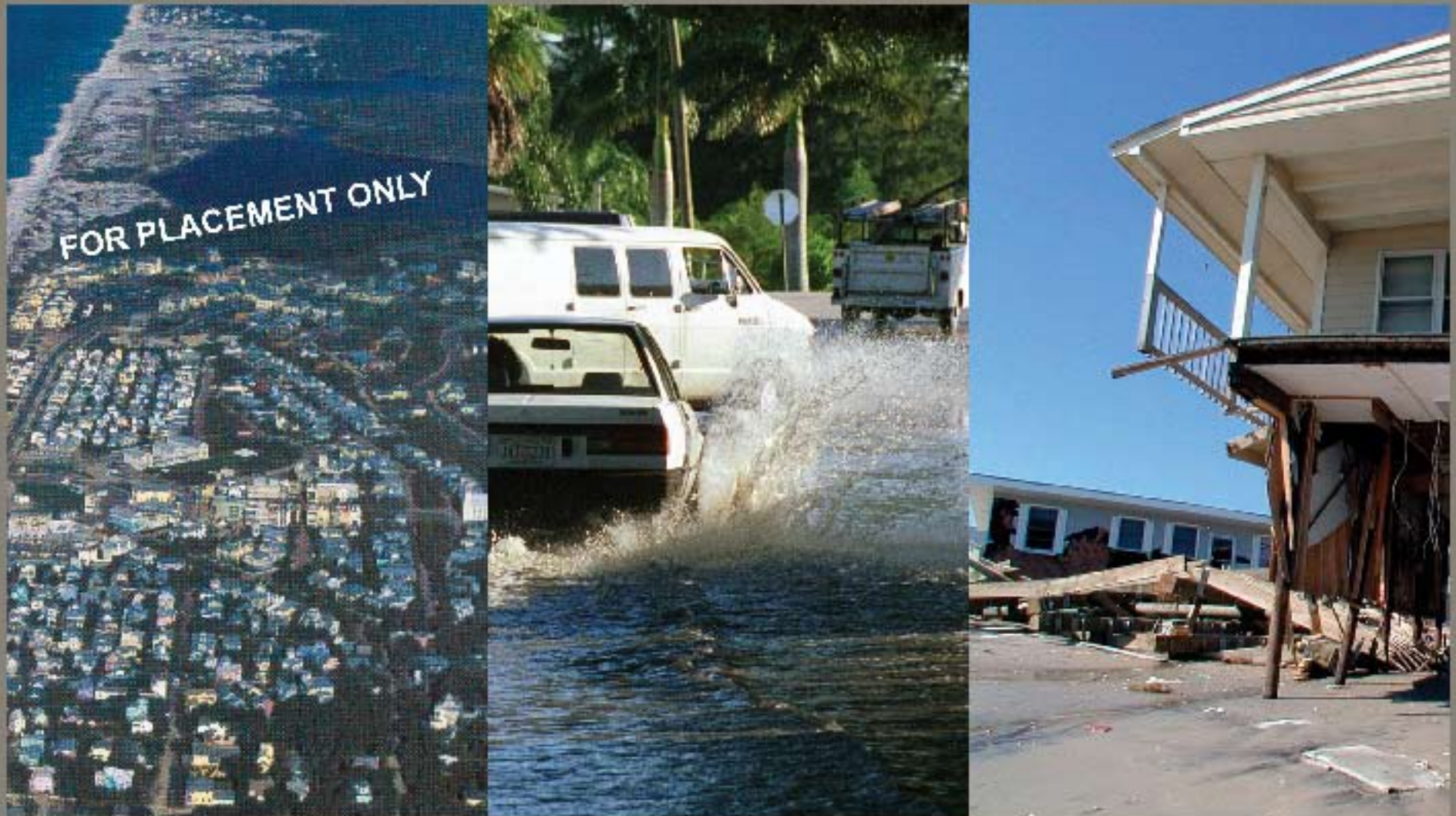


PROTECTING FLORIDA'S COMMUNITIES

Land Use Planning Strategies and Best Development Practices
for Minimizing Vulnerability to Flooding and Coastal Storms



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The Florida Department of Community Affairs also wishes to express its appreciation to the Urban Land Institute.

The following representatives of the ULI Advisory Services Program provided valuable guidance for improving the format and content of this guidebook:

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The document produced by ULI as a part of its review of this guidebook is titled "Florida Department of Community Affairs, Review of Best Practices Guidelines," June 23-25, 2003.

This guidebook is available on the Florida Department of Community Affairs website: www.dca.state.fl.us/fdcp/DCP/publications/index.htm.

For additional copies of this guidebook, please contact: Division of Community Planning, Publications, Florida Department of Community Affairs, 2555 Shumard Oak Boulevard, Tallahassee, Florida 32399-2100, (850)487-4545.

A publication of the Florida Department of Community Affairs prepared by the URS Corporation and the Florida Planning and Development Lab at Florida State University. Funding was provided by grants from the Federal Emergency Management Agency Hazard Mitigation Grant Program, and the State of Florida Residential Construction Mitigation Program (authorized under Section 215.559 Florida Statutes).

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1 Introduction

Florida is subject to severe weather. At the same time, the state is growing fast, with many people moving to the most hazard-prone areas along the coasts of the Atlantic Ocean and Gulf of Mexico. In some areas, the population is growing faster than the ability to evacuate and shelter people during emergencies. Growth in these areas also exposes billions of dollars of private property and public facilities and infrastructure to damage from coastal storms and flooding. The combination of these ingredients – more people, property, and public facilities in the path of natural hazards – is a recipe for disaster.



Source:

Clockwise from top:

Hurricane damage in Charlotte County.

Unidentifiable business on Highway 41 North toward Port Charlotte.

Hurricane damage in Orange County.

Holiday Inn in Punta Gorda.



Source:



Source:



Source:

On the bright side, much valuable and useful planning has been done, at both the state and local levels, to protect people, property, and public facilities. Local governments throughout Florida have developed *Local Mitigation Strategies (LMSs)* and *Comprehensive Emergency Management Plans (CEMPs)*. Some coastal communities have prepared *Post-Disaster Redevelopment Plans (PDRPs)* and incorporated mitigation policies in the coastal management elements of their local *Comprehensive Plans*. In addition, great gains have been made in understanding the natural hazards to which Florida communities are exposed and in developing techniques for reducing community vulnerability to them.

Florida communities are far ahead of many local governments in the U.S. in developing

plans, policies, and strategies for reducing their vulnerability to natural hazards. However, opportunities remain to make communities more resistant and resilient in the face of natural hazards by more effectively integrating hazard mitigation into day-to-day public land use decisions. The key to doing so is to better integrate natural hazards information, policies, and strategies from the array of plans Florida communities have developed into the decisions they make about land use and local government expenditures for public facilities and infrastructure. Communities can accomplish this by better integrating the content of their various plans into local comprehensive plans and by better integrating the processes they follow for developing, amending, and implementing these plans.

This guidebook, *Protecting Our Communities: Land Use Planning Strategies and Best Development Practices for Minimizing Vulnerability to Flooding and Coastal Storms*, is one in a series of “best practices” publications prepared by the Florida Department of Community Affairs (FDCA) (see Sidebar 1.2). It describes how to create a powerful synergy from what currently are related but often discrete or loosely coupled plans. The guidebook provides information on planning policies and strategies that can be implemented before and after disasters strike to further reduce community vulnerability to coastal storms and related flooding.

By publishing this “best practices” guidebook and identifying ways communities can better integrate hazard mitigation into day-to-day land use decision making through the community’s comprehensive planning process, FDCA intends to support local planning efforts to improve public safety and sustainability, without increasing the overall commitment of resources by local governments.

Applying the principles and practices in this guidebook will enable communities to identify and implement appropriate policies before and after a disaster strikes. In so doing, communities can reduce the exposure of people and property to natural hazards such as hurricanes and inland flooding, and speed the process of recovery should a disaster hit. More importantly, this guidebook seeks to integrate this activity with other broad planning and implementation efforts.

Sidebar 1.1

Disasters can result in loss of life and property.

Dozens of Florida residents are killed or injured each year as a result of coastal storms and related flooding (Florida Coastal Management Program, 2000). Property damages from flooding and hurricanes alone total billions of dollars, as indicated in Table 1.1.

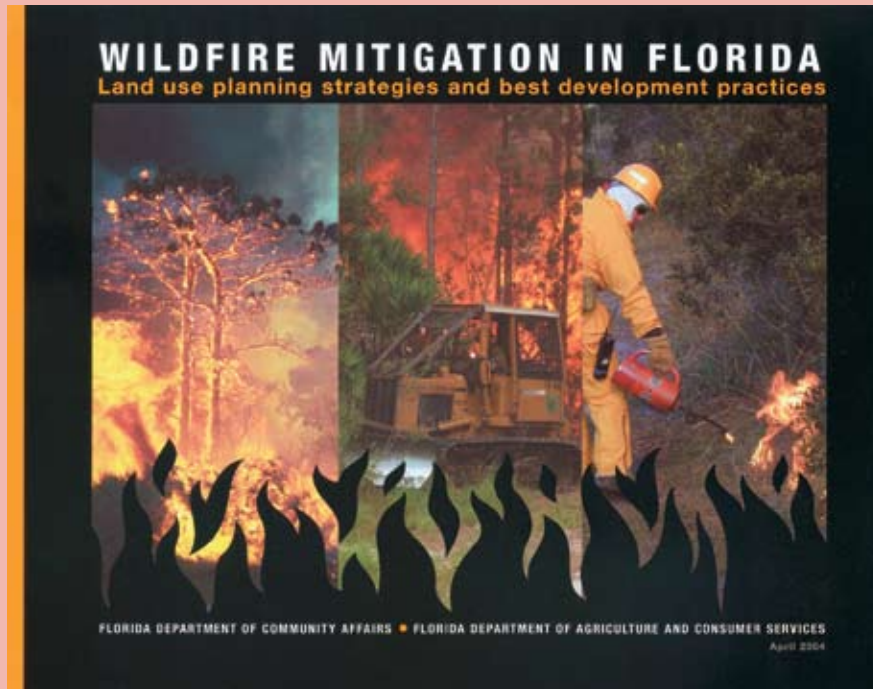
Table 1.1: Damages from flooding and hurricanes in Florida.

Date	Event	Property Damage (in millions)
August (24) 1992	Hurricane Andrew	\$26,500
October (3-4) 1995	Hurricane Opal	\$2,100 (estimated)
March 1998	Flooding	\$367
September (15-29) 1998	Hurricane Georges	\$255
October 1999	Hurricane Irene	\$327
October 2000	Flooding	\$450
August 2004	Hurricane Charley	\$7,400

Source: Florida Department of Community Affairs, 2003. Hurricane Charley estimates are preliminary as of September 2004.

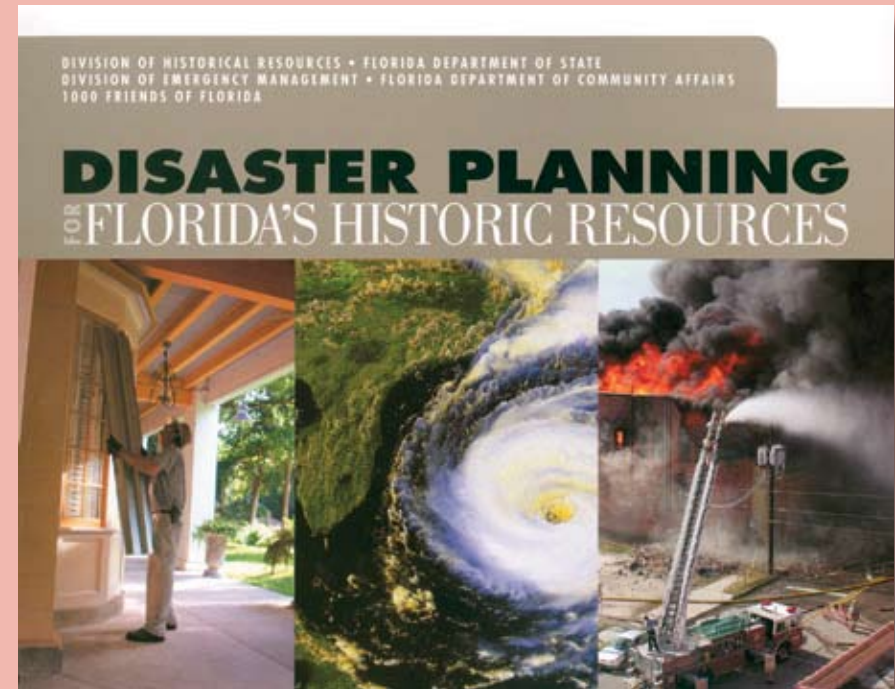
Sidebar 1.2

Best Practices Hazard Mitigation Guidebook Series



Wildfire Mitigation in Florida, prepared by FDCA with assistance from the Florida Division of Forestry.

This guidebook examines the role of planning in community wildfire mitigation efforts. It describes planning strategies such as cooperative strategies, comprehensive plan elements, local mitigation strategies, and other planning approaches. The guide includes guidelines for creating and adopting local wildfire mitigation ordinances to reflect comprehensive plan policies, and explores the relationships and potential conflicts between local ordinances. The guide also discusses neighborhood and landscape design as well as building construction practices and materials for reducing wildfire vulnerability.



Disaster Planning for Florida's Historic Resources, prepared by FDCA with assistance from the Florida Division of Historic Resources and 1000 Friends of Florida.

The guidebook describes steps for preparing emergency response plans for individual historic resources, expediting review of repair and reconstruction permits in the event of damage, and improving coordination between emergency management and historic preservation efforts within a community in order to reduce disaster-related damage and rebuild local economies.

Both guidebooks are available at www.dca.state.fl.us/fdcp/DCP/publications/index.htm.

2 Hazards Happen, People Plan

Section 2.1: The Who, What, When, and Where of Hazards

Before discussing how to reduce community vulnerability to natural hazards and recover from them more quickly, it is important to know what the hazards are, where they occur, how much property they affect, and how many people they threaten.

The State of Florida Mitigation Plan is the document that guides state and local efforts to reduce risk from hazards and lists the natural hazards that threaten life and property in the state, including the following:

- floods,
- hurricanes and coastal storms,
- severe storms and tornadoes,
- wildfire,
- drought / extreme heat,
- winter storms and freezes,
- erosion,
- dam / levee failures,
- sinkholes and seismic events, and
- tsunamis.

The majority of problems year after year come from coastal storms and associated flooding (see Figure 2.1). Many states and territories with coastlines on the Pacific Ocean, the Atlantic Ocean, and the Gulf of Mexico are affected by storms such as hurricanes and tropi-

cal storms, both of which are technically classified as “tropical cyclones.” Florida, however, is the most vulnerable (see Sidebar 2.3 and Figure 2.2).

In general, exposure to hurricanes and related severe weather faced by Florida residents varies by location (see Figure 2.4).

- Barrier islands and the areas immediately adjacent to the Atlantic and Gulf coasts are subject to a staggering combination of effects from tropical cyclones: flooding from storm surge, flooding from rivers and streams inundated with rain water and backwater from storm surge, and damage from high winds and wind-borne debris.
- Areas away from the coast, even 10 miles or more, are vulnerable to high winds and wind-borne debris, as well as flooding from rivers, canals, and streams. Property near inland waterways and water bodies is susceptible to flooding from major rainfall events associated with hurricanes and tropical storms. These areas suffer from high winds as well, but not as much as communities on the coastal fringe.



Source: Federal Emergency Management Agency, 1999.

Figure 2.1: Ocean overwash flushes between coastal homes.

Sidebar 2.1

What is a tropical cyclone?

“Tropical cyclone” is a generic term for a cyclonic, low-pressure system over tropical or sub-tropical waters. Tropical cyclones with maximum sustained winds of less than 39 miles per hour (mph) are called **tropical depressions**. A **tropical storm** is a cyclone with maximum sustained winds greater than 39 mph and less than 74 mph. A **hurricane** is a tropical cyclone with sustained winds of 74 mph or higher.

Sidebar 2.2

What is a hurricane?

Hurricanes develop over warm water and are caused by the atmospheric instability created by the collision of warm air with cooler air. Hurricane winds blow in a large spiral around a calm center called the eye, which can be 20 to 30 miles wide. When a hurricane nears land, it may bring torrential rains, high winds, storm surges, coastal flooding, inland flooding, and, sometimes, tornadoes.

A single hurricane can last for more than two weeks over water and can extend outward 400 miles. The duration of impact depends on the forward motion of the storm and the availability of a warm water source for energy. The hurricane season for the Atlantic Coast and Gulf of Mexico is June 1 to November 30.

Some hurricanes are characterized primarily by water—a rainy or wet hurricane—while others are primarily characterized by wind—a windy or dry hurricane. Wet hurricanes can flood both coastal and inland areas, even as the storm dissipates in wind strength, while windy hurricanes primarily affect coastal areas with their high winds and storm surge. While storm surge can greatly damage the coastline, it can also cause backwater flooding in rivers, canals, and streams.

Source: Federal Emergency Management Agency, 2001.

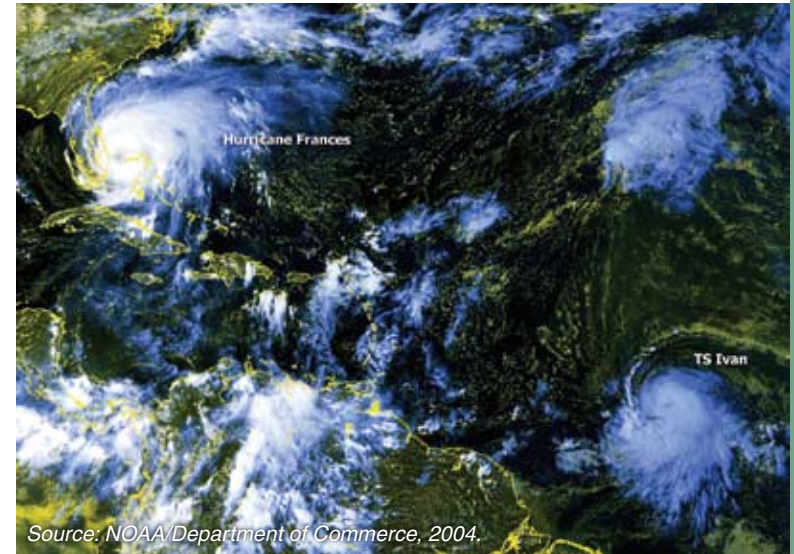
In many cases, it is possible to determine which properties and community assets are the most vulnerable to hazards. This information enables communities to pursue policies and activities that prevent as much damage and destruction as possible and provide the best ways to recover and rebuild after a hazard event. The following section describes the magnitude of the damage that coastal storms and associated flooding can cause in Florida.

Sidebar 2.3

Florida is more prone to major hurricanes than any other state.

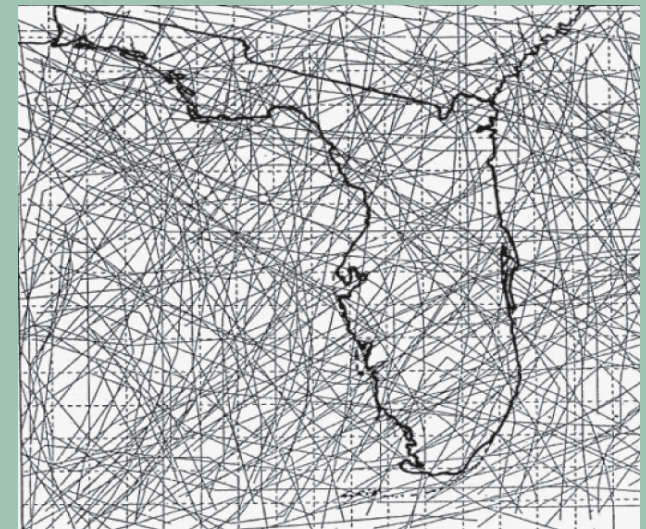
Florida has the greatest probability of any state for a major hurricane (Category 3 or higher) to make landfall in the state, according to data provided by the National Climate Data Center, operated by the National Oceanographic and Atmospheric Administration (NOAA). A total of 151 hurricanes and 248 tropical storms have struck or threatened Florida since 1886 (see Figure 2.3). Between 1900 and 1996, 24 of 57 hurricanes that hit Florida were major hurricanes (Category 3 or greater). Such hurricanes are characterized as causing extensive damage due to wind speeds in excess of 110 mph and storm surges greater than eight feet.

Figure 2.2: Enhanced satellite imagery showing the approach of Hurricanes Frances and Ivan.



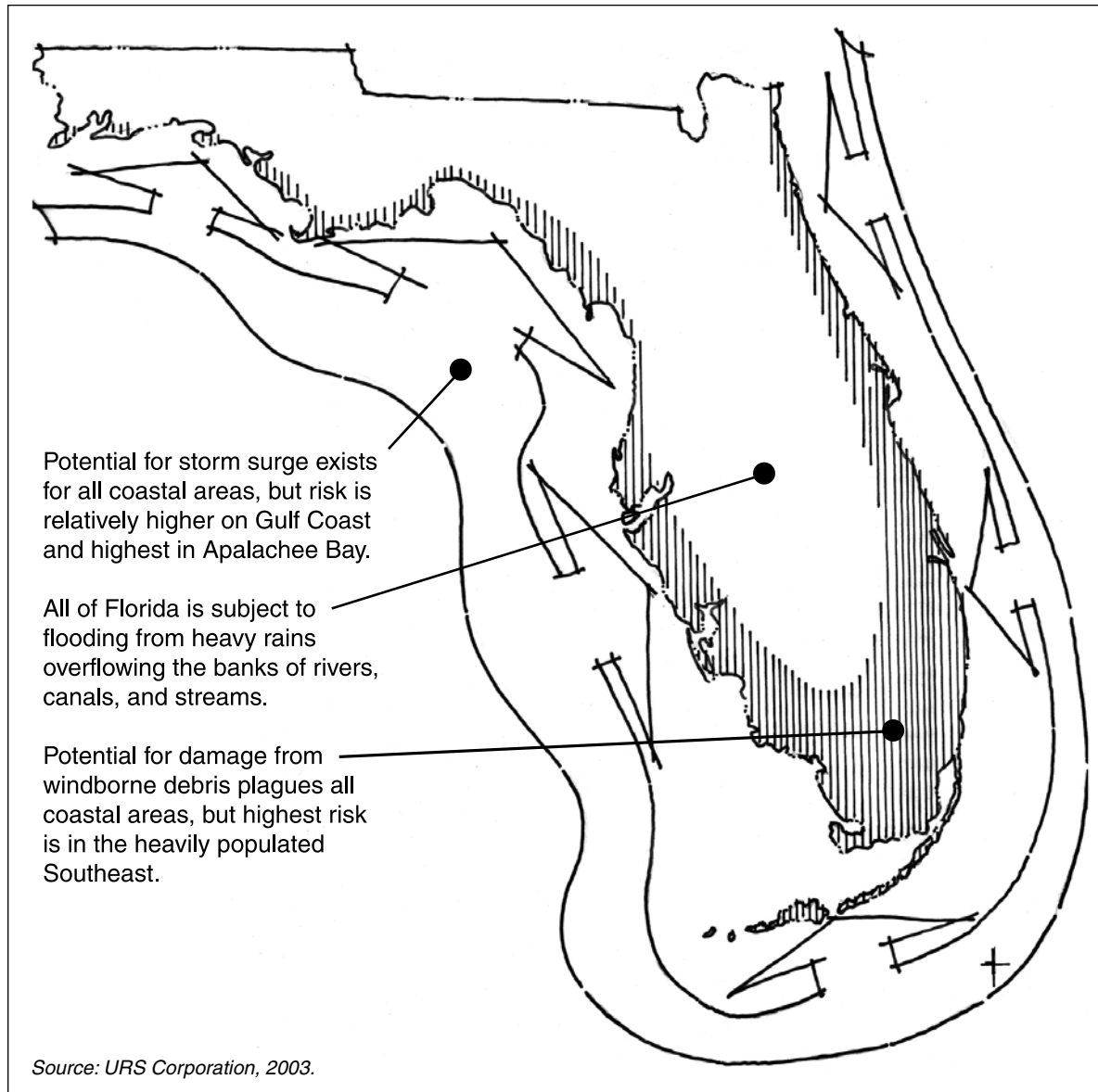
Source: NOAA/Department of Commerce, 2004.

Figure 2.3: Tracks of hurricanes that have threatened or struck the state of Florida since 1886.



Source: Florida State University Beaches and Shores Resource Center.

Figure 2.4: General risk factors in the state of Florida.



Section 2.2: Potential Losses From Coastal Hazards in Florida

Hurricanes, coastal storms, and inland flooding are considered hazards only when they affect people and property. In Florida, they can affect large numbers of people and a significant amount of public and private property. It is important to know who and what is at risk in Florida in order to devise strategies for reducing those risks. The answers to a few simple questions will begin to tell the story.

How many people live in Florida?

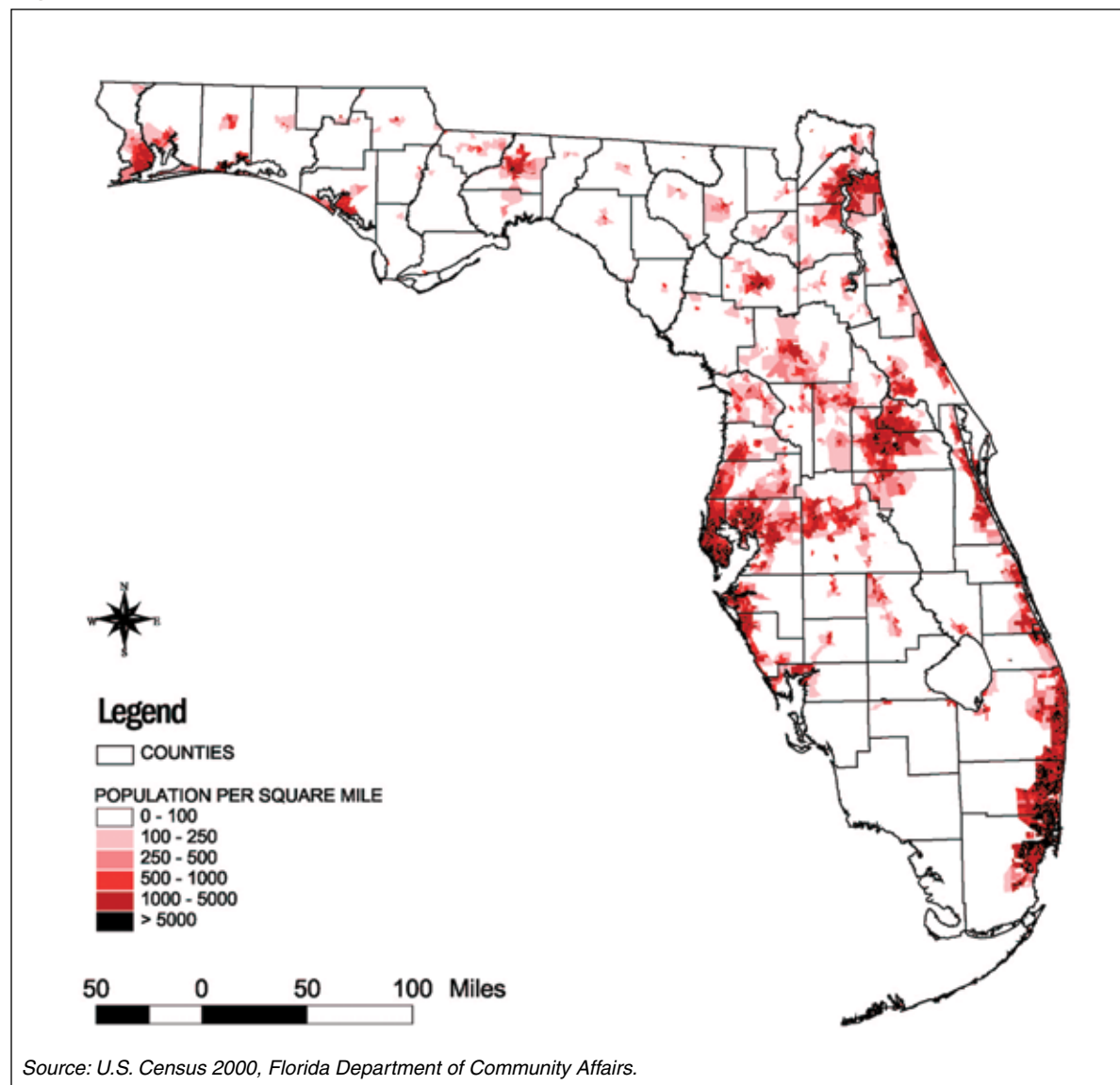
In 2003 the resident population of Florida was estimated to be 16,967,310, according to the Bureau of Economic and Business Research (2003). In addition, the state's high number of visitors at any given time, can significantly increase the actual number of people in a community, sometimes by more than 40 percent for some south Florida coastal communities.

Where do most Floridians live?

Based on the 2003 estimate of population, 77 percent of the state's residents live in the 35 counties that are located along the Atlantic Ocean or the Gulf of Mexico shorelines. As shown in Figure 2.5, even within those counties, much of the state's population is clustered along the coast.

Table 2.1 shows in more detail the percentage of the population of coastal counties that

Figure 2.5: State of Florida 2000 population distribution.



is most at risk and requires evacuation in the event of a Category 1 hurricane. This includes people who live within the area likely to be inundated by storm surge that accompanies a Category 1 hurricane, as well as all residents of mobile homes throughout the county. This population, which is most at risk, is approximately 3 million. The Category 1 evacuation zone, which is defined as the “Coastal High Hazard Area” in local government *Comprehensive Plans* (see Sidebar 2.10), is based upon, but usually somewhat different from, the Category 1 surge zone.

What is the value of the property that may be at risk?

The growth rates for the coastal counties, shown in Table 2.1, indicate that development has increased dramatically in many of these higher risk areas of the state. The 2000 *Florida Assessment of Coastal Trends* estimated that the value of residential and commercial property along the Florida coastline would reach \$870 billion by 2002.

What is the potential for loss?

Quantifying the *potential loss of life* is challenging. Too many variables are involved to create reliable predictions. It is a fact, however, that dozens of people have been killed or injured as a result of presidentially-declared natural disasters in Florida. Since such a high percentage of residents live in the most hazardous areas, it is a certainty that more lives will be

Table 2.1: Populations at risk in a Category 1 hurricane.

Coastal County	% Rate of Change 1990-1999	County Population 1999	Population at Risk (Cat. 1)	% Population at Risk (Cat. 1)
Bay	18.2	150,119	83,779	55.8%
Brevard	19.0	474,803	191,696	40.4%
Broward	18.7	1,490,289	116,154	7.8%
Charlotte	23.2	136,773	47,742	34.9%
Citrus	22.9	114,898	58,800	51.2%
Collier	44.4	219,685	7,582	3.5%
Dade	9.8	2,126,702	272,000	12.8%
Dixie	27.3	13,478	11,500	85.3%
Duval	13.4	762,846	96,770	12.7%
Escambia	14.8	301,613	64,704	21.5%
Flagler	59.6	45,818	23,820	52.0%
Franklin	21.2	10,872	7,821	71.9%
Gulf	25.2	14,403	7,412	51.5%
Hernando	26.0	127,392	47,500	37.3%
Hillsborough	16.0	967,511	278,398	28.8%
Indian River	21.5	109,579	47,382	43.2%
Jefferson	27.7	14,424	4,200	29.1%
Lee	24.5	417,114	176,457	42.3%
Levy	28.9	33,408	18,900	56.6%
Manatee	19.6	253,207	96,206	38.0%
Martin	20.4	121,514	69,307	57.0%
Monroe	11.5	87,030	59,865	68.8%
Nassau	30.6	57,381	24,411	42.5%
Okaloosa	24.9	179,589	67,472	37.6%
Palm Beach	20.7	1,042,196	205,893	19.8%
Pasco	16.1	326,494	134,048	41.1%
Pinellas	5.5	898,784	392,004	43.6%
Santa Rosa	38.0	112,631	48,082	42.7%
Sarasota	15.6	321,044	88,506	27.6%
St. Johns	35.9	113,941	28,950	25.4%
St. Lucie	24.5	186,905	97,157	52.0%
Taylor	15.9	19,836	8,800	44.4%
Volusia	15.1	425,815	113,507	26.6%
Wakulla	45.4	20,648	6,306	30.5%
Walton	45.8	40,466	30,090	74.4%

Source: Florida Department of Community Affairs, Division of Emergency Management.

lost in the future, and many of those fatalities will be due to inland flooding (see Sidebar 2.4).

Reliable techniques do exist to estimate *potential losses to private and public property*. Building performance under conditions of flooding and wind loads has been studied enough to develop predictive models. Table 2.2 presents results of analyses the FDCA Division of Emergency Management (DEM) has undertaken using these techniques as part of a recent update of the state’s hazard mitigation plan.

Sidebar 2.4

Inland Flooding Leading Cause of Storm Deaths

Studies indicate that between 1970 and 1990, 59% of cyclone-related deaths in the US were due to severe inland flooding following storms. Only 1% of deaths were due to storm surge, which has the greatest potential for loss of life. Wind accounted for 12% of deaths, followed by surf and offshore drownings (11% each), tornadoes (4%), and other (2%).

Source: Florida Department of Community Affairs, 2003.

Table 2.2: Florida disaster risks.

Hazards	Annual Estimated Losses (in millions)
Hurricane winds	\$14,700
Riverine flooding	\$255
Tornadoes	\$22
Coastal flooding	\$11
Totals	\$14,988

Source: Florida Department of Community Affairs, 2003.

These data suggest that Florida can expect average damages of nearly \$15 billion per year. It is worth noting, however, that the actual losses will be significantly higher in some years (e.g., \$26.5 billion for Hurricane Andrew in 1992) and lower in others.

What are the other public costs of vulnerability to hazards?

The potential losses to public property from coastal storms and associated flooding are due in large degree to decisions to provide facilities and services to people who have chosen to develop property in hazardous areas. In addition to direct damage to this public property, local and state governments face other expenses associated with private development in hazardous areas:

- the costs of evacuation, public shelters, and other protective measures when coastal communities are threatened by a tropical storm or hurricane;
- emergency response after a storm strikes; and
- post-disaster recovery costs including debris removal and disposal, regulation of private repairs and reconstruction, and ad-

ministration of disaster recovery programs and services.

Analysis of local government costs from six hurricanes that affected Florida between 1979 and 1995 (Frederic, Elena, Kate, Andrew, Erin, and Opal), by the Florida Planning and Development Lab (FPDL) at Florida State University, revealed that damage to public property accounted for only about 25% of all local government costs eligible for federal public assistance disaster relief (Florida Planning and Development Lab, 2003). The remaining 75% was associated with the other disaster response and recovery responsibilities.

FPDL estimated that the total event cost to local governments in Lee County, Florida, for a Category 1 hurricane, based on 1995 data, would be between \$5 and 11 million. Costs for a Category 3 hurricane would run between \$28 and 53 million, while a low-level Category 5 hurricane could incur costs ranging from \$198 to 207 million.

What are the trends for growth and development?

Table 2.3 contains population projections for the state developed by the University of

Florida's Bureau of Economic and Business Research. The projections estimate that Florida will reach a population of 24.4 million in the year 2025, an increase of 8.4 million from the 2000 census count of approximately 16.0 million, or approximately 925 people per day! If current trends continue, the majority of this population growth will occur in coastal communities.

What are the implications of these development trends?

With population and development increasing along the coast, evacuation clearance times are likely to increase in many communities, unless significant public expenditures are made to expand evacuation routes and shelter capacities. More people bring more cars that have to be moved on a finite network of roads. The situation will be even more critical for residents of barrier islands, which often have just one route out. Table 2.4 shows current evacuation times for coastal counties for Category 1–5 hurricanes.

Additionally, even when people have sufficient notice to evacuate, they may not have a safe place to go. As of 2004, the state lacked

Table 2.3: Florida 2000 population and projections.

2000 Census	Projected Population				
	2005	2010	2015	2020	2025
15,982,378	17,760,021	18,978,396	21,000,845	21,807,678	24,428,300

Source: Bureau of Economic and Business Research, 2003.

Table 2.4: Coastal county clearance times per hurricane category (hours).

Region	County	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Southwest	Charlotte	3.5	11.5	12.5	12.5	12.5
	Collier	6.6	16.4	27.1	40.2	50.9
	Lee	9.5	16.5	24.5	27	27
	Sarasota	10.5	10.5	10.5	10.5	10.5
Withlacoochee	Citrus	9.25	12.5	13.25	13.25	13.25
	Hernando	11.75	11.75	11.75	17.25	17.25
	Levy	6.25	6.25	6.25	6.25	6.25
North Central	Dixie	6	6	6	6	6
	Taylor	6.25	6.25	6.25	6.25	6.25
East Central	Brevard	12	12	18	18	18
	Volusia	8	8	10	11	11
Northeast	Nassau	10.25	12.25	12.75	13.25	13.25
	Duval	8.5	12	16.75	19.5	19.5
	St. Johns	10.5	14	16	16.75	16.75
	Flagler	7.75	7.75	12	12	12
Treasure Coast	St. Lucie	8	8	8.5	8.5	8.5
	Indian River	7	7	10.5	10.5	10.5
	Martin	8.75	8.75	14.25	18	18
	Palm Beach	6.5	13.75	13.75	16	16
South	Monroe	12	12	24*	24*	24*
	Miami-Dade	10	10	12	15	15
	Broward	12	12	15	19	19
Tampa Bay	Hillsborough	10	13	13	14	17
	Pinellas	10	13	13	14	17
	Pasco	9	9	11	12	12
	Manatee	9	10	11	11	11
	Franklin	6.75	7	7	7	7
Apalachee	Gulf	6.25	7	7	8	8
	Jefferson	6.25	6.25	6.25	6.25	6.25
	Wakulla	9.5	10	10	10	10
	Escambia (AL also)	16.75	20	20	23.75	23.75
West Florida	Santa Rosa	8.5	9.25	9.25	10.5	10.5
	Okaloosa	13.5	19.25	19.25	21.75	21.75
	Walton	11.75	21	21	21.5	21.5
	Bay	13	14.75	17.75	21	21

more than 590,000 shelter spaces for a Category 5 hurricane. As shown in Table 2.5, a few coastal counties have surpluses, but most do not. Shortages range from 107 in Wakulla County to 93,527 in Pinellas County. Providing additional shelter capacity constitutes another source of local government expense that results from continued growth in hazardous coastal areas.

As this section makes clear, the types of hazards that Florida faces will likely remain the same, but the potential damages and costs of those hazards will continue to grow worse because of increases in population and development in hazardous areas. Florida communities have employed an array of strategies for minimizing and reducing vulnerability, and these strategies are addressed to varying degrees in several of the plans that local communities have developed for coping with natural hazards. These strategies are summarized in the next section. Detailed examples of best practices are presented later in this guidebook.

Section 2.3: What Strategies Are Available?

The vulnerability of communities to natural disasters in general, and of coastal storms and flooding in particular, is primarily a function of what is built and where. Four principal strategies are available to local governments for reducing community vulnerability:

* The most recent Area of Critical State Concern report indicates a 24-hour clearance time for Monroe County.

Source: Florida Department of Community Affairs, Division of Emergency Management.

Table 2.5: 2004 coastal county shelter deficits for Category 5 hurricane.

Region	County	2004 Shelter Surplus/Deficit In People
Southwest	Charlotte	-28,149
	Collier	-27,263
	Lee	-87,366
	Sarasota	-18,754
Cedar Key	Citrus	-11,494
	Hernando	-12,970
	Levy	-2,731
North Central	Dixie	-1,087
	Taylor	-1,681
East Central	Brevard	11,528
	Volusia	-21,368
Northeast	Nassau	-1,258
	Duval	-20,258
	St. Johns	-2,509
	Flagler	-2,401
Treasure Coast	St. Lucie	-2,365
	Indian River	721
	Martin	3,005
	Palm Beach	-3,949
South	Monroe	-4,194
	Miami-Dade	30,958
	Broward	1,126
Tampa Bay	Hillsborough	-55,152
	Pinellas	-93,527
	Pasco	-40,454
	Manatee	-19,401
Apalachee	Franklin	-185
	Gulf	-836
	Jefferson	-253
	Wakulla	-107
West Florida	Escambia	1,513
	Santa Rosa	-1806
	Okaloosa	-12,146
	Walton	-416
	Bay	-7,445

Source: Florida Department of Community Affairs, 2004.

- get out of the way (evacuation and sheltering);
- protect and enhance natural protective features;
- make structures more resistant to natural hazard forces; and
- manage the development and redevelopment of land exposed to natural hazards.

This section briefly describes each strategy and the information base needed to assess when, where, and how it will be most effective to employ each strategy. The next section describes the different types of plans that local governments in Florida have developed for coping with natural hazards and examines how each plan type can facilitate use of these four strategies.

Get out of the way: Provide evacuation and sheltering services

All Florida counties provide evacuation and sheltering services to their residents. Evacuation and sheltering temporarily remove people from harm's way but offer no protection to private or public property. Thus, communities cannot rely solely on these measures to minimize their vulnerability to coastal storms and associated flooding.

As noted above, current evacuation clearance times and shelter capacities are inadequate in many parts of Florida. These will continue to worsen with increasing population growth in the absence of other public-sector initiatives to either limit growth in areas with capacity constraints or to increase evacuation and sheltering capacities through capital expenditure programs. Decisions that local governments make about land use affect the numbers of people for whom such services must be provided. Local capital expenditure decisions affect the capacities of evacuation routes and the supply of suitable emergency shelters.

Protect and enhance natural protective features

Natural features make Florida's environment less hazardous than it otherwise would be by providing protection and buffering from the impacts of coastal storms and associated flooding in the form of natural drainage ways, floodplains, wetlands, beaches, and dunes. In the past, development has altered or destroyed many of these natural protective features and significantly reduced the ability of the land to absorb rainfall and storm water runoff.

A number of communities have adopted policies and land development regulations designed to protect these natural protective features. In many areas, state and local government resources have been expended to restore, enhance, or supplement these natural protective

features. The largest expenditures have been made for storm water detention, retention, and conveyance, beach and dune renourishment, and “hard” flood and erosion protection structures such as dams, levees, seawalls, and revetments.

There are limits, however, to the protection afforded by both natural features and storm water management and flood protection structures. Much property remains at risk of damage from coastal storms and floods that exceed the physical limits of such protective features and structures.

Make structures more resistant to natural hazard forces

Structures can be designed or retrofitted to make them more resistant to damage from the forces of wind, waves, and storm surge and from the flooding that is associated with coastal storms. The principal vehicle by which Florida communities employ the strategy of making structures more resistant to natural hazard forces is via the adoption and enforcement of building codes that govern the construction of new buildings and major renovations of existing buildings. Local governments are required to adopt and enforce the Florida Building Code (§553.80, *Florida Statutes*), which includes standards governing design and construction of private and public structures for resisting damage from wind-borne debris and standards for elevating and/or flood-proofing habitable buildings within flood hazard areas

defined pursuant to the National Flood Insurance Act. Local governments also are authorized to adopt more stringent standards than those contained in the Florida Building Code (§553.73, *F.S.*).

One constraint to reliance on building codes for reducing community vulnerability is the fact that existing structures are typically not required to be brought into compliance with new codes unless they undergo substantial repairs or renovations, which are typically defined as those that exceed 50 percent of the market value of the structure. The state and some local governments, in order to motivate and facilitate voluntary structural mitigation initiatives by private property owners, use public education, technical assistance, and financial assistance programs. State and local governments also may make capital expenditures to relocate, elevate, or strengthen existing public facilities and infrastructure to make them more resistant to damage from natural hazards.

Such measures can be very effective at protecting the built environment from storms of low and moderate intensities, but at some point, mitigation costs become prohibitive. Thus, there are limits to the amount of protection afforded by making structures more resistant to the forces of coastal storms and associated flooding.

Manage the development and redevelopment of land in hazardous areas

The other principal strategy for reducing community vulnerability is to manage the development and redevelopment of land exposed to natural hazards. Where vacant land is exposed to hazard forces, local government decisions about allowable land uses, and the provision of public facilities and infrastructure to support those uses, can have major impacts on the extent to which the community makes itself vulnerable to natural hazards. Where communities are already established and land is predominately “built out,” local governments can take initiatives to reduce existing levels of vulnerability by altering current land uses both in the aftermath of disasters, when opportunities for redevelopment may arise, and under “blue sky” conditions as part of planned redevelopment initiatives.

Section 2.4: What Basis Is There for Assessing Alternatives?

Determining which strategies to employ is complicated and difficult, in part because there typically are significant costs associated with inaction as well as with each alternative action. Evaluating the tradeoffs requires information about the costs and benefits of each choice. An essential foundation for making such evalu-

ations is hazard assessment – an accurate assessment of the nature of the hazards to which a community is exposed, the vulnerability of its people and property to damage from those hazards, and the likelihood that injuries and damage may occur (see Sidebar 2.5).

- **Hazard identification** typically is based on maps that can be used to determine where people, property, and critical facilities are exposed to different natural hazards.
- **Vulnerability assessment** is usually done for an array of specific scenarios, for example, a 100-year flood (1 percent chance every year) or a Category 3 hurricane. This assessment requires information about the characteristics of people (for example, age and physical disabilities) and property (for example, structure type and design, construction materials, first-floor elevations) that would be in harm's way for a specific scenario.

Vulnerability assessment also requires an understanding of the impacts that would occur in response to hazard forces (for example, the percent damage to a structure and its contents from flood waters of a given depth relative to the first floor of the structure).
- **Risk analysis** often takes the form of annualized estimates of the probable impacts from all possible hazard scenarios. Performing risk analysis requires knowledge of the probabilities of hazard events

Sidebar 2.5

Hazard Assessment Terminology

Hazard Identification. Identifying and profiling the full range of natural hazards that can affect the community including the types, frequencies, and magnitudes of hazard events.

Vulnerability Assessment. Determining who and what is in harm's way and the extent of injuries and damage that may result from hazard events of different magnitudes.

Risk Analysis. Quantifying the aggregate probable injuries or damages a community may sustain from a given type of natural hazard for all possible magnitudes.

occurring within a given community across the full spectrum of possible magnitudes.

Both vulnerability assessment and risk analysis can be used to describe the current state of a community (see Sidebar 2.6). However, they also can be used to assess the potential impacts of alternative future land use scenarios, an application with powerful potential for incorporating hazard mitigation into routine community planning and decision making processes (see further discussion in Section 3.0).

Sidebar 2.6

Hurricane Hazards in Lee County

The Florida Planning and Development Lab (FPDL) at Florida State University developed a hurricane hazard assessment for Lee County, Florida, as the basis for assessing the feasibility of a risk-based tax for financing local emergency management services (Florida Planning and Development Lab, 2003). FPDL estimated the magnitude of hurricane force winds and the depth of storm surge flooding at various locations in the county for different hurricane scenarios (hazard identification). They estimated that the costs to local governments in Lee County of a single Category 3 landfalling hurricane would be between \$28 and 53 million, based on 1995 land use patterns (vulnerability assessment). They also estimated that the annual local government cost of hurricanes in 1995 was between \$1.2 and 1.7 million in Lee County based on the annualized sum of the potential costs of all possible hurricanes striking the county (risk analysis).

Section 2.5: What Have Florida Communities Accomplished Already?

Florida has been a national leader in mitigating natural hazard vulnerability through both state and local plans and programs. Communities assess their vulnerability and define

the policies, procedures, and programs for using strategies for mitigating hazard vulnerability in as many as four different types of plans:

Comprehensive Emergency Management Plans (CEMPs), ***Local Mitigation Strategies (LMSs)***, local government ***Comprehensive Plans***, and ***Post-Disaster Redevelopment Plans (PDRPs)***.

- ***CEMPs*** are principally operations plans that define the organizational structures, chains of command, and operational procedures for preparing for, responding to, recovering from, and mitigating the emergencies that can occur within a jurisdiction.
- ***LMSs*** identify hazard mitigation needs in a community and alternative structural and nonstructural initiatives that can be employed to reduce community vulnerability to natural hazards.
- ***Comprehensive Plans*** are primarily policy plans designed to guide the day-to-day land use decisions that determine a community's growth and development. They also include 5-year capital improvements plans that identify the major capital projects required to accomplish the community's short-term growth and development, objectives.
- ***PDRPs*** are often mixed plans that include both an operations component, that details the who, what, when, and where of post-disaster recovery and reconstruction procedures, as well as policies for

governing the recovery and reconstruction process.

Detailed summaries of each of these four plan types are presented in the following sections. An overview of the content of each plan is presented followed by a summary of how each plan addresses the four strategies for reducing community vulnerability to coastal storms and associated flooding. Brief synopses of the planning process used to develop the plans and the review and update process for each plan are also presented.

COMPREHENSIVE EMERGENCY MANAGEMENT PLANS

The ***Comprehensive Emergency Management Plan (CEMP)*** is primarily an operations plan that describes the various types of emergencies that can occur within a jurisdiction and the organizational structure of the emergency management program. It establishes direction and control of the program and coordination between municipal, county, state, and federal agencies, and outlines actions necessary under the four phases of emergency management – preparedness, response, recovery, and mitigation.

All counties, except those that are part of an interjurisdictional emergency management agreement, are required under state law (§252.38(1), ***Florida Statutes***) to prepare a ***CEMP***. Because ***CEMPs*** cover all communities within a given county, municipalities do

not have to prepare their own, although some choose to do so.

Content

Plan compliance criteria promulgated by the State Division of Emergency Management (DEM) require that the ***CEMP*** include a ***Basic Plan*** plus two annexes that address recovery and mitigation functions (***Local Comprehensive Emergency Management Plan Compliance Criteria, Form CEMP-001***).

The ***Basic Plan*** includes the following components:

- a hazards analysis that describes the hazards to which the county is exposed, the probability and severity of occurrence, vulnerable populations, and estimates of probable damage;
- descriptions of the geography, demographics, and economic conditions of the county;
- lists of emergency management support facilities;
- descriptions of the emergency management organization systems for response, recovery, and mitigation;
- lists of agencies responsible for each function;
- descriptions of preparedness activities, mutual aid arrangements, financial management systems and procedures; and
- a list of ordinances which authorize local disaster agency functions and responsibilities.

The *Recovery Annex* outlines the operations, roles, and responsibilities for assessing the need for and administration of state and federal disaster assistance. Specific functions covered by this annex include the following:

- damage assessment;
- operation of a disaster recovery center;
- coordination securing aid under the federal Public Assistance program;
- debris management;
- community relations;
- coordination of aid to disaster victims with unmet needs; and
- coordination of emergency housing.

The *Mitigation Annex* covers the operations, roles, and responsibilities used to administer mitigation activities in both pre- and post-disaster circumstances. Specific functions described in this annex include the following:

- coordination of mitigation activities with the county's municipalities and the state,
- post-disaster mitigation assessment,
- management of post-disaster mitigation funds, and
- pre-disaster mitigation activities, including structural and non-structural mitigation initiatives.

Applications to reducing community vulnerability

The *CEMP* is predominantly an operations plan rather than a policy plan, with some inventory and analysis of hazard conditions. A

few components do address aspects of specific strategies for reducing community vulnerability:

- The *Concept of Operations* section of the *Basic Plan* addresses *evacuation and emergency sheltering* procedures, but not policies governing the demand for or supply of these services.
- The *Mitigation Annex* includes structural and non-structural hazard mitigation initiatives. Some of these initiatives may address *protection and enhancement of natural protective features, making private structures more resistant to natural hazard forces, or managing the development and redevelopment of land exposed to natural hazards*. For the most part, counties have met this requirement by cross-referencing their *Local Mitigation Strategies (LMS)* in the *Mitigation Annex* (see next section). The *LMS* often includes a more expansive list of mitigation initiatives.

Planning process

There are no specific planning process requirements, but counties are supposed to document the approach used to establish the local planning process and to promote local participation in the development, review, and updating of their *CEMPs* (§I.C., *CEMP-001*). Some counties involve only a core group of county public agency staff that form the nucleus of the Emergency Operations Center staff in the event of a disaster, for example:

- public safety department director;
- emergency management manager;
- information officer/citizens response center coordinator;
- emergency operations staff officers;
- emergency communications specialist;
- mass casualty planning medical director;
- multi-trade worker; and
- emergency operations center administration.

Other counties involve a much broader array of public agencies, including those that are involved in the decisions that guide the growth and development of their communities; for example:

- county board of commissioners;
- county clerk of the court;
- county emergency medical service;
- county planning and building department;
- county public health department;
- county property appraiser;
- county roads department;
- county school board;
- county solid waste department;
- county sheriff's department;
- county emergency management;
- local electric utility;
- individual cities and their associated departments;
- county volunteer fire department;
- area chapter of the American Red Cross; and
- regional planning council.

Review and update process

Counties are required to revise their *CEMPs* every four years, with the state divided into four groups of counties whose plans are scheduled for revision and state review and approval on a rotating basis (§9G-6.006. *F.A.C.*).

LOCAL MITIGATION STRATEGIES

Local Mitigation Strategies (LMSs) are free-standing hazard mitigation plans that provide an important tool for making communities more resistant and resilient to natural disasters. The *LMS* provides the means for a comprehensive assessment of the hazard risks a community faces, an integrated view of all the local government policies and programs that can be marshaled to reduce those risks, and a planning process through which all involved agencies and stakeholders can identify and prioritize the most important initiatives that the community can take to reduce the risks they face.

LMSs are generally prepared at the county level and include their respective municipalities. Florida was among the first states to provide technical and fiscal assistance to its local governments for preparing hazard mitigation plans, with an effort that began in 1996 after Hurricane Opal. By 1999 all of Florida's counties had prepared a *LMS*. Florida's initiative served as the model for the local mitigation planning requirements that were incorporated in the federal Disaster Mitigation Act of 2000 (DMA 2000) (see Sidebar 2.7). Local govern-

ments in the state are now revising their *LMSs* to bring them into full accord with the DMA 2000 requirements.

Although *LMS* preparation is technically voluntary, as of November 2004, an *LMS* that meets state guidelines is required for eligibility for state-administered federal Hazard Mitigation Grant Program (HMGP) funds (§9G-22, *F.A.C.*). Under the provisions of DMA 2000, local governments were required to have an approved hazard mitigation plan consistent

with the DMA 2000 requirements in place by November 1, 2003, to retain eligibility for Pre-Disaster Mitigation (PDM) project funds, and by November 1, 2004, to remain eligible for post-disaster Hazard Mitigation Grant Program (HMGP) funds (§44 *CFR* 201.6).

Content

LMSs prepared pursuant to the state's guidelines (Florida Department of Community Affairs, 1998) have three substantive components.

Sidebar 2.7

The Federal Disaster Mitigation Act of 2000

The federal Disaster Mitigation Act of 2000 (DMA 2000) was passed by Congress and signed into law by the President on October 30, 2000. The statute continues the federal Hazard Mitigation Grant Program under which states and local governments in presidentially declared disaster areas can secure federal funds for projects designed to reduce future vulnerability to natural hazards.

In addition, DMA 2000 authorized creation of a new Pre-Disaster Mitigation (PDM) Fund to be used to provide financial assistance to states and local governments for hazard mitigation projects initiated prior to a disaster event rather than in post-disaster situations. The Federal Emergency Management Agency issued an Interim Final

Rule (IFR) in the *Code of Federal Regulations* (§44 *CFR* 201) on February 26, 2002, which governs the implementation of DMA 2000 and sets requirements for communities and states to develop hazard mitigation plans to retain eligibility for PDM and HMGP funds.

Overall, DMA 2000 is very consistent with Florida's *LMS* requirements. It encourages greater collaboration and coordination between the state and local communities as well as among agencies. DMA 2000 also emphasizes public involvement, a key element for community buy-in and support for implementing identified activities. In addition, it requires local governments to define a process through which they will incorporate the requirements of their mitigation plans into other planning mechanisms such as their *Comprehensive Plans* and capital improvement plans.

- **Hazard Identification and Vulnerability Assessment. (HIVA)** This is designed to define a community’s vulnerability to natural hazards. Under Florida rules, the *HIVA* is required to include, at a minimum, “an evaluation of the vulnerability of structures, infrastructure, special risk populations, environmental resources, and the economy to storm surge, high winds, flooding, wildfires, and any other hazard to which the community is susceptible” (§9G-22.005(5), *F.A.C.*).

According to FEMA’s Interim Final Rule (§44 *CFR* 201.6), *LMSs* revised pursuant to the DMA 2000 criteria must include maps and descriptions of the areas that would be affected by each hazard to which the jurisdiction is exposed, plus information on previous events and estimates of future probabilities. Vulnerability is to be assessed in terms of the types and numbers of exposed buildings, infrastructure, and critical facilities with estimates of potential dollar losses. In the first updates of hazard mitigation plans under DMA 2000, local governments are also required to assess the vulnerability that will result from anticipated future growth and development.

- **Guiding Principles.** This section lists and assesses the community’s existing hazard mitigation policies and programs and their impacts on community vulnerability.

In most Florida *LMSs*, this section contains a list of existing policies from the community’s *Comprehensive Plan* and local ordinances that govern or are related to hazard mitigation. Coastal counties frequently include policies from their *PDRPs* as well. Thus, there can be substantial overlap between the policies included in the *LMS* and those in other community plans and regulations.

- **Mitigation Initiatives.** This component identifies and prioritizes a set of structural and non-structural initiatives that the community can undertake to reduce its vulnerability.

Some counties include proposals for amendments to their *Comprehensive Plans*, land development regulations, and building codes in their Mitigation Initiatives. Structural projects typically address public facilities and infrastructure and buy-outs of repetitively damaged private structures in flood hazard areas. Many of these qualify as “capital projects” based on the magnitude of their costs and may also be included in the capital improvements elements of the counties’ and cities’ *Comprehensive Plans*.

Applications to reducing community vulnerability

The policies included in the *Guiding Principles* section as well as the non-structural initiatives that are listed in the *Mitigation*

Initiatives section may address any of the four strategies for reducing community vulnerability (see discussions below of the *Comprehensive Plan* and *PDRP*).

- Many counties include proposals for installing shutters on schools and other public buildings to make them safer as *emergency shelters*.
- Some include projects for expanding evacuation routes and remedying bottlenecks such as bridges and causeways so as to reduce *evacuation clearance* times.
- Initiatives to elevate or floodproof public facilities or to make them *more resistant to damage* from wind-borne debris also are common.
- Some communities include initiatives to elevate or relocate repetitively damaged private structures located in flood hazard zones. Relocation projects typically involve acquisition of the land, often for use as public recreation lands or open space.
- Capital projects to remedy localized flooding and drainage problems are common.
- Also common are initiatives to *restore and enhance natural protective features* of the community’s environment.

Planning process

Local governments were encouraged to establish *LMS* working groups to facilitate coordination among different government agencies with important roles in hazard mitigation

and public participation programs that would involve interested stakeholders in developing the *LMS*.

Florida's regulations governing eligibility for state-administered HMGP funds direct counties to establish *LMS* Working Groups (§9G-22.004 *F.A.C.*) and to annually solicit participation from various agencies of county government, as well as all municipalities within the county, and various interest groups. FEMA's Interim Final Rule under DMA 2000 (§44 *CFR* 201.6) requires that opportunities be provided for various interests to be involved in the hazard mitigation planning process.

Review and update process

The state's regulations governing administration of federal HMGP funds require that a county's *LMS* be updated annually to incorporate changes in any of the following: (1) hazard assessment, (2) project priority list, (3) critical facilities list, (4) repetitive loss properties list, or (5) maps (§9G-22.004(4)(e) *F.A.C.*).

Where counties elect to meet the pre-disaster hazard mitigation requirements for their *CEMPs* by incorporating relevant portions of the *LMS*, the *LMS* must be updated coincident with the applicable four-year review period for the county's *CEMP* (§III, *CEMP*-001).

FEMA's regulations (§44 *CFR* 201.6) stipulate that local mitigation plans must be updated and re-approved every 5 years as do

the contracts issued by the state DEM for revisions of *LMSs* to meet the DMA 2000 criteria.

COMPREHENSIVE PLANS

In Florida, the local government *Comprehensive Plan* sets forth the goals and objectives that define a community's desired path of growth and development and the policies that guide day-to-day decision making regarding land use and development. The *Comprehensive Plan* serves as the basis for land development regulations, zoning, major capital expenditures, and other initiatives to achieve the community's goals and objectives. Florida's 1985 growth management legislation (Chapter 163.3161 et seq., *Florida Statutes*) requires all counties and municipalities to adopt *Comprehensive Plans* and to submit those plans to the state Department of Community Affairs (DCA) for approval.

All land development regulations and land development decisions must be consistent with the adopted *Comprehensive Plan* (§163.3194, *F.S.*). Because of this formal legal standing and the central role of the *Comprehensive Plan* in day-to-day decision making, successful reduction in a community's vulnerability to natural hazards can most effectively be achieved where hazard mitigation goals, objectives, and policies are fully integrated into those sections of the *Comprehensive Plan* that guide land development and capital facilities planning.

Content

As detailed in Chapter 9J-5 of the *Florida Administrative Code*, *Comprehensive Plans* are required to contain chapters or "elements" that address future land use, housing, transportation, public facilities and services, conservation, recreation and open space, intergovernmental coordination, and capital improvements. These elements contain inventory and analysis information and policies to guide the day-to-day decisions that influence a community's vulnerability to natural hazards.

- **Future land use element** (§9J-5.006 *F.A.C.*) designates future land use patterns on a *Future Land Use Map* including densities and intensities of use, based on the goals, objectives, and policies of the other elements of the *Comprehensive Plan*. It includes a land use suitability analysis of vacant and undeveloped land as well as an analysis of the need for redevelopment.
- **Conservation element** (§9J-5.013 *F.A.C.*) inventories the community's natural resources, including wetlands and floodplains, and defines goals, objectives, and policies governing their conservation, use, and protection.
- **Public facilities and services element** (§9J-5.011 *F.A.C.*) includes data and analysis and goals, objectives, and policies for assessing the existing capacities, desired levels of service, and needs and priorities for replacement and expansion of sanitary sewer, solid waste, storm water manage-

ment, and potable water supply facilities and services. It also addresses the needs and means for protecting natural drainage features and ground water aquifer recharge areas.

- **Transportation element** (§9J-5.019 *F.A.C.*) inventories existing facilities and levels of service for transportation facilities, including an analysis of the ability of the transportation system to evacuate coastal population.
- **Capital improvements element** (§9J-5.016 *F.A.C.*) assesses the costs, general fiscal implications, and priorities for remedying existing deficiencies and meeting future needs for public facilities identified in other elements of the plan. The element assesses the local government’s ability to finance needed capital improvements and the potential to use the timing and location of capital improvements to achieve the development goals, objectives, and policies of the *future land use element*. The element also includes a five-year schedule of capital improvements for reducing deficiencies and meeting future needs which serves as the foundation for each community’s annual capital budget.

Coastal communities (35 counties and 160 municipalities) are required to prepare a separate *coastal management element* (§9J-5.012 *F.A.C.*). The required components of this element provide the most explicit focus on natural

hazards of any required *Comprehensive Plan* element, including the following:

- inventory existing land uses within the coastal planning area,
- analyze the effects of future land uses on natural and historic resources within the coastal planning area (see Sidebar 2.8),
- define goals, objectives, and policies for protecting, conserving, or enhancing these resources,
- assess the effects of future land uses within the “hurricane vulnerability zone” (see Sidebar 2.9) on hurricane evacuation clearance times and shelter demands,
- analyze alternatives for maintaining or reducing evacuation times,
- designate “coastal high-hazard areas” (CHHAs) (see Sidebar 2.10), and
- develop goals, objectives, and policies that address mitigating the hazards posed by development within these areas.

Applications to reducing community vulnerability

Although comprehensive plans address *evacuation and sheltering strategies* in the context of hurricane hazards, these requirements apply only to coastal communities, despite the fact that evacuation and shelter services may be needed in inland communities as well.

- Coastal communities are required to include one or more goal statements in their *coastal management elements* that reflect

the state legislature’s intent to “protect human life” (§9J-5.012(3) *F.A.C.*). They also must include an objective to “maintain or reduce hurricane evacuation times.”

- They are directed to inventory and analyze the effects of future land uses on hurricane evacuation, including the effects of anticipated population densities (§9J-5.012(2), *F.A.C.*).
- The *coastal management element* also must include an analysis of measures the local government could adopt to maintain or reduce hurricane evacuation times.
- In addition, the *coastal management element* must include policies and regulatory or management techniques that address hurricane evacuation, including methods to relieve deficiencies, and that ensure that required infrastructure is available to serve development or redevelopment within the coastal planning area consistent with safe evacuation.
- The *future land use element* of a coastal community’s *Comprehensive Plan* must include an objective that coordinates coastal planning area densities with the applicable hurricane evacuation plan (§9J-5.006(3)(b)(5), *F.A.C.*).

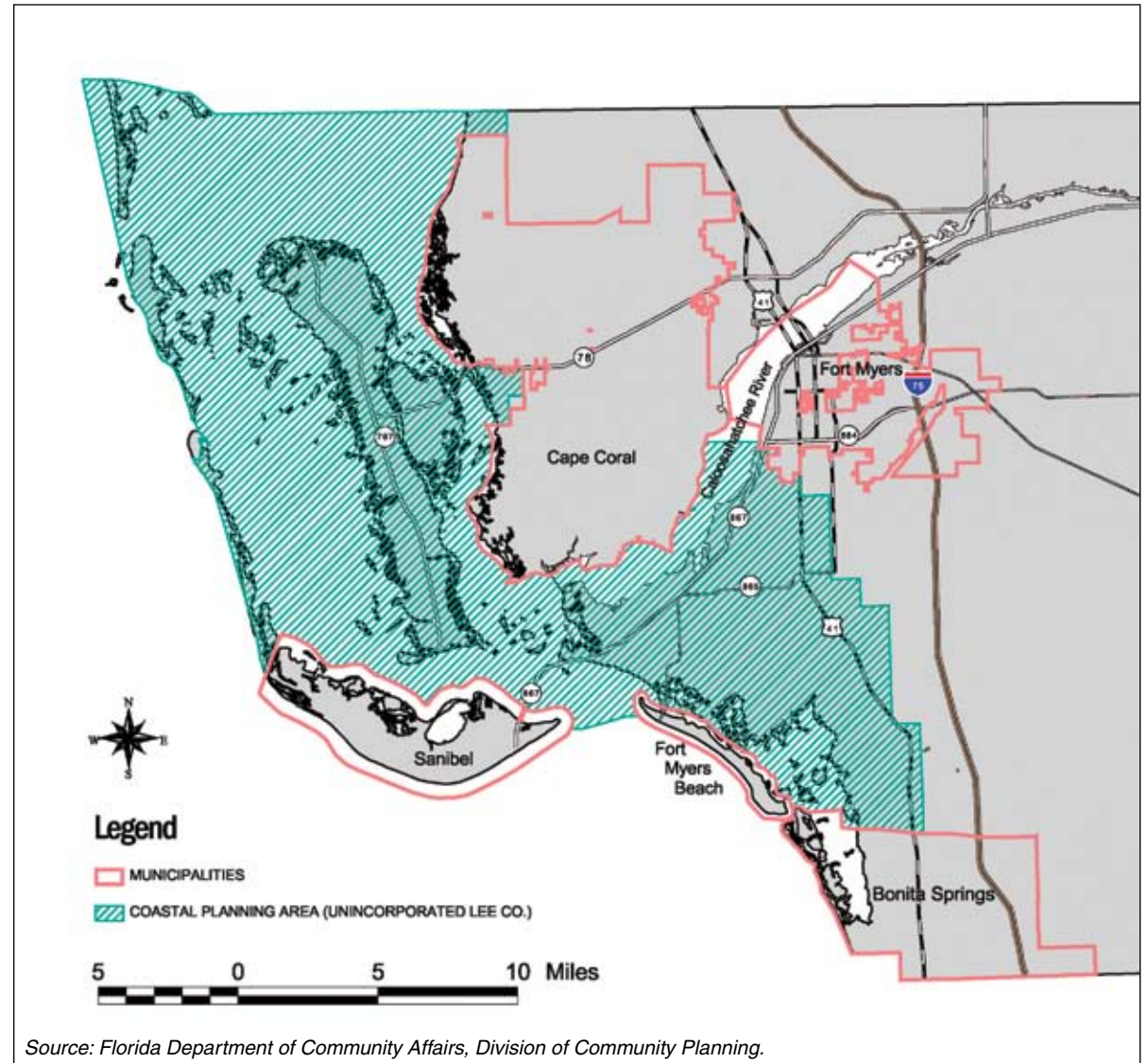
Protection and enhancement of natural protective features are addressed in the *conservation element*, the *public facilities and services element*, and the *coastal management element* of local government *Comprehensive Plans*.

Sidebar 2.8

What is the “Coastal Planning Area”?

Local governments must define the “coastal planning area”, within which the general provisions of the **coastal management elements** must apply. At a minimum, however, this area encompass all of the following: “water and submerged lands of oceanic water bodies or estuarine water bodies; shorelines adjacent to oceanic waters or estuaries; coastal barriers; living marine resources; marine wetlands; water-dependent facilities or water-related facilities on oceanic or estuarine waters; or public access facilities to oceanic beaches or estuarine shorelines; and all lands adjacent to such occurrences where development activities would impact the integrity or quality of the above.” (§9J-5.003(18), **F.A.C.**) For planning purposes, many coastal counties and municipalities define the coastal planning area as their entire jurisdiction. Figure 2.6 depicts the Coastal Planning Area for unincorporated Lee County.

Figure 2.6: Coastal Planning Area for unincorporated Lee County.



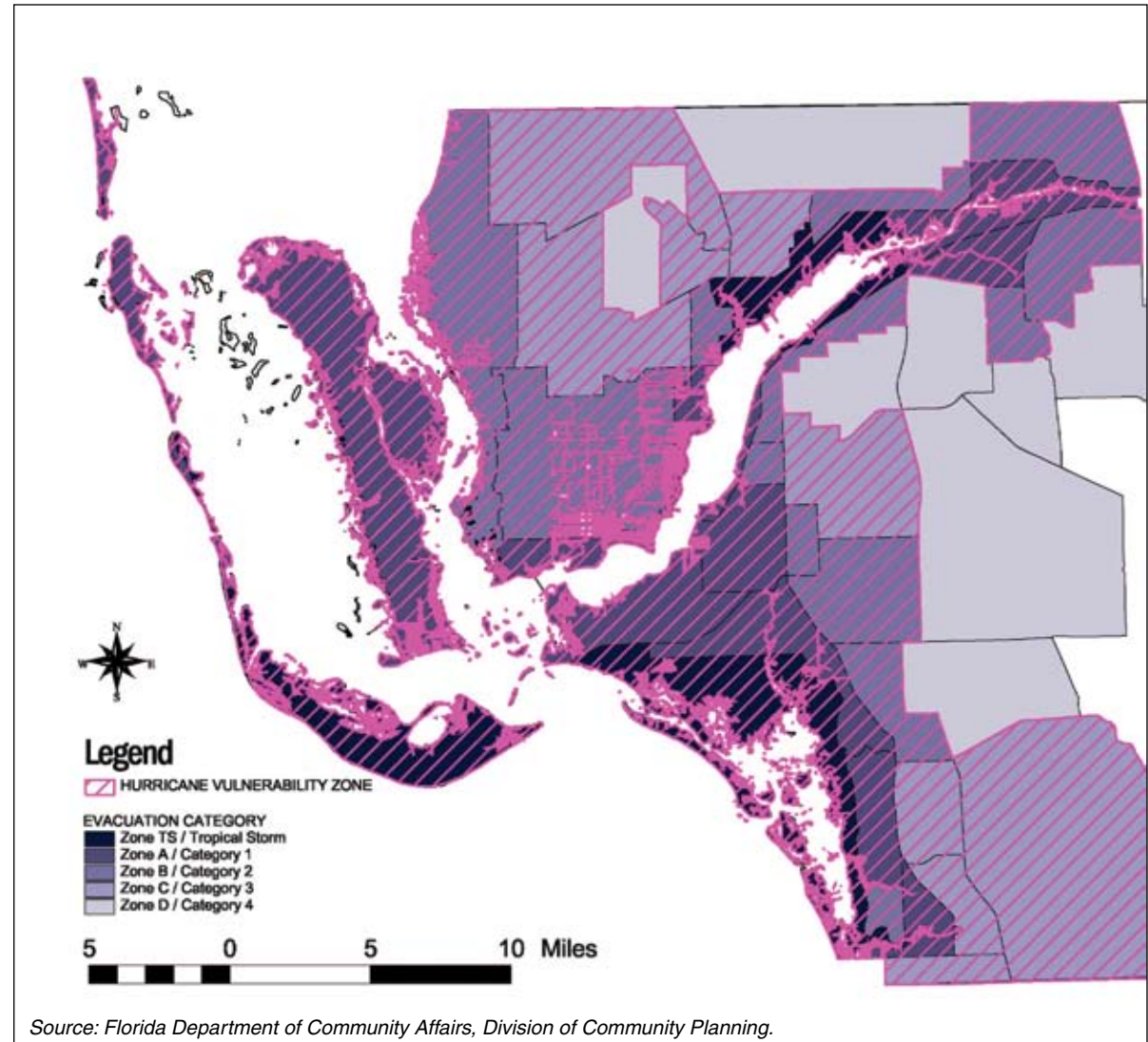
Source: Florida Department of Community Affairs, Division of Community Planning.

Sidebar 2.9

What is the “Hurricane Vulnerability Zone”?

The hurricane evacuation and hazard mitigation requirements of a community’s **coastal management element** apply at a minimum to the “hurricane vulnerability zone” (HVZ), which is defined as “areas requiring evacuation in the event of a 100-year storm or a Category 3 storm event” (§9J-5.003(57), **F.A.C.**). Figure 2.7 depicts the HVZ for Lee County based on the Category 3 evacuation zone.

Figure 2.7: Hurricane vulnerability zone of Lee County based on Category 3 evacuation zone.



Source: Florida Department of Community Affairs, Division of Community Planning.

Sidebar 2.10

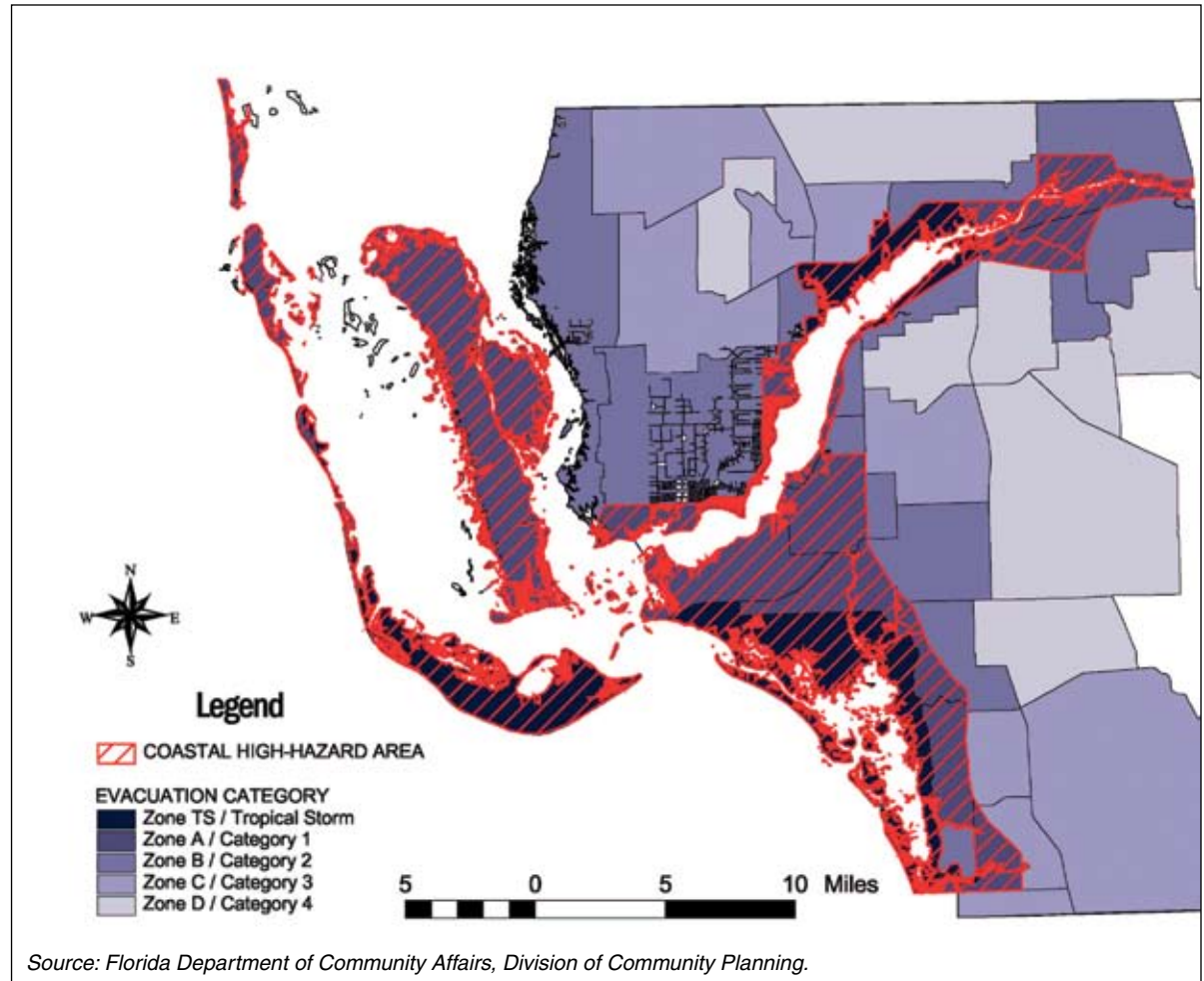
What is the “Coastal High-Hazard Area”?

Local governments that prepare **coastal management elements** are required under the state’s **Comprehensive Plan** regulations (§9J-5.003(2)(e)(3) and (3)(c)(7), **F.A.C.**) to define a “coastal high-hazard area” (CHHA) within which certain objectives and policies apply. These objectives and policies concern directing population concentrations away from the CHHA, reducing hazard exposure for infrastructure, and limiting public expenditures that subsidize development.

Pursuant to 1995 amendments to Chapter 163.3178(2)(h) of the **Florida Statutes**, the CHHA is defined in state **Comprehensive Plan** regulations as “the evacuation zone for a Category 1 hurricane as established in the regional hurricane evacuation study applicable to the local government” (§9J-5.003(18), **F.A.C.**). The Department of Community Affairs permits communities to use more expansive definitions of the CHHA if they wish to do so.

This definition of the CHHA was adopted by the Legislature and added to the statute in 1995. Some comprehensive plans may not yet have been revised to include this new definition; however, the statutory definition supercedes any outdated comp plan definition. Figure 2.8 depicts the CHHA for Lee County based on the Category 1 evacuation zone.

Figure 2.8: Coastal high-hazard area of Lee County based on Category 1 evacuation zone.



- State regulations require that wetlands, estuarine marshes, and floodplains be identified in the *conservation element* of local *Comprehensive Plans* and that the potential for their conservation, use, or protection be analyzed (§9J-5.013(1), *F.A.C.*).
- Specific policies are required governing the protection and conservation of wetlands and their natural functions, and future land uses incompatible with their protection and conservation are to be directed elsewhere (§9J-5.013(3), *F.A.C.*).
- Policies are required in the *public facilities and services element* that regulate land use and development so as to protect the functions of natural drainage features (§9J-5.011(2)(c)(4), *F.A.C.*).
- Coastal communities are directed to include an inventory and analysis of coastal wetlands, beach and dune systems, and shore protection structures and beach renourishment projects in their *coastal management elements* (§9J-5.012(2), *F.A.C.*).
- The *coastal management element* must include an objective to protect, conserve, or enhance existing coastal wetlands, and a separate objective to protect beaches and dunes and restore altered beaches and dunes (§9J-5.012(3), *F.A.C.*).
- Specific policies are to be included that limit the direct and cumulative impacts of development and redevelopment on coastal wetlands, beaches, and dunes and

that identify techniques for doing so as well as restoring or enhancing degraded wetlands, drainage systems, beaches, and dunes (§9J-5.012(3), *F.A.C.*).

State law does not require all local governments to explicitly address building codes and other measures to *make private structures more resistant to natural hazard forces* within their *Comprehensive Plans*. However, state regulations that govern preparation of the *coastal management element* do contain some requirements relevant to making private and public structures more disaster-resistant.

- Coastal communities are required to inventory structures repetitively-damaged by coastal storms and identify measures which can be used to reduce exposure to coastal flooding hazards including structural modification (§9J-5.012(2)(e)(2), *F.A.C.*).
- Coastal communities also are directed to adopt one or more policies and regulatory or management techniques for achieving hazard mitigation, which may include regulation of building practices (§9J-5.012(3)(c)(3), *F.A.C.*).
- *Coastal management element* regulations also require local governments to inventory infrastructure within their CHHAs and to analyze the potential for relocating, mitigating or replacing threatened infrastructure therein (§9J-5.012(2)(e)(3) and (3)(c)(8), *F.A.C.*).

The principal means through which communities employ their *Comprehensive Plans* to *manage the development and redevelopment of land exposed to natural hazards* is through adoption of policies governing regulation of land development and redevelopment, the provision of public facilities and infrastructure to serve new development, and the acquisition of private property in hazardous areas to protect natural resources or to use as public open space or recreation. All local governments are required to

- Include an analysis of proposed development and redevelopment of flood prone areas within their *future land use elements* (§9J-5.006(2), *F.A.C.*);
- Include policies in that element that regulate areas subject to seasonal or periodic flooding (§9J-5.006(3)(c)(1), *F.A.C.*); and
- Consider recommendations in hazard mitigation reports when analyzing proposed development and redevelopment (§9J-5.006(2)(g), *F.A.C.*).

A number of additional mandates apply just to coastal communities. They must:

- Map areas subject to coastal flooding (§9J-5.012(2)(b), *F.A.C.*);
- Inventory existing and proposed land uses in CHHAs and structures repetitively-damaged by coastal storms, and identify measures which can be used to reduce exposure to coastal flooding hazards in-

cluding relocation and public acquisition (§9J-5.012(2)(e)2, *F.A.C.*);

- Include an objective in their *coastal management element* that directs population concentrations away from CHHAs and adopt policies that limit development within CHHAs and that achieve general hazard mitigation including regulation of land use so as to reduce the exposure of people and property to natural hazards (§9J-5.012(3)6, *F.A.C.*);
- Include objectives in their *coastal management element* and in their *capital improvements element* that limit public expenditures for infrastructure and public facilities that subsidize development in CHHAs (§9J-5.012(3)(b) and §9J-5.016(3)(b)2, *F.A.C.*); and
- Include a policy in their *capital improvements element* that includes the elimination of public hazards as a criterion for evaluating local capital improvement projects (§9J-5.016(3)(c)1, *F.A.C.*).

Planning process

Local governments are required to designate some entity as the formal “local planning agency” that is responsible for preparing, reviewing, and updating the community’s *Comprehensive Plan* (§163.3174, *F.S.*). In most communities, this is the planning board that is appointed by the city council/commission or the county commission. Local governments also must adopt formal procedures governing public par-

ticipation in the planning process (§163.3181, *F.S.*). Guidelines issued by FDCA entitled “Preparing a Comprehensive Plan: Practical Considerations in Meeting Florida’s Local Planning Requirements” (Florida Department of Community Affairs, 1987) recommend that the following categories of groups and individuals be involved: developers; land owners; realtors; builders; users of public facilities and services; neighborhood associations; environmental advocates; utility companies and special districts; port authorities; regional, state, and federal regulatory agencies; and school districts.

Review and update process

Communities may adopt major amendments to their plans, which are subject to state review and comment, twice a year. Every seven years, local governments must prepare and adopt an evaluation and appraisal report (*EAR*) that assesses progress in implementing the local government’s *Comprehensive Plan*. The *EAR* is subject to review and approval by FDCA. The five-year schedule of capital improvements in the *capital improvements element* of the *Comprehensive Plan*, by contrast, must be updated annually.

POST-DISASTER REDEVELOPMENT PLANS

In Florida, the *Post-Disaster Redevelopment Plan (PDRP)*, pursuant to requirements governing the *coastal management element* of the community’s *Comprehensive Plan*, guides post-

disaster reconstruction and redevelopment. Some *PDRPs* focus entirely on policies governing post-disaster recovery and reconstruction decision making, many of which overlap with the policies called for in the *coastal management element*. Other *PDRPs* are predominantly post-disaster operations plans that overlap substantially with the *Recovery Annex* of the *CEMP*. Some are mixed plans devoted both to recovery operations and policies for guiding recovery decisions. The *PDRPs* have the greatest utility in implementing hazard mitigation initiatives during redevelopment and reconstruction. They provide a single, free-standing reference to guide action and decision making during the often high-pressure and tumultuous disaster recovery period when sifting through the relevant sections of several different plans is impractical.

Coastal communities are required to include an objective in their *coastal management element* in which they state their intent to prepare a *PDRP* “which will reduce or eliminate exposure of human life and public and private property to natural hazards” (§9J-5.012(3)(b)(8), *F.A.C.*). Non-coastal communities are encouraged in state statute to prepare *PDRPs* as well, but are not mandated to do so (§163.3177(7)(l), *F.S.*):

Local governments that are not required to prepare coastal management elements under s.163.3178 are encouraged to adopt hazard mitigation/post-disaster redevelopment plans. These plans should, at a minimum,

establish long-term policies regarding redevelopment, infrastructure, densities, nonconforming uses, and future land use patterns.

Content

In many communities, the *PDRP* is a free-standing plan, despite considerable overlap in content and application with both the *Comprehensive Plan* and the *CEMP*. Some of the inventory and analysis and policy requirements for the *coastal management element* of the *Comprehensive Plans* of coastal communities concern post-disaster redevelopment. Arguably, these requirements should be replicated in a *PDRP*.

- Existing land uses in the coastal planning area shall be inventoried... Any areas in need of redevelopment shall be identified (§9J-5.012(2)(a), *F.A.C.*).
- Policies are to be included in the *coastal management element* concerning post-disaster redevelopment that (§9J-5.012(3)(c)(5), *F.A.C.*):
 - **distinguish between immediate repair and cleanup actions needed to protect public health and safety and long-term repair and redevelopment activities;**
 - **address the removal, relocation, or structural modification of damaged infrastructure as determined appropriate by the local government but consistent with federal funding provisions and unsafe structures; and**

- **limit redevelopment in areas of repeated damage.**

- Policies also are to be included that identify “areas needing redevelopment, including eliminating unsafe conditions and inappropriate uses as opportunities arise” (§9J-5.012(3)(c)(6), *F.A.C.*).

Applications to reducing community vulnerability

PDRPs are not directly concerned with *evacuation clearance or sheltering*, which are disaster response rather than recovery activities. However, *PDRP* policies that result in reductions in development within hurricane evacuation zones may serve to reduce evacuation clearance times. *PDRP* policies also typically do not concern initiatives intended to *make the environment less hazardous* by restoring or enhancing natural protective features.

PDRP policies may address *making structures more resistant to natural hazard forces* by establishing policies for determining damage thresholds beyond which private structures must be rebuilt to current or newly-adopted building codes. They also may address removal, relocation, or structural modification of public facilities and infrastructure to make them more resistant.

PDRP policies also concern *managing the redevelopment* of property damaged by natural hazard disasters including policies governing redevelopment of repetitively damaged properties.

Planning process

There are no explicit state rules or guidelines governing the process by which communities should develop their *PDRPs*. Ideally the plan should be developed by local officials from both the emergency management and planning realms so that the full spectrum of applicable operational procedures and policies as well as redevelopment policies governing land use and capital facilities are adequately captured in the plan. Guidance provided for the preparation of *LMSs* would be appropriate for the process of developing *PDRPs* as well.

Review and update process

No direction is provided under state laws or regulations concerning the timing or procedures that should be followed for reviewing and updating the *PDRP*. Arguably, the *PDRP* should be revised in concert with major revisions to its two principal source documents: the *CEMP* and the *Comprehensive Plan*. (See further discussion in Section 4.0.)

Section 2.6: There is More that Can be Done

Floridians and their state and local governments have not remained passive in the face of potential disaster. Communities have as many as four plans that address one or more of the strategies available to local governments for reducing community vulnerability to coastal storms and associated flooding. Table 2.6

summarizes the typical scope of each of these plans as most Florida communities currently write them. Separate columns are included for the **Comprehensive Plans** of coastal and non-coastal communities because of the significant differences in their hazard mitigation content. These differences, as well as the absence of a **PDRP** in most non-coastal communities, represent the greatest opportunities for reducing community vulnerability through better planning in the state.

There are three additional initiatives that all Florida communities can take to further reduce injuries and damage to private and public property from natural hazards in general, and from coastal storms and associated flooding in particular:

- ✓ *use the best hazards assessment information available,*
- ✓ *better integrate hazard mitigation policies into the comprehensive plan and its implementation, and*
- ✓ *use land use planning strategies and best development practices for reducing community vulnerability.*

The next three sections of this guidebook are devoted to discussing each of these initiatives and to presenting examples of best practices for each.

The last two sections provide some synthesis. Section 6.0, “Fill in the Gaps in Hazard Mitigation and Post-Disaster Redevelopment Planning,” provides guidance on developing

Table 2.6: Content requirements of local plans that address hazard mitigation.

Purpose and Use	CEMP	LMS	Coastal Comp. Plan	Non-Coastal Comp. Plan	PDRP
Provide hazard assessment information	✓	✓	✓	✓	
Define procedures for providing evacuation and sheltering services	✓				
Define policies for maintaining and enhancing evacuation clearance times		✓	✓		✓
Define capital expenditure priorities for enhancing evacuation and sheltering capacities		✓	✓		
Define policies and capital expenditure priorities for making the environment less hazardous		✓	✓	✓	
Define policies for making structures more resistant to natural hazard forces		✓	✓		✓
Define capital expenditure priorities for making public facilities more resistant to natural hazard forces		✓	✓		
Define policies for managing the pre-disaster development and redevelopment of land exposed to natural hazards		✓	✓	✓	
Define operational procedures for post-disaster recovery and redevelopment	✓				✓
Define policies for governing post-disaster recovery and redevelopment actions		✓	✓		✓

effective *Post-Disaster Redevelopment Plans* that encompass both recovery operations and policies for guiding the recovery and redevelopment process. Section 6.0 also presents a series of model inventory and analysis components plus goals, objectives, and policies for effectively incorporating hazard mitigation and post-disaster redevelopment into a community's *Comprehensive Plan*. This section will be especially useful to communities that do not have a *PDRP* and to non-coastal communities that have addressed hazard mitigation to a very limited extent in their *Comprehensive Plans*.

The final section, Section 7.0, "Putting it all Together: Calamity Shores," presents a hypothetical example of how a community might employ some of these strategies and tools to reduce their vulnerability to coastal storms and flooding.

3 Use the Best Hazards Assessment Information

Sound policies and decisions are fueled by good information and analysis. As noted in Section 2.0, developing effective hazard mitigation policies and land development regulations and the initiatives to implement them requires a thorough assessment and analysis of natural hazards.

The Florida Department of Community Affairs, Division of Emergency Management (DEM) has provided counties with state-of-the-art hazards assessment information that describes their current exposure, vulnerability, and risk. In addition, there are other tools available that can enable local governments to assess the effectiveness of alternative future land use scenarios, land use planning policies, development regulations, and other mitigation initiatives. Local governments should to consider how best to use this information and to incorporate it into their comprehensive planning processes and day-to-day land use and capital expenditure decision making. Some local governments have used it to inform the post-disaster redevelopment policies and strategies in their *PDRPs*.

Hazard assessment information is typically included in three local plans: *CEMPs*, *LMSs*, and *Comprehensive Plans*.

- **CEMP.** The typical *hazards analysis* section of a *CEMP* focuses on areas and facilities that are exposed to hazards. Most counties base their *hazards analysis* on data and experience from previous disasters, including information available from the DEM's "SERT Tracker" system. This information is available to emergency management officials online at <http://www.eoconline.org>. This is usually employed only to prepare emergency response and recovery plans. Where the *CEMP hazards analysis* identifies areas, people, and property exposed to hazards (hazard identification) and provides estimates of potential damage and injuries from specific disaster scenarios (vulnerability assessment), it may be useful in the comprehensive planning process as well as in developing an *LMS* and a *PDRP*.
- **LMS.** The *hazard identification and vulnerability assessment* of an *LMS* may contain substantial hazard assessment information of value for land use and growth management planning and for developing *PDRPs*. In 1999 as well as during the current round of initiatives to revise *LMSs* to meet the new federal DMA 2000 requirements, DEM has provided counties with hazards assessment data and analyses completed using the TAOS model (see Sidebar 3.1). This information also is

available online through DEM's MEMPHIS system (see Sidebar 3.2).

- **Comprehensive plan.** The state's regulations governing local *Comprehensive Plans* (§9J-5.006(4)(b), *F.A.C.*) require the depiction of floodplains on every community's *future land use map (FLUM)* and coastal high-hazard areas (CHHAs) on the *FLUMs* of coastal communities. Coastal communities also map areas subject to coastal flooding (typically portrayed as storm surge zones for each of the five hurricane intensities) in their *coastal management elements* (§9J-5.012(2)(b), *F.A.C.*).

All communities are directed to conduct an analysis of proposed development and redevelopment of flood prone areas (§9J-5.006(2)(e), *F.A.C.*) within their *future land use elements (FLUEs)*. Coastal communities are directed to include in their *coastal elements* analyses of the effects of future land uses on areas subject to coastal flooding and on evacuation clearance times and shelter demand (§9J-5.012(2)(b) and (e), *F.A.C.*).

Sidebar 3.1

TAOS Hazard Assessment Information

Kinetic Analysis Corporation and the University of Central Florida developed hazard assessment data for each county in Florida in 1999 and in 2004 under contract with the Florida Department of Community Affairs, Division of Emergency Management (DEM). Hurricane hazard assessments include the following:

- maps of historic hurricane tracks, wind zones, and storm surge flood zones for each of the five hurricane categories (hazard identification);
- estimates of the numbers of structures likely to suffer damage at each of 5 levels (destroyed, severe damage, etc.) for each hurricane category (vulnerability assessment);
- estimates of aggregate dollar damages for different private and public structure types from each hurricane category (vulnerability assessment); and

- estimates of the numbers of people, in different age and income groups, who are likely to live in structures that sustain different levels of damage for each hurricane category (vulnerability assessment).

Additional hazard identification and vulnerability assessment information is provided for tornadoes, thunderstorms, sinkholes, wildland fires, earthquakes, tsunamis, and flooding within flood-hazard areas defined under the National Flood Insurance Program. Average annual dollar losses also are calculated from combined wind and water forces both with and without mitigation (risk analysis). For more information about the TAOS product developed for DEM see http://www.floridadisaster.org/brm/taos_faqs.htm.

Sidebar 3.2

MEMPHIS System Hazards Assessments

MEMPHIS (Mapping for Emergency Management, Parallel Hazard Information System) is an experimental web based system to allow emergency managers, planners, and other local officials in Florida to easily access a variety of hazard related data.

Statewide and county maps and data can be viewed or downloaded in pdf format for the following natural hazards: hurricanes, tornadoes, thunderstorm and hail damage, earthquakes, and potential for wildland fires, tsunamis, and sinkholes. Grid-format (raster) files also can be downloaded for each of these hazards by county.

To access MEMPHIS see <http://lmsmaps.methaz.org/lmsmaps/index.html>.

This section of the guidebook describes several best practices for using available hazards assessment information and analytic tools in both comprehensive planning and the development of **PDRPs**:

- ✓ integrate hazard assessment into comprehensive planning;
- ✓ establish a central data repository;
- ✓ use hazard assessment in developing the PDRP; and
- ✓ take advantage of available hazard assessment resources.

Section 3.1: Integrate Hazard Assessment Into Comprehensive Planning

The *Comprehensive Plan* sets forth the policies that guide a community's day-to-day decisions about land use and capital facilities expenditures. These policies have a profound impact on who and what are exposed to the dangers posed by natural hazards and the extent to which people and property are vulnerable to injury and damage. It is essential, therefore, that these policies be based on the best available data about the nature of the hazards to which the community is exposed, the vulnerability of its people and property, and the risks of injury and damage from natural hazards.

In undeveloped areas or "greenfields," hazard assessment information can be extremely useful for identifying areas where development will be at risk and should be regulated, discouraged, or prohibited. In areas that are already developed, hazard assessment can show where government initiatives may be necessary to further protect existing structures against hazards or where it may be best to relocate vulnerable private structures or public facilities.

To effectively make use of hazard assessment information, it is essential that hazards data be analyzed as an integral part of the development of the *future land use map (FLUM)* and the policies of the *future land use element (FLUE)* that serve as the primary basis for

managing land use and development practices in hazardous areas of a community. Four initiatives are recommended:

- link hazards data and analyses in the county *CEMP* and/or *LMS* to the *FLUE* of the *Comprehensive Plan*;
- include maps of natural hazards exposure in the *FLUE*;
- formally assess natural hazard exposure and vulnerability in the suitability analysis of vacant and undeveloped land in the *FLUE*; and
- analyze the effects of alternative future land use scenarios on evacuation clearance times and shelter demands.

Link hazards data and analyses to the future land use element

As noted above, the hazards data and analyses that communities have included in the *hazard identification and vulnerability assessment (HIVA)* sections of their *LMSs* are typically the most comprehensive. The scope is generally narrower in the hazards analysis of most county *CEMPs*, although some incorporate the *HIVA* from the *LMS* by reference.

While it may not be efficient to incorporate the full detail of the *HIVA* from the *LMS* into the *Comprehensive Plan*, a formal incorporation by reference within the *FLUE* is an important action that can serve to emphasize the prominent role such information should take in developing the policies governing development

and capital facilities in the community. Doing so also provides a pointer to the sources that should be consulted.

Include maps of natural hazards in the future land use element

While it is important to incorporate hazards information and analyses from the *CEMP* and/or *LMS* into the *Comprehensive Plan* by reference, it is crucial that visual depictions of hazardous areas be explicitly considered in developing the *FLUM* and future land use and redevelopment policies of the community and when considering proposed amendments to these policies and the *FLUM*.

As noted above, floodplains and coastal high-hazard areas should be depicted on a community's *FLUM*. Coastal communities also are required to include maps in their *coastal management elements* of areas subject to coastal flooding. This information may be more effectively utilized if it is also included in the *FLUM*.

Full consideration of the hazards associated with coastal storms also requires information on wind hazard zones associated with different storm intensities. To comprehensively assess all of the natural hazards that vary spatially within a community, maps also should be included of sinkhole- and erosion-prone areas and areas vulnerable to wildland fires. Information on sources of these data is presented below in Section 3.4.

Formally assess natural hazard exposure and vulnerability in the future land use element

The *FLUM* includes a suitability analysis of existing vacant or undeveloped land (§9J-5.006(2)(b), *F.A.C.*), however, this may not assess the constraints posed by natural hazards. As noted above, comprehensive plans must include an analysis is required of proposed development and redevelopment of flood prone areas, and in coastal communities, an analysis of the effects of future land uses on areas subject to coastal flooding.

It is far more effective to consider the constraints posed by all relevant natural hazards as part of the land suitability analysis that serves as an input to developing the *FLUM* and to identify any special land development policies that should be targeted during development or redevelopment of specific areas.

Process

The following steps are recommended for incorporating hazards assessment information and analyses into the development of the *FLUM* and the *FLUE* policies:

1. **Develop explicit criteria for evaluating alternatives.** These should be based on the goals and objectives of the *FLUE* as well as the other elements of the *Comprehensive Plan*.

2. **Create alternative future land use scenarios.** One approach to defining options is to examine alternative land use scenarios in which one or a few criteria are maximized at the expense of others.
3. **Assess the effects of each alternative.** This is the most challenging part of the process. It requires the ability to predict the effects of different future land use scenarios on population growth and the local economy as well as natural resources and levels of service for public facilities and infrastructure. Methods for assessing the impacts on hazards vulnerability are described below in Section 3.4.
4. **Select the optimal scenario that maximizes achievement of desired goals and objectives while minimizing costs and other undesirable impacts.**

Applications

If such a hazard identification and vulnerability assessment is done in the process of developing or revising the *FLUM* and *FLUE* policies, the results can be used to determine which of the land use planning and development management practices described in Sections 5.4 and 5.5 will be most effective in reducing the community's vulnerability, including the following.

- Adopting building code standards more stringent than the minima required under the Florida Building Code.

- Establishing hazardous area overlay zones within which
 - **land use types and/or intensities should be regulated through zoning or purchase-and-sellback or lease-back strategies and managed through capital facilities expenditure policies to avoid subsidizing development in hazardous areas;**
- cluster development should be required to avoid hazards through subdivision and planned unit development regulations and/or encouraged through incentive zoning;
 - **development should be set back from hazard zones;**
 - **development densities should be reduced through purchase or transfer of development rights;**
 - **development should be precluded through fee-simple acquisition or transfer of development rights; and/or**
 - **site design regulations and performance standards should be used to minimize off-site flooding and generation of landscape debris.**

A hazard identification and vulnerability assessment as part of the *FLUE*, coupled with an inventory of natural protective features in the *conservation element* of the *Comprehensive Plan*, will provide the necessary information to identify where the protection, restoration, or enhancement of natural drainage features, floodplains, wetlands, or beach and dune

systems will be most critical to minimizing community vulnerability and where it will be most effective to employ specific tools such as the following for doing so (see Section 3.4).

- Define overlay zones within which:
 - **land use types and/or intensities should be regulated through zoning or purchase-and-sellback or leaseback strategies to minimize impacts on natural protective features;**
 - **cluster development should be required through subdivision and planned unit development regulations and/or encouraged through incentive zoning to avoid destruction or disturbance of natural protective features;**
 - **development should be set back from natural protective features;**
 - **development densities should be reduced through purchase or transfer of development rights;**
 - **development should be precluded through fee-simple acquisition or transfer of development rights;**
 - **site design regulations and performance standards should be used to minimize damage to natural protective features; and/or**
 - **tax incentives should be used to encourage protection of natural protective features.**
- Identify natural protective features for which it will be cost-effective to invest

public resources in restoration and/or enhancement.

Analyze the effects of future land use on evacuation and sheltering

The *coastal management element* of the *Comprehensive Plans* shall include an analysis of the impacts of the anticipated population density associated with the future land use policies and *FLUM* (§9J-5.012(2)(e)(1), *F.A.C.*).

Rather than assessing such impacts **after** developing the *FLUM*, these analyses should be performed as part of the process of assessing **alternative** future land use scenarios **prior to** formalizing the *FLUM*. Simple “abbreviated transportation models” or ATMs are now available from DEM that can be used to easily perform such analyses (see Sidebar 3.4).

Results of such analyses will also provide essential input into deciding what strategies to follow where projected evacuation clearance times and/or shelter demands are anticipated to be excessive. These include implementing capital expenditure programs to expand evacuation routes and shelter capacities (see Section 5.2) and using development and redevelopment management tools such as zoning, fee-simple acquisition, purchase of development rights, transfer of development rights, and capital expenditure policies to maintain or reduce population densities within the community’s hurricane vulnerability zone (see Section 5.5).



Section 3.2: Establish a Central Data Repository

Sharing data between agencies and organizations in the community should not be a one-time occurrence. It is important that current and consistent hazards assessment information be incorporated into each plan during the regular review and update processes (see Section 4.3), and that it be readily available in each planning process. The best practice is to establish a central repository that can acquire, maintain, and provide access to relevant hazard assessment information for all concerned parties.

The local agency that provides technical support for the *LMS* might be a good location for the repository. This is typically the county emergency management agency or the local planning agency. However, because much of the state-of-the-art data are now in geographic information systems (GIS) format, it is important that the central data repository be capable of managing and disseminating such data to all parties.

In smaller jurisdictions, it may not be feasible to have technical staff in both the emergency management and planning agencies who are capable of conducting hazard vulnerability and risk assessment analyses with the available hazard data. In such cases, it will be important that the staff with those analytic capabilities be involved in planning and decision making processes where such analyses are needed (see the discussion of collaboration in Section 4.2).

In larger jurisdictions, there may be equivalent data repositories and analytic capabilities in multiple local agencies. In such cases, more sophisticated means of coordination and collaboration may be needed to assure that each agency has access to current and consistent information.

Section 3.3: Use Hazard Assessment in Developing the PDRP

One key part of the *PDRP* is a well thought out plan for community redevelopment in the wake of a natural disaster. Vulnerability assessment can be used to determine areas that are the most likely candidates for redevelopment under disaster scenarios of different magnitudes. The *PDRP* should contain pre-defined damage thresholds that specify when areas should be redeveloped for different land use densities and intensities, rather than being reconstructed to previous conditions.

Simple hazard identification only allows identification of areas subject to the forces of hazards of a given magnitude, e.g., a 100-year flood or flooding from a category 3 hurricane. If the community has a database that contains information on the first-floor elevations of residential and commercial structures and public facilities, it is possible to predict the percent damage to individual structures from flooding if flood elevation data also are available. Analytic models are available that can provide

such vulnerability assessment information if adequate local data are available (see Section 3.4). A community may choose to use a percent damage threshold as the basis for determining when redevelopment should occur, e.g., 50 percent of market or replacement value, or it may choose to focus redevelopment in areas with repetitive damage. In the latter case, it also will be necessary to have a database of structures that have previously been damaged.

Section 3.4: Take Advantage of Available Hazard Assessment Resources

A number of hazard assessment information and analysis resources are available to local governments in Florida for assessing coastal storm hazards and associated flooding. These are briefly summarized here within five categories: (1) hazard identification information; (2) vulnerability assessment information; (3) vulnerability assessment analysis; (4) risk analysis; and (5) hurricane evacuation and shelter demand analysis.

Hazard identification information

The purpose of hazard identification is to identify areas that are exposed to natural hazards of different magnitudes. Information is available to Florida communities for defining areas subject to coastal flooding, wave impacts and inland flooding, and wind hazards.

Coastal flooding

Coastal flooding associated with tropical storms and hurricanes is the result of storm surge, water (not waves) that is pushed toward the shore by the force of the storm winds. Storm surge inundation zone data are available from two sources based on two different models for predicting storm surge flooding: (1) SLOSH surge maps developed in conjunction with the preparation of regional hurricane evacuation studies, and (2) TAOS surge maps provided to Florida counties.

The regional hurricane evacuation study maps are based on the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model developed by the National Weather Service. Digital copies of these maps are available from the Florida Division of Emergency Management in vector format (see Figure 3.1). Also included in the regional hurricane evacuation studies are maps depicting the hurricane evacuation zones of each county. The boundaries of the evacuation zones are based on the surge zones, but modified to facilitate ready identification of zone boundaries. In some counties, separate evacuation zones are defined for each of the five hurricane categories (see Figure 3.2). In others, one or more of the surge zones may be aggregated (see Figure 3.3). Digital copies of these maps are generally available from the regional planning councils that prepared (or funded the preparation of) the regional hurricane evacuation studies.

Figure 3.1: SLOSH storm surge zones for Lee County, Florida.

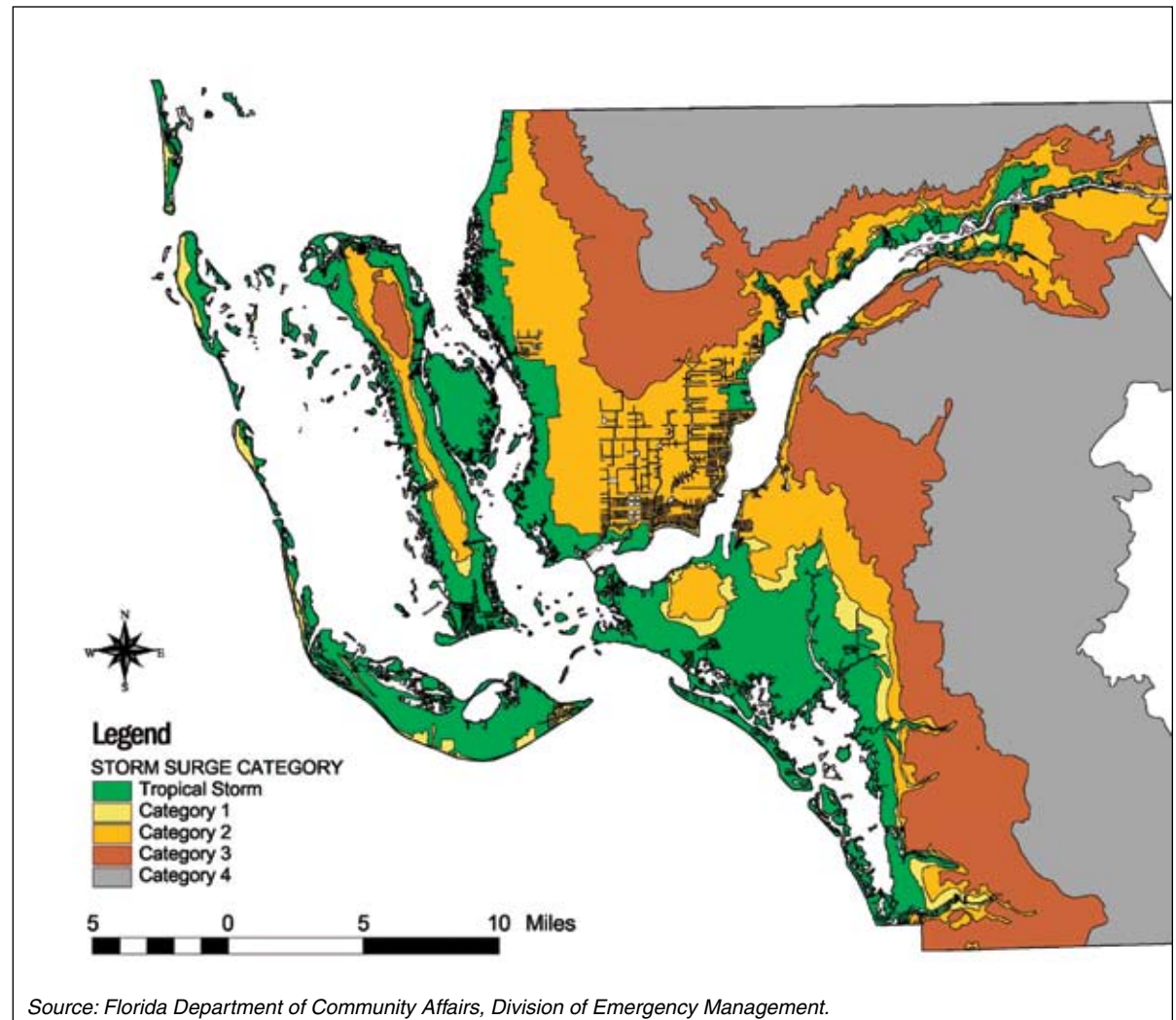
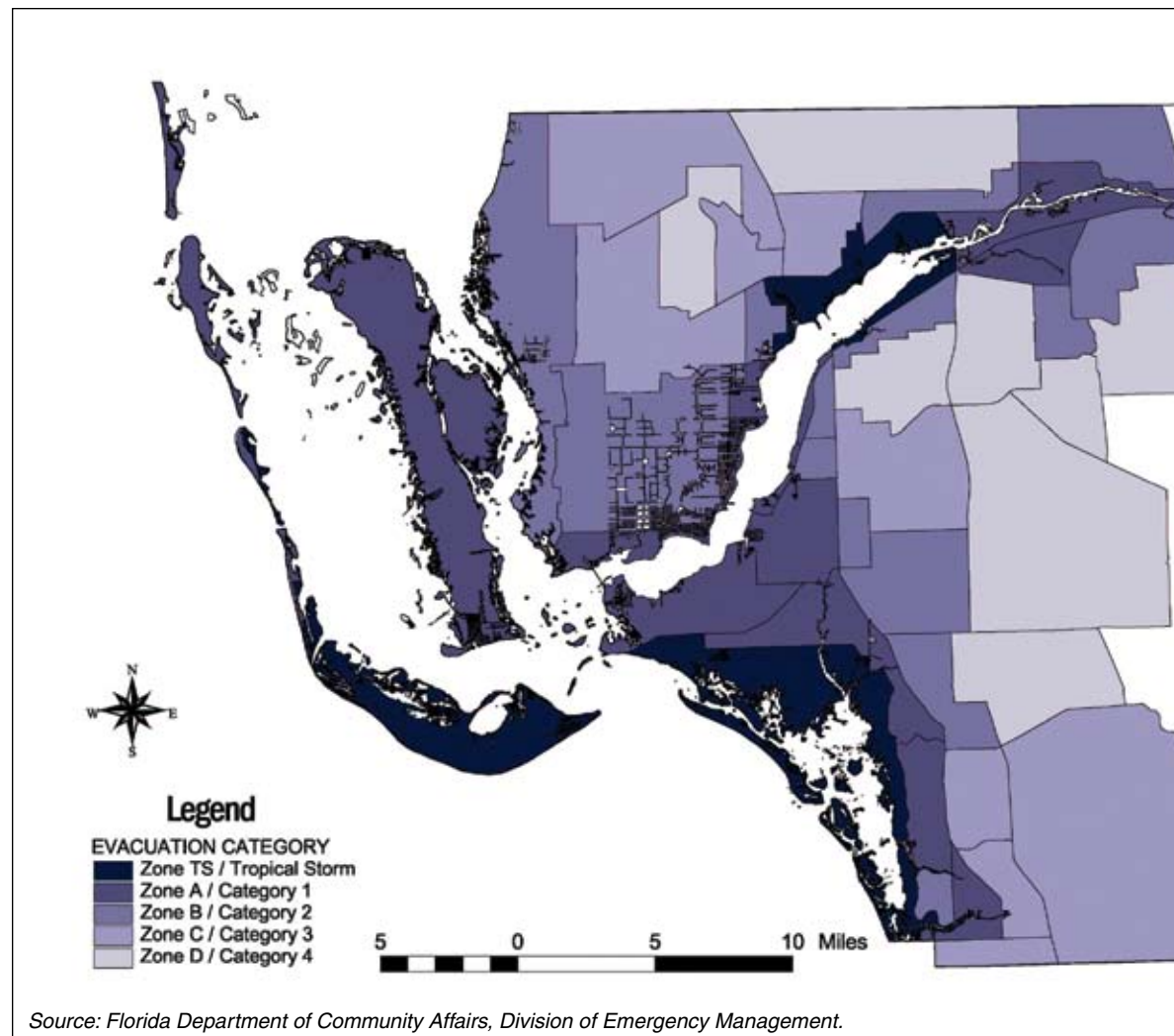


Figure 3.2: Hurricane evacuation zones for Lee County, Florida.



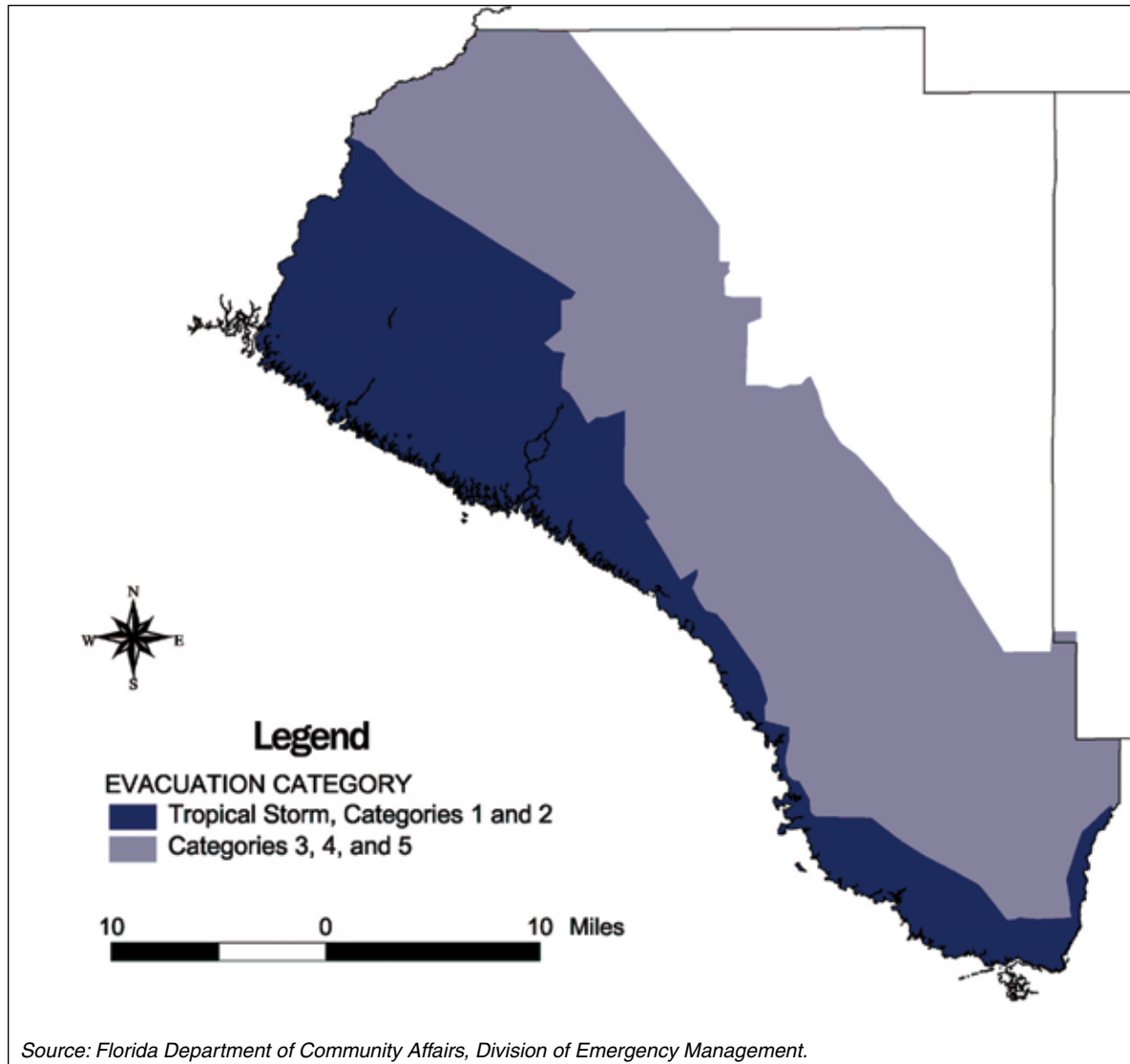
Kinetic Analysis Corporation and the University of Central Florida under contract with by the Florida Department of Community Affairs, Division of Emergency Management (DEM) provided TAOS surge maps to Florida counties in 1999 and 2004 as part of hazards assessment data that was developed. These are produced from The Arbiter of Storms (TAOS) storm surge model. Digital copies of the maps are available in pdf and grid (raster) format through DEM's MEMPHIS system (see Sidebar 3.2).

Sidebar 3.3

Repetitive Loss Structures

Repetitive loss structures are properties currently insured under the National Flood Insurance Program (NFIP) for which two or more NFIP losses (occurring more than ten days apart) of at least \$1,000 each have been paid within any 10-year period since 1978. As of March 2003, 533 structures in Florida were classified as repetitive loss structures. Information on repetitive loss structures in your community is available from the FDCA, Division of Emergency Management, Bureau of Recovery and Mitigation.

Figure 3.3: Hurricane evacuation zones for Taylor County, Florida.



Wave impacts and inland flooding

Wave impact and inland flood hazard information is principally available in the form of Flood Insurance Rate Maps (FIRMs) prepared under the National Flood Insurance Program. These maps depict areas subject to flooding and the force of breaking waves of 3 feet or more in height (V zones) and areas subject to still-water flooding (A zones) associated with 100-year storm events. Digital copies of these maps in pdf and grid (raster) format are included in the TAOS hazard assessment information provided to Florida counties by DEM (see Figure 3.4).

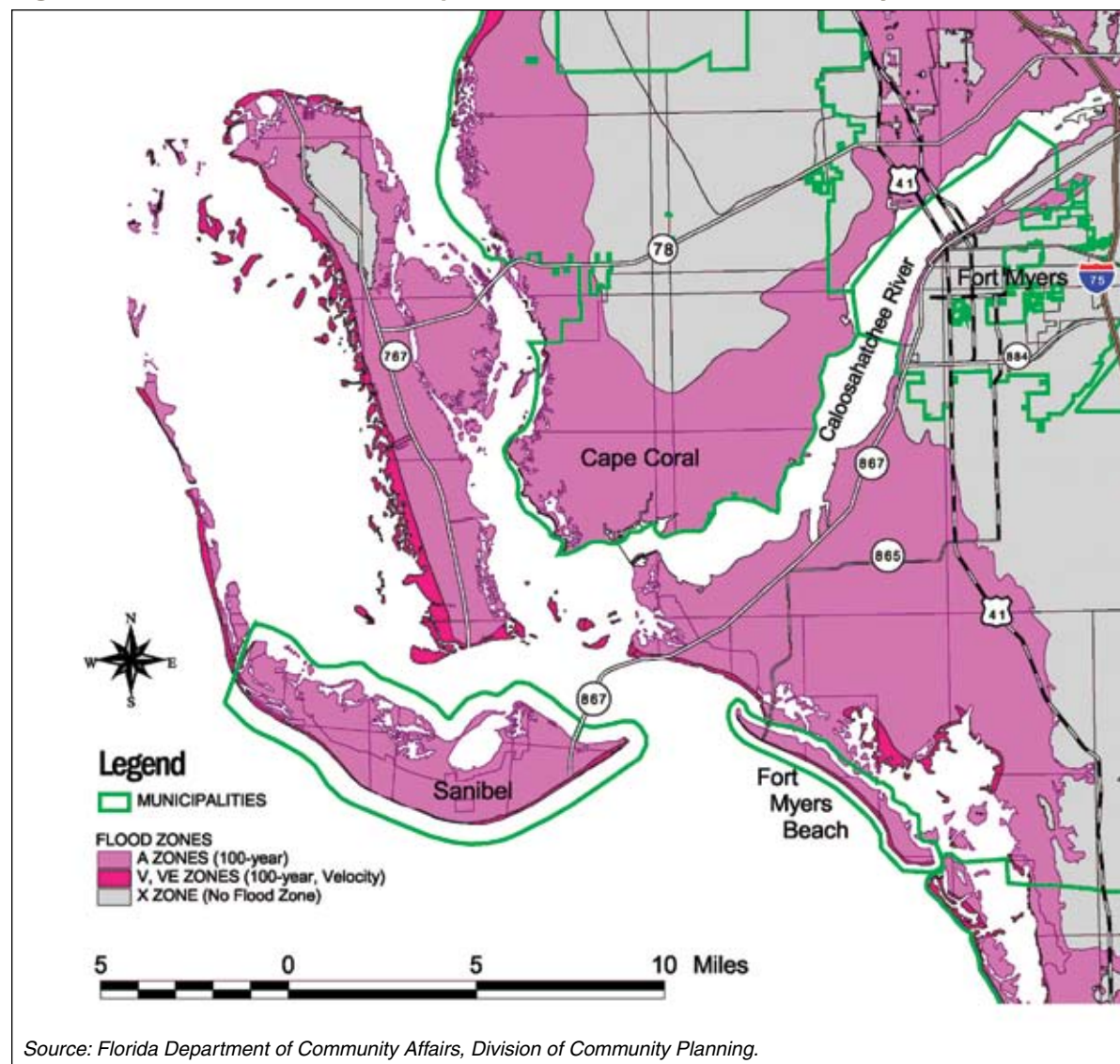
Wind hazards

The TAOS hazard assessment information provided by DEM to Florida counties includes maps that depict wind field areas for peak 2-minute wind speeds at 10 meters above the ground associated with landfalling hurricanes of different magnitudes (see Figure 3.5). Digital copies of these maps are available in pdf and grid (raster) format from DEM's MEMPHIS system.

Vulnerability assessment information

The purpose of vulnerability assessment is to determine who and what are in harm's way and the extent of injuries and damage that may result from hazard events of different magnitudes. The basic inventory data needed to conduct a vulnerability assessment include the following:

Figure 3.4: Flood Insurance Rate Map V zones and A zones for Lee County, Florida.



- the age and condition of private structures and public facilities and infrastructure in hazard-prone areas;
- the number and quality of historic structures in hazard-prone areas;
- the locations of repetitive loss structures (see Sidebar 3.3);
- the numbers of permanent and seasonal residents in hazard-prone areas; and
- the numbers of residents in hazard-prone areas who may be especially vulnerable because of age, income, or physical or mental condition.

Data on the age and condition of private structures are contained in each county's property appraiser's data base.

Data on public facilities and infrastructure that are pertinent to vulnerability assessment, may require some effort to accumulate. Each county emergency management office develops its own list of critical facilities that may include such facilities as the following:

- group quarters such as schools, churches, nursing/convalescent homes, correctional facilities, and mobile home parks;
- hazardous materials storage and disposal facilities including those for radioactive materials, fuel storage, and active and inactive landfills;
- health-related facilities such as hospitals, clinics, emergency medical services, Red Cross, animal-related facilities;

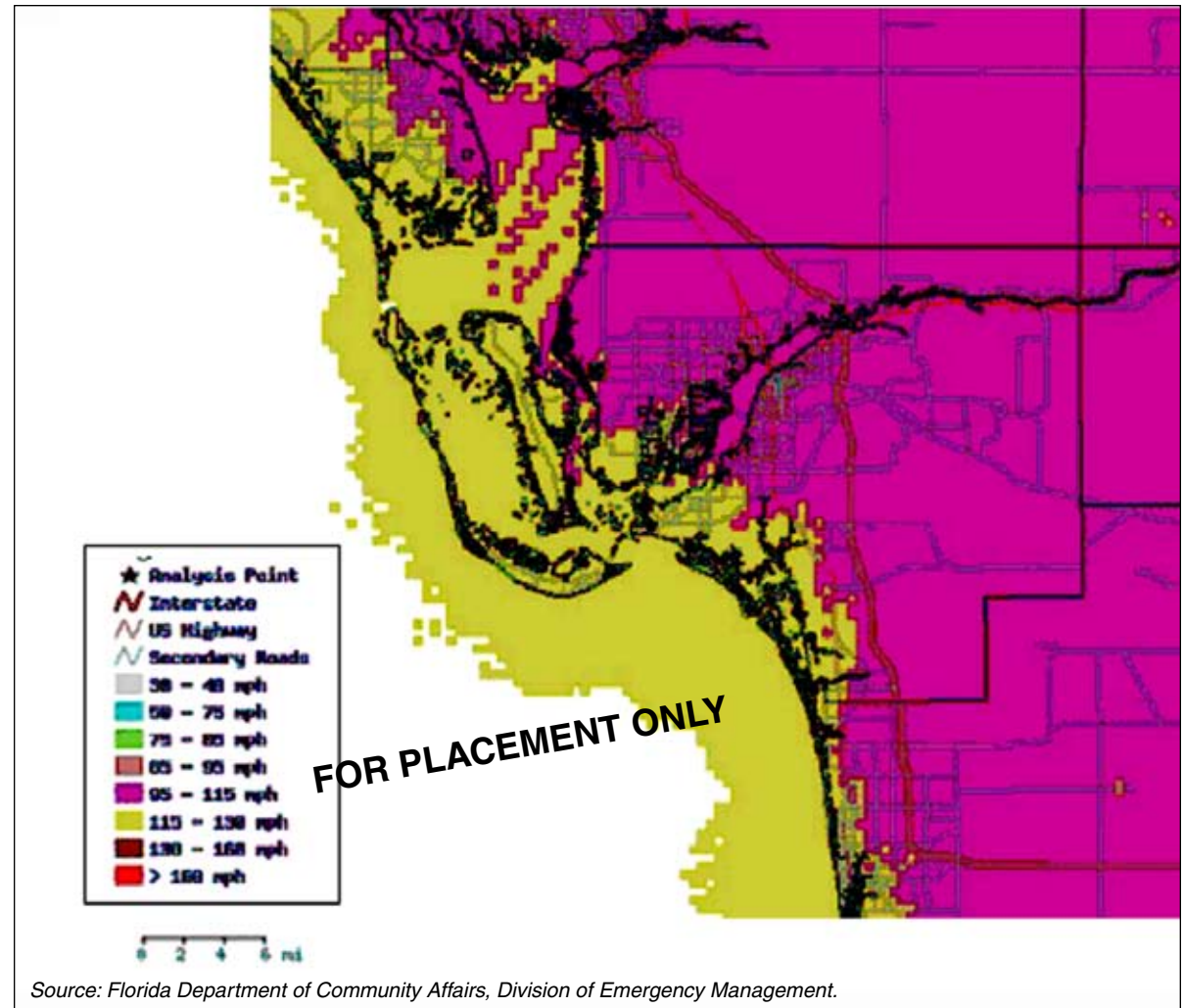
- public facilities and infrastructure such as fire departments, highway patrol, police and sheriff departments, communication facilities, electric utilities, sewage treatment, sewage lift stations, water treatment, water lift stations, and well heads;
- major transportation facilities including airports, marinas, sea ports, bridges, traffic control facilities, mass transit facilities, evacuation routes, maintenance facilities;
- military bases;
- emergency response facilities; and
- emergency shelters.

Data on historic resources are available from the Florida Department of State Master Site File and from local historic preservation organizations. Detailed guidance on how best to develop such an inventory is contained in FDCA's recently published guidebook entitled *Disaster Planning for Florida's Historic Resources* (see Sidebar 1.2 in Section 1.0 above).

Lists of repetitive loss structures in the state are available from DEM as well as spatial data in digital format (see Figure 3.6). Information on permanent and seasonal residents, including age, is available from the US Census Bureau at three levels: census tract, census block group, and census block.

The TAOS hazard assessment information includes vulnerability estimates for wind, flooding, tornadoes, thunderstorms and hail,

Figure 3.5: Category 3 hurricane wind hazard fields, Lee County, Florida.



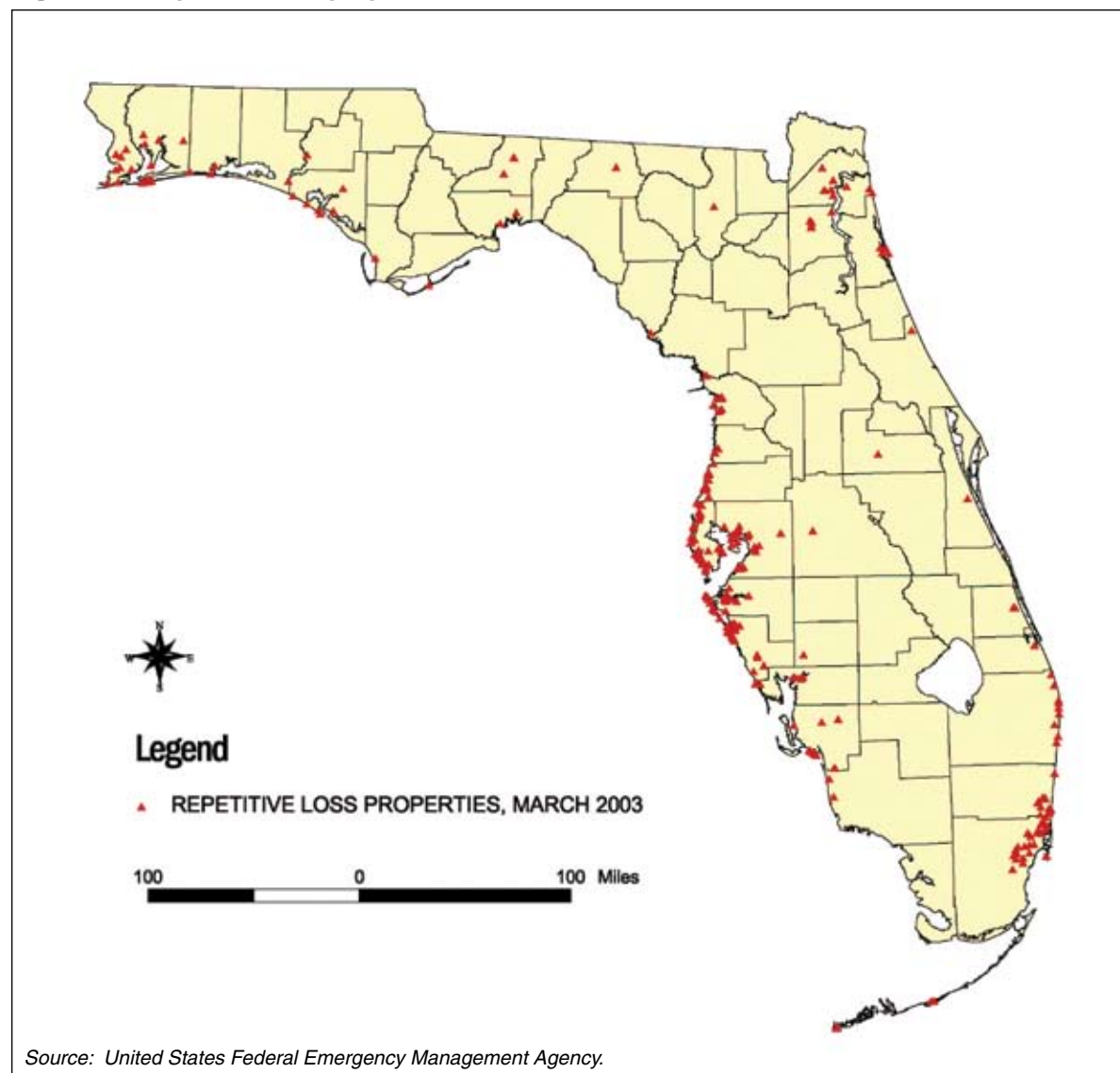
sinkholes, wildfire, earthquakes, and tsunamis. Estimates are provided for:

- numbers of structures likely to be damaged and the aggregate dollar damages for different private and public structure types based on Florida Department of Revenue land use codes;
- numbers of people whose residences are likely to be destroyed or severely damaged, in total and in separate vulnerability classes; and
- separate analyses for wind and flood damage based on 10, 25, 50, and 100 years storm events, including flood damage from both storm surge and rainfall.

Damages are tabulated in five categories: (1) destroyed (> 80% damage of estimated replacement value for the structure and contents); (2) severe (50-80%); (3) heavy (30-50%); (4) moderate (10-30%); and (5) light (< 10%). Separate vulnerability estimates are also provided for dollar damages that would result in the presence of mitigation that would increase wind resistance by 5 mph and reduce flood exposure levels by 1 foot.

The TAOS information can be used to assess a county, city, and census designated place (CDP)'s relative vulnerability to different natural hazards and to hurricanes of different magnitudes with and without wind and flood mitigation.

Figure 3.6: Repetitive loss properties in the state of Florida.



Vulnerability assessment analysis

Vulnerability assessment has three principal applications to hazard mitigation and post-disaster redevelopment.

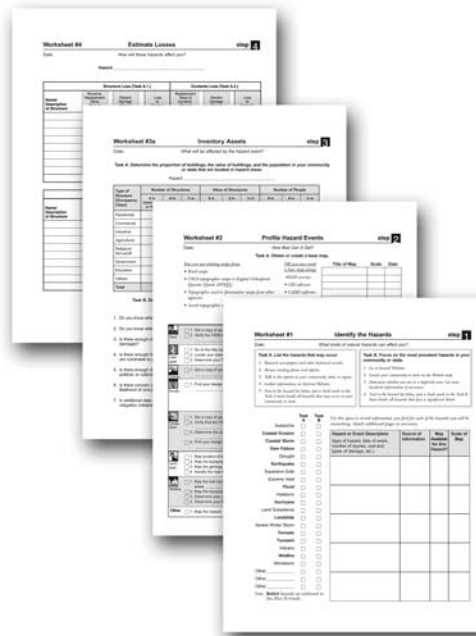
- It is critical to identifying public facilities and infrastructure that may require structural mitigation to reduce the potential for disaster damage. It is in this capacity that vulnerability assessment is most often used in developing *LMSs*.
- As noted above, vulnerability assessment of the current built environment can be very useful in preparing *PDRPs* when it is used to identify areas that may be possible candidates for redevelopment where disasters have sufficient impacts to trip redevelopment damage thresholds.
- The ideal application of vulnerability assessment in land use planning and growth management is for prospective evaluation of alternative future land use scenarios in the development of the future land use map and policies of the *future land use element* of the *Comprehensive Plan*.

Conducting a formal vulnerability assessment requires the ability to define where disaster forces will arise and to estimate the extent of damage that will occur to structures and facilities within those areas. Four vulnerability assessment resources are described in this section: (1) FEMA's *How-to Guide* for identifying hazards and estimating losses; (2) NOAA's CVAT; (3) the TAOS vulnerability assessment

model; and (4) the HAZUS-MH vulnerability assessment models.

FEMA's How-to Guide

The second volume of FEMA's *How-to Guides* entitled *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA 386-2) provides a series of worksheets that identify what information is needed and how to use it in the analysis of natural hazards including flooding, coastal storms, tornados, wildfires, and tsunamis. The process used in the how-to guides is consistent with the Disaster Mitigation Act of 2000 hazard mitigation plan



requirements for risk assessments. For more information see http://www.fema.gov/fima/planning_toc3.shtm.

NOAA's CVAT

CVAT (Community Vulnerability Assessment Tool) is a CD ROM product available from the National Oceanic and Atmospheric Administration (NOAA) that details a process for analyzing physical, social, economic, and environmental vulnerability to hazards at the local level. Also included on this CD-ROM is a comprehensive case study that demonstrates application of the vulnerability assessment methodology to New Hanover County, North Carolina. For more information see <http://www.csc.noaa.gov/products/nchaz/btm/methov.htm>.

TAOS

TAOS is one of two principal software products available that analyze spatially explicit data using GIS and that incorporate damage functions to translate information about hazard forces and the characteristics of affected structures into damage predictions. The other is HAZUS-MH. TAOS is a proprietary software product developed by Kinetic Analysis Corporation (see Sidebar 3.1). The TAOS hazards assessment information provided to counties by DEM is based on data obtained by Kinetic Analysis Corporation. Local governments must contract with Kinetic Analysis Corporation to employ TAOS to conduct vulnerability assessments of current conditions using local data,

or prospective assessments to support future land use planning. For more information see <http://www.floridadisaster.org/brm/lms.htm> or contact the FDCA Division of Emergency Management.

HAZUS-MH

HAZUS-MH is a public domain software product developed by the National Institute of Building Sciences (NIBS) for the Federal Emergency Management Agency (FEMA). The software can provide vulnerability assessment information for Florida communities using default data provided in the software, but for more accurate results, local data are required. Separate models are included for estimating earthquake, wind, and flood losses. For more information see <http://www.fema.gov/hazus/index.shtm>.

- The **HAZUS-MH Hurricane Wind Model** gives users in the Atlantic and Gulf Coast regions the ability to estimate potential damage and loss to residential, commercial, and industrial buildings. It also allows users to estimate direct economic loss, post-storm shelter needs, and building debris.
- The **HAZUS-MH Flood Model** is capable of assessing riverine and coastal flooding. It estimates potential damage to all classes of buildings, essential facilities, transportation and utility lifelines, vehicles, and agricultural crops. The model addresses building debris generation and

Sidebar 3.4

Abbreviated Transportation Models – Evacuation Clearance Times

Abbreviated Transportation Models (ATMs) have been developed for each of the counties in the state except those covered by the southwest Florida regional hurricane evacuation study (HES). In the latter case, a spreadsheet model developed by the Southwest Florida Regional Planning Council can be used for the same purpose.

The primary intent of the ATMs is to provide land use planners, emergency managers, and other involved personnel with the capability to assess the impacts of development on clearance times and shelter demand in areas exposed to hurricanes. An ATM is a spreadsheet that simplifies the many calcu-

lations performed in the full HES transportation analysis and prepares an accurate, but easy to understand result. The program requires that the user know the traffic evacuation zones in which the development is located used in the HES, as well as the number and type (permanent residential, mobile home, or tourist) of residential units to be constructed. The ATM generates predicted evacuation clearance times for designated points along evacuation routes and estimates of the numbers of people from each traffic evacuation zone likely to use public emergency shelters.

shelter requirements. Direct losses are estimated based on physical damage to structures, contents, and building interiors.

Risk analysis

The purpose of risk analysis is to quantify the aggregate probable injuries or damages a community may sustain from a given type of natural hazard for all possible hazard events that might affect a community. The end result

is typically an annualized estimate of damage, often in dollars, that would be expected on average for any given year.

Risk analysis can be a technically demanding process. It also requires data on the probabilities for each possible hazard scenario. For example, to perform a risk analysis of hurricane flooding, one needs information on all possible hurricane tracks and associated probabilities of hurricanes of different magnitudes striking the community along each track. Hurricane storm

track paths and probabilities are available from the National Hurricane Center's HURDAT database. For an example of a risk analysis application, see the Florida Planning and Development Lab's study of Lee County, Florida (see Sidebar 2.6).

The TAOS hazards assessment information provided to Florida counties by DEM in 2004 includes estimates of aggregate annualized dollar losses from wind, flooding, sinkholes, earthquakes, and wildfire with and without wind and flood mitigation. Separate estimates are provided for each land use code included in the State Department of Revenue's property appraiser database. These data can be used to assess a county's level of risk from different hazards and to assess the relative merits of wind (5 mph) and flood (1 foot) mitigation countywide.

Hurricane evacuation and shelter demand analysis

As noted above, it is recommended that communities assess the impact of alternative future land use scenarios on evacuation clearance times and shelter demand. The 2003 Shelter Retrofit Report available online at http://www.floridadisaster.org/internet_library.htm includes information on shelter capacities. Real time information on shelter locations, evacuation routes and shelter capacity is available online at http://www.floridadisaster.org/citizen_emergency_info.htm.

Maps of hurricane evacuation routes are also available online at http://www.floridadisaster.org/bpr/Response/Plans/Nathaz/Brochure/regional_evac.htm.

Hurricane evacuation clearance times and shelter demand estimates have been developed periodically as part of regional hurricane evacuation studies prepared by or for the regional planning councils in Florida. Local governments that have wanted to assess the effects of specific future land use scenarios have generally had to contract separately for such studies. The DEM has recently contracted with the consulting firm PBS&J to produce abbreviated transportation models (ATMs) for most regions of the state that can be used by local planners and emergency managers to easily assess the effects of possible changes in at-risk populations that would be subject to evacuation (see Sidebar 3.4).

Integrate, collaborate, coordinate

This section advocates integrating hazard assessment information from the *CEMP* and *LMS* into the *Comprehensive Plan*, coordinating the procurement and analysis of hazard assessment data, and collaborating among local agencies that have the capability and the need to perform and utilize hazard assessment. Realization of the full potential of the *Comprehensive Plan* for reducing community vulnerability to natural hazards requires further integration, coordination, and collaboration, however, to assure that hazard mitigation policies are most

effectively applied to land use planning and capital facilities decision making. This is the focus of Section 4.0 of this guidebook.

4 Better Integrate Hazard Mitigation Policies Into the Comprehensive Plan and Its Implementation

The *Comprehensive Plan* is a powerful tool for creating a sustainable and disaster-resistant community. It provides the policy base for all local land development regulations and major capital expenditures, redevelopment programs, and other initiatives undertaken to further a community's goals and objectives for growth and development. The *Comprehensive Plan* is also the legal basis for all subsequent land use and growth decisions. For a community's hazard mitigation policies to be effective, they must be integrated into the comprehensive plan and its implementation.

The *future land use map (FLUM)* serves as the guide for future land use patterns in the community, and the policies of the *future land use element (FLUE)* provide the framework for determining appropriate land use intensities and densities and for initiating redevelopment programs that will help fulfill the community's vision of what it wants to become. Policies in the *capital improvements element* concerning the timing and location of public facilities and infrastructure also influence how, where, and when land is used for different purposes.

Florida communities have several opportunities for more effectively integrating hazard mitigation into their *Comprehensive Plans* and into the day-to-day land use and capital facilities decisions that are or should be guided by those plans. This section of the guidebook discusses the following best practices, targeted at increasing this integration:

- ✓ **Integrate – hazard mitigation policies.** There are opportunities to more effectively reduce community vulnerability by integrating relevant policies from a community's *LMS* and its *PDRP* into the *Comprehensive Plan* and vice versa.
- ✓ **Collaborate – planning and implementation.** Hazard mitigation can be more effectively integrated into the *Comprehensive Planning* process and into the implementation of *Comprehensive Plan* policies if people with appropriate knowledge and authority are involved in both the planning and decision making processes that generate and implement hazard mitigation policies.
- ✓ **Coordinate – plan reviews and updates.** While all four local plans have important roles to play in minimizing community vulnerability to natural hazards, assuring that their content is consistent requires an explicit strategy for coordinating reviews and updates of the individual plans.

Section 4.1: Integrate Policies

Hazard mitigation policies may be found in three different local plans: *LMSs*, *PDRPs*, and *Comprehensive Plans*. While a well-done *LMS* may provide a good cross-walk of these policies, effective implementation requires that they be integrated into appropriate sections of the *Comprehensive Plan* that guide day-to-day decision making and that have legal standing as the reference for all land development regulations and decisions and for annual capital expenditures that affect policies contained in the plan. This argument is reinforced by recently promulgated federal regulations under the federal Disaster Mitigation Act of 2000 (DMA 2000) that require local governments to define the process through which they will incorporate the requirements of their mitigation plans into other planning mechanisms such as their *Comprehensive Plans* and *capital improvement elements (CIE)* (44 *CFR* §201.6(c)(4)(ii)).

Four initiatives are recommended for effectively integrating hazard mitigation and redevelopment policies into the *Comprehensive Plan* and for assuring that a community's hazard mitigation policies and programs are comprehensive and consistent across the *Comprehensive Plan*, *LMS*, and *PDRP*.

- **Provide a crosswalk and evaluation in the *LMS*** for the hazard mitigation policies in the *Comprehensive Plan* and *PDRP*.

One of the important tasks that should be conducted in preparing, or updating

an *LMS* is to identify and evaluate all of the community's policies and programs that have been developed to mitigate vulnerability to natural hazards, or that may influence, for better or worse, community vulnerability (Florida Department of Community Affairs, 1998). Such an exercise is essential to assuring that the community's policies and programs are both consistent and comprehensive.

Many communities have included policy "crosswalks" in the *Guiding Principles* sections of their *LMSs*. To be truly useful, these must be sufficiently detailed to allow identification of individual policies in their respective source documents, as well as offer an assessment of the impacts of each policy. Appendix B provides an excerpt from an exemplary mitigation policy crosswalk from the Manatee County *LMS* that lists individual policies, regulations, and objectives from the county *CEMP* and the *Comprehensive Plans*, land development codes and other ordinances, and building codes of Manatee County and its municipalities.

- **Incorporate all relevant hazard mitigation and post-disaster redevelopment policies** from the *LMS* into the *Comprehensive Plan* and *PDRP*.

As noted previously, hazard mitigation policies are more likely to be effectively implemented if they are incorporated in a community's *Comprehensive Plan*,

which has the force of law and is used on a day-to-day basis in local decision making. Therefore, if a community defines new hazard mitigation goals, objectives, or policies in its *LMS*, these should be added to the appropriate elements of the *Comprehensive Plan*, for example the *future land use, conservation, transportation, public facilities and services*, and *capital improvements elements*. Examples of relevant policies and the *Comprehensive Plan* elements in which they may be most appropriately incorporated, are presented in Section 6.0.

Where a community designs its *PDRP* as a guide to both the procedures and policy decisions that must be made during disaster recovery, it is similarly important that policies meant to guide those decisions are incorporated into the *PDRP* from the *LMS*.

Assuring that these policies are up-to-date and consistent across the three plans may be challenging. See the discussion in Section 4.3 below of strategies for coordinating plan reviews and updates.

- **Incorporate all relevant redevelopment policies** from the *Comprehensive Plan* into the *PDRP* and vice versa.

Again, for the *PDRP* to be a useful guide to the high-pressure decision making that occurs during disaster recovery, it is important that it include all relevant policies in the community's *Comprehen-*

sive Plan. Disasters may create opportunities for redevelopment that furthers both hazard mitigation goals and objectives and other community redevelopment objectives. Policies in the *Comprehensive Plan* governing both types of redevelopment initiatives ought to be included in a community's *PDRP*.

It is equally important, however, because of the unique legal stature of the *Comprehensive Plan*, that post-disaster redevelopment policies concerning land use and public facilities be incorporated by policy in the community's *Comprehensive Plan* rather than simply being listed in its *PDRP*.

- **Incorporate appropriate hazard mitigation projects** from the *LMS* into the *capital improvements element* of the *Comprehensive Plan*.

As discussed in Section 2.0, the *CIE* of a community's *Comprehensive Plan* assesses the costs, general fiscal implications, and priorities for remedying existing deficiencies and meeting future needs for public facilities identified in other elements of the plan. It also includes a five-year schedule of capital improvement projects that serves as the foundation for the community's annual capital budget.

A narrow interpretation of the relevant state regulations (§9J-5.016 *F.A.C.*) may suggest that it is not necessary to include the capital projects from a community's

LMS in its *CIE*. However, a community that wishes to be deliberate about its hazard mitigation initiatives and that follows the rationale presented in this section for formally addressing hazard mitigation in its *Comprehensive Plan*, should give serious consideration to doing so. In fact, the *CIE* requires that criteria be used to evaluate capital improvements projects, including prioritization of projects that eliminate public hazards (§9J-5.016 (3)(c)1. *F.A.C.*).

Some communities have chosen to do so. Indian River County, for example, reviews its *LMS* projects list each year as part of its annual review of the five-year schedule of projects in its *CIE*.

Section 4.2: Collaborate – Planning and Implementation

Florida’s communities are fortunate to have as many as four plans that can contribute to reducing potential losses from disasters. At the same time, this creates the need for careful coordination and collaboration to facilitate sharing and updating of key hazards information, maximize consistency and integration of plan content, minimize inefficiencies, and avoid working at cross purposes.

As described in Section 2.5, each plan has a designated planning body that is responsible for its periodic review and update. Each has its own planning process and time schedule as

well. Coordinating the timing of these separate planning processes is addressed in the next section. Here the focus is on assuring that key community organizations are involved in the development and implementation of each of the plans. If the planning process can be structured to include meaningful input from people who are responsible for producing relevant portions of each of the plans, then the content of the plans will be better integrated.

Collaboration with neighboring jurisdictions may also be important where the success of hazard mitigation and redevelopment initiatives depends in part on the actions of other cities and counties.

Facilitate collaboration among local officials within the county

Effectively integrating the relevant content of the county *CEMP* and the community’s *LMS*, *Comprehensive Plan*, and *PDRP* requires the involvement and collaboration of local government officials who understand the policies and their context in local government decision making. Identifying and engaging all the important parties will help inform the process at all stages and make sure that policies and program initiatives are as “do-able” as possible.

Effectively implementing the policies and programs in these plans require that knowledgeable local government officials who have the authority to execute the policies and

programs are involved in decisions where these policies and programs are considered.

With the exception of county *LMS* development, there is little formal guidance directed to local governments that explicitly encourages collaboration with local government organizations or targeting of specific interest groups during the preparation, review, and update of the four local plans that concern natural hazards (see also Section 2.5). The following sections summarize what direction is given and describe the principal participants in each of the four planning processes.

- ***CEMP***. There are no specific state planning process requirements for *CEMPs*, but counties share document the approach used to establish the local planning process and promote local participation (§I.C., *CEMP*-001). Some counties involve only a core group of county public agency staff that form the nucleus of the Emergency Operations Center staff in the event of a disaster. Others involve a much broader array of public agencies, including those that are involved in the decisions that guide the growth and development of their communities.
- ***PDRP***. There are no state directives concerning the process for developing a *PDRP*, and, as a result, there is relatively little documentation for how the plans have been prepared. Ideally the plan should be developed by local officials from

both the emergency management and planning realms so that the full spectrum of applicable operational procedures and policies as well as redevelopment policies governing land use and capital facilities are adequately captured in the plan.

Some communities establish Disaster Recovery Task Forces by local ordinance. These task forces are charged both with preparing and updating the *PDRP* and with implementing it during disaster recovery periods. Sidebar 4.1 describes Escambia County’s Recovery Task Force. It includes a number of local officials who have roles unique to the demands of the disaster recovery process for whom there are no comparable roles in hazard mitigation or comprehensive planning:

- **county administrator,**
 - **county attorney,**
 - **medical director, and**
 - **budget and finance chief.**
- **LMS.** While there are state and federal guidelines and rules that require local governments to **solicit** participation by different local agencies and other government organizations and potentially interested groups in preparing the *LMS* (see Sidebar 4.2), Florida communities have had mixed success in actually involving all the organizations and individuals who ideally should participate.

Sidebar 4.1

Escambia County Recovery Task Force

Escambia County’s Recovery Task Force is appointed by the Board of County Commissioners. The Task Force is responsible both for preparing and implementing the county’s *Post-Disaster Redevelopment Plan*. The Task Force’s role is to “provide opportunities for cooperation between local governments during pre-disaster planning and post-disaster mitigation analysis and redevelopment.”

Composition of the Task Force

The Recovery Task Force is composed of individuals (or their designees) who reflect a broad-base of community interests. According to the *PDRP*, the Task Force shall consist of, but is not limited to, the following individuals.

Ex officios:	
1. County Administrator	1. Representatives of the business community (appointed by the Chamber of Commerce)
2. County Special Projects Director	2. City of Pensacola Liaison
3. County Attorney	3. City of Gulf Breeze Liaison
4. County Emergency Preparedness Director	4. Santa Rosa County Liaison
5. County Solid Waste Director	5. County Sheriff Liaison
6. County Neighborhood Services Director	6. County School District Liaison
7. County Public Works Director	7. Northwest Florida Regional Planning Commission Liaison
8. County Medical Director	8. Santa Rosa Island Authority Liaison
9. County Utilities Authority Director	9. Other representatives appointed by the Board of County Commissioners or the Recovery Task Force (i.e., Home Builders Association, League of Women Voters, etc.)
10. County Neighborhood Improvement Chief	
11. County Budget and Finance Chief	
12. County Building Safety Chief	
13. County Growth Management Director	
14. County Planning and Zoning Chief	
15. Santa Rosa Island Authority General Manager	

Source: Schwab et al., 1998.

Some *LMS* documents have been prepared with active participation by both county planners and emergency management officials. Others have been prepared with little or no participation by one or the other local agency. As a general rule, *LMS* working groups include representatives from each of the municipalities within the county. Typically, however, that representation has consisted of a single individual associated with emergency management, public safety, or planning.

- **Comprehensive Plan.** State law requires the governing body of each local government to designate a “local planning agency” that is assigned the authority and responsibility for preparing the community’s *Comprehensive Plan* (§163.3174 *F.S.*). The statute is silent about the composition of the local planning agency other than requiring that a representative of the local school district be included, at least as a non-voting member. If a military installation is located within the community, then a representative of this installation must be included on the CPIA as a non-voting, ex-officio member. Guidance provided by the FDCA suggests specific interest groups that should be involved (see Section 2.5).

Table 4.1 illustrates of some of the collaborative roles of local agency actors that may be important to successfully integrating hazard

Sidebar 4.2

LMS Working Group Participant Directives

Florida’s *LMS* guidelines recommend creation of a formal *LMS working group* that is commissioned by the local Board of Commissioners (Florida Department of Community Affairs, 1998).

State regulations governing eligibility for state-administered federal Hazard Mitigation Grant Program funds require counties to establish such working groups (§9G-22.004 *F.A.C.*) and to annually solicit participation from various agencies of county government, which may include, but need not be limited to, planning and zoning, roads, public works, and emergency management; municipalities within the county; interested private, civic, and non-profit organizations; trade and commercial organizations, property owners associations, water management districts, regional planning councils, independent special districts, and Native American tribes.

FEMA’s Interim Final Rule under DMA 2000 (44 *CFR* §291.6) requires that opportunities to be involved in the hazard mitigation planning process be provided to local and regional agencies involved in hazard mitigation activities, agencies that regulate development, neighboring communities, and interested businesses, academic institutions, and private and non-profit organizations.

mitigation and redevelopment planning and implementation. The most critical collaboration needed is the involvement of hazards data and analysis experts, emergency management officials, and planners in nearly all roles.

Facilitate collaboration with neighboring jurisdictions

Some local land development and public facilities policies and initiatives may have spillover effects that extend beyond the boundaries of the jurisdiction that implements them. Policies and projects that affect natural hazard vulnerability, both positively and negatively, may have such spillovers. It is important, therefore, to also establish planning and implementation procedures that will ensure appropriate collaboration with other jurisdictions that may be affected by, or that may affect, a community’s land development and public facilities policies. However, this can be even more politically and logistically difficult than facilitating collaboration within a county.

The coordination and conflict resolution mechanisms included in the *intergovernmental coordination element (ICE)* of a community’s *Comprehensive Plan* (see Sidebar 4.3) should address such spillovers. It is important to identify the appropriate local agencies and organizations in other jurisdictions with whom to collaborate, but these will generally be the counterparts of those in the planning jurisdiction.

Table 4.1: Possible collaborative roles of local agency officials in hazard mitigation and redevelopment planning and implementation.

Hazard Mitigation & Redevelopment Planning and Implementation Roles	Local Officials												
	Hazards data & analysis expert	EM recovery operations expert	EM mitigation operations expert	EM evacuation & shelter expert	Planning & zoning official	Growth mgmt planner	Community development planner	Building code official	Natural resource managers	Public works officials	County/city manager	County/city attorney	Budget and finance chief
Prepare, review, & update LMS hazards identification & vulnerability assessment	✓			✓					✓				
Prepare, review, & update CEMP hazards analysis	✓			✓					✓				
Assess natural hazard constraints in FLUE land suitability analysis	✓				✓	✓			✓	✓			
Analyze proposed dev't & redev't in hazard areas for FLUE review & update and any proposed FLUM amendments	✓			✓	✓	✓	✓		✓				
Re-evaluate community exposure & vulnerability after disasters	✓			✓	✓			✓		✓			
Review & update hazard mitigation policies in LMS, PDRP, & Comprehensive Plan	✓		✓	✓	✓	✓	✓	✓	✓				
Review & update hazard mitigation structural projects in LMS & CIE	✓		✓	✓	✓				✓	✓			
Review & update hazard redevelopment policies in LMS, PDRP, & Comprehensive Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Review & update PDRP operations policies and procedures		✓			✓		✓	✓		✓	✓	✓	✓
Participate as member of Recovery Task Force	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓

Sidebar 4.3

The Intergovernmental Coordination Element of the Comprehensive Plan

All local governments are required under the state’s comprehensive plan regulations (§9J-5.015 **F.A.C.**) to include an **intergovernmental coordination element (ICE)** in their **Comprehensive Plans** in which they identify other units of government with which they interact and describe and assess existing coordinating mechanisms. The **CIE** includes objectives and policies for coordinating the community’s comprehensive plan with the plans of other units of government and for addressing the impacts of proposed development on development in neighboring jurisdictions.

Examples of local government actions for which intergovernmental collaboration is likely to be important include the following:

- development and redevelopment policies and development proposal approvals that affect areas served by common evacuation routes;
- development and redevelopment proposal approvals and structural storm water and flood mitigation projects that may affect flood conditions in neighboring jurisdictions; and
- beach and dune renourishment and shoreline protection projects (e.g., seawalls, revetments, groins, or jetties) that may affect coastal sediment erosion or accretion rates in neighboring jurisdictions.

Identifying which organizations should collaborate is the first step. Effectively structuring the collaborative process and successfully engaging the desired participants in planning and implementation are separate challenges.

Strategies for structuring collaboration

Desired collaboration can be facilitated by designating representatives from appropriate agencies, see Table 4.1, as members of the different planning bodies. Overlapping memberships of key agency staff facilitate sharing of knowledge and expertise and can build relationships that are important to success-

ful implementation of hazard mitigation and redevelopment policies and programs.

Another approach is to designate review committees that have the same or overlapping memberships that are advisory to the official planning bodies. As detailed in Sidebar 4.4, Okaloosa County has structured organizational collaboration of the planning processes for their *Comprehensive Plan* and *LMS* by designating a single committee that plays a major intergovernmental coordination role in both processes. While the membership is not as broad as suggested in Table 4.1, designating a single

committee assures consistency and continuity across the two planning processes.

Strategies for engaging collaboration participants

Common constraints to effective collaboration during planning and implementation are summarized in Sidebar 4.5. The principal strategies for facilitating inter-organizational collaboration include (1) mandating collaboration and (2) educating organization actors to appreciate the benefits of voluntary collaboration. Each of these strategies is discussed further in the following sections.

Sidebar 4.4

Creating Integrated Planning Teams: Okaloosa County's Comprehensive Plan Committee

When Okaloosa County began initial work on its *LMS*, the Board of County Commissioners designated the existing Comprehensive Plan Committee as the steering committee responsible for developing the *LMS*. The Comprehensive Plan Committee was initially established pursuant to the county's *Comprehensive Plan* to coordinate comprehensive plans for the local governments

in the county, plans of the school board and the Air Force, and to provide information regarding proposed development. It also functions as the initial mediator of conflicts that may arise between plans. The committee consists of staff from the county, the nine municipalities, Eglin Air Force Base, Hurlburt Field, and the Okaloosa County School Board.

Sidebar 4.5

Institutional factors that may play a role in constraining the integration of local hazard mitigation plans

Lack of awareness. Staff in one agency may simply be unaware of the activities of other agencies and individuals in the same community and the relevance of those activities to their hazard mitigation initiatives.

Cost avoidance. People or agencies may be aware of the potential for collaboration but be unwilling to assume additional work or responsibility.

Lack of resources. People and agencies may be aware of the benefits of collaboration but cannot see how to do it because of real or perceived issues of not enough staff, funds, or resources.

Turf. Some people or agencies may be unwilling to share their resources, power and influence with other agencies.

- **Mandate collaboration and hold participants accountable.**

As noted above, state and federal directives concerning who should participate in the *CEMP*, *CMS* and *PDRP* programs is limited to requirements for documenting the procedures used to invite or encourage potentially interested organizations to participate. Thus, the direction for collaboration must come from within the local government itself, either from the county/city manager or the board of commissioners (BOC).

One approach, therefore, is for the county/city manager or BOC to formally create the planning body or advisory committee by ordinance and to stipulate which local agencies are to be members.

Formalizing the organizational structure for the planning process is a critical step to facilitating collaboration. It also may be necessary, however, to hold the designated participants accountable for fulfilling their assigned participation responsibilities. This would require oversight by the county/city manager or BOC.

- **Educate locals to appreciate the benefits of voluntary collaboration.**

One obstacle to fostering collaboration among different organizations that play a role in hazard mitigation is a lack of awareness of the roles played by other individuals and organizations. A team building exercise structured around a

mitigation and planning premise can help members of different organizations to better appreciate the nature of the decisions they will face and the value of collaborating with other organizations that can bring expertise and resources to bear on those decisions. The STORM gaming simulation administered by the FDCA is an example (see Sidebar 4.6).

Section 4.3: Coordinate – Plan Reviews and Updates

Conditions in communities change over time and experience brings new insight. As a result, community perceptions change about what is important, what they want their communities to be like, and how they should achieve their visions. For plans to be useful, it is important to keep them up-to-date through an institutionalized process of review and revision built on the following tasks:

- monitor progress on current policies and program initiatives;
- re-evaluate the social, economic, and physical conditions of the community using up-to-date data and analytic methods;
- re-assess operational procedures and policies (in *CEMPs* and *PDRPs*) based on experience; and
- re-assess the community's goals, objectives, and policies.

Sidebar 4.6

STORM – A Recovery and Mitigation Gaming Simulation Exercise

The STORM gaming simulation, developed by the Florida Planning and Development Lab at Florida State University, presents players who constitute the recovery task force team for a hypothetical coastal county with the major operational and policy decisions likely to be faced during recovery from a major (Category 3) hurricane: debris collection and disposal, infrastructure repair and reconstruction, permitting of private-sector repair and reconstruction, and securing of federal Hazard Mitigation Grant Fund monies for post-disaster mitigation initiatives.

The game is designed to demonstrate both the value of mitigation in reducing future community vulnerability and the value of hazard mitigation and post-disaster redevelopment policies in a community's **Comprehensive Plan** in guiding recovery decision making.

DEM's, Bureau of Recovery and Mitigation offers the eight-hour STORM simulation annually at Florida's Governor's Hurricane Conference. The bureau also will run the game on request for local governments and other groups involved in public disaster recovery and mitigation.

Three of the four local plans that concern natural hazards have formal review and updating processes that are stipulated by state and/or federal rules.

- **CEMP.** Counties are required to revise their **CEMPs** every four years, with the state divided into four groups of counties whose plans are scheduled for revision and state review and approval on a rotating basis (§9G-6.006, *F.A.C.*).
- **LMS.** To qualify for federal disaster mitigation funding under the Disaster Mitigation Act of 2000 (DMA 2000), local hazard mitigation plans must be revised at least every five years. State regulations, however, stipulate two shorter review cycles (see Sidebar 4.7).
- **Comprehensive Plan.** Florida law requires every community to complete an **Evaluation and Appraisal Report (EAR)** every seven years (see Sidebar 4.8). In addition, communities may adopt major amendments to their plans twice each year.

There are no stipulations governing revision of **PDRPs**, but it is strongly recommended that they be amended following disasters if disaster recovery and redevelopment experience suggests changes are needed. **PDRPs** also should be amended whenever policies governing post-disaster redevelopment are changed in the community's **Comprehensive Plan** or **LMS**. Effectively integrating the relevant content of these plans, as well as that of a **PDRP**, requires

Sidebar 4.7

LMS Review Schedules

Under the **LMS** should be revised at least every five years (44 **CFR** §201.6(c)(4)). FDCA contracts with municipalities for updating their **LMSs** to comply with the DMA 2000 regulations also stipulate a five-year review cycle.

The state's criteria for **CEMPs**, however, require that **LMSs** be revised coincident with the **CEMP** (every four years) where communities elect to meet the **Mitigation Annex** requirements of the **CEMP** by incorporating their **LMS** by reference (§III., **CEMP-001**). The state's regulations governing eligibility of local governments for federal Hazard Mitigation Grant Funds administered by the state, require annual updates of the **LMS** (§9G-22.004(4)(e) *F.A.C.*).

Sidebar 4.8

Evaluation and Appraisal Report

The **Evaluation and Appraisal Report (EAR)** process, specified by state law (§163.3191, **F.S.**), requires all communities in Florida to assess their progress in implementing their **Comprehensive Plans** once every seven years. Based on the evaluation, the **EAR** provides recommendations for revising the plan to better address community goals and objectives, changing conditions and trends, and changes in state requirements regarding local growth management. Proposed **EAR**-based amendments to a community's **Comprehensive Plan** are submitted to FDCA for review and approval. Communities have up to eighteen months to formally adopt the **EAR**-based amendments after approval by FDCA. FDCA provides workshops and technical assistance for preliminary work to undertake the **EAR**, in addition to arranging for staff to meet with local governments.

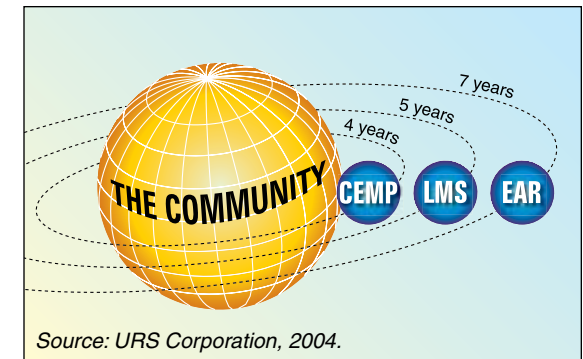
For more information, see <http://www.doc.state.fl.us/fdcp/DCP/ear/indexear.htm>.

coordination of the timing and procedures employed for reviewing and amending the plans.

The information can flow from one plan to another depending on which is the next to be updated. As shown in Figure 4.1, if a community follows the four-year **CEMP** cycle, the five-year **LMS** cycle, and the seven-year **Comprehensive Plan** cycle, the plan revisions will “align” only once in 140 years! The worst case is where a community's **EAR** cycle starts when the **LMS** is four years old. Even if the **LMS** revisions are done annually or every four years to coincide with the **CEMP**, the time between alignments can still be as much as 28 years! It is essential, therefore, that a method for coordinated revision be developed that can be applied whenever one of the four plans is scheduled for review and revision.

The **hazard identification and vulnerability assessment (HIVA)** component of the **LMS** can be viewed as the linchpin for coordinating the revision of a community's four hazards plans. A community's hazard mitigation and post-disaster redevelopment policies should be re-evaluated whenever significant new information is available concerning a community's hazard exposure, vulnerability, and risks. Disaster experience may dictate a need to re-assess disaster recovery and redevelopment operational procedures and policies and hazard mitigation and post-disaster redevelopment policies. Changes in the forces that drive growth and development in a community also may dictate a need

Figure 4.1: Florida plans and their revision cycles.



Source: URS Corporation, 2004.

to reassess hazard mitigation and redevelopment objectives and policies.

The following procedures are suggested for keeping local plans abreast of these changes and for coordinating them with each other in a timely fashion.

- Review the **PDRP** coincident with the **EAR** cycle to assure that relevant amendments to the **Comprehensive Plan** are incorporated in the **PDRP**.
- Amend the **PDRP** if major amendments are made to post-disaster redevelopment policies in the **Comprehensive Plan** during one of the semi-annual major amendment cycles.
- Adopt amendments to the operational procedures or policies of the **PDRP** whenever disaster experience suggests the need for revisions and make parallel revisions to

the *Recovery Annex* of the *CEMP* during the next *CEMP* revision cycle.

- Adopt amendments to the post-disaster redevelopment policies in the *PDRP* and *Comprehensive Plan* as part of the *Comprehensive Plan* semi-annual major amendment cycle when disaster experience suggests the need for change.
- Review and revise the list of prioritized structural mitigation projects in the *LMS* coincident with the annual update of the capital projects schedule in the *capital improvements element* of the *Comprehensive Plan*.
- If the *HIVA* and the full *LMS* are revised annually pursuant to state regulations governing eligibility for state-administered federal HMGP funds, make appropriate revisions to the *CEMP*, *Comprehensive Plan*, and *PDRP* during the regular review and amendment cycles for those plans, and reflect those revisions in the *LMS*.
- If the full *LMS* is only revised every four years, coincident with the *CEMP* review cycle, or if it is revised every five years in compliance with the maximum revision cycle under DMA 2000, review an out-of-cycle review for portions of the *Comprehensive Plan* if the revised *HIVA* of the *LMS* reveals significant changes in community exposure or vulnerability.

- If community exposure to natural hazards forces is significantly different than previously assumed, revise the suitability analysis of existing vacant or undeveloped land in the *future land use element (FLUE)*. This may then indicate a need to amend the *future land use map (FLUM)*.
- If the community's vulnerability to natural hazards is different than previously assumed, change to the *FLUM* or to hazard mitigation and post-disaster redevelopment objectives and policies in the *FLUE* or other elements of the *Comprehensive Plan*.

Such amendments can be initiated as part of the semi-annual major amendment cycle.

What are the best tools?

With the best hazards assessment data and analyses incorporated into the comprehensive planning process and strategies in place for integrating, collaborating, and coordinating hazard mitigation and post-disaster redevelopment policies and their implementation, the remaining task is to select an optimal array of land use planning strategies and development practices for implementing those policies. Section 5.0 describes the principal planning and development management tools that have been used and provides examples of their use for implementing each of the four strategies for reducing community vulnerability.

5 Use Best Land Use Planning and Development Management Practices for Reducing Community Vulnerability

An array of land use planning and development management tools are available to local governments for implementing hazard mitigation and post-disaster redevelopment policies in their *Comprehensive Plans*. For the most part, these are familiar tools of the planning and growth management profession. Specific applications to hazard mitigation and post-disaster redevelopment may be more novel, however.

Section 5.1 provides a brief overview of the tools that may be used, followed by descriptions in Sections 5.2 through 5.4 of specific applications for each of the four strategies for reducing community vulnerability to coastal storms and associated flooding:

- ✓ get out of the way: provide evacuation and sheltering services,
- ✓ make the environment less hazardous: maintain and enhance natural protective features,
- ✓ make structures more resistant to natural hazard forces, and
- ✓ manage the development and redevelopment of land exposed to natural hazards.

Section 5.1: Land Use Planning and Development Management Tools

Florida communities are using many of the tools described in this section to finance the provision of public facilities and services, protect environmentally sensitive features, and

influence and control development and redevelopment on private lands. These tools can be used to implement one or more of the four strategies for reducing community vulnerability to natural hazards. Table 5.1 provides a summary of the strategies for which each tool is useful. Applicability to pre-disaster and post-disaster settings is also noted.

Table 5.1: Land use planning and development management tools for hazard mitigation and post-disaster redevelopment.

Pre-Disaster	Post-Disaster	Planning and Management Tool	Provide Evacuation and Sheltering	Maintain and Enhance Natural Protective Features	Make Structures More Resistant to Natural Hazard Forces	Manage Development & Redevelopment in Hazardous Areas
✓	✓	Building codes		✓	✓	✓
✓	✓	Zoning regulations		✓		✓
✓	✓	Overlay districts		✓		✓
✓	✓	Setbacks and buffers		✓		✓
✓		Subdivision regulations		✓		✓
✓		Planned unit development regulations		✓		✓
✓		Site design regulations and performance standards		✓		✓
✓		Cluster development		✓		✓
✓		Incentive zoning		✓	✓	✓
✓	✓	Fee-simple property acquisition		✓		✓
✓	✓	Purchase-and-sellback or leaseback		✓		✓
✓	✓	Purchase of development rights and easements		✓		✓
✓		Transfer of development rights		✓		✓
✓	✓	Capital expenditure policies and programs		✓	✓	✓
✓		Financing capital and operating costs	✓	✓		
✓	✓	Education and information	✓	✓	✓	✓

Building codes

Building codes define standards and requirements that govern the design and construction, maintenance and operation, occupancy, use, and appearance of buildings. Under the Florida Building Code Act, the Florida Building Code officially replaced all local codes on March 1, 2002. However, local governments are permitted to adopt more stringent provisions where local conditions warrant. Other regulations governing building construction include flood protection regulations pursuant to the National Florida Insurance Program and the state Coastal Construction Control Line permitting standards (CCCL).

Applications of particular interest to hazard mitigation are provisions governing a structure's resistance to wind-borne debris and standards for elevation and flood-proofing. See Section 5.4 for more details.

Zoning regulations

Zoning ordinances divide a jurisdiction into districts based on the *future land use map* of the community's *Comprehensive Plan*, with different regulations governing the types of land uses allowed and the intensity of the uses based on density, floor-area ratio, or lot size. Zoning regulations also may address the types of buildings permitted, their height and bulk, and their placement on a property parcel.

Zoning is most effective for guiding new development of vacant land. Where an existing land use is inconsistent with the existing zon-

ing regulations, or where inconsistencies are the result of re-zoning, land uses become non-conforming uses. Typically, non-conforming uses cannot be expanded and must be converted to

conforming uses if substantial repairs, reconstruction, or remodeling are undertaken, or if the use is discontinued.

The exercise of zoning regulation is subject to constitutional constraints, which require that some economically viable use of the land be

Sidebar 5.1

Constitutional Limitations on Land Use Regulation

The United States Constitution forbids the taking of private property for a public use without just compensation or without due process of law. A taking may include physical appropriation of land or regulation of land to the extent that all economically viable uses of the property are eliminated.

Regulation, however, seldom removes all economically viable use of land. Thus, in the majority of cases, the test is whether the regulation goes "too far." While no hard and fast rules exist for this "test," the U.S. Supreme Court has identified various factors to consider in determining if a questioned regulation has gone "too far." These include: the character of the government action, the economic impact of the regulation, and the extent to which the action interferes with the reasonable investment-backed expectations of the property owner.

Character of the government regulation refers to how the government is regulating. Courts appear more likely to find a taking if the regulation eliminates a substantial

property right such as the right to use, possess or dispose of the property.

The economic impact of the regulation relates to how much it diminishes the value of the land. Courts determine this by looking to the land's value before and after imposition of the challenged regulation. As noted, in the unusual case that all economically viable use of the land is destroyed, a taking is much more likely.

The consideration of reasonable investment-backed expectations involves an inquiry into whether the owner retains uses that were reasonably expected to be available for the property and for which the owner paid when purchasing the land. This factor usually makes it difficult, if not impossible, for a landowner to challenge regulations that affected the value of uses of the property before the landowner took possession.

There are exceptions. All economically viable use of land may be prohibited if that use would constitute a nuisance or is prohibited by underlying principles of property law.

Source: Adapted from University of Florida College of Law Conservation Clinic, "Implementation of the Model Land Development Code for Florida Springs Protection," 2004.

preserved. Thus, zoning cannot be used to impose a blanket prohibition on all development without compensating the property owner (see Sidebar 5.1). Down-zonings or other substantial restrictions, which limit or reduce the allowed land use intensities, also may be subject to legal challenge under Florida's Bert Harris Act (see Sidebar 5.2).

Hazard mitigation and post-disaster redevelopment applications of zoning primarily involve regulating or prohibiting certain uses within hazard zones to do one or more of the following:

- maintain or enhance natural protective features;
- reduce the demand for evacuation shelter space and evacuation clearance times;
- minimize the number of persons who may lose their homes and businesses;
- minimize the exposure of property and infrastructure to damage; or
- minimize evacuation and recovery costs.

Specific applications are discussed in Sections 5.3 and 5.5.

Overlay districts

Overlay districts are drawn on top of the land use districts of a community's future land use map and the corresponding zoning districts of its zoning map. Overlay districts are used to apply additional regulations to land uses beyond those that apply to the underlying districts. They may cover parts of several underly-

Sidebar 5.2

Bert J. Harris, Jr., Private Property Rights Protection Act

The 1995 Bert Harris Act (§ 70.001, Florida Statutes) reflects the judgment of the Florida Legislature that takings law under the U.S. and Florida constitutions did too little to protect private property and placed too much of the burden of regulation for the common good on private property owners. The act creates a separate and distinct cause of action from takings law.

The act requires compensation to landowners for regulations that "inordinately burden" property. The remedy may include compensation for the actual loss to the fair market value of the land resulting from the government regulation. It applies to any law, regulation, or rule noticed for adoption or adopted after May 11, 1995.

Published case law has not yet interpreted many of the key terms in the act. Thus, it remains difficult to predict what facts or economic impacts might lead to a government action losing in a claim under the act. While few claims have been adjudicated, many claims under the act have been filed and settled before trial. Thus, the act presents

possible costs in legal and settlement expenses for local governments even for those cases that never reach the courtroom.

Provisions that may give rise to such claims include open space requirements, prohibitions on development, and mandatory transfer of development rights programs that lack guaranteed development rights markets. Constitutional takings claims can usually be avoided in most of these areas by ensuring that landowners retain some development right on the property or the property as a whole retains some significant value. It is, however, much more difficult to predict whether claims under the Bert Harris Act will result in substantial costs to local governments.

The act specifically allows that settlement offers to aggrieved land owners may include, among others, such things as modifications to permits or development densities, land swaps, transfer of development rights, and variances or special exceptions.

Source: Adapted from University of Florida College of

Law Conservation Clinic, "Implementation of the Model Land Development Code for Florida Springs Protection," 2004.

ing land use and zoning districts or only a portion of one underlying district. In cases where there is a conflict between the requirements of the overlay district and those of an underlying land use or zoning district, the overlay requirements take precedence.

Principal applications include both pre- and post-disaster protection of natural protective features and restrictions on land use types and intensities within hazard areas. See Sections 5.3 and 5.5.

Setbacks and buffers

Setback requirements govern the placement of a structure on a lot relative to some reference such as the lot line, street, or some physical feature. Traditional applications are for assuring adequate public rights-of-way for streets and sidewalks and adequate separation between buildings for health and safety reasons. Hazard mitigation applications include avoidance of hazardous areas and creation of buffers around natural protective features such as wetlands, floodplains and coastal barrier resources, such as beaches and sand dunes. These are typically applied to new development, but they also may be imposed on non-conforming structures that are substantially damaged after a disaster where there is sufficient room on the lot for the structure to be rebuilt in a different location. See Sections 5.3 and 5.5.

Subdivision regulations

Subdivision regulations govern the division of land and the density, configuration, and layout of the resulting parcels. Subdivision regulations also define design and performance standards for required improvements such as streets, sidewalks, storm water drainage, sewage, lighting, etc. The associated plat review process provides opportunities to

- ensure conformance with applicable zoning and subdivision requirements, including site design regulations and performance standards;
- analyze impacts on community infrastructure and services such as schools, recreation facilities, roads, water supply, and sewage disposal; and
- negotiate remedies to undesirable impacts through such means as cluster development, dedications, and exactions.

Hazard mitigation applications include the use of dedications and exactions (see below) to mitigate impacts on evacuation clearance times and shelter demand, design and performance standards to manage storm water runoff, make infrastructure disaster resistant and plat configurations such as cluster development (see below) to avoid damage to natural protective features or development of hazardous areas (see Sections 5.3 and 5.5). These are predominantly pre-disaster applications except in the unusual event of re-subdivision (re-platting) of land after a disaster.

Planned unit development regulations

Planned unit development (PUD) provisions allow flexible allocation of land uses within a large development through review of a multi-use development as a single entity. PUDs also permit regulatory oversight comparable to that afforded through subdivision regulation and the use of such measures as cluster development (see below) to avoid damage to natural protective features or development in hazardous areas. One approach is to designate PUDs on the zoning map. An alternative is to treat PUDs as a form of floating or overlay zone and allow them in certain districts under certain conditions. As with subdivision regulations, applications are principally in pre-disaster settings. See Sections 5.3 and 5.5.

Site design regulations and performance standards

Site design regulations stipulate how subdivisions, PUDs, and individual lots are laid out and developed including design and placement of sidewalks, streets, and parking lots; lighting; landscaping; grading; utilities; sewers and septic systems; and stormwater management. Performance standards provide greater flexibility for some systems; for example, stipulating the maximum quantity of runoff that may leave a site but leaving it to the developer to choose the most cost-effective means of managing stormwater onsite.

Site design regulations and performance standards may be imposed based on land use

type through the zoning ordinance as well as within overlay districts. Application may occur as part of subdivision plat review as well as during site plan review for development of individual parcels. These are principally used in the realm of hazard mitigation to protect natural protective features (section 5.3) and to regulate landscaping and storm water management (section 5.5) in pre-disaster settings.

Cluster development

Cluster development regulations, which are generally contained in both the zoning and subdivision ordinances, provide the option of concentrating development within a portion of a subdivision or PUD, thus leaving a portion of the land undeveloped. Cluster development may be used to provide amenities such as passive open space or active recreation areas, to protect sensitive environmental features, including natural features such as wetlands and dunes that provide protection against natural hazards, or to avoid hazardous areas. Typically the developer is permitted to retain the overall density allowed on the site and concentrate it on less sensitive portions of the site. Incentive zoning (see next section) may offer a developer additional density in return for clustering development. Hazard mitigation applications, which are described in Sections 5.3 and 5.5, principally apply to new development in pre-disaster settings.

Incentive zoning

Incentive (i.e., performance) zoning is a tool that allows developers to exceed certain zoning restrictions, such as those governing density, floor-area ratios, or height, in return for providing amenities or making additional concessions. Such incentives may be offered for maintaining or enhancing the natural protective features of a site, for encouraging cluster development to avoid hazardous areas (see above), or for providing additional safety features such as safe rooms. Incentive zoning may be applicable to redevelopment projects as well as new development, but it is principally applied in pre-disaster settings. Specific applications are described in Sections 5.3, 5.4, and 5.5.

Fee-simple property acquisition

Fee-simple acquisition involves purchase of the full title to land. It is typically used where public use of the land is intended for providing amenities such as open space or recreation or for constructing public facilities or infrastructure. However, it also may be used to preclude development or to eliminate existing development, often in concert with other tools such as zoning or leasing (see below).

Fee-simple acquisition affords the greatest degree of control over how land is used and avoids the potential for takings law suits or litigation under Florida's Bert Harris Act (see Sidebars 5.1 and 5.2). However, acquiring title in fee simple can be expensive. Fee-simple land acquisition has high capital costs, incurs

on-going costs for maintenance, and removes land from the tax rolls. Acquisition also may be politically unpopular, especially where governments choose to exercise the power of eminent domain to condemn land for public use where the owner is not willing to sell voluntarily.

Hazard mitigation and post-disaster redevelopment applications include purchase of vacant land to preclude development in hazardous areas or to maintain or enhance natural protective features, and purchase of developed land to remove threatened or damaged structures and to preclude future re-development. See Sections 5.3 and 5.5 for further discussion of applications.

Purchase-and-sellback or leaseback

Two alternatives that partially mitigate the costs of fee-simple acquisition involve local government purchase of land and then reselling it on the market or leasing it for use by private individuals. These approaches can allow for complete control of how the land is used, without raising takings issues or legal claims under Florida's Bert Harris Act (see Sidebars 5.1 and 5.2). They also allow the government to recoup some of the costs of acquisition, greatly reduce maintenance costs, and mitigate the loss of property tax revenues.

Under the purchase-and-sellback option, the area is rezoned for the desired land use and then sold for development. Under the purchase-and-leaseback option, the area is rezoned, and may also be re-subdivided, by the

local government and individual lots are leased for development.

Both options entail substantial capital and transaction costs for the initial purchase of the property and subsequent sales or leases. Under the purchase-and-sellback option, the capital costs are recouped through subsequent sale. Under the purchase-and-leaseback option, initial capital costs are recovered over a longer period of time as annual lease payments are made. The property taxes foregone by fee-simple acquisition and retention are recovered fully under the purchase-and-sellback option. Under the purchase-and-leaseback option, only improvements on the property would likely be subject to ad valorem taxes. The purchase-and-leaseback option has the advantage of allowing the local government to subsequently alter the allowable uses further when the leases are renewed, without legal liability.

Use of the purchase-and-leaseback option for protecting natural protective features is discussed briefly in Section 5.3. Purchase-and-sellback and purchase-and-leaseback have potential pre-disaster and post-disaster applications for reducing allowable densities in hazardous coastal areas as discussed in Section 5.5. For more information see Santa Barbara County Department of Planning and Development (2002) and Gibbons (1999).

Purchase of development rights and other easements

Purchase of an easement involves acquisition of some, but not all, of the bundle of rights that attend ownership of land. The owner retains title to the land but sells some of the rights to the purchaser. Permanent easements become part of the title and “run with the land,” that is they are binding on future owners as well. Temporary easements are for a fixed period of time and usually only apply to the current owner.

Easements may be “affirmative” or “negative.” Affirmative easements purchased by government often grant the public some limited use of the land, such as the right to cross the land to gain access to the beach, or the right to fish along the shores of a water body. Negative easements constrain the owner’s use of the property, for example an easement that requires the landowner to preserve a sensitive environmental feature or aesthetic quality.

Purchase of development rights (PDR) involves purchase of a negative easement that precludes some or all development of the parcel. Often PDR is used for agricultural or timber land under terms that allow continued use of the property and continued occupancy of existing residential structures but which preclude future subdivision and development. As with other easements, PDR may be temporary or permanent. The capital costs of PDR may be 50 percent or more as much as those for outright fee-simple acquisition, although

the maintenance costs may be lower, and not all property tax revenues are foregone.

Pre-disaster hazard mitigation and post-disaster redevelopment applications include use of negative easements and PDR to maintain natural protective features and to restrict development or redevelopment of hazardous areas (see Sections 5.3 and 5.5).

Transfer of development rights

Transfer of development rights (TDR) involves the sale of development rights from one property parcel to the owner of another parcel, thereby allowing more intense development on the second parcel. Typically the government will define both “sending” areas and “receiving” areas.

TDR programs may be voluntary or mandatory. With a voluntary program, property owners within the sending area may choose to sell development rights to buyers in the receiving area. This is analogous to voluntarily selling a negative easement. Under a mandatory program, the sending area is down-zoned (if the TDR program is added to an existing zoning system), and the property owners are compensated for their loss of economic value by the ability to sell their development rights to property owners within one or more receiving areas.

In either case, the receiving area is rezoned to permit development at higher densities than allowed under the base zoning if the property owner purchases development rights from the

sending area. In some cases, development credit banks or exchanges have been created to buy and sell development credits, thereby assuring a buyer for all property owners located in the sending area (a so-called “active” TDR system).

There is not necessarily a one-for-one correspondence between sending units and receiving units. For example, under the TDR program in Montgomery County, Maryland, which was established to limit development of agricultural land, a would-be developer in the receiving area is allotted one residential unit credit for every 5 acres of farmland that are restricted from development.

Mandatory TDR programs can avoid the constitutional takings constraints of down-zoning (see Sidebar 5.1), and possible claims under Florida’s Bert Harris Act (see Sidebar 5.2), if the affected property owners in the sending area can be assured of an adequate price for their lost development rights through creation of a development credit bank or exchange. Transaction costs, however, can be substantial, especially when a development credit bank or exchange is established.

The principal potential hazard mitigation application of TDR is to restrict new development altogether or to reduce the allowed development density within hazardous areas. A more detailed discussion of such pre-disaster applications is presented in Section 5.5. Model zoning regulations for a TDR program are presented in Appendix C-4 (see Sidebar 5.3).

Capital expenditure policies and programs

Local government decisions about where and when to provide public facilities and infrastructure can substantially influence the location, timing, and intensity of development. Those facilities that have the greatest impact on development patterns are roads, water supply, and wastewater collection and treatment systems. Thus, public spending policies and the decisions embodied in the annual capital

budget and the five-year capital improvements plan in the *capital improvements element* of a community’s *Comprehensive Plan* can be used to direct new development away from hazardous areas.

There are constraints, however, to the effective use of capital expenditure policies. In many instances, local governments do not have direct or exclusive control over the provision of roads, water, and sewer services. Decisions about state and federal highway projects are not subject to direct local control, and water and sewer services may be provided by independent utilities or quasi-independent enterprise operations.

In Florida, concurrency rules require local governments to ensure that public facilities and services “are available when needed for... development” (§163.3202(2)(g), *Florida Statutes*). Thus, capital expenditure policies will be most effective where they are coupled with other growth management tools such as subdivision and zoning ordinances that directly control the density and intensity of allowable land uses.

The *capital improvements element* of a community’s *Comprehensive Plan* also may include capital expenditure policies that articulate a community’s intentions to design and construct public facilities and infrastructure to be more resistant to disaster forces through elevation, flood proofing, hardening, or relocation.

Capital expenditure policies may be applied both to the provision of new services and to decisions about reconstructing public facilities

Sidebar 5.3

Model Zoning Regulations for a Transfer of Development Rights (TDR) Program

Model zoning regulations for creating a fully operational TDR program are presented in Appendix C-41. The model regulations designate the density at which dwellings can be built in the TDR sending area and the base density of the receiving area, and they detail how much the density can be increased when development rights are transferred in. Other technicalities—what constitutes an eligible sending parcel, how to certify the transfer of the development rights—are also covered.

and infrastructure in post-disaster situations. Specific applications are discussed in Sections 5.3, 5.4, and 5.5.

Financing capital and operating costs of emergency management services

Florida communities have five principal options for generating local revenue for financing the capital expenditures and ongoing costs of providing emergency management services associated with coastal storms and associated flooding: (1) general taxes, (2) sale of bonds, (3) special assessments, (4) exactions, and (5) impact fees. Descriptions of each of these revenue sources follow.

The principal applications to flooding and coastal storm hazards include the following:

- financing the capital and operating costs of evacuation and sheltering services and other response and recovery costs as detailed in Section 5.2;
- financing the purchase of development rights and other easements as well as acquisition of land in fee simple for the various applications of these strategies that are described in Sections 5.3 and 5.5; and
- financing the maintenance and restoration of beach and dune systems and the construction and maintenance of erosion and flood control structures as described in Section 5.3.

General taxes

General taxes, such as property taxes and sales taxes, are the principal source of local revenue that has traditionally funded regular government services. In some communities, general taxes also are the primary source of revenue for capital expenditures for land acquisition, construction of new facilities, and purchase of equipment. General taxes also are typically the source of funds that have been used to finance general-purpose or special-purpose contingency or “rainy day” funds that are relied upon to cover the local share of emergency response and recovery costs.

There is, however, no direct connection between the tax and the consumption of specific government services; thus this method of financing can be viewed as inequitable where different property owners receive significantly different benefits. Where general tax revenues are used for financing evacuation and shelter facilities and infrastructure, property owners who live in low-risk areas subsidize those in high-risk areas. Use of general tax revenues for these purposes also results in fewer resources for meeting other community needs.

Bonds

Communities often sell bonds to borrow funds for capital projects. Doing so avoids some of the opportunity costs of using general tax revenues. Two principal types of bonds are employed: (1) general obligation bonds and (2) revenue bonds.

General obligation bonds issued by local governments are typically secured by ad valorem property taxes. Where this is the case, borrowing money does not resolve the tax benefit equity concerns of subsidizing property owners who choose to develop land in high-risk areas, unless the bonds are sold to finance improvements within a special assessment district (see next section).

Revenue bonds are secured by a dedicated revenue source other than the community’s ad valorem tax base. These may include revenues such as user fees generated from the project financed by the bonds (for example, airport, convention center, toll road/bridge, water, or sewer revenue bonds), impact fees (see below), or other local taxes and fees excluding ad valorem property taxes. Revenue bonds may avoid the tax benefit equity issue if the revenue source used to finance the bonds is collected only from those who benefit from the capital improvements.

Special assessments

Special assessments are typically levied on real property in districts that are created within a local jurisdiction to finance specific public capital improvements or the annual operating costs of services that confer a special benefit to the properties within the district. Assessments must vary in proportion to the benefits consumed by the individual property. These provisions can help to remedy the tax benefit

equity limitations of general taxes and general obligation bonds.

The Florida law governing special assessment authority is complicated and differs for counties and cities (see Deyle and Falconer, 2003).

- Counties are explicitly authorized to create special assessment districts to provide capital infrastructure, facilities, and services, including major capital improvements such as, but not limited to, transportation facilities, sanitary sewer facilities, solid waste facilities, water management and control facilities, potable water facilities, alternative water systems, educational facilities, parks and recreational facilities, health systems and facilities, and, dredge spoil disposal sites (§§189.402(3)(a) and 189.403(7), *Florida Statutes*).

Counties also may create municipal service benefit units (MSBUs) for the provision of the following services (§125.01(1) (q), *F.S.*): fire protection, law enforcement, beach erosion control, recreation service and facilities, water, streets, sidewalks, street lighting, garbage and trash collection and disposal, waste and sewage collection and disposal, drainage, transportation, indigent health care services, mental health care services, and other essential facilities and municipal services.

- Cities are authorized to levy special assessments for funding capital improvements and municipal services, including, but not limited to fire protection, emergency medical services, garbage disposal, sewer improvement, street improvement, and parking facilities (§170.201(1), *F.S.*).

The potential for using a risk-based special assessment for financing local government capital and operating costs associated with hurricane vulnerability is discussed in Section 5.2.

Exactions and dedications

Exactions require that developers provide, or pay for, some public facility or other amenity as a condition for receiving development permission. Typically subdivision and PUD regulations require developers to dedicate land for and provide facilities such as streets, sidewalks, water and sewer lines, and drainage facilities. For facilities such as schools and parks, developers may be given the option of constructing and dedicating the needed facilities within the subdivision, dedicating land for the facility, or making payments in-lieu of providing the facility within the subdivision. Developers also may be required to dedicate conservation easements to protect sensitive natural features or open space.

Principal applications of exactions in the context of hazard mitigation include providing or financing evacuation and sheltering facilities and infrastructure (see Section 5.2) and dedica-

tion of easements for preserving natural protective features such as wetlands, floodplains, and beaches and dunes (see Section 5.3). These are predominantly pre-disaster applications except in the unusual event of re-subdivision of land after a disaster.

Impact fees

Impact fees are a type of exaction used to expand or improve public facilities outside a subdivision or PUD. They are one-time charges levied on developers to cover the proportional share of the capital cost of facilities needed to serve the new development. In Florida, impact fees must meet two criteria established by the state courts:

- the local government must demonstrate a reasonable connection between the need for additional capital facilities and the growth in population generated by the subdivision; and
- the local government must show a reasonable connection between the expenditures of the funds collected and the benefits accruing to the subdivision.

In order to satisfy the second requirement, the ordinance establishing the impact fee must specifically earmark the funds collected for use in constructing capital facilities to benefit the new residents.

In the context of hazard mitigation, impact fees are most likely to be useful for financing

evacuation and sheltering facilities and infrastructure as discussed in Section 5.2.

State and federal grant funds

A number of state and federal programs are available for floodplain acquisition and elevation projects and for mitigation projects for existing public buildings and critical facilities to finance the retrofit or relocation to make them more resistant to the impacts of disasters.

Education and information

Education and information programs can be valuable supplements to local government programs that help promote desired behavior among target groups, whether the government initiatives are regulatory or voluntary in nature. Education and information initiatives can be a valuable component of each of the four strategies for reducing community vulnerability to coastal storms and associated flooding. Examples are described in each of the following sections.

Sara Nathe and others, in their 1999 article “Public Education for Earthquake Hazards,” list several principals of effective communication:

- explain complicated phenomena in non-technical terms;
- make sure information comes from multiple credible sources;
- repeat information in multiple and different media;

- tell people what they can do with the information they receive;
- give people opportunities to confirm and validate the information with their peers; and
- do not rely exclusively on electronic media; people need to be able to refer back

to the information when decision circumstances arise.

Sidebar 5.4 illustrates how these principals can be put into practice in a hypothetical example of a city public education program designed to promote voluntary flood hazard mitigation initiatives by private property owners.

Sidebar 5.4

Model Natural Hazard Public Education Program

The Emergency Management Institute’s instructor’s guide for an emergency management course entitled “Building Disaster Resilient Communities” (2002) presents a summary of an ideal city public education program concerning flood hazards.

This particular example is focused on structural mitigation and thus is most relevant to the best practices described in Section 5.4, “Making Structures More Resistant to Natural Hazard Forces”:

1. Written material is produced in attractive, well-illustrated and clearly explained brochures that describe the hazard in each district and exactly what homeowners and businesses can do to reduce their vulnerability.
2. Potential costs of not doing anything are expressed as benefits – future savings in property and safety.
3. A series of public workshops is scheduled to discuss the information in the brochure. These are targeted at specific areas of the city that are vulnerable to flood hazards.
4. At each workshop, a local resident, who has had experience with previous flood events, is asked to comment on the staff’s presentation and to help facilitate response to questions from the audience. Programs available to assist property owners, and next steps they can take, are clearly identified in the workshop.
5. Press kits are prepared for the radio, TV, and print media. These include a copy of the brochure and a press release about the campaign and the upcoming workshops. The press kits also include old news stories on previous flood emergencies in the city and state and a list of local government specialists who are available to answer reporters’ questions.

Section 5.2: Provide Evacuation and Sheltering Services

As noted in Section 2.3, most Florida counties provide evacuation and sheltering services to their residents. However, current evacuation clearance times and shelter capacities are inadequate in many parts of the state. Coastal cities and counties are required to include an objective in their *Comprehensive Plans* to “maintain or reduce hurricane evacuation times,” and they are directed to include an analysis of measures the local government could adopt to achieve that objective.

As more shelters become available, less people will need to evacuate, thus reducing the congestion on the evacuation road network. Therefore, communities essentially have two strategic options for maintaining or reducing evacuation clearance times and assuring the provision of adequate shelter capacity:

- attempt to influence demand for evacuation and shelter services; and/or
- increase the capacity of available evacuation and shelter infrastructure and facilities.

The demand for evacuation and shelter services can be maintained or reduced through the use of land use planning and development management tools for guiding development and redevelopment in hazardous areas, including the following:

- zoning regulations;
- overlay districts;
- subdivision and PUD regulations;
- cluster development;
- fee-simple property acquisition;
- purchase and leaseback;
- purchase of development rights and easements;
- transfer of development rights; and
- capital expenditure policies and programs.

These tools also serve to reduce the number of people, the amount of private property, and numbers of public facilities that are exposed to natural hazards. Specific applications of these tools are described in Section 5.5.

Local governments have the option of making hurricane evacuation capacity a concurrency requirement. For example, Monroe County established a Rate of Growth Ordinance (ROGO) based on the ability to safely evacuate the Florida Keys. The state-approved *Comprehensive Plan* determined that 2,550 new residential units could be allocated while maintaining the 24 hour evacuation standard adopted in the plan. Monroe County set a 10-year allocation or 255 units per year. Walton County has similar provisions in its *Comprehensive Plan*, which require that, for development within any hurricane evacuation zone, a 12-hour clearance time needs to be maintained for a Category 3 storm (Policy C-4.2.5). Development projects of 400 or more dwellings are required to submit an analysis of hurricane evacuation impacts, to

determine whether the adopted standard would be met.

In addition, public education and information initiatives may be used to reduce unnecessary evacuation by people who live outside of areas for which evacuations may be declared for a given storm threat or who live in structures that are not vulnerable to anticipated storm forces. These initiatives are typically undertaken within the realm of county emergency management preparedness operations and are not covered by *Local Mitigation Strategies* or *Comprehensive Plan* policies.

While the objective is to remedy deficiencies or to maintain current levels of service while allowing additional growth, the alternative strategy of increasing the capacity of evacuation infrastructure and emergency shelters can be achieved by using various tools for financing the operational costs of planning and providing evacuation and shelter services and the capital costs of evacuation infrastructure and hurricane shelters.

Emergency shelters in Florida are predominantly located in public school buildings and are operated as shelters by the American Red Cross under contracts with the counties. Some new shelter capacity is being created when county school districts, community colleges, and state universities build new school facilities. Funding for this construction is derived from existing state capital outlay funds. However, retrofitting of existing school buildings is a major part of the state’s strategy for reducing

current shelter deficits. These projects are frequently undertaken by counties, in collaboration with their school districts (see Sidebar 5.5).

Tools for financing the capital costs of such retrofit projects and for expanding evacuation infrastructure are described in this section as

Sidebar 5.5

State Shelter Retrofit Report and Shelter Plan

The State of Florida's 2003 **Shelter Retrofit Report** presents findings from the state's on-going survey of existing emergency shelters and reports on progress made in constructing new Enhanced Hurricane Protection Area (EHPA) shelters. It also details the state's strategy for remedying the current shelter deficit. The report can be accessed online at <http://floridadisaster.org/bpr/Response/engineers/documents/03ShelterRetrofit.pdf>.

The **State of Florida 2004 Statewide Emergency Shelter Plan** provides information on existing and long-term hurricane evacuation shelter space requirements and determines which regions and counties are required to construct new educational facilities to comply with the state's public shelter design criteria. The plan is available at <http://floridadisaster.org/bpr/Response/engineers/documents/2004SESP/2004%20SESP%20COMPLETE.pdf>.

well as tools for financing the annual operating costs of maintaining shelters and evacuation infrastructure, planning and preparing for evacuation, and the actual costs of evacuation and sheltering when a coastal storm threatens or strikes a community. With the exception of procuring grants from the federal or state governments, these are predominantly pre-disaster initiatives. They include the following:

- levy of general taxes;
- bond sales;
- imposition of exactions, dedications, or impact fees;
- special assessments;
- risk-based special assessments; and
- procurement of state and federal grant funds.

Finance maintenance and/or increase in service supply

Local governments face three categories of costs associated with the provision of evacuation and shelter services:

- capital costs of expanding or constructing new public shelters and evacuation infrastructure (roads, bridges, and causeways);
- annual operating costs of maintaining shelters and evacuation infrastructure and planning and preparing for evacuation; and
- response and recovery costs associated with actual evacuations when coastal storms threaten the jurisdiction and costs

of repairing shelters and evacuation infrastructure damaged during a disaster.

Capital costs can be financed with local revenues and grants from state and federal government. Annual operating costs of facilities maintenance, planning, and preparedness are typically funded from local revenues. If a community is included within a presidential disaster declaration, it may be eligible for state and federal public assistance that will cover up to 87.5 percent of response and recovery costs, including evacuation and shelter operation. The balance (12.5 percent) must be covered from local funds. Where evacuations are ordered, but the community is not included in a presidential disaster declaration, the local government typically must cover all of the costs of evacuation and shelter operations.

Financing capital costs

Options for financing the capital costs of expanding evacuation and shelter capacities include the following:

- **General tax revenues.** As discussed in Section 5.1, these consist primarily of property tax and sales tax revenues. Where general tax revenues are used for financing evacuation and shelter facilities and infrastructure, property owners who live in low-risk areas subsidize those in high-risk areas.
- **Bond sales.** Also as noted in Section 5.1, where communities sell general obligation

bonds to raise revenues for evacuation and shelter capital expenditures, borrowing money does not resolve the tax benefit equity concerns of subsidizing property owners who choose to develop land in high-risk areas unless the bond sales are part of a special district financing strategy. Where communities sell revenue bonds, the tax benefit equity issue can be remedied if the revenue source used to finance the bonds is collected only from those who consume the evacuation and shelter services. This could be accomplished if the bonds are paid off from revenues derived from an impact fee or special assessment.

- **Exactions, dedications, and impact fees.** Several jurisdictions in Florida levy fees or other exactions on developers for the construction of new shelters. This assures that new shelter space is available to serve the new residents.
 - Hillsborough County, which relies primarily on its public school system for emergency shelters, assesses an **exaction** through its subdivision process that generates funds for the school district to use for providing additional shelter capacity (see Sidebar 5.6).
 - Several other Florida jurisdictions, including the City of Jacksonville and Hernando, Lee, and Pasco counties, employ similar **exactions/impact fees** to finance new shelter space.

Sidebar 5.6

Hillsborough County, Florida: An Exaction for Shelter Space

Hillsborough County levies an exaction on new residential developments to cover the costs of providing additional emergency shelter space in the public school system through the retrofit of existing school facilities. The mitigation-offset exaction fee is conveyed by the county to the Hillsborough County School Board to be used solely for their public-shelter retrofit projects.

The following formula is used to calculate the mitigation-offset fee to be paid for a given residential development:

1. Number of dwelling units (x) 2.5 (*occupancy factor*) = the number of potential evacuees.
2. Number of potential evacuees (x) 0.25 (*historical public shelter demand*) = shelter space demand.
3. Shelter space demand (x) \$129.00 = shelter impact mitigation-offset cost.

The \$129 cost per space is the amount that local and state agencies are currently paying to mitigate the existing shelter deficit.

- Model language from the City of Jacksonville **Comprehensive Plan** for such an **exaction** system is presented in Sidebar 5.7.
- The City of Bonita Springs, in Lee County, Florida, offers developers several options for offsetting increases in the need for shelter and evacuation capacity that result from new residential development. These include **dedications** of land for offsite or onsite shelters, **payments in lieu** of dedications, **exactions** for evacuation services, and **design concessions** that allow for in-place sheltering (see Sidebar 5.8).
- Escambia County imposes an **impact fee** for shelter space on mobile home parks and RV parks.
 - Impact fees could be used to help finance evacuation infrastructure, for example, increases in the capacity of roads, bridges, and causeways along evacuation routes. However, to do so, the local government would have to devise a fee structure that meets the state courts' requirements that the fee be in proportion to the benefit provided to the new residents of a subdivision (see Section 5.1).
- **Special assessments for evacuation and shelter services.** As noted in Section 5.1, special assessments are levied on improved property parcels in a designated area as the basis for financing capital and

Sidebar 5.7

City of Jacksonville 2010 Comprehensive Plan: Conservation/Coastal Management Element (February 2003)

The **Comprehensive Plan** of the City of Jacksonville contains explicit policies for increasing shelter space to serve residents in the coastal high-hazard area (CHHA). Policies 7.2.5, 7.2.6, and 7.2.7 recognize that dense residential development in the CHHA puts a strain on existing shelter assets. These policies ensure that developers finance the cost of retrofitting one shelter space for each new occupant of a medium or high density residential development within the CHHA. All the units in developments that are partially or completely within the CHHA are included when calculating the assessment. Low density residential development is not required to contribute to the Shelter Assessment Fund, but is subject to numerous policies which restrict incompatible uses, encourage clustering, and limit infrastructure.

Issue: Providing Hurricane Shelter

The City currently has a deficit in State ARC 4496 design criteria-compliant shelter spaces of over 12,000. The Emergency Preparedness Division, the Planning and Development Department and the Duval County School Board are working to retrofit schools to reduce the deficit. It is the City's intent to monitor the relationship between population growth and shelter capacity to ensure the provision of additional shelter spaces, as determined to be necessary. Further, the City will continue to assist in the emergency preparedness requirements of its people with special needs.

Objective 7.2 Adequate shelter space shall continue to be available for the population in the Hurricane Evacuation Zones at risk under a Category 3 storm event. The City, acting as

Duval County, shall have a mechanism in place to assist in providing shelter and transportation for people with special needs during an emergency.

Policies

7.2.1 The City, acting as Duval County, shall increase its shelter capacity. All new or retrofit school projects shall be evaluated for sheltering of special needs as well as general populations.

7.2.2 The Chief of Emergency Preparedness, with assistance from State and regional agencies, shall establish the target shelter demand, and make recommendations on additional policies and strategies to ensure, if needed, the availability of additional shelter space.

7.2.3 In the event that the Chief of Emergency Preparedness determines that the shortage of shelter space requires mitigation, then policies 7.2.5, 7.2.6 and 7.2.7 shall apply.

7.2.4 The Emergency Preparedness Division shall, for evacuation purposes, continue to identify the special needs population of Duval County, and plan for appropriate facilities and services through the Duval County Health Department, with the assistance of such government and quasi-government agencies as the Northeast Florida American Red Cross, the First Coast Hospital Disaster Planning Council, and other similar agencies.

7.2.5 The City shall require that all new development located in the Coastal High Hazard Area in land use categories that permit

residential density greater than Low Density Residential shall contribute to the cost of emergency shelter space in existing school sites.

7.2.6 For purposes of determining an owner's assessment for the cost of emergency shelter space in existing school sites, the City shall use a quantitative formula where:

A equals the total number of residential units proposed;

B equals number of persons per household; and

C equals average cost to retrofit one shelter space;

D owner's assessment

A X B X C = D Owner's Assessment

7.2.7 The City shall use the most recent U.S. Census data related to average household size, population in households and households. In calculating the assessment owed, the City shall use the full unit count of the proposed development, the county-wide average household size from the U. S. Census, and the average shelter retrofit cost as provided by the City's Emergency Preparedness Division in consultation with the Duval County School District Facilities Services Division. The City shall not allow a reduction of the shelter space required based on assumptions of smaller household sizes than the county-wide census data or reduced uses of public shelters for certain developments. These factors shall be updated as warranted by the City to ensure accuracy of costs and population factors.

operating costs for a specific service or other public amenity that directly benefits the property. Emergency management services, such as planning and preparedness for evacuation and sheltering, and the capital facilities and infrastructure required to provide those services, are not explicitly listed as services for which special assessment districts may be created.

However, a recent review of state statutory and case law indicates that a special assessment for such services appears to be consistent with the powers delegated to local governments in the state (see Deyle and Falconer, 2003).

- **Risk-based special assessments.** A special assessment district is not needed unless

(a) there are some areas of a jurisdiction for which there is no need for evacuation and shelter services, or (b) there is a basis for assessing consumers of these services at different rates. Because evacuation frequencies are based primarily on the location of a property parcel (see Figures 3.2 and 3.3), it is feasible to levy an annual assessment that varies by the evacuation zone within which a property parcel is located and the annual probability that a structure on the parcel will be evacuated. Researchers with the Florida Planning and Development Lab at Florida State University devised a risk-based assessment mechanism for Lee County, Florida, that encompasses both the operating and capital costs associated with on-going planning, preparedness, and mitigation, as well as the event costs associated with evacuation, response, and recovery (see Sidebar 5.14).

- **State or federal grant funds.** Three principal sources of capital are available from the State of Florida and the federal government that can be used for installing shutters and making other structural retrofits to existing public buildings for use as shelters. These include funds from the state **Shelter Retrofit Program** (see Sidebar 5.9), the federal **Hazard Mitigation Grant Program** (see Sidebar 5.10), and the federal **Pre-Disaster Mitigation Grant Program** (see Sidebar 5.11).

Sidebar 5.8

Bonita Springs Shelter and Evacuation Impact Ordinance

The purpose of city Ordinance No. 01-16 is “to address the impact created by residential development on hurricane shelter availability and evacuation capability in the City of Bonita Springs. These regulations are intended to mitigate the growing hurricane shelter deficit, along with related effects on evacuation times and infrastructure, caused by permitting residential development without addressing the incremental impact on the city’s hurricane preparedness program.” The ordinance applies to residential development “located in a landfalling category 1, 2, or 3 storm surge area” and “to new and existing developments of regional impact.”

Developers have a range of options to choose from for mitigating shelter and evacuation impacts. The option has to be approved by the city. Shelter impacts can be addressed through the donation of land or the use of a private

structure, payment in lieu of donation of land or use of a private structure, or provision of on-site shelter within the development. Evacuation efficiency improvements can be addressed by paying an exaction that “may be used for items such as:

- a. Communications equipment to convey real time conditions to the public on the roadways.
- b. Information systems along major arterial evacuation routes to convey emergency information.”

Mitigation options that address both shelter and evacuation impacts include the construction of safe rooms in houses and the elevation of houses above hurricane flood-level levels (see section 5.4).

Sidebar 5.9

Florida Shelter Retrofit Program

In 1999 and 2000, the State of Florida committed state and federal funds to remedy its emergency shelter deficit. Each year, county emergency management officials in cooperation with local American Red Cross (ARC) chapters, school boards, and other public and private agencies, submit proposals for retrofitting existing public buildings to meet the ARC's **Guidelines for Hurricane Evacuation Shelter Selection**. Proposals are reviewed by the DEM, and submitted to the Governor and the State Legislature for funding. For more information, see the state's 2003 **Shelter Retrofit Report** at <http://floridadisaster.org/bpr/Response/engineers/documents/03ShelterRetrofit.pdf>.

Sidebar 5.11

Federal Pre-Disaster Mitigation Grant Program

The Pre-Disaster Mitigation (PDM) grant program was authorized by Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended by Section 102 of the Disaster Mitigation Act of 2000, to assist communities to implement hazard mitigation programs designed to reduce overall risk to the population and structures before the next disaster occurs. This is a competitive grant program administered through the Florida

Sidebar 5.10

Federal Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL 93-288 as amended). It is a partnership designed to assist states, local governments, private non-profit organizations, and Indian Tribes in implementing long-term hazard mitigation measures following a major disaster declaration.

The objectives of the program are:

- to prevent future losses of lives and damage to property due to disasters;
- to implement state or local hazard mitigation plans;
- to enable mitigation measures to be implemented during immediate recovery from a disaster; and

- to provide funding for previously identified mitigation measures that benefit the disaster area.

The HMGP can fund up to 75 percent of the costs of mitigation measures to protect public or private property, as long as they are in compliance with the program's guidelines. Applicants must provide 25 percent match in the form of cash, in-kind services, or materials. Although the program is federally funded, it is administered through a partnership arrangement with the Florida Department of Community Affairs. The Division of Emergency Management is the lead state administrative agency. A FEMA-approved state and local mitigation plan is required to receive project funding, and the project must conform to the priorities established in the **Local Mitigation Strategy**.

For more information see <http://www.floridadisaster.org/brm/hmgp.htm>.

Division of Emergency Management. Eligible projects include the following:

- property acquisition or relocation;
- structural and non-structural retrofitting (e.g., elevation, storm shutters and hurricane clips);
- minor structural hazard control on protection (e.g., culverts, floodgates, retention basins); and

- localized flood control projects that are designed to protect critical facilities and are not part of a larger flood control system.

A FEMA-approved state and local mitigation plan is required to receive project funding, and the project must conform to the priorities established in the **Local Mitigation Strategy**. For more information see http://www.floridadisaster.org/brm/PDM/PDM_main.htm.

Financing operating costs

Local governments have two principal options for financing the annual operating costs of maintaining shelters and evacuation infrastructure and for planning and preparing for evacuation: (1) general tax revenues and (2) special assessments. To the extent that these services are differentially consumed by property owners in high-risk areas, use of general tax revenues for such purposes is inequitable. Special assessments based on relative risk (see above) offer an alternative that avoids this inequity.

Financing response and recovery costs

Some categories of response and recovery costs are eligible for reimbursement under the federal Public Assistance Program (see Sidebar 5.12) when a community is covered by a presidential disaster declaration. The federal share is 75 percent, and in Florida, the state will cover half the balance, leaving the local government responsible for 12.5 percent of eligible costs. The exception is mitigation projects, for which the local government must pay the full 25 percent non-federal share. There are some costs, however, associated with disaster response and recovery, for which the local government is entirely responsible.

Some communities create “rainy day” or contingency funds to cover such circumstances. These are often funded from general tax revenues, and, therefore, may be viewed as inequitable where these funds are more likely to

Sidebar 5.12

Federal Public Assistance Program

Public Assistance is that part of disaster relief through which the federal government supplements the efforts of state and local governments to return the disaster area to pre-disaster conditions. Eligible categories of expenses include the following:

Category A

Debris Clearance: This category includes all storm-induced debris on non-federal public roads, including the right-of-way, non-federal public waterways, other public property, and private property when undertaken by local government forces. It can also cover the cost of demolition of public structures if those structures were made unsafe by the disaster.

Category B

Emergency Protective Measures: This category addresses the need to provide appropriate emergency measures designed to protect life, safety, property, and health (i.e., barricades, sand bags and safety personnel).

Category C

Road System: This category addresses damages to non-federal roads, bridges, streets, culverts, and traffic control devices.

Category D

Water Control Facilities: Eligible damages under this category include costs to repair or replace dikes, dams, drainage channels, irrigation works, and levees.

Category E

Building and Equipment: Eligible damages under this category include costs to repair public buildings and equipment, supplies/inventories that were damaged, and transportation systems such as public transit systems.

Category F

Public Utility Systems: Under this category, assistance is available for damaged water systems, landfills, sanitary sewerage systems, storm drainage systems, and light/power facilities.

Category G

Other: The “other” category includes park and recreational facilities, or any other public facility damages that do not reasonably fit in one of the other six categories.

For more information see <http://www.floridadisaster.org/brm/Public%20Assistance.htm>.

be spent in high-risk areas of the community. Using general tax revenues for such purposes also entails opportunity costs for other public purposes that are not funded. Lee County, Florida, created an “All Hazards Protection District” to generate revenue for mitigation and recovery (see Sidebar 5.13). The Lee County

special assessment avoids the opportunity costs of using general tax revenues for mitigation and recovery, but because it levies a fixed assessment on all property, it does not address the equity issue.

A risk-based special assessment that covers all response and recovery costs would offer an

alternative that is more equitable (see Sidebar 5.14). Sarasota County has established a more narrowly targeted special assessment district that is used to fund repairs to a single road that is prone to storm erosion damage (see Sidebar 5.15). This assessment district is more equitable because it taxes those property owners

Sidebar 5.13

All-Hazards Protection District – Lee County, Florida

Lee County officials took notice after Hurricane Hugo hit South Carolina in 1989. They recognized that they could experience very substantial costs for recovery from a similar disaster and that they needed funds to finance the capital costs of mitigation measures that would reduce their vulnerability to hurricane damage. The county created an All Hazards Protection District in the unincorporated areas of the county that levies a property tax of \$5 on every \$100,000 of assessed value to be used for emergency management and mitigation. The assessment generates about \$900,000 yearly. The county sets aside 25 percent of those revenues in a contingency fund to help cover the local share of disaster response and recovery costs that would not be covered by federal and state assistance.

Sidebar 5.14

A Risk-Based Assessment for Emergency Management Services

Researchers with the Florida Planning and Development Lab (FPDL) devised a risk-based assessment mechanism for Lee County, Florida, based on a set of risk indices that can be applied to four cost categories:

- an **anticipatory protective measures index** applied to costs associated with Category B expenditures under the federal Public Assistance Program (see Sidebar 5.12) - based on the annual probability that a given improved property parcel will be evacuated for a hurricane;
- a **damage risk index** applied only to property parcels with structural improvements for costs associated with debris clearance (Category A) - based on the vulnerability of the structure to damage from wind, waves, and storm surge flooding;

- a **public facilities risk index** applied to Category C-G costs – based on the square footage of the structural improvements on the property; and
- an **ongoing services risk index** applied to on-going planning and preparedness operating costs and mitigation capital costs – based on a combination of the other three indices.

FPDL estimated that such an assessment would raise between \$1.2 and \$1.7 million a year, if levied in 1995 in unincorporated Lee County. After paying annual operating costs of approximately \$718,000, the special assessment would generate sufficient revenues for a contingency fund to cover the 1995 predicted local costs of a Category 2 hurricane (\$2.2 million) in 3 years. At that rate, it would take about 7 years to raise sufficient revenues to cover the estimated local response and recovery costs of a Category 3 hurricane (\$5.0 million).

Source: Florida Planning and Development Lab, *The Costs of Hurricane Emergency Management Services: A Risk-Based Method for Calculating Property Owners' Fair Share*, 2003.

Sidebar 5.15

Sarasota County Special Assessment District for Storm Damage Repairs

Sarasota County created a special assessment district in 1988 on the Casey Key barrier island to pay for revetment construction to protect a segment of North Casey Key Road and to pay for future repair and reconstruction of the revetment and the roadway. Property owners in the district are assessed on an ad valorem basis as necessary to retire bonds that are issued and to finance other expenses of the district.

ed runoff can be detained. The natural vegetation of these areas helps to reduce storm water flow rates and minimize soil and bank erosion (see Figure 5.1).

- Coastal wetlands help to dampen the flow of storm water runoff from uplands to coastal waters and provide buffer areas that can absorb storm surge flooding and dampen wave energy associated with coastal storms (see Figure 5.2).



Source: URS Corporation, 2000.

Figure 5.1: Protective natural features: freshwater wetlands and floodplains.

who primarily rely on the road for access to their land.

Section 5.3: Maintain and Enhance Natural Protective Features

As noted in Section 2.3, natural drainage ways, floodplains, wetlands, beaches, and dunes help to mitigate a community's vulnerability to damage from coastal storms and associated flooding:

- Drainage ways, floodplains, and freshwater wetlands provide space for storm water runoff to flow and areas where accumulat-



Source: URS Corporation, 2000.

Figure 5.2: Protective natural features: coastal wetlands.

- Natural beach and dune systems are part of the coastal sediment supply system that adjusts to variations in the wave energy of the coast (see Figure 5.3). During coastal storms, beaches and dunes help to dampen storm wave energy as well as providing physical protection from storm surge. Damage to dune vegetation increases their vulnerability to erosion. Removal of dunes reduces the sand supply of the beach and dune system and makes the entire beach and dune system more vulnerable to erosion and long-term recession of the beach.

State regulations governing local *Comprehensive Plans* contain several directives con-

Figure 5.3: Protective natural features: healthy beach and dune system.



Source: U.S. Army Corps of Engineers

cerned with the protection of natural protective features.

- All local governments are required to analyze the potential for the conservation, use, or protection of wetlands, estuarine marshes, and floodplains in the *conservation elements* of their *Comprehensive Plans*.
- Specific policies are to be included in the *conservation element* that address protection and conservation of wetlands and their natural functions, and future land uses incompatible with their protection and conservation are to be directed elsewhere.
- Policies are required in the *public facilities and services element* that regulate land use and development to protect the functions of natural drainage features.
 - Coastal communities are directed to include objectives in their *coastal management elements* to protect, conserve, or enhance existing coastal wetlands, and to protect beaches and dunes and restore altered beaches and dunes.
 - Specific *coastal management* policies also are required that limit the direct and cumulative impacts of development and redevelopment on coastal wetlands, beaches, and dunes and that identify techniques for doing so as well as restoring or enhancing degraded wetlands, drainage systems, beaches, and dunes.

Governments have employed two basic strategies concerning these natural protective features: (1) measures to protect and maintain these systems in their natural state so that they can continue to perform their natural hazard mitigation functions, and (2) measures to enhance and restore the natural protective functions of these systems. Specific land use planning and development management tools used to implement these strategies include the following:

- zoning with overlay districts;
- subdivision and PUD regulations;
- site design regulations and performance standards;
- cluster development;
- incentive zoning;
- setbacks and buffers;
- fee-simple property acquisition;
- purchase and leaseback;
- purchase of development rights and conservation easements;
- transfer of development rights;
- exactions and dedications;
- capital expenditure programs;
- financing capital and operating costs; and
- education and information.

Specific applications are described in the following sections. Typically, use of these tools

is enabled through policies, contained in the *future land use, conservation, or coastal management elements* of a community's *Comprehensive Plan*, that govern new construction in pre-disaster settings. Some capital projects to enhance natural protective features by constructing or expanding erosion or flood control structures may be eligible for post-disaster federal funding under the Hazard Mitigation Grant Program.

Protect and maintain natural protective features

Three principal approaches are taken to protect and maintain natural protective features:

1. land use regulation that prevents disturbance of existing natural protective features;
2. land use regulation that employs setbacks to protect buffer areas around the margins of natural protective features; and
3. acquisition of property in fee-simple or acquisition of negative easements that constrain use of property so as to protect the natural protective features.

A fourth strategy, transfer of development rights (TDR), has the potential to be used as well, but to date has been used primarily to protect farmland or other natural features. In addition, education and information initiatives have been widely used to inform the public about the need to protect dunes and dune veg-

etation. Other such initiatives may be undertaken to garner public support for initiatives to protect other natural protective features such as floodplains and wetlands.

Land use regulation that prevents disturbance of natural protective features

Local regulation of development within wetlands and beach and dune areas in Florida occurs within the context of several federal and state regulatory programs.

- *U.S. Army Corps of Engineers regulation of dredge and fill activities within navigable waters of the United States and adjacent wetlands.* Dredge and fill activities involved in the construction of flood protection and erosion control structures at or below the mean high water line of navigable waters, including beach renourishment projects, and dredge and fill activities in freshwater and coastal wetlands that are adjacent to or tributary to navigable waters are regulated by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act as well as Section 10 of the Rivers and Harbors Act of 1899.
- *State beach and dune regulatory programs.* Local regulations to protect the beach and dune system complement two state regulatory programs administered by the Florida Department of Environmental Protection (FDEP), Bureau of Beaches and Coastal Systems:

- **Coastal Construction Control Line (CCCL) permitting program.** Twenty-seven of Florida's 35 coastal counties are subject to the state's CCCL permitting program, which is designed to protect the beach and dune system from improperly sited and designed structures. Standards that govern the placement, elevation, and construction of habitable structures within the CCCL jurisdictional area serve to reduce the vulnerability of the structures to damage from wind, waves, and storm surge (see Sidebar 5.32 in Section 5.4). This, in turn, reduces the likelihood that damage to the built structures will destabilize or destroy the beach and dune system. The CCCL permitting program supplements the standards contained in the Florida Building Code (see Section 5.4) and local setback and development regulations intended to reduce the vulnerability of private property from coastal storm damage (see Section 5.5).
- **Joint Coastal Permit (JCP) program.** Beach restoration and other erosion control projects, such as the construction of seawalls, groins, and breakwaters, require permits from FDEP as well as the U.S. Army Corps of Engineers. A copy of the JCP application is forwarded to the United States Army Corps of Engineers by FDEP for sepa-

rate processing of the federal dredge and fill permit, if necessary. For more information, see <http://www.dep.state.fl.us/beaches/programs/envpermt.htm>.

- *State wetland regulatory programs.* The State of Florida regulates construction activities in wetlands to prevent degradation of water quality (such as through the loss of wetlands, improper in-water construction techniques, or discharge of inadequately treated storm water runoff), flooding, or degradation of habitat for aquatic or wetland dependent wildlife species. For more information, see <http://www.dep.state.fl.us/water/wetlands/erp/index.htm>.
- **Environmental Resource Permit (ERP) program.** In all areas of the state except the Florida Panhandle (Escambia through Wakulla Counties), construction in and adjacent to wetlands is regulated through an ERPs issued by the water management district, pursuant to delegation of such authority by FDEP. Local governments may petition the FDEP for delegation of some or all of this regulatory authority. Local government regulations can be more, but not less, restrictive than the applicable state regulations.

- **Wetland Resource Permit (WRP) program.** In Florida Panhandle counties, Wetland Resource Permits must be obtained from the FDEP for development actions that disturb wetlands or other waters of the state. These regulations do not apply to “isolated wetlands” that are not connected to surface waters of the state. There are provisions for delegation of this permitting program to local governments.

A number of Florida cities and counties establish conservation or preservation land use categories and include policies in their *Comprehensive Plans* to protect and/or restore natural protective features. All of the land use regulatory tools listed in Table 5.1 can be applied to implementing such policies. A selection of exemplary approaches is described here.

- *Zoning with overlay districts.* A number of communities zone natural drainage ways, floodplains, wetlands, beaches, and dunes as preservation areas. Because the areas encompassed by such features typically do not correspond to property parcel boundaries, communities often use overlay districts to define the areas within which specific zoning restrictions for these features apply.
- **The City of Indian Rocks Beach 2003 Beach Management Plan** recommends amending the city’s *Comprehensive Plan* to establish a Dune Preservation

Zone and to designate the zone as a preservation area on the future land use map with no associated density.

- St. Lucie County’s land development code defines a Dune Preservation Zone within which no development is permitted that would threaten the stability of the frontal dune or beach in front of or adjacent to any parcel of land.
- *Subdivision and PUD regulations.*
 - Longboat Key’s land development code requires PUDs to set aside 50% of their area for open space (§158.069). The regulations permit inclusion of wetlands in meeting those requirements. This provides an incentive for their protection in addition to the restrictions applied to retain them as storm water retention areas (see Sidebar 5.16).
- *Site design regulations and performance standards.*
 - The Town of Longboat Key protects wetlands as storm water retention areas through development restrictions applied during the site plan review process (§158.102(G)). The town’s land development code (§158.102(F)(5)) also includes provisions that require developers to preserve, enhance, and

Sidebar 5.16

Town of Longboat Key Land Development Code

§158.102(G) **Wetland Development Restrictions**

... No development activity shall be allowed in a wetland area unless “competent evidence” indicates that:

1. Dominant vegetation is no longer comprised of wetland types.
2. The water regime has been permanently altered artificially or naturally in a manner to preclude its associated watershed areas from functioning as wetlands and cannot function as part of the stormwater management system for the site.

§158.102(F) **Open Space and Landscape**

5. ... Preserve Natural Landscape, Native Vegetation, and Significant Wildlife Species and Their Habitats.
... Sand dunes and natural landscape barriers fronting on the Gulf of Mexico shall be preserved, enhanced and restored to the greatest extent possible through the land development process.

§158.069 **Open Space**

All residential planned unit developments shall preserve a minimum of 50% of the gross land area as open space... Wetland and locked water bodies may be used in calculating open space as long as a minimum of 40% of the upland property is comprised of open space...

restore sand dunes on properties along the Gulf of Mexico (see Sidebar 5.16).

- Walton County’s Comprehensive Plan includes a policy in its coastal management element that establishes a Coastal Protection Overlay Zone within which several site design regulations apply to protect dunes and

their natural vegetation (see Sidebar 5.17).

- St. Lucie County’s land development code contains a series of development regulations that restrict erosion control structures (§6.02.01(E)(6)), require dune walkovers (§6.02.01(H)(5)), and protect

Sidebar 5.17

Walton County Comprehensive Plan: Coastal Management Element

Objective L-1.5: Protection of Coastal Resources

Consistent with the recommendations of the Northwest Florida Coast Resource Management Plan and with the policies of this Comprehensive Plan for Walton County, Coastal Resources shall be protected. The county shall protect, conserve or enhance coastal wetlands, coastal dune lakes, living marine resources, remaining coastal barriers, and wildlife habitats.

Policy L-1.5.1: The Northwest Florida Coast Resource Management Plan recommends the establishment of a coastal protection overlay zone. The County hereby adopts such a coastal protection overlay zone which extends seaward of the landward toe

of the primary dune ridge or, where the toe cannot be determined, fifty (50) feet landward of the crest of the primary dune or twenty-five (25) feet landward of the top of the higher bluff regions where no primary dune exists.

[Paragraph 2]: No activities shall be permitted which create erosion of dunes or the dune system. Development within the coastal protection zone shall be limited to elevated boardwalks and other approved fences or structures that will enhance and protect the dune system. Natural dune vegetation within the overlay zone shall be disturbed only to the extent necessary to construct these boardwalks and related structures; however, in no case may more than 10 percent of the existing vegetation or dune be disturbed.

Sidebar 5.18

St. Lucie County Land Development Code

§6.02.01(D) Vegetation and Landscaping

All development is required to comply with the following criteria concerning the preservation of existing native vegetation....

1. *Selective Clearing and Micro-Siting:*

All development requiring a County permit shall set aside through selective clearing and micro-siting of buildings, as a minimum, twenty-five (25) percent of each native plant community which occurs onsite... .

2. *Minimum Disturbance:*

Existing native vegetation shall be disturbed to the least degree practical.

§6.02.01(E) Beach and Dune Protection

6. *Erosion Control:*

All development shall comply with the following criteria in order to protect coastal area resources and natural processes within the Beach-Dune Shoreline Area:

- a. *Limitations*

Erosion control measures shall be limited to those that do not interfere with normal littoral processes, sea turtle nesting and hatching activities, or negatively impact coastal area resources.

§6.02.01(F) Dune Restoration

All development shall comply with the following criteria concerning site development and maintenance, beach nourishment, and dune height elevations:

1. *Restoration Requirement:*

Dune restoration shall be required for development which requires a County permit when the elevation of the existing dune is less than the maximum height elevation specified in Subsection 4.

2. *Developed Sites:*

Persons with habitable major structures onsite shall be encouraged to maintain or restore their dune with sand and vegetation to the maximum height elevation specified in Subsection 4.

3. *Dune Restoration With Beach Nourishment:*

Dune restoration where needed shall be an integral part of any proposed beach nourishment plan.

4. *Dune Restoration Height Elevation:*

All restored dunes, unless otherwise approved by the State, shall have the maximum height elevation specified below:

- a. *one (1) foot greater than the minimum required flood elevation for the subject parcel of land; or*
- b. *equal to the height of the adjacent dune.*

In no case shall the restored dune be less than eight (8) feet in elevation above mean sea level... .

§6.02.01(H) Shoreline Access Requirements

5. *Beach-Dune Shoreline Criteria*

All new beach access points and beach-front parks shall be provided with dune crossovers. Existing public beach access points shall be provided with dune crossovers as soon as practical to implement this provision.

§6.02.03(F) Required Buffering

A buffer zone of native upland edge (i.e. transitional) vegetation shall be provided and maintained around isolated wetlands covered by this Section which are constructed or preserved on new development sites. The buffer zone may consist of preserved or planted vegetation but shall include canopy, understory, and ground cover of native species only. The edge habitat shall begin at the upland limit of any wetland or deepwater habitat. As a minimum, ten (10)

square feet of such buffer shall be provided for each linear foot of wetland or deepwater habitat perimeter that lies adjacent to uplands. This upland edge shall be located such that no less than fifty (50) percent of the total shoreline is buffered by a minimum width of ten (10) feet of upland habitat. The upland buffer requirement does not apply to drainage canals for storm-water conveyance systems requiring periodic maintenance.

§6.02.02 **Shoreline Protection**

B. *St. Lucie River Shoreline*

2. *Development Regulations*

Two zones are hereby created. The boundaries of the zones and the restrictions applying to these zones are as follows:

a. *Zone A*

- (1) *For a platted lot of record existing as of August 1, 1989, Zone A shall consist of the area from 0 to 50 feet from the mean high water line... or*
- (2) *When there was no platted lot of record existing as of August 1, 1989, Zone A shall consist of the area from 0 to 75 feet from the mean high water line... .*

No development activity or shoreline alteration, including alteration of native vegetation and habitat, shall be permitted, other than that associated with the construction of a private access point, including docks if permissible under applicable laws.

b. *Zone B*

Zone B shall consist of the area between Zone A and 300 feet from the mean high water line... .

No development activity that would permit the introduction of any permanent structure that does not comply with the provisions of St. Lucie County's flood damage prevention regulations in Section 6.05.00 of this code is to be permitted.

No road right-of-way (public or private), except for individual driveways, on-site drainage retention pond or system (except for lawfully permitted drainage conveyance outfalls), wastewater lift station, petroleum or chemical storage area, or other activity that would contribute to the degradation of water quality within the North Fork System is permitted.

native dune vegetation (§6.02.01(D)) (see Sidebar 5.18).

- **The Monroe County Comprehensive Plan requires 100% of mangroves, freshwater wetlands, and undisturbed salt marsh to be protected as open space (Policy 204.1). Any densities that assigned by the Future Land Use Map to these wetlands need to be transferred out of the wetland area.**
- **The 2003 Beach Management Plan developed by the City of Indian Rocks Beach recommends several new ordinances that would govern regulation of erosion control structures, requirements for dune walkovers, and removal of exotic plant species from beaches and dunes (see Sidebar 5.19).**
- **The City of Ocean Ridge protects native dune vegetation through an ordinance that requires a permit for planting, trimming, pruning, or removal of dune vegetation (see Sidebar 5.20).**
- **Cluster development.** Several Florida communities allow density transfers within subdivisions or PUDs that permit clustering of development and protection of sensitive environmental features. Such an approach can be effective for voluntarily protecting wetlands, floodplains, and dunes.

Sidebar 5.19

City of Indian Rocks Beach: 2003 Beach Management Plan

The City of Indian Rocks Beach is located on a barrier island in the Gulf of Mexico that is subject to the daily impact of wind and waves. The city's beaches are adversely affected by erosion control structures located updrift of the city and by nearby inlets.

An ad hoc committee was appointed to develop a beach management plan that deals with all issues surrounding beach management including the forces of structural, biological, environmental, and human interaction on an actively used beach within a densely populated and developed area. Recommendations of the 2003 plan concerning beach and dune systems include the following:

- Amend the City's **Comprehensive Plan** to include a policy that **erosion control structures** should be considered as an alternative of last

resort for the protection of upland infrastructure or to mitigate an emergency event, and identify "soft" engineering approaches such as beach renourishment as the preferred alternative.

- Prepare an ordinance for review and approval by the City Commission requiring that **new multi-family residential projects** fronting the beach include a **dune walkover** meeting FDEP permitting guidelines whenever the City determines that it is necessary to preclude possible erosion to the dune system.
- Prepare an ordinance for review and approval by the City Commission

requiring the **removal of exotic species and restoration of the beachfront** areas in accordance with the approved master beach landscaping plan for any residential development project that establishes a new (either additional or replacement) residential unit on a beachfront lot.

- Prepare an ordinance for review and approval by the City Commission permitting the City to **remove exotic species and restore the beachfront** area in front of an existing residential or commercial development in accordance with the approved master beach landscaping plan at the City's expense.

Sidebar 5.20

City of Ocean Ridge Dune Vegetation Protection Ordinance

Section 66-161 Ocean Ridge Code of Ordinances Vegetation.

(a) Permit required for planting or removal of vegetation. It shall be unlawful for any person to plant vegetation or to remove, cover, prune or destroy the natural vegetation growing upon any dune located within the town without first having obtained a permit therefore from the administrative official... .

A "no fee" permit, issued by the administrative official shall be required for the removal from the dune or dry sandy beach on a single-family residential property, by its owner or occupant, of certain invasive plant species, which are prohibited or restricted by law. A

"no fee" permit for such removal may also be granted for multifamily residential property, upon receipt of a request from the condominium, cooperative or property owners' association.

A regular town permit shall be required for removal of any plant more than six feet high, or for removal of more than 20 percent of the plants on the dune or dry sandy beach of a property within any six-month period. Unless removal is a result of a town-initiated requirement, any removal of plants on the dune or beach shall require replacement, within ten days, with beneficial plants of similar spread

or canopy, and shall be of the permitted species listed in subsection (g)(2) herein. Where removal is the result of town-initiated action, the landowner shall have up to 12 months to replace the plant material in accordance with this section.

Temporary irrigation shall be provided to replacement plants in a manner adequate to sustain at least 90 percent of such plants.

Invasive plant species, as used herein, shall include those listed in section 66-119 herein, and those listed as "invasive" in the Plant Guide II, published by the South Florida Water Management District.

- The City of Palmetto uses density transfers to protect wetlands. Developers are allowed to increase development densities on the upland portions of their sites at the rate of one unit per acre for every four acres of wetlands that remain undeveloped.
- The City of Tallahassee's Environmental Management Ordinance (see Sidebar 5.21) encourages density transfers on sites situated within areas zoned as conservation and requires

them in areas zoned as preservation. If there is no room for density transfer, development is allowed only at very low densities.

- **Incentive zoning.** This is an option for encouraging developers to donate easements that protect natural protective features such as dunes, wetlands, or natural drainage features. Development is clustered on the remaining land, but the developer is allowed to exceed the density or floor area

ratios that would otherwise apply to the zoning district.

Setbacks and buffers

A number of local governments impose setbacks that restrict development within some specified distance of protective natural features including floodplains, wetlands, and dunes. By providing undisturbed land cover, these buffers reduce the impacts of construction and subsequent use of the adjoining land on the long-

Sidebar 5.21

Density Transfers - City of Tallahassee Environmental Management Ordinance

(No. 90-O-0044AA, amended January 10, 2001)

Section 3.1 Pre-Development Reviews.

(2)(a) Density Transfers and Developable Area.

1. **Conservation Areas.** In all cases, the transfer to non-environmentally sensitive areas is **preferable** [emphasis added]. Density transfer shall be within the parcel, no off-site transfer is permitted. Transfer of development density to non-environmentally sensitive areas will be allowed up to the density permitted by the existing land use category in which the parcel is located. The amount of density transfer may be limited by other applicable requirements and ordinances implemented during the development

review process such as requirements for stormwater retention, preserved urban forest and landscaping, buffer, setbacks, parking, transportation access, and any concurrency requirements. If there is no area on the site suitable for transfer, development will be allowed at one unit or 4,000 square feet of disturbance per acre unless otherwise stated. In no case shall the density be more than double the underlying density normally allowable on the developable portion of the site.

2. **Preservation Areas.** The transfer of density to non-environmentally sensitive portions of the site will be **required** [emphasis added]. Development can be transferred at the same density

allowed by the existing land use. **If there is no area suitable for density transfer, development can be allowed at one unit or 4,000 square feet of disturbance per 40 acres** [emphasis added]. In no case can the density be more than double the allowed density on the developable portion of the site. The amount of density may also be limited by other applicable requirements and ordinances such as the requirements for stormwater retention, preserved urban forest and landscaping, buffers, setbacks, parking, transportation access, and any concurrency requirements. This may result in substantially less density than the maximum density allowed by the land use category in which the parcel is located.

term integrity of the natural feature. Examples of such setbacks and buffers are presented here.

Some jurisdictions employ setbacks for the explicit purpose of mitigating the exposure of development to flooding and wave damage along rivers, lakes, and the sea. These setbacks have secondary benefits of providing buffers and reducing the need for shoreline hardening. Specific examples of development setbacks of this type are presented in Section 5.5.

- St. Lucie County's land development code (6.02.03(F)) requires **vegetated buffers around isolated freshwater wetlands** of one-half acre or more in size (see Sidebar 5.18).
- St. Lucie County also requires (LDC §6.02.02) maintenance of vegetated buffers along the county's rivers and the Indian River lagoon (see Sidebar 5.18).
- The Walton County *Comprehensive Plan* requires a 50-foot vegetative buffer adjacent to Choctawhatchee Bay, a 75-foot buffer adjacent to rivers, and 100-foot buffer adjacent to coastal lakes (Policy C-3.2.1).
- Within the major riverine floodplains of Suwannee County, the *Comprehensive Plan* requires vegetative buffers of 75 feet from perennial rivers and streams, and a 50-foot buffer adjacent to lakes, ponds, and wetlands. Furthermore, lots are required to have a length to width ratio of not more than 3:1, in order to limit the

density of lots along water bodies (Policy I.2.2).

Purchase of property rights

As discussed in Section 5.1, fee-simple acquisition offers the greatest assurance of protection of natural features, but it is also the most costly method of doing so. Where the objective is protection of natural protective features, fee-simple acquisition is most appropriate where the land is to be used for active public recreation and/or where public use facilities are to be constructed. Fee-simple acquisition may be appropriate for protection of environmentally sensitive resources, such as coastal barriers, dunes and wetlands. Fee-simple acquisition also may be appropriate where regulatory restrictions on development of natural protective features affect so much of a property parcel that the owner has no remaining economically viable use of the property, thus potentially triggering a takings claim (see Sidebar 5.1). This may also be viewed as an "inordinate burden" and potentially trigger a claim under the state Bert Harris Act (see Sidebar 5.2). Purchase and leaseback strategies also may be suitable for such situations.

Where the objective is simply to protect the natural feature and the amount of land affected will leave the property owner with sufficient land for other uses, purchase of development rights or conservation easements can be less costly. Local governments also may secure easements as development exactions.

- **Fee-simple acquisition.** A number of local governments have acquired coastal land using local, state, and federal funds. In most cases, these purchases have served multiple purposes including the provision of active or passive recreation opportunities and services as well as preservation of natural features for their environmental and/or natural protective functions.
 - About one-third of the counties in Florida have passed referenda to create and fund such land purchases. Some of these funds are used to match regional, state, and federal program grants or private land conservation efforts. Several important state funding sources are described in Sidebar 5.22.
 - **Palm Beach County has used funds from its Environmentally Sensitive Lands Acquisition General Obligation Bond Program to purchase environmentally significant lands within its coastal high-hazard area including the Juno Dunes Natural Area (271 acres) and the Paw-Paw Preserve (3 acres).**
 - **Indian River County has acquired over 460 acres on Hutchinson Island for conservation and passive recreation with about \$7.6 million in local environmental land acquisition bond funds, coupled with about \$11.8 million in matching funds from the Florida Communities Trust, the state**

State Funding Sources for Land Acquisition

Since 1990, the State of Florida has purchased more than one million acres of environmentally-sensitive land through Preservation 2000 (P2000), the Conservation and Recreational Lands (CARL) Program, the Land Acquisition Trust Fund (LATF), and the Florida Communities Trust (FCT).

The Florida Forever Program, successor to P2000, uses documentary stamp tax revenue for the acquisition of land. Florida Forever distributes \$300 million annually to the CARL Program and the Florida Recreational Development Assistance Program administered by FDEP; the water management districts; the FCT Program at FDCA; the Fish and Wildlife Conservation Commission; the Division of Forestry at the Department of Agriculture and Consumer Services; and the Division of Recreation and Parks and Office of Greenways and Trails at FDEP.

Local governments may nominate properties for purchase by the state under the Florida Forever Program. The FDEP Division of State Lands also provides matching grants to local governments for acquisition of lands for parks, trails, and green spaces within urban areas. For more information, see <http://www.dep.state.fl.us/lands/acquisition/FloridaForever/default.htm>.

The FCT provides grants to local governments and eligible non-profit environmental organizations, for the acquisition of land for community-based parks, open spaces, and greenways that further the outdoor recreation and natural resource protection needs identified in the goals, objectives, and policies of local **Comprehensive Plans**. For more information, see <http://www.dca.state.fl.us/ffct>.

Preservation 2000 Fund, and the U.S. Fish and Wildlife Service, with whom the county partnered for acquisitions associated with expansion of the Pelican Island National Wildlife Refuge.

- **St. Lucie County's Land Acquisition Task Force is considering options for financing the purchase of properties within flood-prone areas that have conservation value.**

- **Purchase-and-leaseback.** The purchase-and-leaseback strategy described in Section 5.1 can be used to restrict development of property and thereby assure protection of natural protective features without potential liability under constitutional takings doctrines or Florida's Bert Harris Act where such restrictions would otherwise substantially reduce the economic value of property.

The Red Hills Conservation Program

The Red Hills Conservation Program of the Tall Timbers Research Station in Leon County, Florida, has used donated conservation easements to protect more than 70,000 acres of longleaf pine-wiregrass community that had traditionally been used as hunting plantation lands. The easement conditions serve to protect the native biological communities and the underlying Floridan aquifer while permitting landowners to retain title to their property and to continue to live on it and sell it or pass it on to their heirs knowing that it will always be protected. Easements benefit the property owner by providing substantial federal income tax deductions as well as greatly reducing or eliminating estate taxes. For more information see <http://www.ttrs.org/index.htm>.

- **Purchase of development rights and conservation easements.** There has been little direct purchase of development rights or conservation easements by local governments for the purpose of protecting natural protective features. A number of private non-profit organizations have, however, successfully used this strategy for years to protect environmentally sensitive lands (see Sidebar 5.23).

Transfer of development rights

One of the most successful transfer of development rights (TDR) programs is that of Montgomery County, Maryland, which instituted the program in the 1980s to preserve farmland from encroaching development (see Sidebar 5.24). A number of jurisdictions have used TDR to protect environmentally sensitive areas, including the Lake Tahoe Regional Planning Agency, in California and Nevada, and Collier and Monroe counties, in Florida (see Sidebar 5.25). While none of these programs specifically targets wetlands, floodplains, or beaches and dunes, they can easily be applied to such natural protective features.

It is important to note that as a general rule, TDR is used to compensate property owners for **reduced** development density rather than a complete prohibition on development. If adequate protection of natural protective features requires an absolute ban on development, a TDR program modeled after that of the Lake Tahoe Regional Planning Agency may be more appropriate.

Sidebar 5.24

Transfer of Development Rights to Protect Farmland

Montgomery County, Maryland, has the most successful transfer of development rights (TDR) program in the nation, with over 46,000 acres preserved as of 2000. The sending area is the 90,000-acre Rural Density Transfer Zone. Originally zoned for 1 house per 5 acres, the area was downzoned in 1980 to allow construction of just 1 house per every 25 acres. The development rights, however, can be transferred at the old density of 1 house per 5 acres, thus creating an incentive to sell development rights. Because the county's relatively affluent population has been growing fast, developers in the receiving areas have had an incentive to purchase the rights and add density to their projects.

Montgomery County established a Credit Fund to serve as a buyer of last resort, but reportedly it has never had to buy a credit. The Credit Fund also guarantees loans by private institutions to landowners who use credits as collateral, i.e., who have not yet sold them. Thus the Montgomery County

system has functioned as a passive TDR system, although it has the institutional mechanism in place to operate as an active system.

Montgomery County's TDR program demonstrates what a TDR program needs to succeed:

1. The political will to lower densities in sending areas. This provides an incentive to sell development rights in certain areas and to raise densities in receiving areas, making the purchase of development rights appealing to developers.
2. The ability of a landowner to sell enough development rights to recoup the perceived loss of value brought about by the downzoning.
3. A balance between the supply of and demand for development rights that makes their price acceptable to both buyers and sellers.

Transfer of Development Rights to Protect Environmental Resources

The Lake Tahoe Regional Planning

Agency instituted a TDR program based on lot coverage rather than development density that was designed to protect the water quality of Lake Tahoe. The watershed of the lake, which lies in both California and Nevada, is divided into 9 hydrologic basins or zones. Transfers take place between parcels with different environmental sensitivity ratings that are located in the same hydrologic zone. Development is prohibited on lots with very high environmental sensitivity ratings. Lots that qualify as receiving lots may increase their lot coverage up to a maximum of 30% depending on the hydrologic zone within which they are located.

California established a Land Coverage Bank, which can buy and sell coverage credits. No similar institution exists within the Nevada portion of the watershed. Data on the numbers of transfers suggest that the Land Coverage Bank may have facilitated transfers on the California side.

Monroe County, Florida, which includes the Florida Keys and large parts of Everglades National Park and the Big Cypress National Preserve, uses a TDR program to protect environmentally sensitive areas by retiring development rights on private vacant land. Most of the rights transferred to date

have come from the middle and lower Keys and have gone to receiving areas in the middle and upper Keys where they are used to supplement allowable densities for single-family residential subdivisions and allowable floor-areas for commercial development.

Collier County, Florida, established a rural land use planning program within its Rural Fringe Mixed Use District, which consists of approximately 93,600 acres, or 7% of Collier County's total land area. The primary purpose of the TDR program is to establish an equitable method of protecting and conserving the most valuable environmental lands, including large connected wetland systems and significant areas of habitat for listed species, while allowing property owners of such lands to recoup lost value and development potential through an economically viable process of transferring such rights to other more suitable lands.

Properties within the Rural Fringe Mixed Use District are designated as Sending, Receiving, or Neutral areas, based primarily upon their environmental value.

- Permitted uses within Sending areas include agriculture, sporting and recreational camps, and single-family detached residences at a density of 1 dwelling unit per 40 acres (or pre-existing parcel size

of less than 40 acres if created prior to June 22, 1999). Residential density may be transferred at the rate of 1 unit per 5 acres (or pre-existing parcel size of less than 5 acres if created prior to June 22, 1999).

- The allowed density in the Receiving areas is 1 dwelling unit per 5 acres. For parcels of 40 or more acres, the density may be increased via development credits to a maximum of 1 dwelling unit per acre. For Rural Villages, where base densities are only 0.2 unit per acre, credits must be procured to attain the minimum gross density of 2.0 units per acre.
- The permitted density in Neutral areas is 1 dwelling unit per five acres. Properties in these areas are not eligible to participate in the stewardship credit program.

Development rights also may be transferred to the Urban Residential Fringe Subdistrict on a limited basis. Within these areas, credits of one dwelling unit per acre may be transferred from Rural Fringe Mixed Use District Sending Areas to increase allowable residential densities from 1.5 to 2.5 units per acre.

Exactions and dedications

- Pinellas County designates **wetland areas** as Preservation on the future land use map or requires developers to dedicate **conservation easements** for them; natural drainage ways, floodways, and floodplains are treated similarly.
- The City of Tallahassee Environmental Management Ordinance requires the granting of **flood zone conservation easements** on all developed property (see Sidebar 5.26).

Education and information

Education and information programs can be a significant complement to other voluntary and regulatory strategies for protecting natural protective features. Education and information initiatives directed towards property owners and developers are important for assuring that

Sidebar 5.26

Flood Zone Easements, City of Tallahassee Environmental Management Ordinance

Section 3.5 Easement Requirements.

(2)(a) Flood Zone Easements. *All areas subject to inundation post-development during storm events, up to and including a 25-year storm, shall be protected by a conservation easement prohibiting the owner from making any alterations other than those associated with infrastructure*

and vegetation management, and granting to the local governmental entity within whose boundaries a development site is located the right to periodically inundate the property. This easement shall also grant to the local governmental entity the power of enforcing the prohibition against alterations within the conservation easement.

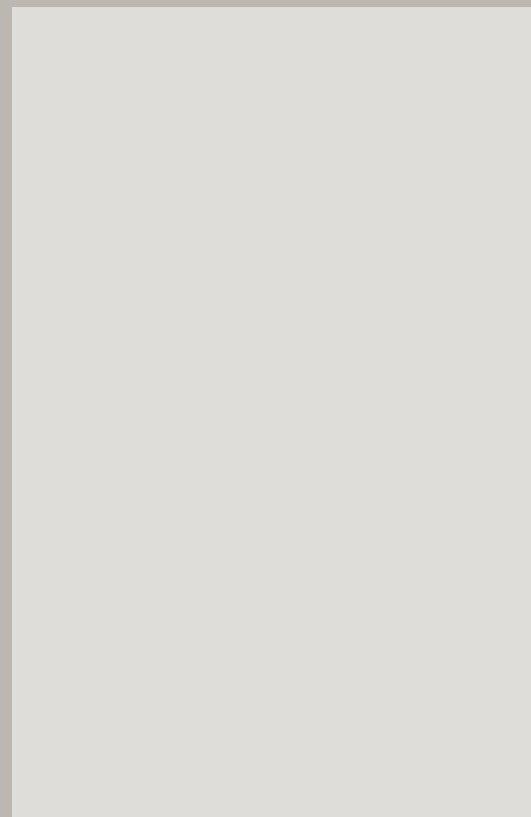
Sidebar 5.27

Homeowner's Guide to Wetlands

This FDEP handbook explains what wetlands are, why it is important to protect them, and how wetlands are regulated under federal, state, and local laws in Florida. In addition, it describes best management practices for residential construction, septic tank installation and maintenance, mangrove trimming, boat ramps, docks and piers, shoreline stabilization, and coastal construction. Copies are available online at http://www.floridadep.org/water/wetlands/docs/erp/wetland_guide.pdf.

Building Back the Sand Dunes

FDEP produced this brochure to assist private property owners who want to restore sand dunes on their property. The brochure describes alternative approaches for rebuilding sand dunes as well as initiatives property owners can take to protect them. Copies are available online at <http://www.dep.state.fl.us/beaches/publications/pdf/bldgbkvw.pdf>.



they understand the applicable land development regulations. An excellent example of such an initiative is the *Homeowner's Guide to Wetlands* published by FDEP in 2002 (see Sidebar 5.27). FDEP also has produced a brochure designed to help property owners restore degraded sand dunes (see Sidebar 5.28).

Enhance and restore natural protective features

Local government initiatives to enhance natural protective features have employed three principal strategies: (1) subdivision and site development regulations that require developers to restore degraded protective natural features, (2) capital programs to restore degraded or destroyed wetlands or beach and dune systems, and (3) capital programs for constructing and maintaining “hard” structures to mitigate flooding and coastal erosion. Capital programs are typically financed with a mix of local revenues and funds secured from the state and federal governments (see Sidebar 5.29).

Subdivision and site development regulations

- The Town of Longboat Key's land development code (LDC §158.102(F)(5)) includes provisions that require developers to **preserve, enhance, and restore sand dunes** on properties along the Gulf of Mexico (see Sidebar 5.16).
- St. Lucie County's land development code (§6.02.01(F)) includes regulations that require the **restoration of dunes** as

State and Federal Funding through the Florida Beach Erosion Control Program

The Florida Beach Erosion Control Program was established for the purpose of working in concert with local, state and federal governmental entities to achieve the protection, preservation, and restoration of the coastal sandy beach resources of the state. Under the program, financial assistance in an amount up to 50 percent of project costs is available to Florida's county and municipal governments, community development districts, or special taxing districts for shore protection and preservation activities located on the Gulf of Mexico, Atlantic Ocean, or Straits of Florida.

Qualifying activities include beach restoration and nourishment activities, project design and engineering studies, environmental studies and monitoring, inlet management planning, inlet sand transfer, dune restoration and protection activities, and other beach erosion prevention related activities. Eligible projects include those that have been authorized by Congress for federal financial participation and for which a nonfederal match is required. For more information, see <http://www.dep.state.fl.us/beaches/programs/bcherosn.htm>.

a condition of new development permits (see Sidebar 5.18).

- The City of Indian Rocks Beach's **2003 Beach Management Plan** recommends adoption of an exotic vegetation ordinance that requires the **removal of exotic species and the restoration of beachfront** areas by developers of new residential projects (see Sidebar 5.19).

Capital programs to restore degraded or destroyed natural protective features

- The Town of Longboat Key has **constructed wetlands** for use as storm water retention facilities on land acquired through **fee-simple acquisition**.
- Palm Beach County **restores and maintains dune vegetation** on privately-owned dunes where property owners are willing to **donate easements** to the county for this purpose.
- Indian Rocks Beach finances its share (25%) of a federal **beach renourishment** project within the city from its allocation of revenues from the Indian River County **tax on hotel and motel accommodations**.
- The Town of Longboat Key has established two **beach maintenance districts** within which special assessment property tax levies are used to pay off bonds that are sold to finance **beach renourishment and berm maintenance** work.
- Miami-Dade County has secured funds from the **federal Coastal Impact As-**

sistance Program, administered by the National Oceanic and Atmospheric Administration's Coastal Service Center, to finance dune vegetation restoration projects.

Capital programs for constructing and maintaining "hard" structures

In some instances, "hard" structures such as groins or jetties may be needed to prevent critical shore erosion. New seawalls are generally not permitted in Florida, but maintenance of existing seawalls may be necessary in some areas to prevent serious erosion and flood damage to adjacent upland development.

When floods affect a whole community or large parts of it, individual efforts on private property may not be adequate. Structural improvements initiated by local government may be needed, including storm water detention or retention facilities; drainage ditches, culverts, and canals; levees; and dams. Such improvements are among the most common projects included in county *Local Mitigation Strategies*. Many communities have undertaken master storm water management plans to guide expenditures for such facilities.

- The City of Jacksonville Beach is moving forward with **storm water and outfall re-engineering** to reduce the impacts of storm water flooding on homes and businesses. (This is a priority project in the Duval County *LMS*.)

Sidebar 5.30

Floridatown Drainage Improvement Project

Located on Escambia Bay in the western Panhandle, rural Floridatown is one of the most flood-prone areas in the entire state. Approximately 2,000 households experience localized flooding an average of three times per year. Public health is threatened by the discharge of septic tank waste and raw sewage. Needless to say, the problems caused by hurricanes in this poorly drained area are even worse.

Using federal Hazard Mitigation Grant Program funds, the Floridatown Drainage Improvement Project was designed to alleviate inadequate drainage systems, reduce the potential for structural flooding, reduce the exposure of residents and emergency personnel to raw sewage and septic tank wastes, and improve water quality in Escambia Bay.

The project will include an analysis of the hydrology and hydraulics of the area, evaluation of existing drainage facilities, review of environmental and historic resources, and engineering, design, and construction of a new storm water drainage system. The natural drainage system will be expanded through fee-simple acquisition of private land, purchase of flood easements, and construction of new drainage channels and other facilities. The estimated cost of the project is \$4.5 million.

- Escambia County has initiated a major **drainage improvement project** in the Floridatown area on Escambia Bay using federal **Hazard Mitigation Grant Program** (HMGP) funds (see Sidebar 5.30).
- Miami-Dade County has initiated a series of **flood control projects** using **HMGP funding**, in cooperation with the South Florida Water Management District, to remedy flooding problems in several areas (see Sidebar 5.31).

Section 5.4: Make Structures More Resistant to Natural Hazard Forces

One of the most cost-effective mitigation measures is to design and construct new buildings and retrofit existing buildings to better withstand the effects of natural disasters. Local governments to do so use three principal strategies:

- adopt and enforce building codes that govern the design and construction of private and public buildings;
- promote the voluntary use of additional protective measures in new private buildings and the retrofitting of existing structures; and
- adopt capital expenditure policies and implement capital programs to build and retrofit public facilities that are more resistant to natural hazard forces.

Sidebar 5.31

Miami-Dade County C-4 Basin Flood Control Project

South Florida's system of levees and water control structures were constructed in the 1950's and designed for half the population that now reside in the area. Miami-Dade County's **Local Mitigation Strategy** includes five major flood projects to mitigate floods in susceptible areas, primarily within the C-4 Basin. The cities of Sweetwater and West Miami, and the Flagami neighborhood of Miami are subject to flooding following significant periods of above average rainfall in part because the C-4 canal that drains the area is unable to convey the excess water. Other communities in the vicinity, including the Cities of Coral Gables and South Miami, and other portions of Miami, are also affected by high water levels in the C-4 Canal. Approximately 500,000 people live or work in the affected basin.

The South Florida Water Management District has proposed an extensive series of improvements that will enhance storm water conveyance through the C-4 Canal with funding provided by the Hazard Mitigation Grant Program including the following:

- Construction of a 600 cubic-feet-per-second pump station at a total cost of \$3.4 million.
- Dredging of the C-4 canal upstream to increase the canal conveyance at a total estimated cost of \$5.3 million.
- Construction of a 1-mile berm on the north C-4 canal bank in the City of Sweetwater to act as a barrier against floodwaters under high water conditions, for a total cost of \$400,000.

In addition, the City of West Miami experienced extreme flooding during an October 2000 storm. The city is modeling its storm water systems to ascertain what will be required to minimize the flooding. The city requested HMGP funds for construction of the following:

- exfiltration trenches to manage short-term rainstorms, and
- an interconnected drainage system to transport more storm water to three pump stations strategically located to discharge significant amounts of runoff into the C-4 canal.

State regulations governing the preparation of local *Comprehensive Plans* do not address building codes except in the context of the *coastal management element* that must be included in the plans of coastal communities. These communities are required to identify measures that can be used to reduce exposure to coastal flooding hazards, including structural modification, and they are directed to adopt one or more policies and regulatory or management techniques for achieving hazard mitigation, which may include regulation of building practices. *Coastal element* regulations also require local governments to inventory infrastructure within their coastal high-hazard areas (CHHAs) and to analyze the potential for relocating, mitigating or replacing threatened infrastructure in those areas.

While building codes primarily affect new construction, they also may be applied to older, nonconforming structures that were built under a previous building code. Typically, the local building code, or a separate ordinance, defines a threshold for the value of remodeling, repair, or reconstruction, above which the structure must be brought into conformance with current code standards. Under National Flood Insurance Program (NFIP) regulations, the threshold for defining “substantially damaged” and “substantially improved” is 50% of the market value of the structure. The Florida Building Code has a similar threshold – existing structures must be rebuilt in conformance with all code requirements when repairs or alterations performed

within a 12-month period exceed 50% of the value of the existing building (§§3401.7.2.6 and 3401.8.3.5 FBC). Thus, there may be cases in the aftermath of a disaster where damaged structures are required to be rebuilt to current code and, as a result, are substantially less vulnerable to future hazards.

Local government initiatives to promote voluntary use of additional protective measures, including financial assistance to private property owners for elevation of flood-prone structures, are often undertaken in post-disaster settings with federal funds available from the Hazard Mitigation Grant Program (HMGP). Similar initiatives also may be competitive for funding under the federal Pre-Disaster Mitigation (PDM) grant program authorized under the Disaster Mitigation Act of 2000. Similarly, local government initiatives to relocate or mitigate vulnerable public facilities and infrastructure often occur during post-disaster recovery and redevelopment with HMGP funds.

Specific best management practices described in this section include the following:

- ✓ enforce the Florida Building Code;
- ✓ comply with National Flood Insurance Program regulations including participation in the Community Rating System;
- ✓ adopt and enforce more stringent building code standards;
- ✓ adopt incentive zoning for inclusion of additional protective measures in new developments;

- ✓ initiate capital programs for financing shutter and elevation retrofit programs for existing private buildings;
- ✓ promote education and information programs directed at private property owners; and
- ✓ adopt capital expenditure policies and programs to build and retrofit disaster-resistant public facilities.

Adopt and enforce building codes

As noted in Section 2.3, local governments are required to adopt and enforce the Florida Building Code, which includes standards governing the design and construction of private and public structures for resisting damage from wind-borne debris, as well as standards for elevating and/or flood-proofing habitable buildings within flood hazard areas defined pursuant to the National Flood Insurance Act. Within the areas demarcated by the state Coastal Construction Control Line (CCCL), these standards are supplemented by standards set forth in regulations adopted and enforced by the Florida Department of Environmental Protection (FDEP), Bureau of Beaches and Coastal Systems (see Sidebar 5.32). Local governments are authorized to adopt more stringent standards than those contained in either the Florida Building Code or under the CCCL permitting program. Local governments also may opt to administer the CCCL permits in lieu of the FDEP.

Three best practices are recommended:

State Coastal Construction Control Line Standards

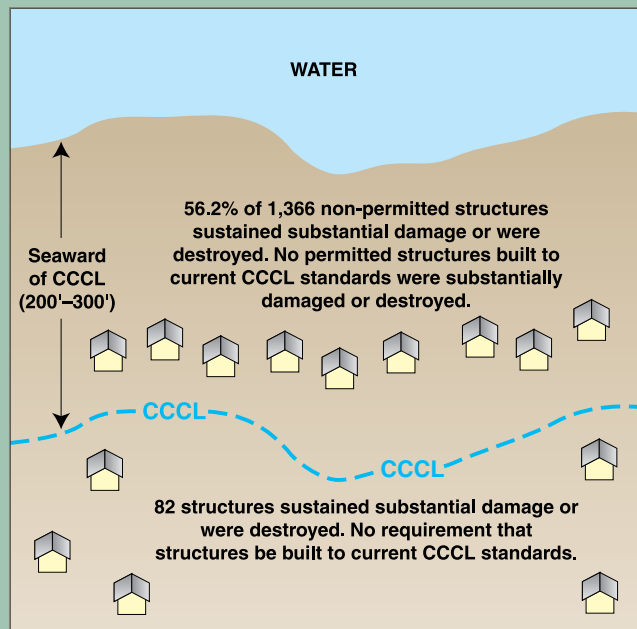
The state Coastal Construction Control Line (CCCL) permitting program protects Florida's beaches and dunes through a set of siting and design criteria that apply to habitable structures built within the CCCL zone of jurisdiction. The CCCL demarcates the portion of the beach and dune system that is likely to be eroded from a 100-year coastal storm.

The CCCL location regulations require that habitable structures be located as far landward of the CCCL as possible and sufficiently landward of the beach and dune system to permit natural shoreline fluctuations and to preserve dune stability and natural recovery following storm-induced erosion. In addition, habitable structures must be setback from the mean high water line a distance equal to 30 times the average annual erosion rate.

Specific design and construction standards must be met that are designed to resist wind, wave, and erosion conditions, and accompanying hydrostatic and hydrodynamic loads, associated with a 100-year storm event. For more information on the Coastal Construction Control Line standards, see <http://www.dep.state.fl.us/beaches/programs/ccclprog.htm>.

Experience with Hurricane Opal: In terms of both erosion and structural damage, Hurricane Opal, which hit Florida in 1995, was one of the most destructive storms to ever strike the coastal zone of the state. With sustained winds of 100 mph, gusts of up to 125 mph, and storm surges in excess of 20 feet, Opal's impact was most severe across the Panhandle counties, with lesser damage occurring throughout the entire Gulf coast of Florida. The majority of the structural damage within the coastal zone was due to storm surge, waves, and associated erosion. Most damage occurred within a zone extending 200 to 300 feet from the shoreline (see Figure 5.4). According to the Florida Department of Environmental Protection, none of the 576 major habitable structures

located seaward of the CCCL and permitted by the state under current standards sustained substantial damage during Hurricane Opal. By contrast, 768 of the 1,366 pre-existing non-permitted major habitable structures seaward of the CCCL (56%) were substantially damaged.



Source: URS Corporation, 2004.

- ✓ enforce the Florida Building Code;
- ✓ comply with National Flood Insurance Program regulations; and
- ✓ adopt and enforce more stringent building code standards where warranted.

Enforce the Florida Building Code

The Florida Building Code (FBC) is based on national code models and consensus standards for the design and construction of buildings, tailored to Florida's needs. It integrates minimum plumbing, mechanical, gas, electrical, and building codes with the fire protection and life safety requirement of the Florida Fire Prevention Code. In addition, the FBC incorporates several new technical and procedural changes, some of which relate to hazard mitigation, including the following:

- Windows and glass doors are required to meet new testing standards that include water resistance, air leakage, mandatory load deflection, structural tests, and other specific installation requirements.
- Minimum requirements apply within designated wind zones (see Figure 5.5) defined by the American Society of Civil Engineers (ASCE) to ensure that buildings in high-intensity hurricane areas can withstand the impact of wind-borne debris. Buildings must either be designed to withstand pressure differentials that occur when windows and doors are pierced, or all exterior glass windows and doors

Figure 5.4: Storm surge damage from Hurricane Opal.



Source: E. Jay Baker.

must be made of shatter-resistant glass or protected by shutters.

- All structures must comply with the requirements of the FBC.
- All manufactured buildings (*modular housing*) in Florida can only be installed if they are approved and carry the insignia or seal of approval of the State Department of Community Affairs and comply with the FBC. Mobile homes (*manufactured housing*) however, are regulated separately by the U.S. Department of Housing and Urban Development (see Sidebar 5.33).

Sidebar 5.33

Regulation of Mobile Homes and Manufactured Buildings in Florida

Mobile homes. The design and construction of mobile homes, also referred to in the federal regulations as “manufactured housing,” are regulated by the federal Department of Housing and Urban Development (HUD) under Title 24, Section 3280 of the **Code of Federal Regulations**. Each mobile home must carry a permanently affixed decal that attests to its conformance to the HUD regulations. Mobile homes sold in Florida since 1994 must meet HUD wind design standards for Wind Zone II or Wind Zone III (see Figure 5.6).

Under the HUD regulations, the design wind speed for Wind Zone III is 110 miles

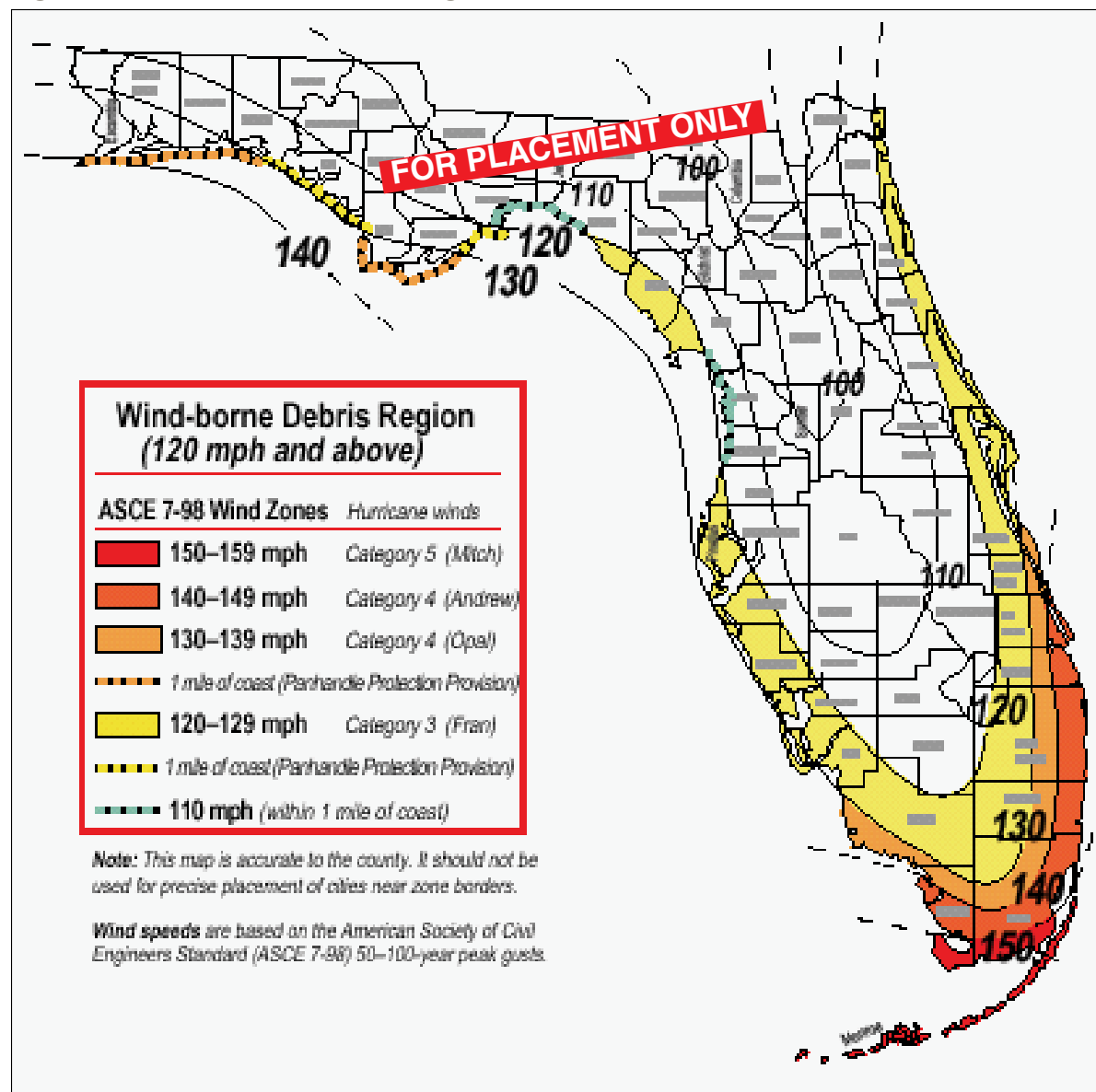
per hour (mph), fastest mile. This is equivalent to a 130 mph, 3-second gust standard, or the upper-end of the Category 3 120 -129 mph, 3-second gust ASCE 7-98 standard depicted in Figure 5.5. The fastest mile design standard for mobile homes in Wind Zone II is 100 mph. This is equivalent to a 120 mph, 3-second gust standard, which is the bottom of the ASCE 7-98 Category 3 standard.

Florida is one of the first states to adopt uniform installation requirements for mobile homes. Mobile homes in Florida must also comply with state installation standards promulgated by the State Department of Highway Safety and Motor Vehicles that specify founda-

tion design and construction and the use of tie downs and anchors to resist wind, flood, flotation, overturning, sliding, and lateral movement (§320.8325 F.S.).

Manufactured buildings. The design and construction of manufactured buildings, also known as “modular housing,” are governed by the standards of the Florida Building Code and are subject to the wind-borne debris standards that correspond to those for the wind zones shown on Figure 5.5. Such structures may be used for non-residential as well as residential purposes. In Florida, manufactured buildings must carry the insignia or seal of approval of the State Department of Community Affairs.

Figure 5.5: FBC Wind-borne debris regions of Florida.



- Flood elevation and floodproofing standards, set pursuant to the National Flood Insurance program (NFIP), must be met by all structures built within the “A” and “V” zones demarcated on NFIP Flood Insurance Rate Maps (see next section).

As well as retaining their previous roles, local governments now have the authority to:

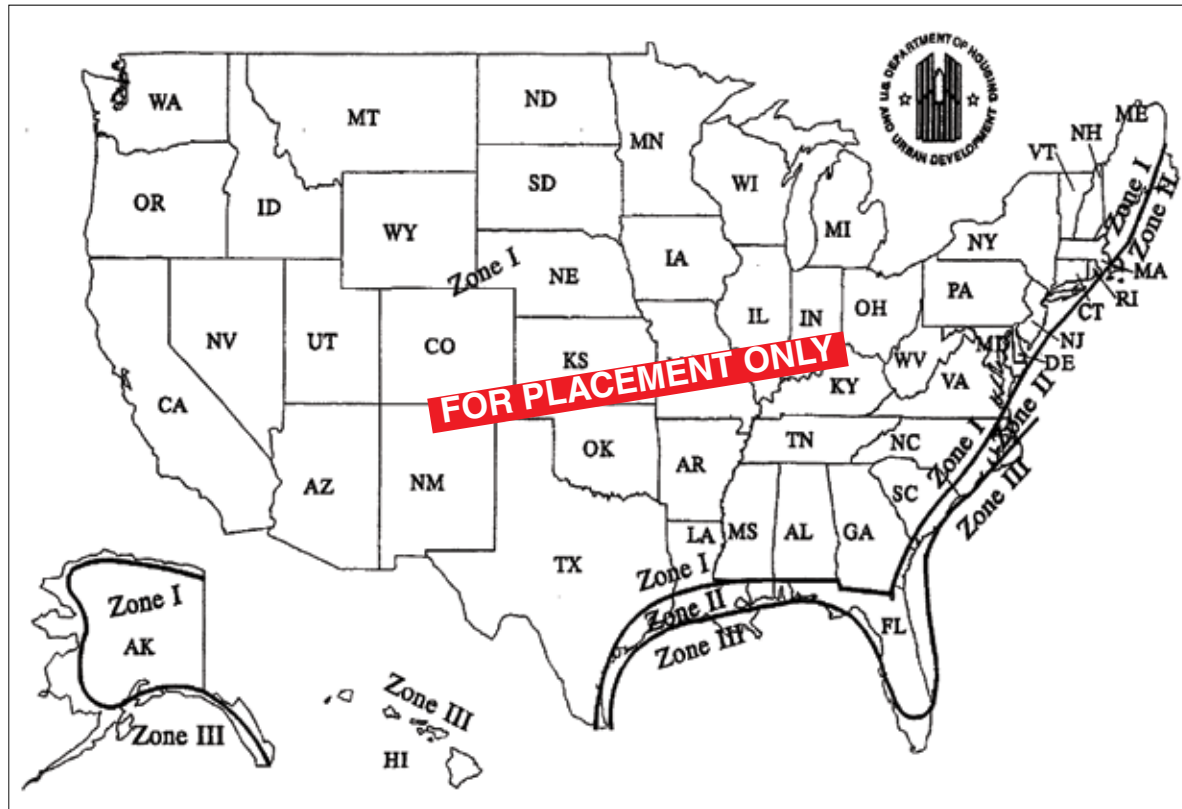
- enforce and interpret the FBC, impose fees or fines on architects, engineers, or contractors that do not comply with the building code;
- conduct plan reviews and inspections of state-owned buildings; and
- amend the code to be more stringent when local conditions justify such action.

Studies have shown that compliance with the FBC can result in substantial reductions in hurricane losses (see Sidebar 5.34). However, as with any building code, success depends on local enforcement. The Florida Department of Community Affairs (FDCA) has developed course materials and on-line training programs to help local officials effectively implement the FBC. Information about FBC training is available on the FBC website at <http://www.floridabuilding.org/tr/default.asp>.

ISO Properties Incorporated (ISO) has developed a Building Code Effectiveness Grading Schedule (BCEGS) that assesses the building codes in effect in a particular community and how the community enforces those codes, with special emphasis on mitigation of

Source: <http://www.dca.state.fl.us/fhcd/fbc/maps/2003-Wind-borne-map.pdf>.

Figure 5.6: Housing and Urban Development wind zone map for manufactured housing (mobile homes).



Source: 24 CFR 3280.305.

losses from natural hazards. Each community's BCEGS classification is based on three factors: (1) administration of codes, (2) review of building plans, and (3) field inspections. Communities are graded on a scale of 1 to 10, with 1 representing exemplary enforcement of a model building code or a local building

code that demonstrates equivalence to a model building code.

Private insurance premium discounts have been proposed by ISO based on the BCEGS classification system. The Florida Legislature, in legislation passed in the spring of 1995, requires insurers to either adopt the ISO discounts or develop their own discounts

tied to the ISO grading plan. Building code enforcement discounts have been required in all residential rate filings made with the Florida Department of Insurance since June 1, 1996. Figure 5.7 illustrates the distribution of BCEGS class scores for Florida communities for personal and commercial insurance lines. The personal lines classification addresses building code adoption and enforcement for single and 2-family dwellings. The commercial lines classification is for all other buildings.

Comply with National Flood Insurance Program Regulations

A large proportion of Florida communities are exposed to coastal and/or inland flooding. The National Flood Insurance Program (NFIP) is a program administered by the Federal Emergency Management Agency (FEMA) that makes flood insurance available to property owners in communities that have enacted floodplain management regulations in compliance with NFIP regulations (44 CFR Section 60.3) Under the FBC, local governments in Florida are required to adopt and enforce the NFIP standards for flood hazard areas within their jurisdiction.

The NFIP standards are based on the 100-year "base flood," the flood that has a 1% probability of occurring in any given year. To provide communities with the information they need to enact and enforce floodplain management ordinances in compliance with the NFIP regulations, FEMA conducts flood hazard studies and publishes the results in the form of

Sidebar 5.34

Benefits of Implementing the Florida Building Code

The Florida Department of Community Affairs undertook a demonstration and education project to illustrate the costs and benefits of implementing the Florida Building Code (FBC) for single-family houses. The University of Florida and Applied Research Associates, Inc was conducted the project. The study focused on the costs of building to the new design wind speed map in both the Wind Borne Debris Regions (WBDR) and non-Wind Borne Debris Regions (non-WBDR). Using three actual houses and computer modeling for 25 other structures based on those three houses, the benefits of improved wind load design and construction were estimated by evaluating how houses built according to the FBC would perform in hurricanes compared to the same houses built to the older Standard Building Code (SBC).

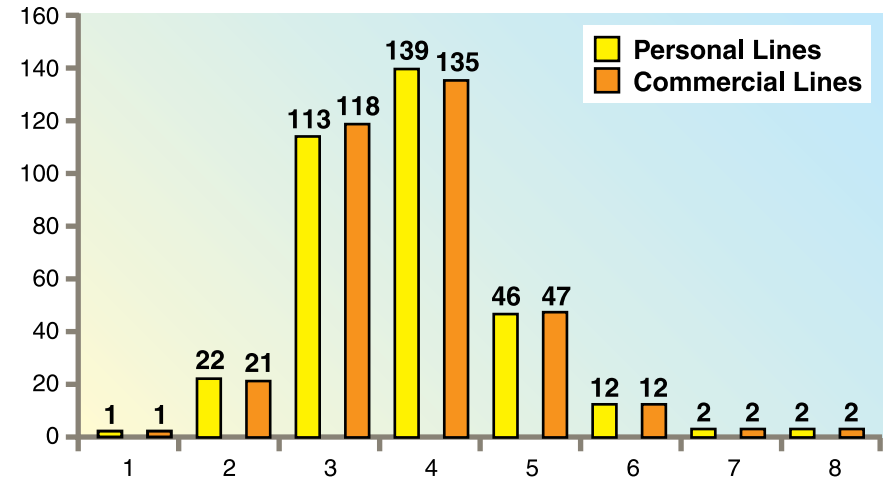
Construction in accordance with the FBC will result in stronger houses and lower losses from hurricanes,

with the “enclosed” design using impact-resistant coverings or glazing providing the greatest loss reduction. The increased costs of building to the FBC varied from \$0.77 per square foot on the low end to \$7.45 per square foot on the high end. These translate into roughly a 0.8 percent to 10.1 percent increase in selling price.

The study found that houses in the non-WBDR and WBDR will essentially break even for cost of construction versus losses avoided. However, there are clearly long-term economic benefits of reduced damage and loss for residences built to the FBC. The study showed that by adopting the FBC, losses from hurricanes will decrease by about 50 to 55% relative to a house designed to the minimum standards of the SBC, with much of the savings attributed to the roof covering. Additionally, an enclosed building design with impact resistant coverings is the design option that yields the greatest loss reduction.

Source: Florida Department of Community Affairs, Florida Building Code Cost and Loss Reduction Benefit Comparison Study, 2002.

Figure 5.7: Distribution of Florida communities by ISO BCEGS class.



Flood Insurance Study (FIS) reports and Flood Insurance Rate Maps (FIRMs).

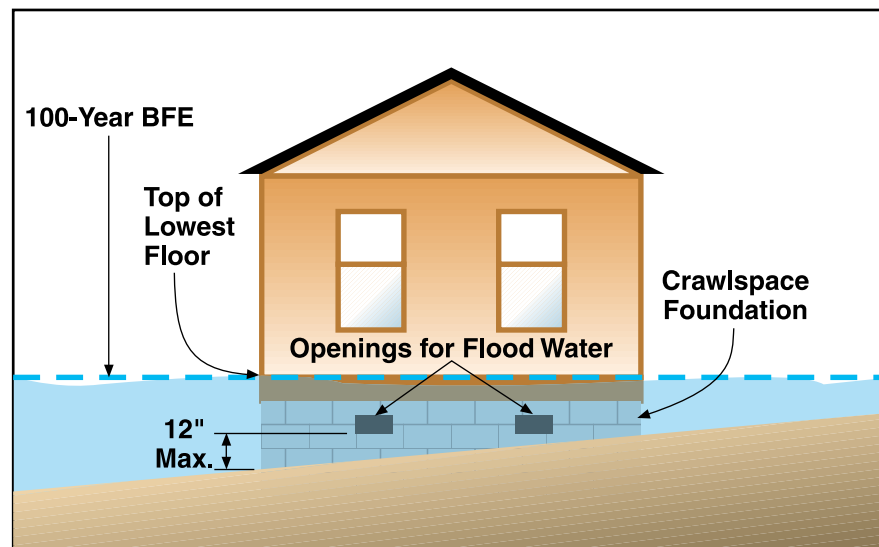
The FIRMs for coastal regions depict two types of “special flood hazard areas”:

- V-zones, which are defined as “special flood hazard areas inundated by the 100-year flood and which support a 3-foot wave or coastal floods with velocity hazards” and
- A-zones, which are defined as “special flood hazard areas inundated by 100-year floods.”

The minimum NFIP standards do not prohibit development within the regulatory

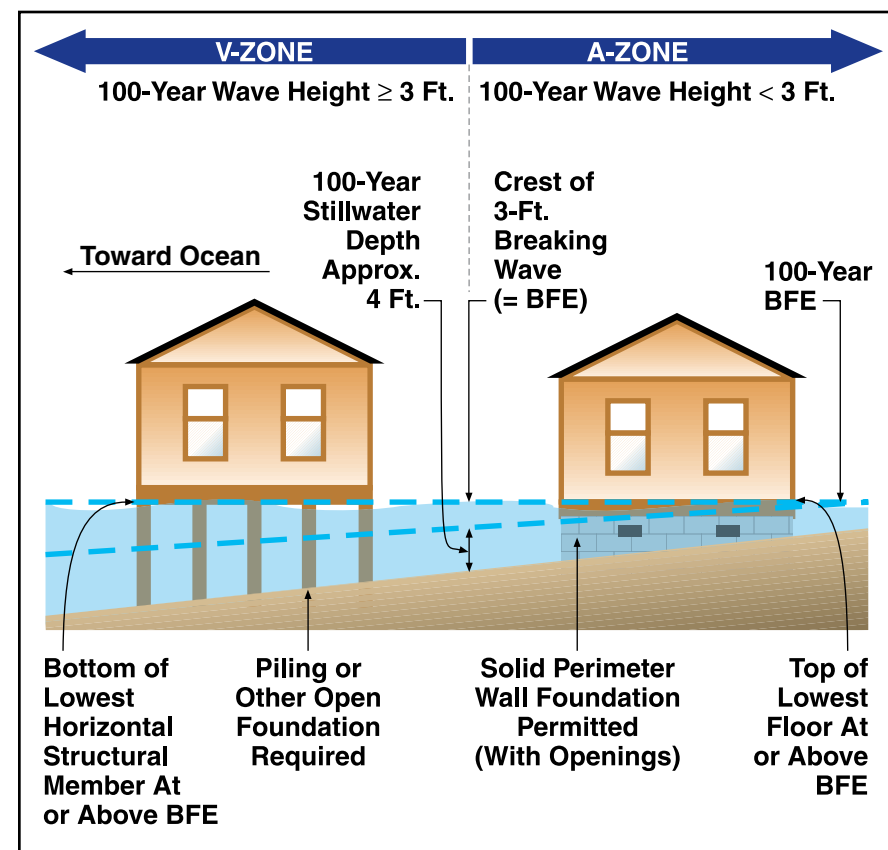
floodplain (V- and A-zones), but require the floodproofing or elevation of the first floors of buildings at or above the 100-year base flood elevations (BFEs) that are depicted on the FIRMs. The minimum standards, which apply to newly constructed, substantially damaged, and substantially improved buildings, primarily concern the type of foundation, the height of the lowest floor, the installation of building utility systems, the use of flood-resistant mate-

Figure 5.8: National Flood Insurance Program regulatory parameters.



Source: Federal Emergency Management Agency, 2000.

Figure 5.9: National Flood Insurance Program velocity and flood hazard zones.



Source: Federal Emergency Management Agency, 2000.

rials, and the use of the area below the lowest floor. The minimum requirements for V-zone buildings are more stringent than those for A-zone buildings (see Figures 5.8 and 5.9).

Adopt and enforce more stringent building code standards

As noted above, Florida communities are authorized to adopt and enforce building code standards that exceed the minima contained in the FBC, and they may set requirements that exceed those of the state's CCCL permitting program within the CCCL zone. Local governments that adopt and enforce building standards that exceed the minimum in the NFIP regulations can earn points under FEMA's Community Rating System (CRS) that result in reduced flood insurance premiums for their residents and property owners (see Sidebar 5.35).

One example of a more restrictive building code standard is the recommendation in FEMA's *Coastal Construction Manual* that communities apply V-zone standards to structures built in "coastal A-zones." The NFIP regulations do not differentiate between coastal and non-coastal A-zones. FEMA's *Coastal Construction Manual* (see Sidebar 5.36), however, does make this distinction. Coastal A-zones are defined as the portion of the special flood hazard area landward of a V-zone or landward of an open coast without mapped V-zones, in which the principal sources of flooding are astronomical tides, storm surges, seiches, or tsunamis, rather than runoff from rainfall

Sidebar 5.35

National Flood Insurance Program Community Rating System

The Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that contribute to meeting three goals: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance. Flood insurance premium rates paid by residents of a participating community are discounted to reflect the reduced flood risk resulting from the community's actions.

Communities are classified into one of 10 classes based on 18 creditable activities, organized under four categories: (i) public information, (ii) mapping and regulations, (iii) flood damage deduction, and (iv) flood preparedness. Examples of specific creditable activities include adopting local building code standards that exceed the NFIP standards; managing development in areas not mapped on NFIP Flood Insurance Rate

maps; floodproofing or relocating existing public and private structures; helping insurance agents obtain flood data; and helping citizens obtain flood insurance.

Flood insurance premium rates in participating communities are discounted in increments of 5%; i.e., a Class 1 community receives a 45% premium discount, while a Class 9 community receives a 5% discount (a Class 10 is not participating in the CRS and receives no discount).

At present about 45% of Florida's communities are participating in the CRS program covering about 92% of the flood insurance policies in the state resulting in total annual flood insurance premium savings of more than \$78 million for their constituents.

For more information see <http://www.fema.gov/nfip/crs.shtm> and FDCA's publication, "Community Rating System: A Comprehensive Approach to Flood Mitigation."

and/or snowmelt. Because coastal A-zones may be subject to the types of hazards present in V-zones, such as wave effects, velocity flows, erosion, scour, and high winds, the FEMA manual recommends that buildings in coastal A-zones be designed to meet the regulatory requirements for V-zone buildings. These include performance requirements concerning resistance to

flotation, collapse, and lateral movement; and prescriptive requirements concerning elevation, foundation type, engineering certification of design and construction, enclosures below the base flood elevation, and use of structural fill.

Table 5.2 is excerpted from a longer table that summarizes the NFIP regulatory requirements for A, coastal A, and V-zones, and

Sidebar 5.36

FEMA's Coastal Construction Manual

This manual provides broad coverage of practices and techniques from planning to site layout to construction detailing in coastal areas. The materials and information in the manual have applicability throughout the planning, permitting, and construction processes and to the types of specific hazard situations found in Florida. For more information, see <http://www.fema.gov/hazards/floods/lib55.shtm>.

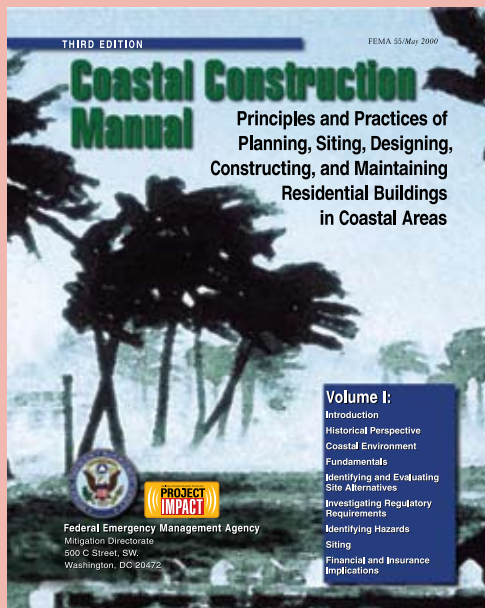








Table 5.2: Summary of National Flood Insurance Program regulatory requirements and recommendations for exceeding the requirements.

			
	V Zone	Coastal A Zone	A Zone
	Guidance ^a	Guidance ^a	Guidance ^a
	 X-ref ^b	 X-ref ^b	 X-ref ^b
General Requirements			
Design	Requirement: building and its foundation must be designed, constructed, and anchored to prevent flotation, collapse, and lateral movement due to simultaneous wind and water loads	Section 6.4.3.3 Requirement: building must be designed, constructed, and anchored to prevent flotation, collapse, and lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy Recommendation: same as V zone	Section 6.4.3.1 Requirement: building must be designed, constructed, and anchored to prevent flotation, collapse, and lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy
Materials	Requirement: structural and nonstructural building materials at or below the BFE must be flood-resistant	Section 6.4.3.1 Requirement: structural and nonstructural building materials at or below the BFE must be flood-resistant TB2 (see Appendix H)	Section 6.4.3.1 Requirement: structural and nonstructural building materials at or below the BFE must be flood-resistant
Construction	Requirement: building must be constructed with methods and practices that minimize flood damage	Section 6.4.3.1 Requirement: building must be constructed with methods and practices that minimize flood damage	Section 6.4.3.1 Requirement: building must be constructed with methods and practices that minimize flood damage
Siting	Requirement: all new construction shall be landward of mean high tide; alteration of sand dunes and mangrove stands that increases potential flood damage is prohibited Recommendation: site new construction landward of the long-term erosion setback and landward of the area subject to erosion during the 100-year coastal flood event	Section 6.4.3.3 CFR 60.3(e)(3) and 60.3(e)(7) Section 6.5.2 Section 7.5 Chapter 8	CFR 60.3(c)(10) Requirement: encroachments into the SFHA are permitted as long as they do not increase the BFE by more than 1 foot ^c ; encroachments into the floodway are prohibited Section 6.5.2 Section 7.5 Chapter 8

Source: Federal Emergency Management Agency, Coastal Construction Manual, 2000.

recommendations for exceeding the requirements. For the complete table, please consult the *Coastal Construction Manual*. For more information see *A Local Official's Guide to Implementing the National Flood Insurance Program in Florida*, Florida Department of Community Affairs (2000) or see <http://www.dca.state.fl.us/brm/nfip.htm>.

Recent experience with Hurricane Charley (August 2004) has heightened awareness of the vulnerability of mobile homes to wind damage (see Figure 5.10). Preliminary assessments indicate that mobile homes constructed to the new HUD standards and meeting state installation requirements better endured the wind effects of Hurricane Charley. The Florida Department of Community Affairs recommends the following additional local policies concerning mobile homes:

- Require that mobile home units be new, *previously uninstalled* manufactured housing units that are built to HUD post-1994 construction standards and installed to post 1999 state installation requirements.

Moving and re-installation of a manufactured housing unit can compromise the structural integrity of the unit. The Federal Housing Administration, which finances manufactured housing, will not finance “moved” units.

- Require mobile home units (manufactured housing) to bear the HUD compliance decal and meet the HUD wind resistance construction standards for the appropri-

ate wind zone category for that county, i.e., Wind Zone II or III standards.

Wind Zone III standards are the highest HUD wind zone standard (see Sidebar 5.33). Manufactured homes installed in 14 of Florida's 67 counties must meet Wind Zone III standards under the HUD regulations (see Figure 5.6): Broward, Charlotte, Collier, Franklin, Gulf, Hendry, Lee, Martin, Manatee, Miami-Dade, Monroe, Palm Beach, Pinellas, and Sarasota.

- Inspect and approve the installation of all mobile homes (manufactured housing) to assure that they are installed or retrofitted to meet post-1999 state installation standards (§15C-1.0102 *F.A.C.*) and the manufacturer's installation instructions.
- At the time of the installation inspection, verify that the mobile home unit bears the required HUD compliance decal to meet the HUD wind resistance construction standards for the appropriate wind zone



Source: Florida Department of Community Affairs, Division of Emergency Management.

Figure 5.10: Mobile home wind damage from Hurricane Charley.

category for that county, i.e., Wind Zone II or III.

- In order to maintain safety during a hurricane, no attachments or add-ons shall be added to mobile home units (manufactured housing), unless that add-on follows the manufacturer's specifications for such additions and the additions meet the requirements of the FBC.

Evidence suggests that add-ons to manufactured housing such as garages and sun rooms can compromise the integrity of the unit, especially when the add-ons are directly attached to the manufactured housing structure. Likewise, some experts believe that certain types of add-on configurations can make the manufactured

housing unit more susceptible to severe wind damage.

- Designate mobile-home units constructed prior to the effective date of the 1994 HUD standards as non-conforming structures. Require that they be replaced with units meeting the current standards if they are “abandoned” as that term is defined in the local government’s land development code. Develop provisions for code enforcement that requires the removal and proper disposal of non-repairable manufactured units.

This will promote replacement of older mobile home unit with newer manufactured housing and increase public safety.

- In order to help citizens transition from older mobile home units to new manufactured housing constructed post-1994 HUD requirements and installed post-1999 state requirements, programs should be put into place to assist with the replacement of units constructed before 1994 or the retrofitting of the installation for those homes installed before 1999.

Indian River County and the Town of Indian River Shores are two examples of Florida communities that have chosen to adopt and enforce more stringent standards than those contained in the Florida Building Code.

- Indian River County requires that **first floor elevations** be constructed 6 inches above the 100-year base flood elevation.

- The *coastal management element* of the Indian River Shores *Comprehensive Plan* includes a policy that stipulates that the town shall continue to enforce local existing building code **wind design standards**, which require that all construction within the town be designed to withstand 140 mph winds.

Sidebar 5.37

Nocatee Development of Regional Impact Development Order: Safe Room Requirement

Section 26(b) of the DRI development order for the Nocatee PUD located in a Category 4 evacuation zone in Duval and St. Johns counties, requires the construction of safe rooms in detached single-family residential units.

Any single-family residential detached dwelling unit within Nocatee (in both St. Johns and Duval County) shall be constructed with a safe room. Single-family attached units such as townhouses may be constructed with a safe room or be engineered and constructed to meet a 130-mile per hour wind load. Safe rooms shall be designed by a Florida registered professional engineer generally in accordance with the design guidelines found in FEMA publication “TAKING SHELTER FROM THE STORM,” First Edition: October 1998, on file with the Northeast Florida Regional Planning Council, except as follows:

Live load: 150 MPH minimum.

Room size: 48 Square feet minimum (see FEMA publication for occupancy above 4 persons).

Property covenants will provide basic information about safe rooms and prohibit alterations that will negate the safe room function. Education information concerning safe rooms shall be maintained and distributed by Housing Developers and/or Community Development Districts within the Nocatee Development. All residents of this development shall be provided with information regarding the vulnerability of the development to the impacts of hurricanes. This information shall take the form of education materials designed to increase evacuation participation.

Safe Rooms

Safe rooms may be constructed within individual residences, in commercial buildings to protect employees, and in community shelters, both public and private, for example in mobile home parks. In hurricane-

prone areas, it may be appropriate to require them only in areas with relatively low flood hazard risk, for example, outside of 100-year flood hazard areas and landward of Category 3 storm surge or evacuation zones. FEMA has

developed a series of guidance documents and resource materials that local jurisdictions and individual property owners can use to develop safe room shelters.

Design Considerations

TO AVOID THIS... Make sure the safe room is adequately anchored to resist overturning and uplift.

The walls, ceiling, and door of the safe room must withstand wind pressure and resist penetration by shrapnel, missiles, and falling debris.

The connections between all parts of the safe room must be strong enough to resist the wind forces without failing.

...DO THIS Connections to existing house walls must be reinforced so that damage to the house will not cause damage to the safe room.

Possible locations in your house for a safe room include: the first floor in a basement or finished or concrete slab-on-grade foundation.

Structural steel beams and joists provide the greatest protection for a safe room. However, if a first floor is not available, it also provides the most likely option. Using a garage, machine room, and pool room for a safe room has been found an alternative if a second or detached house is standing after failure of the house remains above ground.

In a house with a slab-on-grade or foundation foundation:

- ✓ Corner of the house or a free-standing, self-supporting wall is to the house.
- ✓ Bathrooms, study rooms, or other interior room with adequate space that can be quickly accessed.
- ✓ Closet in storage room.

In a house with a basement:

- ✓ A free-standing addition to the basement.
- ✓ A bathroom, closet or other smaller room in the basement.
- ✓ In a corner of the basement, preferably where the basement walls are below the level of the ground.

Taking Shelter From The Storm

Building a SAFE ROOM Inside Your Home

The purpose of a safe room is to provide a space where you and your family can survive a tornado or hurricane with little or no injury.

There are several possible locations in your house for a safe room, but regardless of where you build it, your safe room must be able to remain standing through high winds, even if your house is severely damaged.

Did You Know...

Almost every state in the U.S. is subject to extreme wind storms, and the serious threat these events pose to buildings and their occupants.

Tornadoes strong enough to damage roofs, destroy mobile homes, crush or upend large homes, and take down the strongest steel-frame structures have occurred in almost every state.

Major hurricanes affected major parts of Florida and Gulf of Mexico coastal areas in the U.S., including Puerto Rico and the U.S. Virgin Islands.

Even states not normally considered susceptible to extreme wind events, such as Washington, New York, and Oregon, have experienced high winds. These winds, typically near their peak strength, include the Pacific Northwest coast.

FEMA, in cooperation with the Wind Engineering Research Center at Texas Tech University, has developed designs for wind shelters, or "safe rooms", that homeowners can build inside their houses. These shelters are designed to provide protection from the forces of extreme winds as high as 250 mph, including the impact of windborne debris.

Do You Need a Safe Room?

If your house was constructed within the last 10 years, it was probably built to code and will withstand minimum winds.

However, extreme events such as a tornado or hurricane can often cause winds much greater than those you think was designed for. Without built-in protection, an older structure may not be able to survive the high winds and debris that are involved during the design and construction of the building.

If you are concerned about wind hazards where you live, FEMA has developed a "homeowner's checklist" based on information about building performance in high wind areas as well as that built up over a period of historical data about hurricanes.

To determine your risk from extreme winds based on your geographic location, use the worksheet in the booklet described below. The worksheet can help you determine your risk from extreme winds based on your geographic location and whether a safe room or other shelter is appropriate for you.

Want to Learn More?

FEMA has prepared *Taking Shelter from the Storm: Building a Safe Room Inside Your House* for Homeowners and Builders. The book includes:

- ✓ Homeowner's Worksheet: Assessing Your Risk
- ✓ Design and construction techniques
- ✓ Cost estimates

Taking Shelter from the Storm: Building a Safe Room Inside Your House (FEMA Publication 2006-S0001) and FEMA Publication 2006-1000 (construction plans) are available from FEMA Publications (1-800-485-3049). This booklet is also available on the FEMA website: www.fema.gov/mit/saferoom

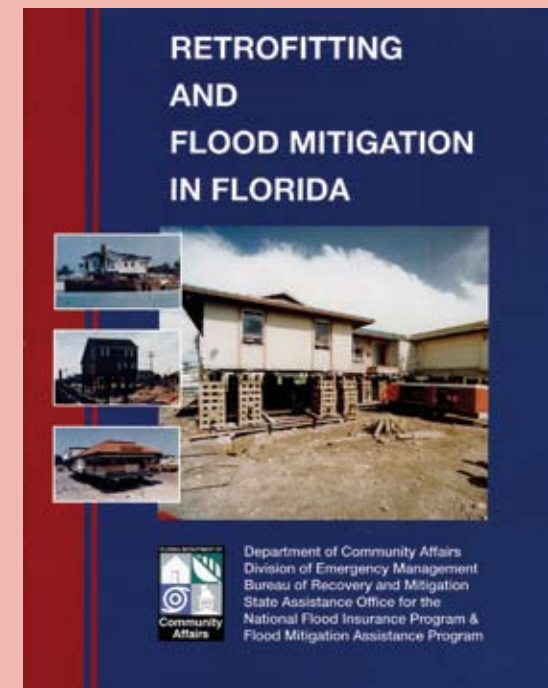
For more information see www.fema.gov/mit/saferoom.

Sidebar 5.39

Retrofitting and Flood Mitigation in Florida

This guide discusses flood mitigation and describes several retrofitting measures that can be applied to existing structures to make them less vulnerable to flooding. This guide is especially applicable to those structures that have sustained or are vulnerable to repetitive flood damage.

Source: Florida Department of Community Affairs, 2002.



A related example is the development order issued under Florida's Development of Regional Impact (DRI) procedures for the Nocatee PUD which requires the developer to include "safe rooms" in newly constructed detached single-family residential structures (see Sidebar 5.37). A "safe room" is a fortified space where one can safely ride out a tornado or hurricane (see Sidebar 5.38).

Promote voluntary use of additional protective measures

In addition to enforcing building codes, local governments can take several measures to encourage the voluntary construction of additional protective measures by developers and the owners of private structures. These include:

- incentive zoning for inclusion of additional protective measures in new developments;
- capital programs for financing shutter and elevation retrofit programs for existing private buildings; and
- education and information programs directed at private property owners who are building new structures or have existing buildings.

Incentive zoning

This is an option for encouraging developers to go beyond building code and land development code requirements in the design and construction of new developments and redevelopment projects. The City of Palo Alto, Cali-

fornia, permits a 25 percent increase in floor area ratio, or an additional 2,500 square feet of floor area, for redevelopment projects that voluntarily upgrade buildings to higher seismic safety standards. Incentive zoning offers an alternative to mandating the construction of safe rooms in new construction and redevelopment projects.

Capital programs for retrofitting private structures

Vulnerable structures in areas exposed to coastal storms and flooding can frequently be modified to further protect them from wind and flooding. The most commonly used retrofit measures include floodproofing, elevation, and wind-retrofitting. For more information, see FDCA's publication, "Retrofitting and Flood Mitigation in Florida" (Sidebar 5.39).

- ✓ **Floodproofing.** Two principal floodproofing measures have been used in Florida:
 1. wet floodproofing, which allows flood waters to enter portions of a building that can resist flood waters and that are not used as habitable areas (e.g., garages, crawl spaces) or that do not contain equipment and materials that would be significantly damaged; and
 2. dry floodproofing, which completely seals the exterior of a building to prevent the entry of flood waters.

Wet floodproofing is usually used for basements and garages. Dry floodproofing is appropriate for buildings on sound slab founda-

tions that are subject to no more than 3 feet of flooding. Most walls and floors are not strong enough to withstand the hydrostatic pressure from more than 3 feet of water.

- ✓ **Elevation.** Another retrofit measure that is increasingly being used in Florida and other floodprone states is to elevate floodprone structures so that the living or working area is above the 100-year base flood elevation.

The most appropriate elevation method depends on the location of the structure. Elevation on fill may be permitted in areas exposed to low-velocity flooding, but may not be allowed in A-zones and

is prohibited in V-zones under the NFIP regulations. Elevation on extended foundation walls is commonly used in areas exposed to low and moderate flood depths and velocities. Elevation on columns or piles (see Figure 5.11) is recommended for greater flood depths. Use of piles is required in FEMA V-zones and within the state's CCCL regulatory zone.

- ✓ **Wind-retrofitting.** Hurricane shutters, hurricane clips, tie downs, doorway reinforcements, and other wind-retrofit measures have been widely used, particularly in South Florida, to protect hospitals, schools, police and fire stations, emer-

gency operations centers, and other critical facilities, as well as private residences, that are at risk from hurricane-force winds. Wind-retrofit measures, notably shutters, are also an integral feature of the FDCA Division of Emergency Management's public shelter deficit elimination strategy.

The principal funding vehicle that has been used to finance retrofit projects initiated by local governments in Florida, including elevation proj-

ects for private structures and shutter retrofits for privately-owned critical facilities, has been the federal Hazard Mitigation Grant Program (see Sidebar 5.10). A number of counties that have included such projects in their *LMSs* report are waiting for the availability of HMGP funds to carry out those projects.

- ✓ Pasco County used HMGP funds to help finance the **elevation** of one **repetitive loss structure** that was **built prior to the NFIP** (see Sidebar 5.40). The County used funds from the Flood Mitigation Assistance Program (FMAP) to help finance

Figure 5.11: Elevation on piles in the V-zone.



Source: Federal Emergency Management Agency, 1999.

Sidebar 5.40

Pasco County Residential Property Elevation

El Niño rainfall in 1998 caused severe flooding along the Anclote River. Several roads and several homes along Elfers Parkway were flooded. One resident, who experienced substantial flooding, elected to accept a county offer to help finance elevation of his home with HMGP funds. The resident received \$59,250 from the grant program to accomplish the elevation. Pasco County did not provide matching funds, but did offer guidance and grant administration for the resident. The resident agreed to provide a match of \$19,750. With the elevation project 80% complete, the homeowner avoided flood damage from spring floods that occurred in 2003.

Sidebar 5.41

Federal Flood Mitigation Assistance Program

The Flood Mitigation Assistance Program (FMAP) was authorized in 1994 for the purpose of funding the acquisition or elevation of repetitively damaged structures that are insured under the National Flood Insurance Program (NFIP). FMAP provides up to 75 percent of eligible costs of projects that meet the eligibility criteria. At least 25 percent of the total eligible costs must be provided by a non-Federal source. In addition to Community Development Block Grant and local or state funds, the match may include property owner funds or a portion of flood insurance claim payments. No more than 12.5 percent may be from in-kind contributions.

the elevation of several other private repetitive loss structures (see Sidebar 5.41). For guidance on both floodplain elevation and acquisition projects, see FDCA's *Handbook for Floodplain Acquisition and Elevation Projects* (see Sidebar 5.42).

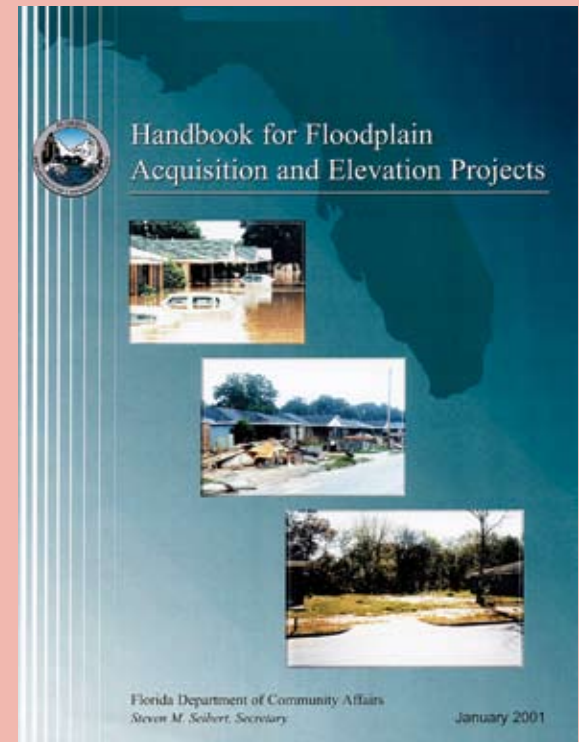
- ✓ Miami-Dade County procured HMGP funds to retrofit three hospitals with storm shutters after Hurricane Andrew in 1992 (see Sidebar 5.43).

Sidebar 5.42

Handbook for Floodplain Acquisition and Elevation Projects

This handbook addresses the acquisition, demolition, relocation, and elevation of private residential structures that have suffered repetitive flood damage. It includes information on funding available under the federal Hazard Mitigation Grant Program and the federal Flood Mitigation Assistance Program. The handbook is organized to follow the entire process, from planning a project, deciding policies, preparing the application, and implementing the project, to closing out the books.

Source: Florida Department of Community Affairs, 2001.



Public education and information

Several communities have initiated education and information programs to promote the adoption of voluntary mitigation measures by private property owners.

- Hillsborough County has operated a **hazard mitigation inspection program** conducted by county building inspectors

and energy audit inspectors. Bulk mailings have been used to inform property owners of the service. The inspections are provided on request when the county has funding available for the program. The project has been funded with grants from Fannie Mae, the Federal Alliance for Safe Homes (FLASH), and the Florida Home Builders Association.

Sidebar 5.43

Mitigation Success Stories: Wind Shutter Protection

After Hurricane Andrew in 1992, damage surveys showed that not only did wind and rain penetration cause substantial damage, but in many instances the wind was able to get inside buildings, damaging contents and creating direct wind pressures that placed stress on the interior walls and roofing systems. The result was partial or complete blowouts of major structural systems such as walls and roofs.

One of the principal recommendations of the ***Building Performance: Hurricane Andrew in Florida*** report prepared by FEMA (1992) was the use of shutters in new buildings and the retrofitting of existing buildings with wind-resistant shutters, particularly critical facilities such as hospitals and other buildings that provide emergency services.

The following case study shows how wind shutters, which are a relatively low-tech retrofit, can save important public facilities from major damage and disruption.

Protecting Miami's Hospitals with Wind Shutters

The damage from wind, wind-driven debris, and rainwater penetration during Hurricane Andrew caused \$10 million in damage to three Miami hospitals. In addition, interruption of services cost another \$4.8 million. In all three hospitals, windows and doors were blown out. The breaching of the building envelopes allowed rain and wind inside, causing damage to the interiors and contents of the buildings.

With HMGP funds secured by Miami-Dade County, the three hospitals, and approximately 160 other critical facilities and public buildings, have been retrofitted with wind shutters. The most common types are roll-down and accordion shutters. They share the same function: to protect building envelopes and all exterior openings (doors, windows, skylights, and ventilation louvers).

A total of 753 openings were retrofitted with wind shutters in the South Miami Hospital. During Hurricane Georges, it took hospital staff 6 hours to fully shutter the facility, compared to the three days it took to put up plywood prior to Hurricane Andrew.

Sidebar 5.44

University of North Florida Small Business Development Center

This case study demonstrates that mitigation measures with a relatively low cost per structure can add up to substantial property protection. UNF's Small Business Development Center (SBDC) established a Small Business Mitigation Rebate Program with a \$25,000 Project Impact seed grant. The SBDC provided free mitigation assessments and a \$1,000 rebate for mitigation projects for 26 local small businesses. The first business to complete a mitigation project was Uli's Restaurant on 216 11th Avenue South in Jacksonville Beach. Uli's installed hurricane shutters and was featured in *The Beaches Leader* newspaper.

Sidebar 5.45

Miami-Dade County Education and Economic Incentive Programs

- The county worked with Home Depot and the Federal Alliance for Safe Homes (FLASH) to put on expositions demonstrating how simple do-it-yourself projects, such as building boxes to elevate air conditioning systems and hot water heaters, can reduce homeowner vulnerability to hurricanes and flooding.
- The county also prepared a brochure entitled "Mitigation for Misers," that describes mitigation projects that homeowners can undertake for less than \$100.

- The University of North Florida Small Business Development Center used funds from FEMA's Project Impact (no longer in existence) to finance a combined project of **technical and financial assistance to small businesses** in Duval County (see Sidebar 5.44).
- Miami-Dade County has undertaken a number of **education and information programs targeted at residential hazard mitigation** (see Sidebar 5.45).

Capital expenditure policies and programs to build and retrofit disaster-resistant public facilities

Local governments should be just as concerned with the disaster-resistance of their own buildings and facilities as they are with private buildings, and the standards used for constructing public buildings should be just as rigorous, if not more so. Explicit capital expenditure policies to design and build more disaster resistant public facilities and infrastructure may be appropriate for inclusion in the *capital improvements element* of a community's *Comprehensive Plan*.

The pace of recovery following a disaster is directly influenced by how quickly a community's basic services—electric power, water supply, wastewater treatment, telecommunications, gas, transportation—are back online. Community infrastructure should be designed to withstand the effects of flooding, storm surge, waves, and high winds as well as

manmade and technological hazards. FDCA has prepared a handbook that provides information about such initiatives (see Sidebar 5.46).

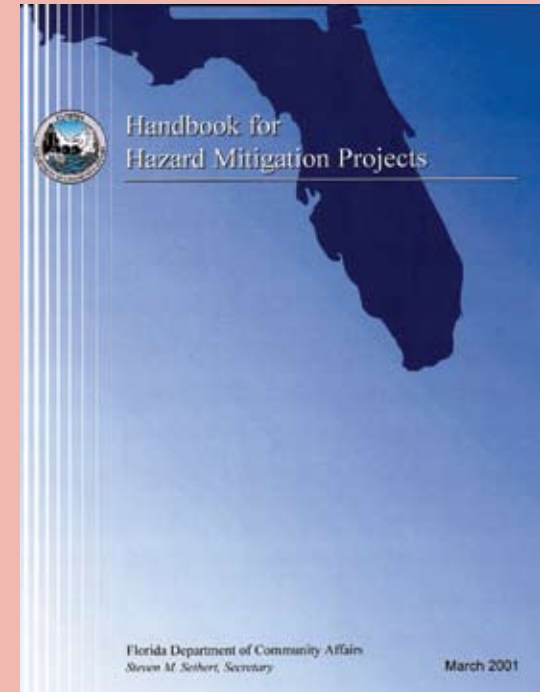
- Miami-Dade County has adopted **storm-resistant vegetation landscape standards** that are included in contracts **for all new public facilities**.
- A fire district in Manatee County **constructed a new fire station** on higher ground to replace an existing facility that had been subject to repetitive flood damage.
- Sarasota County recently adopted a downtown redevelopment plan that includes **construction of a new city hall**. The existing structure does not meet current building standards and is located in a Category 2 storm surge zone. The proposed new site, two blocks away, is on higher ground, outside the Category 2 zone.
- Pasco County used HMGP funds to finance **drainage improvement projects** to reduce flooding of several county roads (see Sidebar 5.47).
- The consolidated City of Jacksonville's municipal utility company, JEA, has undertaken initiatives to reduce the vulnerability of its **power lines** and **service centers** to hurricane wind damage (see Sidebar 5.48).

Sidebar 5.46

Handbook for Hazard Mitigation Projects

This FDCA handbook details the planning process for securing federal funds under the Hazard Mitigation Grant Program and the Flood Mitigation Assistance Program for mitigation projects that protect existing public buildings and critical facilities, including floodproofing, elevation, relocation and wind retrofitting of existing public buildings, floodproofing of sewer lift stations, and drainage improvements.

Source: Florida Department of Community Affairs, 2001.



Sidebar 5.47

Highway Flooding Mitigation in Pasco County

Pasco County experienced widespread flooding of roadways and homes during the 1998 El Niño event. Hazard Mitigation Grant Program funds enabled the county to make improvements that successfully prevented flooding during a subsequent flood event in spring 2003. The county spent \$549,857 in HMGP funds to improve the drainage of five roads that were impassable during the El Niño event. During the 2003 spring rains, four of these roadways did not flood. The fifth one did flood but was still passable; the previous floodwater depth of 12 inches was reduced to 6 inches.

Sidebar 5.48

City of Jacksonville/Duval County – Electrical Utility Continuity of Operations

Jacksonville Electric Authority (JEA), the municipal electrical, water, and sewer utility in Jacksonville-Duval County, has committed to placing at least 20 miles of electrical distribution lines underground each year. Over their 7-year plan, this will “harden” at least 140 miles of electrical distribution lines. JEA has also utilized \$20,000 in Hazard Mitigation Grant Program funds to shutter its service centers for hurricane wind and debris impact resistance.

Sidebar 5.49

Public Facility Storm Shutter Projects

Hurricane Andrew broke windows on all sides of the four buildings that make up the Metro-Dade County Office of Community Services. Damage totaled almost \$150,000. Afterward the center installed removable galvanized steel storm panels and aluminum accordion shutters, at a cost of just \$30,000 in HMGP funds. A benefit-cost analysis, based on projected future damages similar to those sustained during Hurricane Andrew, determined that every \$1

invested in wind shutters at the center would result in a savings of at least \$5 in mitigated interior damages should a future event occur.

Shuttering the Panama City Municipal Building. Located on St. Andrew Bay in the Florida Panhandle, Panama City has experienced one hurricane of Category 3 strength or greater every 20 years. In 1995, Hurricane Opal struck the city with sustained winds of 115 mph. The city suffered extensive flooding, erosion, and wind damage.

State and local officials recommended a wind retrofit project for the Panama City Municipal Building, using HMGP funds. The project called for the installation of 63 aluminum shutters designed to withstand winds of up to 120 mph, and 69 electrical circuits and switches to operate the shutters. The total cost was \$120,920. The building can now be shuttered in minutes, a procedure that is tested weekly.

- Miami-Dade County and Panama City have completed **storm shutter projects** that have substantially reduced the vulnerability of public buildings to hurricane wind damage (see Sidebar 5.49).

Section 5.5: Manage Development and Redevelopment

Use of land use planning and development management tools to manage the development and redevelopment of land is one of the most effective strategies for reducing community vulnerability to coastal storms and associated flooding. As noted in Section 2.5, there are a number of directives in the state's regulations governing the preparation of local **Comprehensive Plans** that require local governments to assess the potential to use these tools for hazard mitigation purposes.

- All local governments are required to include an analysis of proposed development and redevelopment of flood prone areas in the future land use elements and policies that regulate areas subject to seasonal or periodic flooding.
- All local governments also must include a policy in the **capital improvements element** that identifies the elimination of public hazards as a criterion for evaluating capital improvement projects.
- Coastal communities are required to identify measures in the **coastal management**

element that can be used to reduce exposure to coastal flooding hazards, including relocation and public acquisition.

- Coastal communities also must include an objective in their **coastal element** that directs population concentrations away from coastal high-hazard areas (CHHAs), and they must adopt policies that limit development within CHHAs and regulate land use so as to reduce the exposure of people and property to natural hazards.
- Coastal communities are required to include objectives in their **coastal element** and their **capital improvements element** that limit public expenditures for infrastructure and public facilities that subsidize development in CHHAs.

Nearly all of the land use planning and development management tools listed in Table 5.1 can be employed to manage development and redevelopment in areas exposed to coastal storms and associated flooding, including the following:

- zoning regulations;
- overlay districts;
- setbacks and buffers;
- subdivision and PUD regulations and cluster development;
- site design regulations and performance standards;
- incentive zoning;
- fee-simple property acquisition;
- purchase-and-sellback or leaseback;

- purchase of development rights;
- transfer of development rights;
- capital expenditure policies; and
- education and information.

Examples of the applications of these tools for these purposes are presented in the following sections. Pre-disaster applications include decisions about allowable land uses on vacant land and the provision of public facilities and infrastructure to serve those uses as well as decisions about redevelopment initiatives in areas that are “built out”. Some of these tools also may be useful in post-disaster recovery settings where opportunities may arise for redevelopment initiatives that reduce community vulnerability to future hazard events. Unless otherwise noted, the applications described pertain to pre-disaster settings.

Zoning regulations

Zoning regulations are employed to achieve two principal hazard mitigation policy objectives within CHHAs and other flood hazard areas:

- restrict certain land uses that are especially vulnerable, and
- restrict land use intensities within hazard zones so as to minimize the amount of property and the number of people who are vulnerable.

Both of these applications may contribute to maintaining or reducing hurricane evacuation clearance times and emergency shelter

demands (see Section 5.2) as well as the public safety objective of reducing vulnerability.

Restrict vulnerable uses

- Several coastal communities restrict or prohibit “**special needs**” facilities within their CHHAs (typically defined as the Category 1 evacuation zone). These include such land uses as adult congregate living facilities, hospitals, nursing homes, homes for the aged, and total care facilities that are likely to require extraordinary efforts to evacuate in the event of a tropical storm or hurricane.

Some jurisdictions also “discourage” such facilities in Category 2 evacuation zones for example, by requiring special condition permits.

Escambia County prohibits such special needs facilities unless developers submit an evacuation and sheltering plan for residents.

- Manatee County prohibits new **manufactured homes** within its CHHA. Escambia County requires issuance of a “special condition” permit for mobile homes within its CHHA. As indicated in Sidebar 5.49, community restrictions of mobile homes may be constrained by state laws intended to avert discrimination against such housing. This may be particularly challenging

Sidebar 5.49

State Law Regarding Restriction of Mobile Homes

It may be desirable to restrict mobile homes from areas subject to hurricane force winds that exceed the design and construction standards set by the federal Department of Housing and Urban Development (HUD) (see Sidebar 5.33) because the highest HUD standard (130 mph, 3-second gust) is not equivalent to those applied under the Florida Building Code for site-built housing in the ASCE 7-98 wind-borne debris zones for Category 4 and 5 hurricanes (130-139; 140-149; and 150-159 mph 3-second gust). (see Figures 5.5 and 5.6).

State regulations governing the Housing Element of local Comprehensive Plans state that local governments need to address the provision of “adequate sites” for mobile homes (§§9J-5.010(3)(b)(3), **F.A.C.**). Where a jurisdiction lies entirely within one of the ASCE 7-98 Category 4 or 5 wind-borne debris zones, this rule may be problematic.

State law does not prohibit zoning and land use regulation of mobile homes. It requires that “[s]uch local requirements and regulations and others for manufactured homes must be reasonable, uniformly applied, and enforced without distinctions as to whether such housing is manufactured, located in a mobile home park or a mobile home

subdivision, or built in a conventional manner” (§320.8285(6) F.S.). However, local governments may not “prohibit siting or resiting of used mobile homes based solely on the date the unit was manufactured.”

For example, in 2003, Jacksonville amended its land development regulations by adopting an aesthetic ordinance. This ordinance allowed any type of housing, i.e., HUD approved manufactured housing, as well as any housing type built to the Florida Building Code, to be located in the residential zone of the city provided that it meets the criteria set forth in the aesthetic ordinance. In this way there are no restrictions on the location of manufactured housing placement, but rather on the appearance of the type of housing located within the city.

It may be possible within the spirit of these statutory provisions to restrict any type of new residential structure within a community that does not meet the ASCE 7-98 standard that applies to a jurisdiction. Such a rule may, however, be constrained by state and federal law, which precludes state and local governments from imposing more stringent design and construction standards for manufactured housing than those promulgated by the federal government.

for jurisdictions that lie entirely within the CHHA.

Restrict land use intensity

Several coastal communities have restricted residential densities within their CHHAs. Down-zonings, however, raise the potential for claims under Florida's Bert Harris Act (see Sidebar 5.2 in Section 5.1).

- The City of Palmetto requires either that **residential densities** be **limited** to 4 dwelling units per acre (du/ac) within its CHHA or that developers submit a PUD, which clusters development in areas outside the CHHA.
- Vero Beach limits **residential densities** to 15 du/ac on its barrier island.
- Indian River County **zoned** 8,000 acres within a **floodplain as agricultural land** (AG-1) thereby limiting the maximum allowable residential density to 1 dwelling unit per 5 acres.
- The Town of Longboat Key **down-zoned** all **property within** its **V-zone** in 1984, thereby rendering most multi-family and hotel and motel land uses as non-conforming. Lower intensity uses have replaced these high-occupancy facilities as properties have been redeveloped. If one of these non-conforming structures were substantially damaged in a coastal storm, they also would be required to be redeveloped in conformance with the new zoning. (Note: rezonings prior to May 11,

1995, are not subject to the provisions of the Bert Harris Act.)

- Okaloosa County **down-zoned portions of its CHHA** its 2000 EAR-based *Comprehensive Plan* amendments from maximum allowable residential densities of 16 and 25 units per acre to 5 units per acre. The changes were initiated based on damage experienced in 1995 from Hurricane Opal and a subsequent FEMA Flood Insurance Restudy that resulted in reclassifying a number of coastal areas from X-zone to A-zone designations and others from A-zone and X-zone designations to V-zones.

Overlay districts

Several examples of overlay districts used to protect dunes are described in Section 5.3. Land development regulations that apply zoning and site development regulations within specified hazard areas such as the CHHA, V-zone, or 100-year floodplain, or within spatially defined regulatory zones such as the state's Coastal Construction Control Line (CCCL) (see Sidebar 5.32 in Section 5.4) use this same approach.

- Walton County's *coastal management element* defines a **Coastal Protection Overlay Zone**, which includes all of the Category 1 storm surge area and much of the Category 1 evacuation zone. Within that overlay zone, **new lots are prohibited**

that do not have buildable areas landward of the CCCL.

Setbacks and buffers

As described in Section 5.4, Florida's CCCL permitting program requires habitable structures built within the CCCL regulatory area to be setback from the mean high water line a distance equal to 30 times the average annual erosion rate. While this provision is intended primarily to protect the beach and dune system from damage, it also reduces the vulnerability of these structures to storm surge flooding and wave damage. A number of coastal communities require additional setbacks along the open coast.

- The Town of Longboat Key restricts most structural improvements within a "**gulf waterfront yard**" that may extend further landward than the CCCL (see Sidebar 5.50).
- The City of Venice has a similar provision in which development is prohibited within a "**shoreline hazard area**" defined by a 150-foot **gulf-front setback**.
- The City of Fort Myers Beach requires all buildings to be **relocated landward of the 1978 CCCL when rebuilt**, a provision that is triggered when structures are substantially damaged in a disaster.

Town of Longboat Key Land Development Code: Gulf Waterfront Yards

§58.150(D) **Required Waterfront Yard Requirements**

(1) *Required gulf waterfront yard. Every lot which abuts the Gulf of Mexico or an established erosion control line shall have, on the gulfside, a required gulf waterfront yard. The required gulf waterfront yard shall be a minimum of 150 feet in depth. The seaward edge of the yard from which the depth shall be measured shall be the mean high water-line; except that, where an erosion control line has been established, the depth shall be measured from that line.*

(a) *Where the state coastal construction control line for Manatee County and the original proposed state coastal construction setback line for Sarasota County... lies more than 150 feet upland from the mean high-water line or erosion control line, the state coastal construction setback line shall be the landward edge of the required gulf waterfront yard. In no event, however, shall the required gulf waterfront yard be less than a minimum of 150 feet in depth, except as for provided in subsection (b) below.*

(b) *No structures, buildings, swimming pools... drives, vehicular parking, walls and fences may be built within the required gulf-side waterfront yard except for beach shelters, pool fences and windfalls,... and dune walkover structures, sand fences, accessory decks or marine structures...*

Subdivision and PUD regulations and cluster development

As noted in Section 5.1, one of the features of the subdivision and PUD review processes is the opportunity for local officials to review and negotiate the details of larger scale, and in the case of many PUDs, multi-use developments. Cluster development often is a condition set for approval of subdivision plats and PUD proposals.

- Escambia County requires a **PUD review and approval process** for development projects with densities greater than 20 units per acre on a coastal barrier island. This process entails reporting and review of formal findings of fact concerning the effect of the proposed development on coastal population densities, health and safety of the general public, and evacuation times.
- The City of Palmetto requires either that residential densities be limited to 4 dwelling units per acre (du/ac) within its CHHA or that developers submit a **PUD**, which **clusters development** in areas outside the CHHA.

Site design regulations and performance standards

Two categories of site design regulations and standards can be important to reducing vulnerability to coastal storms and associated

flooding: (1) storm water management, and (2) landscape design.

Storm water site design best management practices

Storm water management regulatory authority in Florida is shared between the State Department of Environmental Protection (FDEP), four of the five water management districts, and local governments. Local governments are responsible for adopting a **Comprehensive Plan** that is consistent with state and regional storm water management goals, and for implementing a storm water management program that includes the development and implementation of a storm water master plan and provisions to assure that storm water systems are properly operated and maintained.

Most development projects receive a storm water management permit from regional water management district (WMD) that includes performance standards to minimize flooding by limiting post-development storm water peak discharge rate and, in some cases such as closed basins, storm water volume. In the Florida Panhandle, these permits are issued by FDEP, rather than the Northwest Florida Water Management District. The permits prepared by the WMD or FDEP are reviewed and approved by local governments to assure consistency with their local **Comprehensive Plans** and land development regulations. At this time, nonstructural, land use planning best management practices (BMPs) are incorporated into a project. For more information concerning the

coordinated storm water management regulatory program in Florida see <http://www.dep.state.fl.us/water/nonpoint/urban1.htm>.

Florida's growth management and urban storm water management programs rely on both structural and nonstructural BMPs for minimizing flooding and nonpoint source pollution. Technology-based **structural BMPs** are required on all new developments and redevelopments to help mitigate the increased stormwater peak discharge rate, volume, and pollutant loading that accompany urbanization. The most widely used structural BMPs include retention or infiltration areas, wet detention ponds, constructed wetlands, sand filters, bioretention areas, vegetated buffer strips along streams, and swales.

Nonstructural BMPs, also called "source controls," are used to minimize the amount of storm water runoff that leaves a site through such measures as preservation of wetlands and floodplains (see Section 5.3) and minimizing impervious surfaces through site design and construction measures. For examples of specific site design and performance standards that can be employed through local land development regulations, see FDCA's Protecting Florida's Springs: Land Use Planning Strategies and Best Management Practices (available online at <http://www.dca.state.fl.us/fdcp/publications/index.htm>). For more information about non-structural and structural BMPs see FDEP's Florida Development Manual: A Guide to Sound Land and Water Management (avail-

able online at <http://www.dep.state.fl.us/water/nonpoint/pubs.htm>).

Orange County, Florida, includes **storm water performance standards** within its subdivision regulations that leave developers free to use whatever combination of structural and non-structural BMPs is most cost effective. New developments must retain the first one-half inch of runoff, or the runoff resulting from the first one inch of rainfall, whichever is greater. In addition, the post-development peak rate of storm water discharge must not exceed the pre-development peak rate of discharge from the site for a specified storm event.

Landscape design best management practices

The choice of landscape vegetation can have a dramatic effect on the amount of debris generated from a residential or commercial site that is exposed to the high winds of a tropical storm or hurricane. This debris can clog storm water drains and result in local flooding. It also may become wind-borne debris that can inflict damage on other private and public property.

Miami-Dade County has developed a **landscape manual** that identifies trees that can best withstand flooding, drought, and wind. The county also has developed an ordinance that **prohibits the planting of trees** that do not meet these standards.

Incentive zoning

As discussed in section 5.1, incentive zoning is an option for **encouraging developers to cluster development** within portions of a

subdivision or PUD that are outside of flood hazard zones. In return, the developer is allowed to exceed the total density or floor area ratios that would otherwise apply to the zoning district.

Fee-simple property acquisition

As described in the following subsections, Florida communities have used fee-simple property acquisition to **reduce the amount of developed land that is vulnerable to coastal storms and associated flooding** in both pre-disaster and post-disaster contexts.

Pre-disaster applications

In a number of communities, property has been purchased in coastal areas for multiple purposes that include **protection of natural resources and/or provision of open space and active or passive recreation opportunities** while at the same time **excluding hazardous areas from development**. In addition to serving a hazard mitigation function, such acquisition may help to preserve the natural protective functions of floodplains, wetlands, beaches and dunes (see Section 5.3). These purchases are typically pre-disaster acquisitions accomplished with a variety of funding sources.

- The City of Layton, located in the Florida Keys, purchased two **vacant commercial parcels** on U.S. Route 1 with local funds for use **as green space**.
- Palm Beach County has used funds from its **Environmentally Sensitive Lands**

Florida Communities Trust Case Studies

Acquisition General Obligation Bond Program to purchase environmentally significant lands within its coastal high-hazard area, including the Juno Dunes Natural Area (271 acres) and the Paw-Paw Preserve (3 acres).

- Several communities have used funds from the **Florida Communities Trust (FCT)** program (see Sidebar 5.22 in Section 5.3) to purchase properties for both recreation and hazard mitigation purposes (see Sidebar 5.51). The FCT scoring criteria awards additional points for projects that (a) provide recreational opportunities and open space areas that direct residential and commercial development away from a coastal high-hazard area or a 100-year flood plain, or (b) are located within an area identified in the county's adopted **Local Mitigation Strategy** as a mitigation priority. Other funding sources are described in Sidebar 5.22.

Post-disaster applications

The majority of post-disaster, fee-simple acquisition has been targeted at **developed properties that have suffered repetitive flood damage**. In some cases, the damaged structure is demolished, in others it may be relocated.

The principal funding sources used by Florida communities for "buyouts" of repetitively damaged property have included the federal Hazard Mitigation Grant Program or HMGP (see Sidebar 5.10 in Section 5.2) and the federal Flood Mitigation Assistance Program

Below are three local examples that show the versatility and importance of FCT funding to the implementation of land acquisition goals in local **Comprehensive Plans**.

Wall Springs, Pinellas County Urban Wildlife Preserve

The 32-acre project site located in northwestern Pinellas County on St. Joseph Sound will be developed as an urban wildlife preserve. The project site is one of the last remaining undeveloped coastal properties in the county and will be incorporated into the adjacent Wall Springs Park. Adjacent to the Pinellas Trail, the park provides ancillary facilities and a destination point along the trail. Proposed facilities at the project site include a nature trail and wildlife observation platform. The total cost was \$6,987,417.

City of Satellite Beach

In 1998, this 98% built-out coastal community with 9,600 residents recognized the loss of public beach access due to coastal construction and initiated a proactive program to identify and acquire the remaining undeveloped coastal properties within the city.

The city identified remaining undeveloped beachfront properties totaling 35.5 acres along 2.6 miles of oceanfront. Over a three-year period the city submitted three grant applications to FCT to acquire all the remaining open space along the beach. All three applications were approved, and FCT provided funding to purchase four parcels totaling 17.2 acres. This acquisition included the two largest undeveloped parcels along the city's beachfront. One parcel had an approved site plan for a 20-unit condominium;

the other an approved site plan for a 96-unit timeshare.

Spanning nearly one-fifth of the city's oceanfront, these properties now provide public open space and conservation land along the city's Atlantic coastline. In addition, the purchases have served to minimize the number of people and the amount of property at risk from coastal storms.

City of Venice

Venice is fortunate to have almost four linear miles of coastline along the Gulf of Mexico, which is not obstructed by barrier islands. Due to this geography, however, the city is highly vulnerable to the storm surges, waves, and high winds of hurricanes and tropical storms, and most of the coastal areas of the city are within the CHHA.

In 2003, with the assistance of funding from FCT, the city acquired the Loufek property, one of the last undeveloped coastal properties within the city. The 0.90-acre property consisted of three residential lots with full views of the Gulf of Mexico. The site is located across the street from the Venice Municipal Beach Park.

The acquisition of this property met two important community needs:

- provide additional public beach parking and expand the recreational activities along the coastal area of the city; and
- reduce future development within the Coastal Construction Control Line area and the CHHA.

The 2001 **Sarasota County Unified Local Mitigation Strategy** was instrumental in providing justification for the FCT grant.

or FMAP (see Sidebar 5.41 in Section 5.4). Both programs require that local governments retain ownership of land that is purchased and that no permanent structures be constructed on that land. As illustrated in Sidebar 5.52, these buyouts can result in significant decreases in community vulnerability.

Purchase-and-sellback or leaseback

Where a community wishes to significantly **reduce allowable densities of vacant land** in hazardous coastal areas and avoid takings or Bert Harris Act legal challenges (see Sidebars 5.1 and 5.2 in Section 5.1), purchase-and-sellback or purchase-and-leaseback strategies described in Section 5.1 offer lower-cost alternatives to fee-simple acquisition and retention by the local government.

Under the purchase-and-sellback option, the area is rezoned for the desired density and then sold for development. Under the purchase-and-leaseback option, the area is rezoned and subdivided by the local government and individual lots are leased for development. Both strategies can be applied in either pre-disaster or post-disaster settings. Neither HMGP nor FMAP funds can be used for such purposes because both require the local government to retain ownership of the land and use the land solely for open space and passive recreation.

Purchase of development rights

Purchase of development rights (PDR) has potential applications for reducing develop-

Sidebar 5.52

Acquiring Property to Eliminate Future Flood Losses in the Florida Panhandle

In July 1994, tropical storm Alberto dumped over 20 inches of rain on the Florida Panhandle. The subsequent riverine flooding required over \$500 million in federal disaster assistance. Over 500 houses, many damaged in previous floods, were destroyed. State and local officials decided that the best solution to the problem of repetitive losses was the removal or demolition of structures at risk.

The Florida Department of Community Affairs used emergency supplemental Community Development Block Grant (CDBG) funds to assist seven local governments to acquire a number of private properties that sustained major damage during the flood. CDBG funds were combined with HMGP money to provide a total of \$27.5 million to purchase 388 private parcels. In all, a total of 486 residential structures and 11 commercial buildings were demolished or relocated using federal funds.

Evidence of the success of this strategy was provided shortly thereafter. In the spring of 1998, the El Niño phenomenon brought heavy rain and flooding. Some river crests were higher than they were during Alberto, yet damages from the El Niño disaster were lower in the seven counties that acquired flood-prone properties (see Table 5.3).

Table 5.3: Total federal funding amounts for individual and family grants and temporary housing assistance.

County	TS Alberto	El Niño
Calhoun	\$1,112,563	\$308,971
Gadsden	\$80,189	\$1,178
Holmes	\$3,527,174	\$287,714
Washington	\$2,336,883	\$161,154
Total:	\$7,056,759	\$753,017

Source: Florida Department of Community Affairs

ment densities in hazardous areas. However, if the objective is to **preclude building** on vacant land **or reconstruction** in areas with substantial damage in a post-disaster setting, property owners are unlikely to be interested in retaining ownership of coastal property that cannot be

used for residential or commercial purposes. Thus, fee-simple acquisition is the norm.

PDR may have applications where the objective is to **reduce the density of new development** on vacant land in hazardous areas that is eligible for subdivision. In such cases, local

governments may purchase a portion of the development rights and allow development at significantly lower density. This is also the most likely scenario for the use of transfer of development rights (see next section).

Transfer of development rights

Examples of applying the transfer of development rights tool for purposes of protecting environmentally sensitive resources and natural protective features in particular, are presented in Section 5.3. The approach is easily extended to circumstances where the objective is to **preclude development or reduce allowable densities in hazardous areas**. An example of such an application of TDR is the California Coastal Commission's TDR program for the seismically active Santa Monica Zone (see Sidebar 5.53).

Capital expenditure policies

As noted in Section 5.1, capital facilities **policies that limit the provision of such public facilities** as roads, water, and sewer can be employed to limit development densities. They are most effective where used in concert with zoning and subdivision regulations that directly regulate land use types and intensities.

The principal application in hazardous areas is to limit public expenditures for facilities and infrastructure that will be exposed to hazard forces and, therefore, vulnerable to damage that will impose costs on the local government for repair and reconstruction. Critics have argued

Sidebar 5.53

California Coastal Commission: TDR in the Santa Monica Seismic Zone

The California Coastal Commission TDR program requires developers of new subdivisions to purchase development credits for each new lot that is created by subdivision. Credits are purchased from buildable lots of 20 acres or more in size within existing subdivisions that are located in areas vulnerable to ground shaking or land slides in the event of an earthquake.

The area is divided into three zones. Transfers in Zones I and III operate solely through the private market (passive TDR). In Zone II, developers can make in-lieu payments to the Mountains Restoration Trust, which can then purchase development rights from marginal properties. The Trust also can receive charitable donations of credits and can sell credits.

Source: Johnston and Madison (1997).

that other taxpayers are subsidizing development in hazardous areas where property owners who benefit from such services do not bear the full costs of paying for initial capital expenses as well as the local expenses of repair and reconstruction.

This argument is the basis for Florida's rule that requires coastal communities to include objectives in their *coastal elements* and their *capital improvements elements* that limit public expenditures for infrastructure and public facilities that "subsidize development" in Coastal High-Hazard Areas (CHHAs). For example:

- Manatee County requires private financing of infrastructure within CHHAs.
- Escambia County's *coastal management element* includes policies governing public expenditures in CHHAs (Policy 11.A.5.2) and public facilities criteria (Policy 11.A.5.3) that reflect the need to fulfill local government concurrency obligations while also limiting development in hazardous areas (see Sidebar 5.54).

Education and information

A broad-based public education and information program designed to inform the public about natural hazards and what they can do about them also can serve as the basis for raising the salience of hazards in the public's minds and for building and maintaining support for new and existing strategies for managing development and redevelopment.

Sidebar 5.54

Escambia County Public Facilities Policies

Policy 11.A.5.2: Public Expenditures in CHHA

Public expenditures within the coastal high hazard area will be limited to the provision or support of recreation uses such as parks and walkovers, erosion control devices, increase public access and the correction of deficiencies, and to support infrastructure, provided, however, that infrastructure sizing is consistent with that needed to support the densities and intensities established by this plan for those areas within the CHHA.

The county shall, by ordinance, provide for funding sources for infrastructure improvements necessitated as a result of concurrency and hurricane evacuation standards including but not limited to the creation of tax increment financing districts. . . . The identification and availability of such funding shall be a prerequisite to approval of any development that requires an increase or expansion of infrastructure.

Policy 11.A.5.3 Public Facilities Criteria

New public facilities shall not be located in the coastal high hazard area unless the following criteria are met:

1. *The facility is necessary to protect human lives or preserve important natural resources; or*
2. *The service provided by the facility cannot be provided at another location outside the CHHA; and*
3. *The facility is designed to provide the minimum capacity necessary to meet level of service standards for its service area and its sizing is consistent with the densities and intensities reflected on the future land use map.*

Several examples described in earlier sections could be extended in this manner, including the following:

- the Florida Department of Environmental Protection’s (FDEP) booklet, Homeowner’s Guide to Wetlands, for educating property owners about wetlands and the state’s wetland regulatory programs (see Sidebar 5.27 in Section 5.3); and
- the FDEP’s “Building Back the Sand Dunes” public education brochure (see Sidebar 5.28 in Section 5.3).

Miami-Dade’s storm-resistant landscaping initiative, described in part above, offers an example of combining public education and regulation. It is a multi-part program that includes among other elements:

- a poster to educate property owners about storm resistant landscaping vegetation developed by the Miami-Dade County Department of Environmental Resource Management in partnership with the South Florida Water Management District;
- a landscape manual that identifies trees that can best withstand flooding, drought, and wind; and
- an ordinance that restricts the planting of trees that are prohibited because they do not meet these standards.

Fill in the Gaps and Putting it all Together

Section 6.0, which follows, presents guidelines for communities that do not have *Post-Disaster Redevelopment Plans (PDRP)* and for non-coastal counties that have limited hazard mitigation and post-disaster redevelopment components in their *Comprehensive Plans*. Section 6.1 describes the recommended components of a *PDRP* as well as two model ordinances and a model *PDRP* that are included in the Appendices of this guidebook. Section 6.2 presents specific *Comprehensive Plan* inventory and analysis components, goals, objectives, and policies that incorporate the best practices described elsewhere in this guidebook.

Section 7.0, illustrates how a number of the land use planning and development management practices described in Section 5.0 could be applied to a hypothetical coastal community, Calamity Shores.

6 Fill in the Gaps in Hazard Mitigation and Post-Disaster Redevelopment Planning

While there are explicit mandates in Florida’s growth management legislation and comprehensive planning regulations that direct coastal communities to develop *Post-Disaster Redevelopment Plans (PDRPs)* and to address hazard mitigation in the coastal elements of their *Comprehensive Plans*, non-coastal communities have no such requirements.

Many of the *PDRPs* developed by coastal communities tend to focus solely on operational procedures, which largely repeat the content of the *Recovery Annex* of their *Comprehensive Emergency Management Plans*. In addition, the hazard mitigation mandates that apply to coastal communities only address coastal storms. Non-coastal flooding is addressed only to a limited extent in state regulations governing the *future land use element*.

Given these gaps, the following initiatives are recommended for harnessing the power of a *PDRP* and a *Comprehensive Plan* to more effectively mitigate community vulnerability to natural hazards.

- ✓ Adopt a *PDRP* to guide recovery operations and post-disaster redevelopment decision making.
- ✓ Fully address hazard mitigation and post-disaster redevelopment in the *Comprehensive Plan*.

Section 6.1: Adopt a *PDRP* to Guide Recovery Operations and Post-Disaster Redevelopment Decision Making

While every county in Florida includes a *Recovery Annex* in their *Comprehensive Emergency Management Plan*, most cities and counties have not adopted a formal *PDRP* that addresses both recovery operations and policies intended to guide post-disaster reconstruction and redevelopment decision making.

As noted in Section 2.5, coastal communities are required to include an objective in the *coastal management element* of their *Comprehensive Plan* in which they state their intent to prepare a *PDRP*, while non-coastal communities are encouraged in state statute to prepare *PDRPs* as well.

- The state regulations governing the *coastal management element* state that the purpose of the *PDRP* is to “reduce or eliminate exposure of human life and public and private property to natural hazards” (§9J-5.012(3)(b)(8) *F.A.C.*).
- The state statute recommends that “[t]hese plans should, at a minimum, establish long-term policies regarding redevelopment, infrastructure, densities, nonconforming uses, and future land use patterns” (§163.3177(7)(l) *F.S.*).

Little guidance, beyond these directives, is provided concerning the ideal content of such a plan. The most useful *PDRPs* detail recovery and redevelopment operations as well as forth policies from the community’s *Comprehensive Plan* and land development code that should guide the reconstruction and redevelopment process after a disaster.

A community with an effective *PDRP* is in a position to achieve a more rapid recovery and may be able take advantage of opportunities to rebuild in a manner that is more disaster resistant.

- *PDRPs* are a valuable operations tool because they can provide a single, free-standing guide to action and decision making during the often high-pressure and tumultuous disaster recovery period when sifting through the relevant sections of several different plans is a luxury most decision makers don’t have the time to exercise.
- *PDRPs* are important instruments for helping to reduce community vulnerability to future disasters because disasters may create opportunities for redevelopment that furthers hazard mitigation goals and objectives.
- Disasters may present opportunities to advance other community redevelopment objectives. Where these opportunities are anticipated in a *PDRP*, a community will be better positioned to take advantage of them.

This section identifies the key operations and policy components of a *PDRP*. A model plan and examples of ordinances that adopt policies and procedures to facilitate the post-disaster reconstruction and redevelopment process are also presented.

Recommended components of a *PDRP*

The recommendations in this section are adapted from those presented in the American Planning Association's Planning Advisory Service Report 483/484, *Planning for Post-Disaster Recovery and Reconstruction* (Schwab et al., 1998).

Authority, organization, and operations policies and procedures

This section defines which local agencies or organizations are responsible for specific activities and the operational procedures and policies that should govern implementation of the policies in the *PDRP*. These elements of the plan should be formalized through adoption of an ordinance by the local governing body. Operational procedures may be a separate ordinance, such as one of those presented in Appendix C, or the entire plan may be adopted as an ordinance.

This section of the *PDRP* and the post-disaster redevelopment ordinance should:

- **Designate the lead agency** responsible for coordinating the reconstruction and redevelopment process and ensuring conformance with the policies and procedures of the *PDRP*.
- **Create and empower a post-disaster redevelopment task force** responsible for developing the *PDRP* and for implementing it under the oversight of the lead agency.
- **Define operations policies and procedures** that detail which local agencies and organizations are responsible for specific recovery, reconstruction, and redevelopment tasks, who reports to whom, required coordination with state, federal, and private agencies and organizations, and the policies that govern operational decisions. This will incorporate the short-term recovery tasks typically encompassed by the Recovery Annex of the local *Comprehensive Emergency Management Plan (CEMP)*, but it should also cover long-term recovery and redevelopment tasks as well.
- **Define the plan preparation, review, and revision process**, including provisions for participation by individuals and groups in the community with important stakes and/or roles to play in the recovery and redevelopment process.

Short-term response and recovery rehabilitative functions

These functions include the immediate actions needed to begin the recovery process and the short-term recovery actions that are intended to reconstruct the community, as it existed prior to a disaster. Many of these functions are likely to be included in the *Recovery Annex* of the community's *CEMP*.

- **Provision of temporary shelter** for residents whose houses cannot be re-occupied without repairs. The *PDRP* should address what types of temporary housing may be provided and sited consistent with the community's land use patterns and zoning regulations.
- **Policies and procedures for debris management and disposal**, including the following:
 - **criteria for pre-disaster contracts for debris clearance, collection, and disposal,**
 - **operational policies that stipulate debris clearance priorities, and**
 - **identification of appropriate sites for temporary storage and ultimate disposal of different categories of debris.**
- **Preliminary damage assessment procedures and policies** that define the damage categories to be employed and the criteria for each category.
- **Restoration of utility services**, including priorities for the sequence of service

restoration and policies governing coordination with private utilities.

- **Establishment of reconstruction priorities** for damaged public buildings and facilities.
- **Policies governing demolition** of structures that pose an imminent danger to public health and safety.
- **Policies governing re-occupancy of damaged habitable structures.**
- **Policies governing emergency repairs to private structures.**
- **Policies governing repair and reconstruction of non-conforming structures.**
- **Policies governing demolition, repair, and reconstruction of historic structures.**
- **Policies governing the issuance of development and building permits** including the following:
 - **imposition of an initial moratorium on processing of new development and building permits, and**
 - **conditions under which the moratorium is lifted for new construction versus repair of damaged structures and for structures that have experienced different levels of damage.**

Long-term redevelopment and mitigation tasks and policies

These are the policies that guide decisions to redevelop the community in ways different from the way it was before the disaster.

- **Reassessment of the community's exposure and vulnerability** based on damage incurred during the disaster.
- **Reassessment of the adequacy of evacuation and emergency shelter infrastructure and facilities.**
- **Reassessment of the future land use element, building code, and land development regulations** based on new knowledge about exposure, vulnerability, evacuation, and shelter demand.
- **Policies governing redevelopment** of areas that have experienced substantial damage including (a) those with repetitively damaged private property and public facilities and infrastructure and (b) those in which substantial damage was not anticipated:
 - **opportunities to mitigate vulnerability through compliance with revised building code and land development regulations;**
 - **opportunities to mitigate vulnerability through strategies to make the environment less hazardous;**
 - **opportunities to mitigate vulnerability by redeveloping the area for different uses; and**

- **opportunities to achieve other community redevelopment objectives by redeveloping the area for different uses.**

Incorporation of components from other plans

The foregoing sections identify a number of procedures and policies that should be included in the *PDRP* that overlap with components of the local *CEMP*. If the *PDRP* is to serve as the primary reference for guiding post-disaster operations and decision making, it is important that it replicate or, at the least, provide a crosswalk to critical information from the community's *Comprehensive Plan* and *Local Mitigation Strategy (LMS)* including the following.

- **Comprehensive Plan future land use element:**
 - **existing land use map, including depiction of wind, flood, and other natural hazard zones;**
 - **future land use map, including depiction of natural hazard zones and areas in need of redevelopment;**
 - **inventory of public facilities and infrastructure within 100-year special flood hazard areas and coastal high-hazard areas;**
 - **inventory of private structures and public facilities with a history of repeated damage from natural disasters;**

Sidebar 6.1

A Model Recovery and Redevelopment Ordinance

A model recovery and redevelopment ordinance published in the American Planning Association's 1998 Planning Advisory Service Report #483/484, is presented in Appendix C-2. This ordinance contains the basic elements required for establishing a recovery organization, and authorizing a variety of pre- and post-event planning and regulatory powers and procedures related to disaster recovery and redevelopment. Designed to be adopted in advance of a major disaster, the ordinance greatly facilitates long-term recovery and the implementation of redevelopment opportunities identified in the *PDRP*.

The essential concepts of the model ordinance include:

- the establishment of a recovery organization, such as a Redevelopment Task Force, that will prepare a *Post-Disaster Redevelopment Plan (PDRP)*;
- the adoption of that plan and this ordinance by the governing body before a major disaster occurs; and
- the use of the *PDRP* by the Task Force to efficiently and effectively guide post-disaster recovery and redevelopment.

The model ordinance language is interspersed with italicized commentaries that provide alternatives or clarification. These have been supplemented to address the context within which Florida hazard mitigation and post-disaster redevelopment planning is done.

- inventory of beach and dune areas and river shores susceptible to erosion from coastal storms and floods;
 - inventory of erosion protection structures;
 - development suitability analysis for vacant and undeveloped land;
 - policies that distinguish between immediate repair and cleanup actions needed to protect public health and safety and long-term repair and reconstruction activities that should be subject to different review and approval processes;
 - policies governing the repair and alteration of private structures that do not conform to current building code standards or zoning regulations; and
 - policies intended to guide redevelopment of specific areas, including elimination or reduction of exposure and vulnerability to natural hazards through development regulation, public acquisition, and publicly-financed redevelopment initiatives.
- *Comprehensive Plan capital improvements element:*
 - the five-year schedule of capital improvement projects; and
 - policies that address the removal, relocation, and structural modification of damaged public facilities and infrastructure.
- *Local building and development codes:*
 - zoning map, including overlay zones for hazard zones and natural protective features such as wetlands, floodplains, major natural drainage features, and beaches and dunes;
 - rules governing the repair and alteration of private structures that do not conform to current building code standards; and
 - rules governing the repair and alteration of private structures that do not conform to current zoning regulations.
 - *LMS:*
 - prioritized list of mitigation projects.

Model plans and ordinances

Model post-disaster ordinances and a model redevelopment plan are presented in Appendix C including the following:

- a model recovery and redevelopment ordinance from the American Planning Association's Planning Advisory Service Report with some additional commentary to place it within the Florida context (see Sidebar 6.1);
- the Hillsborough County, Florida, ordinance (see Sidebar 6.2); and
- the Okaloosa County *PDRP* (see Sidebar 6.3).

Sidebar 6.2

Hillsborough County Redevelopment Ordinance (Number 93-20)

Hillsborough County adopted a redevelopment ordinance in 1993 to guide redevelopment and hazard mitigation in the unincorporated areas of the county. The ordinance provides for the creation of a task force, procedures for assessing damage, a build-back policy, a building moratorium, and explains the types of emergency repairs allowed. See Appendix C-3 for the complete ordinance.

Sidebar 6.3

Okaloosa County Post- Disaster Redevelopment Plan

Okaloosa County prepared this plan in late summer 1995 but had not yet formally adopted it when Hurricane Opal struck in October 1995. The plan addresses both recovery operations as well as policies for guiding the reconstruction and redevelopment process. It sets forth explicit policies governing the repair and reconstruction of structures that sustain different levels of damage within the **Coastal High-Hazard Area (CHHA)** and **Hazard Vulnerability Zone (HVZ)**. It also spells out specific initiatives to be pursued to reduce post-storm densities and vulnerability within the CHHA. See Appendix C-4 for the complete plan.

Section 6.2: Fully Address Hazard Mitigation and Post- Disaster Redevelopment in the *Comprehensive Plan*

This guidebook has identified a number of initiatives that can be taken by local governments to more effectively use the *Comprehensive Plan* as one of the primary tools for making Florida communities more resistant and resilient to damage and injuries from coastal storms and associated flooding. This section identifies specific *Comprehensive Plan* inventory and analysis components, goals, objectives, and policies that incorporate these best practices. Examples of both regulatory and non-regulatory strategies are included.

As detailed in Sidebar 6.4, local governments in Florida have the authority to extend the reach of their *Comprehensive Plans* beyond the requirements set forth in Chapter 163, *Florida Statutes*, and Chapter 9J-5, *Florida Administrative Code*. These “best practices” are recommended for enhancing local *Comprehensive Plans*.

The following sections are organized by plan element. Relevant citations to the 9J-5, *F.A.C.*, are included for reference. Plan components that are targeted at coastal flooding and the requirements that apply only to coastal counties are presented in bold typeface. All other components apply to wind hazards and non-coastal flooding and are appropriate to the *Comprehensive Plans* of both coastal and non-coastal communities.

Sidebar 6.4

Local Authority to Go Beyond State Planning Mandate Minima

Chapter 163, Florida Statutes, clearly affirms the power of local governments to plan and regulate the use of land (§163.3161(8), *F.S.*):

It is the intent of the Legislature that the repeal of ss. 163.160 through 163.315 by s. 19 of chapter 85-55, Laws of Florida, shall not be interpreted to limit or restrict the powers of municipal or county officials, but shall be interpreted as a recognition of their broad statutory and constitutional powers to plan for and regulate the use of land.

This is reiterated in the state regulations governing the preparation of local *Comprehensive Plans* (§9J-5.001(4), *F.A.C.*):

As minimum criteria, these criteria are not intended to prohibit a local government from proposing, considering, adopting, enforcing, or in any other way administering a *Comprehensive Plan* which is more specific, detailed, or strict, or which covers additional subject areas, whether within required or optional elements, as long as the *Comprehensive Plan* is in compliance with Chapter 9J-5, *F.A.C.*, Chapter 163, *F.S.*, and any other applicable statutes, laws or rules.

Coastal management element

- Inventory and analysis:** Identify *coastal high-hazard areas* and inventory public facilities and infrastructure within them.
- Analyze the potential for replacing, mitigating, or relocating vulnerable public facilities and infrastructure within the *coastal high-hazard area*.
- Analyze hurricane evacuation and shelter needs within the *hurricane vulnerability zone*.
- Analyze the effects of development proposed in the *future land use element* on population densities within the *hurricane vulnerability zone* and on populations with special hurricane evacuation needs.
- Identify measures that can be used to maintain or reduce hurricane evacuation times.
- Inventory beach and dune systems and analyze erosion and accretion trends and the effects of shore protection structures.
- Inventory existing and potential beach renourishment areas and identify measures to protect and restore beaches and dunes.
- Goal 1:** Maintain and enhance the natural hazard protection functions of coastal wetlands and beaches and dunes [see *Future land use element* Goal 2].
- Objective 1.1:** Protect and conserve the natural functions of coastal wetlands and beaches and dunes [see *Future land use element* Objective 2.1].
- Objective 1.2:** Restore the natural functions of degraded coastal wetlands and beach and dune systems [see *Future land use element* Objective 2.2].

Goal 2:

Objective 2.1:

Protect human life from coastal storm hazards.

Maintain or reduce hurricane evacuation clearances times to a maximum of ___ hours and assure provision of adequate emergency shelter capacity for residents within the *hurricane vulnerability zone*.

Policy 2.1.1: Establish an evacuation clearance time level of service standard consistent with the standard defined in Objective 2.1 and require that adequate evacuation route capacity to maintain that standard is in place prior to approving additional residential development within the *hurricane vulnerability zone* [see *Future land use element* Policy 3.1.1].

Policy 2.1.2: Establish an emergency shelter capacity level of service standard and require that adequate shelter capacity to maintain that standard is in place prior to approving additional residential development within the *hurricane vulnerability zone* [see *Future land use element* Policy 3.1.2].

Policy 2.1.3: Prohibit new “special needs” facilities within the *coastal high-hazard area* [or Category 1 and Category 2 evacuation zones; or on all barrier islands] and the expansion of existing special needs facilities including adult congregate living facilities, hospitals, nursing homes, homes for the aged, total care facilities, and others that are likely to require extraordinary efforts to evacuate in the event of a tropical storm or hurricane.

Policy 2.1.4: Require submission and approval of an evacuation and sheltering plan as a condition

for approval of the construction of special needs facilities within the *coastal high-hazard area* [or Category 1 and Category 2 evacuation zones; or on all barrier islands].

Policy 2.1.5: Prohibit the placement of new manufactured homes/mobile homes within the *coastal high-hazard area* [or Category 1 and Category 2 evacuation zones; or on all barrier islands].

Policy 2.1.6: Prohibit the repair or replacement of non-conforming special needs facilities and manufactured homes/mobile homes that are damaged more than ___ percent of the value of the existing structure within 12 months.

Policy 2.1.7: Initiate a grant (or loan) program to assist owners of manufactured homes/mobile homes located within the *coastal high-hazard area* [or Category 1 and Category 2 evacuation zones; or on all barrier islands] with the financial costs of relocation.

Policy 2.1.8: Levy an impact fee on all new residential development to finance the residents' proportional share of new public emergency shelter space and the expansion of evacuation route highways, bridges, and causeways required to maintain an evacuation clearance time the standard set in Objective 2.1.

Policy 2.1.9: Levy a special assessment on all residential property within the city/county to finance the provision and maintenance of public emergency shelters and the planning and delivery of evacuation services. The assessment rate shall be based on the annual probability of evacuation of

the residential structure as a function of its type and location.

Policy 2.1.10: Create special assessment districts as necessary to finance the maintenance of evacuation route infrastructure that is subject to chronic erosion and/or coastal storm damage.

Policy 2.1.11: Coordinate coastal planning area population densities with the applicable local or regional hurricane evacuation plan [see also *Future land use* Policy 3.1.1].

Policy 2.1.12: Employ fee-simple acquisition and re-subdivision at lower densities in *coastal high-hazard areas* where hurricane evacuation clearance times exceed the standard set in Objective 2.1.

Goal 3:

Minimize the exposure of human life and private property to coastal hazards.

Objective 3.1:

Ensure that all new construction and structures that are substantially altered or repaired (more than 50% of the value of the existing structure within 12 months) are in conformance with the minimum wind-borne debris and flood protection standards of the Florida Building Code [see *Future land use element* Objective 1.1].

Objective 3.2:

Adopt local building code standards that exceed the minimum wind-borne debris and flood protection standards of the Florida Building Code and the minimum coastal flood protection standards of the Florida Coastal Construction Control Line permit program [see *Future land use element* Objective 1.2].

- Objective 3.3:** Encourage and facilitate retrofitting of existing habitable structures to comply with or exceed current wind-borne debris and flood protection building code standards [see *Future land use element* Objective 1.3].
- Objective 3.4:** Encourage the construction of safe rooms in new and existing residential structures outside of 100-year special flood hazard zones and landward of the Category 3 storm surge zone [see *Future land use element* Objective 1.4].
- Objective 3.5:** Reduce the generation of wind-borne debris from private landscape vegetation [see *Future land use element* Objective 1.5].
- Objective 3.6:** Direct population concentrations away from *coastal high-hazard areas* [see *Future land use element* Objective 1.6].
- Goal 4:** Minimize costs of wind and flood damage to public facilities and infrastructure in areas exposed to coastal storms [see *Capital improvements element* Goal 1].
- Objective 4.1:** Minimize damage to public facilities and infrastructure from coastal flooding [see *Capital improvements element* Objective 1.1]
- Relevant 9J-5 sections:** Inventory and analysis requirements: §§9J-5.012(2)(b),(e), (f), and (h).
Requirements for goals, objectives and policies: §§9J-5.012(3)(a), (b)(4)-(7), (c)(1)-(5), (7)-(8).

Conservation element

- Inventory and analysis:** Inventory *coastal* and non-coastal wetlands, 100-year floodplains, and *beaches and dunes*, and analyze the potential for their use, conservation, and protection.
- Goal 1:** Maintain and enhance the natural hazard protection functions of *coastal* and non-coastal wetlands, floodplains, and *beaches and dunes* [see *Future land use element* Goal 2].
- Objective 1.1:** Protect and conserve the natural functions of *coastal* and non-coastal wetlands, floodplains, and *beaches and dunes* [see *Future land use element* Objective 2.1].
- Objective 1.2:** Restore the natural functions of degraded *coastal* and non-coastal wetlands, floodplains, and *dunes* [see *Future land use element* Objective 2.2].
- Relevant 9J-5 sections:** Inventory and analysis requirements: §§9J-5.013(1)(a) and (b) and **§§9J-5.012(2)(b)**
Requirements for goals, objectives and policies: §§9J-5.013(2)(a), (b), and (c)(6); §9J-5.013(3); and **§§9J-5.012(3)(c)(1)-(2)**.

Future land use element

- Inventory and analysis:** Complete inventories of
- public facilities and infrastructure within 100-year special flood hazard areas and *coastal high-hazard areas*;
 - private structures and public facilities with a history of repeated damage from natural disasters;

- *beach and dune areas and river shores susceptible to erosion from coastal storms and floods;* and
- erosion protection structures.

Depict the following on the existing and future land use maps or map series:

- wetlands;
- 100-year floodplains;
- areas subject to wind-borne debris from hurricane winds of different speeds;
- *areas subject to coastal flooding;*
- *coastal high-hazard areas;*
- major natural drainage features (e.g., drainage features inundated by a 25-year storm event);
- locations of public and private structures that have experienced repetitive flood damage; and
- areas in need of redevelopment.

Incorporate by reference the hazard identification and vulnerability assessment in the *Local Mitigation Strategy*.

Analyze the suitability of existing vacant and undeveloped land for use based on soils; topography; natural resources, including *coastal* and non-coastal wetlands, major natural drainage features, and *beaches and dunes*; historic resources; exposure to *coastal* and non-coastal flooding and erosion; and exposure to wind-borne debris from coastal storms.

Analyze the effects of proposed development and redevelopment of *coastal* and non-coastal flood prone areas on the vulnerability of private property and public facilities and infrastructure to damage from wind-borne debris and flooding.

Goal 1:

Objective 1.1:

Analyze the effects of population densities, including special needs populations, associated with proposed development and redevelopment, on evacuation clearance times.

Minimize the exposure of human life and property to damage and injury from wind and flooding.

Ensure that all new construction and structures that are substantially altered or repaired (more than 50% of the value of the existing structure within 12 months) are in conformance with the minimum wind-borne debris and flood protection standards of the Florida Building Code.

Policy 1.1.1: Enforce all provisions of the Florida Building Code.

Policy 1.1.2: Develop a mandatory training program for building inspectors based on the Florida Building Code requirements.

Objective 1.2:

Adopt local building code standards that exceed the minimum wind-borne debris and flood protection standards of the Florida Building Code *and the minimum coastal flood protection standards of the Florida Coastal Construction Control Line permit program.*

Policy 1.2.1: Require that all habitable structures be constructed to withstand the impact of wind-borne debris from wind speeds of ____ miles per hour (3-second gust ASCE 7-98 standard).

Policy 1.2.2: Require that the first-floors of all habitable structures located within the 100-year special flood hazard area (A-zone), as defined on Flood Insurance Rate Maps produced by the

National Flood Insurance Program, be elevated to ___ feet above the base flood elevation.

Policy 1.2.3: Require that the bottom of the lowest horizontal structural member of the first-floors of all habitable structures located within special flood hazard areas inundated by the 100 year flood in coastal areas (A-zone), as defined on Flood Insurance Rate Maps produced by the National Flood Insurance Program, be elevated to the base flood elevation.

Policy 1.2.4: Require that the bottom of the lowest horizontal structural member of the first-floors of all habitable structures located within special flood hazard areas inundated by the 100-year flood and which support a 3 foot wave or coastal floods with velocity hazards (V-zone), as defined on Flood Insurance Rate Maps produced by the National Flood Insurance Program, be elevated to ___ feet above the base flood elevation.

Policy 1.2.5: Require that the first-floors of all habitable structures located within the area demarcated by the Coastal Construction Control Line (CCCL), as defined by the Florida Department of Environmental Protection (FDEP), be elevated to ___ feet above the minimum elevation required under the FDEP CCCL permit regulations.

Policy 1.2.6: Require the construction of “safe rooms” in all new single-family residential detached dwelling units located outside of 100-year special flood hazard zones and *landward of the Category 3 storm surge zone*. Single-family attached units, such as townhouses, may be con-

structed with a safe room or be engineered and constructed to meet a 130-mile per hour wind load.

Objective 1.3:

Encourage and facilitate retrofitting of existing habitable structures to comply with or exceed current wind-borne debris and flood protection building code standards.

Policy 1.3.1: Initiate a grant (or loan) program to assist private property owners with the financial costs of retrofitting existing habitable structures with shutters to protect against damage from wind-borne debris.

Policy 1.3.2: Initiate a grant (or loan) program to assist private property owners with the financial costs of elevating, floodproofing, or relocating existing habitable structures that have experienced repetitive damage from flooding within 100-year special flood-hazard zones as defined on Flood Insurance Rate Maps produced by the National Flood Insurance Program.

Policy 1.3.3: Initiate a public information and education program to inform private property owners about the benefits of retrofitting existing habitable structures with shutters and elevating existing structures within 100-year special flood hazard zones.

Policy 1.3.4: Initiate a hazard mitigation inspection program to assist private property owners in identifying cost-effective mitigation measures for habitable structures.

Objective 1.4:

Encourage the construction of safe rooms in new and existing residential structures outside of 100-

year special flood hazard zones and *landward of the Category 3 storm surge zone*.

Policy 1.4.1: Permit a ____ percent increase in residential unit densities and a ____ percent increase in floor area ratios in subdivisions and PUDs in which safe rooms are constructed for all residential units.

Objective 1.5:

Reduce the generation of wind-borne debris from private landscape vegetation.

Policy 1.5.1: Adopt landscape standards for storm-resistant vegetation and apply those to all new private construction and re-landscaping of existing private property.

Policy 1.5.2: Initiate a public education program to encourage voluntary compliance with landscape guidelines for storm-resistant vegetation.

Objective 1.6:

Minimize/avoid/eliminate development within 100-year special flood hazard zones and *coastal high-hazard areas* [see also *Capital Improvements element* Objective 2.1].

Policy 1.6.1: Create overlay zones of 100-year special flood hazard zones and *coastal high-hazard areas*.

Policy 1.6.2: Designate the 100-year special flood hazard zones and *coastal high-hazard areas* for *preservation use* on the future land use map, and prohibit development within the overlay zones.

Policy 1.6.3: Prohibit alterations that increase the floor area of existing habitable structures within 100-year special flood hazard zones and *coastal high-hazard areas*.

Policy 1.6.4: Require dedication of easements of land within 100-year special flood-hazard zones and *coastal high-hazard areas* that prohibit development therein as a condition of subdivision and PUD plat approval and allow cluster development (within-parcel density transfer).

Policy 1.6.5: Where the extent of the 100-year special flood-hazard zone or the *coastal high-hazard area* is so great as to preclude development of vacant land at previously allowed densities, allow and facilitate transfer of development rights to designated receiving areas.

Policy 1.6.6: Where the extent of the 100-year special flood-hazard zone or the *coastal high-hazard area* is so great as to preclude any economically viable use of property, allow single-family residential development at a maximum density of 1 unit per ____ acres and allow and facilitate transfer of development rights to designated receiving areas to recover the value of previously allowed densities.

Policy 1.6.7: Where the extent of the 100-year special flood-hazard zone or the *coastal high-hazard area* is so great as to preclude any economically viable use of property, the city/county shall purchase the property in fee-simple.

Policy 1.6.8: Initiate a grant (or loan) program to assist private property owners with the financial costs of relocating existing habitable structures that are located within 100-year special flood hazard zones and *coastal high-hazard areas*.

Policy 1.6.10: Limit public expenditures that subsidize development within 100-year special flood-hazard zones and *coastal high-hazard areas* except for restoration or enhancement of public access to natural resources and *provision of essential services to water-dependent uses* [see also *Capital Improvements element* Policy 2.1].

Policy 1.6.11: Rezone land zoned for multi-family residential, condominium, and hotel and motel uses within the 100-year special flood-hazard zones and *coastal-high hazard areas* to low-density, single-family residential use.

Policy 1.6.12: Allow and facilitate transfer of development rights to designated receiving areas to recover the value of previously allowed densities for vacant land that is affected by Policy 1.6.11.

Policy 1.6.13: Prohibit expansion of non-conforming uses that result from Policy 1.6.11.

Policy 1.6.14: Prohibit repairs that exceed ___ percent of the value of the existing structure within 12 months for non-conforming uses that result from Policy 1.6.11, and allow and facilitate transfer of development rights to designated receiving areas to recover the value of previously allowed densities.

Policy 1.6.15: Use local, state, and federal funds for open space and recreation land acquisition to acquire land within 100-year special flood hazard zones and *coastal high-hazard areas* that can be used for passive or active public recreation and preclude development of hazardous areas.

Objective 1.7:

Minimize damage to private structures from chronic river and *coastal* shoreline erosion

Policy 1.7.1: Require the construction of all new habitable structures a distance equal to ___ times the average annual erosion rate along rivers with shifting banks and *along sandy coastal beaches*.

Objective 1.8:

Pursue opportunities to reduce the exposure of private property and public facilities and infrastructure to natural hazards during post-disaster recovery and reconstruction periods.

Policy 1.8.1: Distinguish between immediate repair and cleanup actions needed to protect public health and safety and long-term repair and reconstruction activities that should be subject to different review and approval processes.

Policy 1.8.2: Where repetitive damage of private property from flooding is widespread within 100-year special flood-hazard zones and/or *coastal high-hazard areas*, prepare redevelopment plans for the affected areas so as to reduce or eliminate development that exposes substantial numbers of people, private structures, and public facilities to future damage through such means as development regulation, public acquisition, relocation, and publicly-financed redevelopment initiatives.

Policy 1.8.3: Where repetitive damage of private property from flooding is scattered in isolated areas within 100-year special flood-hazard zones and *coastal high-hazard areas*, initiate a program for purchasing or elevating individual habitable structures that have experienced repetitive damage.

Goal 2:

Maintain and enhance the natural hazard protection functions of *coastal* and non-coastal wetlands, floodplains, and *beaches and dunes*.

Objective 2.1:

Protect and conserve the natural functions of *coastal* and non-coastal wetlands, floodplains, and *beaches and dunes*.

Policy 2.1.1: Limit the specific impacts and cumulative impacts of development and redevelopment on *coastal* and non-coastal wetlands, 100-year floodplains, and *beaches and dunes*.

Policy 2.1.2: Create overlay zones of *coastal* and non-coastal wetlands, 100-year floodplains, and *beaches and dunes*, designate the zone for preservation use on the future land use map, and prohibit development within the overlay zone.

Policy 2.1.3: Where the extent of wetland, floodplain, or *beach and dune* coverage is so great as to preclude development at previously allowed densities, allow transfer of development rights to designated receiving areas.

Policy 2.1.4: Where the extent of wetland, floodplain, or *beach and dune* coverage is so great as to preclude any economically viable use of property, allow single-family residential development at a maximum density of 1 unit per 40 acres and allow transfer of development rights to recover the value of previously allowed densities.

Policy 2.1.5: Require dedication of conservation easements for perpetual protection of *coastal* and non-coastal wetlands, 100-year floodplains, and *beaches and dunes* as a condition of subdivision

and PUD plat approval and allow cluster development (within parcel density transfer).

Policy 2.1.6: Require vegetated buffers of at least 50 feet around the margins of wetlands and floodplains and restrict/prohibit disturbance of those vegetated buffers.

Policy 2.1.7: Purchase conservation easements for wetlands and 100-year floodplains on developed property, where these features provide significant storm water management functions for 25-year or greater storm events, and where they are not protected by existing land development regulations, easements, or covenants.

Policy 2.1.8: Purchase conservation easements for dune systems where they are not protected by existing land development regulations, easements, or covenants.

Policy 2.1.9: Purchase in fee-simple major wetlands and 100-year floodplain areas where these features provide significant storm water management functions for 25-year or greater storm events, and where they cannot be feasibly protected through land development regulations, easements, or covenants and where they can serve passive or active public open space and/or recreation needs.

Policy 2.1.10: Purchase in fee-simple dune systems where they are not protected by existing land development regulations, easements, or covenants and where they can serve passive or active public open space and/or recreation needs.

Objective 2.2:

Restore the natural functions of degraded *coastal* and non-coastal wetlands, floodplains, and *beach and dune systems*.

Policy 2.2.1: Require the removal of exotic vegetation from wetlands, 100-year floodplains, and *dunes* as a condition of subdivision plat approval and/or the issuance of development permits.

Policy 2.2.2: Require the structural restoration of degraded dunes as a condition of subdivision plat approval and/or the issuance of development permits.

Policy 2.2.3: Coordinate with the U.S. Army Corps of Engineers and the State Department of Environmental Protection to provide for necessary renourishment of beach and dune systems that are subject to chronic erosion and storm damage and that provide significant protection from coastal storms.

Policy 2.2.4: Create special assessment districts as necessary to finance renourishment of beach and dune systems that are subject to chronic erosion and storm damage and that do not qualify for sufficient federal and state financial assistance.

Goal 3:

Protect human life from coastal storm hazards [see *Coastal management element* Goal 2].

Objective 3.1:

Maintain or reduce hurricane evacuation clearances times to a maximum of ___ hours and assure provision of adequate public shelter capacity for residents within the *hurricane vulnerability zone* [see *Coastal management element* Objective 2.1].

Policy 3.1.1: Establish an evacuation clearance time level of service standard consistent with the standard defined in Objective 2.1 and require that adequate evacuation route capacity to maintain that standard is in place prior to approving additional residential development within the *hurricane vulnerability zone* [see *Coastal management element* Policy 2.1.1].

Policy 3.1.2: Establish an emergency shelter capacity level of service standard and require that adequate shelter capacity to maintain that standard is in place prior to approving additional residential development within the *hurricane vulnerability zone* [see *Coastal management element* Policy 2.1.2].

Policy 3.1.3: Coordinate coastal planning area population densities with the applicable local or regional hurricane evacuation plan [see *Coastal management element* Policy 2.1.11].

Relevant 9J-5 sections:

Existing land use data requirements: §9J-5.006(1)(b).

Land use analysis requirements: §§9J-5.006(2)(b) and (e).

Future land use map requirements: §9J-5.006(4)(b) and **§9J-5.012(2)(b)**.

Requirements for goals, objectives, and policies: §§9J-5.006(3)(b)(4) **and (5)** and (3)(c)(1); §9J-5.011(2)(c)(4); **§9J-5.012 (2)(b); and §§9J-5.012(3)(a), (b)(4)-(7), (c)(1)-(5), (7)-(8)**.

Sanitary sewer, solid waste, storm water management, potable water and natural groundwater aquifer recharge element

Inventory and analysis: Identify major natural drainage features (e.g., drainage features inundated by a 25-year storm event) and assess the adequacy of existing regulations governing land use and development of them.

Goal 1: Reduce the exposure of people and property to damage and injury from flooding.

Objective 1.1: Achieve comprehensive resolution of existing flood problems and avoid future problems from new development or redevelopment.

Policy 1.1.1: Develop and fund a storm water master plan for the community, which includes storm water projects that would alleviate existing flooding problems and prevent future flooding problems.

Policy 1.1.2: Participate in the Community Rating System of the National Flood Insurance Program and enact the recommendations for maintenance of drainage ways.

Policy 1.1.3: Require the use of storm water best management practices so as to limit the volume of off-site storm water to pre-development levels. These may include (a) restoration of wetlands, 100-year floodplains, and natural drainage features that have been altered from their natural conditions, (b) use of design and construction techniques that minimize impervious surfaces, and (c) construction of drainage features and storm water detention and retention facilities.

Objective 1.2:

Policy 1.1.4: Acquire land in fee-simple and construct storm water retention or detention facilities.

Protect and conserve major natural drainage features.

Policy 1.2.1: Limit the specific impacts and cumulative impacts of development and redevelopment on major natural drainage features.

Policy 1.2.2: Create an overlay zone of major natural drainage features (e.g., drainage features inundated by a 25-year storm event), designate the zone for ***preservation use*** on the future land use map, and prohibit development within the overlay zone.

Policy 1.2.3: Where the extent of major natural drainage feature coverage is so great as to preclude development at previously allowed densities, allow transfer of development rights to designated receiving areas.

Policy 1.2.4: Where the extent of major natural drainage feature coverage is so great as to preclude any economically viable use of property, allow single-family residential development at a maximum ***density of 1 unit per 40 acres and allow transfer of development rights to recover the value of previously allowed densities.***

Policy 1.2.5: Require dedication of conservation easements for perpetual protection of major natural drainage features as a condition of subdivision and PUD plat approval and allow cluster development (within parcel density transfer).

Policy 1.2.6: Purchase conservation easements for and major natural drainage features on developed property, where these features provide significant storm water management functions for 25-year or greater storm events, and where they are not protected by existing land development regulations, easements, or covenants.

Policy 1.2.7: Purchase in fee-simple major natural drainage features on vacant land where these features provide significant storm water management functions for 25-year or greater storm events, and where they cannot be feasibly protected through land development regulations, easements, or covenants.

Relevant 9J-5 sections: Inventory and analysis requirements: §§9J-5.011(1)(g) and (h).

Requirements for goals, objectives and policies: §§9J-5.011(2) (b)(5) and (c)(4).

Transportation element

Inventory and analysis: Depict designated local and regional transportation facilities, critical to the evacuation of the coastal population prior to an impending natural disaster, on the existing and future transportation system maps.

Inventory public transportation facilities and infrastructure located within 100-year flood plains and *coastal high-hazard areas* and analyze the potential for relocating, mitigating, or replacing vulnerable transportation infrastructure and facilities in those areas.

Goal 1: Minimize costs of wind and flood damage to public transportation facilities and infrastructure [see *Capital improvements element* Goal 1].

Objective 1.1: Minimize damage to public transportation facilities and infrastructure from wind-borne debris and flooding [see *Capital improvements element* Objective 1.1].

Relevant 9J-5 sections: Inventory and analysis requirements: §§9J-5.019(2)(a) and (5)(b); **§9J-5.012(1)(e)(3)**.

Requirements for goals, objectives and policies: **§9J-5.012(3)(c)(8)**.

Capital improvements element

Inventory and analysis: Inventory public facilities and infrastructure located within 100-year special flood hazard zones, as defined on Flood Insurance Rate Maps produced by the National Flood Insurance Program and *within the coastal high-hazard area*, including but not limited to sanitary sewers and sewage treatment facilities, solid waste management facilities, and potable water supply treatment and distribution systems.

Analyze the potential for relocating, mitigating, or replacing vulnerable public facilities and infrastructure in those areas.

Capital improvements schedule: Incorporate the list of capital projects from the *Local Mitigation Strategy* in the five-year schedule of capital improvement projects.

Goal 1: Minimize costs of wind and flood damage to public facilities and infrastructure.

Objective 1.1:

Minimize damage to public facilities and infrastructure from wind-borne debris and flooding.

Policy 1.1.1: Avoid to the fullest extent possible the siting of new public facilities and infrastructure within 100-year special flood hazard areas or *coastal high-hazard areas*.

Policy 1.1.2: Construct new public facilities and infrastructure in conformance with the wind-borne debris and flood protection standards of the Florida Building Code.

Policy 1.1.3: Where possible, relocate or replace existing public facilities and infrastructure located within 100-year special flood hazard areas or *coastal high-hazard areas*.

Policy 1.1.4: Where public facilities and infrastructure located within 100-year special flood hazard areas or *coastal high-hazard areas* cannot be cost-effectively relocated or replaced, elevate or flood-proof them to the fullest extent that is cost-effective.

Policy 1.1.5: Adopt landscape standards for storm-resistant vegetation and apply those to all contracts for new public facilities and infrastructure and re-landscaping of existing public facilities and infrastructure.

Goal 2:

Minimize the exposure of people and property to damage and injury from wind and flooding.

Objective 2.1:

Avoid/eliminate development within 100-year special flood hazard zones and *coastal high-hazard areas* [see also *Future land use element* Objective 1.6].

Policy 2.1.1: Limit public expenditures that subsidize development within 100-year special flood-hazard zones and *coastal high-hazard areas* except for restoration or enhancement of public access to natural resources and *provision of essential services to water-dependent uses* [see also *Future land use element* Policy 1.6.10]

Relevant 9J-5 sections: Inventory and analysis requirements: **§9J-5.012(1)(e)(3)**.

Requirements for goals, objectives and policies: **§9J-5.012(3)(c)(8)**.

7 Putting It All Together: Welcome to Calamity Shores

All the “best practices” contained in this guide will not apply to every location and community in Florida, or be implemented to the same degree, because the state’s communities differ in so many ways:

- exposure to natural hazards;
- development pressures;
- redevelopment potential;
- location and access;
- population and demographics;

- public involvement;
- political will; and
- the community’s ability to implement planning goals, objectives, and policies.

Furthermore, no single practice or set of best practices can provide the optimum result for all communities. However, a hypothetical community called Calamity Shores can show how to address planning issues, find opportunities for mitigation, and reach an ideal outcome.

Fast-forward to the Calamity Shores of 2034 as it celebrates its 100th anniversary. The

Mayor, City Council, staff, and citizens are interviewed by a reporter. They talk about the steps the community took early in the 21st Century to improve its future. The city had been through several disastrous hurricanes and floods at the end of the 20th Century before it undertook a revision of its *Comprehensive Plan*, *Post Disaster Redevelopment Plan (PDRP)*, *Comprehensive Emergency Management Plan (CEMP)*, and *Local Mitigation Strategy (LMS)* to incorporate hazard mitigation.

Calamity Shores Celebrates its Centennial! Choices Made Decades Ago Ensured the City’s Survival.

“The next hundred years look bright,”
Mayor declares

Years ago, at the turn of the 21st century, the City of Calamity Shores was a typical Florida community. Along the coast, the city featured a historic commercial district that combined stores, houses, offices, and hotels. Generally speaking, the eastern half of the community was densely populated, while in the western half a sparse arrangement of

houses gave way to saw palmetto and pine flatwoods. The land to the west is bisected by a small river, which feeds a bay. After tropical storms, the river and its tributaries flooded; the flood hazard areas along the river and bay, along with high hazard zones along the ocean, were mapped by the National Flood Insurance Program. Back then, there was only one way into and out of Calamity Shores: a highway heading west that linked

up with the interstate further inland. Other communities abutted the city to the south and north, with unincorporated land lying directly to the west.

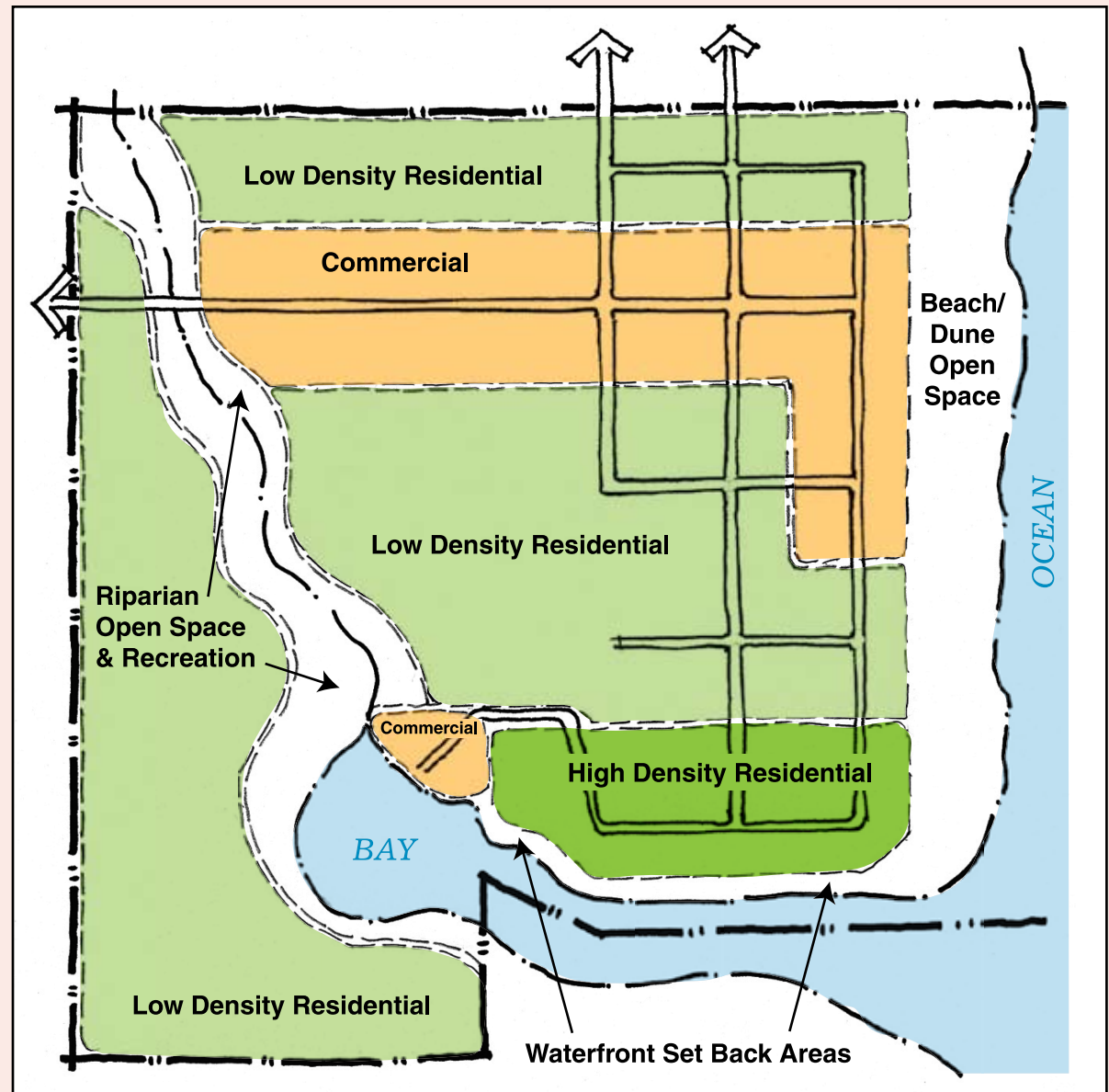
People liked living and working in Calamity Shores, and it was a good place to raise children. City officials saw opportunities for continued growth and prosperity. However, the specter of tropical storms and hurricanes always loomed. Evacuations were necessary

every few years, and on several occasions, coastal storms severely damaged the community, along both the coast and inland floodplain areas. Throughout the 20th century the city seemed to be regularly rebuilding houses and stores, parks, schools, and firehouses, only to suffer the same kind of damage during the next large storm.

A Vision for the Community

Early in the new millennium, as part of a periodic comprehensive planning effort, elected officials, business leaders, and concerned citizens of Calamity Shores decided to figure out what was most important in planning for the future. The City Planning Board began by looking at the results of past planning efforts. The main source of information was the city's 1999 Comprehensive Plan (see Figure 7.1), which was soon to undergo the Evaluation and Appraisal Report (EAR) process. Luckily for the city, the Florida Department of Community Affairs had just published "Protecting Florida Communities—Best Land Use Planning and Development Management Practices for Minimizing Vulnerability to Coastal Storms and Flooding" (hereafter called "the Guide"), which helped Calamity Shores integrate hazard mitigation and post-disaster redevelopment policies into its Comprehensive Plan update.

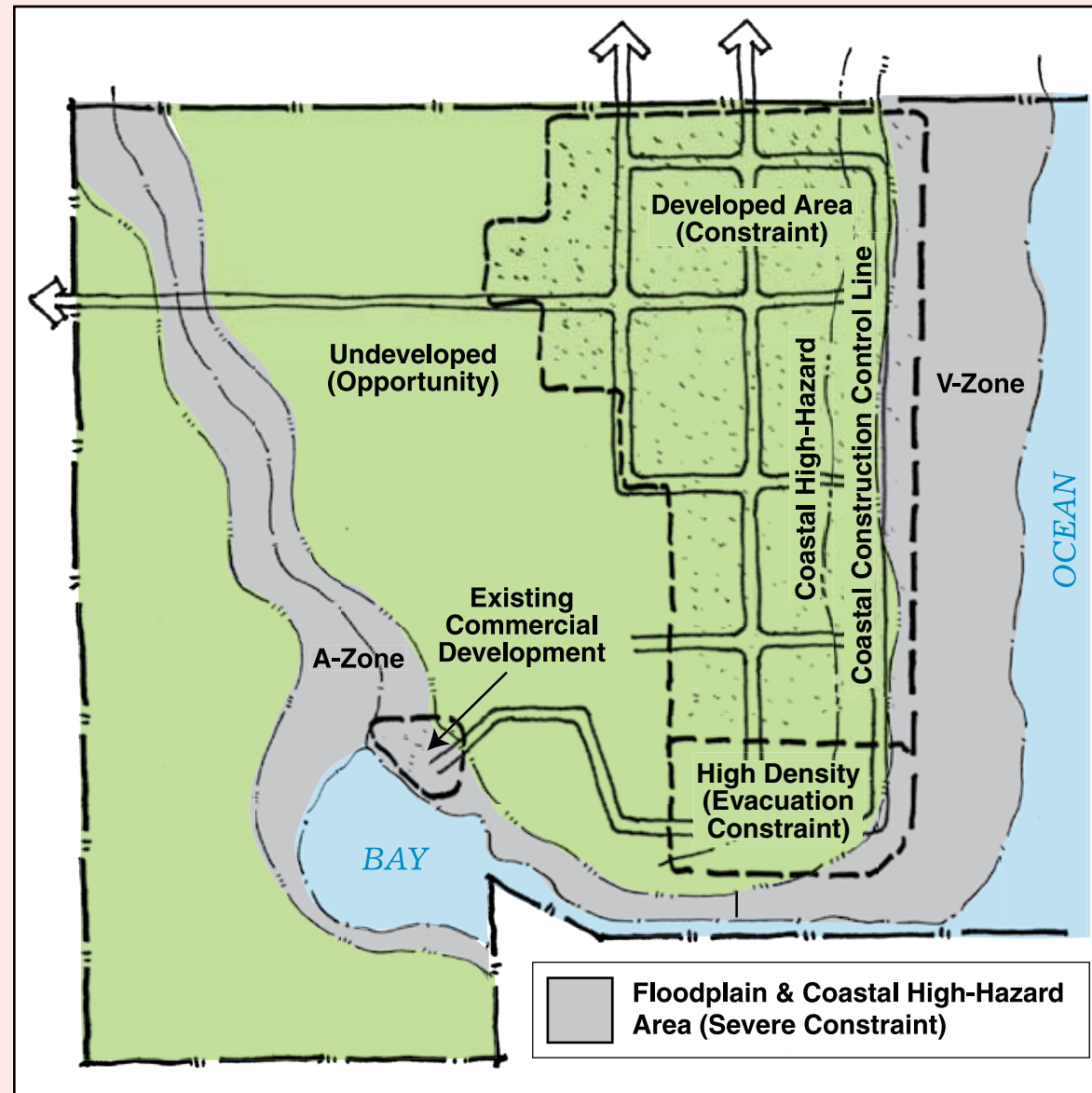
Figure 7.1: 1999 Future Land Use Map



Although the Planning Board was responsible for preparing the EAR, an advisory committee was formed to guarantee the input of interested citizens and groups. Elected officials made sure that the committee included people who were responsible for the three other plans that guide pre- and post-disaster planning in Calamity Shores: the local PDRP, the county CEMP, and the county LMS. The committee systematically pursued a number of activities (see Figure 7.2):

- looking at the physical characteristics of the community and the way land was being used at the time;
- updating the Hazard Identification and Vulnerability Assessment of the county LMS by researching all the disasters that had previously struck the city and the potential impact of natural hazards on both developed and undeveloped areas of the city;
- updating the natural features inventory in the conservation element of the Comprehensive Plan, which identified and mapped existing natural resources, including natural protective features such as natural drainage ways, floodplains, wetlands, and beaches and dunes;
- conducting a development suitability analysis for the future land use element of the Comprehensive Plan that included natural hazards as development constraints; and

Figure 7.2: 1999 Opportunities and Constraints



- assessing the implications of alternative future land use scenarios on community vulnerability, evacuation clearance times, and shelter demand during hurricanes and tropical storms.

The committee identified two major concerns relevant to comprehensive planning and hazard mitigation:

- **key parts of the community** including existing residential neighborhoods and commercial districts as well as substantial areas of undeveloped lands **are highly vulnerable** to the impacts of tropical cyclones; and
- **evacuation routes are inadequate**, particularly in existing coastal residential neighborhoods.

As part of the planning process, the community had to answer a number of difficult questions, including these:

- Do the current plans and policies of the community serve the best interests of the community (social, economic, environmental, etc.) or work against them? If the latter, what are the appropriate changes and how do we implement them?
- Do the regulations guiding the development of undeveloped land discourage or prohibit construction in areas that are

highly susceptible to coastal storms and flooding hazards?

- Are there specific areas at risk that need to be protected, and private or public structures that need to be made more wind resistant or elevated? What level of risk is acceptable to the community and its residents?
- Are there areas and structures so at risk that their redevelopment “as is” is not warranted? If so, what should be the goals, objectives, and policies to guide post-disaster redevelopment?

The committee’s role in the comprehensive planning process culminated in a new vision for how land should be utilized within the community. The committee developed a series of revised goals, objectives, and policies to provide direction for future land use, capital improvements, and other important aspects of the community in the revised Comprehensive Plan. Some of the actions to implement the plan could commence only after a disaster, but others were designed for pre-disaster implementation.

The committee recommended the creation of a transfer of development rights (TDR) program. Through the TDR program, landowners in areas that shouldn’t be developed were able to sell their development rights to developers who used them to

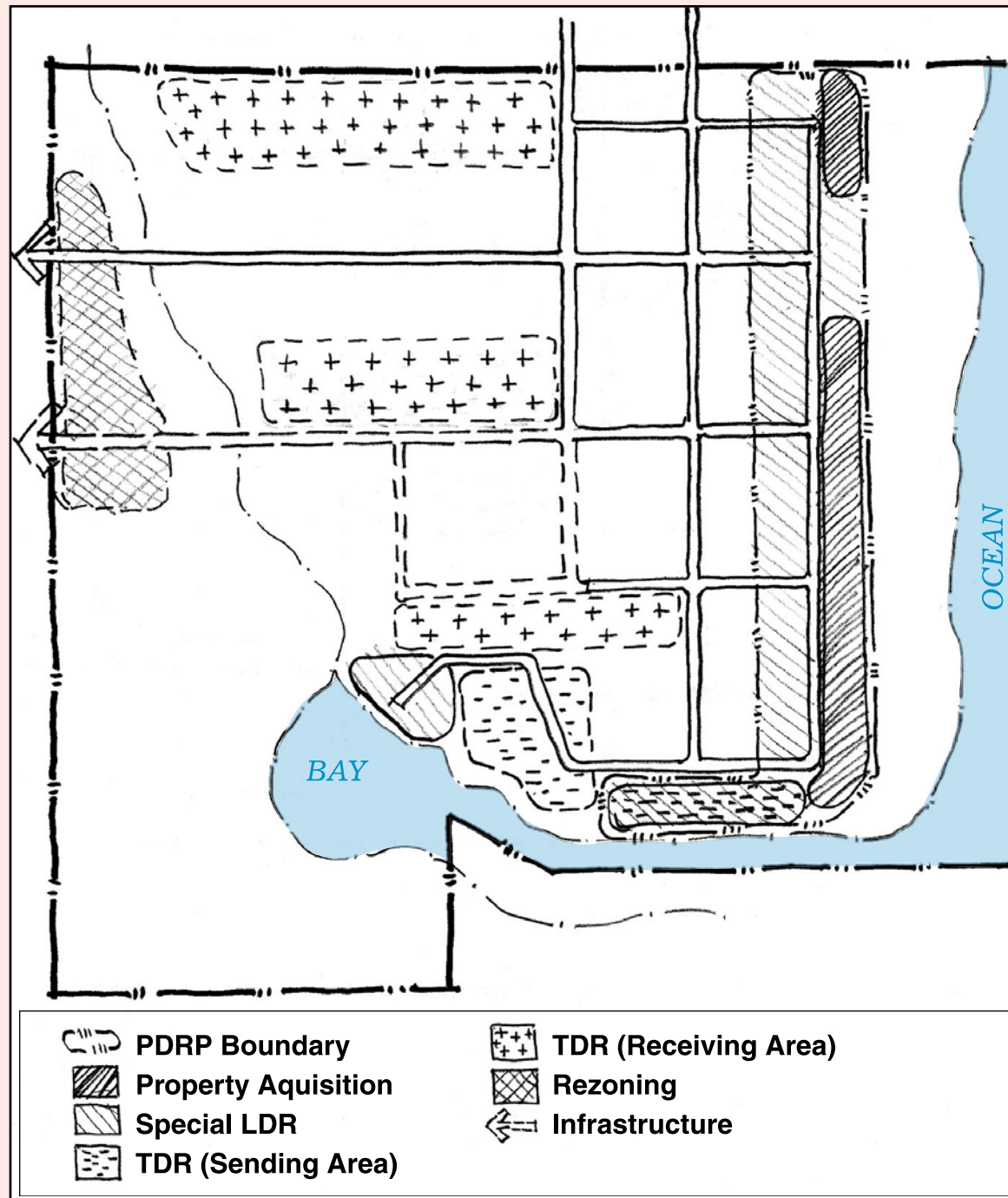
increase density in receiving areas designated on the revised Future Land Use Map that were not so susceptible to hazards and had road, sewer, and school capacity either planned or in place (see Figure 7.3).

This program required the creation of two overlay districts: the TDR “sending area” and the TDR “receiving area.” The market was strong enough, most of the time, to support direct landowner-to-landowner transfers of development rights. When necessary, however, the city itself purchased development rights from property owners in the sending area who were unable to sell when they wanted to, and the city then banked them for later resale. If a certain parcel in the Coastal High-Hazard Area (CHHA) (see Figure 7.2) was planned for public use, the city bought the land outright, then sold the development rights to defray the cost of the purchase.

The goals, objectives, and policies of that milestone Comprehensive Plan EAR revision grew out of several different scenarios for future development on the largely undeveloped areas of Calamity Shores. (The importance of creating these scenarios was highlighted in the Guide.) Each development scenario had its own costs, benefits, and vulnerability to potential hazards, which the committee evaluated.

In some scenarios, the build-out option brought so many benefits that a limited level

Figure 7.4: Interventions



lives, and from which the city took a long time to recover. Residents came to understand and anticipate the disaster cycles, but they got tired of the impacts and the costs of restoring places that were damaged over and over again.

The city sought to reduce the community's vulnerability to repeated damage by including post-disaster redevelopment policies for neighborhoods in the CHHA (see Figure 7.2) in a revised PDRP for guiding decision making during recovery and reconstruction. To facilitate efficient implementation of this redevelopment plan, the committee added a number of parallel pre- and post-disaster policies to the revised Comprehensive Plan to guide development in the undeveloped areas of the community:

- the rezoning of a low density, non-hazard area (see “Rezoning” on Figure 7.4) to allow the relocation of businesses—pre-and post-disaster—from the CHHA;
- the creation of a Transfer of Development Rights (TDRs) program to eliminate development rights in undeveloped portions of the CHHA by allowing developers to buy them and add the extra density to projects in non-hazard areas; and
- the creation of a purchase of development rights program through which the city could buy development rights to preserve properties, then sell the rights on the TDR

market to defray the cost of the purchase and provide more funds for purchasing more development rights.

The PDRP was prepared between major storms, but the committee did not forget the city's long history of problems. The PDRP started with the recognition that development in the CHHA would be damaged by future storms and that some reconstruction would be unwise. The highest hazard areas, ultimately, should not have any buildings or other improvements. They should be converted to public open space and be used to provide beach access with restored dunes to help protect upland areas against smaller storms. These areas were slated for direct purchase by the city.

The committee considered high-density development inappropriate in other parts of Calamity Shores because it overloaded the evacuation capacity of city streets, and the buildings were not worth the cost of repeated damage and repair. Those areas were planned for rebuilding at a lower density, using higher construction standards and design techniques that would withstand the predicted intensity of storms. The post-disaster redevelopment policies in the PDRP and the Comprehensive Plan did, however, allow for certain public improvements in specific portions of the CHHA. Public restrooms, picnic pavilions, and boardwalks were planned

for construction with the full knowledge and expectation that they would be severely damaged, even in moderate storms; their value as amenities was so high that the community was willing to pay for their reconstruction.

At the 100th anniversary of Calamity Shores, the retrospective analysis showed that it had been a good idea to prepare a redevelopment plan for the waterfront neighborhoods in advance of a major storm. It allowed the community to sort out the issues related to the inevitable changes that were coming, develop mechanisms to allow change to occur, and prioritize its interests without the chaos and trauma that attend post-disaster recovery.

The Situation Today

As fate would have it, a major hurricane hit Calamity Shores a few years after the plan's adoption, triggering implementation of the post-disaster redevelopment policies in the PDRP and the Comprehensive Plan. As a result, the character of the waterfront today is dramatically different from what it was before that storm. What's most important, subsequent storms caused minimal damage and redevelopment costs were a fraction of what they had been. Public beachfront facilities are designed with a limited lifespan and the cost of periodic replacement and reconstruction is budgeted in the annual capital plan.

The population within the CHHA has been reduced so that the roads can more easily handle evacuation traffic; no storm-related deaths have occurred since the adoption of the revised Comprehensive Plan and PDRP.

Today, the city is thriving due to the sustained, coordinated effort to fashion and implement a far-reaching Comprehensive Plan that integrates hazard mitigation and redevelopment policies throughout its elements, thus guiding the evolution of a safe, sustainable community. If visitors from the early 21st Century could see Calamity Shores today, they would find it familiar, with several important changes. A large share of the residential and commercial activity that took place in old parts of the CHHA along the coast is now located elsewhere, thanks to a series of mutually beneficial arrangements with property and business owners. Additionally, new development in the CHHA has been limited through the use of innovative regulations and made more disaster-resistant through the careful enforcement of progressive building codes.

Today, Calamity Shores is more capable than ever of enduring tropical storms and hurricanes, and getting back to normal afterward.

Protecting Florida Communities—Best Land Use Planning and Development Management Practices for Minimizing Vulnerability to Coastal Storms and Flooding can do for Florida communities what it did for Calamity Shores. The most basic recommendation in this guide is to integrate land use, pre-disaster mitigation, and post-disaster redevelopment considerations into all land use planning and capital facilities decisions.

In the aftermath of a disaster, so many issues demand the attention of local officials, emergency responders, and affected residents that time becomes a compelling factor in determining recovery and redevelopment outcomes. Pressure to restore normality and rebuild “the way it was” can be so strong that safety, hazard mitigation, and community improvement goals can be compromised or abandoned. This is the

strongest argument that can be made for doing two things BEFORE a disaster occurs:

- find all the ways possible to reduce and eliminate risk through land use planning and development management, and
- develop and adopt post-disaster redevelopment policies and plans.

A Glossary of Terms

“A” Zones. Special flood hazard areas inundated by the 100 year floods on the Flood Insurance Rate Maps.

Abbreviated Transportation Model (ATM). A model that has been developed for each of the counties in the state, except for those covered by the southwest Florida Regional Hurricane Evacuation Study, with the primary intent to provide personnel with the capability to assess the impacts of development on clearance times and shelter demand in areas exposed to hurricanes.

Acquisition. Use of conservation easements, purchase of development rights, or outright purchase of property to gain control of land in high hazard areas.

Barrier Island. A depositional geological feature which consists of unconsolidated sedimentary materials and are subject to wave, tidal and wind energies.

Berm. The flat or gently sloping area between the high-tide limit and the frontal dune.

Bert Harris Act. An act adopted in 1995 by the Florida Legislature that requires compensation to land owners for regulations that “inordinately burden” their property. This act specifically seeks to create a separate and distinct cause of actions from takings law.

Bluff. A high steep bank, formed by beach or stream bank erosion.

Breakwater. A structure protecting the shore area, harbor, anchorage, or basin from waves.

Cluster Development. A flexible alternative that concentrates development within a certain portion of a subdivision of Planned Unit Development, leaving other portions of the land undeveloped.

Coastal Construction Control Line (CCCL). The line established pursuant to the provisions of Section 161.053, F.S., and recorded in the official records of the county, which defines that portion of the beach-dune system subject to severe fluctuations based on a 100-year storm surge, storm waves, or other predictable weather conditions. The Florida Department of Environmental Protection must permit any construction seaward of the CCCL.

Coastal Barrier. A term used to describe bay barriers, tombolos, barrier spits, and barrier islands, which are depositional geologic features which consist of unconsolidated sedimentary materials and are subject to wave, tidal and wind energies. The typical barrier will include most of the following characteristics: beach, berm, dunes, barrier flats, overwash fans, saltmarsh or mangroves, tidal flats, inlets, and lagoons.

Coastal Dune Lakes. Lakes that occur in coastal communities that are separated from the ocean by a barrier beach and dune system which may be intermittent with or without a meandering tidal outlet.

Coastal High-Hazard Area (CHHA). Section 163.3178(2)(h), Florida Statutes, defines the CHHA as the evacuation zone for a Category 1 hurricane. Hurricane evacuation zones are established in the regional hurricane evacuation study applicable to the local government.

Coastal Planning Area (CPA). Area for which a Coastal Management Element needs to be prepared under Chapter 9J-5.003(18) of the Florida Administrative Code. Discretion is given to local governments when defining the CPA, but at a minimum it must include the following: water and submerged lands of oceanic water bodies or estuarine water bodies; shorelines adjacent to oceanic waters or estuaries; coastal barriers; living marine resources; marine wetlands; water-dependent facilities or water-related facilities on oceanic or estuarine waters; or public access facilities to oceanic beaches or estuarine shorelines; and all land adjacent to such

occurrences where development activities would impact the integrity or quality of the above.

Community Rating System (CRS). CRS is a program that provides incentives for National Flood Insurance Program communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of the policyholders in those communities are reduced.

Community Vulnerability Assessment Tool (CVAT). A CD-ROM product available from the National Oceanic and Atmospheric Administration (NOAA) that details a process for analyzing physical, social, economic, and environmental vulnerability to hazards at the local level.

Comprehensive Emergency Management Plan (CEMP). Operations plan required under Chapter 252.38(1), Florida Statutes, that defines the organizational structure, chain of command, and operational procedure for the preparation, response and recovery and mitigation efforts associated with an emergency. The CEMP includes a basic plan as well as a recovery annex and a mitigation annex.

Comprehensive Plan. A legislative act of local governments, required for all municipalities and counties in Florida set forth in Chapter 163, Part II, Florida Statutes, that provides the foundation for developing programs and actions related to the use and development of land, and the provision of public facilities. The Comprehensive Plan includes goals, objectives and policies and a 5-year capital improvements plan, as well as a Future Land Use Map.

Concurrency Requirement. The requirement that the necessary public facilities and services to maintain the adopted level of service standards be in place before or at the same time development occurs, set forth in Section 163.3180, Florida Statutes.

Critical Facilities. Locally-designated facilities that are critical to important community functions, such as emergency response and safety operations centers and shelters. A list of these facilities must be included in the Local Mitigation Strategy. Other critical facilities include, but are not limited to, the following: Group quarters such as schools, churches, nursing/convalescent homes, correctional facilities, mobile home parks; Hazardous facilities such as fuel and hazard material storage and landfills; Health-related facilities such as hospitals, Red Cross and large animal-related facilities; Infrastructure such as Fire, Highway Patrol, Police and Sheriff's Departments, Communications centers and important utilities (electrical, sewage, water treatment, etc.); Military facilities; and Transportation facilities such as airports, marinas, sea ports, bridges and evacuation routes.

Dedication. The transfer of land or an interest in land by its owner to public ownership, to be used for a public purpose.

Density Transfer. An on-site density transfer is similar to cluster development in that it relocates development away from a sensitive portion of the site, to a location more capable of accommodating development impacts. An off-site density transfer, however, is similar to TDR, where the rights to develop sensitive property can be bought by a developer wishing to increase his/her zoning in a more accommodating area.

Development of Regional Impact (DRI). As defined in Section 380.06, Florida Statutes, a DRI is any development, which, because of its character, magnitude, or location, would have a substantial effect upon the health, safety, or welfare of citizens of more than one county. Impacts to regionally significant facilities and resources need to be mitigated as a part of the DRI process

Disaster Mitigation Act of 2000 (DMA 2000). DMA 2000 (Public Law 106-390) is the latest federal legislation designed to improve the hazard mitigation planning process. It was signed into law on October 10,

2000. This new legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur.

Documentary Stamp Tax Revenue. A tax levied on documents as provided under Chapter 201, Florida Statutes. Documents subject to the tax include, but are not limited to the following: deeds, stocks and bonds, notes and written obligations to pay money, mortgages, liens and other evidences of indebtedness.

Dune Walkover. A wooden walkway built over dunes to protect vegetation from trampling by foot traffic.

Easement. In the context of hazard mitigation and planning, a legally-binding agreement between a landowner and a qualifying government agency or nonprofit organization, in which the land owner voluntarily agrees to specific terms that limit the use of development of a given property for the purpose of protecting certain features inherent to that property or designation of publicly used space. The easement runs with the land title and is binding on all future landowners for a set time period.

Elevation of structures. Raising structures above the base flood elevation to protect structures located in areas prone to flooding.

El Niño. The cyclical warming (El Niño) and cooling (La Niña) of the equatorial Pacific off South America that results in significant changes in weather patterns in North America. In Florida, El Niño results in cooler and wetter weather.

Emergency Operations Center (EOC). Centers operated by the state each county, and some municipalities to handle immediate response and recovery activities related to an emergency.

Erosion Control Structures. A structure constructed with purpose of protecting the beach from erosion such as a seawall, breakwater or groin.

Estuarine Marsh. A large grassland tidally flooded by brackish water.

Evaluation and Appraisal Report (EAR). A document required by Section 163.3191, Florida Statutes, which evaluates how successfully a community has been in addressing major community land use planning issues through implementation of its comprehensive plan. The EAR must be prepared and adopted by a local government every 7 years.

Exactions. A fee or contribution of cash or property required of a developer as a condition of receiving development approval.

Exotic Plant Species. Plants occurring outside their native ranges in a given place as a result of actions by humans.

Federal Pre-Disaster Mitigation Grant Program. A program authorized by Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by Section 102 of the Disaster Mitigation Act of 2000, to assist communities with the implementation of hazard mitigation programs designed to reduce overall risk to the population and structures before the next disaster occurs.

Fee-Simple Property Acquisition. Also known as “fee simple purchase,” this is the outright purchase of land and it gives the owner (a local government, for example) full control over the property rights.

Flash Flood. A flood event occurring with little or no warning where water levels rise at an extremely fast rate.

Flood Insurance Rate Map (FIRM). Map of a community, prepared by the Federal Emergency Management Agency, which shows both the special flood hazard area and the risk premium zones applicable to the community.

Flood Insurance Study (FIS). A study conducted under the auspices of the National Flood Insurance program that provides an examination, evaluation, and determination of flood hazards and, if appropriate, corresponding water surface elevations in a community or communities.

Floodplain. Land areas adjacent to rivers and streams that are subject to recurring flooding.

Floodproofing. Actions that prevent or minimize future flood damage. Making the areas below the anticipated flood level watertight or intentionally allowing floodwaters to enter the interior to equalize flood pressures are examples floodproofing.

Florida Building Code (FBC). A set of uniform building construction regulations that was prepared and adopted by the Florida Building Commission. The FBC is in effect within all local government jurisdictions in Florida. The code applies to the construction, erection, alteration, modification, repair, equipment, use/occupancy, location, maintenance, removal and demolition of every public and private building, structure, facility, or floating residential structure, or appurtenances connected or attached to same.

Florida Communities Trust (FCT). Florida Communities Trust is a state land acquisition grant program housed at the Florida Department of Community Affairs. FCT provides funding to local governments and eligible non profit environmental organizations for acquisition of community based parks, open space and greenways that further outdoor recreation and natural resource protection needs identified in local government comprehensive plans.

Florida Shelter Retrofit Program. A program started in the state, funded by the state and federal government, to remedy the State of Florida's emergency shelter deficit.

Future Land Use Map (FLUM). A map that displays the different land use zones that regulate future development in the jurisdiction. The Future Land Use Map is a component of the local government Comprehensive Plan.

General Obligation Bond. Bond issued by a local government that is typically secured by ad valorem property taxes.

General Tax Revenue. Primarily property tax and sales tax revenues.

Groin. A rigid structure built at an angle (usually perpendicular) from the shore to protect it from erosion or to trap sand.

Hazard. A source of potential danger or adverse condition.

Hazard identification. Defines the magnitudes (intensities) and associated probabilities (likelihoods) of a natural hazard that may pose threats to human interests in a specific geographic area.

Hazard Mitigation Grant Program (HMGP). Authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, HMGP is administered by Florida Emergency Management Agency and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.

HAZUS-MH. A public domain software product developed by the National Institute of Building Sciences (NIBS) for FEMA which provides vulnerability assessment information for Florida communities using default data provided in the software. For more accurate analysis, local data are required.

Hurricane. A tropical cyclone with sustained winds of 74 mph or higher.

Hurricane Clips. Metal strips that fasten the roof rafters and beams to the tops of walls.

Hurricane Evacuation Study (HES). A regional study that includes an analysis of where the predicted storm surge from various categories of hurricanes, traveling at various speeds and directions, would strike. The study also determines the number of residents living in surge areas that are vulnerable to storm surge. This study is used to determine the number of people that will need to evacuate, and where they will go as well as the evacuation routes leading out of these vulnerable areas and their carrying capacities. Most of the HESs in Florida were prepared by the U.S. Army Corps of Engineers.

Hurricane Vulnerability Zone (HVZ). As defined in Chapter 9J-5.003(57) of the Florida Administrative Code, an area requiring evacuation in the event of a 100-year storm or a Category 3 storm event.

Hydrodynamic Load. The horizontal and vertical forces resulting from a mass of water in motion, such as the forces associated with the flow accompanying a storm surge. Hydrodynamic loads include the effects of turbulence resulting from the interaction of the flowing water mass with a rigid structure.

Hydrostatic Load. The horizontal and vertical forces resulting from a standing mass of water.

Impact Fee. A type of exaction used to expand or improve public facilities outside a subdivision or PUD.

Incentive Zoning. An option that encourages developers to go beyond the minimum standards of the land development code by offering certain rewards, such as higher densities, for taking this action.

Infrastructure. Refers to the public facilities of a community. Infrastructure includes communication technology, such as phone lines or Internet access; vital services, such as public water supplies and sewer treatment facilities; and an area's transportation system: airports, heliports, highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, dry docks, piers, and regional dams.

Leaseback (Purchase-And-Sellback). Land is purchased by a local government and rezoned for the desired land use and under the sellback option, it is then sold for development. Under the leaseback option, however, the area may also be subdivided by the local government and then individual lots can be leased for development.

Levee. A natural or manmade feature of the landscape that restricts movement of water into or through an area.

Local Mitigation Strategy (LMS). The term used in Florida for the local government "hazard mitigation plans" required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Pursuant to the federal Disaster Mitigation Act of 2000 (Public Law 106-390), state and local government must develop hazard mitigation plans as a condition of federal grant assistance. The LMS is a community plan to promote hazard mitigation that includes a guiding principles section, a vulnerability assessment, and mitigation initiatives, as well as capital projects.

Local Ordinances. Local regulations that establish the means to implement locally adopted emergency management plans. Additionally, many local governments adopt ordinances to establish a review process, design standards, and permitting requirements for alternation to historic resources.

Manufactured Building. A building that is constructed in a factory to meet the Florida Building Code and transported, usually in sections, to

the building site. Unlike Manufactured Homes, these buildings do not have an integral chassis and can have occupancies other than residential.

Manufactured Home. A home that is built entirely in a factory and meets the Housing and Urban Development Code, that has an integral chassis and must be transported on their own axles and wheels from the factory.

Mapping for Emergency Management, Parallel Hazard Information System (MEMPHIS). An experimental website based system to allow emergency managers, planners, and other local officials in Florida to easily access a variety of hazard related data. MEMPHIS website: <http://lmsmaps.methaz.org/lmsmaps/index.html>

Mitigation 20/20. A tool used by state and local governments in the development of comprehensive mitigation plans. It also aids state and local governments in achieving federal requirements, including those under the Federal Disaster Mitigation Act of 2000.

Mobile Home. The term used for manufactured homes produced prior to Jun 15, 1976, when the first Housing and Urban Development Code went into effect. The term “mobile home” is often used interchangeably with “manufactured housing.”

Modular Building. A term that is used interchangeably with Manufactured Buildings.

National Flood Insurance Program (NFIP). Federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations as indicated in 44 CFR 60.3.

Native Dune Vegetation. The species of plants that naturally occur on dune systems and are native to the area.

Non-Conforming Use. A land use that currently does not conform to the requirements of the zoning district in which it is located, but that met municipal requirements prior to adoption or amendment of the zoning district regulations.

Overlay Zone. A mapped area that allows differential treatment in response to the special needs specific to that area, supplemental to the underlying zoning district on the Future Land Use Map Category.

Performance Standards. General criteria that are set out to ensure that a particular structure, type of land use or development will be able to meet certain minimum standards or that its effects on the community will not exceed set limits.

Planned Unit Development (PUD). A type of development characterized by comprehensive planning for the project as a whole, where the clustering of structures is employed to preserve usable open space and other natural features. A mixture of housing types and sometimes a variety of nonresidential uses can be constructed in these developments as well.

Post-Disaster Mitigation. Mitigation actions taken after a disaster has occurred, usually during recovery and reconstruction.

Post Disaster Redevelopment Plan (PDRP). A plan that is required to be prepared pursuant to the coastal management element of comprehensive plans. The PDRP is required for coastal communities by Section 9J-5.012(3)(b)(8) of the Florida Administrative Code, and encouraged for inland counties by Section 163.3177(7)(I), Florida Statutes. The PDRP is often a mixed plan that includes both an operations component, that details the who, what, when and where of post-disaster recovery and re-

construction procedures, as well as the policies for governing the recovery and reconstruction process.

Pre-Disaster Mitigation. Projects that are initiated under “blue-sky” conditions rather than in post-disaster situations.

Purchase of Development Rights (PDR). The purchase of development rights by a government entity or nonprofit organization to protect certain features inherent to that property. This can be accomplished through a conservation easement or the land title, but unlike TDR, the development rights are then “retired,” and not used elsewhere.

Repetitive Loss Property. A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least \$1000 each have been paid within any 10-year period since 1978.

Revenue Bond. Bond issued by a local government that is secured by a dedication of revenue source other than the community’s ad valorem tax base, such as user fees.

Risk. The calculated potential of suffering harm from a hazard. The risk associated with a given natural hazard is the product of the probabilities and the magnitudes for all possible intensities of the hazard phenomenon.

Risk Analysis. Incorporates estimates of the probability of various levels of injury and damage to provide a more complete description of the risk from the full range of possible hazard events in an area.

Safe Room. A room designed for protection from the high winds and flying debris expected during tornadoes and hurricanes.

Seawall. A protective structure of stone or concrete that extends along the shore into the water to prevent beach erosion.

Seismic. Pertains to earthquake or earthquake vibrations

Special Needs Facility. A facility such as a hospital or an assisted living facility that caters to the needs of citizens who are disabled or currently needing medical attention.

State Emergency Response Team (SERT) Tracker. The Emergency Operations Center database that compiles all incoming and outgoing messages and requests for assistance during activation. The SERT Tracker can be accessed at <http://www.floridadisaster.org/DEMcom.htm>.

SLOSH (Sea, Lake and Overland Surges from Hurricanes). A computerized model developed by the National Hurricane Center that computes the maximum possible still-water storm surge flood depth resulting from the composite of an array of possible storms of a given intensity.

Special Assessment. An assessment typically levied on real property in districts that are created within a local jurisdiction, to finance specific public capital improvements or the annual operating costs of services that confer a special benefit to the properties within the district.

Stafford Disaster Relief and Emergency Assistance Act. The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-107 is a federal law signed on November 23, 1988, and amended by the Disaster Mitigation Act of 2000, Public Law 106-390. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to Federal Emergency Management Agency and its programs.

STORM (Simulation and Training on Recovery and Mitigation) Gaming Simulation. A gaming simulation developed by the Florida Planning and Development Lab at Florida State University that presents players, who constitute the recovery task force team for a hypothetical

coastal county, with the major operational and policy decisions likely to be faced during recovery from a major (Category 3) hurricane.

Storm Surge. A rise in the surface of the sea caused by the low atmospheric pressure under the eye of a hurricane. The height of the storm surge is directly related to the atmospheric pressure of the storm as well as the depth of the bottom of the ocean under the eye.

Stormwater. Rainwater that flows overland after falling. In developed areas, storm water typically becomes polluted by materials it picks up from roofs, streets, parking lots, and other impermeable surfaces, and may deliver pollutants to surface and ground water.

Structural Retrofitting. Modifying buildings and infrastructure to protect them from hazards.

TAOS (The Arbiter Of Storms). A computerized model used to model meteorological hazards, and is used in real time hurricane forecasting, as well as calculating potential vulnerability and damage costs due to wind and water from hurricanes.

Transfer of Development Rights (TDR). A land use management technique that transfers development potential from sensitive areas to less sensitive areas that have been identified as suitable and designated for growth. In a TDR program, two or more zones are established in a given geographic area: 1) a “sending” (preservation) zone and 2) a “receiving” zone. The most common TDR program allows the landowner to sell the development rights to a developer who then uses those development rights to increase the density of development on another piece of property at another location. A second method allows local governments to establish a TDR bank to transfer development rights.

Tropical Depression. A tropical cyclone with maximum sustained winds of less than 39 miles per hour.

Tropical Storm. A tropical cyclone with maximum sustained winds greater than 39 mph and less than 74 mph.

“V” Zone. Special flood hazard area delineated on Flood Insurance Rate Maps, inundated by the 100 year flood and supports a 3 foot wave or coastal flood with velocity hazard.

Vulnerability. The susceptibility of property or populations to damage or injury from a natural hazard event of a given intensity.

Vulnerability Assessment. Characterizes the exposed populations and property and the extent of injury and damage that may result from a natural hazard event of a given intensity in a given area.

Wetland. Lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface.

Wind-Borne Debris. Objects that become airborne and dangerous when subject to high winds.

B Exemplary Hazard Mitigation Policy Crosswalk

This appendix presents an exemplary hazard mitigation policy crosswalk from the *Guiding Principles* section of Manatee County’s *Local Mitigation Strategy*. The crosswalk table is divided into a series of hazard mitigation goals, for example, “Public, Health, Safety, Welfare”, under which are listed individual policies, regulations, and objectives from the county *Comprehensive Emergency Management Plan* and the *Comprehensive Plans*, land development codes and other ordinances, and building codes of Manatee County and its municipalities. Separate columns specify the source reference, describe the relevant mitigation function, and provide an evaluation of the effectiveness of the policy, regulation, or objective. Three pages excerpted from the table are presented in the following pages.

Local Mitigation Strategy, Guiding Principles

Manatee County, Florida

LMS Community Guiding Principles Table			
Comp Plan Policy, Regulation, Objective	Source Reference	Mitigation Function	Evaluation
1. Public Health, Safety, Welfare			
Occupancy Quattlebaum Guest House (EMS Stations #5)	R89-143 (MC EMS)	Resolutjon to enable MCEMS to continue using Quattlebaum guesthouse as an EMS substation.	Enables MCEMS to properly house an Ambulance and its crew for emergency response coverage of Eastern Manatee County.
Football Game Stand-bys	R93-142 (MC EMS)	Allows customary Ambulance Stand-by for School board sanctioned football events	Provides an on the spot response where a greater potential for injury exist due to the nature of the activity and large crowd gatherings, participants involved.
Certificate of Public Convenience and Necessity West Coast Medical Transfer	91-73/R-93-253(MC EMS)	West Coast. Medical Service Provides Non-first response Basic life Support and Advance life Support inter-hospital transports.	The service provided by West Coast Medical Service reduces the demand placed on MCEMS providing better responses for emergency calls. West Coast also is a good back up resource available to a MCEMS should demand exceed supply.
Participation of Helping Hugs Program	R-94-112 (MC EMS)	Agreement between Target stores and the County to donate Stuffed Animals for pediatric patients. On a quarterly basis.	Ultimately should help to alleviate the inerrant difficulties associated with the emergency care of sick/injured pediatric patients.
Certificate of Public Convenience and Necessity	R-94-239 (MC EMS)	Enables Advance Life Support Units operated under the direction of the Town of Longboat Key to operate within the portions of Longboat Key within Manatee County Jurisdiction.	Decreases the demand placed on MCEMS and provides additional resources through mutual aid request.

Community Guiding Principles Table			
Policy, Regulation, Objective	Source Reference	Mitigation Function	Evaluation
Bayflight Bayfront Medical Mutual Agreement	(MC EMS)	Agreement with Bayfront to provide Helicopter transport for patients termed "Trauma Alert" to area Trauma Centers	Works very well in getting severely injured persons to a trauma center where emergency surgery is available.
Tampa General Hospital and AEROMED	(MC EMS)	Agreement with Tampa General to provide secondary Trauma Transport to Tampa General	Works well for at times the primary responder Bayflight may be unable to respond.
Coastal Management	LDC (MC Planning)	All new development in the Category 1, 2, or 3 hurricane evacuation areas shall have a Public Safety approved evacuation plan.	How is this monitored/verified? At what stage does Public Safety receive the Plan? No standards/guidelines have been established. Need better coordination with the planning and public safety departments.
Floodplain Management Plan	Provision 8.4.1 (MC Building)	The County maintains an evacuation assistance list of elderly and others who need County help when an evacuation is necessary.	Effective
Future Land Use	Incompatible Land Uses (9J-5.006(3)(b)3.] Pol. 1.3.4 (City of Palmetto)	Heavy commercial/industrial land uses shall be subject to performance standards to control noise, vibration, glare, odors, fumes, and smoke.	Effective
Future Land Use	Coastal Population Densities [9J-5.006(3)(b)5.] Pol. 1.5.1 (City of Palmetto)	To limit coastal area population densities, consistent with the need for an effective hurricane evacuation plan.	Effective
Future Land Use	Coastal Population Densities [9J-5.006(3)(b)5.] Pol. 1.5.2 (City of Palmetto)	Coastal Densities shall be consistent with local or regional coastal evacuation Plans.	Effective
Hurricane Vulnerability	TFC 1.4.4 (City of Bradenton Beach)	City to clearly post and maintain emergency evacuation routes.	Reduces potential loss of life through fostering of public awareness of evacuation routes.
Hurricane Vulnerability	Comp. Plan Policy (City of Anna Maria)	The City shall clearly post and maintain emergency evacuation routes.	Effective
Hurricane Vulnerability	FLU Obj. 4, Policies 1-4 (City of Bradenton)	Pol.1: Prohibit density increases in first priority hurricane evacuation zones.	Effective as a policy guide to limit population in areas subject to the effects of storms.

Community Guiding Principles Table			
Policy, Regulation, Objective	Source Reference	Mitigation Function	Evaluation
Hurricane Evacuation	Obj. 8.5, Pol. 8.5.1-8.5.2 (City of Palmetto)	The City shall continue to work with the County Public Safety Dept, And the TBRPC to improve the hurricane evacuation clearance time of 12 hours for all zones within Palmetto and to ensure that adequate shelter capacity is available for city residents and visitors.	Will reevaluate with new surge zone map due in 1999 from TBRPC.
Hurricane Evacuation	Obj. 8.6 Pol. 8.6.1 (City of Palmetto)	High density developments in areas projected to receive major hurricane damage from coastline storm surges shall be avoided.	Effective
Flooding	FLU 1.1.6 (City of Bradenton Beach)	Residential areas to be located and designed to protect life and property from flooding.	Effective as a policy.
Flood	LDC 718.6.1 (MC Building)	No storage areas for hazardous or acutely hazardous waste in the watershed protection overlay, coastal high hazard area overly district or floodway.	Effective
Flood Damage Protection	Ord. No. 89-10 Floodplain Mgmt. Obj. 101.2 Land Dev Code 718.1 (MC LDC 718.6.1.10 (MC Building)	Protect human life. Help maintain a stable tax base through sound developments.	Effective building construction code sections designed to limit flood and storm damage to structures.
Flood Damage Protection	Ord. No. 89-10 Floodplain Management Objective 101.2 Land Development Code 718.1 (MC Building)	Protect human life.	Effective building construction code sections designed to limit flood and storm damage to structures.
Coastal High Hazard Protection	LDC 604.3.3 Coastal High Hazard Area Prohibitions (3)	Uses that generate, store or dispose of 45.5 lbs of hazardous materials or .45 lbs of acutely hazardous materials per month	EMS lead agency to evaluate.

Example and Model Plans and Ordinances

Appendix C includes four different sections:

- C-1: *Model Zoning Regulations for a TDR Program*
- C-2: *APA Model Recovery and Reconstruction Ordinance*
- C-3: *Hillsborough County Post-Disaster Redevelopment Ordinance*
- C-4: *Okaloosa County Post-Disaster Redevelopment Plan*

C-1 Model Zoning Regulations for a TDR Program

These regulations, with some modification, were adapted from *Flexible and Innovative Zoning Series: Transferable Development Rights* (Maryland Department of Planning, 1995). Numerical standards used in the model are for illustration purposes only and some of those not directly related to the TDR concept are omitted.

Section 100

Definitions

Bonus Density: The right to develop property at a higher density/ intensity than normally permitted, through compliance with optional procedures established in these regulations.

Receiving Area: Any zoning district where optional procedures have been established for additional bonus density through transfer of development rights.

Sending Area: Any zoning district where, according to the procedures of Section 130, owners of property are eligible to obtain certification of ownership of transferable development rights and to transfer such ownership.

Transferable Development Right: The right to create a residential building lot or construct a dwelling unit, which right may be severed from a property in the sending area and transferred to a property in the receiving area in the form of bonus density according to procedures established in these regulations.

Section 110

Coastal High-Hazard Sending Area (CHHSA) District¹

A. Purpose

The purpose of the CHHSA is to minimize residential development density within the Coastal High-Hazard Area and to help implement the Comprehensive Plan goal of directing growth away from the Coastal High-Hazard Area.

B. Uses permitted as a matter of right

1. One single-family detached dwelling unit per lot.
2. Recreational and open space activities.

C. Accessory uses [see any zoning ordinance with “coastal” district regulations]

D. Development standards

1. The following maximum limitations shall apply:
 - a. height [omitted]
 - b. lot coverage [omitted]
 - c. density – overall for residential subdivisions1 unit per 50 acres

2. The following minimum requirements shall be observed:
 - a. lot size..... 50 acres
 - b. lot width at building restriction line [omitted]
 - c. building setbacks [omitted]

3. Cluster option

For subdivisions for which a cluster sketch plan has been submitted to the Planning Commission for approval, the following less restrictive minimum standards shall apply in lieu of Section 110.D.2. a. and b.:

- a. lot size..... 1 acre
- b. lot width at building restriction line [omitted]

In a cluster subdivision, land not used for residential lots, rights-of-way, or storm water management facilities and not required to be dedicated to the County or State under the provisions of the Subdivision Regulations, shall be placed under a permanent easement restricting its use to agriculture or open space use.

E. Transfer of development rights

1. If development rights are transferred from the CHHSA District pursuant to Section 130 of these regulations, or if development rights are sold from the CHHSA District pursuant to applicable County or State programs for the acquisition of development rights, then the number of development rights eligible for such transfer or sale shall be calculated at the rate of one development right per five gross acres [or a figure corresponding to the density under the prior zoning], minus one development right for each existing dwelling unit and minus the number of development rights previously transferred or sold.

2. Land that is encumbered with easements that entirely restrict the development of the property for residential use and land in public ownership shall not be eligible for transfer of development rights.

Section 120

Residential Receiving Area (RRA) District

A. Purpose

The purpose of the residential receiving area district is to help implement the goals of the Comprehensive Plan by providing suitable areas where development may be concentrated. To minimize residential development density within the Coastal High-Hazard Area, this district is intended to provide a preferred location for growth that might otherwise take place in coastal areas, via a transfer of development rights from the CHHSA District.

B. Uses permitted as a matter of right

1. One single-family detached dwelling unit per lot.
2. Single-family attached dwelling units.
3. Duplexes.
4. Apartments.
5. Government buildings, facilities, and uses including public schools and colleges.

C. Accessory uses [see regulations for residential districts in any zoning ordinance]

D. Development standards

1. The following maximum limitations shall apply:

- a. height [omitted]
 - b. lot coverage [omitted]
 - c. density (except as provided in Section 120 E. of these regulations for bonus density)2 units per acre
 - d. units per structure [omitted]
2. The following minimum requirements shall be observed:
- a. lot size [omitted]
 - b. lot width at building restriction line [omitted]
 - c. building setbacks [omitted]
 - d. distances between buildings other than single-family detached units [omitted]
 - e. open space including landscaped areas [omitted]

E. Bonus Density

- 1. Eligibility – properties within the RRA District are eligible to receive bonus density under these regulations provided that public facilities are adequate to serve the development and that all other requirements of this subsection are met.
- 2. Maximum density permitted – Density may be increased under this subsection up to limits determined for each parcel according to the land use designation of the parcel on the future land use map of the Comprehensive Plan as follows:

Comprehensive Plan designation	Maximum Density Permitted
low density	4 units per acre
medium density	8 units per acre
high density	16 units per acre

- 3. Density may be increased up to the maximums established in Section 120 E. 2. provided that for every additional dwelling unit (bonus unit) awarded under this provision a development right is transferred to the project, pursuant to procedures of Section 130 of these regulations.
- 4. No subdivision plans or site plans for any project involving bonus density will be approved until a sketch plan of the project has been approved by the Planning Commission. The Planning Commission, before acting on the sketch plan, shall give consideration to the following:
 - a. the Comprehensive Plan for _____;
 - b. the proposed density of the development;
 - c. the adequacy of public facilities in the area including, but not limited to, water and sewerage facilities, roads and schools;
 - d. the highway plans of the municipality, county, and state; and
 - e. compatibility of the development with surrounding land uses.

After carefully considering the above, the Planning Commission shall approve, approve with modifications and conditions attached, or disapprove the sketch plan stating the reasons for its action.

Section 130

Transfer of Development Rights

A. Eligibility

- 1. Development rights may be severed from land within a sending area and transferred to land within a receiving area for transferable development rights according to procedures established in these regulations. As it applies here, a sending area is:

- a. any property within the CHHSA District with development rights available for transfer, or
- b. land surrounding a structure listed on the inventory of historic sites of _____ in any zoning district except the CHHSA District provided that:
 - (1) such land is under the same ownership as the historic structure;
 - (2) no more than fifteen acres adjoining any historic structure shall qualify as a sending area; and
 - (3) development rights shall be assigned as follows:

acreage	development rights
5 or more acres	3
>10 but <15 acres	2
less than 10 acres	1
- 2. Receiving areas for transferable development rights are those areas within the RRA District that are eligible for bonus density.

B. Certification of Transferable Development Rights

- 1. The legal title holder of property in a sending area may apply to the Department of Planning and Zoning for certification of ownership of transferable development rights. The application shall contain:
 - a. the exact name and address of the legal title holder and a reference to the liber and folio of the Land Records of _____ at which the deed conveying the property to the applicant is recorded.
 - b. a metes and bounds description of the property, a copy of the deed or survey showing the acreage of the property upon which the number of transferable development rights will be calculated.

- c. the number of development rights proposed to be certified.
- d. an easement, in a recordable form approved by the Department of Planning and Zoning and conveyed to the Commissioners [or Mayor and Council] of _____, restricting and reducing future subdivision for residential purposes and construction of dwellings on the property by an amount equal to the number of transferable development rights to be certified.
- 2. After review of the application for conformity to these regulations, the Department of Planning and Zoning will record the easement in the Land Records of _____ and issue to the applicant a certificate of ownership of transferable development rights. The certificate may be sold and a new certificate issued in the name of the new owner.

C. Transfer of Rights to Receiving Area

- 1. The legal title holder, tenant under a lease having a term of not less than 75 years, or contract purchaser of property in a receiving area, at the time of application for subdivision or site development plan approval, may apply to the Department of Planning and Zoning for approval to use the bonus density provisions of these regulations. The application shall contain:
 - a. the exact name and address of the legal title holder of the property and, if the applicant is not the legal title holder, the written assent to the application signed by the legal title holder.
 - b. the number of development rights proposed to be transferred to the receiving property.
 - c. a sketch plan of the property approved by the Planning Commission for use of bonus density.

- d. a certificate of ownership of transferable development rights issued to the applicant documenting ownership of at least as many development rights as proposed to be transferred to the receiving property.
- 2. The Department of Planning and Zoning shall review the application for conformity to these regulations and shall provide written approval to the applicant to increase the number of dwelling units in the development by the number of development rights proposed for transfer to the property.
- 3. The Final Record Plat for a subdivision or approved site development plan shall contain a statement setting forth the number of transferable development rights used to qualify for bonus density and the recordation reference of the conveyance required by Section 130 B.2.

C-2

APA Model Recovery and Reconstruction Ordinance

This ordinance is adapted from the “Model Recovery and Reconstruction Ordinance” by Kenneth C. Topping, published in the American Planning Association’s Planning Advisory Service Report *Planning for Post-Disaster Recovery and Reconstruction* (1998).

- Section 1. Authority
- Section 2. Purposes
- Section 3. Definitions
 - 3.1 Damage Assessment Survey
 - 3.2 Development Moratorium
 - 3.3 Director
 - 3.4 Disaster Field Office (DFO)
 - 3.5 Disaster Recovery Center (DRC)
 - 3.6 Disaster Survey Report (DSR)
 - 3.7 Emergency
 - 3.8 Event
 - 3.9 Federal Response Plan (FRP)
 - 3.10 Flood Insurance Rate Map (FIRM)
 - 3.11 Hazard Mitigation Grant Program
 - 3.12 Historic Building or Structure
 - 3.13 In-Kind
 - 3.14 Interagency Hazard Mitigation Team
 - 3.15 Major Disaster
 - 3.16 Reconstruction
 - 3.17 Recovery
 - 3.18 [Recovery Task Force]
 - 3.19 Recovery Plan
 - 3.20 Recovery and Reconstruction Strategy
 - 3.21 Stafford Act
- Section 4. [Recovery Task Force]
 - 4.1 Powers and Duties
 - 4.2 [Recovery Task Force]
 - 4.3 Operations and Meetings
 - 4.4 Succession
 - 4.5 Organization
 - 4.6 Relation to Emergency Management Organization
- Section 5. Recovery Plan
 - 5.1 Recovery Plan Content
 - 5.2 Coordination of Recovery Plan with County and Regional Plans, FEMA, and Other Agencies
 - 5.3 Recovery Plan Adoption
 - 5.4 Recovery Plan Implementation
 - 5.5 Recovery Plan Training and Exercises
 - 5.6 Recovery Plan Consultation with Citizens
 - 5.7 Recovery Plan Amendments
 - 5.8 Recovery Plan Coordination with Related (City, County) Plans
- Section 6. General Provisions
 - 6.1 Powers and Procedures
 - 6.2 Post-Disaster Operations
 - 6.3 Coordination with FEMA and Other Agencies
 - 6.4 Consultation with Citizens
- Section 7. Temporary Regulations
 - 7.1 Duration
 - 7.2 Damage Assessment
 - 7.3 Development Moratorium
 - 7.4 Debris Clearance
 - 7.5 One-Stop Center for Permit Expediting
 - 7.6 Temporary Use Permits
 - 7.7 Temporary Repair Permits
 - 7.8 Deferral of Fees for Reconstruction Permits

- 7.9 Nonconforming Buildings and Uses
- Section 8. Demolition of Damaged Historic Buildings
 - 8.1 Condemnation and Demolition
 - 8.2 Notice of Condemnation
 - 8.3 Request to FEMA to Demolish
 - 8.4 Historic Building Demolitions Review
- Section 9. Temporary and Permanent Housing
- Section 10. Hazard Mitigation Program **[excluded]**
- Section 11. Recovery and Reconstruction Strategy
 - 11.1 Functions
 - 11.2 Review
- Section 12. Severability

WHEREAS, [jurisdiction name] is vulnerable to various natural hazards such as earthquakes, flooding, wildfires, and wind, resulting in major disasters causing substantial loss of life and property;

WHEREAS, [jurisdiction name] is authorized under state law to declare a state of local emergency and take actions necessary to ensure the public safety and well-being of its residents, visitors, business community, and property during and after such major disasters;

WHEREAS, it is essential to the well being of [jurisdiction name] to expedite recovery and reconstruction, mitigate hazardous conditions, and improve the community after such major disasters;

WHEREAS, disaster recovery and reconstruction can be facilitated by establishment of a [recovery task force] within [jurisdiction name] to plan, coordinate, and expedite recovery activities;

WHEREAS, preparation of a pre-event plan for disaster recovery and reconstruction can help [jurisdiction name] organize to expedite recovery in advance of a major disaster and to identify and mitigate hazardous conditions, both before and after such a disaster;

WHEREAS, recovery can be expedited by pre-event adoption of an ordinance authorizing certain extraordinary governmental actions to be

taken during the declared local emergency to expedite implementation of recovery and reconstruction measures identified in a pre-event plan;

WHEREAS, it is mutually beneficial to cooperatively plan relationships needed between [jurisdiction name] and other state and federal governmental authorities;

WHEREAS, it is informative and productive to consult with representatives of business, industry, and citizens' organizations regarding the most suitable and helpful approaches to disaster recovery and reconstruction;

The [name of legislative body] does hereby ordain:

Section 1. Authority. This ordinance is adopted by the [name of local legislative body] acting under authority of the [authorizing legislation], [state emergency management act, or equivalent], and all applicable federal laws and regulations.

Section 2. Purposes. It is the intent of the [local legislative body] under this chapter to: authorize creation of an organization to plan and prepare in advance of a major disaster for orderly and expeditious post-disaster recovery and to direct and coordinate activities; direct the preparation of a pre-event plan for recovery and reconstruction to be updated on a continuing basis; authorize in advance of a major disaster the exercise of certain planning and regulatory powers related to recovery and reconstruction to be implemented upon declaration of a local emergency; identify means by which the [jurisdiction name] will take cooperative action with other governmental entities in expediting recovery; and implement means by which the [jurisdiction name] will consult with and assist citizens, businesses, and community organizations during the planning and implementation of recovery and reconstruction procedures.

Section 3. Definitions. As used in this ordinance, the following definitions shall apply:

- 3.1 Damage Assessment Survey.** A field survey to determine levels of damage for structures and to identify the condition of structures.
- 3.2 Development Moratorium.** A temporary hold, for a defined period of time, on the issuance of building permits, approval of land use applications or other permits and entitlements related to the use, development, redevelopment, repair, and occupancy of private property in the interests of protection of life and property.
- 3.3 Director.** The Director of the [recovery task force] or an authorized representative.
- 3.4 Disaster Field Office (DFO).** A center established by the Federal Emergency Management Agency (FEMA) for coordinating disaster response and recovery operations, staffed by representatives of federal, state, and local agencies as identified in the Federal Response Plan (FRP) and determined by disaster circumstances.
- 3.5 Disaster Recovery Center (DRC).** A multi-agency center organized by FEMA for coordinating assistance to disaster victims.
- 3.6 Disaster Survey Report (DSR).** A claim by a local jurisdiction for financial reimbursement for repair or replacement of a public facility damaged in a major disaster, as authorized under the Stafford Act and related federal regulations, plans, and policies.
- 3.7 Emergency.** A local emergency, as defined by the [pertinent local law, which has been declared by the [local legislative body] for a specific disaster and has not been terminated.
- 3.8 Event.** Any natural occurrence which results in the declaration of a state of emergency and shall include earthquakes, fires, floods, wind storms, hurricanes, etc.
- 3.9 Federal Response Plan (FRP).** A plan to coordinate efforts of the government in providing response to natural disasters, technological emergencies, and other incidents requiring federal assistance under the Stafford Act in an expeditious manner.
- 3.10 Flood Insurance Rate Map (FIRM).** An official map of the community, on which the Federal Insurance Administration has delineated both the special flood hazard areas and the risk premium zones applicable to the community.
- 3.11 Hazard Mitigation Grant Program.** A federal program that assists state and local communities in implementing long-term hazard mitigation measures following a major disaster declaration.
- 3.12 Historic Building or Structure.** Any building or structure listed or eligible for listing on the National Register of Historic Places, as specified by federal regulation, the state register of historic places or points of interest, or a local register of historic places, and any buildings and structures having historic significance within a recognized historic district.
- 3.13 In-Kind.** The same as the prior building or structure in size, height and shape, type of construction, number of units, general location, and appearance.
- 3.14 Interagency Hazard Mitigation Team.** A team of representatives from FEMA, other federal agencies, state emergency management agencies, and related state and federal agencies, formed to identify, evaluate, and report

on post-disaster mitigation needs. [Note: Not all states employ the use of this team.]

- 3.15 Major Disaster.** Any natural catastrophe (including any [hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought]), or, regardless of cause, any fire, flood, or explosion, which in the determination of the President of the United States causes damage of sufficient severity and magnitude to warrant major disaster assistance under the Stafford Act to supplement the efforts and available resources of states, jurisdictions, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.
- 3.16 Reconstruction.** The rebuilding of permanent replacement housing, construction of large-scale public or private facilities badly damaged or destroyed in a major disaster, addition of major community improvements, and full restoration of a healthy economy.
- 3.17 Recovery.** The process by which most private and public buildings and structures not severely damaged or destroyed in a major disaster are repaired and most public and commercial services are restored to normal.
- 3.18 [Recovery Task Force].** Generic term for an interdepartmental organization that coordinates [jurisdiction name] staff actions in planning and implementing disaster recovery and reconstruction functions. [Other locally chosen names (e.g., the municipal disaster recovery commission) can, of course, be substituted.]
- 3.19 Recovery Plan.** A pre-event plan for post-disaster recovery and reconstruction, composed of policies, plans, implementation actions, and designated responsibilities

related to expeditious and orderly post-disaster recovery and rebuilding, with an emphasis on mitigation.

- 3.20 Recovery and Reconstruction Strategy.** A post-disaster strategic program identifying and prioritizing major actions contemplated or under way regarding such essential recovery functions as business resumption, economic reinvestment, industrial recovery, housing replacement, infrastructure restoration, and potential sources of financing to support these functions.
- 3.21 Stafford Act.** The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended).

Section 4. [Recovery Task Force]. There is hereby created the [recovery task force], for the purpose of coordinating [jurisdiction name] actions in planning and implementing disaster recovery and reconstruction activities.

- 4.1 Powers and Duties.** The [recovery task force] shall have such powers as enable it to carry out the purposes, provisions, and procedures of this chapter, as identified in this chapter.
- 4.2 [Recovery Task Force].** The [recovery task force] shall include a [recovery task force *or* locally chosen term] comprised of the following officers and members:
- The [title of the chief executive officer (e.g., the mayor)] who shall be Chair;
 - The [title of the deputy chief executive officer (e.g., city manager or county or town equivalent)] who shall be Director and Vice Chair;
 - The [title of the next-ranking executive officer (e.g., assistant city manager)] who shall be Deputy

Director, and who shall act as Vice-Chair in the absence of the Vice Chair;

- d. The [title of the jurisdiction's legal advisor] who shall be Legal Adviser;
- e. Other members, including the [list the titles of other interested jurisdiction officials, which might include the chief building official, chief engineer, the director of community development or planning, the fire chief, the emergency management coordinator, the general services director, the historic preservation coordinator, the police chief, the director of public works, and the director of utilities], together with representatives from such other departments and offices as may be deemed necessary by the Chair or Director for effective operation.

Commentary. The formal structure of a recovery organization will vary from community to community. The important thing is to include representatives from agencies and organizations so that the broadest array of functions that may have a direct or indirect role in recovery and reconstruction can be addressed. Also, formal leadership may vary by size and structure of local governmental organization. In a big-city environment, presence and availability of the mayor or a deputy mayor may be important from a leadership standpoint, even though recovery in many instances is largely a staff-driven process. On the other hand, in a typical council-manager form of government, inclusion of the mayor may not be very useful. The intent here is to provide a communications connection with the governing body as well as a ceremonial function.

- 4.3 Operations and Meetings.** The Director shall have responsibility for [recovery task force] operations. When

an emergency declaration is not in force, the [recovery task force] shall meet monthly or more frequently, upon call of the Chair or Director. After a declaration of an emergency and for the duration of that declared emergency period, the [recovery task force] shall meet daily or as frequently as determined by the Director.

Commentary. The overall concept here is for the city manager or county administrator to run the recovery task force operations on behalf of the city council or board of county commissioners, reserving the involvement of the mayor for those times when policy matters are being discussed or at critical junctures following a major disaster. In actuality, the city manager or county administrator inevitably becomes the pivotal party for informing and advising the city council or county commission on recovery matters, interpreting council/commission policy and coordinating staff functions.

- 4.4 Succession.** In the absence of the Director, the Deputy Director shall serve as Acting Director and shall be empowered to carry out the duties and responsibilities of the Director. The Director shall name a succession of department managers to carry on the duties of the Director and Deputy Director, and to serve as Acting Director in the event of the unavailability of the Director and Deputy Director.
- 4.5 Organization.** The [recovery task force] may create such standing or ad hoc committees as determined necessary by the Director.
- 4.6 Relation to Local Emergency Management Organization.** The [recovery task force] shall work in concert with the [local emergency management organization] that has interrelated functions and similar membership.

Commentary. As noted in the introductory paragraphs, there are certain fundamental differences in function that make it preferable to establish a recovery organization that can operate parallel to the emergency management organization. However, because of the inherent linkage of emergency preparedness and response with recovery, reconstruction, and hazard mitigation functions, a close relationship must be continuously maintained. For many purposes these overlapping organizations can meet and work jointly. The value of having a separate recovery organization is best recognized when hard-core building, planning, redevelopment, and economic recovery issues require extended attention during the pre-event planning phase or during the long months and years it is likely to take to fully rebuild.

Section 5. Recovery Plan. Before a major disaster, the [recovery task force] shall prepare a pre-event plan for post-disaster recovery and reconstruction, referred to as the recovery plan, which shall be comprised of pre-event and post-disaster policies, plans, implementation actions, and designated responsibilities related to expeditious and orderly post-disaster recovery and rebuilding, and will incorporate hazard mitigation in all elements of the plan.

5.1 Recovery Plan Content. The recovery plan shall address policies, implementation actions, and designated responsibilities for such subjects as business resumption, damage assessment, demolitions, debris removal and storage, expedited repair permitting, fiscal reserves, hazards evaluation, hazard mitigation, historical buildings, illegal buildings and uses, moratorium procedures, nonconforming buildings and uses, rebuilding plans, redevelopment procedures, relation to emergency response plan and comprehensive plan, restoration of infrastructure, restoration of standard operating proce-

dures, temporary and replacement housing, and such other subjects as may be appropriate to expeditious and wise recovery.

5.2 Coordination of Recovery Plan with County and Regional Plans, FEMA, and Other Agencies. The recovery plan shall identify relationships of planned recovery actions with those of adjacent communities and state, federal, or mutual aid agencies involved in disaster recovery and reconstruction, including but not limited to FEMA, the American Red Cross, the federal Department of Housing and Urban Development (HUD), the federal Small Business Administration (SBA), the federal Environmental Protection Administration (EPA), the federal Department of Transportation (DOT), FDEM, and other entities that may provide assistance in the event of a major disaster. The Director shall distribute a draft copy of the plan to FDEM for review in sufficient time for comment prior to action on the recovery plan by the [local legislative body].

Commentary. In contrast to most local emergency management organizations, FEMA and the state emergency management agency have substantial recovery and reconstruction responsibilities. FEMA is a significant source of funds made available by Congress under the Stafford Act for rebuilding public facilities. Because the state emergency management agency is an important point of coordination between localities and FEMA, it is important to solicit from that agency as much advance information as can be obtained regarding post-disaster procedures essential to recovery and reconstruction. For example, cities and counties should become fully informed through communication with their state emergency management agency about Damage Survey Report (DSR) and Hazard Mitigation Grant Program

(HMGP) procedures before disaster strikes. Because recovery issues often affect jurisdictions outside the immediate disaster area, the recovery plan should be coordinated with recovery planning activities of adjacent communities and regional entities.

- 5.3 Recovery Plan Adoption.** Following formulation, the recovery plan shall be transmitted to the [local legislative body] for review and approval. The [local legislative body] shall hold one or more public hearings to receive comments from the public on the recovery plan. Following one or more public hearings, the [local legislative body] may adopt the recovery plan by resolution, including any modifications deemed appropriate, or transmit the plan back to the [recovery task force] for further modification prior to final action.

Commentary. Governing board adoption of this ordinance together with the pre-event plan is extremely important to its successful post-disaster implementation. The city council/county commission needs to become comfortable with the concept of pre-event plan and ordinance adoption in order to be supportive of greater than normal delegation of decisions to staff, which may be necessary during post-disaster recovery operations. If governing board adoption is not possible immediately because of the press of other business, look for opportunities to bring the plan and ordinance forward such as when a catastrophic disaster has struck in another jurisdiction.

- 5.4 Recovery Plan Implementation.** The Director and [recovery task force] shall be responsible for implementation of the plan both before and after a major disaster, as applicable. Before a declaration of emergency, the Director shall prepare and submit reports annually, or more frequently as necessary, to fully advise the [lo-

cal legislative body] on the progress of preparation or implementation of the recovery plan. After a declaration of emergency in a major disaster, the Director shall report to the [local legislative body] as often as necessary on implementation actions taken in the post-disaster setting, identify policy and procedural issues, and receive direction and authorization to proceed with plan modifications necessitated by specific circumstances.

- 5.5 Recovery Plan Training and Exercises.** The [recovery task force] shall organize and conduct periodic training and exercises annually, or more often as necessary, in order to develop, convey, and update the contents of the recovery plan. Such training and exercises will be conducted in coordination with similar training and exercises related to the emergency operations plan.

Commentary. Clearly, training and exercises are functions that should happen on a joint, ongoing basis with the community's emergency management organization. For greatest value, training and exercises should include careful attention to critical relationships between early post-disaster emergency response and recovery actions that affect long-term reconstruction, such as street closings and reopenings, demolitions, debris removal, damage assessment, and hazards evaluation.

- 5.6 Recovery Plan Consultation with Citizens.** The [recovery task force] shall schedule and conduct community meetings, periodically convene advisory committees comprised of representatives of homeowner, business, and community organizations, or implement such other means as to provide information and receive input from members of the public regarding preparation, adoption, or amendment of the recovery plan.

5.7 Recovery Plan Amendments. During implementation of the recovery plan, the Director and the [recovery task force] shall address key issues, strategies, and information bearing on the orderly maintenance and periodic revision of the plan. In preparing modifications to the plan, the [recovery task force] shall consult with city or county departments, business, and community organizations, and other government entities to obtain information pertinent to possible recovery plan amendments.

5.8 Recovery Plan Coordination with Related Plans. The recovery plan shall be prepared in coordination with related elements of the Comprehensive Plan, the Comprehensive Emergency Management Plan, and the Local Mitigation Strategy. Such related plan elements shall be periodically amended by the [local legislative body] to be consistent with key provisions of the recovery plan, and vice versa.

Section 6. General Provisions. The following general provisions shall be applicable to implementation of this chapter following a major disaster:

6.1 Powers and Procedures. Following a declaration of local emergency in a major disaster and while such declaration is in force, the Director and the [recovery task force] shall have authority to exercise powers and procedures authorized by this chapter, subject to extension, modification, or replacement of all or portions of these provisions by separate ordinances adopted by the [local legislative body].

6.2 Post-Disaster Operations. The Director shall direct and control post-disaster recovery and reconstruction operations, including but not limited to the following:

- a. Activate and deploy damage assessment teams to identify damaged structures and to determine further actions that should be taken regarding such structures;
- b. Activate and deploy hazards-evaluation teams to locate and determine the severity of natural or technological hazards that may influence the location, timing, and procedures for repair and rebuilding processes;
- c. Maintain liaison with the [jurisdiction name]'s [emergency management organization] and other public and private entities, such as FEMA, the American Red Cross, and FDEM, in providing necessary information on damaged and destroyed buildings or infrastructure, natural and technological hazards, street and utility restoration priorities, temporary housing needs, and similar recovery concerns;
- d. Establish "one-stop" field offices located in or near impacted areas, staffed by trained personnel from appropriate departments, to provide information about repair and rebuilding procedures, issue repair and reconstruction permits, and provide information and support services on such matters as business resumption, industrial recovery, and temporary and permanent housing;
- e. Activate streamlined procedures to expedite repair and rebuilding of properties damaged or destroyed in the disaster;
- f. Establish a moratorium subject to [local legislative body] ratification, as provided under Section 7.3;

- g. Recommend to the [local legislative body] and other appropriate entities necessary actions for reconstruction of damaged infrastructure;
- h. Prepare plans and proposals for action by the [local legislative body] for redevelopment projects, redesign of previously established projects, or other appropriate special measures addressing reconstruction of heavily damaged areas;

Commentary. Some redevelopment projects covered by this provision may be mitigation projects contained in a community's Local Mitigation Strategy.

- i. Formulate proposals for action by the [local legislative body] to amend the Comprehensive plan, Comprehensive Emergency Management Plan, Local Mitigation Strategy, and other relevant programs and regulations in response to new needs generated by the disaster;
- j. Such other recovery and reconstruction activities identified in the recovery plan or by this chapter, or as deemed by the Director as necessary to public health, safety, and well-being.

Commentary. Some of these operations may be covered in the recovery annex of the County's Comprehensive Emergency Management Plan (CEMP). The provisions of this ordinance should be in conformance with the CEMP.

6.3 Coordination with FEMA and Other Agencies. The Director and the [recovery task force] shall coordinate recovery and reconstruction actions through the county [emergency management organization] with state, federal, and mutual aid agencies, including but not limited to FEMA, the American Red Cross, HUD, SBA, and

FDEM, and other entities which provide assistance in the event of a major disaster. Intergovernmental coordination tasks that would be coordinated through the county [emergency management organization] may include, but are not limited to the following:

- a. Assign trained personnel to provide information and logistical support to the FEMA Disaster Field Office;
- b. Supply personnel to provide information support for FEMA Disaster Recovery Centers;
- c. Participate in damage assessment surveys conducted in cooperation with FEMA and other entities;
- d. Participate in the development of hazard mitigation strategies with the Interagency Hazard Mitigation Team (when activated) with FEMA and other entities;
- e. Cooperate in the joint establishment with other agencies of one-stop service centers for issuance of repair and reconstruction permits, business resumption support, counseling regarding temporary and permanent housing, and other information regarding support services available from various governmental and private entities;
- f. Coordinate within county and city government in the preparation and submission of supporting documentation for Damage Survey Reports to FEMA;
- g. Determine whether damaged structures and units are within floodplains identified on Flood Insurance Rate Maps and whether substantial damage has occurred;

- h. Implement such other coordination tasks as may be required under the specific circumstances of the disaster.

Commentary. To provide direction for handling of emergency response and recovery in relation to major disasters, Congress has enacted the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended). A substantial portion of the Stafford Act is devoted to the means by which federal funds are distributed to persons, businesses, local governments, and state governments for disaster response and recovery. For most communities this is an important means by which disaster losses can be compensated, at least in part. Some of the federal assistance is in the form of grants and loans, involving not only FEMA but also other agencies such as HUD and SBA.

6.4 Consultation with Citizens. The Director and the [recovery task force] shall schedule and conduct community meetings, convene ad hoc advisory committees comprised of representatives of business and community organizations, or implement such other means as to provide information and receive input from members of the public regarding measures undertaken under the authority of this chapter.

Commentary. Direct outreach to the community should be established in advance of a major disaster through neighborhood safety or similar programs conducted by fire and law enforcement officials, ideally in conjunction with preparation of a pre-event plan. Following a major disaster, proactive outreach is critical to establishing a two-way flow of information, without which controversy inherent in post-disaster settings can become severe.

Section 7. Temporary Regulations. The Director shall have the authority to administer the provisions of this section, temporarily modifying provisions of the [pertinent local law] dealing with building and occupancy permits, demolition permits, and restrictions on the use, development, or occupancy of private property, provided that such action, in the opinion of the Director, is reasonably justifiable for protection of life and property, mitigation of hazardous conditions, avoidance of undue displacement of households or businesses, or prompt restoration of public infrastructure.

Commentary. The following temporary regulations are at the heart of the recovery process. Although existing state law or local ordinances may already authorize some of these functions, it is preferable to have a single source for locally adopted ordinances that, among other things, identifies regulatory functions related to post-disaster recovery, clearly places responsibility for implementation, and provides a coordinated rationale for city or county intervention in case of challenge. Among the components of these temporary regulations are provisions dealing with duration, damage assessment, development moratoria, debris clearance, permit expediting, temporary uses and repairs, deferral of fees, nonconforming buildings and uses, condemnation and demolition, and temporary and permanent housing. Each of these components needs careful examination and, as appropriate, adjustment made based on local policies and conditions. Pre-event adoption of this ordinance (adjusted to take into account local circumstances) provides a solid basis for initial post-disaster action and legitimizes the policies established as part of the planning process. It is not possible to anticipate the exact character, magnitude, and distribution of damage from a major disaster. Pre-adopted regulations, however, provide a basis for more efficient action that is substantially less subject to policy reversals and other uncertainties typically found in communities that have not prepared in this manner.

- 7.1 Duration.** The provisions of this section shall be in effect for a period of six months from the date of a local emergency declaration following a major disaster or until termination of a state of local emergency, which-ever occurs later, or until these provisions are extended, modified, replaced by new provisions, or terminated, in whole or in part, by action of the [local legislative body] through separate ordinances.

Commentary. This provision allows for flexibility in the duration of application of the temporary regulations, so that any portion can be terminated, modified, or extended depending upon local circumstances. It also reflects a recognition that “temporary” regulations may be in effect for an extended period of time beyond either termination of the local emergency or passage of the six-month period. Depending on the nature and scale of the disaster, such temporary provisions may be in effect for several years after the disaster.

- 7.2 Damage Assessment.** The Director or an authorized representative, shall direct damage assessment teams having authority to conduct field surveys of damaged structures and post placards designating the condition of such structures as follows:
- a. A placard indicating “Inspected--Lawful Occupancy Permitted,” is to be posted on any building in which no apparent structural hazard has been found. This does not mean there are not other forms of damage that may temporarily affect occupancy.

Commentary. This is commonly known as the “green tag” placard.
 - b. A placard indicating “Restricted Use” is to be posted on any building in which damage has resulted in some form of restriction to continued occupancy.

The individual posting this placard shall note in general terms the type of damage encountered and shall clearly and concisely note the restrictions on continued occupancy.

Commentary. This is commonly known as the “yellow tag” placard.

- c. A placard indicating “Unsafe - Do Not Enter or Occupy” is to be posted on any building that has been damaged to the extent that continued occupancy poses a threat to life safety. Buildings posted with this placard shall not be entered under any circumstances except as authorized in writing by the department that posted the building or by authorized members of damage assessment teams. The individual posting this placard shall note in general terms the type of damage encountered. This placard is not to be considered a demolition order.

Commentary. This is commonly known as the “red tag” placard.

- d. This chapter and section number, the name of the department, its address, and phone number shall be permanently affixed to each placard.
- e. Once a placard has been attached to a building, it shall not be removed, altered, or covered until done so by an authorized representative of [jurisdiction name] or upon written notification from [jurisdiction name]. Failure to comply with this prohibition will be considered a misdemeanor punishable by a \$300 fine.

Commentary. Damage assessment and the placement of placards identifying whether or not buildings are safe or unsafe to occupy are two functions having perhaps the

most profound effects on life, property, and community recovery than any other within the post-disaster decision and action sequence towards which the provisions of these temporary regulations are directed. Damage assessment is undertaken by various entities following a major disaster, usually the city or county, state, and FEMA.

There is at least a twofold purpose for these inspections. One is to determine the degree of structural damage of each building and notify the public about the relative safety of entry and occupancy. This has been a long-standing duty under local government public health and safety responsibilities with which building departments are usually very familiar. The other is to quickly estimate the approximate replacement costs of damaged buildings and other property in order to inform the state and federal governments of whether a federal declaration is warranted. Another concurrent purpose of placarding is to identify potential substantially damaged buildings. This is essential to ensure that the structure is rebuilt to current local building code standards including those adopted pursuant to the National Flood Insurance Program.

The most important element of all these concerns is the establishment of standard identification of structural damage both in gross general terms reflected in the red, yellow, and green tag placard systems, as well as in the details recorded on the placards for each building. This ordinance reflects only the standard placard system, leaving to the building professions the means by which such determinations are made and recorded in detail. FDEM is the lead agency in coordinating mutual-aid assistance. In this circumstance, FDEM may request the Florida Building Officials Association of Florida to assist in

standardizing procedures used to make these basic safety distinctions.

7.3 Development Moratorium. The Director shall have the authority to establish a moratorium on the issuance of building permits, approval of land use applications or other permits and entitlements related to the use, development, and occupancy of private property authorized under other chapters and sections of the [pertinent local law] and related ordinances, provided that, in the opinion of the Director, such action is reasonably justifiable for protection of life and property and subject to the following:

Posting. Notice of the moratorium shall be posted in a public place and shall clearly identify the boundaries of the area in which a moratorium is in effect as well as the exact nature of the development permits or entitlements which are temporarily held in abeyance;

Duration. The moratorium shall be in effect subject to review by the [local legislative body] at the earliest possible time, but no later than 90 days, at which time the [local legislative body] shall take action to extend, modify, or terminate such moratorium by separate ordinance.

Commentary. *After disasters around the world, the prevailing sentiment often is to act quickly to replicate pre-disaster building patterns. In many instances, this sentiment prevails as policy despite the presence of a severe natural hazard condition, thus reinforcing the chances of repeating the disaster.*

To prevent or lessen the chances of repetition of the disaster, it may be necessary for a city or county to interrupt and forestall repair and rebuilding long enough to assess rebuild-

ing options and/or to determine effective means of mitigation. The city or county may wish to establish an emergency moratorium on issuance of repair and rebuilding permits or on land use approvals in areas where severely hazardous conditions are identified. The hazard may be newly detected, as in a post-earthquake circumstance where the pattern of damage or ground deformation may indicate the need for geologic studies to clearly identify such hazards as landslides, liquefaction, or fault rupture. On the other hand, the hazardous condition may be a well known cause of prior damaging disasters, as in the Oakland Hills firestorm area which had a long history of previous fires, or communities affected by the 1993 Midwestern floods where prior flood control and floodproofing efforts were proven ineffective.

A moratorium on development may be important for a city or county to undertake from the standpoint of enlightened public policy. However, since such action may be extremely controversial and unpopular, it is important to lay the groundwork with the community in advance, if possible. This subsection provides prior authorization through adoption of this ordinance before a major disaster, whereby city or county staff can act expeditiously in a post-disaster setting to forestall premature issuance of permits in areas shown to be hazardous. Such action is necessarily subject to local legislative review, ratification, modification, or termination.

- 7.4 Debris Clearance.** The Director shall have the authority to direct removal of debris and rubble, trees, damaged or destroyed cars, trailers, equipment, and other private property from public rights-of-way without notice to owners, provided that in the opinion of the Director such action is reasonably justifiable for protection of life and property, provision of emergency evacuation, assurance of firefighting or ambulance access, mitigation of otherwise hazardous conditions, or restoration

of public infrastructure. The Director also shall have the authority to secure emergency waivers of environmental regulations from state and federal authorities and to call upon outside support from such agencies for debris clearance, hazardous materials spills, and restoration of ground access.

Commentary. *Although clearance of privately owned debris is routinely considered a function of local government, it can become very controversial where owners take the position that such property is salvageable and has value (e.g., used brick after an earthquake). Pre-event adoption of such a provision reinforces the expectation that debris clearance functions will be carried out decisively, thus minimizing a problem otherwise compounded by local government hesitation or ambiguity of intention. The U.S. Army Corps of Engineers has the lead under the Federal Response Plan for ensuring resources for local emergency and long-term debris clearance. FEMA and the state emergency management agency determine priorities for the entire disaster area.*

- 7.5 One-Stop Center for Permit Expediting.** The Director shall establish a one-stop center, staffed by representatives of pertinent departments, for the purpose of establishing and implementing streamlined permit processing to expedite repair and reconstruction of buildings, and to provide information support for provision of temporary housing and encouragement of business resumption and industrial recovery. The Director shall establish such center and procedures in coordination with other governmental entities that may provide services and support, such as FEMA, SBA, HUD, FDEM, or the Florida Department of Environmental Protection.

Commentary. One-stop permit centers have become more common with recent major disasters, often combining the presence of multiple agencies to provide better coordination of information that disaster victims may need in order to rebuild. Benefits to be gained from setting up a special one-stop center include not only accelerated review but also integration of information and permitting functions. Setting up a team of specialists working exclusively on repair and rebuilding permit issues has the added advantage of insulating normal development review from disruption by the recovery process and vice versa.

7.6 Temporary Use Permits. The Director shall have the authority to issue permits in any zone for the temporary use of property that will aid in the immediate restoration of an area adversely impacted by a major disaster, subject to the following provisions:

- a. **Critical Response Facilities**--Any police, fire, emergency medical, or emergency communications facility that will aid in the immediate restoration of the area may be permitted in any zone for the duration of the declared emergency;
- b. **Other Temporary Uses**--Temporary use permits may be issued in any zone, with conditions, as necessary, provided written findings are made establishing a factual basis that the proposed temporary use:
 - 1) will not be detrimental to the immediate neighborhood;
 - 2) will not adversely affect the Comprehensive Plan or any applicable specific plan; and
 - 3) will contribute in a positive fashion to the reconstruction and recovery of areas adversely impacted by the disaster.

Temporary use permits may be issued for a period of one year following the declaration of local emergency and may be extended for an additional year, to a maximum of two years from the declaration of emergency, provided such findings are determined to be still applicable by the end of the first year. If, during the first or the second year, substantial evidence contradicting one or more of the required findings comes to the attention of the Director, then the temporary use permit shall be revoked.

Commentary. Most zoning ordinances have no provisions for temporary use of property following a disaster. A few allow temporary placement of mobile homes or manufactured housing on residentially zoned sites pending reconstruction of a residence. Time limits vary, but are usually for a two-year period. After a major disaster, special latitude may be needed, however, to support various recovery needs. Care must be taken not to set precedents which will erode or destroy a pre-existing pattern of zoning which the city or county may wish to protect.

Smaller communities may wish to restrict temporary uses to those already allowed by the zone in which they are located, limiting the provision to temporary structures such as tents, domes, or mobile units.

7.7 Temporary Repair Permits. Following a disaster, temporary emergency repairs to secure structures and property damaged in the disaster against further damage or to protect adjoining structures or property may be made without fee or permit where such repairs are not already exempt under other chapters of the [pertinent local law]. The building official must be notified of such repairs within 10 working days, and regular permits with fees may then be required.

Commentary. This provision is specifically written for repairs which may not be exempt under standard building code permit exemptions but which are justifiable from a public health and safety standpoint to avoid further damage to property after a disaster.

- 7.8 Deferral of Fees for Reconstruction Permits.** Except for temporary repairs issued under provisions of this chapter, all other repairs, restoration, and reconstruction of buildings damaged or destroyed in the disaster shall be approved through permit under the provisions of other chapters of this code. Fees for such repair and reconstruction permits may be deferred until issuance of certificates of occupancy.

Commentary. Pressure to waive or defer processing fees frequently arises after a disaster when victims are unsure of their sources of financing for rebuilding. It is inadvisable to succumb to pressures to waive fees entirely due to the need for cost recovery for disaster related services at a time when there may be substantial uncertainties in city or county revenue flows. Also, it is helpful to buy time to determine the degree to which sources other than the victims may help offset fee costs. For example, sometimes insurance will cover the cost of processing fees. Also, such costs have been covered by FEMA. Deferral of fees until occupancy permit issuance provides time in which such alternate sources can be worked out, without sacrificing the basic revenue flow to the local government treasury.

- 7.9 Nonconforming Buildings and Uses.** Buildings damaged or destroyed in the disaster which are legally non-conforming as to use, yards, height, number of stories, lot area, floor area, residential density, parking, or other provisions of the [pertinent local law] may be repaired and reconstructed in-kind, provided that:

- a. the building is damaged in such a manner that the structural strength or stability of the building is appreciably lessened by the disaster and is less than the minimum requirements of the [pertinent local law] for a new building;
- b. the cost of repair would exceed 50 percent of the replacement cost of the building;
- c. all structural, plumbing, electrical, and related requirements of the [pertinent local law] are met at current standards;
- d. all natural hazard mitigation requirements of the [pertinent local law] are met;
- e. reestablishment of the use or building is in conformance with the requirements and procedures of the National Flood Insurance Program (NFIP) and, where applicable, the Florida Coastal Construction Control Line (FCCCL) permitting program;
- f. the building is reconstructed to the same configuration, floor area, height, and occupancy as the original building or structure, except where this conflicts with provisions of the NFIP or the FCCCL permitting program;
- g. no portion of the building or structure encroaches into an area planned for widening or extension of existing or future streets as determined by the Comprehensive Plan or applicable specific plan;
- h. repair or reconstruction shall commence within two years of the date of the declaration of local emergency in a major disaster and shall be completed within two years of the date on which permits are issued.

Nothing herein shall be interpreted as authorizing the continuation of a nonconforming use beyond the time limits set forth under other sections of the [pertinent local law] that were applicable to the site prior to the disaster.

Commentary. *Some of these provisions may already be included in local building code requirements or the community's zoning ordinance. Any policies in this ordinance should be in conformance with those regulations.*

No issue can be more vexing to planners than whether or not to encourage reestablishment of nonconforming uses and buildings after a major disaster. Planners have sought for decades to write strict provisions in zoning ordinances designed to gradually eliminate nonconforming uses or buildings as they were abandoned, changed owners, or were damaged by fire, wind, or water. The latter provisions normally prohibit reestablishment of nonconforming uses and buildings where damage exceeds a certain percentage of replacement cost, most often 50 percent. This approach is logical, orderly, and normally equitable when weighing community interests balanced with those of the property owner. However, the thinking behind such provisions has been geared to incremental adjustments or termination of such uses over time, not to sudden catastrophic circumstances forcing attention to disposition of such uses as a class at a single point in time.

In theory, disasters represent an opportunity to upgrade conditions such as parking deficiencies attributable to the nonconforming status of a building or use. More fundamentally, disasters are seen as an opportunity to eliminate uses which conflict with the prevailing pattern in a neighborhood but which remain because of legal nonconforming status—for example, scattered industrial uses in

a residentially zoned neighborhood. In reality, however, after major disaster local governments are normally beset by severe pressures from property owners and other community interests to reestablish the previous development pattern exactly as it previously existed, including nonconforming buildings and uses. Moreover, such pressures extend beyond the demand to reestablish nonconforming buildings or uses to include waiver of current building, plumbing, and electrical code provisions to the standards in place at the time of construction. From a risk management, liability exposure, or public safety standpoint, acquiescence to the reduction of standards in the face of a known hazard can be seen as clearly unacceptable by local legislative bodies. However, zoning provisions hindering reestablishment of nonconforming buildings and uses tend to be more arguable and are more likely to be modified by local legislative bodies under extreme pressures of the moment to restore the prior status quo.

In recognition of such pressures, this model ordinance language offers a straightforward tradeoff that allows reestablishment of a nonconforming use or building in turn for strict adherence to structural, plumbing, and electrical codes and related hazard mitigation requirements. The language assumes the existence of a commonly found provision in the pertinent local law authorizing repair or reestablishment of a nonconforming use or building where damage is less than 50 percent of the replacement cost. It also assumes that the building was substantially weakened by the disaster and is below present code requirements.

This compromise approach recognizes that its application may require the unwelcome decision to accept continuation of disorderly land use patterns, unless a solution can

be found through redevelopment or rezoning. Instead, it places a high value on life safety.

It is important to note that the language of these provisions includes important limitations that tend to limit the economic incentive to reestablish the nonconforming use or building.

- 1) *It does not extend any previously stipulated life of the nonconforming use - an important disincentive if the costs of replacement cannot be offset by insurance, FEMA assistance, SBA loans, or other sources of financial support.*
- 2) *It does not allow the extent of nonconformance to be increased over what existed prior to the disaster, thwarting another common pressure.*
- 3) *It requires strict adherence to existing structural, plumbing, electrical, and other requirements of the pertinent local law as well as any street setbacks stipulated within the Comprehensive Plan and related ordinances. This may be especially costly from a structural standpoint.*
- 4) *It recognizes that compliance with existing local hazard mitigation requirements may be needed, especially in cases involving increased on-site hazards because of coastal erosion or severe flooding where upgrading to current structural, plumbing, and electrical code requirements isn't enough. Compliance with the latter provision may also be sufficiently costly to discourage reestablishment of the use or other nonconforming feature.*

The relative importance of post-disaster reestablishment of nonconforming uses and buildings may vary greatly from jurisdiction to jurisdiction. Therefore, the most useful time to assess this aspect of post-disaster recovery is before a major disaster, in the course of pre-event plan-

ning. Education of the local legislative body in advance can help lessen post-disaster tendencies to compromise critical hazard mitigation and public safety requirements, notwithstanding the outcome on nonconforming use and building requirements.

Section 8. Demolition of Damaged Historic Buildings. The Director shall coordinate with the local building official and the local historic preservation coordinator to order the condemnation and demolition of buildings and structures damaged in the disaster under the standard provisions of the [pertinent local law], except as otherwise indicated below:

- 8.1 Condemnation and Demolition.** Within ___ days after the disaster, the building official shall notify the State Historic Preservation Officer and/or the local historic preservation coordinator that one of the following actions will be taken with respect to any building or structure determined by the building official to represent an imminent hazard to public health and safety, or to pose an imminent threat to the public right-of-way:
- a. Where possible, within reasonable limits as determined by the building official, the building or structure shall be braced or shored in such a manner as to mitigate the hazard to public health and safety or the hazard to the public right-of-way;
 - b. Whenever bracing or shoring is determined not to be reasonable, the building official shall cause the building or structure to be condemned and immediately demolished. Such condemnation and demolition shall be performed in the interest of public health and safety without a condemnation hearing as otherwise required by the [pertinent local law]. Prior

to commencing demolition, the building official shall photographically record the entire building or structure.

- 8.2 Notice of Condemnation.** If, after the specified time frame noted in Subsection 8.1 of this chapter and less than 30 days after the disaster, a historic building or structure is determined by the building official to represent a hazard to the health and safety of the public or to pose a threat to the public right-of-way, the building official shall duly notify the building owner of the intent to proceed with a condemnation hearing within ____ business days of the notice in accordance with [pertinent local law]; the building official shall also notify FEMA, in accordance with the National Historic Preservation Act of 1966, as amended, of the intent to hold a condemnation hearing.
- 8.3 Request to FEMA to Demolish.** Within 30 days after the disaster, for any historic building or structure which the building official and the owner have agreed to demolish, the building official shall submit to FEMA, in accordance with the National Historic Preservation Act of 1966, as amended, a request for approval to demolish. Such request shall include all substantiating data.
- 8.4 Historic Building Demolition Review.** If after 30 days from the event, the building official and the owner of a historic building or structure agree that the building or structure should be demolished; such action will be subject to the review process established by the National Historic Preservation Act of 1966, as amended.

Commentary. One of the more difficult aspects of post-disaster response and recovery in older communities is the existence of damaged historically significant structures. Since these can be very old, measures needed to make them

structurally sound may be more difficult and costly and complicated than normal. Because of the emotion frequently attached to this issue and the often widely conflicting views, community controversy can erupt when a badly damaged historical structure is subject to demolition. Therefore, it is wise to have language already in place to guide the planning and building officials involved.

Because of problems with seemingly premature or unjustifiable demolition of historic structures in previous disasters, the National Historic Preservation Act of 1966, as amended, identifies steps that must be taken by a jurisdiction or owner to mitigate public health and safety hazards resulting from disaster-caused damage when using federal funding. The intent is to establish predictable rules by which proposed demolitions, except in extreme cases of danger to the public, can be reviewed by state and federal officials in order to provide time to identify options for preservation of a damaged historic building or structure. The review process is also intended to discourage hasty demolition action by local officials when such action may not be justified.

The important element of local judgment here is the establishment of a specific time frame for declaring a structure an imminent hazard to public health and safety justifying immediate demolition without a condemnation hearing. Such time frames are generally from three to five days, although sometimes stretched to ten. After the established time frame, the threat may no longer be justified as imminent and, therefore, the remaining procedures kick in.

Designation of a local historic preservation coordinator, as recommended in the Florida Department of Community Affairs guidebook, "Disaster Planning for Florida's Historic Resources," can significantly improve the coordination

needed to deal appropriately and efficiently with damaged historic structures.

Section 9. Temporary and Permanent Housing. The Director shall assign staff to work with FEMA, SBA, HUD, FDEM, the Florida Department of Community Affairs, Division of Housing and Community Development, and other appropriate governmental and private entities to identify special programs by which provisions can be made for temporary or permanent replacement housing that will help avoid undue displacement of people and businesses. Such programs may include deployment of manufactured housing, mobile homes, and mobile home parks under the temporary use permit procedures provided in Section 7 of this chapter, use of SBA loans and available Section 8 and Community Development Block Grant funds to offset repair and replacement housing costs, and other initiatives appropriate to the conditions found after a major disaster.

Commentary. This section is essentially a placeholder for language which preferably should be made more specific on the basis of a pre-event plan for post-disaster recovery and reconstruction that takes into account the level of local housing vulnerability and the adequacy of existing local, state, and federal resources for providing temporary housing after emergency shelters are closed.

Section 10. Hazard Mitigation Program. [excluded]

Commentary. Florida's Local Mitigation Strategies (LMSs) cover this component. What is desirable is a cross-reference to the LMS and explicit procedures for the recovery task force to use the LMS to identify mitigation projects that are appropriate for post-disaster implementation. See, for example, Objective 2.2 in the Okaloosa County Post-Disaster Redevelopment Plan (Appendix B-4).

Section 11. Recovery and Reconstruction Strategy. At the earliest practicable time following the declaration of local emergency in a

major disaster, the Director and the [recovery task force] shall prepare a strategic program for recovery and reconstruction based on the pre-disaster plan and its policies.

11.1 Functions. To be known as the recovery and reconstruction strategy, the proposed strategic program shall identify and prioritize major actions contemplated or under way regarding such essential functions as business resumption, economic reinvestment, industrial recovery, housing replacement, infrastructure restoration, and potential sources of financing to support these functions.

11.2 Review. The recovery and reconstruction strategy shall be forwarded to the [local legislative body] for review and approval following consultation with the local planning board, other appropriate local, state, and federal agencies, and business and citizen representatives. The recovery strategy shall provide detailed information regarding proposed and ongoing implementation of initiatives necessary to the expeditious fulfillment of critical priorities and will identify needed amendment of any other plans, codes, or ordinances that might otherwise contradict or otherwise block strategic action. The Director shall periodically report to the [local legislative body] regarding progress toward implementation of the recovery and reconstruction strategy, together with any adjustments that may be called for by changing circumstances and conditions.

Commentary. The concept of this provision is to structure the flow of local post-disaster recovery and redevelopment actions around a short-term strategy, that extends the pre-event plan into greater detail at the earliest possible time after a major disaster. This may prove absolutely essential to the extent that damage conditions differ substantially from those anticipated as part of the pre-event plan. In any case,

development of such a strategy in the early days of recovery has the special benefit of adding a proactive emphasis to the recovery process to counter the overwhelmingly reactive context. It can be updated as often as necessary as experience is gained and new issues emerge. It also has the added benefit of providing a source from which the pre-event recovery plan and related plans can later be readily updated.

Section 12. Severability. If any provision of this chapter is found to be unconstitutional or otherwise invalid by any court of competent jurisdiction, such invalidity shall not affect the remaining provisions that can be implemented without the invalid provision, and, to this end, the provisions of this ordinance are declared to be severable.



Hillsborough County Post-Disaster Redevelopment Ordinance

ORDINANCE NUMBER 93 - 20

AN ORDINANCE TO GUIDE REDEVELOPMENT AND MITIGATION FOLLOWING A STORM EVENT OR OTHER NATURAL DISASTER WITHIN THE UNINCORPORATED AREAS OF HILLSBOROUGH COUNTY, FLORIDA; PROVIDING THE PURPOSE AND INTENT OF THE ORDINANCE; PROVIDING FOR JURISDICTION; PROVIDING DEFINITIONS; PROVIDING FOR THE ENACTMENT, RESPONSIBILITIES, COMPOSITION, CHAIRPERSON, DURATION, AND REPEALING OR EXTENDING OF A REDEVELOPMENT TASK FORCE; PROVIDING FOR DETERMINATION OF DAMAGE; PROVIDING A REDEVELOPMENT POLICY; PROVIDING FOR A DECLARATION OF AN INITIAL BUILDING MORATORIUM; PROVIDING FOR PROVISIONS FOR MORATORIUMS; PROVIDING FOR AUTHORITY; PROVIDING PENALTIES; PROVIDING FOR CONFLICT AND SEVERABILITY; AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, the Hillsborough County area is vulnerable to a variety of natural or man-made hazards which may result in emergencies causing substantial injury or harm to the population or substantial damage to or loss of property; and

WHEREAS, Chapter 252, Florida Statutes, provides the Board of County Commissioners the authority to declare a state of local emergency and take actions necessary to ensure the safety and well being of its residents, visitors and property during emergencies caused by these hazards; and

WHEREAS, Chapter 125, Florida Statutes, provides the authority for the Board of County Commissioners of Hillsborough County, Florida to adopt ordinances; and

WHEREAS, pursuant to Chapter 163, Florida Statutes, the Board of County Commissioners of Hillsborough County adopted the Comprehensive Plan promulgated by Hillsborough County Ordinance Number 89-28 on July 26, 1989 and became effective on July 26, 1989; and

WHEREAS, the Hillsborough County Comprehensive Plan Coastal Management and Port Element Goal 1 requires Hillsborough County to protect, restore and appropriately manage the natural resources of the coastal area to maintain or enhance environmental quality for present and future generations by restricting development and redevelopment that would damage or destroy the natural resources of the coastal area; and

WHEREAS, the Hillsborough County Comprehensive Plan Coastal Management and Port Element Goal 2 requires Hillsborough County to strive to protect human life and property in the Coastal High Hazard Area, and limit public expenditures for infrastructure in areas susceptible to destruction by natural disasters; and

WHEREAS, the future of Hillsborough County Comprehensive Plan's Coastal Management and Port Element Objective 12 requires that Hillsborough County develop a post-disaster redevelopment plan for the coastal high hazard area and to adopt regulations necessary for its implementation; and

WHEREAS, the future of Hillsborough County Comprehensive Plan Coastal Management and Port Element Objective 10 requires the limitation of public expenditures for infrastructure and facilities in the coastal high hazard area; and

WHEREAS, the future of Hillsborough County Comprehensive Plan Coastal Management Element Policy 12.2 requires the County, by 1992, to prepare a post-disaster redevelopment plan which includes measures to restrict and eliminate inappropriate and unsafe development in the coastal high hazard area; and

WHEREAS, the future of Hillsborough County Comprehensive Plan Coastal Management and Port Element Policy 12.5 requires the county, by 1992, to adopt a redevelopment decision-making matrix for deciding whether public infrastructure should be rebuilt, relocated or structurally modified; and

WHEREAS, it is the intent of Hillsborough County to take reasonable action to guide redevelopment during the recovery period following an emergency, or storm event.

NOW, THEREFORE, BE IT ORDAINED BY THE BOARD OF COUNTY COMMISSIONERS OF HILLSBOROUGH COUNTY, FLORIDA:

SECTION ONE. PURPOSE AND INTENT OF ORDINANCE.

It is the intent of the County to establish, prior to a storm event or emergency, a redevelopment task force which will oversee the reconstruction process and serve as an advisory committee to the Board of County Commissioners on recovery and redevelopment issues. This body will also identify opportunities to mitigate future damages through the management of recovery and redevelopment. To further this intent, the County will make every effort to develop its capacity to identify and coordinate various post-disaster recovery and redevelopment resources while at the same time ensuring maximum local control over the recovery and redevelopment process.

Following a damaging storm event or emergency, sufficient time must be provided to conduct a damage assessment, classify and categorize individual structure damages and to conduct an evaluation into the effectiveness and enforcement of the existing building code. It is the intent of the County to allow rebuilding and redevelopment in an orderly manner in accordance with this ordinance and the future of the Hillsborough County Comprehensive Plan by controlling the issuance of building permits in order to manage the location, timing, and sequence of reconstruction and repair, as well as ensuring that mitigation occurs.

Nothing in this ordinance construed to prohibit the County from taking any other legal action.

SECTION TWO. JURISDICTION.

This Ordinance shall apply to all areas within Hillsborough: County, Florida under the jurisdiction of the Hillsborough County Board of County Commissioners.

SECTION THREE. DEFINITIONS.

The following terms and definitions shall apply for the purposes of this ordinance.

- A. "Building Value" means the latest total assessment of all: improvements on a parcel of land recorded on the Hillsborough County Property Appraiser's file before the structure was damaged. Building value for structures not yet on the rolls of the Property Appraiser or under construction shall be valued by an alternative method.
- B. "Building official" means the Director of the Building Department or his/her designee, who is hereby designated by the Board of County Commissioners of Hillsborough County, Florida to implement, administer and enforce the building permit moratoria provisions of this ordinance.
- C. "Damage Assessment" means a systematic procedure for evaluating damage to public and private property, based on current replacement cost. The assessment is used to determine if the area can qualify for federal or state disaster assistance.
- D. "Destroyed Structure" means a structure that is a total loss or damaged to such an extent that repairs are not technically or economically feasible. The indicator for this category is if the cost of repairing the structure exceeds fifty (50%) percent of the replacement cost of the structure at the time of damage or destruction.
- E. "Emergency" means any occurrence, or threat thereof, whether accidental, natural, or caused by man, in war or in peace, which results or may result in substantial injury or harm to the population or substantial damage to or loss of property (Chapter 252, Florida Statutes - 1989).
- F. "Local Damage Assessment Team" means a group of individuals designated by the local jurisdiction to perform a damage assessment according to State and Federal requirements.
- G. "Major Damaged Structure" means a structure that can be made habitable with extensive repairs. Damage may include foundation, roof structure, and major structural components. The indicator for this category is if the cost to repair is greater than twenty percent (20%) and up to and including fifty percent (50%) of the replacement cost at the time of damage.

- H. “Minor Damaged Structure” means a structure that can be made habitable in a short period of time with minimal repairs. Damages may include doors, windows, floors, roofs, Mechanical Systems, and for other minor structural damage. The threshold in this category is if the cost to repair is less than or equal to twenty percent (20%) of the replacement cost of the structure at the time of damage.
- I. “Redevelopment Task Force” means a group of officials designated by and for purposes of this ordinance, as outlined in Section Four of this ordinance.
- J. “Replacement Cost” means the actual cost to repair, reconstruct, rebuild or replace a damaged structure. For purposes of this ordinance, the replacement cost shall be compared to the structure’s building value contained in the Hillsborough County Property Appraiser’s file to determine the percent of the structure damaged category.
- K. “Storm Event” means any severe, natural weather event causing damage and destruction of property. A storm event shall include, but not be limited to, hurricanes, tropical storms, severe thunderstorms, tornadoes, and waterspouts.
- L. “Structure” as defined in the Land Development Code, means anything constructed or erected which requires location on the ground or attachment to something having a fixed location on the ground, including but not limited to principal or accessory buildings, signs, fences, walls, ridges, monuments, flagpoles, antennas, transmission poles, towers and cables.

SECTION FOUR. REDEVELOPMENT TASK FORCE.

- A. Planning Role of the Redevelopment Task Force. The Redevelopment Task Force shall meet on a continuing and regularly scheduled basis to discuss its specific roles and responsibilities in accordance with this ordinance, and relative issues associated with the recovery from a major storm event or emergency. This would include, but not be limited to, setting its own procedures and rules, preparing a redevelopment plan for the County, developing procedures to carry out the County’s redevelopment policy, developing policies for redeveloping land areas that have stained repeated damages from storm events, developing priorities for relocating and acquiring damaged property, establishing special committees and subcommittees within the task force to deal with specific issues during the disaster recovery process, establishing criteria to determine reconstruction and redevelopment priorities, developing procedures that promote the mitigation of future disaster damage through activities carried out during recovery and redevelopment, and recommending changes to the Hillsborough County Post-Disaster Redevelopment ordinance and the Hillsborough County Comprehensive Plan.
- B. Activation of the Redevelopment Task Force. For post-disaster responsibilities, the redevelopment task force shall be activated and mobilized upon the request by the Board of County Commissioners or when directed by the County Administrator.
- C. Responsibilities of the Redevelopment Task Force. The redevelopment task force shall be responsible for advising the Board of County Commissioners on a wide range of post-disaster recovery, reconstruction, and mitigation issues. The task force shall have the following responsibilities:
 1. To receive and review damage reports and other analyses of post-disaster conditions. To compare these conditions with mitigation opportunities identified prior to the disaster to discern appropriate areas for post-disaster change and innovation. Where needed, the task force can review alternative mechanisms for bringing these changes about and recommend the coordination of internal and external resources for achieving these ends.
 2. In addition to the responsibilities above, the Redevelopment Task Force shall:
 - a. Initiate recommendations for the enactment, repealing or extension of emergency ordinances and resolutions for consideration.

- b. Review the nature of damages, identify and evaluate alternate program objectives for repairs and reconstruction, and formulate recommendations to guide recovery.
 - c. Formulate special committees and sub-committees as situations warrant.
 - d. Recommend and implement an economic recovery program focusing on rapid recovery of the tourism industry, utilizing funding sources set aside for this purpose.
 - e. Recommend rezoning changes in areas of damage, when deemed appropriate.
 - f. Set a calendar of milestones for redevelopment tasks.
 - g. Recommend the repealing or extension of moratoria.
 - h. Recommend land areas and land use types that will receive priority in recovery.
 - i. Recommend blanket reductions in non-vital zoning regulations and development standards (e.g., buffering, open space, side yard setbacks, etc.) to minimize the need for individual variances or compliance determinations prior to reconstruction.
 - j. Recommend procedures to document actual uses, densities and intensities and compliance with regulations in effect at the time of construction, through such means as photographs, diagrams, plans, affidavits, permits, appraisals, tax records, etc.
 - k. Evaluate hazards and the effectiveness of mitigation policies and recommend the amendment of policies as appropriate.
 - l. If necessary, recommend land areas for the redevelopment of land uses that sustained or has sustained repeated damages from storm events.
 - m. Initiate recommendations for relocation and acquisition of property.
 - n. Initiate a property owner notification program, to inform non-resident property owners of damages incurred to their property; and post-disaster conditions and requirements imposed by the county.
 - o. Participate in federal and state hazard mitigation planning.
 - p. Initiate hazard mitigation projects or recommend programs for which would be considered for state or federal funding.
 - q. Evaluate damaged public facilities and formulate mitigation options (i.e., repair, replace, modify or relocate).
 - r. Participate in the preparation of a redevelopment plan in coordination with other federal, state and local emergency officials.
 - s. Review emergency actions and recommend amendments to Hillsborough County's: Post-Disaster Redevelopment Ordinance, Peacetime Emergency Plan, Emergency Operations Center's Standard Operating Procedures, and the Administrative Code.
3. The Redevelopment Task Force shall recommend appointment of the following positions:
- a. Disaster Recovery Redevelopment Coordinator
 - (1) Purpose. To facilitate the coordination of disaster assistance from the federal government and state agencies available to Hillsborough County following a storm event or emergency.
 - (2) Duties. Shall consist of, but not be limited to, the following:
 - (a) Determine the types of assistance available to the County and the types of assistance most needed.
 - (b) Assist in the local coordination of federal and state disaster recovery efforts.

- (c) Provide local assistance to facilitate federal and state disaster assistance.
 - (d) Act as facilitator in securing federal or state disaster assistance.
 - (e) Inform the community of types of disaster assistance available.
 - (f) Other duties as directed by the redevelopment task force or the Board of County Commissioners.
- b. Economic Recovery Coordinator
- (1) Purpose. To facilitate the coordination of economic recovery with the business community following a storm event or emergency.
 - (2) Duties. Shall consist of, but not limited to, the following:
 - (a) Determine the potential or actual impacts to the local economy and determine short and long term strategies for consideration.
 - (b) Assist in the local coordination of federal and state economic recovery efforts.
 - (c) Act as a facilitator in disseminating accurate information to and from the business community.
 - (d) Inform the business community of the types of disaster assistance available.
 - (e) Other duties as directed by the redevelopment task force or the Board of County Commissioners.
- c. Hazard Mitigation Coordinator
- (1) Purpose. To facilitate the coordination of hazard mitigation assistance from the federal government and state agencies available to Hillsborough County following a storm event or emergency.
 - (2) Duties. Shall consist of, but not limited to the following:
 - (a) Determine the types of hazard mitigation assistance or funding available to the County and the types of assistance most needed.
 - (b) Assist in the local coordination of federal and state hazard mitigation efforts.
 - (c) Provide local assistance to facilitate federal and state hazard mitigation, assistance programs.
 - (d) Act as a facilitator in securing federal or state hazard mitigation funding for local hazard mitigation projects.
 - (e) Other duties as directed by the redevelopment task force or the Board of County Commissioners.
- 4. The Redevelopment Task Force may recommend any changes in the Comprehensive Plan, Land Development Code, building codes or any other ordinances which it deems necessary or advisable to prevent a recurrence of damages.
 - 5. The Redevelopment Task Force may also undertake a similar process for non-mitigative local objectives and opportunities. The task force may recommend for Board of County Commissioners consideration the following specific opportunities:
 - a. Enhancement of local recreational and open space opportunity.
 - b. Enhancement of public access to estuary and riverine systems.
 - c. Enhancement and restoration of local natural ecosystems.
 - d. Reduction of traffic congestion, noise, and other transportation-related projects.
 - e. Enhancement of the long-term economic vitality of the local commercial and industrial base.

D. Composition of the Redevelopment Task Force. The Redevelopment Task Force will be composed of the individuals (or their designees) that reflect a broad-based representation of community interests and shall be appointed annually by the Board of County Commissioners. The redevelopment task force shall consist of, but not be limited to, the following individuals:

1. County Administrator
2. County Citizens Assistance and Information Director
3. County Attorney
4. County Public Safety Director
5. County Community Action and Planning Director
6. County Planning and Development Management Director
7. County Building Department Director
8. County Public Utilities Director
9. County Budget Director
10. County Roads and Streets Department Director
11. County Port Authority Director
12. County Sheriff's Office Liaison
13. County Housing and Community Development Director
14. County Commerce Department Director
15. County Facilities Management Director
16. County Emergency Planning Operations Director
17. County Engineering and Construction Services Director
18. County Environmental Protection Commission Director
19. Planning Commission Executive Director
20. City of Temple Terrace Liaison

21. City of Tampa Liaison
22. City of Plant City Liaison
23. Chamber of Commerce Representative
24. Board of Realtors Representative
25. Tampa Electric Company Representative
26. General Telephone Company Representative
27. Builder's Association of Greater Tampa Representative
28. American Institute of Architects' Representative
29. Associated General Contractor's Representative
30. American Society of Civil Engineer's Representative

E. Chairperson of the Redevelopment Task Force. The County Administrator (or his/her designee) will serve as the Chairperson of the Redevelopment Task Force.

F. Duration of the Redevelopment Task Force. In the event of a disaster, the redevelopment task force shall be activated and mobilized for a minimum period of sixty (60) days following the request of the Board of County Commissioners or the County Administrator's direction.

G. Repealing or Extending of the Redevelopment Task Force. The activation of the redevelopment task force may be repealed or extended upon resolution by the Board of County Commissioners.

SECTION FIVE. DETERMINATION OF DAMAGE BUILD-BACK POLICY MORATORIA AND EMERGENCY REPAIRS

A. Emergency Repairs.

1. No construction or reconstruction activity may be undertaken without a building permit while a building moratorium is in effect, except for emergency repairs necessary to prevent injury, loss of life, imminent collapse or other additional damage to the structure or its contents. For illustrative purposes only, items that constitute emer-

gency repairs may include temporary roof repairs to avoid further water damage, minor repairs to steps and the temporary shoring up of a structure to avoid imminent collapse.

2. Activities required to protect the public health, safety and welfare shall be exempted from these provisions of this ordinance and shall include repairs to potable water, waste water, power and communications facilities; emergency stabilization of roadways; police, fire and medical facilities; essential governmental facilities; debris removal; and stabilization or removal of structures about to collapse.
 3. Nothing in this ordinance shall be construed to exempt State and Federal permit regulations.
- B. Determination of Damage. The primary task of the Local Damage Assessment Team is to identify structures which have been damaged as a result of the storm event or emergency. The County damage assessment team will recommend to the County Building Department Director those structures which have: (1) been destroyed; (2) received major damage; and (3) received minor damage. The Building Department Director will then inspect the damaged structures and place each structure in one of the damaged categories. The assessment will also serve as a basis for determining if an initial building moratoria will be declared.
- C. County Build-back Policy. Structures which have been damaged by a storm event or emergency to the extent that the cost of their reconstruction or repair exceeds fifty percent (50%) of the replacement cost of the structure may be reconstructed at (but not to exceed) the legally documented actual use, density and intensity existing at the time of destruction, thereby allowing such structures to be rebuilt or replaced to the size, style, and type of their original construction, including their original square footage; provide, however, that applicable federal and state regulations, local building and life safety codes, and other local regulations do not preclude reconstruction otherwise intended by this policy.

In accordance with this policy, the ordinance shall provide that:

1. Structures damaged less than fifty percent (50%) of their replacement cost at the time of damage can be rebuilt to their original conditions, subject only to current building and life safety codes.
 2. Structures damaged more than fifty percent (50%) of their replacement cost at the time of damage can be rebuilt to their original square footage and use density or intensity, provided that they comply with:
 - a) federal requirements for elevation above the 100 year flood level;
 - b) building code requirements for flood-proofing;
 - c) current building and life safety codes;
 - d) state Coastal Construction Control Lines; and
 - e) any required land development regulations (other than density or intensity), unless compliance with such regulations would preclude reconstruction otherwise intended by the build-back policy.
 3. No provision is made to redevelop property containing damaged structures for a more intense use or at a density higher than the original lawful density. Redevelopment at a higher density or more intense use shall be permitted in accordance with the current land development regulations and no redevelopment at a higher density or more intense use shall commence until appropriate Zoning, Development Review, Building Permit and other applicable approvals are granted.
- D. Declaration of an Initial Building Moratorium. An initial building moratorium shall be declared in effect for all or part of the County when one or more of the following actions or findings are determined:
1. The County is declared a disaster area either by the Governor of the State of Florida or the President of the United States.

2. Upon the finding by the Board of County Commissioners of the existence of a state of local emergency in accordance with Chapter 252 of the Florida Statutes.
 3. The inability of the County to maintain acceptable levels of public service as determined by the County Administrator or the Board of County Commissioners.
- E. Moratoria. The following moratoria will apply accordingly to all or part of the County, for the purpose of prioritizing reconstruction immediately needed for the public, health, safety and welfare.
1. Initial building moratorium. The initial building moratorium may be in effect for up to 72 hours. No building permits shall be issued during this time period. After expiration of this initial building moratorium, the following moratoria shall then apply.
 2. Destroyed structure moratorium. No building permit may be issued within thirty (30) days following the declaration of the initial building moratorium for the replacement of any structure which has been destroyed. When a building permit is issued, structures damaged more than fifty percent (50) of their replacement cost at the time of damage can be rebuilt to their original intensity and density, provided that they comply with:
 - a) federal requirements for elevation above the 100 year flood level;
 - b) building code requirements for flood-proofing;
 - c) current building and life safety codes;
 - d) state Coastal Construction Control Lines; and
 - e) any required land development regulations (other than density or intensity), unless compliance with such regulations would preclude compliance with otherwise intended by the build-back policy.
 3. Major damaged structure moratorium. No building permit for repairs of a major damaged structure may be issued for at least ten (10) days following the declaration of the initial building moratorium. When a building permit is issued, structures damaged greater than twenty percent (20%) and up to and including fifty percent (50%) of the replacement cost at the time of damage can be repaired to their original condition, subject to current building and life safety codes.
 4. Minor damaged structure moratorium. No building permits for the repair of minor damaged structures may be issued for at least four (4) days following the declaration of the initial building moratorium. When a building permit is issued, structures damaged twenty percent (20%) or less than the replacement cost at the time of damage can be repaired to their original condition, subject to current building and life safety codes.
 5. New development moratorium. Issuance of building permits for new construction not related to the rebuilding or repairing of storm damage of a structure may not be issued for at least thirty (30) days following the declaration of the initial building moratorium. The redevelopment task force shall determine and advise the Board of County Commissioners whether a new development moratorium is required based upon the results of damage assessment and. Recommendations from the Building Department Director.
 6. Outstanding building permit moratorium.
 - a. All building permits which were issued prior to the storm event or emergency may be suspended for a minimum period of thirty (30) days following the expiration of the initial building moratorium, unless the Building Department Director determines on a case-by-case basis that sufficient inspection staff is available to adequately inspect the structures should construction begin or resume.

- b. The County reserves the right to reinspect any and all building permit work in place prior to the storm event or emergency to verify that the work in place was not damaged during the storm event or emergency. In the event that the County determines that the building permit work in place was damaged during the storm event or emergency or suspects that damage incurred, the owner shall be responsible for rework, removal, retesting, and uncovering work to facilitate inspection, so that compliance with the building permit documents and the building code can be ensured.
7. Outstanding development order moratorium.
- a. All development orders issued prior to a “storm event” or emergency may be suspended for a minimum period of thirty (30) days following the expiration of the initial building moratorium. Suspension of the development order shall mean that no development order work is authorized and that no development order inspections by the Hillsborough County Planning and Development Management Department will be performed during the moratorium. Applications for development orders suspended under this section shall be adjusted accordingly to reflect the time period covered by this thirty (30) day moratorium.
 - b. The County reserves the right to reinspect any and all development order work in place prior to the storm event or emergency to verify that the work in place was not damaged during the storm event or emergency. In the event that the County determines that development order work in place was damaged during the storm event or emergency or suspects that damage occurred, the developer shall be responsible for rework, removal, retesting, and uncovering work to facilitate inspection, so that compliance with the development order documents and the development standards ordinance can be ensured.
8. Site plan review moratorium.
- a. Review of site plans which have been submitted to the County prior to the storm event or emergency may be suspended by the County staff or Board of County Commissioners for a period of thirty (30) days following the declaration of the initial building moratorium. All submittal dates and review periods shall be adjusted accordingly to reflect the time period covered by this thirty (30) day moratorium.
 - b. New site plans, zoning requests or subdivision plats may not be accepted by the County for a period of thirty (30) days following the declaration of the initial building moratorium.
9. Duration of Moratorium. All moratoria, other than the initial building moratorium as enacted, shall be in effect for the length of time described above and may be repealed or extended upon resolution by the Board of County Commissioners.
- E. Emergency Repairs.
- 1. No construction or reconstruction activity may be undertaken without a building permit while a building moratorium is in effect, except emergency repairs necessary to prevent injury, loss of life, imminent collapse or other additional damage to the structure or its contents. For illustrative purposes only, items that constitute emergency repairs may include temporary roof repairs to avoid further water damage, minor repairs to steps and the temporary shoring up of a structure to avoid imminent collapse.
 - 2. Activities required to protect the public health, safety and welfare shall be exempted from these provisions of this ordinance and shall include repairs to potable water, wastewater, power and communications facilities; emergency stabilization of roadways; police, fire and medical facilities; essential governmental facilities; debris removal; and stabilization or removal of structures about to collapse.

3. Nothing in this ordinance shall be construed to exempt State and Federal permit regulations.

SECTION SIX. AUTHORITY.

Nothing in the ordinance shall be construed to limit the authority of the Board of County Commissioners to declare, repeal or extend a state of local emergency or take any action prescribed herein when sitting in regular or special session.

SECTION SEVEN. PENALTIES.

- A. Any person, firm, company or corporation who refuses to comply with or violates any section of this ordinance, or the emergency measures which may be made effective pursuant to this Ordinance, shall be guilty of a misdemeanor of the second degree, and upon conviction for such offense, shall be punished by a fine not to exceed five hundred dollars (\$500.00 or by imprisonment not to exceed sixty (60) days in the Hillsborough County Jail, or both, in the discretion of the Court hearing the case. Each day of continued noncompliance or violation shall constitute a separate offense. In addition to this penalty, any construction licensee of Hillsborough County or the State of Florida who violates any provision of this ordinance or the emergency measures which are effective as a result of this ordinance, shall be charged with said violation and have the matter heard before the appropriate Hillsborough County Board, state administrative proceeding, or court of law.
- B. Nothing contained herein shall prevent the County from taking such other lawful action in any court of competent jurisdiction as is necessary to prevent or remedy any refusal to comply with, or violation of this ordinance or the emergency measures which may be made effective according to this Ordinance. Such other lawful action shall include but shall not be limited to, an equitable action for injunctive relief or an action at law for damages.

SECTION EIGHT. CONFLICT AND SEVERABILITY.

This Ordinance shall supersede any other land development regulations regardless of when they were adopted. If any phrase or portion of this Ordinance is held invalid or unconstitutional by any court of competent jurisdiction, such portion shall be deemed a separate, distinct and independent provision and such holding shall not affect the validity of the remaining portion.

SECTION NINE. EFFECTIVE DATE.

This Ordinance shall become effective upon receipt of official acknowledgment from the Secretary of State that said Ordinance has been filed.

STATE OF FLORIDA)
COUNTY OF HILLSBOROUGH)

I, RICHARD AKE, Clerk of the Circuit Court and Ex-Officio Clerk of the Board of County Commissioners of Hillsborough County, Florida, do hereby certify that the above and foregoing is a true and correct copy of an ordinance adopted by the Board at its regular meeting of July 29, 1993, as the same appears of record in Minute book 206 of the Public Records of Hillsborough County, Florida.

Witness my hand and official seal this the 4th day of August, 1993.

RICHARD AKE, CLERK

BY: _____

APPROVED BY COUNTY ATTORNEY

BY _____

Approved As To Form and
Legal Sufficiency

C-4 Okaloosa County Post-Disaster Redevelopment Plan

POST-DISASTER REDEVELOPMENT PLAN

OKALOOSA COUNTY, FLORIDA

INTENT: To provide for the health, safety, and welfare of the public through sound pre-disaster and post-disaster redevelopment policies intended to reduce the potential for loss of life and property.

AUTHORITY The Post-Disaster Redevelopment Plan for Okaloosa County, Florida, is adopted by the Board of County Commissioners as Ordinance No. _____ in accordance with the Comprehensive Plan.

Goal 1 Reestablish the economic vitality and social order of Okaloosa County in a timely and orderly manner consistent with the other goals of this plan.

Objective 1.1 Create and appoint a Disaster Recovery Advisory Committee, hereinafter referred to as the Committee, to guide implementation of this Plan after a disaster.

Policy 1.1.1 The Committee shall meet once a quarter or more often if deemed necessary by the County Manager, regardless of a disaster occurrence, to discuss development rules that may be adopted or changed to mitigate the loss of life and property from potential disasters. The committee shall make a report annually to the Board of County Commissioners on its findings and recommendations. After a disaster, the Committee shall meet within 72 hours of the onset of damages, and as often as needed thereafter, to discuss and formulate recommendations for the execution of this Plan.

Policy 1.1.2 The Committee shall include those personnel as the County Manager deems necessary, but as a minimum

shall include representatives from the following departments and agencies:

Emergency Management Division

Growth Management

Clerk of Courts, Finance

Public Works

Water and Sewer

Public Health

Property Appraisers Office

Policy 1.1.3

The Committee shall, as necessary, seek input from, and coordinate with, municipalities, chambers of commerce, constitutional officers, and subject matter experts to develop policy recommendations for implementing disaster recovery plans and objectives. The County Manager shall be the chair or spokesperson for the Committee, and shall task the members to perform such work as may be necessary to accomplish the Committee's purposes as outlined in this plan.

Policy 1.1.4

The Committee shall prepare and maintain a list of critical facilities, both public and private, threatened by hurricane or other disasters, and shall make recommendations to reduce the vulnerability of those facilities. The Committee shall evaluate the undeveloped areas of the County that are in the Hurricane Vulnerability Zone and the V, VE, A, and AE zones on the Federal Emergency Management Agency's Flood Insurance Rate Maps, and make recommendations on mitigation and development strategies to reduce the potential for loss of life and property from natural hazards.

- Policy 1.1.5 The Committee shall make recommendations on other pre-disaster zoning, building and related construction codes, or land use changes that are prudent and feasible, and which will reduce the loss of life or property resulting from hurricanes, floods, or other disasters. All recommendations for changes to existing zoning, building, and related construction codes shall be presented in writing for consideration by the Board of County Commissioners.
- Objective 1.2 Conduct a post-disaster assessment of the impact on essential services, followed by a detailed assessment of damage to infrastructure, housing, and economic interests according to the State and County Comprehensive Emergency Management Plans in effect.
- Policy 1.2.1 The Director of Public Safety, Chief of Emergency Management or designee shall ensure that a generalized impact assessment is conducted as soon as conditions allow following the disaster event. Each municipality shall also conduct an assessment of the disaster's impact to its residents and report the information to the County Emergency Operations Center (EOC) via whatever communications, including courier that is available. The County EOC shall correlate the data from municipalities and unincorporated areas and relay the information to the State EOC via whatever communications available. The impact assessments will concentrate on immediate human needs, such as food, water supply, electrical power needs, temporary housing needs, emergency medical needs and security. The report will be in the format specified by the Florida Division of Emergency Management, and shall be provided within 12 hours of cessation of 40 mph winds (in the case of hurricanes), or daily in the case of floods or other disasters. The Department of Public Safety shall attempt to obtain such aid as is reasonably necessary to reduce suffering, restore public safety and order, restore communications, and clear transportation routes. All county departments and officers will render such aid as is available to meet these needs.
- Policy 1.2.2 The Director of Public Safety, Chief of Emergency Management, or designee shall ensure that a more detailed Preliminary Damage Assessment is conducted in the unincorporated area of the County. The reports will be in a format specified by the Florida Division of Emergency Management, and will be provided within 36 hours if conditions allow.
- Policy 1.2.3 Municipalities shall perform Preliminary Damage Assessments within their jurisdictions and report findings to the County EOC within 12 hours of cessation of 40 mph winds (for hurricanes), or 24 hrs for other types of disaster if conditions allow. The County EOC shall collect and collate damage information provided by the municipalities and report this information to the State EOC in the manner specified by the Florida Division of Emergency Management. The Okaloosa County Property Appraiser shall implement the procedures necessary to provide valuation information in support of this policy.
- Policy 1.2.4 Preliminary Damage Assessments will provide, insofar as possible, information on the numbers of homes, businesses, public facilities, public beaches, parks, and roads that are destroyed, suffered major damage, and sustained minor damage. Reports will include the estimated value of the destroyed structure or costs of repair for damages, the estimated number of employees or residents displaced and other information as may

be required by state or federal agencies. The following definitions will be used for reporting purposes.

- a. Substantial Damage is when the cost of repair, replacement, or relocation of a structure exceeds 50-percent of its pre-disaster replacement value. A mobile home will be considered destroyed if flood waters reach floor level and the floor is soaked.
- b. Major damage is when the cost of repair, replacement, or relocation of a structure is between 25 to 50 percent of its pre-disaster replacement value, e.g., a building or house shall be considered to have major damage if flood waters reach the level of electrical outlets.
- c. Minor damage is when the cost of repair, replacement, or relocation of a structure is less than 25-percent of its pre-disaster replacement value.

Policy 1.2.5

The Department of Public Safety shall coordinate with municipal, county, state, and federal agencies to accomplish additional damage assessments and verifications as may be necessary.

Policy 1.2.6

Each county department head shall ensure that estimates for damage, repair or debris removal within their area of responsibility is conducted as soon as practical after the disaster event. They will prepare and maintain a detailed list of labor, materials, and contract expenditures for work performed to make final preparations for the recovery from the disaster. Each department head shall designate a knowledgeable person from middle or upper management who will work with state and federal representatives to prepare damage survey reports for assistance or reimbursement claims within the department's area of responsibility.

Policy 1.2.7

The County Manager shall coordinate with the Clerk of Courts to evaluate immediate revenue sources needed for emergency repairs or relief of suffering. They will consider various options for funding the county's share of costs if state and federal aid will be available, or the entire amount if such aid is not made available.

Policy 1.2.8

The County Manager or designee shall apply for state and federal disaster relief grant and loan programs when necessary to relieve suffering or repair infrastructure.

Policy 1.2.9

The Department of Public Safety shall cooperate with state and federal agencies to make available to them such facilities as may be needed to establish disaster Application Centers, staging areas, or other support facilities within Okaloosa County. All county employees and officers shall render to the Department of Public Safety such aid and support as may be necessary to accomplish this task.

Policy 1.2.10

The Clerk of Courts shall appoint personnel within his/her department who will be responsible for the necessary accounting and fiscal reporting procedures mandated by state and federal grant and loan agreements. The Clerk of Courts, or his/her designee, will coordinate payment schedules and procedures with the Disaster Field Office established by state and federal authorities.

Policy 1.2.11

The Committee shall advise the Board of County Commissioners on the need or advisability of revising policies on building permits, zoning, construction and related codes, and business licensure to promote mitigation and economic redevelopment. The County Manager or his designee will be the liaison to the State and Federal Mitigation Officers, and shall participate in the implementation of the Local Mitigation Strat-

	<p>egy Plan following a disaster. The Committee and the County Manager will make such recommendations as necessary to the Board of County Commissioners.</p>	Policy 1.3.5	<p>The Committee may identify and designate areas that can be used for relocation of residential housing and public facilities outside of the Hurricane Vulnerability Zone.</p>
Policy 1.2.12	<p>The Building Official shall, within the limits of access, time and staffing, condemn and visibly placard structures that were destroyed (per Policy 1.2.4) or which are unsafe for occupancy or use.</p>	Objective 1.4	<p>Effective immediately upon the Declaration of a State of Local Emergency within Okaloosa County by the Board of County Commissioners or Governor of Florida, a moratorium shall be instituted on all previously approved development orders, building permits, and review procedures in progress for the affected areas of the county. This initial moratorium will be in effect during the State of Emergency (including any extension) and for 48 hours after the storm or disaster event. Moratoriums will be lifted or extended according to the schedule below. Nothing in this policy should be construed to delay or prevent short-term, temporary measures of an emergency nature intended to improve safety or limit further damage or deterioration. For example, temporary repairs to cover roof openings, repair steps, or shore up structures may be conducted without permits.</p>
Objective 1.3	<p>Establish the necessary staff structure and planning procedures to accommodate the emergency nature of redevelopment.</p>		
Policy 1.3.1	<p>The Committee shall evaluate the projected workload for managing the recovery and reconstruction process and recommend the hiring of temporary workers or contracting portions of the workload to specialists. The Board of County Commissioners shall approve or disapprove such recommendations.</p>		
Policy 1.3.2	<p>The County shall evaluate the long-term needs for capital facilities planning and LMS project list immediately after meeting the human needs following a hurricane or other disaster.</p>		
Policy 1.3.3	<p>If necessary, the County shall prepare and forward to the Florida Department of Community Affairs an amendment to the Capital Improvements Element of the Comprehensive Plan and revisions to the LMS project list to obtain a Statement of Consistency. This will be accomplished as soon as practical.</p>	Policy 1.4.1	<p>The moratorium will be lifted immediately upon expiration of the initial moratorium, if the Governor of Florida did not declare the county a disaster area or did not request a Presidential Disaster Declaration which included Okaloosa County.</p>
Policy 1.3.4	<p>County department heads and staff shall initiate coordination and cooperation with State and Federal agencies to obtain assistance in mitigation planning, relocation, or repair-in-place of public facilities.</p>	Policy 1.4.2	<p>If Okaloosa County is included in a disaster declaration, the moratorium will be lifted in phases, as specified below.</p> <ol style="list-style-type: none"> a. Five days, or as soon as practical, after the initial moratorium, private or public facilities and infrastructure that suffered major damage and which create or aggravate a threat to the public's health,

	<p>safety, or welfare shall be able to apply for building permits and associated construction and development orders for repair or demolition. Destroyed public or private structures that pose an immediate threat to the public or occupants by risk of collapse, should be assessed for insurance purposes and demolished as soon as practical. The review of such permits is subject to the policies listed under Goals 2 and 3, below.</p> <p>b. Private or public facilities that suffered major damage but do not constitute a threat as specified above, may apply for necessary permits and orders fourteen (14) days after the initial moratorium.</p> <p>c. Thirty (30) days after the initial moratorium, private or public facilities, which were destroyed, may apply for building permits and associated construction and development orders. The review process is subject to the policies listed under Goals 2 and 3, below.</p> <p>d. All building permits and development orders issued for the impacted area prior to the disaster will be revoked and shall not be reissued for a minimum of 45 days after the initial moratorium. Forty-five (45) days after the initial moratorium, previously approved building permits, development orders, and review procedures will revert to the pre-disaster status. It will not be necessary to repeat previous applications, but the applicants must notify Growth Management in writing that they intend to continue with or cancel the development plans.</p>		<p>conditions. The Board of County Commissioners will approve or disapprove such recommended changes.</p>
<p>Policy 1.4.3</p>	<p>The Committee may, by consensus of the members, recommend extending or reducing the duration of the time frames listed in Policy 1.4.2 if necessary to meet local</p>	<p>Goal 2</p> <p>Objective 2.1</p> <p>Policy 2.1.1</p> <p>Policy 2.1.2</p> <p>Policy 2.1.3</p> <p>Policy 2.1.4</p>	<p>Reduce the loss of life and property in any future hurricane, flood, or other disaster.</p> <p>Permitting and certification of structures will continue to be required to ensure compliance with applicable building, FEMA, CRS and related codes, zoning, and redevelopment policies to limit the potential for future loss of life and property.</p> <p>Except for facilities requiring access to the waterfront, water wells and towers, recreation facilities, or those which provide essential services, safety and evacuation functions, all public structures in the Coastal High Hazard Area that were destroyed will be relocated out of such zone.</p> <p>When feasible, destroyed bulkheads and seawalls will be replaced with nonstructural forms of shoreline stabilization in accordance with all Federal, State, Regional and Local jurisdictional rules and regulation including emergency orders, except where such replacement would endanger essential transportation routes, critical facilities, or the public safety.</p> <p>The County and private developers will be required to coordinate with the necessary Federal, State, Regional and Local jurisdictional agencies as required by law or regulation for the permitting of reconstruction or redevelopment in order to ensure safety and protect the environment.</p> <p>Coordinate with public and private utilities to flood proof facilities and utility services through incentives or regulations consistent with the local mitigation strategy.</p>

- Objective 2.2 Establish a procedure to review proposals for redevelopment of public and private structures and develop policies to guide redevelopment decisions, consistent with the local mitigation strategy.
- Policy 2.2.1 The timing of redevelopment reviews is set forth in Goal 1. The review of redevelopment permits for destroyed structures shall be guided by the following priorities:
- a. Reduce the pre-disaster density of residential development in the Coastal High Hazard Area (CHHA) or flood inundation areas through relocation assistance, zoning incentives, or acquisition of property for open space.
 - b. Encourage the relocation of all non-residential structures destroyed in the CHHA or flood inundation areas to areas outside such zones by using relocation assistance or zoning incentives, or acquisition of property for open space.
 - c. Structures in the CHHA or V, VE, A, or AE flood zones that were destroyed, and where the owner decides to rebuild in the same zone, will be designed and constructed consistent with the adopted Comprehensive Plan, Future Land Use Maps, Land Development Code including zoning maps, Local Mitigation Strategy, FEMA flood insurance rate maps, Community Rating System and Florida building codes. They will be prohibited from purchasing flood insurance underwritten by the Federal and State Government unless they meet all additional requirements as may be imposed by the Federal, State, and Local Government for elevation, flood proofing, etc.
 - d. Prior to issuance of a building permit, the applicant must submit a post-disaster survey, (pre disaster if available) and/or site plan, as applicable, of the lot and structure and cost estimate for reconstruction. The construction plan must provide for direct, unimpeded, approved vehicle ingress and egress to the parcel.
 - e. Destroyed structures outside the Coastal High Hazard Area (CHHA), but within the Hurricane Vulnerability Zone (HVZ) and rebuilt in the HVZ shall be designed and constructed consistent with the adopted Comprehensive Plan, Future Land Use Map, Land Development Code, FEMA Flood Insurance Rate Maps, and Florida building and related codes, i.e., Coastal codes, FEMA and CRS.
 - f. All destroyed structures, if rebuilt within the HVZ, will be required to be inspected prior to issuance of a Certificate of Occupancy to ensure conformance with building and related codes or regulations.
 - g. Coordinate the redevelopment of shoreline areas with the Florida Department of Environmental Protection, U.S. Army Corps of Engineers, and/or other Local, State and Federal agencies which may have regulatory jurisdiction over these areas.
 - h. Certificates of Occupancy for private structures which were destroyed shall be contingent upon the immediate provision of services necessary for health and safety to the structure, e.g., sewer or septic service, electrical power, disaster debris removal and potable water.
 - i. The Committee may make recommendations for increasing building standards or rezoning that

would reduce the potential for damage or loss of life from future disasters. The Board of County Commissioners may adopt such recommendations as deemed prudent and necessary, and all redevelopment efforts after enactment will be required to comply with such stricter standards.

Policy 2.2.2

The review of redevelopment permits for structures experiencing major damage, or which propose addition or changes exceeding 50-percent of the pre-disaster value of the structure, shall be guided by the following redevelopment policies.

- a. Where feasible, reduce the pre-disaster density of residential development which experienced major damage.
- b. Encourage the relocation of structures experiencing major damage in the CHHA to outside the CHHA.
- c. Structures experiencing major damage in the CHHA and redeveloped in the CHHA shall be designed and reconstructed consistent with the adopted Comprehensive Plan, Future Land Use Map, Land Development Code, FEMA FIRM, CRS and Florida Building and related codes.
- d. Prior to issuance of a development or building permit on the same parcel, the applicant must submit a post-disaster survey (pre-disaster survey if available) and estimate of construction, and site plan as applicable, of the parcel and structure if there is a proposed increase in the building footprint or if any portion of the parcel or parcels was eroded away by wave action, storm surge, or flood water. The con-

struction plan must provide for direct, unimpeded, approved vehicle ingress and egress to the parcel.

- e. Structures experiencing major damage and redeveloped outside the CHHA, but within the HVZ, shall be designed and constructed consistent with the adopted Comprehensive Plan, Future Land Use Map, Land Development Code, FEMA FIRM, CRS and Florida Building and related codes.
- f. All structures experiencing major damage and redeveloped will be required to be inspected prior to issuance of a Certificate of Occupancy to ensure conformance with building codes and related regulations.
- g. Nonconforming uses (as defined in the adopted Comprehensive Plan, and Land Development Code) damaged outside the CHHA but within the HVZ, shall be designed and rebuilt consistent with the adopted Comprehensive Plan, Future Land Use Map, Land Development Code, FEMA FIRM, CRS, Florida Building and related codes.
- h. Certificates of Occupancy and permitting for redevelopment of private structures which suffered major damage shall be contingent upon the immediate provision of services necessary for health and safety to that structure, e.g., sewer or septic service, electrical power, and potable water, and comply with the FEMA 50% rule.
- i. The Committee may make recommendations for increasing building standards consistent with the Florida Building Codes or rezoning that would reduce the potential for damage or loss of life from future disasters. The Board of County

Commissioners may adopt such recommendations as deemed prudent and necessary, and all redevelopment efforts after enactment would be required to comply with such stricter standards.

Policy 2.2.3

The review of building permits for structures experiencing minor damage shall be guided by the following redevelopment priorities.

- a. Structures experiencing minor damage in the HVZ, including the CHHA, shall be allowed to rebuild to pre-disaster square footage consistent with the adopted Comprehensive Plan, Future Land Use Map, Land Development Code, FEMA FIRM, CRS, Florida Building and related codes.
- b. Prior to issuance of a building permit on the same parcel, the applicant must submit a post-disaster survey (pre-disaster if available) and/or site plan as applicable, of the lot and structure if there is a proposed increase in building footprint or if any portion of the lot or lots was eroded away by wave action, storm surge, or flood waters. The site plan must provide for direct, unimpeded, approved vehicle egress and ingress to each lot.
- c. Certificates of Occupancy and permitting for redevelopment to pre-disaster square footage of private structures which suffered minor damage shall be contingent upon the immediate provisions of services necessary for health and safety to that structure, e.g., sewer or septic service, electrical power, waste disposal and potable water.
- d. Eligibility for flood insurance underwritten by the Federal Government will be contingent on program rules regarding the specific case.

Policy 2.2.4

All private development which was destroyed or suffered major damage shall be guided by the following redevelopment priorities:

- a. Develop new street patterns in hardest hit areas to accommodate clustering of structures away from the CHHA and attempt to remove structural and physical patterns which increase the susceptibility of development to the hazards of hurricane, flood, or other natural disasters.
- b. Residential redevelopment densities shall not exceed pre-disaster development without providing enhanced evacuation methods and routes in order to reduce evacuation times.
- c. In order to reduce potential future property damage, redevelopment floor area ratios for commercial and office development in the HVZ shall not exceed those established in the adopted Comprehensive Plan and Future Land Use Map.
- d. Discourage the rebuilding and relocation of mobile homes and manufactured housing in the CHHA and HVZ unless they are proven to be able to withstand wind load requirements and structural safety rules established for other structures in the CHHA and HVZ by local, state, and federal building and related codes. This provision shall not be construed to limit the establishment of short-term housing areas to provide immediate and emergency relief to victims of the disaster.
- e. The Building Official shall, after consultation with the Growth Management Director, Planning Manager, Public Works Director/County Engineer and Chief of Emergency Management or in his/her

absence Emergency Management Coordinator, condemn land parcels or lots that are destroyed and replaced by tidal waters.

- f. The replacement or repair of private beach or beach stabilization structures shall be the sole responsibility of the property owner, and shall conform to the rules and regulations of Local, State, Regional and Federal jurisdictional agencies.
- g. If a structure listed on the National Register of Historic Places, the State Inventory of Historic Places, or the State of Florida Master File suffers major or minor damage, it will not be required to redevelop in such a way as to cause it to lose its historic designation if the Building Official approves such exemption.

Policy 2.2.5

Provision of water and sewer service at private expense to existing parcels of record in the CHHA will be permitted, provided that such service does not conflict with existing policies for determining when structures can be rebuilt, land development regulations, building and related codes, and state and federal policies regarding development and construction in the CHHA and environmental regulations. New sanitary sewer and potable water facilities in the CHHA will be flood proofed.

Policy 2.2.6

It shall be the policy of Okaloosa County not to expend public funds for the repair of damaged private roads or easements, except in conjunction with the repair and maintenance of the county's water and sewer system or public easements. In cases where a declared disaster has resulted in a private road being rendered impassable to emergency vehicles, and therefore renders it impossible to conduct fire/rescue or law enforcement activities for a populated area, the county may make temporary, emer-

Policy 2.2.7

gency repairs sufficient to allow passage of emergency vehicles. These repairs will be temporary in nature, such as filling holes or gaps in the roadway with dirt or sand, and will be done only once. Thereafter, it will be the responsibility of the owners to make any repairs and perform necessary maintenance. Real estate developers or sellers shall inform all future potential buyers in writing if the property is located on a private road that is not maintained by the county.

The Committee will review mitigation alternatives and make recommendations for consideration by the Board of County Commissioners. The Committee will review the nature and extent of damages, the causal relationships between the damage and land use policies, and ways to reduce damage in future disasters. Among those policies and programs that will be considered are:

- a. Changes from residential to commercial zoning to reduce evacuation times.
- b. Reduction in residential density by increasing the minimum lot size or reducing the number of dwelling units allowed per acre.
- c. Awarding bonus or incentive points that would allow increased density if developers incorporate hazard-reduction features.
- d. Clustering development on the most protected portions of parcels.
- e. Requests for Special Exemptions will be reviewed and considered based on the impact on population density (which effects evacuation clearance times and search/rescue needs) and potential for suffering or aggravating damage to other structures in the area.

	f. Reconstruction must comply with, FEMA FIRM, CRS, Florida Building and related codes.		
Policy 2.2.8	The County will seek opportunities through grants or other means to acquire land in the CHHA. The land acquisition will be designed to reduce development in the CHHA, increase open space ratings, and thereby mitigate potential loss of life or property in future disasters.		
Goal 3	Provide public facilities and services which guarantee to the extent possible the health, safety, and welfare of the citizens of Okaloosa County and which reduce future expenditure for public infrastructure in the CHHA.	Policy 3.1.4	Public facilities which experienced minor damage in the CHHA shall be rebuilt in place to current local, state, and federal standards.
Objective 3.1	Based upon the extent of damage, the review of permits for relocation or repair shall be guided by the following policies:	Policy 3.1.5	Public facilities outside the CHHA, but within the HVZ, and are destroyed or suffer major damage will be rebuilt in place or relocated consistent with the adopted Comprehensive Plan, Future Land Use Map, and Land Development Code. Their construction will be consistent with Local, State, FEMA, and CRS standards.
Policy 3.1.1	Those facilities that are essential to the immediate health, safety, and welfare of citizens will be assigned high priority. If this is not feasible, every effort will be made to provide the service through alternative means.	Policy 3.1.6	Public facilities currently located in the CHHA that must function during a hurricane or other disaster, such as police and fire stations, emergency operations center, and communication centers shall be considered for relocation outside the CHHA in order to mitigate possible disruption of service due to their location in a surge zone or possible high velocity wave action from storms.
Policy 3.1.2	Public buildings in the CHHA that were destroyed or suffered major damage shall be relocated out of the CHHA consistent with the adopted Comprehensive Plan, Future Land Use Map, Land Development Code, FEMA FIRM, and CRS and will be rebuilt to current local, state, and federal standards. Facilities for access to the waterfront, recreational facilities, water and sewer, and facilities that are needed for evacuation may be allowed in the CHHA.	Policy 3.1.7	Prior to repair or reconstruction of county roads and bridges, except when deemed a crucial transportation route or corridor or crucial to the public health, safety and welfare, which were destroyed or damaged by a disaster, the County shall consider alternative solutions, including, but not limited to, abandonment procedures, special assessment and condemnation, and construction practices to mitigate damage from future disasters. This
Policy 3.1.3	Public buildings that must function during a hurricane or other disaster, such as hospitals, blood banks, police and fire stations, emergency operations centers,		

shall not prevent the temporary repair of roads and bridges during or after the disaster event.

Glossary of Terms

CHHA	Coastal High Hazard Area. The area of the hurricane vulnerability zone defined as the landfalling Category 1 evacuation zone as delineated by the Florida Regional Planning Council.
CRS	Community Rating System. A program encouraging floodplain management.
HVZ	Hurricane Vulnerability Zone. The area delineated by a regional hurricane evacuation study requiring evacuation in the event of a landfalling category three hurricane event conducted by the Army Corps of Engineers.
LMS	Local Mitigation Strategy.
Zone A	No base flood elevation determined.
Zone AE	Base flood elevation determined.
Zone V	Coastal flood with velocity hazard wave action; no base flood elevation determined.
Zone VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.
Zone X	Areas of 500 year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

D Resources

1. Hazard Mitigation

Brower, David J., David R. Godschalk, and Timothy Beatley. 1986. *Implementing Coastal Storm Hazard Policy*. Report no. 86-16. Center for Urban and Regional Studies, University of North Carolina.

Through an examination of federal, state, and local policies, the report assesses the primary approaches to coastal hazard mitigation and introduces model land management strategies for addressing these hazards. Furthermore, the report reviews recovery and reconstruction practices following major hurricane events and lessons learned from them.

Emergency Management Institute. 2002. *Building Disaster Resilient Communities*. Emmitsburg, MD.

This course manual consists of lectures, classroom discussion guides, handouts, and overheads for one-semester undergraduate or graduate course that addresses the concepts, strategies, and techniques for making communities resistant and resilient to natural disasters through land use planning and development management.

Erikson, Hank and Alan Krebs. November 1997. "The Municipal Recovery Process." *Quality Cities*. Florida League of Cities. 1997.

The article defines the emergency management cycle and outlines the post-disaster recovery process, including preliminary damage assessments.

Federal Emergency Management Agency. 2000. *Coastal Construction Manual: Principles And Practices Of Planning, Siting, Designing, Constructing, And Maintaining Residential Buildings In Coastal Areas*. FEMA 55. Washington, DC.

This manual provides broad coverage of practices and techniques from planning to site layout to construction detailing in coastal areas. The materials and information in the manual have applicability throughout the planning, permitting, and construction

processes and to the types of specific hazard situations found in Florida.

Federal Emergency Management Agency. 2001. *State and Local Mitigation Planning: How-To Guides*. 386-X. Washington, DC.

The how-to guides are a series of planning booklets published by FEMA that details the phases and steps of the hazard mitigation planning process. The first four booklets in the series provide instruction on organizing to prepare the plan, assessing potential losses from disaster damage, developing a mitigation strategy, and implementing the plan. Subsequent booklets in the series supplement the core phases and include topics such as mitigation planning for terrorism, using benefit-cost analysis, multi-jurisdictional mitigation planning, and historic preservation and environmental concerns in the mitigation planning context.

Florida Department of Community Affairs. 1997. *Workbook in Local Mitigation Strategy Development: Recommendations for Local Government on the Hazard Mitigation Planning Process*. Tallahassee, FL.

This workbook, a companion to Florida's Local Mitigation Strategy: A Guidebook for Florida Cities and Counties, discusses the process that local governments can use to implement the strategies set out in the guidebook. The workbook describes ways to jump start the hazard mitigation planning process, steps in the planning process, and methods of implementing the resultant strategy.

Florida Department of Community Affairs. 1998. *The Local Mitigation Strategy: Cities and Counties Working Together to Build Disaster Resistant Communities*. Tallahassee, FL.

The booklet presents Florida's Local Mitigation Strategy, the state's initiative to help communities develop hazard mitigation plans. The booklet outlines the benefits of planning for hazard mitigation, the major steps in the hazard mitigation planning process, frequently

asked questions, and ways communities can obtain technical assistance from the Department of Community Affairs.

Florida Department of Community Affairs. 2001. *Handbook for Floodplain Acquisition and Elevation Projects*. Tallahassee, FL. This handbook addresses the acquisition, demolition, relocation, and elevation of private residential structures that have suffered repetitive flood damage. It includes information on funding available under the federal Hazard Mitigation Grant Program and the federal Flood Mitigation Assistance Program. The handbook is organized to follow the entire process, from planning a project, deciding policies, preparing the application, and implementing the project, to closing out the books.

Florida Department of Community Affairs. 2001. *Handbook for Hazard Mitigation Projects*. Tallahassee, FL. This FDCA handbook details the planning process for securing federal funds under the Hazard Mitigation Grant Program and the Flood Mitigation Assistance Program for mitigation projects that protect existing public buildings and critical facilities, including floodproofing, elevation, relocation and wind retrofitting of existing public buildings, floodproofing of sewer lift stations, and drainage improvements.

Florida Department of Community Affairs. 2002. "Community Rating System: A Comprehensive Approach to Flood Mitigation." Tallahassee, FL. This brochure provides an overview of the National Flood Insurance Program Community Rating System and includes a list of state and federal contacts.

Florida Department of Community Affairs. 2002. *Retrofitting and Flood Mitigation in Florida*. Tallahassee, FL. This guide discusses flood mitigation and describes several retrofitting measures that can be applied to existing structures to make them less vulnerable to flooding. As such, this guide should

be especially helpful with those structures that have sustained or are vulnerable to repetitive flood damage.

Florida Department of Community Affairs. Accessed 3/4/2003. "Storm Hazard Modeling Using TAOS & SLOSH The Arbiter of Storms (TAOS), Sea, Lake, and Overland Surges from Hurricanes (SLOSH)." www.dca.state.fl.us/brm/taos_faqs.htm. Using the frequently-asked-questions format, the web article explains DCA's TAOS modeling efforts and how they fit into the risk assessment aspect of the Local Mitigation Strategy.

Florida Department of Community Affairs. 2004. *The Local Mitigation Strategy: A Guidebook for Florida Cities and Counties*. www.dca.state.fl.us/brm. The Guidebook provides help to Florida communities in developing hazard mitigation strategies. Divided into two parts, process and product, the guidebook describes the activities involved in generating a local mitigation strategy including coordinating government actors and other stakeholders, evaluation and review of the plan, identification of community mitigation guiding principles, risk assessment, and mitigation initiatives.

Florida Department of Community Affairs. 2004. *The Local Mitigation Strategy: A Guidebook for Florida Cities and Counties, Vulnerability Assessment Supplement, Parts I and II*. www.dca.state.fl.us/brm. The Vulnerability Assessment Supplement to the Local Mitigation Strategy guidebook outlines the methods local mitigation planners in Florida should use in developing the vulnerability assessment. Part One of the Supplement details the steps necessary to complete the vulnerability assessment, including assigning responsibilities for conducting the assessment, identifying hazards that can affect the jurisdiction, defining hazard areas using mapping techniques, identifying vulnerable people and property, and conducting a risk analysis using existing resources such as TAOS. Part II of the

Supplement aids communities in identifying and prioritization of mitigation initiatives to address the identified vulnerabilities.

Florida Department of Community Affairs, Division of Emergency Management. 2002. *State of Florida Comprehensive Emergency Management Plan.* www.dca.state.fl.us/bpr/Projects/CEMP%20Online/situation.htm, accessed 3/4/2003.

With three sections-- the basic plan, emergency support function appendices, and hazard specific annexes, the plan establishes the framework for preparing for, responding to, recovering from, and mitigating hazards.

Florida Department of Environmental Protection. 1988. *The Florida Development Manual: A Guide to Sound Land and Water Management.* Tallahassee, FL.

Volume 2 (Chapter 6), which is available online (<http://www.dep.state.fl.us/water/nonpoint/pubs.htm>), contains detailed descriptions, theory, and standards and specifications for structural and nonstructural BMPs to control erosion and sediment during construction and storm water management after construction.

Hillsborough County Board of County Commissioners. 1993. *Hillsborough County, Florida, Ordinance 93-20: An Ordinance to Guide Redevelopment and Mitigation following a Storm Event or Other Natural Disaster within the Unincorporated Areas of Hillsborough County, Florida.* Hillsborough County, FL.

The ordinance provides for the creation of a task force, procedures for assessing damage, a build-back policy, a building moratorium, and explains the types of emergency repairs allowed. See Appendix B-3 for the complete ordinance.

“Land Use Planning and Natural Hazard Mitigation.” 1998. *Natural Hazards Insights. No. 8.* Institute for Business and Home Safety.

The October 1998 newsletter advocates using land use planning practices to help mitigate the effect of hazards. The article briefs communities on the benefits of mitigation and the components of hazard mitigation plans. Finally, the article presents a list of land use

management tools that also have application as hazard mitigation tools, including zoning and subdivision ordinances, capital improvement programs, and impact taxes.

Mileti, Dennis S. 1999. “Chapter 6: Tools for Sustainable Hazards Mitigation.” *Disasters by Design: A Reassessment of Natural Hazards in the United States.* Washington, D.C.: Joseph Henry Press.

Chapter Six of *Disasters by Design* explores the various tools that can be used to promote sustainable hazard mitigation, including land-use planning, building codes, insurance, engineering, and warning systems.

Mileti, Dennis S. 1999. *Disasters by Design: A Reassessment of Natural Hazards in the United States.* Washington, D.C.: Joseph Henry Press.

Disasters by Design promotes the idea of “sustainable hazard mitigation” by presenting a framework for the concept, assessing the human and economic losses from disasters, and suggesting land management, research, educational, government, and industry tools and policies for sustainable hazard mitigation.

North Carolina Division of Emergency Management. 2000. *Keeping Natural Hazards from Becoming Disasters: A Basic Workbook for Local Governments.*

This workbook, developed by the North Carolina Division of Emergency Management, presents a condensed hazard mitigation planning process with job aids at every step. The workbook includes steps on hazard analysis, vulnerability assessment, capability assessment, goals development, and strategy development. The workbook also includes information on sources of planning help, funding, and hazard research.

Okaloosa County. n.d. *Okaloosa County Post-Disaster Redevelopment Plan.* Ft. Walton Beach, FL.

The plan addresses both recovery operations as well as policies for guiding the reconstruction and redevelopment process. It sets forth

explicit policies governing the repair and reconstruction of structures that sustain different levels of damage within the Coastal High-Hazard Area (CHHA) and Hazard Vulnerability Zone (HVZ). It also spells out specific initiatives to be pursued to reduce post-storm densities and vulnerability within the CHHA. See Appendix B-4 for the complete plan.

Topping, Kenneth. 1998. "A Model Recovery and Redevelopment Ordinance," In Schwab, Jim, et al. *Planning for Post-Disaster Recovery and Reconstruction, Planning Advisory Service Report 483/484.* Chicago: American Planning Association.

This ordinance contains the basic elements required for establishing a recovery organization, and authorizing a variety of pre- and post-event planning and regulatory powers and procedures related to disaster recovery and redevelopment. Designed to be adopted in advance of a major disaster, the ordinance greatly facilitates long-term recovery and the implementation of redevelopment opportunities identified in the post-disaster recovery plan.

Tucker, John, Todd Trexler, and Jeff Wade. 1996. *Hurricane Mitigation and Post Disaster Redevelopment: Program Analysis of Flagler County, Florida.* Gainesville, FL: Center for Governmental Responsibility, University of Florida College of Law.

The report summarizes general principles and comprehensive planning requirements for coastal management and contains an in-depth assessment of Flagler County, Florida's approach to coastal hazard mitigation and post-disaster redevelopment. The report evaluates the County's coastal growth policies, natural systems protection programs, and its post-disaster redevelopment plan.

Wade, Jeff and Todd Trexler. 1996. *Hurricane Mitigation and Post-Disaster Redevelopment: Principles and Practices. Volume 1.* Gainesville, FL: Center for Governmental Responsibility, University of Florida College of Law.

Volume 1 presents general principles and strategies of effective hurricane mitigation programs. The report analyzes several Florida coastal management statutes, the Tampa Bay region's model plan and ordinances, and several plans and ordinances of the Town of Nags Head and Brevard, Indian River, Lee, Sarasota, St. John's, and St. Lucie Counties.

2. Comprehensive Planning

"Addressing Natural Resources in a Comprehensive Plan." 2001. *Natural Resource Guidance Checklist.* Minnesota Department of Natural Resources. St. Paul, MN.

The Natural Resource Guidance Checklist provides a list of natural resource issues for Minnesota communities to consider when developing comprehensive plans. The checklist advises communities to include an introduction and vision statement, community background with natural resource inventory, a list of issues, a policy plan, and an implementation plan. The checklist does not directly address natural hazards; however, it provides a list of questions regarding natural resource policy planning that can be useful during the hazard mitigation planning process.

California Governor's Office of Planning and Research. 1998. *State of California General Plan Guidelines.* Sacramento, CA. <http://ceres.ca.gov/planning/genplan/gpg.pdf>.

The California Office of Planning and Research developed Guidelines in order to aid California communities in developing their general plans. These guidelines interpret California's requirement for local general plans, providing advice on addressing the statutory requirements and optional elements of the plan.

California Governor's Office of Planning Research. 2002. *Hazard Mitigation: Fire Hazard Planning and the General Plan.* Sacramento, CA.

Hazard Mitigation: Fire Hazard Planning and the General Plan provides localities in California guidance to integrate fire hazard

mitigation planning and general plan considerations. The document outlines methods necessary to analyze urban, urban-interface, and wildland fire danger, and it suggests policies to address these hazards.

City of Las Cruces and Doña Ana County, New Mexico. 2000. “Section 3: Goals and Objectives.” *City of Las Cruces and Doña Ana County, New Mexico Extraterritorial Zone’s Comprehensive Plan, 2000-2020*. Las Cruces, NM. <http://www.co.dona-ana.nm.us/plan/etz-comp-plan/etzcompplan.html>.

The ETZ Comprehensive Plan includes goals geared to sustainable development and protection from flooding hazards. With Objective 11.4, the City and County establish their intent to develop a Floodplain Management Overlay Zone Ordinance that discourages development in floodplains and requires the development of certain floodplain management policies and plans.

Department of Planning and Development, City of Fargo, North Dakota. 1995. “Utilities.” *City of Fargo Comprehensive Policy Plan*. Fargo, North Dakota. <http://www.ci.fargo.nd.us/Planning/LandUse/comppol.htm>.

The “Utilities” portion of the Comprehensive Policy Plan conveys the City of Fargo’s intention to review sources of riverine and urban flooding, floodplain-related land management, and riverfront development issues within the City.

Feagin, Laura, et al. 2003. “2002 Growth Management Reforms Impact Local Governments.” *Legal News and Articles: Local and State Government Issues*. Lewis, Longman & Walker, P.A. Attorneys at Law. www.llw-law.com/article17.cfm, accessed 3/4/2003.

The article reviews recently passed land use management and other legislation that affects local governments, including water supply planning, comprehensive plan process streamlining, and development-of-regional impact procedures.

Godschalk, David R., et al. 1998. “Integrating Hazard Mitigation and Local Land Use Planning.” *In Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*, Raymond J. Burby, Editor. Washington, D.C.: Joseph Henry Press.

“Integrating Hazard Mitigation and Local Land Use Planning” examines the role of land use planning in mitigating the threats posed by natural hazards. The article explores local planning powers and authority and ways to combine the processes of hazard mitigation and land use planning. Also, the article advises local governments on effective stakeholder participation and the development of high-quality mitigation plans.

Maryland Office of Planning. 1995. *Managing Maryland’s Growth, Models and Guidelines -- Flexible and Innovative Zoning Series: Transferable Development Rights*. Baltimore, MD.

Transferable Development Rights (TDRs) are one type of land use management technique that some have used to further hazard mitigation. The booklet provides an overview of the use of TDRs in other states and how they can be used in Maryland. The booklet also shows local communities how to prepare a local TDR ordinance, provides a model zoning regulation for TDRs, and new approaches for using TDRs in agricultural preservation.

“Natural Hazards Goals, Policies, and Maps Element.” 1995. *Boulder County Comprehensive Plan*. www.co.boulder.co.us/lu/bccp/nat_hat.htm, accessed 3/27/2003. Boulder County, CO.

The natural hazards element of the Boulder, Colorado comprehensive plan emphasizes minimizing risks as an essential function of public safety planning. The element discusses the various hazards that may affect Boulder County, indicating the relative severity of risk. The element also presents goals for addressing hazards (including geologic, erosion, flooding, wildfire, radiation, seismic, and extreme weather hazards) and policies outlining the priorities for the County.

Department of Urban and Regional Planning, University of Wisconsin-Madison Extension and Wisconsin Department of Natural Resources. 2002. *Planning for Natural Resources: A Guide to Including Natural Resources in Local Comprehensive Planning*. Madison, WI.

Planning for Natural Resources provides Wisconsin local governments with advice for addressing the required natural resources element of the comprehensive plan. While the guidebook does not address planning for hazards directly, it promotes sustainability concepts; covers floodplains, stormwater runoff, erosion, solid and hazardous waste; and provides an overview of some general implementation tools.

Warren County Planning Commission. 1999. "Chapter 4: Growth Management and Land Use." *Warren County Virginia Comprehensive Plan.*, Warren County, VA. www.warrencountyva.net/CP_land_use.html, accessed 3/27/2003.

In this chapter of Warren County's comprehensive plan, the County promotes a growth management strategy that discourages growth in environmentally sensitive and geologically hazardous areas such as wetlands, steep slopes, karst terrain, and floodplains.

Wisconsin Groundwater Coordinating Council. 2002. "Comprehensive Planning and Groundwater Fact Sheet 1: Groundwater and Its Role in Comprehensive Planning." *www.dnr.state.wi.us/org/water/dwg/gcc*.

By outlining the hydrologic cycle and the connection between groundwater and land use, the article explains how groundwater is related to several comprehensive planning elements, including housing, transportation, utilities and communities facilities, and intergovernmental cooperation.

3. Laws and Regulations

Florida Department of Environmental Protection. 2002. *Homeowner's Guide to Wetlands*. Tallahassee, FL.

This FDEP handbook explains what wetlands are, why it is important to protect them, and how wetlands are regulated under federal, state, and local laws in Florida. In addition, it describes best management practices for residential construction, septic tank installation and maintenance, mangrove trimming, boat ramps, docks and piers, shoreline stabilization, and coastal construction. Copies are available online at http://www.floridadep.org/water/wetlands/docs/erp/wetland_guide.pdf.

Tampa Bay Regional Planning Council, Hillsborough County Planning and Development Management Department for the Florida Department of Community Affairs. 1995. *Model Local Government Disaster Mitigation and Redevelopment Plan and Model Local Redevelopment Regulations*.

The model plan and model regulation booklet not only provides communities with a template for developing these documents, but it also serves as a guide for local governments for all phases of plan creation, including risk assessment, strategy development, and implementation.

4. Building Codes

Elliot, Mittler. 1998. "Natural Hazards Research Working Paper #97: A Case Study of the Enactment of a State Building Code in South Carolina." National Hazards Research and Applications Information Center Institute of Behavioral Science, University of Colorado.

The case study details the approaches one South Carolina senator undertook to enact a state-wide building code. The article describes the political system and culture in South Carolina and includes details on the difficulties of passing bills. Next, the article documents the challenges the senator encountered in garnering support for the bill, and finally, it explains why the senator was ultimately successful in passing the legislation.

5. Sustainability

Burby, Raymond J. 1998. "Policies for Sustainable Land Use." In *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*, Raymond J. Burby, Editor. Washington, D.C.: Joseph Henry Press.

Raymond Burby, professor of urban and public affairs at the University of New Orleans, and other contributing authors set forth five public policy principles to promote sustainability and break the cycle of disaster. The authors maintain that current federal and state land use and hazards policies address the most frequently occurring hazards, but do little to prevent catastrophic property losses, to improve knowledge about how hazards occur, or to garner consensus of all stakeholders, in effect subsidizing risks in low-frequency/high-consequence areas and ignoring the sometimes damaging effects incomplete risk reduction measures can have to other priorities (e.g., the environment). The authors go on to explain how the patchwork of governmental programs and the incomplete scope of policies have constrained the choices local governments can make when addressing hazards. Finally, the authors suggest for federal, state, and local government a policy agenda that addresses risk subsidizing, hazard research, improved integration of hazard policies, and land management at federal, state, and local levels.

Burby, Raymond J. (ed). 1998. *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*. Washington, D.C.: Joseph Henry Press.

Cooperating with Nature critiques land use management practices in relation to natural hazards and hazard mitigation. In nine essays from leading scholars in the fields of land use, hazard mitigation, and sustainability, *Cooperating with Nature* analyzes the nation's pattern of land development, the ineffectiveness of past land use policies, and federal, state, and local government reactions to continued damages from disasters. Next, the discussion proposes several strategies for integrating hazard mitigation considerations

into land management practices, land use planning, and the capabilities of governments. Finally, the authors discuss ways to promote concepts of sustainability and mitigation through federal and state policies.

6. Other References

Florida Department of Community Affairs. Accessed 4/28/2003. "Coastal Redevelopment and Hazard Mitigation" and "Evaluation and Appraisal Reports." Tallahassee, FL. www.dca.state.fl.us/fdcp/DCP/coastreddevhazmat/index.htm and www.dca.state.fl.us/fdcp/DCP/ear/indexear.htm.

The Florida DCA website provides communities information on FEMA's Disaster Mitigation Act (DMA) and DCA's requirement of using the Evaluation and Appraisal Report process to update local comprehensive plans.

Florida Department of Community Affairs, Division of Emergency Management. 2003. *Shelter Retrofit Report*. Tallahassee, FL.

The State of Florida's 2003 Shelter Retrofit Report presents findings from the state's on-going survey of existing emergency shelters and reports on progress made in constructing new Enhanced Hurricane Protection Area (EHPA) shelters. It also details the state's strategy for remedying the current shelter deficit. The report can be accessed online at <http://floridadisaster.org/bpr/Response/engineers/documents/03ShelterRetrofit.pdf>.

Florida Department of Community Affairs, Division of Emergency Management. 2004. *State of Florida 2004 Statewide Emergency Shelter Plan*. Tallahassee, FL.

The State of Florida 2004 Statewide Emergency Shelter Plan provides information on existing and long-term hurricane evacuation shelter space requirements and determines which regions and counties are required to construct new educational facilities to comply with the state's public shelter design criteria. The plan

is available at <http://floridadisaster.org/bpr/Response/engineers/documents/2004SESP/2004%20SESP%20COMPLETE.pdf>.

Florida Department of Environmental Protection. 2004. “Building Back the Sand Dunes.” <http://www.dep.state.fl.us/beaches/publications/pdf/bldgbkvw.pdf>.

FDEP produced this brochure to assist private property owners who want to restore sand dunes on their property. The brochure describes alternative approaches for rebuilding sand dunes as well as initiatives property owners can take to protect them.

Natural Hazards Center, University of Colorado, Boulder. 1999. “Disasters by Design: Reassessment of Natural Hazards in the United States-- A Bibliography.” Boulder, CO. www.colorado.edu/hazards/assessbib.html, accessed 3/26/2003.

This list of literature comprises all the citations used by the researchers and authors of the essays included in the book, Disasters by Design. Additional references from research conducted by reviewers of the book are also included.

Petterson, Jeanine. 1999. “A Review of the Literature and Programs on Local Recovery from Disaster” (Working Paper #102). Public Entity Risk Institute. www.riskinstitute.org.

This working paper reviews academic and informal literature to identify lessons on recovery from disasters and to summarize the programs that provide post-disaster technical assistance.

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- Federal Emergency Management Agency. 2001. *Understanding Your Risks: Identifying Hazards and Estimating Losses*. FEMA 386-2. Washington, D.C.
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- Florida Coastal Management Program. 2000. *Florida Assessment of Coastal Trends*. Tallahassee, FL.
- Florida Department of Community Affairs. 1987. "Preparing a Comprehensive Plan: Practical Considerations in Meeting Florida's Local Planning Requirements." Tallahassee, FL.
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