

# EMERGENCY PREPAREDNESS



## 5. Emergency Preparedness

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### A. Trends and Conditions

#### 1. Introduction

To many Treasure Coast residents, the term emergency preparedness is most often associated with hurricanes and those community or personal precautions utilized to lessen the immediate effects of such events. This impression is only partially correct. As recently witnessed here in Florida and in many other parts of the nation, our population has become so large and society so dependent upon technology that any major disaster, either natural or manmade, causes extensive recovery and redevelopment costs. Furthermore, these immediate costs do not reflect long-term social, economic, and ecological impacts. Such events do not recognize any political boundaries; the Region is just as susceptible to experiencing a disaster as anywhere else in the nation.

This plan element addresses the concept of modern comprehensive emergency preparedness and how its application will affect the immediate and long-term future of the Treasure Coast Region. In order to better understand the significance of emergency preparedness and its intrinsic link to planning for the vitality and well-being of the Region, a brief review of regional characteristics is necessary.

#### POPULATION GROWTH

The Region has become noted for its pleasant year-round climate, affordable lifestyle, unparalleled lakes, rivers, tidal inlets and waterways, abundant and diverse wildlife, and some of the finest ocean beaches in the United States. It is therefore not surprising that the area, comprised of Indian River, Martin, Palm Beach, and St. Lucie Counties, is one of the most rapidly growing in the State. In fact, according to the 1990 U.S. Census of Population, regional growth rate in population for 1980-1990 was 57.6 percent.

The Treasure Coast Region is currently the fourth largest of Florida's eleven Regions based on population. In 1987, Florida replaced Pennsylvania as the fourth most populous state behind California, New York, and Texas. The State's 1994 population was nearly 14 million and the Region's population was estimated at over 1.3 million. The population density of the Region was 356 persons per square mile, ranking well above the national average for coastal population density of 237 persons per square mile, but below Florida's coastal average of 417 persons per square mile (Institute of Science and Public Affairs, 1994). Higher population densities, while desirable when justifying expenditures for the enhancement of public transit systems and other population-intensive infrastructure, require special planning considerations with regard to emergency preparedness. This is especially so when populations are concentrated in traditional at-risk areas such as barrier islands, waterfront areas with ocean access, flood plains, and mobile homes.

**Table 5.1**  
**General Population Comparisons, 1980 - 1993, by County and Region**

	1980 population	1990 population	1993 population	% change, 80-90, 90-93		Land area, square miles	1993 pop. Density
<b>Indian River</b>	59,896	90,208	95,641	51.6	6.0	503	190.1
<b>Martin</b>	64,014	100,900	106,780	57.7	5.8	556	192.1
<b>Palm Beach</b>	576,758	863,518	918,223	49.7	6.3	1,974	465.2
<b>St. Lucie</b>	87,182	150,171	163,192	71.5	8.7	573	285.0
<b>Region</b>	787,850	1,204,782	1,283,836	57.6	6.6	3,606	356.0

*Source: 1994, Florida County Atlas and Municipal Fact Book, Florida State University.*

For example, emergency management officials within the Treasure Coast Region estimate that there are approximately 466,200 residents who may be vulnerable to the effects of a Category 3 hurricane event (USACOE et. al, 1994). This figure is based on 1990 population figures, highest seasonal occupancy, and includes those persons residing in mobile homes and areas subject to storm surge. It is noteworthy that the figure given is for a storm event less severe than Hurricanes Hugo (1989) or Andrew (1992). Table 5.5 lists the greatest estimated storm surge heights for hurricane Categories 1, 3, and 5, and worst case vulnerable populations for low and high seasonal occupancy.

State and regional population growth is largely due to influxes of retirees, workers and their families, and foreign immigrants and refugees. Between 1980 and 1990, approximately 87 percent of Florida's growth was the result of net migration, and retirement-age persons comprised a sizable portion of this migration. Because the elderly often have specialized health care needs, it is important to note that nearly 20 percent of the State's population is 65 years of age or older, and that in the Treasure Coast Region the average is a bit higher at approximately 25 percent of total population (BEBR 1994).

**Table 5.2**  
**1990-1993 Population Growth, Natural Increase, Net Migration, Elderly Residents**

	Net Change, 1990-93	# Natural Increase	# Net Migration	1993 Total Population	Age 65 + 1993	% of Total Age 65 +
<b>Indian River</b>	5,433	(59)	5,492	95,641	26,214	27.4
<b>Martin</b>	5,880	124	5,756	106,780	29,252	27.4
<b>Palm Beach</b>	54,720	6,697	48,023	918,223	221,153	24.1
<b>St. Lucie</b>	13,021	2,311	10,710	163,192	34,541	21.2
<b>Region</b>	79,054	9,073	69,981	1,283,836	311,160	24.2

*Source: 1994, Florida County Rankings, University of Florida.*

Given the Region's relative economic health, it is reasonable to assume that those functions and service mechanisms which sustain a large and growing population have increased proportionately. Despite delays in meeting certain infrastructure needs, the Region has experienced the development of 25 airports and landing strips, two major ocean ports of entry, three freight or passenger railway systems, health services facilities, chemical pipeline networks, nuclear and conventionally fueled power generating facilities, potable water and wastewater treatment facilities, and roadway networks.

**DEVELOPMENT TRENDS**

Regional population growth and development reflect State trends. Since 1950, Florida's population has grown from under three million to nearly 14 million, and coastal counties have absorbed approximately 80 percent of this growth (FDCA 1995). The geographic elements which make barrier islands and coastal areas most desirable to people paradoxically subject them to greater exposure from natural disaster hazards. Construction within these vulnerable areas eliminates the natural mitigative effects that island dunes and shoreline vegetation provide against hurricane storm surge, and greater coastal population densities mean that more residents and infrastructure are at risk now than ever before. According to the Florida Division of Emergency Management, this growth has impacted the State's ability to keep up with the demands for bridge and road construction and the ability of local public safety agencies to quickly and efficiently evacuate and shelter residents when threatened by a major hurricane.

The Region's rapid population growth has also intensified the rate of suburban development in flood-prone areas. These areas, originally wetlands drained for agriculture, have for the past three decades undergone substantial commercial and residential development. When these commonly upscale developments experience flooding, the impacts on regional, State, and federal resources are significantly greater than when such flooding occurred prior to development.

Other important factors which directly affect regional emergency preparedness are past and current development and redevelopment practices. Throughout the United States, suburban development planning has essentially remained unchanged since the late 1940s, and the same is true for development within the Treasure Coast Region. Today, the approval and construction of poorly planned regional developments is manifested in large pockets of isolated, unconnected residential areas. When analyzed in terms of emergency preparedness, these illogical development patterns tend to exacerbate the problems associated with disaster response and recovery.

#### COMMUNITY DESIGN AND PATTERN OF DEVELOPMENT

A well-planned and designed community will greatly enhance the success of post-disaster relief and recovery efforts. This statement is based upon and strengthened by what occurred in the aftermath of Hurricane Andrew. Several of the afflicted communities were served by limited ingress and egress or almost completely isolated by walls, gates, or canals. They had no recognizable community or neighborhood centers such as common areas or public squares, no centralized public buildings, and lacked a well-defined network or grid of streets. These factors contributed to preventing or delaying the establishment of medical relief centers; food, water, and essential provisions distribution centers; debris removal and road clearing efforts; the staging, storage, and deployment of recovery equipment and resources; law enforcement personnel from effectively suppressing looting or providing protection to storm victims; and efforts to stop the spread of diseases. In many instances, relief workers were forced to set up aid centers in isolated strip mall parking lots, only to find that stricken residents could not travel to them for assistance. For example, when debris-clogged streets rendered

automobiles useless, these sites were situated too far from residential areas for even uninjured victims to walk for assistance. After most of the street signs had blown away, emergency response and relief personnel often had no idea where they were. Rescue units frequently lost their way in areas characterized by a lack of discernible landmarks, aimlessly curving streets, ravaged homes, and cul-de-sac dead ends.

#### **BUILDING CODES**

Certain structural code requirements which prescribe regional construction practices do not conform to those utilized in other Regions. After Hurricane Andrew, changes were implemented in certain State and local building material and structural codes in an attempt to improve or standardize them. However, the Florida Department of Community Affairs (DCA) suggests that these changes may not be enough to mitigate extensive damage or complete structural failure under hurricane high wind loads. In its *1995 Florida Land Plan: the State Land Development Plan*, the DCA stresses continued development, adoption, implementation, and enforcement of effective building codes. The plan indicates that State and local design wind force levels may be inadequate, and that performance-type code requirements may not effectively ensure safe structural response. Some of the major areas of concern which the plan recommends for review include: State-wide standardization of building code criteria for wind design, including roof, window, doorway, and garage door requirements; greater restraint on the part of local regulatory agencies to approve applications for variances to building codes, flood plain development restrictions, and other land use ordinances; requiring that the construction of State-owned and financed structures be subject to local building codes; requiring that buildings which sustain less than substantial damage be required to comply with current building codes during the repair process; more effective inspections during the construction process; and uniform, consistent enforcement of building codes.

Emergency planners now realize that in the event of a hurricane, no area is safer than another. Prior to Hurricane Andrew, it was presumed that coastal areas would sustain the greatest damage and loss of life, whereas inland areas would fare somewhat better and provide relatively safe havens for evacuees. This was not the case; in fact, just the opposite occurred. Clearly, the Region's development practices and land uses, regardless of location, impact emergency preparedness planning and the safety of its citizens. There should be little doubt that well-planned community development and redevelopment will positively influence public safety and disaster recovery efforts.

#### **ROAD NETWORK, EVACUATION AND CLEARANCE TIME**

A considerable segment of the Region's population reside in coastal areas which have been designated by county governments as hurricane evacuation zones. These zones are delineated, topographically and roughly conform to levels of vulnerability based upon hurricane severity defined by the Saffir/Simpson Hurricane Intensity Scale and hurricane storm surge models (see Table 5.6 on page 5-10). When a hurricane threatens, the National Weather Service (NWS) will issue a hurricane watch for a designated stretch of coastline 36 hours prior to projected storm landfall. Twenty four hours prior to landfall, the NWS will issue a hurricane warning. At some point prior to the issuance of a

hurricane warning, emergency management and elected officials in the counties where impact is projected to occur must determine whether they will implement their evacuation procedures and if so, at what level of vulnerability the evacuation will be carried out. These can be very difficult decisions, as the NWS storm tracking projections and resulting warning bulletins are not infallible. Any variations from projected storm path, severity or estimated time of landfall will affect the evacuation process.

During an evacuation, a large number of vehicles must be moved across a road network in as short a time as possible. The number of vehicles will vary according to the severity of the storm, presence of seasonal residents and visitors, simultaneous evacuations in neighboring jurisdictions, and certain behavioral response characteristics of the evacuating population. Ideally, the goal of local emergency managers is to relocate all effected residents to safe areas within the 24-hour hurricane warning period, as far in advance of storm landfall as possible. This goal is measured as evacuation clearance time, or the time it takes to clear a county's roadway of all evacuating vehicles. Timely evacuation may be hindered by the limited capacity of the road network within and through an evacuating county, the choice or need of evacuating residents to seek shelter outside of the county, and by gridlock caused by large numbers of evacuees fleeing through the county from some other locale. Regional critical evacuation links and intersections, by county, are listed under Regionally Significant Resources and Facilities.

The Treasure Coast Region is susceptible to the accumulation of lower South and Southwest Florida evacuation vehicles. According to the 1994 *Treasure Coast Hurricane Evacuation Study, Transportation Analysis*, the Region's in-county clearance times were found to range anywhere 12 to 19 hours for Category 3-5 hurricanes, and that clearance times for Florida's Turnpike and Interstate 95 out-of-Region evacuation movements ranged from 40 to 55 hours, depending on the storm scenario. A complete listing of Treasure Coast Region evacuation clearance times, by county and storm severity, are found in Appendix H).

#### **MOBILE HOMES, SPECIAL NEEDS, AND SHELTERING**

Equally relevant to emergency preparedness when analyzing development or demographic trends is dwelling preference. Ample concern exists over that segment of the population who choose to place themselves at greater risk by living in mobile homes. Mobile homes, while affordable and easily sited, are particularly vulnerable to wind damage and are not designed to withstand the wind velocities of a Category 3 or greater hurricane. An example of their vulnerability to wind damage is that 98 percent of all mobile homes structurally affected during Hurricane Andrew were totally destroyed (FDCA 1995). Local emergency management agencies recommend evacuation of mobile homes for Category 1 or greater hurricanes. According to the U.S. Department of Commerce, the Treasure Coast Region contains 47,692 mobile homes, a significant number to local emergency planners.

Consideration must also be given to those persons who are categorized as having special needs and the critical care facilities in which they reside or on which they depend. Examples of residents who may be thus encumbered by special needs are the physically

impaired, medically unsound, elderly persons, or anyone requiring special systems or devices. The facilities where these needs are met are quite naturally considered to be significant to the Region. The State of Florida requires that emergency preparedness and response agencies track and routinely update listings of residents with special needs so that they may respond quickly to medical emergencies or provide transport or other assistance when a disaster event warrants sheltering or evacuation. Special needs registration is not mandatory, and local emergency management officials estimate that

the special needs figures would be much higher if all those persons requiring assistance chose to register.

The location of special needs or health care facilities

such as nursing homes, hospitals, and medical centers is as important as the services they provide. A certain percentage of these regional facilities are located in hurricane storm surge or flood-prone areas. It is feasible that during and immediately after a major storm event, residents requiring specialized treatment at such facilities could not reach them due to flooding at the facilities or inundation of access routes. Patients already in residence during an emergency might have to be evacuated to other locations which may not be equipped to adequately sustain them. It is important for local elected officials to consider these factors when planning for or approving the development of such facilities.

Regional public emergency shelter capacity is another emergency planning concern of significance. Table 5.4 lists the numbers of county designated primary and secondary shelters, maximum capacities, estimated numbers of persons seeking public shelter during a major storm, and registered special needs residents. The shelter statistics cited in Table 5.4, while valuable for emergency planning purposes, may be somewhat misleading.

In 1991, the Treasure Coast Regional Planning Council conducted a regional natural disaster shelter survey and found that a portion of the designated shelters were located in flood-prone inland areas (TCRPC 1991). Additionally, space allocation criteria used to determine the maximum occupancy rates of designated shelters are subject to debate.

**Table 5.3  
Total Housing Units (all types) and Mobile Homes**

	<b>Total Housing Units</b>	<b>Mobile Homes</b>	<b>Percent of Total Units Mobile Homes</b>
<b>Indian River</b>	47,128	6,804	14.4
<b>Martin</b>	54,199	7,812	14.4
<b>Palm Beach</b>	461,665	21,573	4.7
<b>St. Lucie</b>	73,843	11,503	15.6
<b>Region</b>	636,835	47,692	7.5

*Source: U.S. Bureau of the Census, 1990.*

**Table 5.4  
Shelters, Capacity, Demand, and Special Needs**

	# Designated Shelters	# Shelter Spaces	Estimated # Using Shelters (Cat. 3-5 storm)	# Registered Special Needs Cases
<b>Indian River</b>	23	18,169	8,200	444
<b>Martin</b>	24 <sup>1</sup>	19,330	8,500	202
<b>Palm Beach</b>	29	36,200	38,100	480
<b>St. Lucie</b>	21	16,047	11,600	1,100

Sources: 1994, *Treasure Coast Region Hurricane Evacuation Study*.

1995, *Indian River, Martin, Palm Beach, and St. Lucie County Departments of Public Safety*.

<sup>1</sup> Six shelters are located within the Category 5 storm surge area.

The American Red Cross allots 20 square feet of occupancy space per person when figuring shelter capacities, whereas emergency management officials prefer an allocation of 40 square feet per person. It is reasoned that the living area allocated to each person based upon the smaller figure would only be utilized for a maximum of 72 hours. However, this difference in living space is extremely critical if one considers that South Florida evacuees occupied emergency shelters for weeks, long after Hurricane Andrew had passed. It is difficult to imagine existing in a space four feet by five feet for any extended period of time.

In addition to shelter location, development and redevelopment design and construction practices play an important part in the public shelter planning process. A community of well-defined, recognizable, and interconnected neighborhood streets, public areas, and centrally-located public buildings provides strategic locations for disaster relief staging areas and public sheltering. Dense and interconnected roadway networks increase the ability of citizens to access designated shelters safely and efficiently, since several segments of the roadway network may become impassable during an emergency.

One approach to alleviating the Region's emergency shelter deficit is to ensure that new public buildings, including at least one main building on each school campus, be constructed and sited so that the entire structure can be safely accessed and utilized by evacuees. Recent State legislation has attempted to address this deficit by requiring that as of July 1, 1994, a portion of school campuses be constructed so that some of the school can be safely utilized as emergency shelter space. These school areas have been designated Enhanced Hurricane Protection Areas (EHPAs). However, the State Board of Education has shown reluctance to adopt these criteria, and local school boards can request a variance to the requirements from local emergency management. In Florida, county school district buildings have traditionally been designated as public emergency shelters. A large percentage of the Treasure Coast's shelter sites are located on school campuses. Municipal, county and school board officials should carry out a cooperative planning effort to retrofit or harden at least one main school building on existing campuses which qualify as shelter sites. New construction or renovation of other public buildings such as courthouses, libraries, administrative centers, and recreation centers should be planned, designed, and sited to safely accommodate evacuees in times of emergency. Such actions should be developed with the input of emergency planners and considered a priority by local officials.

Commitment to the implementation of such development practices has yet to be fully realized within the Treasure Coast Region. Understandably, there is often public and private sector resistance to this sort of mitigation due to the higher construction costs. However, the debate over marginal additional costs must be tempered with the realization that the Treasure Coast Region is subject to the same natural dangers that are unique and yet common to the rest of South Florida. Community and school officials must therefore carefully measure initial costs against the worth of providing for a safe and secure citizenry during times of emergency. In order to increase the availability of public emergency shelter space, it will require a cooperative planning and funding effort by State, regional, and local officials, school board officials, and the private sector.

The State of Florida realized that financing such mitigation was a justifiable concern for local governments and therefore provided for competitive grants under the Emergency Management, Preparedness, and Assistance Trust Fund. These funds are available to State, regional, and local governments, and private non-profit organizations to implement projects that will further State and local emergency management objectives. Local governments already have the authority to require that any new development or redevelopment fully mitigate its emergency preparedness impacts. Additionally, local governments also have the ability to assess user impact fees on those residents who choose to reside in areas vulnerable to the effects of major storm events.

#### **TOURISM AND THE ECONOMY**

Florida enjoys and relies on the benefits of a lucrative tourist industry. As an example of the revenue that visitors can generate, the national chapter of the American Automobile Association estimates that in 1995, vacationers will spend an average of \$1,076.00, and that a family of four will spend an average of \$221.80 per day on meals, lodging, and automobile costs. The Florida Department of Commerce estimates that in 1993, there were 41,032,560 visitors, and that approximately 58.6 percent of these traveled to destinations in the southeast and eastern portions of the peninsula (FDOC 1994). These are relevant numbers to local emergency management officials who must consider their impacts when planning emergency evacuation routes and sheltering capabilities for existing populations. These officials must also consider the impacts from visitors to adjacent Regions who must evacuate through the Treasure Coast Region in the event of an emergency.

The 1990 Census lists the Region's industries which employed the greatest percentage of the population as being services (30 percent), retail trade (24.8 percent), agriculture (9.8 percent), construction (6.8 percent), and manufacturing (6.5 percent). The remaining 22.1 percent of the population were employed in such diverse fields as transportation, finance, wholesale trade, federal, State, and local government, and other economic impact industries. These statistics do not reveal the Region's economic dependence on the use of hazardous materials, just as they do not illustrate regional vulnerability to the adverse effects of naturally occurring events. However, transport, use, and reliance upon chemical substances in the course of normal business processes is typical for many

industries. As an example, nearly 100 percent of the hydrocarbon and nuclear fuels (cogenerating power facilities account for negligible amounts) which drive these industries are refined and transported from areas outside the Region.

## 2. Emergencies Defined

**W**hat relevance do these statistics have when considering the importance of regional emergency preparedness, and just what might be characterized as an emergency? For the purposes of this element, an emergency can be defined as:

**Any event, either naturally occurring or artificially induced, which wastes or damages human, material, or natural resources or systems, and causes impacts which adversely affect immediate and/or long-term mitigation of those impacts within a stricken locality.**

Emergency events within the Region can be listed in one of two categories: 1) naturally occurring; and 2) manmade or technological.

### NATURAL EVENTS

*Hurricanes, Tropical Storms.* The Treasure Coast Region regularly experiences and is susceptible to a variety of naturally occurring events whose effects have the potential to cause an emergency as defined above. Those most familiar to South Florida residents are categorized as tropical cyclones. Cyclones are storms whose primary characteristics are strong circular winds ranging from 40 miles per hour to over 200 miles per hour (FDCA 1995). Events of this type include tropical depressions, tropical storms, and hurricanes. Tornadoes also may be formed in conjunction with storms of this nature. A recent and most vivid example of a storm of this type is Hurricane Andrew, which ravaged parts of South Florida during the early morning hours of August 24, 1992. The Region's proximity to the Gulf of Mexico and Atlantic Ocean, coupled with low coastal elevations and a large number of coastal developments and residents, compounds regional vulnerability to such storms. To understand this vulnerability, an analysis of the dynamic forces associated with storms of this nature is required. The primary destructive forces associated with storms of this type are storm surge, high velocity wind, and to a lesser extent, prodigious rainfall amounts.

*Storm Surge.* Storm surge, or abnormally high water levels along ocean coasts and interior shorelines, results from the effects of a storm's extremely low atmospheric pressure and the amount of water pushed by its winds ahead of the storm as it approaches from a large body of water like the Atlantic Ocean. Surge effects can be heightened when they occur during times of high tide and by severe wave action created by the storm itself. Other factors which determine the strength and duration of storm surge are the shoreline's underwater topography, the presence or absence of barrier islands, and the number and physical nature of cuts or breaches through these islands to interior water systems.

From 1989 to 1993, a collaborative team representing the Florida Departments of Community Affairs and Environmental Protection, Federal Emergency Management Agency, U.S. Army Corps of Engineers, the National Hurricane Center, and local

**Table 5.5**  
**Surges from Hurricane (SLOSH) Storm Surge Heights, Vulnerable Population**

	Greatest Calculated Storm Surge, in Feet			Vulnerable Population	
	Category 1	Category 3	Category 5	Low (Summer)	High (Autumn)
<b>Indian River</b>	5.6	12.0	17.54	53,700	57,000
<b>Martin</b>	6.4	8.7	13.9	77,200	82,100
<b>Palm Beach</b>	4.0	7.0	11.7	255,100	270,900
<b>St. Lucie</b>	6.9	10.0	14.4	77,000	93,500
<b>Region</b>				463,000	503,500

Source: SLOSH Model: Treasure Coast Hurricane Storm Surge Atlases, 1994 Hurricane Evacuation Study, U.S. Army Corps of Engineers, FEMA, NOAA, State Division of Emergency Management, 1994

emergency management agencies performed extensive computer modeling to determine reliable projections of regional storm surge heights. The Sea, Lake, and Overland Surges from Hurricane (SLOSH) modeling predicts that certain coastal areas within the Treasure Coast, depending on the severity of the event, may experience storm surges during a hurricane in excess of 17 feet in height (USACOE et. al. 1994). The Regional Hurricane Surge Maps found in Appendix C illustrate local hurricane storm surge and flood zones.

*Winds.* High sustained winds from storms of this nature are also very destructive, and hurricane strength categories are defined by maximum sustained wind velocities of between 74-200 miles per hour. It was the destructive winds and many ancillary tornadoes spawned by Hurricane Andrew and not storm surge which caused most of the damage to South Florida. This was an unusually dry storm

**Table 5.6**  
**Saffir/Simpson Hurricane Intensity Scale**

Category	Central Pressure (Millibars)	Barometric Pressure, Hg	MPH	Knots
<b>1</b>	> 980	> 28.9	74 - 95	64 - 83
<b>2</b>	965 - 979	28.5 - 28.9	96 - 110	84 - 96
<b>3</b>	945 - 964	27.9 - 28.5	111 - 130	97 - 113
<b>4</b>	929 - 944	27.2 - 27.9	131 - 155	114 - 135
<b>5</b>	< 928	< 27.2	> 155	> 135

Source: 1993, National Hurricane Center, Miami, Florida.

which moved onto and over land at a high rate of speed, contradicting most conventional hurricane planning. In fact, intense study of Andrew's characteristics has altered the manner in which emergency planners assess and prioritize elements of hurricane preparedness.

The State of Florida holds the dubious distinction of national leadership in the frequency for hurricane and tropical storm events. This has been widely publicized, and a reexamination of the data substantiates this distinction. From 1900 to 1994, 55 hurricanes have made landfall and 25 of those have been classified as major hurricane

events (Category 3 or higher) (FDCA 1994). Since 1921, Florida has also experienced seven notable and highly destructive tropical storms. The total costs from the effects of hurricanes during this period has been estimated at over \$44 billion of 1990 dollars in damages and more 3,900 lives lost (Sheets 1993, FEMA 1992). It is impossible to accurately determine the total numbers of injured persons directly attributable to these storms. According to the Florida Division of Emergency Management, if the effects of tropical storms, tornadoes, and major thunderstorm events were included, all of the figures cited above would increase significantly.

*Tornadoes.* What most residents and local officials do not realize is that Florida also ranks first nationally in the number of tornado touch-downs per 10,000 square mile area, with an average of 52 events per year. Tornadoes can attain wind speeds in excess of 250 miles per hour. Although of short duration when compared to hurricanes and restricted to a relatively narrow path of destruction, tornadoes are perhaps the most violent type of storm event that occurs in the Region. There are very few structures in the Treasure Coast Region which can withstand the effects of such powerful forces without damage.

*Flooding.* In inland areas, heavy precipitation in the form of rainfall from tropical and other weather systems such as thunderstorm cells pose a significant flooding hazard. Although localized flooding is a common and natural occurrence within the Region due to its topography and relatively high annual rainfall amounts, it becomes problematic when vulnerable land uses are sited within flood-prone areas or when hydrologic systems are disturbed to accommodate such development. Such alterations affect naturally defined flood zones, water retention areas, and stormwater runoff patterns (FDCA 1995). Past development practices, which focused on rapid removal of stormwater runoff and aggressive suburban construction within historic flood zones, have exacerbated regional flooding problems. Since 1979, the majority of federally declared disasters in Florida have involved flooding (FDCA 1994). Statistics suggest a direct correlation between an increase in the frequency and severity of regional flooding and an increase in population and development.

*Other Events.* Other natural occurrences with the potential to create emergency conditions include the effects of animal- and human-borne diseases. Examples which are not uncommon within the Region include encephalitis, rabies, and many communicable or sexually transmitted viruses such as hepatitis, herpes, tuberculosis, and Acquired Immune-Deficiency Syndrome (AIDS). There are areas within the Region that are currently experiencing social and economic impacts due to certain of these afflictions. Also included in the natural realm of events which pose threats to residents, local industries, and environmental resources are saline intrusion into potable water sources, wildfires, droughts and winter freezes.

## MANMADE AND TECHNOLOGICAL EVENTS

In recent years, tragic events have occurred in places such as Bhopal, India; Times Beach, Missouri; Love Canal, New York; Three Mile Island, Pennsylvania; Chernobyl, Ukraine; and Prince William Sound, Alaska. In the United States, some type of adverse chemical-related incident occurs nearly every day. Such events are common in the Treasure Coast Region as well.

*Hazardous Materials and Wastes.* Almost every aspect of our lives, regardless of individual or family incomes, are heavily dependent upon chemical-based technology. Chemical substances are used in processes which provide employment, food, water, waste elimination, hygiene, clothing, dwelling, furnishings, electricity, medicines, health care processes, transportation, and recreational pursuits. This dependency, coupled with the Region's population growth, underscores the importance of effective hazardous materials emergency planning. The American lifestyle is sustained by the use of tremendous amounts of chemical substances each day. By-products generated from this sustaining process include large amounts of hazardous wastes.

An analysis of all issues associated with hazardous materials and their relationships to local emergency preparedness is beyond the scope of this Plan element. However, a few basic premises regarding these chemical substances will provide some insight as to their regional significance.

*Chemicals Must be Transported.* Whether their ultimate destination is a farm, factory, power plant, fuel distribution station, or household, it is a fact that chemicals are transported via every major road, air and rail line, pipeline, and port within the Treasure Coast. Approximately 55 percent of all hazardous materials and wastes transported within the United States is done so by truck, five percent by rail, and the remainder via pipeline, ship, and aircraft (TRANSCAER 1991). The probability for a transportation-related chemical incident to occur within the Region is much greater than that for hurricane, tropical storm, tornado, flood, wildfire, drought, or freeze events combined. The potential impacts of a chemical transport incident are just as severe as those of a naturally occurring event. Unlike point source (fixed facility) releases, transportation-related releases tend to occur with greater frequency near or within the bounds of valuable natural resources and systems such as wetlands, rivers, lakes, and forest preserves. Furthermore, chemicals are transported both when they are virgin (before use) and also when they are spent, impure, or spilled (after use). They are potentially dangerous in either case. As a result, major consideration must be given to emergency preparedness throughout all transportation-related infrastructure decision processes.

*Chemicals Must be Handled, Stored, and Used.* Regardless of their destination or eventual use, chemicals must be routinely handled, stored, utilized in a business process, or distributed to consumers. Most of the processes which use large amounts of chemicals to service the Region (with the exception of agriculture) are in the midst of our suburbs and municipalities. Since this is precisely where most of the citizens reside and most of the critical infrastructure is found, local officials should focus their attention on emergency preparedness planning for chemical releases or spills.

**Table 5.7**  
**Facilities Reporting Hazardous Chemicals, Extremely Hazardous Substances (EHSs), and Estimated Number of Facilities Subject to Reporting Requirements**

	Hazardous Chemicals (> 10,000 lbs)	EHSs	Estimated Number of Facilities
Indian River	142	81	237
Martin	187	111	312
Palm Beach	887	302	1,478
St. Lucie	214	94	357
Region	1,450	588	2,417

Source: 1995, District X Local Emergency Planning Committee.

Within the Treasure Coast Region alone, there are more than 1450 facilities which store and use hazardous materials or toxic substances in large amounts (a minimum of 10,000 pounds per chemical). Of that total, 588 facilities store and use extremely hazardous substances (chemicals that are an immediate danger to life or health) (LEPC 1995). Furthermore, the Florida District X Local Emergency Planning Committee (LEPC) estimates that they represent only about 60 percent of the total number of regional facilities which should be registered under federal and State notification requirements.

During the period from January to November, 1994, the Treasure Coast Region experienced 160 serious hazardous materials incidents, with 48 occurring at fixed facilities, 79 of which were transportation-related, and 33 involving abandoned chemical drums or unidentified pollution sources such as water spills (FDEM 1994). These incidents caused the evacuation of nearly 5,400 persons and injured nine. Fortunately, and unlike 1993, there were no deaths as a result of these releases. Although the figures are high, it is important to note that they represent only those incidents which were reported to the State Warning Point in Tallahassee. Florida Division of Emergency Management officials estimate that actual chemical release figures may be higher.

**Table 5.8**  
**Reported Hazardous Materials Incidents, January - November, 1994**

	Total	Petroleum	Non-Petroleum	Fixed Facility	Transport-Related	Other <sup>1</sup>	Persons Evacuated	Persons Injured
Region	160	55	105	48	79	33	5,384	9

Source: 1994, State of Florida Emergency Response Commission.

<sup>1</sup> Abandoned chemical drums, unknown pollution sources, etc.

Emergency preparedness should be pivotal in determining and approving the design and siting of public facilities, occupational and business licensing, and community development patterns. Input is necessary and significant for redevelopment, new construction, or development which will create local or multi-jurisdictional impacts.

*Chemicals Must be Disposed Of.* With the exception of fuels and direct application chemicals which have their own inherent health and environmental concerns, most process-related chemicals sooner or later become fouled with or altered by impurities, break down structurally with use or age, or are released to the environment. The spent substances are then replaced and in most instances dealt with in a manner which will not adversely affect residents or material and natural resources. Stringent criteria is in place at all levels of government to promote the safe handling, storage, transport, recycling, or disposal of hazardous wastes. This stringency, while designed with the intent to alleviate risk factors when dealing with these substances, is costly. Unfortunately, these costs do not ensure that accidental releases to the environment or improper disposal will not occur. Communities and industries which must invest in hazardous waste temporary storage, transport, disposal, and preventative planning incur additional financial impacts whenever an incident occurs.

*Nuclear Power Generation.* The Region's nuclear power generating facility (St. Lucie Nuclear Power Plant) is located on Hutchinson Island, a barrier island north and east of the regional geographic center. Federal requirements have mandated detailed emergency planning for the areas of potential risk. Those areas are the plume emergency planning zone (areas within 10 miles of the nuclear plant) and the ingestion pathway zone (areas within 50 miles of the plant). Approximately 148,423 persons reside within the plume exposure emergency planning zone for the St. Lucie Nuclear Plant and the estimated regional population of the ingestion pathway zone is 916,547 (FDCA 1995) (these figures do not reflect the small areas within Okeechobee and Brevard counties). An Outdoor Emergency Warning System is in place for promptly notifying the residents within the 10 mile radius of the nuclear plant; this system is routinely tested. Radiological emergency response plans are tested annually during drills with the appropriate state and local governments.

Because of the design and operating philosophy of the U.S. nuclear power plants, an emergency requiring public protective action is highly unlikely, even with a natural disaster such as a hurricane. Nuclear plants are built to withstand the maximum severe weather projected for that area of the state (winds and tornadoes of a Category 5 hurricane up to 195 miles per hour). Additionally, nuclear plants are safely shut down and made ready prior to the onset of any hurricane force winds. The evacuation area for a coastal hurricane is the same (or similar) to the nuclear power plant evacuation areas in the Treasure Coast Region, minimizing the potential impact of a compound evacuation. The nuclear plant in Homestead, Florida (Turkey Point) survived the full impact of Hurricane Andrew without any damage to plant staff or the nuclear safety systems.

*Mass Immigration.* Emergency situations which can cause societal and financial impacts are not limited in origin to the hazardous properties of a chemical, improper management of mechanical systems, or the capriciousness of nature. Since the 1960s, asylum has been the ultimate objective for hundreds of thousands of political refugees, predominantly fleeing political unrest in Cuba, Haiti, and Central America. According to the South Florida Regional Planning Council, more than 30,000 refugees arrived in Florida within a few weeks during the dramatic 1994 Cuban raft emigration alone. The resettlement of

these refugees is further complicated by the migration of thousands of persons who choose to emigrate each year for reasons other than ethnic, religious, or political persecution. All public service agencies in South Florida have been impacted by the effects of this tremendous influx of displaced persons.

**SIGNIFICANCE OF EMERGENCY PREPAREDNESS**

Effective emergency preparedness is one of the most vitally important contributions any county or municipal government can make to its citizens. A safe and secure community offers new businesses and industries the incentive of investment security. No public building, recreational facility, or any other segment of modern infrastructure exists that is immune to the effects of natural or technological disaster. When they occur, infrastructure fails. Architects and engineers can redesign and rebuild after the rubble is cleared away, but key elements to consider are at what price and at what pace a community will be restored to vitality.

Local officials have a responsibility to permanently reduce or alleviate the losses of life, property, and natural systems resulting from natural and manmade hazards through long-term strategies which incorporate emergency preparedness planning and policies. The importance of mitigating our vulnerability to hazards is illustrated in Table 5.9, which lists the ten most costly insured catastrophes in United States history. Please note that these figures, although very great, represent only insured losses, and that costs could be much higher. For example, the Florida Department of Community Affairs estimates that total losses from Hurricane Andrew exceeded 30 billion dollars.

**Table 5.9  
The Ten Most Costly Insured Catastrophes in the United States**

<b>Date</b>	<b>Perils (primary area damaged)</b>	<b>Insured Loss, in Millions of \$</b>
August, 1992	Hurricane Andrew (Florida)	15,500
January, 1994	Northridge, Calif., earthquake	11,200
September, 1989	Hurricane Hugo (South Carolina)	4,195
March, 1993	Winter storms in 20 states	1,750
October, 1991	Oakland, Calif., fire	1,700
September, 1992	Hurricane Iniki (Hawaii)	1,600
October, 1989	Loma Prieta, Calif., earthquake	960
October/November, 1993	California brush fires	950
December, 1983	Winter storms in 41 states	880
April/May, 1992	Los Angeles riots	775

*Source: 1995, Insurance Information Institute*

Clearly, emergency preparedness should be an important component in the planning processes which facilitate a healthy and dynamic Treasure Coast Region. The following section will discuss emergency preparedness in relation to past and current local planning practices. Broadly defined regional issues will be analyzed to determine how the application of comprehensive emergency preparedness in key future planning strategies may provide remedial assistance in dealing with these issues.

**3. Perspective On Regional Preparedness**

**E**mergency preparedness was once known as civil defense and disaster planning generally focused on protective actions in the event of a conventional or nuclear weapons attack on the United States. Emergency preparedness as a modern administrative discipline evolved from these conflict-based programs established during the latter stages of World War II and enhanced in the late 1940s and early 1950s (Myers 1995).

For many years, local officials adhered to the principals defined under this concept. During this period emergency management agencies were often created to comply with government mandates or qualify a jurisdiction for grant funding. In many cases, emergency management agencies were limited in their missions and subsisted on funding which reflected these limitations. In fact, this funding was often the first to be curtailed whenever the need arose to alleviate a budget deficit, a fiscal policy still occasionally practiced. This strategy assumed that local fire and police departments could handle all emergencies, regardless of scope, and concentrated community resources on reacting to an emergency situation rather than planning to prevent or lessen the impacts of its occurrence. However, with the advancement of technology, regional population growth, continued development within potentially hazardous areas, and increased demands for those services and products which sustain modern lifestyles, recent events have illustrated that the magnitude and complexity of large-scale emergencies dwarf the ability of any local response agency to effectively manage them as they occur, much less mitigate their effects.

#### **MODERN DISASTER STRATEGIES**

Today, county and municipal emergency management within the Treasure Coast Region is structured and practiced under an “all-hazards” four point strategy; that is, preparedness, response, recovery, and mitigation to any emergency event. This comprehensive emergency management approach is multi-tiered, meaning that it encompasses and is practiced at all levels of government. The Florida Division of Emergency Management has consistently provided direction to local governments for improving response and recovery efforts, but now places special emphasis on pre-disaster mitigation as the cornerstone of effective emergency preparedness. This approach is the basis for the State’s overall emergency management concept and is reflected in landmark legislation to that effect.

The Region’s local emergency management agencies, while striving to incorporate this pre-disaster mitigation strategy into their preparedness planning, have always placed great emphasis on post-disaster response and recovery strategies. These efforts have been considerable and are carefully defined in existing local comprehensive emergency management plans and extensive intergovernmental mutual aid agreements. The Region’s local emergency management agencies have consistently demonstrated State leadership in this endeavor by incorporating innovative strategies into their comprehensive planning. No better example of visionary planning exists than the success of the Florida Relief Center, a huge response and short-term recovery command and relief staging base activated at Palm Beach County’s South Florida Fairgrounds only

hours after Hurricane Andrew struck. This remarkable local emergency management planning achievement contributed greatly to South Florida's initial recovery efforts. This relief center concept is now accepted and practiced as standard disaster planning criteria in the State of Florida.

The State of Florida considers effective local emergency management so important to its overall preparedness planning that it specifies exacting criteria which counties must follow under Chapter 252, Florida Statutes. Among its many provisions, this legislation requires that counties establish and maintain an emergency management agency, that such agency have a director appointed by the board of county commissioners, and that the emergency management agency and its director be subject only to the direct control and administration of the county's governing body.

These requirements acknowledge that local elected officials and emergency planners best understand local characteristics, vulnerabilities, and availability of resources. More importantly, their intent is to ensure that local governments safeguard their citizens by providing the most effective emergency preparedness planning possible. This is reinforced by mandating that redundant levels of control which misdirect emergency planning resources be eliminated. The regulations attempt to make those responsible for determining the direction of such planning accessible and accountable to the public.

#### **LOCAL GOVERNMENT AND DISASTER RESPONSE**

Local governments employ specific operating procedures and hierarchies when responding to an emergency event. These specifics vary from one local government to the next, but all are clearly defined in local comprehensive emergency management plans which have been approved by the respective governing boards. It is impossible for this regional plan element to accurately define or chart how all local governments structure their emergency management disaster responses. However, the following general description illustrates a typical response for a local government when an emergency event occurs:

The Emergency Management Director assumes overall incident command and activates the Emergency Operations Center (EOC). The Director notifies the chair of the governing body and/or the local executive (administrator), declares a local state of emergency, and notifies the State Division of Emergency Management. The county EOC is staffed by representatives of local government departments who will provide the incident commander with support and resources. These representatives are grouped into 16 Emergency Support Functions (ESFs) which include Transportation, Communications, Public Works and Engineering, Fire Fighting, Information and Planning, Mass Care, Resource Support, Health and Medical Services, Search and Rescue, Hazardous Materials, Food and Water, Energy, Military Support, Public Information, Volunteers and Donations, and Law Enforcement and Security.

If the magnitude of the event exhausts local resources, regional intergovernmental mutual aid agreements may be activated and adjacent local governments will then provide

response and recovery resources and support. State assistance may be requested. At that time, the State may activate its EOC, and at the discretion of the Governor identify assistance needs and deploy vital response resources to the stricken locale. Throughout the event, the county EOC is in constant communication with the State EOC, and the State EOC serves as the Governor's central emergency coordination center. Depending on the severity of the event, the Governor may declare a state of emergency and ultimately request federal response and recovery assistance.

Comprehensive emergency management refers to any government's responsibility and capability for managing all forms of emergencies by coordinating the actions of multiple organizations and agencies. Mutual jurisdictional assistance agreements are critical. Hurricanes Hugo and Andrew, the Loma Prieta earthquake, and most recently the Great Midwest Floods and Northridge, California earthquake have demonstrated that no federal, State or local government alone can effectively cope with the incredible costs to fully recover from large-scale disasters. The more effectively a local government can prepare for an emergency prior to its occurrence, the less it will be harmed by its effects. Public awareness of disaster hazards, home mitigation techniques, and emergency shelter and evacuation procedures is critical. Local emergency management officials must ensure that their existing public awareness and information campaigns are continued and enhanced.

## B. Important Regional Issues

The preceding sections briefly outline the Region's physical characteristics, population growth, current development practices, and related impacts on existing infrastructure. They define regional susceptibility and current state of preparedness, based upon these characteristics, to potential natural, technological, and manmade hazards. More importantly, they illustrate why effective emergency preparedness planning is so important to the economic vitality of the Region and safety of its citizens.

A close link between community and emergency planning is essential, and emergency preparedness must play a pivotal role in every local and regional development and redevelopment planning process of consequence. Local officials should acknowledge the errors, omissions, and mistakes made in the past in this and other Regions and incorporate emergency preparedness strategies into their community planning and decision-making processes.

The following key issues are significant to regional emergency preparedness:

### 1. **New developments are currently approved for areas most vulnerable to the effects of major storm events.**

At some point in time, the Treasure Coast Region will suffer the effects of a major storm event. As regional development continues and population densities increase on barrier islands, shorelines, and flood-prone areas, the impacts on our capabilities to safely evacuate and shelter residents who live in these vulnerable areas will grow accordingly. This must be realistically considered by local officials already faced with an emergency shelter capacity deficit and limited bridge and thoroughfare evacuation infrastructure. Additionally, a community's investment in services, utilities and delivery systems in such areas also increases, thereby compounding potential recovery and mitigation costs.

Because local officials have a responsibility to provide for the safety and well being of the Region's citizens and property, there should be a concerted effort to: 1) encourage sensible redevelopment and increase population densities in established areas less subject to hazards; 2) encourage new development in reduced-hazard areas by offering developers fiscal incentives; 3) promulgate and adhere to stringent mitigation requirements for developments which will impact existing emergency shelter capacities and transportation infrastructure, or which limit or deny the provision of infrastructure in vulnerable areas; 4) utilize vulnerable lands as community recreational areas which require minimal disaster recovery and mitigation expenditures; 5) develop equitable methods for the transfer or sale of private development rights in high-hazard areas; 6) reestablish island dune systems and natural shoreline vegetation; and 7) relocate existing vulnerable public facilities and structures.

**2. Developments are currently approved without sufficient mitigation of their impacts on existing infrastructure and emergency preparedness planning.**

At all levels of government, there are some controls in place which require development to take actions which lessen the impacts they impose on existing communities and infrastructure. However, local officials must be committed to their consistent application when reviewing such developments for approval. A lack of such commitment manifests itself in the exceedance of desirable development densities in vulnerable areas; vital evacuation thoroughfare concurrency exemptions; eradication or alteration of natural storm and flood mitigation systems and topography; no requirement for the provision of emergency shelters to offset deficits brought about by such development; and shortages of critical and health care facilities or accommodations.

One of the most effective tools that a local government can employ to promote the long-term reduction of its citizens' vulnerability to hazards is the uniform, consistent application of its comprehensive land use and development criteria.

**3. Land use changes and variances to zoning codes for developments which impact emergency preparedness continue to be granted by local regulatory agencies.**

No statute, code or ordinance can effectively discourage or prohibit inappropriate or poorly-planned construction or development, or help ensure the safety and well-being of existing neighborhoods, natural systems, and residents when local governments grant variances to them. Aside from the potential to decrease existing community values, zoning exemptions such as those often granted to alleviate building setback restrictions, stringent wellfield protection criteria, or restrictions on the number of potentially hazardous facilities within a given area can impact the ability of public safety agencies to plan for and respond to emergencies such as natural disasters, fires, explosions, and hazardous chemical releases. Community planners and public policy decision makers must consider what impacts these decisions have on public safety.

**4. Emergency management planning is not fully integrated into the community planning process.**

This entire element has detailed how the quality of life, safety of citizens and environment, and economic vitality of the Region are intrinsically linked to and depend upon effective emergency preparedness. It is therefore unfortunate that emergency preparedness planning currently plays a limited role in everyday community planning processes which shape the growth and future development of the Treasure Coast Region. While the efforts and dedication of emergency planners to prepare for natural and manmade disaster response, recovery, and mitigation are considerable, local officials have often failed to employ their professional insight and knowledge effectively. There should be no

infrastructure, development, or code planning decisions made without emergency preparedness input from the initiation of a project to its completion.

Often, this oversight on the part of local officials to fully incorporate valuable emergency planning resources into the mainstream community development process stems from conflicts which: 1) arise between the necessity to plan for public safety and the desire to plan for economic growth and vitality; 2) are brought about by inter-agency disputes over responsibilities, jurisdiction, and control; or 3) are brought about by inconsistency in the direction provided by or application of local ordinances or development incentives. Many community planners fail to grasp the concept or importance of comprehensive disaster mitigation planning or consider the efforts of emergency planners to have little relevance to the community development process. If local officials included and were committed to input from emergency planners in the development review process, developments which have limited ingress and egress are isolated by walls or gates from the rest of the community, lack well-planned street patterns and centralized neighborhood centers, and lack strategically located, well-constructed public buildings which could be used as onsite emergency shelters would be discouraged.

**5. Local emergency preparedness agencies are underfunded and their effectiveness is often impacted by multiple or redundant levels of organizational control.**

Substantial revisions to State legislation have increased the responsibilities of local emergency management agencies tremendously without corresponding increases in program funding. These new responsibilities include reviewing comprehensive emergency plans for hospitals and medical centers, ambulatory surgical centers, adult congregate living facilities and nursing homes, and special needs facilities. These agencies have also been mandated to completely reconstruct county peacetime and hazardous materials emergency plans into a comprehensive disaster plan which incorporates Emergency Support Functions (ESFs) protocols. While Florida Division of Emergency Management staff and funding have been increased to effectively administer these additional responsibilities, most local agencies have been required to perform existing and new mission tasks on limited budgets.

Despite a tremendous increase in public disaster awareness due to recent natural and technological emergency events, emergency management directors and agencies still experience underfunding or are organized in such a manner as to be removed from the direct control of the county's governing board. This happens when emergency management agencies are structured as adjuncts to other departments headed by officials with expertise in fields other than emergency management. These controlling agencies usually have primary mission requirements which differ from those specifically prescribed for emergency management by the State of Florida. As a result, effective local emergency

preparedness planning may be compromised by the redirection or denial of funding, inadequate personnel resources, and the lack of direct access to the governing board. In addition to disaster preparedness, responsibilities which are often compartmentalized under the auspices of an emergency management agency such as emergency communications, animal control, mosquito control, or beach safety are often considered low priorities in a county's budget hierarchy. This is significant in a Region that is experiencing dynamic growth, periodically afflicted with rabies and encephalitis alerts, and which depends upon a lucrative tourist economy. A community's potential for disaster preparedness and mitigation is almost completely dependent upon the foresight, commitment, and executive direction of its local elected officials.

**6. Adequate emergency shelter capacity for the Region's vulnerable population has not been attained.**

There is currently an emergency shelter deficit within the Treasure Coast Region. Disaster planners throughout South Florida are confident that after Hurricane Andrew, more people than ever will evacuate their homes and seek shelter locally or in another part of the State when threatened by a major storm event. Safe shelter should be available for all residents and visitors. Accommodating this need would lessen the potential for residents to seek shelter outside the Region and thus help relieve the burden on already heavily-used inter-regional evacuation routes. The addition of evacuees on these routes increases the possibility that those persons slowed or stalled by traffic congestion would be forced to bear the full effects of a storm while trapped in their vehicles.

Other Regions and communities are also experiencing shelter deficits and will be unable or choose not to open their shelters to nonresidents. Because the Treasure Coast Region will at some point experience the effects of a major storm event or manmade disaster, local officials should commit to programs or development patterns which will immediately begin to increase the safety, numbers, and capacities of community shelters.

**7. Post-disaster recovery and pre-disaster mitigation strategies have not been fully developed within the Region.**

It has been three years since Hurricane Andrew struck South Florida, and it has taken nearly as long for that area to recover. In fact certain public and private institutions and enterprises have yet to fully recover from the storm's effects.

In this Region, agencies at all levels of government have been preparing response and recovery strategies in preparation for such a disaster. Restoring the economic vitality of a community after a disaster has occurred will require far more involved and complex strategies. No single local government can effectively respond to and recover from a major disaster, and strategies must be in place which ensure complete coordination at all levels of government. Response

strategies should be defined which will assure a coordinated inter-agency response throughout the Region and adjacent regions; provide for response resource staging areas and field command and medical centers; and ensure complete inter-agency compatibility of emergency protocols, communications, and response equipment. Short-term recovery strategies need be in place which will identify medical and disease monitoring centers, relief resources staging areas and distribution centers, provide for the restoration of electricity and other critical utilities, extended-stay shelter centers, and debris removal systems. Long-term strategies should be in place which will provide for a community's rapid and complete redevelopment of residences, economic, financial, and employment institutions, and local infrastructure. These recovery strategies should also include provisions which will help mitigate the effects of any future disasters. Examples of such strategies are revisions to and enforcement of existing building and zoning codes, restrictions on rebuilding in coastal high hazard or floodplain areas, and stringent post-disaster reconstruction guidelines and inspections.

## C. Significant Regional Resources and Facilities

Throughout the Treasure Coast Region, there are many organizations, facilities, and other resources which are of critical importance to emergency preparedness.

Resources such as emergency management agencies, fire-rescue and police stations, emergency communications facilities, hospitals, and public shelters are essential to successful emergency preparedness, response, recovery, and mitigation efforts.

Local elected officials should carefully weigh any decisions which affect the operation, effectiveness, or growth potential of such organizations or facilities. This is especially true as the Region continues to develop and increase in population. Regional growth will require corresponding increases in properly designed, constructed, and centrally-located public buildings to meet emergency shelter capacity and relief staging needs. It will also require that State and local governments keep pace with transportation infrastructure needs for shelter access and evacuation. Such responsible development and infrastructure growth can only be achieved with major input from emergency preparedness at each level of the community planning process.

Listed below are resources, organizations, and facilities significant to emergency preparedness within the Treasure Coast Region:

### ECONOMIC RESOURCES

- Financial centers
- Insurance centers
- Wholesale and retail trade centers

### INSTITUTIONAL FACILITIES AND ORGANIZATIONS

- Amateur radio operators
- Charitable/volunteer organizations
- Civic centers
- Correctional facilities
- Emergency operations centers (EOCs)
- Fairgrounds and parks: municipal, county State
- Fire-rescue stations
- Flood control structures
- Fuel distribution centers
- Health and critical care facilities
- Landfills
- Law enforcement stations
- Media centers: electronic and print
- Military installations
- Power generating facilities and delivery systems
- Public and private emergency shelters designated by the American Red Cross
- Regional disaster recovery centers

Religious centers

Water and wastewater treatment facilities and delivery systems

#### TRANSPORTATION RESOURCES

Airports: international, general aviation, landing strips

Bridges

Public and private transit systems

Railways

School bus transit systems

Seaports

Critical evacuation links and intersections, identified by the U.S. Army Corps of Engineers' 1994 *Treasure Coast Region Hurricane Evacuation Study, Transportation Analysis*. These links and intersections, by county, are as follows:

#### Indian River County:

17th Street/U.S. 1 intersection

17th Street Causeway bridge

A1A/17th Street Causeway intersection

A1A/SR 60 intersection

Florida's Turnpike (SR 60 interchange)

I-95 N on-ramp at SR 60

Merrill Barber Bridge, (SR 60)

SR 60/11th Avenue intersection

SR 60 from Kings Highway to I-95

SR 60/U.S. 1 intersection

Wabasso Bridge

Wabasso Road/U.S. 1 intersection

#### Martin County:

A1A/Monterey Road intersection

A1A/Sewell's Point Road intersection

Bridge Road/Gomez Avenue intersection

Bridge Road/U.S. 1 intersection

CR 707/U.S. 1 intersection

CR 707/Jensen Beach Causeway intersection

Florida's Turnpike/Martin Downs interchange

I-95 N on-ramp at SR 76

I-95 N on-ramp on SR 714

I-95 N on-ramp at CR 708

Indian Street/SR 76 intersection

Martin Downs Boulevard

Monterey Road/SR 76 intersection

Monterey Road/SR 714 intersection

Monterey Road/U.S. 1 intersection

Palm City Bridge

Palm City Road/U.S. 1 intersection

Roosevelt Bridge

SR 714 (Florida's Turnpike to I-95)

SR 76/U.S. 1 intersection

#### Palm Beach County:

Atlantic Avenue

Camino Real/U.S. 1 intersection

Florida's Turnpike N of SR 706

Florida's Turnpike S of SR 706

I-95 N on-ramp at Palmetto Park Road

I-95 N on-ramp at Glades Road

I-95 N on-ramp at Yamato Road

I-95 N on-ramp at Belvedere Road

I-95 N on-ramp at Okeechobee Blvd.

I-95 N on-ramp at Palm Beach Lakes

I-95 N on-ramp at 45th Street

I-95 N on-ramp at Blue Heron Blvd.

I-95 N on-ramp at Northlake Blvd.

I-95 N on-ramp at PGA Blvd.

I-95 N on-ramp at Linton Boulevard  
I-95 N on-ramp at Atlantic Avenue  
I-95 N on-ramp at Woolbright Road  
I-95 N on-ramp at Gateway Boulevard  
I-95 N on-ramp at Boynton Beach Boulevard  
I-95 N on-ramp at Hypoluxo Road  
I-95 N on-ramp at Lantana road  
I-95 N on-ramp at Lake Worth Road  
I-95 N on-ramp at 10 Avenue  
I-95 N on-ramp at Forest Hill Boulevard  
I-95 N on-ramp at SR 80

I-95 N on-ramp at Military Trail  
I-95 N on-ramp at Donald Ross Road  
I-95 N on-ramp at SR 706  
Indiantown Road  
Lake Worth Road  
Palmetto Park Road  
PGA Boulevard  
PGA Boulevard/U.S. 1 intersection  
SR 80  
U.S. 27

St. Lucie County:

7th Street/Avenue A intersection  
7th Street/Orange Avenue intersection  
A1A - Peter Cobb Bridge  
A1A/CR 707 intersection  
A1A/U.S. 1 intersection  
Florida's Turnpike/Okeechobee Road interchange  
Florida's Turnpike/Port St. Lucie Blvd. interchange  
I-95 N from Okeechobee Road  
I-95 N on-ramp at Gatlin Boulevard  
I-95 N on-ramp at St. Lucie West Boulevard

I-95 N on-ramp at Midway Road  
I-95 N on-ramp at Orange Avenue  
North Causeway/CR 605 intersection  
North Causeway/U.S. 1 intersection  
Okeechobee Road  
Port St. Lucie Boulevard  
Prima Vista Boulevard  
U.S. 1/Avenue A intersection  
U.S. 1/Virginia Avenue intersection  
U.S. 1/Citrus Avenue intersection

## D. Goals, Strategies and Policies

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### Regional Goal 5.1

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#### Lives and property which are less susceptible to disasters.

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##### **Indicator:**

*Percent change in residential development in Category 1 hurricane evacuation areas.*

*Number of new health care or medical centers constructed in Category 3 hurricane evacuation areas.*

*Percent reduction in the average rate of population growth in Category 3 hurricane evacuation areas.*

*Number of private facility comprehensive emergency management plans that are consistent with State, regional and county plans.*

*Reduction in the number of injuries and fatalities caused by disasters.*

**Strategy 5.1.1:** Direct development away from areas most vulnerable to the effects of natural and manmade disasters.

**Policy 5.1.1.1:** Discourage the designation of lands in coastal high hazard and floodplain areas which would increase development intensities and densities above those designated in local government comprehensive plans. Support efforts to retain undeveloped lands in such areas as public recreational sites, agricultural reserve areas, natural storm buffers, or for other non-residential uses.

**Policy 5.1.1.2:** Develop strategies which will reduce existing population densities in coastal high hazard and floodplain areas. Encourage the incorporation and enhancement of existing natural systems and open areas within such developed areas to serve as natural storm buffers and post-disaster staging areas.

**Policy 5.1.1.3:** Limit thoroughfare or other infrastructure improvements such as water and sewer system expansions in coastal high hazard or floodplain areas to those deemed necessary to correct existing infrastructure deficiencies or as part of the maintenance and repair of existing infrastructure. Prohibit the construction of bridges or causeways to spoil or barrier islands not currently served by such infrastructure.

**Policy 5.1.1.4:** Reduce or eliminate the expenditure of federal, State and local funds used to subsidize the reconstruction or repair of existing developments destroyed by a natural disaster in coastal high hazard and floodplain areas.

**Policy 5.1.1.5:** Limit the construction of new commercial or public facilities which regularly use, handle, or store hazardous materials in coastal high hazard and floodplain areas or within defined wellfield zones of influence. Where such siting occurs in accordance with local government comprehensive plans, require the development of a comprehensive facility emergency preparedness plan which clearly defines measures to mitigate the effects of a hazardous materials release.

**Policy 5.1.1.6:** Prohibit development of new critical care, health care, and special needs facilities inside coastal high hazard and floodplain areas.

**Policy 5.1.1.7:** Assist local governments to develop and deliver public information and awareness programs concerning natural and manmade disasters and emergency response.

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## **Regional Goal 5.2**

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### **Reduced vulnerability to disasters.**

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***Indicator:***

*Number of new commercial or public facilities other than water-dependent uses such as marinas constructed in Category 1 hurricane evacuation areas which use, handle or store hazardous materials or extremely hazardous substances.*

*Percent change in existing county hurricane evacuation clearance times.*

*Number of regional hazardous materials releases.*

**Strategy 5.2.1:** Utilize land use, transportation, and community planning processes to address vulnerability issues.

**Policy 5.2.1.1:** Plan and design new development and redevelopment to increase the ability of the internal and external roadway network to accommodate emergency traffic, enhance post disaster recovery efforts, and provide natural central locations for public shelters and emergency relief centers.

**Policy 5.2.1.2:** Prohibit the siting of solid or hazardous waste disposal, storage, transfer, or treatment facilities in coastal high hazard and floodplain areas, or within community wellfield zones.

**Policy 5.2.1.3:** Limit thoroughfare and transportation infrastructure repair or expansion projects on emergency evacuation routes during the hurricane season.

**Policy 5.2.1.4:** Give priority to maintenance or construction improvement projects on bridges, causeways, and highway facilities designated as major evacuation routes or critical links.

**Policy 5.2.1.5:** Cooperate with the State Division of Emergency Management, the Regional Planning Council, and the private sector to periodically perform regional behavioral and evacuation analyses based upon the latest population figures and best available modeling technology.

**Policy 5.2.1.6:** Cooperate with State and regional agencies to develop a public emergency advisory and communications system for evacuation thoroughfares. Consideration should be given to increasing the numbers and visibility of signs designating evacuation routes, utilizing portable electronic message boards, and providing for a dedicated emergency radio broadcast station evacuees can monitor for pertinent information.

**Policy 5.2.1.7:** Limit development in coastal high hazard areas to non-residential or water-dependent land uses such as cargo and passenger shipping terminals, marinas, and water and tourist-oriented recreation facilities. Where such facilities regularly use, handle, or store hazardous materials, require development of a comprehensive facility emergency preparedness plan which clearly defines mitigative criteria in the event of a hazardous materials release and which outlines pre-disaster protective actions which will prevent the release of hazardous materials during a hurricane.

**Policy 5.2.1.8:** Review existing flood pathways and natural storm water runoff, catchment, and retention systems. Prohibit the approval of new developments or expansion of existing developments in such areas.

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## **Regional Goal 5.3**

### **Adequate and safe shelter within the Region for residents in coastal high hazard and floodplain areas.**

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**Indicator:**

*Percent change in the availability of safe public shelter space based on current regional disaster shelter survey population figures.*

**Strategy 5.3.1:** Provide shelter space for residents of areas susceptible to flooding from the effects of hurricanes and other storms.

**Policy 5.3.1.1:** Develop new and enhance existing outreach programs to increase the awareness and knowledge of citizens regarding evacuation zones, shelter locations, safe home sheltering and disaster preparedness practices, and evacuation routes.

**Policy 5.3.1.2:** Restrict expansion of existing critical care, health care, and special needs facilities located in coastal high hazard and floodplain areas. Retrofit buildings of such facilities outside the coastal high hazard and floodplain areas to shelter specifications.

**Policy 5.3.1.3:** Increase local emergency management public awareness efforts regarding the special needs survey program. Designate and equip enough special needs shelters to accommodate the jurisdiction's special needs population as demonstrated by annual survey.

**Policy 5.3.1.4:** Require existing critical care, health care, and special needs facilities located in coastal high hazard and floodplain areas to enter into disaster assistance agreements with similar facilities located outside the vulnerable areas. These agreements should include provisions which detail patient evacuation and transfer, sheltering, and special needs or critical care requirements. Such agreements should be adopted into each facility's emergency preparedness plan and periodically reviewed by local emergency management agencies.

**Policy 5.3.1.5:** Encourage municipal officials and school boards to carry out a cooperate effort which will lead to the adoption of new campus construction practices and provisions for public sheltering as detailed under the Educational Facilities Act. This should include the retrofitting to shelter specifications of at least one main building greater than 5,000 square feet in floor area, exclusive of mechanical or storage uses, on campuses located outside coastal high hazard and floodplain areas.

**Policy 5.3.1.6:** Existing mobile home parks with populations greater than 25 residents, located within coastal high hazard and floodplain areas, should provide residents with alternative off-site sheltering exclusive of existing designated shelters. Mobile home parks located outside vulnerable areas with populations greater than 25 residents should provide an on-site shelter facility to accommodate their needs.

**Policy 5.3.1.7:** Construct residences located outside coastal high hazard and floodplain areas with a room designed to provide safe shelter for home sheltering residents. Encourage financial and insurance institutions to provide residents living outside vulnerable areas with incentives to construct or retrofit residences so they safely serve as home shelters.

**Policy 5.3.1.8:** Site new public buildings outside coastal high hazard and floodplain areas. Prohibit construction of such buildings in vulnerable areas except when absolutely necessary to provide for the health, safety, and welfare of existing residents. Require that new public buildings, exclusive of mechanical or storage uses and in excess of 5,000 square feet in floor area, be constructed to shelter specifications. Retrofit existing public buildings which conform to the above criteria to shelter specifications.

**Policy 5.3.1.9:** Coordinate with the State Division of Emergency Management, American Red Cross, the Regional Planning Council, local governments and other private and volunteer organizations to develop a comprehensive regional emergency shelter program. The program should include provisions to resolve differences in shelter space allocation criteria, conduct a regional disaster shelter structural survey, perform a behavioral and evacuation analysis based upon the affected population in all hurricane category zones, and explore funding alternatives to retrofit existing public buildings to shelter specifications.

**Policy 5.3.1.10:** In accordance with State, local, and regional hurricane evacuation studies and emergency evacuation plans, require new developments to fully mitigate impacts on existing public shelter capacities by providing additional shelter space which can safely accommodate the development's residents who are likely to seek public shelter locally during a hurricane event.

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## **Regional Goal 5.4**

### **An integrated system of planning between local government and emergency planning agencies.**

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**Indicator:**

*Number of local comprehensive plans amended to reflect the regional policies.*

**Strategy 5.4.1:** Develop the mechanisms necessary to ensure that emergency planning agencies have input into the local government decision-making process.

**Policy 5.4.1.1:** Local governments should work in coordination with the Regional Planning Council to establish a permanent regional disaster preparedness committee. The committee will provide an ongoing forum where community planning and development issues which impact regional emergency preparedness can be addressed and resolved.

**Policy 5.4.1.2:** Include local emergency management agencies at the initial states of local development review and code revision processes.

**Policy 5.4.1.3:** Local governments should include a comprehensive emergency preparedness and mitigation section in local development approval review processes.

**Policy 5.4.1.4:** Local emergency management agencies should conduct introductory and annual refresher emergency preparedness education classes for elected and appointed officials. The classes should include basic concepts of federal, State, and local emergency management concepts of operations, including Incident Command and Emergency Support Functions.

**Policy 5.4.1.5:** Review local emergency management agency organizational hierarchy, current mission requirements, and chain of command to ensure compliance under Chapter 252, Florida Statutes.

**Policy 5.4.1.6:** Establish or maintain local emergency management departments which are: 1) not dependent upon any other department for its funding; 2) adequately funded and staffed to perform its mission; and 3) afforded direct access to the governing body.

**Policy 5.4.1.7:** Limit development, redevelopment, and expansion of existing development, or altering land elevations in floodplain areas or flood-prone areas adjacent to emergency evacuation routes. When possible, preserve such lands in their natural state as water retention areas or flood water pathways.

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## **Regional Goal 5.5**

### **Reduced regional vulnerability and rapid post-disaster recovery from future disasters.**

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**Indicator:**

*New public facilities and infrastructure constructed within Category 1 hurricane evacuation areas.*

*Number of local government comprehensive plans amended to reflect post-disaster policies.*

*Percent population growth in Category 3 hurricane areas.*

**Strategy 5.5.1:** Initiate disaster preparedness activities which will protect lives and property and reduce evacuation times.

**Policy 5.5.1.1:** Establish a permanent regional disaster preparedness committee in coordination with the State Division of Emergency Management, the Regional

Planning Council, local governments, and private and volunteer organizations. The committee will provide an ongoing forum for the development of regional emergency management post-disaster strategies. These strategies should require regional ports and aviation facilities to develop and maintain comprehensive emergency management plans consistent with county and State plans, include developing a comprehensive regional recovery plan, consistent with local and State plans, which provides for regional relief staging areas, interjurisdictional emergency rapid response teams, standardized interjurisdictional electronic communications networks, standardized interjurisdictional response unit organization and protocols, regional field command and support sites, and procedures to quickly restore electricity and other vital utilities to afflicted areas.

**Policy 5.5.1.2:** Local governments should coordinate efforts with the Regional Planning Council and State Division of Emergency Management to encourage the State legislature to adopt and enforce model building code requirements and incentives for new residential structures, both single- and multiple-family, which address natural disaster issues. Such issues should include roof construction and attachment, building weather envelope, and window, entry door, and garage door failures. These requirements should specifically address incentives for shutters, improved roof connections, and creation of a safe shelter space within the living area available to each household.

**Policy 5.5.1.3:** Maintain or reduce hurricane evacuation clearance times within the Treasure Coast Region.

**Policy 5.5.1.4:** Give priority to infrastructure improvements that contribute to the reduction of evacuation clearance times, regional shelter capacities, and critical and health care capacities.

**Policy 5.5.1.5:** Local governments should encourage the retrofitting of existing buildings for window and entry door protection through tax incentives or other incentives.

**Policy 5.5.1.6:** Support legislation which requires that new state-owned and financed construction, as well as redevelopment or improvements to State facilities, must comply with all applicable portions of local building codes.

**Policy 5.5.1.7:** Plan and design new development and redevelopment to increase the ability of the internal and external roadway network to accommodate emergency traffic, enhance post disaster recovery efforts, and provide central locations for public shelters and emergency relief centers.

**Strategy 5.5.2:** Establish mechanisms and regulations necessary for post-disaster reconstruction to occur consistent with policies to make future disasters less destructive to lives and property.

**Policy 5.5.2.1:** Prohibit post-disaster reconstruction and redevelopment that utilizes outdated pre-disaster building practices.

**Policy 5.5.2.2:** Cooperate with State and local environmental agencies to waive restrictions on the open burning of vegetative and construction debris, and designation of temporary debris holding areas in times of emergency.

**Policy 5.5.2.3:** Plan for the reconstruction and redevelopment of all public facilities destroyed by a hurricane in areas outside the coastal high hazard and floodplain areas.

**Policy 5.5.2.4:** Designate facilities other than schools as long-term shelters for displaced residents so that school campuses can be allowed to return to normal operation after a hurricane has passed.

**Policy 5.5.2.5:** Local governments and public utilities should establish a local emergency trust fund to be used solely for the repair and restoration of critical public facilities damaged or destroyed by a disaster.