unique needs.

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) designates approximately three-fourths of the land in the City of Hallandale Beach as a Special Flood Hazard Area (SFHA). There are 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 twelve 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, 80 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 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 six 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 (Northwest Quadrant)
- West of Federal Highway area (Southeast Quadrant)
- Southwest Quadrant
- 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.

I. PREPARATION OF THE PLAN

Formation of the Floodplain Management Committee

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). Until now, this plan has also served as the community's floodplain management plan. Though the City has been able to make significant progress over the past years 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 new plan formulated specifically for this community.

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:

Earl King, Chair

Acting Director of Public Works, Utilities and Engineering

Staff

Tony Gonzalez

Building Official, CRS Coordinator

Staff/Resident

Bruce Griswold

Assistant Fire Chief

Staff/Resident

Joe Sher

Vice Chairman of Public Transportation/Flood Mitigation Board

Resident

Patricia Brennan

Member of Public Transportation/Flood Mitigation Board

Resident

Monique Serres

Resident who has been impacted by flooding

Resident

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

II. PUBLIC INVOLVEMENT

Planning Committee With Members of the Public

The planning process 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:

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

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 recommended to be submitted to the community's governing body for its approval 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 11th 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 4th 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

In 2007 the City Commission directed the City Manager to hire a consultant to prepare a City-Wide Strategic Master Plan. The consultant has been engaged and the report is being prepared at this time.

The following narrative delineates the actions that the City of Hallandale Beach has taken to address flooding in the city's six 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 six 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 FIRM map of Hallandale Beach with the following six repetitive loss areas designated:

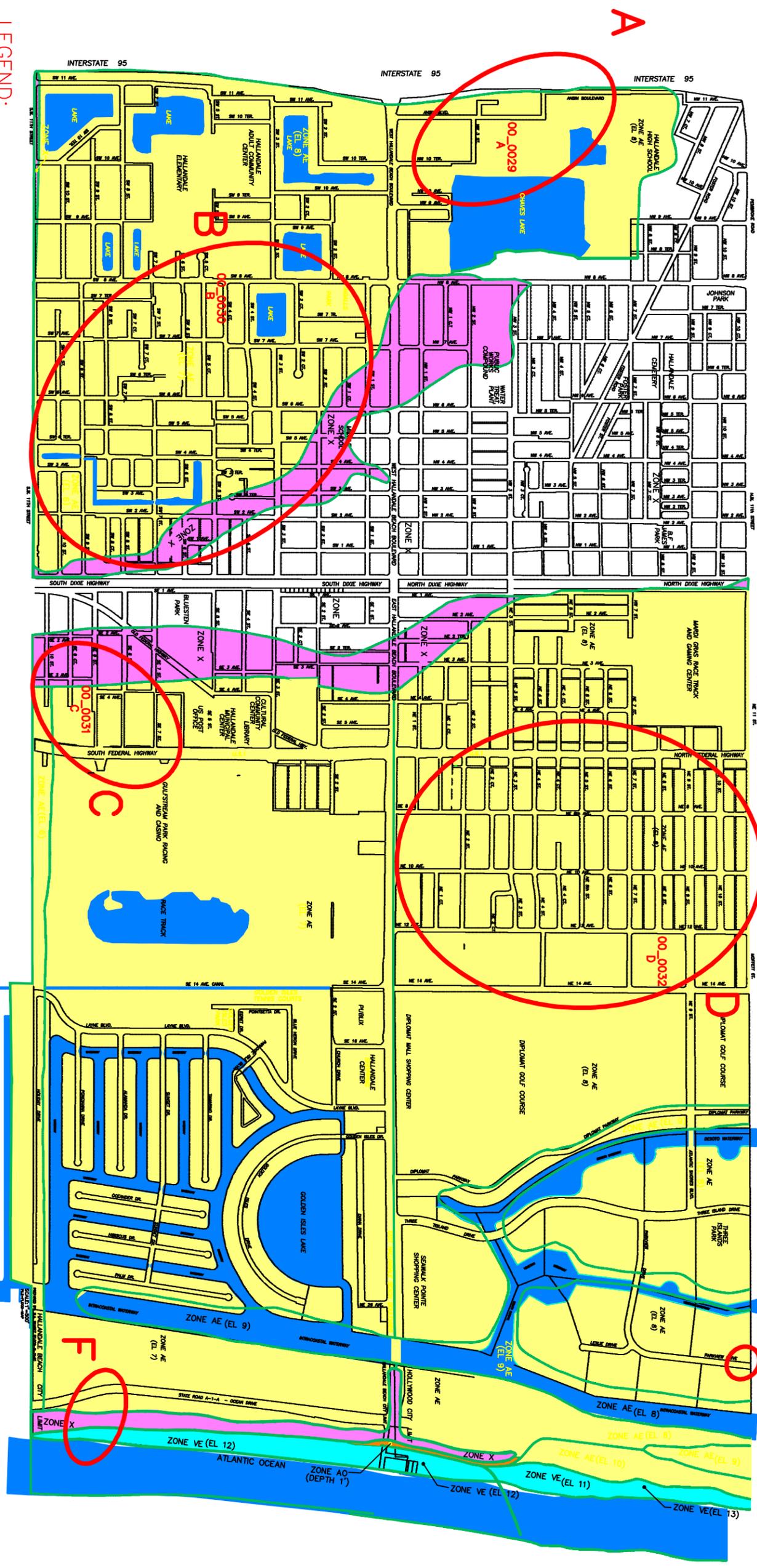
A. Ansin Boulevard Area

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 flooding problem for the Ansin Boulevard area. Major rainfall in recent years has confirmed that the flooding problem has indeed been resolved. There are five repetitive loss properties in this area. All of these properties had flood insurance claims in 2003. The City intends to go through the necessary procedures to remove the properties from the repetitive loss list.



CITY OF HALLANDALE SPECIAL FLOOD HAZARD ZONING MAP



NOTE: ALL ELEVATIONS IN FEET

LEGEND:

- ZONE VE: COASTAL FLOOD WITH VELOCITY HAZARD (WATER ACTION) PLAIN.
- ZONE AE: 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.
- ZONE AO: ATLANTIC OCEAN & LAKES

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.

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

B. Southwest Quadrant Area

Over the past five 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 and received Community Development Block Grants (CDBG) through Broward County averaging approximately \$300,000 annually. Over \$1.5 million has been spent over the past six years to enhance stormwater drainage in the area.

In fiscal year 2006-2007, \$339,344 was budgeted for drainage improvements in the area through the City's participation in the 32nd Year CDBG program. The project is substantially complete. In fiscal year 2005-2006, \$279,203 was spent in drainage improvements in the area through the City's participation in the 31st Year CDBG program. As with the Ansin Boulevard Area, the major flooding problems that characterized the area in previous years have been substantially resolved through all of these major capital improvements. There are twelve property addresses on the repetitive loss list in this area. Although two properties had flood-loss claims in 2003, the other ten properties have not had a claim since 2000. The City intends to go through the necessary procedures to remove many of the properties from the repetitive loss list.

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, and staff intends to remove properties from the repetitive loss list.

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 many 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 2005/06 was the securing of a Flood Mitigation Assistance (FMA) drainage improvement grant for \$798,870. In fiscal year 2006/07, the City submitted the required design drawings and applications to permit this major improvement. Additionally, in this fiscal year the City has been successful in securing a Hazard Mitigation Grant for \$2 million to effect needed drainage improvements that will further reduce the flooding hazard in the Northeast Quadrant. Clearly, the City has prioritized this area for future drainage improvements.

E. Parkview Drive Area

In FY 2005/06, the City of Hallandale Beach completed designs for drainage improvements on Parkview Drive. Construction of these drainage improvements is anticipated in the 2007/08 Fiscal Year. There are only two repetitive loss properties in this area. There have been no flood-loss claims filed in seven years.

F. South Ocean Drive Area

There are only two repetitive loss properties in this area. One of these properties has recently been demolished and rebuilt. Its new elevation provides considerably more protection from flooding than its previous elevation. There has not been a flood insurance claim filed for this property since 1992. The other property has not had a property loss in over seven years. The City intends to investigate this property in FY 2007/08 to determine if the problem has been resolved or if additional actions are necessary to further mitigate flooding.

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 2005/06 Fiscal Year, the City of Hallandale Beach passed an ordinance to revise its code to require maintenance of private stormwater management facilities. In FY 2006/07, the City began implementation of this ordinance. Letters were sent to all owners of stormwater management facilities advising them of the necessity to maintain these facilities. 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 52nd 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

Solicitation of Input from Other Agencies and Organizations, continued

Ms. Debra Patterson
Principal
Hallandale Beach Middle School
120 SW 4th 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 84th Avenue
Plantation, Florida 33324

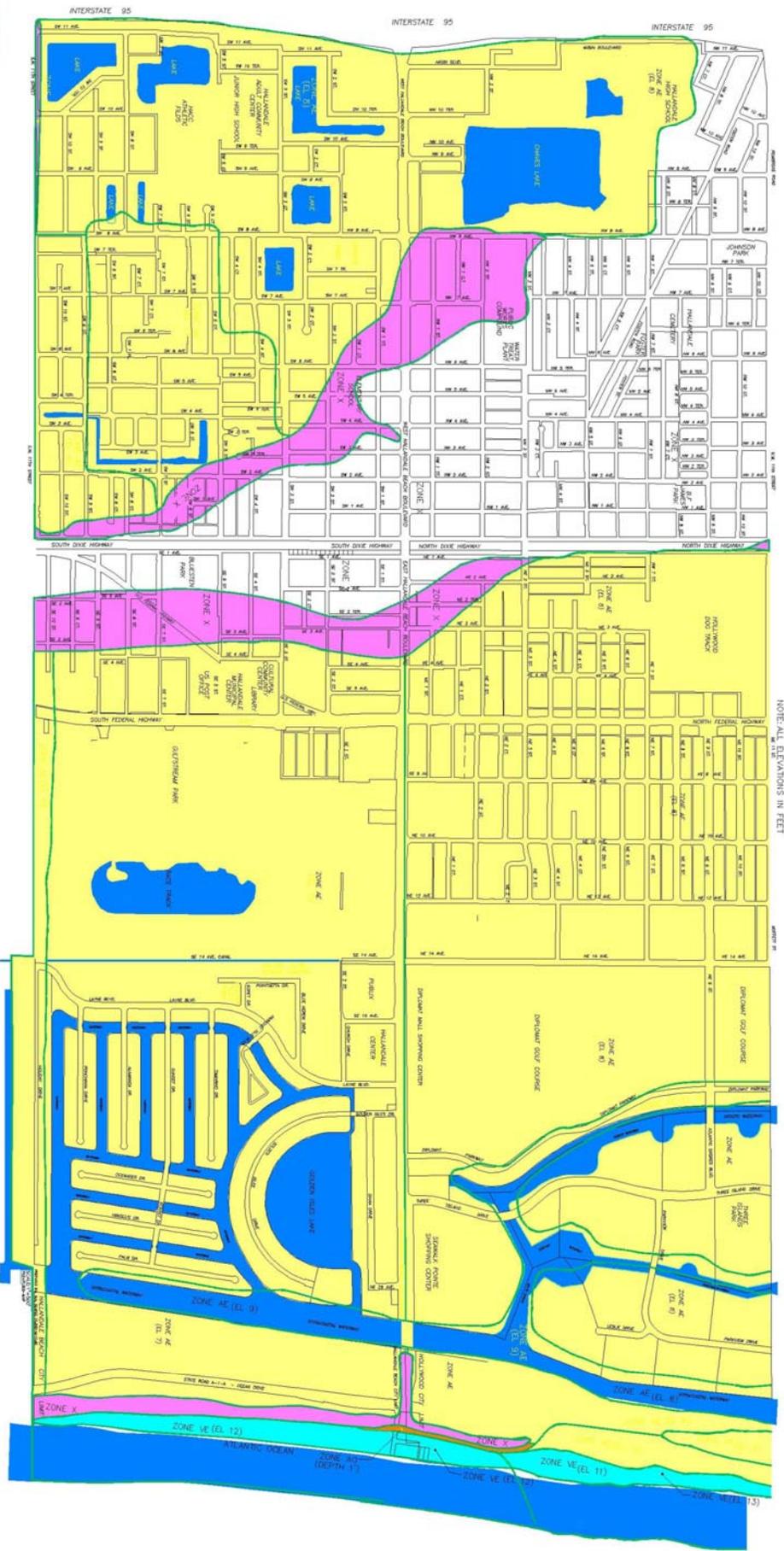
Mr. Jose L. Lopez, PE, PMP
South Florida Water Management District
8211 W. Broward Boulevard
Plantation, Florida 33322

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

CITY OF ATLANTA BEACH FLOOD ZONE MAP



NOTE: ALL ELEVATIONS IN FEET

- LEGEND:**
- █ ZONE VE: COASTAL FLOOD WITH VELOCITY HAZARD (WATER ACTION) BASE FLOOD ELEVATION DETERMINED.
 - █ ZONE AE: COASTAL FLOOD WITH VELOCITY HAZARD (WATER ACTION) 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.

- 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

Solicitation of Input from Other Agencies and Organizations, continued

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. However, FEMA is currently working together with the South Florida Water Management District to update the Study in 2008.

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 will be contacting Mr. Royce Tipton for more information.

Solicitation of Input on the Draft Action Plan

A draft of the FMP Action Plan has been sent to all of the other agencies and organizations that have 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.

Existing Flood Studies

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

- Drainage Study Area west of U.S. 1 from 7th St. to the Miami/Dade County Line
- Hydraulic Evaluation for SE 14th 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. However, FEMA is currently working together with the South Florida Water Management District to update the Study in 2008.
- 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 14th 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 14th Avenue Canal.

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 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)	Winds (mph)	Surge (ft.)	Damage
1	>28.94	74-95	4-5	Minimal
2	28.50-28.91	96-110	6-8	Moderate
3	27.91-28.47	111-130	9-12	Extensive
4	27.17-27.88	131-155	13-18	Extreme
5	<27.17	>155	>18	Catastrophic

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 a result of an elevation study conducted in the year 2000, Broward County was able to reduce the area for mandatory hurricane evacuations. The data gathered from this study indicated that the storm surge would be primarily confined to the region east of Federal Highway (US 1) for a category 3-5 storm.

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 14th 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.

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 freshwater flooding.

Flood Hazards

Type of Flood Hazard	Probability High-5/Low-1	Human Impact High-5/Low-1	Property Impact High-5/Low-1	Business Impact High-5/Low-1
Tropical Cyclone	4	5	5	5
Freshwater Flooding	5	5	5	5
Storm Surge	4	5	5	5
Thunderstorms	5	5	5	5

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 Local Mitigation Strategy 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.

History of Natural Hazards and Probability of Future Events, continued

The following hazards are listed in the Florida State Hazard Mitigation Plan. These hazards were identified as having the greatest possible impact on the State.

- ❑ Flood and Dam Failures
- ❑ Hurricane and Coastal Storms
- ❑ Severe Storms and Tornadoes
- ❑ Wildfire
- ❑ Drought and Extreme Heat
- ❑ Winter Storms and Freezes
- ❑ Erosion
- ❑ Sinkholes, Landslides and Seismic Events
- ❑ Terrorism
- ❑ Technological
- ❑ Mass Migration

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 Local Mitigation Strategy (LMS) and in this report:

- ❑ Tropical cyclones / wind and storm surge
- ❑ Lightning
- ❑ Fresh water flooding
- ❑ Thunderstorm-hail
- ❑ Thunderstorm-wind
- ❑ Drought
- ❑ Wildfire
- ❑ Tornadoes and waterspouts
- ❑ Rip current
- ❑ Heat
- ❑ Freeze
- ❑ Sink holes
- ❑ Agriculture disease
- ❑ Insect borne diseases

Of these hazards, freshwater flooding, tropical cyclone-wind, tropical cyclone-storm surge, and lightning were ranked the four highest priority natural disasters. Flooding is not covered in this section as it is covered in other sections of this report.

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 fronts the Atlantic Ocean or the Gulf of Mexico. Hallandale Beach is in 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 LMS states that between 1886 and 1999 there were an estimated 3,451 deaths from South Florida hurricanes as well as \$37.4 billion in damages. As the population increases and more development occurs, the risk of exposure to hurricanes and tropical storms is likely to increase. In fact, the 2004 and 2005 hurricane seasons saw unprecedented numbers of formed tropical depressions, tropical storms and hurricanes. This trend is predicted to continue.

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.

Florida’s experience with hurricanes is summarized in the following table. Hallandale Beach, which is in southeast Florida, is highlighted in red. This area has historically been the most susceptible to this natural hazard.

Hurricane History in Florida in the Twentieth Century

Area	Category 1	Category 2	Category 3	Category 4	Category 5	All	Major Hurricanes (Cat. 3 or higher)
Northwest	9	8	7	0	0	24	7
Northeast	2	7	0	0	0	9	0
Southwest	6	3	6	2	1	18	8
Southeast	5	10	7	4	0	26	11
Florida	17	16	17	6	1	57	24

The state, county and local emergency management personnel continue to look to El Nino/La Nina studies and advisories to help predict the future storm seasons. An explanation of the El Nino/La Nina phenomena and the latest predictions of the El Nino/La Nina patterns are as follows:

El Nino is a term originally used to describe the appearance of warm (surface) water from time to time in the eastern equatorial Pacific region along the coasts of Peru and Ecuador.

La Nina is defined as cooler than normal sea-surface temperatures in the central and eastern tropical Pacific Ocean that impact global weather patterns. La Nina conditions recur every few years and can persist for as long as two years.

Florida El Nino Effects:

- ❑ Rainfall – above average rainfall
- ❑ Severe Weather – During El Nino the jet stream is oriented from west to east over the northern Gulf of Mexico and Northern Florida. Thus this region is most susceptible to severe weather.
- ❑ Temperatures – below normal temperatures
- ❑ Winter Storms – increased cyclogenesis (low pressure, tropical cyclone formation systems) in the Gulf of Mexico
- ❑ Hurricanes – El Nino almost always reduces the frequency of storms.

Florida La Nina Effects:

- ❑ Rainfall – Generally dry conditions prevail during La Ninas in late fall, winter and early spring.
- ❑ Wildfires – Increased risk of Wildfires in spring/summer months.
- ❑ Temperatures – Temperatures average slightly above normal during La Nina events.
- ❑ Hurricanes – According to research, the chances for the continental U.S. and the Caribbean Islands to experience hurricane activity increases substantially during La Nina.

The latest El Nino/La Nina Advisory:

The El Nino/Southern Oscillation amplifies certain climate driven events in Florida during strong El Nino/La Nina years. The effects listed below should be used only as indicators of increasing or decreasing threats. This does not mean that severe weather, hurricanes, or other damaging weather events will or will not occur.

It was reported as recently as October 10, 2007, that La Nina had arrived in the area and is expected to make conditions ripe for the formation of storms. La Nina reduces wind shear, thus allowing storms to form and build. An average hurricane season sees 11 named storms. As of October 15, 2007, this hurricane season has had thirteen named storms and forecasters expect to see three or four more storms due to La Nina before the season ends on November 30.

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.



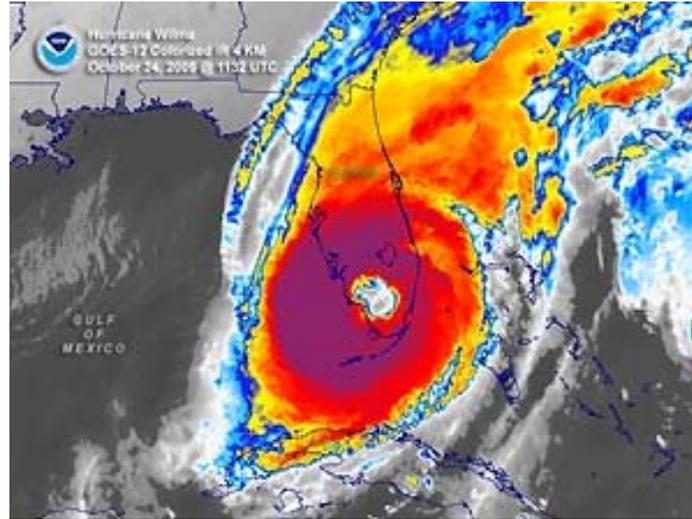
Hurricane conditions also occurred over southern Florida and the Dry Tortugas. The National Hurricane Center reported sustained winds of 69 mph with a gust to 87 mph. Katrina caused 10 to 14 inches of rain over southern Florida, and thirty-three tornadoes were reported from the storm.

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.

Hurricane Wilma, continued



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

Hurricanes have always been a threat to Florida. Between 1906 and 1996, there have been 24 major (Category 3 or higher) hurricanes that have impacted the state. Of all the hurricanes that have affected the state in this century, 58 have made landfall within the state and the majority have been Category 1 hurricanes. Generally, the lower intensity hurricanes have made landfall in the northwest portion of the state.

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.

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) and Hurricane Wilma (2005).

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	Length (mi.)	Total Cost	Federal Share	State Share	County Share	Cities' Share
1970	Pompano (Seg. II)	2.8	\$1.76	\$.88	\$.44	\$.33	\$.11
1976	John U. Lloyd State Rec. Area (Seg. III)	1.5	\$2.96	\$1.97	\$.84	\$.15	---
1979	Hollywood/Hallandale (Seg. III)	5.2	\$7.83	\$3.33	\$2.82	\$.88	\$.80
1983	Pompano\ Lauderdale-By-The-Sea (Seg. II)	5.3	\$9.99	\$4.80	\$3.49	\$1.40	\$.30
1989	John U. Lloyd State Rec. Area (Seg. III)	1.6	\$5.68	\$3.97	\$1.71	---	---
1991	Hollywood/Hallandale (Seg. III)	5.2	\$9.47	\$4.17	\$3.88	\$1.07	\$.35
Totals		21.6	\$37.69	\$19.12	\$13.18	\$3.83	\$1.56

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 and neighboring Hollywood Beach and John U. Lloyd State Park was 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 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.

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, project costs are increasing, and economical sources of sand are dwindling. Therefore, future plans for beach erosion control in Broward County must include ways to increase the lifespan of beach nourishment, 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.

Landslide History and Future Probability

There is no historical evidence of landslide events in the vicinity of Hallandale Beach.

Earthquake History and Future Probability

Although Florida is not usually considered to be a state subject to earthquakes, several minor shocks have occurred here. Official records and newspaper accounts from as early as 1727 document the occurrence of many small earthquakes and aftershocks, but it is unlikely that the epicenter of any of these was in Florida itself. One earthquake occurred near St. Augustine, in the northeast part of the State, in January 1879. Additional shocks of doubtful seismic origin also are listed in earthquake documents.

In January 1880, Cuba was the center of two strong earthquakes that sent severe shock waves through the town of Key West, Florida. The next tremor to be felt by Floridians also centered outside the state. It was the famous Charleston, South Carolina shock in August 1886. The shock was felt throughout northern Florida. Jacksonville residents felt many of the strong aftershocks that occurred in September, October, and November 1886.

On June 20, 1983, Jacksonville experienced another slight shock, apparently local, that lasted about 10 seconds. Another minor earthquake shook Jacksonville at 11:15 a.m., October 31, 1900 but caused no damage.

There was an apparent earthquake at Captiva, in southwest Florida, in November 1948. The sudden jar was accompanied by sounds like distant heavy explosions.

On November 18, 1952, a slight tremor was felt by many at Quincy, Florida, a small town about 20 miles northwest of Tallahassee. No serious effects were noted.

Earthquake History and Future Probability, continued

Three Florida shocks of doubtful seismic origin rumbled through:

- The Everglades/La Belle/Fort Myers area in July 1930
- Tampa in December 1940
- Miami-Everglades – Fort Myers area in January 1942

Most authorities attribute these incidents to blasting, but a few contend they were seismic.

There is little damage to people and property from earthquakes in Florida, in general, and in Hallandale Beach, specifically. With respect to earthquakes, Florida is in a region that is classified as stable, and strong earthquakes are not likely. Since a seismographic station was established in 1977 at the Geology Department of the University of Florida in Gainesville, no earthquakes originating in Florida have been identified. With this brief history of earthquakes in Florida, Hallandale Beach's emergency management personnel consider the future probability of the city experiencing an earthquake to be very low.

Sinkhole History and Future Probability

Florida has more sinkholes than any other state in the nation. The average sinkhole size ranges from 3 to 4 feet across and 4 to 5 feet deep. Based upon data from Florida Geological Survey, there are currently 2360 recorded sinkholes in the state.

Sinkholes are a natural and common geologic feature in areas underlain by limestone and other rock types that are soluble in water. Large areas of Florida have this geological characteristic, and the most common types of rock structure in the state where sinkholes occur are limestone and dolomite. Sinkholes are a hazard of concern in Florida because they are one of the predominant landform features of the state; because their development may be sudden, resulting in possible loss of life and property; because they may cause flooding during a storm when the drainage capacity of natural subsurface conduits is exceeded, and; because they may provide an avenue for pollutants on the land surface to move rapidly into the underlying limestone and dolomite aquifers – the source of more than 80 percent of the drinking water in the state.

While there are four principal areas for sinkhole occurrence in Florida, based on the type and thickness of cover material overlying the limestone, it is important to note that local factors will govern whether sinkholes actually form, and under certain conditions they could form in an area that ordinarily would be at low risk. Hallandale Beach is in Area 1:

Area 1: Cover material ranges in thickness from less than a foot to about 25 feet. The cover material is generally permeable, not unlike bare limestone exposed to weathering. Area 1 experiences mostly solution sinkholes, but reportedly has

very few collapse sinkholes, which are usually very shallow and broad and develop slowly. Area 1 includes Jackson County, South Florida, and the Big Bend area.

While sinkholes can occur in Broward County, they were given a low priority in the LMS ranking as well as by the Hallandale Beach emergency management personnel.

The Florida Geological Survey maintains a database of sinkholes reported throughout the state. There is no reported history of naturally occurring sinkholes in Broward County or in Hallandale Beach.

Wildfire History and Future Probability

Wildfires have burned across the woodlands of Florida for centuries and are part of the natural management of much 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.

Much of the Everglades Conservation Area is located in Broward County and some of the vegetation in this area can be a potential source of wildfire fuel. As the LMS states, encroachment of development on the conservation area could increase the risk of wildfires caused by human error. The LMS includes recent accounts of wildfire losses including a 200,000-acre wildfire in the Everglades swampland area in 2000. Also, since 2002, there have been 41 human-caused wildfires totaling 1,218 acres in Broward County. Because Hallandale Beach is an urban area, wildfires are not considered to be particularly hazardous to this community.

Severe Storms, and 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 and 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 2003

County	Number of events	Deaths	Injured	Property Damage
Broward	225	1	90	\$78,095,000.00

Events include F-0 through F-5 tornadoes, including funnel clouds and waterspouts.
 Source: National Climatic Data Center, 2003

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 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.

In 1992, a total of 285 severe thunderstorms occurred in 56 of Florida’s 67 counties, causing over \$19.9 million in damage, injuring 12 persons, and killing one individual. During the 36-year period from 1980 to 1995, Florida had a total of 2964 confirmed severe thunderstorms that caused 39 deaths and 335 injuries

Lightning History and Future Probability

Lightning strikes are a frequent impact associated with thunderstorms, and Florida leads the nation in lightning related deaths. Since 1950, each year an average of ten people are killed and 29 injured as a result of lightning strikes. During 1996, five persons were killed and 46 injured by lightning.

The peak of thunderstorm season is the month of July and therefore, the threat of lightning strikes, damage and deaths increases during this time.

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, then they reached the lowest level ever recorded (9.74 ft).

The southern region of the state is characterized by an extensive history of water shortages. This region is under the administration of the South Florida Water Management District, and records indicate major water shortages occurred in 1932, 1956, 1962, 1971, 1981, 1989, 2000 and again in 2006-2007.

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.

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 and 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 accentuated the fact 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

Hazard Category	Frequency of Occurrence	Population Vulnerability Impact	Property Vulnerability Impact	Environment Vulnerability Impact	Government Operations Vulnerability Impact
Flood and Dam Failures	2	M	M	H	L
Hurricanes & Coastal Storms	2	C	C	C	H
Severe Storms & Tornadoes	1	M	M	H	L
Wildfire	1	M	M	H	L
Drought/extreme Heat	---	L	L	L	L
Erosion	---	L	M	M	L
Sinkholes	---	L	M	M	L
Seismic Events	---	L	M	M	L
Terrorism	4	H	H	H	L
Technological	2	M	M	M	L
Mass Migration	3	L	L	L	L

Frequency of Occurrence	Numerical Factor	Vulnerability Factor	Numerical Value
Annual Event	1	Low	L
Every 5 Years or Less	2	Moderate	M
Every 10 Years or Less	3	High	H
Every 30 years or Less	4	Extensive	E
Greater Than 30 Years	5	Catastrophic	C

V. ASSESSMENT OF THE PROBLEM

Vulnerability to Natural Hazards

One recent adverse impact on our City has been the alarming trend of major storms affecting the City. Over the past three fiscal years, the City of Hallandale Beach has been 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 the last four storms 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 means 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: They may experience power outages, and may be isolated, with no immediate family or friends to look out for their well being.

Broward County experienced nine heat casualties from 1979 to 1998 and one heat casualty in 2001. 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 an *Emergency and Hurricane Procedures Manual*. Supervisory personnel from each department are charged with insuring that all

employees are knowledgeable of policies and procedures. Briefings occur before May 1st of each year. Department Directors submit a memo by May 7th 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 7th of each year, each Department Director submits any necessary revisions to the *Emergency Procedures Manual* to the Fire Department. By June 1st of every year, the Fire Department, in conjunction with the City Manager's office, conducts a Department Director's meeting to review the *Emergency Procedures Manual*. 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 Marquees
The City's two marquees are situated outside of the City Hall Complex on South Federal Highway at 3rd Street and at the intersection of Foster Road

and NW 8 Avenue. These marquees 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 on senior citizens and handicapped residents. According to figures from the 2000 Census, 35.8% of the population of Hallandale Beach is over the age of 65 and 25.8% of the city’s households have 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 and 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 8th Street
 - Hallandale High School, 720 NW 9th Ave
 - Gulfstream Middle School, 120 SW 4th Ave
 - Hallandale Adult Community Center, 1000 SW 3rd Street
 - Private Schools
 - The City of Hallandale Beach maintains a listing of buildings that have acquired a "Hazardous Material Permit". As of 2004, there are 135 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 is notified to instruct EOC when bridge is locked in closed position.
 - Three fire stations in the City

As stated in Hallandale Beach's *Emergency and Hurricane Procedures Manual*, 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 his 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. He 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:

City of Hallandale Municipal Complex
400 South Federal Highway, Room 257
Hallandale Beach, Florida 33009

In the event of circumstances in which the EOC cannot be located at the Municipal Complex, the main Fire Station will house the EOC at:

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

Construction of the new membrane water treatment plant is substantially complete. This modern new plant will meet and exceed 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. The location of this new EOC is:

630 NW 2nd 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 2nd 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, and 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. With this commitment in mind, this fiscal year the City Commission authorized the purchase of emergency generators and other storm-related equipment and \$250,000 has been budgeted for FY07 to assist gas stations and condominiums with the purchase of power generators.

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 utmost 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 for the past two 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 does 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.

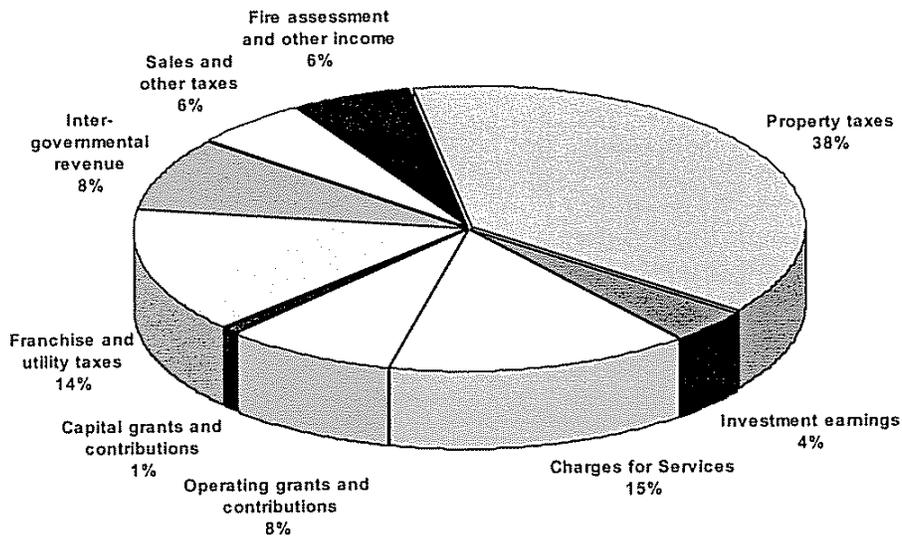
Zip Code Business Patterns for Hallandale Beach

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:

- The assets of the City exceeded its liabilities at the close of FY 2006 by \$119.2 million (net assets).
- Property taxes increased by \$1.7 million or 9.3%. Almost 45% of the increase was attributable to new construction.
- 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.

Revenues by Source - Governmental Activities



In Fiscal Year 2006, General government program expenses were \$13 million, an increase of \$4.6 million over the prior year. More than half of this increase was due to clean-up and public safety costs relating to Hurricane Wilma, in October 2005.

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 7,404 buildings, of which 5,044 are 1-4 family structures, and 2,360 are other types of structures.

Of the 7,404 total structures, 3,985 are 1-4 family structures in the Special Flood Hazard Area (SFHA) and 1,800 are other types of structures in the SFHA. 78.3% of the buildings in Hallandale Beach are in the SFHA.

In Hallandale Beach there were 25,176 dwelling units in 2006. 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

As of August 31, 2007 there are 19,550 flood insurance policies in-force in the city of Hallandale Beach. The dollar amount of property insured by these policies is \$2.68 billion. Since 1978 there have been a total of 938 loss claims filed by Hallandale Beach properties. Of these, 304 have been closed without payment, one is still open as of August 31, 2007, and 633 claims have been paid in the amount of \$10.46 million.

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 277 repetitive loss claims in the City of Hallandale Beach dating from July 1987 through May

2003. 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 2nd 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 3rd – 5th, 2000: There were 69 repetitive loss claims paid for flooding events on the dates of this “No-Name” storm. On October 2nd and 3rd, 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 20th – 26th, 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 15th – 16th, 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 22nd – 28th, 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.

Please see Table I for a listing of Repetitive Loss Claims listed by location.

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 down stream. One of the City’s primary drainage canals, the SE 14th 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.

TABLE I

NFIP Repetitive Loss Claims
 On or before 03-31-2005
 CITY OF HALLANDALE BEACH, FLORIDA

Street #	Date of Event																						
	2003			2002						2001	2000			1999				1998				1996	
	05-28	05-27	05-22	12-12	12-06	12-08	06-26	06-10	04-01	08-02	10-05	10-04	10-03	10-16	10-15	09-15	06-08	02-03	02-02	01-22	01-21	10-17	10-16
1		4									2	2	1	2		2	1	2	2	2			
2	1											1			1								
3			1				1					5	1										
4											1	3											
5												1											
6												1											
7		3		1	1	1		1	1		1	9	1	2					2			1	1
8		1									1	2											
9		1										2			1								
10												1											
11												1			1								
12		1										3			2								
13		1									2	3			2								
14												1		1									
15									1				1										
16		2										2			2		2			1		1	
17												2											
18		1			1		4					9			5								
19												1			1					1			
20												1											
21												1											
22											1				1								
23												1			1								
24												2			1					1			
25												1			1								
26												2			1								
27												1											
28												1			1								
29												1			1								
30																							
31		1										1			1	1							
	1	15	1	1	2	1	5	1	1	1	3	6	60	5	26	1	5	1	7	2	3	1	1

TABLE I

NFIP Repetitive Loss Claims
 On or before 03-31-2005
 CITY OF HALLANDALE BEACH, FLORIDA

Street #	Date of Event																	Total Claims Paid per Street	
	1995							1994			1992		1991				1987		
	07-29	06-26	06-24	06-23	06-22	06-21	06-20	12-21	11-15	05-24	10-01	08-24	10-31	10-25	10-16	10-14	10-08		07-19
1			1	1															22
2																			3
3					4				1										13
4				2	2												2		10
5					1														2
6					1														2
7	1			2	4		2	1			3		1	1			3	2	45
8					2														6
9					1														5
10					1														2
11					1														3
12					2												1		9
13					6												1		15
14																			2
15																			2
16																			10
17					2														4
18					1	1													22
19											1				1				5
20		1																	2
21				1															2
22																			2
23																			2
24					1												1		6
25																			2
26					1														4
27					1														2
28																			2
29																			2
30					1											1			2
31					1				1								1		7
	1	1	1	6	33	1	2	1	1	1	3	1	1	1	1	1	9	2	217

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
- .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
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 both Broward County and Hallandale Beach, 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. With this in mind, \$1,000,000 was included in the FY07 Budget to purchase land for affordable housing. Furthermore, \$250,000 has been budgeted for planning activities. The evaluation of planning needs and tools

necessary to facilitate the City's development and redevelopment activities will also be 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.

Although Hallandale Beach is experiencing an increase in development projects in the City, it must be careful to plan for in 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 they, along with gaming, will have on our community. The City Manager and his staff have spent countless 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.

The City Commission has mandated a six-month moratorium for new building and development in order to plan and implement a study of the community's needs, goals and future. The City will only act on applications for development submitted prior to June 20, 2007, when the moratorium was adopted. To ensure development within the City takes into consideration the best interests of the community, the City Commission has directed the City Manager to complete a City-Wide Master Plan and Implementation Strategy. The City-Wide Master Plan will take into consideration the best way to control the booming growth and development in the city, including protection of the growing area from future flooding.

In the fiscal year 2006-07 Budget, approximately \$3.3 million in funding was provided for capital projects. There are five major categories of projects and improvements, which are as follows: rights-of-way, storm water drainage, sewer, water, and facilities.

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.

The population of the City of Hallandale during the Season is 49,000; the Off-Season population is 39,471. With the unprecedented development occurring, Hallandale Beach is anticipating significant increase in population in the coming year, depending on when the various developments receive their certificates of occupancy.

The following population projections are based on planned development of condominiums, office, retail and entertainment space, hotels, churches, and schools, and information regarding planned developments, including location, number of condominium units, square footage of office, retail and entertainment space, number of hotel rooms and students through 2025:

Hallandale Beach Population Projections

Year	Projected Population
2008	40,438
2009	43,087
2010	45,736
2011	46,793
2012	47,785
2013	48,982
2015	51,022
2020	52,056
2025	53,607
2028	54,571

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

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 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. 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

- **Acquire more property for parks.** 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 would be especially beneficial. The Commission has already begun to acquire property for parks with the purchase of property adjacent to Bluesten Park in September 2007. The continued prioritization of park acquisition is encouraged over the next five years. Funding sources for this acquisition of property could include the following:
 - Fund reserves
 - Community Redevelopment Agency funds
 - Bond funds
 - Grants

➤ City Engineer

- **Prioritize addressing of flooding issues in repetitive loss areas and implement capital projects to mitigate flooding.** Drainage issues should continue to be prioritized in the capital improvement program, particularly in repetitive loss areas. It is understood that this is an ongoing program that will require at least five years of significant investment. Because municipal funding is limited, the City must continue 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

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

- **Encourage percolation-oriented drainage.** 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. Pursuit of various funding sources for water quality improvements is also encouraged.
- **Plant beach vegetation to protect erosion of beachfront.** Reduction of erosion is an important natural consideration for any community, particularly a coastal community. Planting of sea oats and other effective beach vegetation is beneficial for reducing beach erosion. Though the City completed a beach revegetation project in August 2007, there needs to be continued emphasis on beach protection.
- **Review City Code of Ordinances to strengthen drainage requirements.** Drainage codes should be altered and strengthened to require not only improved design but also enhanced maintenance of all private drainage facilities. This should be completed by September 2008.
- **Update repetitive loss forms and remove properties from Repetitive Loss List.** 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 will need to quantify the improvements to demonstrate the need to reclassify these properties. This should be accomplished before December 2009.
- **Install lightning detectors at all City parks.** 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. This should be accomplished before December 2008.

➤ **Director of Development Services**

- **Encourage responsible redevelopment.** Considering the stormwater drainage requirements for new developments are stronger than the drainage requirements that were in effect when older developments were built,

redevelopment is typically beneficial to the City from the perspective of floodplain management. Accordingly, responsible redevelopment is encouraged.

- **Zone all current parks to assure perpetual preservation of open space.** Open space preservation is an important component of floodplain management. To assure that parks are not eventually converted into developments, appropriate zoning restrictions are recommended. This should be completed by December 2009.
- **Address City Code requirements for lightning protection in new developments.** To protect new developments from lightning, consideration should be given to strengthening code requirements to this effect. This activity should be accomplished by December 2008.
- **Maintain strong enforcement of South Florida Water Management District regulations, especially in times of drought.** 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.
- **Assure dissemination of information concerning the City's shutter program.** The City has an impressive program that assists its residents in obtaining hurricane shutters. This program needs to be publicized more aggressively to attract more participants. Suggestions for additional advertisement of this service include: water bills, website, *Hallandale Happenings* newsletter, and City marquees. This recommendation should be implemented by October 2008.

➤ **Building Official**

- **Include elevations as a necessary consideration on plan review checklist.** This clerical and procedural revision will further highlight the importance of elevations in planning and will assure that flood elevations will receive the attention they deserve from the outset of the planning process. This revision should be implemented by October 2008.
- **Include base flood finished floor elevations on Certificate of Occupancy.** This clerical and procedural revision will assure that construction must be completed in accordance with approved elevations. This revision should be implemented by October 2008.
- **Implement program for assuring the private maintenance of stormwater management facilities.** This program, which has already been developed, is

a methodology for assuring that larger private drainage systems within the community are adequately maintained. This recommendation is ongoing.

- **Include form for signature of developer at issuance of permit acknowledging the requirements of securing of site, equipment and materials from high wind events.** If not properly secured, construction sites can become sources for dangerous projectiles during hurricane events. This recommendation, which should be implemented by February 2008, alerts all developers to their responsibilities in the event of hurricanes and other major storm events.
- **Assure bus shelters are all properly grounded against lightning.** This recommendation is intended to protect transit patrons against lightning. This should be completed by December 2008.

➤ **Fire Chief**

- **Assure 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. Assuring that condominiums follow through on their emergency preparation requirements will mitigate against hazards resulting from these storm events. This should be completed by December 2008.
- **Encourage more frequent use of Code Red, including:**
 - **using Code Red for flood warnings**
 - **using Code Red at every hurricane warning**
 - **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. This recommendation is intended to assure that this effective warning tool is used as often as it is needed. This recommendation should be implemented immediately.
- **Assure that all citizens have registered for Code Red with an active phone number.** This recommendation is intended to make the Code Red system current and thus more effective. This should be completed by June 1, 2008.
- **Assign individual to continually update information pertaining to natural disasters, including hurricane and flood warnings.** This update responsibility will include, but not be limited to the following media:
 - Radio station 1620 AM
 - Comcast Government Access Channel 78
 - City of Hallandale Beach marquees
 - City website

This assignment should be made by January 2008.

- **Encourage City staff to follow the Emergency Procedures Manual.** The City's Emergency Procedures Manual 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 encouragement to do so should be one effective means to maximize the effectiveness of the City's emergency response.
- **Continue to maintain the Vulnerable Population Registry.** 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.
- **Assure dissemination of location of local hurricane shelters.** 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.

Post Disaster Mitigation Policies and Procedures

The City of Hallandale Beach *Emergency Procedures Manual* (EPM) is reviewed by each City Department by May 1st of every year. Evidence of this review is communicated to the City Manager by May 7th of every year. Each Department submits recommendations or changes to the Fire Department by May 7th of each year. By June 1st, the Fire Department presents the revisions to the City Manager and the Department Directors.

Phase III of the EPM, *Post-Emergency Recovery and Clean-up*, includes all immediate actions necessary to restore essential services, provide emergency assistance to disaster victims, and return to normal day-to-day operations as quickly as possible.

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 Hallandale Beach.

X. IMPLEMENTATION, EVALUATION AND REVISION

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.