10.1 Overview of Key Colony Beach

Geography

Key Colony Beach, a man-made island community built in 1957, comprises just 285 acres in area. It is low-lying, with all land below about 5.5 feet above mean sea (MSL). The entire south shore faces the Atlantic Ocean and the west shoreline faces Vaca Cut, which connects the Atlantic to the Gulf of Mexico. The island, located approximately between Mile Marker 53 and Mile Marker 54, contains numerous dead-end canals, channels and bays that experience flooding due to storm surges that may be higher than along flat shorelines.

Population

Key Colony Beach has a permanent resident population of 836. The seasonal population increases by as much as 3,600. Current population projects indicate the permanent population may grow to about 950 by 2010.

In 2004, the Monroe County Social Services registered 12 people in the area between Mile Marker 53 and Mile-Marker 60 as having special needs for hurricane assistance.

Land Use & Economy

Key Colony Beach is a well-planned community comprised of single family, duplex, and multi-family dwellings. These uses are served by limited commercial development, including light retail, restaurants, offices and marinas. Just over 10% of the land area is used for recreational purposes.

The City joined the National Flood Insurance Program in July 1971 and administers a floodplain management ordinance that meets or exceeds the minimum federal requirements. About 40% of the buildings were constructed prior to 1971.

Comprehensive Plan

The City of Key Colony Beach adopted its Comprehensive Plan in February 1992. The plan includes nine elements pertaining to the future growth and development of the City. Throughout the plan are numerous goals, objectives and policies that acknowledge hurricane risks, especially related to evacuation, growth, ensuring safety, providing adequate facilities, managing storm water, working with providers of water supply and wastewater services, and requirement compliance with codes. The Infrastructure Element and the Conservation and Coastal Element contain specific policies relevant to mitigation of future risk and damage.

The Infrastructure Element includes:

- Complete a detailed engineering study of drainage and implement priority storm water projects. As of mid-2005 date, the City is 50% construction complete with citywide storm water retention systems.

- On-site wastewater disposal facilities to minimize potential environmental impacts. The City's wastewater treatment plant was installed in 1970 and has been upgraded to 2010 standards.
- Establish and coordinate acquisition programs. The City has acquired several properties over the past five years.

The Conservation and Coastal Element includes:

- New development encroaching into the 100-year floodplain shall incorporate elevation and flood protection measures sufficient to protect against the 100-year flood.
- The City shall maintain consistency with program policies of the National Flood Insurance Program.
- The City shall monitor new, cost-effective programs for minimizing flood damage.
- Such programs may include modifications to construction setback requirements or other site design techniques, as well as upgraded building and construction techniques.

10.2 City Organization and Agencies

The City of Key Colony Beach is a Commission Form of Government. The City Commission is composed of 5 members, including the Mayor who is selected by the Commission to that office. The City Commission sets government policy and adopts guidance documents, such as the Comprehensive Plan, the Land Development Regulation, and ordinances establishing various codes and standards.

Key Colony Beach is organized into several departments, each with authorized responsibilities that, as described below, have bearing on how natural hazards are recognized and addressed.

Mayor/City Administrator. The Mayor of Key Colony Beach implements the policies of the Commission and administers the overall operations of the City. With regard to floodplain management the Mayor (or designee) is appointed to administer and implement these provisions consistent with the requirements of the National Flood Insurance Program.

Key Colony Beach Planning and Zoning Committee. The Key Colony Beach Planning and Zoning Committee is responsible for the development and maintenance of the City's Comprehensive Plan and the Land Development Regulations. City personnel serve as staff to the and are involved in the following related to hazard mitigation:

- Ensures that mitigation related items in the Comprehensive Plan, such as floodplain management and natural resource management, are followed and reflected in the City's Codes and Standards.
- Participates in post-disaster appraisals and may formulate additional mitigation measures for use in the Comprehensive Plan.

- Works closely with the Building, Code Enforcement, and Fire Department to ensure coordination of actions related to disaster planning, recovery, and mitigation.
- Reviews construction plans for compliance to the NFIP regulations.
- Responsible for enforcing planning and zoning standards.

Key Colony Beach Building Department. The Building Department is responsible for regulations of building construction pertaining to life safety, health, and environmental land use zoning regulations. The department is staffed by the Building Official, a Building Inspector, a Permit Clerk and an on-call State of Florida Registered Engineer. Related to mitigation of hazards, the department is responsible for the following:

- Review of construction plans and issuing building permits
- Inspection and enforcement during construction
- Designated as coordinator for the National Flood Insurance Program.
-

Table 10-1. Key Colony Beach Permit Statistics for 2004

Permits Issued	CY 2004
New single-family, detached	3
Duplexes	4
Multi-family (3 or more)	1
Non-residential (all types)	0
Residential (additions, alterations, repairs)	304
Non-residential (additions, alterations, repairs)	3
Demolition	2
Relocation	0
Number of inspections	901

Key Colony Beach Public Works Department. The Public Works Department works under the Building Official and is responsible for overseeing the maintenance of most city facilities, including buildings, roads, and bridges. It operates and maintains City vehicles.

Public Works is responsible for coordination and provision of emergency public works, initial evaluation of infrastructure damage and preparation of documentation required for federal reimbursement (including identification of mitigation components to be incorporated), and coordination of emergency debris clearing.

In executing its disaster recovery responsibilities, Public Works coordinates with the Florida Department of Transportation, Monroe County Department of Public Works, Florida Keys

Aqueduct Authority, and Florida Keys Electric Co-op. The department plans, coordinates and initiates restoration of the serviceability of transportation routes, bridges, and assurance as to the safety of affected public and private dwellings and structures.

Key Colony Beach Code Enforcement Board and Officer. The Code Enforcement Board and Officer oversee after-the-fact code compliance issues pertaining to safety, health, and environmental land use zoning regulations. The department is staffed by a Code Enforcement Officer and an Administrative Assistant. Related to mitigation of hazards, the department is responsible for: working closely with the Building, Planning, and Fire departments to ensure coordination of actions related to disaster planning, recovery, and mitigation; and participating in post-disaster appraisals.

City Clerk/Finance Administrator. The Finance Administrator is responsible for overseeing the day-to-day financial requirements of the City, including establishment of purchasing procedures for all agencies. To expedite preparation for, response to, and recovery from disasters, the Finance Administrator may implement special emergency procedures to expedite necessary purchase and payment before, during, and after a disaster.

Key Colony Beach Police Department. The Key Colony Beach Police Department is responsible for overall law enforcement and protection of residents and visitors in the City of Key Colony Beach. The department plays a key role in planning and response during emergencies to include but not limited to: coordination with Florida Highway Patrol to promote speedy and safe evacuation, communicates with base operations, field personnel, and emergency shelters.

Marathon Fire Department. The City contracts with the Monroe Fire Department to provide emergency management assistance and direction to the City of Key Colony Beach for all life safety in connection with other duties of fire control, fire prevention, and fire and hurricane public education. The department plays a lead role in planning and response for all emergencies. As required under U.S. Homeland Security Presidential Directive 5, has adopted and uses the National Interagency Incident Management System (NIIMS) and will adopt the National Fire Service Incident Management System (IMS) Incident Command System (ICS) as the baseline incident management system. ICS is implemented for all fires, haz-mat incidents, rescues, structural collapse and urban search and rescue operations, manmade and natural disasters, and EMS responses that require two or more rescue companies.

10.3 Hazards and Risk in Key Colony Beach

Historic Storms that have affected the Key Colony Beach Area:

- 1929 Hurricane (September 22 to October 4) – The hurricane crossed over Key Largo on a northerly course. Key Largo reported winds estimated at over 100 mph,

a central barometric pressure of 28 inches, and tide levels of 8-9 feet above MSL. Key West experienced tide levels of 5-6 feet above MSL and winds of 66 mph.

- 1935, Hurricane (August 29-September 10) - The small, extremely violent, Category 5 hurricane crossed the Florida Keys on a northwesterly track. The Tavernier-Islamorada area reported winds estimated at 120 mph with gusts from 190-210 mph. Tide levels in the Florida Keys ranged from 14 feet above MSL in Key Largo to 18 feet above MSL in Lower Matecumbe Key. The storm was so intense and tightly wrapped that Key West had tide levels of only 2 feet above MSL and average sustained winds of less than 40 mph. One of the most tragic aspects of the 1935 storm was the unfortunate death of many WWI veterans who were working on construction of the first Overseas Highway.
- Hurricane Donna, 1960 (August 29-September 19) – Hurricane Donna curved northwestward over the Middle Keys near Long Key/Layton and then traveled northward toward the Gulf Coast towns of Naples and Fort Myers. Areas in the vicinity of the storm experienced winds speed of 128 mph and a central pressure of 28.44 inches. The storm affected the Everglades with estimated winds of 150 mph. Tide levels were reported at Upper Matecumbe Key of 13.5 feet above MSL, at Plantation Key 10+ feet above MSL, and 8.9 feet above MSL in Key Largo. As of 1992 Hurricane Donna, a Category 4 storm is listed as the 6th most intense hurricane in the US.
- Hurricane Betsy, 1965 (August 26-Septmber 12) – Hurricane Betsy passed over Marathon while moving westward into the Gulf of Mexico. The lowest central pressure was measured in Tavernier at 28.12 inches and wind speeds were estimated to be 120 mph. Tide levels in Tavernier were 7.7 feet above MSL and Key Largo had tide levels of around 9 feet above MSL. Betsy was a Category 3 storm and is ranked 25th in intensity.
- Ground Hog's Day Storm (February 2, 1998) involved multiple F-2 tornado touchdowns resulting from severe thunderstorms characterized by dangerous cells with high, cold cloud tops affected the Florida Keys. Areas most affected were primarily in the Middle Keys including Grassy Key and Valhalla Beach in the vicinity of Duck Key. Several buildings were damaged. Also significant problems occurred from the displacement of lobster traps that contributed to seaborne debris and navigational problems; the fishing industry suffered considerable loss of income.
- Severe thunderstorms (July 4, 1998). Severe thunderstorms with lightning and high winds came up quickly in the Middle Keys. The Weather Service Office in Key West recorded wind speeds up to 70 mph sustained. Because it was July 4^{th,} many boats were offshore celebrating and waiting for the fireworks. Although, this event did not warrant a presidential disaster declaration, it did result in loss of life.
- Hurricane Georges, 1998 (September 25, 1998), a Category 2 when made landfall in the Lower Keys, affecting the entire county to some extent. Damage estimates approached $300 million, including insured and uninsured damage and infrastructure loss. Maximum sustained winds at the Naval Air Station (Boca Chica) near Key West were 92 mph; gusts up to 110 mph were reported by the Emergency Operations Center in Marathon. According to the Key West Weather Service, precipitation levels in the Lower Keys were as 8.65 inches on the south

side of Sugarloaf Key, 8.38 inches at Key West International Airport, and 8.20 inches on Cudjoe Key. Tavernier in the Upper Keys recorded 8.41 inches. In Key Colony Beach storm surge flooding exceeded six feet over normal high tide. All city streets and many buildings were flooded, with approximately 125 damaged ground level dwelling units.

- Tropical Storm Mitch, 1998 (November 4 and 5). Feeder bands from Mitch containing dangerous super cells spawned several damaging tornadoes in the Upper Keys. Sections with mobile homes were especially hard hit. Islamorada experienced an F-1 tornado; Rock Harbor and Key Largo were hit by F-2 tornadoes. According to the Department of Community Affairs, damages were estimated at $11 million.
- Hurricane Irene, October 1999. Hurricane Irene hit the Florida Keys and Southeastern Florida. This Category 1 Hurricane dumped 10 to 20 inches of rain resulting in severe flooding in the Florida Keys and Southeastern Florida causing total damage estimated at $800 million
- Tropical Storm Gabrielle, September 2001. Although it did not reach hurricane strength, this storm hit the southwest coast of Florida and caused flooding problems; Marathon did see some effects from the storm.

Some Costs of Recent Hurricane Disasters

Damage from Hurricane Georges is representative of Key Colony Beach's exposure to tropical cyclones:

- Debris removal costs exceeded $300,000
- Repair of city street signage and parks cost $7,900
- Waterway cleanup, including buoy replacement, cost $8,300
- Manning the EOC, search and rescue, and emergency labor and supplies cost $8,600
- Contract for structural engineering support was $16,300
- Repairs to the wastewater treatment system cost $31,400
- Repairs to the storm water system cost $36,000

Damage sustained on private property included:

- Wind and flood damage was estimated at $4.4 million
- Approximately 10% of all residences were damaged, notably those that predated the City's floodplain management requirements
- Approximately 5% of fiberglass roof singles and concrete tile roofs were damaged
- 4% of all structures sustained significant flood, wave and wind damage
- All businesses were closed or severely restricted due to structural damage and power outages
- Tourist-based businesses were most affected

Hurricane Flooding as Predicted by SLOSH Modeling

The National Hurricane Center's surge model, called SLOSH (Sea, Lake, and Overland Surges from Hurricanes), estimates surges associated with different characteristics of tropical cyclones (track, forward speed, wind speed, etc.). The results can be combined with topographic mapping to delineate inland areas subject to flooding (with a margin of error of +/- 20%). The closest available predications are made for Marathon Mile-Marker 50 and Duck Key Mile-Marker 61 (Table 10-2). Although storm surge flooding cannot be predicted simply at any given location, these charts can be used to approximate surge flooding in Key Colony Beach.

Table 10-2. SLOSH Maximum Predicted Water Depths above MSL

Ocean Side Mile-Marker 50						Ocean Side Mile Marker 61					
Track Direction	Storm Categories					Track Direction	Storm Categories				
	1	2	3	4	5		1	2	3	4	5
WSW	4	5	6	7	8	WSW	4	5	6	7	8
W	4	5	7	8	9	W	4	5	7	8	9
WNW	4	6	7	8	9	WNW	4	6	7	9	10
WN	4	6	7	8	9	NW	4	5	7	8	10
NNW	4	5	7	8	9	NNW	4	5	7	8	9
N	4	5	7	8	9	N	4	5	6	8	9
NNE	4	5	6	7	9	NNE	4	5	6	8	9
NE	4	5	6	7	8	NE	4	5	6	7	9
ENE	3	5	6	7	8	ENE	3	5	6	7	8
E	3	4	5	6	7	E	3	4	5	6	8

NFIP Floodplain Mapping

The National Flood Insurance Program (NFIP) prepared a Flood Insurance Rate Map for Monroe County (current effective map is dated February 18, 2005). The FIRM delineates areas that have been determined to be subject to flooding by the "base flood," the flood that has a 1-percent-annual chance of flooding in any given year (commonly called the 100-year flood).

NFIP Flood Insurance Policies in Key Colony Beach: 1,213

Claims paid since 1978: 128

http://www.fema.gov/nfip/pcstat.shtm
(as of December 31, 2004)

The entire City is located in areas designated as VE Zones (coastal flood with velocity hazard wave action) and AE Zones. With land elevations averaging 4-7 feet, water depths associated with the 1%-annual chance flood can be expected to range from 4 to 9 feet. As indicated by the predicted storm surge flood depths, even deeper flooding will occur during more severe

hurricanes. As such, all new development in the City is subject to the floodplain management standards established in the City's Land Development Regulations.

NFIP Repetitive Loss Properties

Data provided by the Florida Department of Community Affairs identifies properties that are or have been insured by the National Flood Insurance Program and that have received two or more claims of at least $1,000. Within unincorporated Key Colony Beach there are 9 repetitive loss properties. The cumulative payments (claims paid on building damage and on contents damage) range from just over $7,000 to more than $348,000.

Stormwater Management & Rainfall/Ponding Flooding

Key Colony Beach's Stormwater Management Master Plan, prepared in 1995, identifies areas of localized flooding and specific engineered construction plans to minimize local flooding that includes closed drainage systems, open swales, retention ponds, covered trenches, and injection wells. This project is approximately 50% completed construction as of this date.

Severe Storms, Tornadoes, Water Spouts and High Winds (Other than Hurricane)

Key Colony Beach, like the rest of the Keys, has low-lying terrain. Section 6.2 characterizes the entire area encompassed by Monroe County and the cities as having equal distribution of winds. The risk of severe storms, tornadoes, water spouts and high winds in Layton does not vary from the rest of the planning area. All new buildings, replacement buildings, and additions to existing buildings must comply with the Florida Building Code's wind load requirements.

Drought Hazards

Drought hazards for the planning area are described in Section 6.4. Key Colony Beach's risk due to drought is comparable the drought risk throughout the area.

Wildland Fire Hazards

The Florida Forestry Department indicates that in the Key Colony Beach area, Grassy Key (including Geiger and Boca Chica) is the area most prone to wildland/brush fires. Based on data provided by Monroe County Property Appraiser, Grassy Key includes a total of 9,391 parcels of land of which 6,498 are improved. The total assessed value of improvements is $1,562,786,704. It is important to note that this summary is not to imply that all properties would be vulnerable in any given wildfire outbreak. Future development on Grassy Key is influenced by property owner choices; all new construction must comply with environmental restrictions.

Key Colony Beach's Important and Critical Facilities

Figure 2-2 shows the locations of the City's facilities that are listed in Table 10-3.

Table 10-3. Important and Critical Facilities in Key Colony Beach

Critical/Essential Facilities: • City Hall-Police/Auditorium/Post Office Complex • Wastewater Treatment Plant and System • Stormwater System • Public Works Building	**Other Public Facilities :** • Public Golf Courses • Public Tennis Courts • City Parks and Playground
Hazardous Materials Sites (302 Facilities): • Wastewater Treatment Plant (chlorine and sulfuric acid)	**Marinas:** • The Boat House (MM 53.5, Ocean side) • Key Colony Beach Marina (MM53.7, Ocean side)

10.4 Damage Reduction Activities

On-Going Activities

- Comprehensive Plan objectives and policies address the need to hold down densities so as not to increase hurricane evacuation times. A stated objective of the Plan is to: "Grant no land use amendments that would increase the land use density and intensity, in order to assure that the projected 'build-out' hurricane evacuation traffic entering on U.S. 1 will not increase. Concurrent policies address restrictions on population density "in order to avoid further burdens on the hurricane evacuation plan".
- Plan policies advocate no City expenditures for infrastructure in the V zone that would encourage increased private development.
- The City of Key Colony Beach Disaster Preparedness Committee, composed of residents and City representatives, coordinates with the County on emergency management activities such as planning, response, recovery, and mitigation. It provides its own public information program, disaster command center, and emergency supplies.
- Post-disaster redevelopment is addressed in the Coastal Management Element of the Comprehensive Plan, recognizing that redevelopment may require greater building setbacks and elevations, and installation of dunes rather than seawalls.
- The Building Code requires buildings to be designed to withstand the forces of 150 mph winds (assumed in any direction and without regard to the effects of shielding of other structures).
- Post-disaster assessments are required by the Building Department to determine whether demolition versus repairs are appropriate given the level of damage; buildings damaged more than 50% must be rebuilt to current codes.
- The Land Development Code requires that all existing mangroves be maintained to state requirements; use of seawalls is restricted; new oceanfront development shall include dune planting plans.

Key Colony Beach participates in the Community Rating System (CRS) of the National Flood Insurance Program. The CRS recognizes actions that exceed the minimum requirements. In

return, the City's property owners enjoy a 10% reduction in the cost of NFIP flood insurance. Actions undertaken by the City include:

- Maintains elevation certificates
- Makes NFIP map determinations
- Sends annual NFIP mailings to all local lenders, realtors, and insurance companies
- Keeps NFIP library in City Hall
- Constructs stormwater facilities
- Warns citizens of impending flooding

Recent Projects

- Since Hurricane Andrew, the City has reconstructed its causeway bridge to improve its ability to withstand storm surge.
- The City has its own sewage collection and treatment system, which is operated by the Wastewater Treatment Plant Operator. The sewage treatment plant is subject to storm surge flooding but has been recently retrofitted and operating at 2010 requirements. A generating system has been added for emergency operation and all of our effluent is converted to potable irrigation through our reverse osmosis and storage system. All lift stations and lines are continually being retrofitted and monitored for infiltration.
- The entire City Hall/Post Office complex has been retrofitted and floodproofed to current requirements.
- Several properties were purchased by the City and converted to open space.
- The City's master storm water control project that includes swales, retention ponds, and deep injection wells which were designed, installed, and monitored by the South Florida Water Management District, FL Department of Environmental Protection, and the U.S. Environmental Protection Agency. As of this date, the citywide project is approximately 50% complete.