

# 2015 Charlotte County Local Mitigation Strategy



Prepared By:

Charlotte County Local Mitigation Strategy Work Group



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# Part I

## Local Mitigation Strategy Adoption

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## MEMORANDUM

Date: September 9, 2013  
To: Charlotte County Board of County Commissioners  
From: Gerard S. Mallet, Local Mitigation Strategy Coordinator  
Subject: FLOODPLAIN MANAGEMENT PLAN PROGRESS REPORT

The Charlotte County Local Mitigation Strategy (LMS) has been adopted by the Board of County Commissioners by resolution as the Floodplain Management Plan for Charlotte County. The LMS is maintained by a committee of government and non-government employees who monitor and revise the plan as needed. The following is a progress report for 2012/2013. A copy of this memorandum is being made available to the public through a posting on the County's website at [www.CharlotteCountyFL.com/emergency](http://www.CharlotteCountyFL.com/emergency).

### **1. Background**

The Charlotte County Office of Emergency Management initiated the LMS process in 1999. The original plan then went under extensive revision to comply with the Federal Disaster Mitigation Act of 2000. The LMS has since been reviewed in 2005 and 2010 by the Florida Division of Emergency Management and re-adopted by the Board of County Commissioners on each occasion. The plan is based on a risk analysis of the most common causes of flooding that may affect Charlotte County.

The LMS identifies projects that can reduce the impact of flooding and reduce the losses that can occur. Properties identified by the National Flood Insurance Program as Repetitive Loss Properties and Severe Repetitive Loss Properties have been included as an action item in the LMS since its inception.

#### **PUBLIC SAFETY**

Emergency Management  
26571 Airport Road, Punta Gorda, FL 33982  
Phone: 941.833.4000 | Fax: 941.833.4081

The LMS relies on grant funding to achieve many of its goals. The Hazard Mitigation Grant Fund, awarded after a Federal declaration, is the most significant source of funding. Since the adoption of the LMS as the Floodplain Management Plan the County has been granted funding as a result of tropical systems that affected the area. The most funding was received from Hurricane Charley in 2004 which made landfall in Charlotte County. Many of the mitigation projects listed in the LMS were funded subsequent to that storm including hardening of County facilities, schools, and shelters. The HMGP also allowed for the City of Punta Gorda to undertake a major storm water project.

Since 2004 Charlotte County has not been directly impacted by any severe tropical systems. The LMS Committee continues to review and revise the plan to address the current needs and seek funding from wherever possible.

## **2. LMS Action Item Review**

The order of the following action items does not reflect prioritization which is decided separately by the LMS Working Group.

**Objective 1:** Reduce the vulnerability of persons and property from losses from natural disasters.

*Status:* Ongoing. Tropical cyclones are the most likely threat to cause significant and widespread loss of life and property damage to Charlotte County. The County addresses this objective in a number of ways. All new construction must comply with strict building codes that require both wind and flood protection. Structures within the Special Flood Hazard Area (SFHA) are also required to obtain base flood elevations as part of the permitting process. All new construction is required to be elevated 18" above the crown of the roadway to maximize the open drainage system in use in the majority of the County.

Preparing for the possibility of storm surge is a major component of the Emergency Management Office who has instituted a number of programs to provide flood warning to the residents and visitors to Charlotte County. Reflective collars with the color of the evacuation zone that corresponds to a given area have been installed on approximately nine thousand stop signs. A website, "Know Your Zone", is given prominence on the County site each year allowing for County residents to easily determine their evacuation zone and the appropriate actions to take if their area is threatened. The Emergency Management Office maintains both Twitter and Facebook accounts to distribute and receive information from social media.

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The County, through the Building Construction Services Office and the Emergency Management Office, monitors properties deemed to be Repetitive Loss Properties in the NFIP, offers mitigation advice to the owners and, when funding can be secured, eliminates the hazard.

**Objective 2:** Ensure cooperation between government and non-government entities to enhance mitigation activities.

*Status:* Ongoing. The LMS Working Group is representative of the Community through its members. Invitations to County and City Departments, Civic Organizations, and the general public are extended for each meeting. Projects are discussed, selected, and prioritized by consensus. Should the County experience a natural hazard, all segments of government and response organizations are represented in the Emergency Operations Center. A continual program of training and exercising is in place to address preparedness and response activities. The County also maintains an Interlocal Agreement with the City of Punta Gorda, the County's only incorporated entity that accepts the LMS as the Floodplain Management Plan and agrees to cooperatively address mitigation efforts. The Interlocal Agreement was reaffirmed and resolved by both political subdivisions with the adoption of the 2010 LMS.

**Objective 3:** Reduce the vulnerability of critical, public, and historic facilities.

*Status:* Ongoing. All projects funded through the 2004 HMGP grants have been completed. Additionally, using both public and private funds, two historic structures in the City of Punta Gorda have been retrofitted to a higher standard. All Fire Stations, the County Administration Building, and the majority of school facilities, have either been constructed to a higher than code standard or retrofitted since 2004.

**Objective 4:** Strengthen Plans for Post Disaster, Recovery, and Mitigation Plans.

*Status:* Ongoing. The Charlotte County Comprehensive Emergency Management Plan (CEMP) was updated, and revised in 2010. The complete plan was adopted by the Charlotte County Board of County Commissioners as the all hazards response and recovery plan for the County. The CEMP was reviewed and approved by the Florida Division of Emergency Management.

**Objective 5:** Ongoing. The Charlotte County Emergency Management Office has a continuing public awareness program to promote preparedness and response to hazardous weather. The Office produces and distributes 40,000 All Hazard Guides annually, conducts numerous expos and seminars, and maintains a public website,

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[www.CharlotteCountyFL.com/emergency](http://www.CharlotteCountyFL.com/emergency), that provides preparedness information. The Charlotte County Building Construction Services Division, who maintains the Community Rating System for the NFIP, regularly contacts owners of repetitive loss and severe repetitive loss properties and offers flood safety and protective construction methods seminars.

**Objective 6:** Protect and acquire unique natural habitats and wetlands as part of the flood protection system.

*Status:* Ongoing. In the last four years the County has acquired 2,164 acres of unique natural habitats and wetlands to be preserved as green space. These areas, along with the over 40,000 acres of the Charlotte Harbor Preserve State Park, protects over 50 miles of Charlotte County's shoreline. All of the preserved area is in the SFHA with FIRM ratings of 8AE to 26AE.

### **3. Community Rating System**

The Charlotte County Community Development, Building Services Division, is responsible for the maintenance of the Community Rating System (CRS). Charlotte County began the CRS in 1993 and in 2002 achieved the current rating of 5. That rating has been continuously maintained.

### **4. Prioritized Project Status**

Repetitive Loss Properties are always included in the prioritized projects in the LMS. Funding has been secured through Severe Repetitive Loss Grant to demolish, elevate, and rebuild a residence in Charlotte Harbor. The project was completed in June of 2013 resulting in the property being elevated above the 100 year floodplain and removed from the repetitive loss list. The LMS Committee has met and reviewed the prioritized project list, removed the projects that have been completed, added a number of projects, and reprioritized the list.

### **5. Recommendations**

Homeowners in the SFHA are continuously being sought in an effort to submit their property for mitigation grants. Funding for additional projects, in the absence of any HMGP, is becoming difficult to obtain. The Emergency Management Office and the Building Construction Services Office will continue to seek projects and funding sources to mitigate the County's hazard vulnerability.

Gerard S. Mallet  
LMS Coordinator

**PUBLIC SAFETY**  
Emergency Management  
26571 Airport Road, Punta Gorda, FL 33982  
Phone: 941-833-4000 | Fax: 941-833-4081

**City of Punta Gorda, Florida**  
**Urban Design**  
**M E M O R A N D U M**

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TO: Mayor Rachel Keesling  
Members of the Punta Gorda City Council

FROM: David C. Hilston, AICP, Urban Design Manager

CC: Howard Kunik, City Manager

DATE: September 3, 2014

RE: Local Mitigation Strategy Implementation - ISO/CRS Program

The City Council formally adopted the "Local Mitigation Strategy" (LMS) for Charlotte County and the City of Punta Gorda on June 1, 2005. This was accomplished following the adoption of an Interlocal Agreement between Charlotte County and the City of Punta Gorda on March 9, 2004 wherein the County and City pledged mutual cooperation in planning for hazard mitigation.

The LMS is the vehicle upon which the City participates in the National Flood Insurance Program (NFIP). To continue participation in the NFIP, a yearly progress report is required. Please accept this memorandum as the City's formal yearly report under the ISO/CRS Program.

Background

The LMS was created and adopted in order to more effectively plan for disaster related responses. The LMS lists a variety of mitigation initiatives designed to reduce flooding problems and/or to protect people and property when flooding does occur.

The initiatives were created by the LMS Working Group and from a vulnerability analysis completed for structures in Charlotte County. The LMS Working Group is made up of thirty-eight (38) members representing seven (7) distinct governmental agencies and civic organizations. In addition to the initiatives, the LMS sets forth six (6) goals for which Charlotte County and the City of Punta Gorda's hazard mitigation programs are geared. They are as follows:

- Charlotte County shall reduce the vulnerability and exposure of the public by protecting lives and property from the losses of natural disasters.
- In order to enhance hazard mitigation planning and subsequent mitigation actions, the Charlotte County Office of Emergency Management will take a proactive lead to ensure intra-governmental coordination within its own agencies and intergovernmental coordination between other agencies.
- Reduce the vulnerability of critical and public facilities from natural disasters.
- Strengthen plans for post-disaster, recovery and mitigation plans.
- Improve coordination of Emergency Management information, through the media, to increase public awareness and participation in preparedness, response, mitigation and recovery.
- Charlotte County shall protect and acquire unique natural habitats and ecological systems (such as wetlands, hardwood hammocks, palm hammocks, and virgin longleaf pine forests) and restore degraded natural systems to a functional condition in order to maximize hazard mitigation values.

### Local Initiatives

The City currently has nine (9) local initiatives for which it is responsible for under the LMS program. The projects and their current status are listed as follows:

- *Hendrickson Dam Rebuild*: This project has been completed.
- *Punta Gorda Downtown Drainage Project*: The first phase of this project has been funded through the Hazard Mitigation Grant Program through the Florida Department of Community Affairs. Construction has been completed on Phase One. Phase Two was approved for construction funding by the Federal Emergency Management Agency (FEMA) and is currently under construction.
- *Punta Gorda River and Harbor Seawall Rebuilds*: This is part of the City's annual seawall replacement program for the various canal assessment districts. Work continues on a year round basis.
- *Punta Gorda City Hall Wind Retrofit*: Through post-disaster reconstruction the identified wind retrofits have been completed.
- *Cooper Street Recreation Center Wind Retrofit*: Through post-disaster reconstruction the identified wind retrofits have been completed.
- *Bayfront Center Wind Retrofit*: Through post-disaster reconstruction the identified wind retrofits have been completed.
- *Historic Homes Wind Retrofit*: The City has coordinated private historic home wind retrofit grants through the Hazard Mitigation Grant Program administered by FEMA and Department of Community Affairs. This project has been completed.
- *Public Safety building Shutters*: Through post-disaster reconstruction the identified shutters have been completed.
- *Punta Gorda Fire Station #3 Wind Retrofit*: These retrofits have been completed.

### Conclusions

The City has progressively achieved or is striving to achieve each of the City's mitigation initiatives, 100% of the initiatives have been completed or are being implemented. In 2014, the Local Mitigation Strategy (LMS) mandated ten year update began; City staff is in coordination with Charlotte County staff to ensure the City's continued participation in the National Flood Insurance Program.

Thank you for your time and consideration in this matter.

Copy to: Sun Herald Newspaper  
23170 Harborview Road  
Port Charlotte, FL 33980

Herald Tribune Newspaper  
1617 Tamiami Trail  
Port Charlotte, FL 33948

**City of Punta Gorda**

RESOLUTION NO. 3116-14

**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF PUNTA GORDA, FLORIDA, REAFFIRMING THE CHARLOTTE COUNTY/CITY OF PUNTA GORDA LOCAL MITIGATION STRATEGY AS THE FORMAL GUIDE FOR HAZARD MITIGATION ACTIVITIES**

WHEREAS, the City Council of the City of Punta Gorda, Florida, approved an Interlocal Agreement between the City of Punta Gorda ("City") and Charlotte County (County") on March 9, 2004, requiring that the City and County work jointly to revise and update the County/City Local Mitigation Strategy to ensure its compliance with the Disaster Mitigation Act of 2000; and

WHEREAS, pursuant to that Interlocal Agreement, the County/City Local Mitigation Strategy Working Group has jointly identified local hazards, has assessed county-wide and city-wide vulnerability to these risks and hazards and has prioritized mitigation initiatives that will reduce local vulnerability to these hazards in the form of the Charlotte County/City of Punta Gorda Local Mitigation Strategy; and

WHEREAS, Initiatives identified on the Local Mitigation Strategy Initiatives List are given more consideration by the State managed funding programs such as the Hazard Mitigation Program Grant (HMPG), the Emergency Management Preparedness Assistance Trust Fund, Communities Trust, Community Development Block Grant (CDBG), coastal Partnerships Initiative, and many others; and

WHEREAS, the Local Mitigation Strategy also serves as the Flood Mitigation Plan as required of all communities participating in the National Flood Insurance Program; and

WHEREAS, the Local Mitigation Strategy is designed to be a process-oriented document with review and revision policies that allow the Local Mitigation Strategy to be changed to meet new or changing conditions, including hazard-event frequency; perceived local needs, and funding opportunities; and

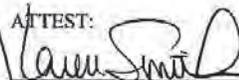
WHEREAS, there have been no substantial changes to the Local Mitigation Strategy since the adoption on June 1, 2005;

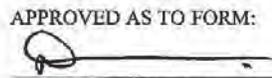
NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF PUNTA GORDA, FLORIDA, THAT:

I. The City Council of the City of Punta Gorda reaffirms that the Charlotte County/City of Punta Gorda Local Mitigation Strategy is the formal guide for the City's hazard mitigation activities.

ADOPTED in a regular meeting of the City Council of the City of Punta Gorda, Florida, this 3 day of September, 2014.

  
RACHEL KEESLING, Mayor

ATTEST:  
  
KAREN SMITH, City Clerk

APPROVED AS TO FORM:  
  
DAVID M. LEVIN, City Attorney

9/3/14  
Date

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## Part II

# Local Mitigation Strategy Planning Process

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# ***SECTION 1: WORKING GROUP ORGANIZATION***

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## **INTRODUCTION**

The Charlotte County Local Mitigation Strategy (LMS) is a community developed plan to reduce and or eliminate the risks associated with natural and man-made hazards. The Local Mitigation Strategy's purpose will be achieved through the process of hazard mitigation. As used in the LMS, "hazard mitigation" refers to any actions taken by local governments, other government entities, or private interests to permanently reduce or eliminate long-term risks to people and their property from the effects of natural or manmade disasters. In this regard, the Local Mitigation Strategy is a planning document.

This section describes the local jurisdictions and organizations participating in the ongoing Charlotte County/Punta Gorda Local Mitigation Strategy (LMS) Working Group that began in 1999. It discusses the organizational structure used to complete the required five year LMS update. It also provides a summary of the current status of planning activities by the participants.

## **THE WORKING GROUP ORGANIZATIONAL STRUCTURE**

The Charlotte County/City of Punta Gorda LMS Working Group encourages participation by all interested government entities, agencies, organizations, and individuals. The Working Group is intended to represent a partnership between the public and private sector of the community, working together to create a disaster resistant community. The proposed mitigation initiatives developed by the Working Group and listed in this plan, when implemented, are intended to make the entire community safer from the impacts of future disasters, for the benefit of every individual, neighborhood, business, and institution.

The LMS Working Group has expanded on its past attempts to get the public involved. Methods to achieve involvement are articles in the newspaper, emails to employees, mailings to repetitive loss properties, and phone calls and emails regarding grant opportunities. Unfortunately, while the LMS Working Group strives to have adequate representation from local government agencies, business interests, community organizations, institutions, and the public, these entities do not always want to become involved in the planning process. The LMS Working Group continues to reach out to these entities to attempt to get some form of representation from each of these groups. If these groups cannot attend the meetings, the document is available online prior to adoption for review and any comments. Public comments can also be stated before the Board of County Commissioners prior to the plan being officially adopted.

## **Participating Jurisdictions**

Charlotte County and the City of Punta Gorda are the two jurisdictions that have been involved from the initial development of the Charlotte County/City of Punta Gorda Local Mitigation Strategy. These jurisdictions are also participating in the planning process to complete the Charlotte County/City of Punta Gorda Local Mitigation Strategy 2009 update. These two entities represent the only two jurisdictions in the County. Charlotte County represents the unincorporated portions of the County. Representatives from different segments of the governments of Charlotte County and Punta Gorda in the LMS Working Group are listed below.

The City and County are discussed as one in regards to having similar vulnerabilities for all of the hazards, and will be discussed separately only if/when the level of risk varies. Aside from actual LMS Working Group Members, departments within each entity are included through the availability of all planning documents and open comment periods. Ideas and suggestions from these different sectors are requested. By providing the LMS Working Group with information relating to the different elements within Charlotte County, each jurisdiction helps to improve this document.

The project list provided in this LMS will continue to change and evolve as potential new members are identified.

### **Roles of the LMS Working Group**

The LMS Working Group represents all of the local jurisdictions and key organizations participating in the planning process and makes the official decisions regarding the planning process. The LMS Working Group is also responsible for approval of proposed mitigation initiatives for incorporation into the plan, for determining the priorities for implementation of those initiatives, and for removing or terminating initiatives that are no longer desirable for implementation.

The LMS Working Group reviews the results of the actual technical analyses and planning activities that are fundamental to the development of this plan. These activities include conducting the hazard identification and vulnerability assessment processes, as well as receiving and coordinating the mitigation initiatives that are proposed by the LMS Working Group participants for incorporation into this plan.

### **Process**

Individual jurisdictions, as well as their agencies and local organizations, are really the key to accomplishing the planning process. The effort begins with developing a community profile of Punta Gorda and Charlotte County to document the basic characteristics of their community that are relevant to controlling the impacts of disasters. Vulnerability assessments of key facilities, systems, and neighborhoods within or serving the jurisdictions are conducted to specifically define how these may be vulnerable to the impacts of all types of disasters. Finally, the jurisdictions and their organizations use the vulnerability assessments to formulate and characterize mitigation initiatives that they could implement if the resources to do so became available. Once these proposed initiatives are coordinated, the LMS Working Group can then decide whether or not to incorporate them into the Charlotte County/City of Punta Gorda Local Mitigation Strategy.

The participating jurisdictions, organizations, and individuals in the Charlotte County LMS Working Group have all worked diligently to complete this plan, and will continue to do so in the future to create a truly disaster resistant community for the benefit of all its citizens.

**Table I-1 Charlotte County/City of Punta Gorda  
Local Mitigation Strategy Working Group Members 2014**

<i>Name</i>	<i>Position/Agency</i>	<i>CRS Step 7 Categories</i>
Gerry Mallet	Coordinator/ LMS Chair Emergency Management	Emergency Services
Ellen Pinder	Mitigation Planner/ LMS Vice Chair	Emergency Services
Wayne Sallade	Charlotte County Emergency Management Director	Emergency Services
Lynne Stickley	Emergency Planning Specialist Emergency Management	Emergency Services
Chief Marianne Taylor	Fire Chief Charlotte County Fire/ EMS/ Public Safety	Emergency Services
Dee Hawkins-Garland	Public Information Officer Charlotte County Fire/EMS/Public Safety	Public Information
Jason Fair	Deputy Chief Charlotte County Fire/EMS/Public Safety	Emergency Services
Bill Van Helden	Deputy Chief Charlotte County Fire/EMS/Public Safety	Emergency Services
David Milligan	Director Charlotte County Facilities	Property Protection
Teri Salomon	Business Service Supervisor Charlotte County Facilities	Property Protection
Karen Bliss	Community Development Engineering Division Storm water Management	Structural Projects
Mike Dallenbach	Maintenance & Operations Road Superintendent Public Works	Structural Projects
Paul Polk	Property Appraiser	Public Information
Scott Graham	Director Information Services Property Appraiser	Public Information
Kevin Edwards	Information Services Coordinator Information Technology	Public Information
Elizabeth Nocheck	Concurrency Manager Growth Management	Preventive
Chip Hague	Plans Examiner Building Construction Services	Preventive
Steven Ellis	Planner Community Development Zoning Division	Preventive
Tim Free	Maintenance and Operations Manager	Property Protection
Richard Allen	Solid Waste Operations Manager	Property Protection
Mike Koenig	Financial Planner Parks and Recreation	Natural Resource Protection
Bruce Bullert	Operations and Engineering CC Utilities	Preventive & Property Protection
Gary Pederzoli	GIS Programmer Information Technology	Preventive
David Johnston	Financial Consultant - Records Retention	Public Information
<b>Tina Jones</b>	<b>Permit &amp; Licensing Coordinator Community Development</b>	Preventive
<b>Tommy Scott</b>	<b>Director Community Services</b>	Preventive
<b>Matt Trepal</b>	<b>Planner Growth Management</b>	Preventive & Property Protection

Claire Jubb	Customer Service Manager Charlotte County Community Development	Preventive & Property Protection
Bob Hebert	Housing Manager Human Services	Preventive & Property Protection
Gary Harrell	Planner Metropolitan Planning Organization	Preventive & Property Protection
Mitchell Austin	Urban Planner City of Punta Gorda	Preventive & Property Protection
Brian Jones	Lieutenant Animal Control	Natural Resource Protection
Tracie Baird	Administrative Services Supervisor Animal Control	Natural Resource Protection
Ray Briggs	Fire Chief Punta Gorda Fire Department	Emergency Services
Holden Gibbs	Punta Gorda Fire Department	Emergency Services
Scott Lane	Fire Chief Englewood Fire Department	Emergency Services
Sherman Robinson	Logistics Division Commander Charlotte County Sheriff's Office	Emergency Services
Darin Chandler	Logistics Division Commander Charlotte County Sheriff's Office	Emergency Services
Rick Christman	Forest Area Supervisor Myakka River District	Emergency Services
Patrick Mahoney	Wildfire Mitigation Specialist/ PIO Florida Division of Forestry- Myakka River District	Emergency Services
David Lupinetti	District Security/ Emergency Management Charlotte County Public Schools	Emergency Services
April Prestipino	Charlotte County Schools	Emergency Services
Jerry Olivo	Charlotte County Schools	Emergency Services
Dr. Henry Kurban	Administrator Charlotte County Health Department	Emergency Services
Joseph Pepe	Preparedness Planner Charlotte County Health Department	Emergency Services
John Fanning	Charlotte County Homeless Coalition	Public Information
Patricia Land	President Edison State College- Charlotte Campus	Public Information
Tim Walker	Southwest Regional Florida Planning Council	Public Information
Dr. Harry Agabedis	Volunteer Coordinator	Public Information
Linda Landry	Administrative Director of Facilities Fawcett Memorial Hospital	Public Information
Liz Barton	Administrator Douglas T Jacobson Veterans Nursing Home	Public Information
Patrick Fuller	Region 6 Coordinator Florida Division of Emergency Management	Public Information
Bonnie Jacobs	Emergency Services Chair American Red Cross	Public Information

## ***SECTION 2: PLANNING PROCESS***

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### **BACKGROUND AND PURPOSE**

The LMS Working Group was established to identify and recommend projects and programs that, when implemented, would eliminate, minimize, or otherwise mitigate the vulnerability of the people, property, environmental resources, and economic vitality of the community to the impacts of future disasters. These identified projects and programs are termed “mitigation initiatives” and constitute the most essential component of the Charlotte County/City of Punta Gorda Local Mitigation Strategy. The fundamental purpose of this plan is to guide, coordinate, and facilitate the efforts of the agencies, organizations, and individuals participating in the LMS Working Group as they seek funding, authorities, or other resources necessary for implementation of the identified mitigation initiatives.

### **THE PLANNING PROCESS**

The planning process began with the development of the LMS Working Group as an organization by obtaining participation from both Charlotte County and the City of Punta Gorda. The Interlocal Agreement between Charlotte County and the City of Punta Gorda is located in the Introduction to the LMS. The planning work conducted to develop this document relies heavily on the expertise and authorities of the participating agencies and organizations. It is also based on research from existing plans, studies, and technical information. The LMS Working Group is confident that the best judgment of the participating individuals, because of their role in the community, can achieve a level of detail in the analysis that is more than adequate than that found in reference materials for purposes of local mitigation planning. As the planning process described herein continues, more detailed and costly scientific studies of the mitigation needs of the community can be defined as initiatives for incorporation into the plan and implemented as resources become available to do so.

### **Establishing the Planning Schedule**

As indicated in the exhibit below, the LMS Working Group initially establishes a planning schedule for the upcoming planning period that allows the participants to anticipate their involvement in the technical analyses and evaluations that they will be asked to do. The Plan Maintenance Process Section of this LMS details the timeframe for when these analyses and evaluations should be completed. At the outset of the planning period, the LMS Working Group defines the goals that the planning process is attempting to achieve, as well as the specific objectives within each goal that will help to focus the planning efforts. The goals and objectives established by the LMS Working Group for this planning period are described in the Mitigation Goals and Objectives Section of the Mitigation Strategy Part of this LMS document.

Conducting the needed analyses and then formulating proposed mitigation initiatives to avoid or minimize all vulnerabilities of the community to future disasters is an enormous effort, and one that must take place over a long period of time. Therefore, the goals and objectives set by the LMS Working Group are intended to help focus the effort of the participants, for example, by directing attention to certain types of facilities or neighborhoods, or by emphasizing implementation of selected types of proposed mitigation initiatives.

## **Hazard Identification and Risk Estimation**

The LMS Working Group identifies the natural hazards that threaten portions or all of the community where possible, specific geographic areas subject to the impacts of the identified hazards are delineated. The LMS Working Group also uses general information to estimate the relative risk of the various hazards as an additional method to focus their analysis and planning efforts. The LMS Working Group compares the likelihood or probability that a hazard will impact an area, as well as the consequences of that impact to public health and safety, property, the economy, and the environment. This comparison of the consequences of an event with its probability of occurrence is a measure of the risk posed by that hazard to the community. The LMS Working Group compares the estimated relative risks of the different hazards it has identified to highlight which hazards should be of greatest concern during the upcoming mitigation planning process.

Depending on the participating jurisdiction, a variety of information resources regarding hazard identification and risk estimation have been available. The planners representing the jurisdiction have attempted to incorporate consideration of hazard specific maps, whenever applicable, and have attempted to avail themselves of GIS-based analyses of hazard areas and the locations of critical facilities, infrastructure components, and other properties located within the defined hazard areas. The hazard specific maps considered are listed below:

1. 100/500 Year Floodplain Delineation Maps
2. Sea, Lake, and Overland Surge from Hurricane (SLOSH)
3. Wind Damage Model (Tornado/Hurricane)
4. Areas Subject to Wildfires
5. Areas at Risk to Erosion
6. Community Redevelopment Areas

The LMS Working Group used information provided by the property appraiser's office to determine valuations and potential losses by hazard for every structure located within the county. An explanation of how this was done can be found in the Introduction portion of the Risk Assessment Part of this document. By analyzing valuation and potential losses for the county on a parcel by parcel level, the LMS Working Group gets a more complete picture of potential damage. This information, which is contained in several spreadsheets and databases, can be queried to determine risk for any combination of reasons. This flexibility allows the LMS Working Group to obtain the most complete picture.

Estimating the relative risk of different hazards is followed by the assessment of the vulnerabilities in the likely areas of impact to the types of physical or operational agents potentially resulting from a hazard event. Two methods are available to the LMS Working Group to assess the communities' vulnerabilities to future disasters.

## **Vulnerability Assessment**

The first avenue is a methodical, qualitative examination of the vulnerabilities of all structures within the county to the impacts of future disasters. For the participating jurisdictions and organizations, the individuals most familiar with the facility, system, or neighborhood through a guided, objective assessment process complete the assessment. The process ranks both the hazards to which the facility, system, or neighborhood is most vulnerable, as well as the

consequences to the community should it be disrupted or damaged by a disaster. This process typically results in identification of specific vulnerabilities that can be addressed by specific mitigation initiatives that can be proposed and incorporated into this plan. As an associated process, the LMS Working Group also reviews past experiences with disasters to see if those events highlighted the need for specific mitigation initiatives based on the type or location of damage they caused. Again, these experiences can result in the formulation and characterization of specific mitigation initiatives for incorporation into the plan.

The second avenue for assessment of community vulnerabilities involves comparison of the existing policy, program, and regulatory framework promulgated by local jurisdictions to control growth, development, and facility operations in a manner that minimizes vulnerability to future disasters. The LMS Working Group members can assess the individual jurisdictions' existing codes, plans, and programs to compare their provisions and requirements against the hazards posing the greatest risk to that community. If indicated, the participating jurisdiction can then propose development of additional codes, plans, or policies as mitigation initiatives for incorporation into the Charlotte County/City of Punta Gorda Local Mitigation Strategy for future implementation when it is appropriate to do so.

### **Developing Hazard Mitigation Initiatives**

This process enables the LMS Working Group participants to highlight the most significant vulnerabilities, and to assist in prioritizing subsequent efforts to formulate and characterize specific hazard mitigation initiatives to eliminate or minimize those vulnerabilities. Once the highest priorities are defined, the LMS Working Group participants can identify specific mitigation initiatives for the plan that would eliminate or minimize those vulnerabilities.

A methodical, objective procedure for characterizing and justifying the mitigation initiative proposed by each participating jurisdiction for incorporation into this plan has been established. This procedure involves describing the initiative, relating it to one of the goals and objectives established by the LMS Working Group, and justifying its implementation on the basis of its economic benefits and/or protection of public health and safety, as well as valuable or irreplaceable resources. A benefit to cost ratio is established for each initiative to demonstrate that it would indeed be worthwhile to implement if and when the resources to do so became available. Further, each proposed mitigation initiative is "prioritized" for implementation in a consistent manner by each participating organization using a set of ten objective criteria.

### **Developing the Local Mitigation Plan**

Once the above procedure is completed by the agency or organization developing the proposed mitigation initiative, the information used to characterize the initiative is submitted to the LMS Working Group for review and inter-jurisdictional coordination. On receipt of an initiative, the LMS Working Group evaluated the level of public demand for the proposal and considered its potential for conflict with other jurisdiction's program or interests. The LMS Working Group also assures that the proposal is consistent with the goals and objectives established for the planning period and confirms that it would not duplicate or harm a proposal submitted by another jurisdiction or agency. If there is such a difficulty with a proposed initiative, it is returned to the submitting organization for revision or reconsideration.

## **Approval of the Current Edition of the Plan**

At the end of each planning period, a plan document such as this is prepared for release to the community and for action by the governing bodies of the jurisdictions and organizations that participated in the planning process. To facilitate this action, the plan provides hazard assessment information and proposed initiatives in separate discussions grouped by jurisdiction or key organization. With this approach, the governing body only needs to approve, endorse, or act on its own component of the plan, and to address the implementation of mitigation initiatives its own representatives proposed. Consequently, there is no need for one jurisdiction or organization to be concerned with acting on proposals made by and for another.

## **Implementation of Approved Mitigation Initiatives**

Once incorporated into the Charlotte County/City of Punta Gorda Local Mitigation Strategy, the agency or organization proposing the initiative becomes responsible for its implementation. This includes developing a budget for the effort, or applying to state and federal agencies for financial support for implementation.

## **Benefits of the Planning Process**

It is important to emphasize that the procedure used by the LMS Working Group is based on the following important concepts:

- A multi-organizational, multi-jurisdictional planning group establishes specific goals and objectives to address the community's vulnerabilities to all types of hazards.
- It utilizes a logical, stepwise process of hazard identification, risk evaluation, and vulnerability assessment, as well as review of past disaster events, that is consistently applied by all participants.
- Mitigation initiatives are proposed for incorporation into the plan only by those jurisdictions or organizations with the authorities and responsibilities for their implementation.
- The process encourages participants to propose specific mitigation initiatives that are feasible to implement and clearly directed at reducing specific vulnerabilities to future disasters.
- Proposed mitigation initiatives are characterized in a substantive manner, suitable for this level of planning, to assure their cost effectiveness and technical merit, as well as coordinated among jurisdictions to assure that conflicts or duplications are avoided.

## **The 2015 Local Mitigation Strategy Five Year Update**

FEMA requires that Local Mitigation Strategies undergo a thorough update every five years. Accordingly, the LMS Working Group conducted a thorough update of the Charlotte County/Punta Gorda multijurisdictional LMS. This involved, in addition to the same processes described above, a meticulous review and revision of every section of the LMS. The changes made to the 2010 document are outlined as followed:

- I. Plan Adoption
  - A. Once approved plan has been adopted, the resolutions will be inserted here.
- II. Planning Process
  - A. Past project update: The LMS Working Group reviewed and updated the status of the previously submitted LMS projects. This information is provided in tables in the Mitigation Strategy Part of the plan, and is organized according to whether a project has been completed, removed, or deferred (including the explanation of why those projects were deferred). Tables of these projects are located in Part IV Section 1, Table IV.1-1
- III. Risk Assessment
  - A. New analyses of hazard vulnerability: The LMS Working Group conducted hazard vulnerability analyses using the most recent and best available population and property appraiser data. In order to meet the standards of the Emergency Management Accreditation Program (EMAP) all hazards are now part of the LMS including man made disasters.
  - B. Inclusion of recent hazard occurrences: The LMS Working Group consulted extensive literature containing reports of hazard events that have occurred since the 2010 LMS was written. If the event did not cause extensive damage or cost to the county it was not listed.
- IV. Mitigation Strategy
  - A. The LMS Working Group reviewed but did not change the goals and objectives.
  - B. New projects: The LMS Working Group actively solicited for new projects throughout the 2014 update period. These projects are presented in a ranked order according to how high they scored in a vote held at our second public LMS Working Group meeting, and according to their scores in a thorough benefit-cost review conducted by the LMS Working Group. The LMS Working Group benefit-cost review was based on a benefit-cost scoring worksheet, a copy of which is included in this LMS. The score a project received in the benefit-cost review was given priority over the LMS Working Group vote when calculating a project's final ranking.

- C. The LMS Working Group added projects and initiatives to improve Charlotte County's and Punta Gorda's Community Rating System (CRS) standing. The inclusion of several maps

#### IV. Plan Maintenance Process

- A. Ambitious actions are planned to incorporate this updated LMS, once approved, into any relevant local planning mechanisms.
- B. Further public outreach initiatives that have both already been completed and planned are now mentioned.

### **Local Mitigation Strategy Working Group Meetings**

During the drafting stage of the 2014 LMS update process, the LMS Working Group held one publicly open meeting. This meeting was advertised on the county website and an ad was put in the local newspaper inviting the public to attend the planning process. An email was sent to all county, city, and public stakeholders involved in updating the LMS.

The meeting took place on June 27, 2014. The focus of this meeting was a reexamination of the LMS's goals and objectives which would enable the solicitation of more effective mitigation projects. All members present were also asked to review the entire LMS document in hopes that the revision would be as complete and cooperative as possible.

The meeting announcements and sign-in sheets are located in Appendix 1.

At this meeting it was decided that all communication for the plan would be done electronically through email or phone calls. If a section needed further revision the stakeholders responsible for that section would then arrange to meet. The emails are located in Appendix 1.

The stakeholders discussed the sections that would need further review, how the tasks were divided will be described in this paragraph. The property appraiser's office and the GIS departments will be responsible for updating the maps, demographical information, and property estimations. Community development is responsible for updating the CRS requirements, floodplain management sections, and information regarding community development. All stakeholders were required to give feedback on the mitigations initiatives, goals, objectives, and future projects, including approving and ranking of projects. They were also required to read the plan and give input.

After this meeting, the LMS Working Group members were in constant contact with each other concerning potential mitigation projects. All agencies and members responsible for updating the project list for the LMS were sent an electronic copy of the Project Evaluation sheet. The sheets would give each project a ranking based on the projects benefits and cost. The LMS Working Group submitted their projects electronically a month after the meeting. In order to give the LMS Working Group time to review the projects and consider their benefits and costs the list was then compiled by ranking order. The compiled list was then sent to all agencies and members of the LMS workgroup in an electronic vote format.

## **SECTION 3: EXISTING PLANNING MECHANISMS**

At the earliest stages of the 2015 update process, the LMS Working Group diligently examined relevant planning mechanisms already in place that could significantly inform the revision of the LMS. They are as follows:

### **CHARLOTTE COUNTY**

#### **Standard Building Code**

The basic rationale for this building code, which is used by most local governments in the state, is to protect the health, safety, and general welfare of the public as it relates to the construction and occupancy of buildings and structures. This concept is very important because it provides an underlying basis for a building code to address wind hazards from hurricanes and tornadoes.

#### **Smart Charlotte 2050 Comprehensive Plan**

The Comprehensive Plan has a number of land use regulations that directly and indirectly relate to hazard mitigation activities.

#### **Comprehensive Emergency Management Plan (CEMP)**

The Charlotte County CEMP identifies the manner in which the county will function in the event of an emergency. The CEMP delineates emergency chains-of-command, and roles of various governmental agencies in disaster preparedness, response, recovery, and mitigation. Specifically, preparedness and response activities are forms of mitigation in that they are intended to reduce the loss of life and property prior to a threatening disaster.

#### **Community Wildfire Protection Plan (CWPP)**

The Charlotte County CWPP addresses the challenges of the Wildland/Urban Interface (WUI). The plan identifies and prioritizes areas for hazardous fuel reduction treatments, recommends measures homeowners and communities can take to reduce ignitability of structures in the addressed areas, and identifies community education and outreach. Then plan in itself is a mitigation program to protect the loss of life and property should a wildfire occur.

#### **Public Information/Education Program on Emergency Preparedness**

The Office of Emergency Management works with other entities to promote public information and education of a variety of emergency preparedness issues.

#### **Hazardous Materials Program**

Both local governments participate in the various State and Federal Hazardous Materials Reporting Programs, as coordinated through the Local Emergency Planning Committee. Information gathered by the LEPC is made available to local Fire Departments, Sheriff, and Emergency Management Departments, for the purpose of enabling emergency responders to have advanced knowledge of dangers posed by hazardous materials. This plan in itself is a mitigation program to protect the loss of life and property should a hazardous materials event occur.

## CITY OF PUNTA GORDA

### **Article 14, Land Development Regulations, Flood Damage Prevention**

This article addresses building codes and other regulations for structures located in all areas of special flood hazard within the City of Punta Gorda. Included under this regulation are a minimum finished floor elevation and a requirement to obtain a flood proofing certificate.

### **City of Punta Gorda Emergency Plan**

The City of Punta Gorda's Emergency Plan identifies the manner in which the City will function in the event of an emergency. The Emergency Plan delineates emergency chains-of-command, and roles of various governmental agencies in disaster response, preparedness, recovery and mitigation. Specifically, response and preparedness activities are forms of mitigation in that they are intended to reduce the loss of life and property prior to a threatening disaster.

### **City of Punta Gorda Comprehensive Plan**

The Comprehensive Plan has a number of land use regulations that directly and indirectly relate to hazard mitigation activities.

### **City of Punta Gorda Downtown Redevelopment Plan**

This plan addresses the problems of seasonal flooding in the downtown area by working to improve drainage facilities in the waterfront area.

## CHARLOTTE COUNTY/CITY OF PUNTA GORDA

### **Flood Warning Program Annex**

The Charlotte County Flood Warning Program establishes a framework through which Charlotte County may prevent, prepare for, respond to, and recover from salt water or freshwater flooding conditions that could adversely affect the health, safety and general welfare of Charlotte County's residents or visitors.

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# Part III

## Risk Assessment

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## SECTION 1: RISK ASSESSMENT INTRODUCTION

Each hazard’s section contains all of the information pertaining to that hazard. This includes a profile of the hazard in general and a history of the hazard in Charlotte County<sup>1</sup> in particular, and an assessment of the county’s vulnerability to the hazard. Exceptions occur, however, whenever a hazard has overlapping impacts. This is most notable in the case of tropical cyclones, where the section “Tropical Cyclones” analyzes the impact of storm surge and “Thunderstorms/High Wind Events” analyzes the impact of a tropical cyclone’s wind. The order of the sections in the Risk Assessment part of the LMS is very roughly determined by the level of concern the LMS Working Group believes each hazard deserves. For an overview of how the LMS Working Group evaluated the threat of each hazard, please consult Table III.1-1.

**Table III.1-1. Hazard Vulnerability Overview**

Type	Hazard	Probability	Impact	Frequency	Distribution
<b>Natural</b>	Coastal Erosion	Medium	Moderate	1 to 2 years	Coastal areas and barrier islands
	Drought	Medium	Major	5-10 years	County-wide
	Earthquakes	Low	Minor	500 years	County-wide
	Exotic Pests	Low	Minor	Continuous	County-wide
	Extreme Heat	High	Minor	Annually	County-wide
	Flooding	Medium	Major	5-10 years	Localized
	Freeze	Medium	Minor	5-10 years	County-wide
	High Wind Event	High	High	5-10 years	County-wide
	Sinkholes	Low	Minor	30+ Years	Localized
	Tornado	Medium	Moderate	Several per year	County-wide
	Tropical Cyclone*	Medium	Major-Catastrophic	2-3 years	Coastal areas and barrier islands
	Tsunami	Low	Major	500 years	Coastal areas and barrier islands
	Wildfire	Medium	Moderate	Several per year	County-wide
<b>Technological</b>	Dam Failure	Low	Minor	N/A	Three parcels in northwest corner of county
	Hazardous Materials	Medium	Minor	Sporadically	County-wide
	Terrorism	Low	Major-Catastrophic	N/A	County-wide
	Critical Infrastructure Disruption	Low	Moderate	N/A	County-wide

\*Refers to the storm surge impact of a tropical cyclone. For the wind impact of a tropical cyclone, refer to High Wind Event.

This table addresses the top hazards to potentially affect Charlotte County. The hazards were separated by type: Natural or Technological. Each hazard’s section includes two main components (as further described below): hazard identification and vulnerability analysis. The vulnerability analysis is usually further divided into three sections: history of hazard occurrence, probability of hazard occurrence, and an estimation of potential losses. Probability has three categories: high likely to (occur), Medium (may occur), Low (low occurrence). Annually means once every year.

The following hazards were not included due to the little to no risk of the hazard: Nuclear Power Plant Incidents, Civil Disturbance, Mass Immigrations, Coastal Oil Spill, Epidemic, Solar Storms, and Traffic Accidents. For further information on these hazards and their impact on Charlotte County refer to the Comprehensive Emergency Management Plan or Appendix II of this plan. The impacts of lightning and hail are omitted since mitigation efforts for these impacts are the same as projects submitted for high wind events.

<sup>1</sup> Unless explicitly identified otherwise, “Charlotte County” or “the county” refers to both unincorporated Charlotte County and the City of Punta Gorda collectively.

## HAZARD IDENTIFICATION:

In the hazards sections there is a general description of natural and technological hazards that could possibly affect the jurisdiction. If a hazard has scales of severity, like a hurricane's Saffir-Simpson scale, this section outlines those scales.

## VULNERABILITY ANALYSIS:

### **HAZARD HISTORY:**

The hazards section catalogues recent occurrences of hazards that had some impact on Charlotte County or the City of Punta Gorda. It records the date, place, and a description of an event. Much of the data in this section was collected from NOAA's NCDC Storm Event Database.

### **PROBABILITY OF HAZARD OCCURRENCE:**

Since the majority of this plan is concerned with natural hazards, the LMS Working Group was careful not to give probability excessive attention. Natural hazards are not very predictable. For example, we can say that structures located in the 100-year floodplain have a 1% chance of flooding annually. Of course this does not mean that these structures will experience flooding exactly once every hundred years. On the contrary, they may not experience flooding for 500 years or, on the other hand, may experience flooding for five consecutive years. The terms high, medium, and low are used to describe the probability of each hazard occurring in the County. High means the hazard could occur every year; medium means the hazard could occur within a five year period; and low means the hazard could occur in a time period greater than five years.

### **ESTIMATION OF POTENTIAL LOSSES**

This section inventories the losses that Charlotte County stands to lose in a worst-case-scenario hazard. This is a monetary value referred to as "total exposure." This is most often a dollar amount calculated by adding a structure's building value, its content value, and its functional use value. The values of the county's buildings were obtained from the Charlotte County Property Appraiser. Content value and functional use value were calculated based on tables provided in FEMA's guide 3-12, "State and Local Mitigation Planning how-to guide, Understanding Your Risks." This process is somewhat further explained at the beginning of the subsequent section, Charlotte County Asset Overview.

The total asset exposure to a hazard is broken down, whenever possible, into the two jurisdictions this Local Mitigation Strategy was designed for, Charlotte County and the City of Punta Gorda. The exposure value is further divided into land use types.

## ***SECTION 2: CHARLOTTE COUNTY ASSET OVERVIEW***

### **CHARLOTTE COUNTY’S ASSETS BY LAND USE TYPE**

According to Charlotte County Property Appraiser records, there are 105,857 buildings located in Charlotte County, with a total building value of approximately \$18.2 billion. However, the value of an asset at risk to hazards is often much more than the value of a building alone. Accordingly, the dollar values shown in Table III-1 referred to as “Total Exposure” here and throughout the LMS, represent a calculation of the replacement value of Charlotte County buildings. According to FEMA’s publication “Understanding Your Risks: Identifying Hazards and Estimating Losses,” the replacement value of a building is the value of a building itself plus the value of its contents and, where appropriate, its functional use value. For agricultural land, a property’s agricultural value was added as well, since such assets are also at risk to hazards.

Within Charlotte County, 93.6% of the structures are classified as residential land use. These structures represent 83.4% of the total value for the County. While only 2.5% of the structures in Charlotte County are classified as commercial (the land use type containing the second most number of buildings), the commercial land use has 7.3% of the total value for the County.

<b>Table III.2-1: Estimated Values for Structures Located in Charlotte County and the City of Punta Gorda by Land Use</b>						
	<b>City of Punta Gorda</b>		<b>Charlotte County</b>		<b>Both Jurisdictions Combined</b>	
<b>Land Use</b>	<b>No. of Structures</b>	<b>Total Exposure</b>	<b>No. of Structures</b>	<b>Total Exposure</b>	<b>No. of Structures</b>	<b>Total Exposure</b>
Agricultural	0	\$0	1,180	\$80,930,055	1,180	\$80,930,055
Commercial	347	\$231,472,940	2305	\$1,094,782,346	2652	\$1,326,255,286
Government	153	\$196,653,587	773	\$502,834,195	926	\$669,487,782
Industrial	65	\$9,691,918	820	\$270,047,347	885	\$279,739,265
Institutional	80	\$100,764,934	581	\$477,938,588	661	\$578,703,522
Misc.	36	\$21,287,004	266	\$35,884,392	302	\$57,171,396
Residential	8,140	\$1,701,487,509	91,111	\$13,491,649,643	99,251	\$15,193,137,152
<b>Total</b>	<b>8,821</b>	<b>\$2,261,357,892</b>	<b>97,036</b>	<b>\$15,954,066,566</b>	<b>105,857</b>	<b>\$18,215,424,458</b>

Source: Charlotte County property appraiser data analysis by Charlotte County LMS Working Group

### **CHARLOTTE COUNTY’S ASSETS BY JURISDICTION**

Wherever possible in this LMS, the analysis of assets, risks, and potential losses will be broken down between the unincorporated areas of Charlotte County and its only jurisdiction, the City of Punta Gorda. Within Punta Gorda’s city limits lie 8.1% of the county’s total structures. Collectively they amount to 12.4% of the total value of all county structures. Also of note is the fact that the majority of Charlotte County’s historic structures are within or just outside Punta Gorda’s city limits.

## CHARLOTTE COUNTY ECONOMY, TAX BASE, AND MAJOR EMPLOYERS

One of Charlotte County’s top employers, with close to 2,500 employees, is the Charlotte County School District. With over 2,200 employees, Health Management Association provides industry leading medical care with two medical center locations and eight other locations throughout Charlotte County. The third top employer is Walmart, with six stores employing over 1500 employees. As of May 2014, there are over 67,500 employed within Charlotte County with a Median household income of \$44,596 (ACS 2008-2012)

Every year Charlotte County draws thousands with an average year round temperature of 75 degrees and plenty of sunshine, Charlotte County is the perfect place to enjoy the great outdoors. Based on tourist tax revenues (RERI) from 2014, over 275,000 tourists visit Charlotte County each year.

## REPETITIVE LOSS PROPERTIES

There are 133 structures in Charlotte County that are repetitive loss structures. They make up 0.13% of the total number of structures in the County. These account for 1.21% of all repetitive loss properties in the state of Florida. These structures are scattered throughout both Charlotte County and Punta Gorda, with a majority of them clustering on the islands in the western section of the county (Map III.2-1).

<b>Table III.2-2: Estimated Values for Repetitive Loss Structures in Charlotte County by Land Use</b>						
	City of Punta Gorda		Charlotte County		Both Jurisdictions Combined	
Land Use	No. of Structures	Total Exposure	No. of Structures	Total Exposure	No. of Structures	Total Exposure
Commercial	5	\$762,641	6	\$4,603,467	11	\$5,366,108
Residential	34	\$3,083,891	95	\$5,732,655	129	\$8,816,546
<b>Total</b>	<b>39</b>	<b>\$3,846,532</b>	<b>101</b>	<b>\$10,336,122</b>	<b>140</b>	<b>\$14,182,654</b>

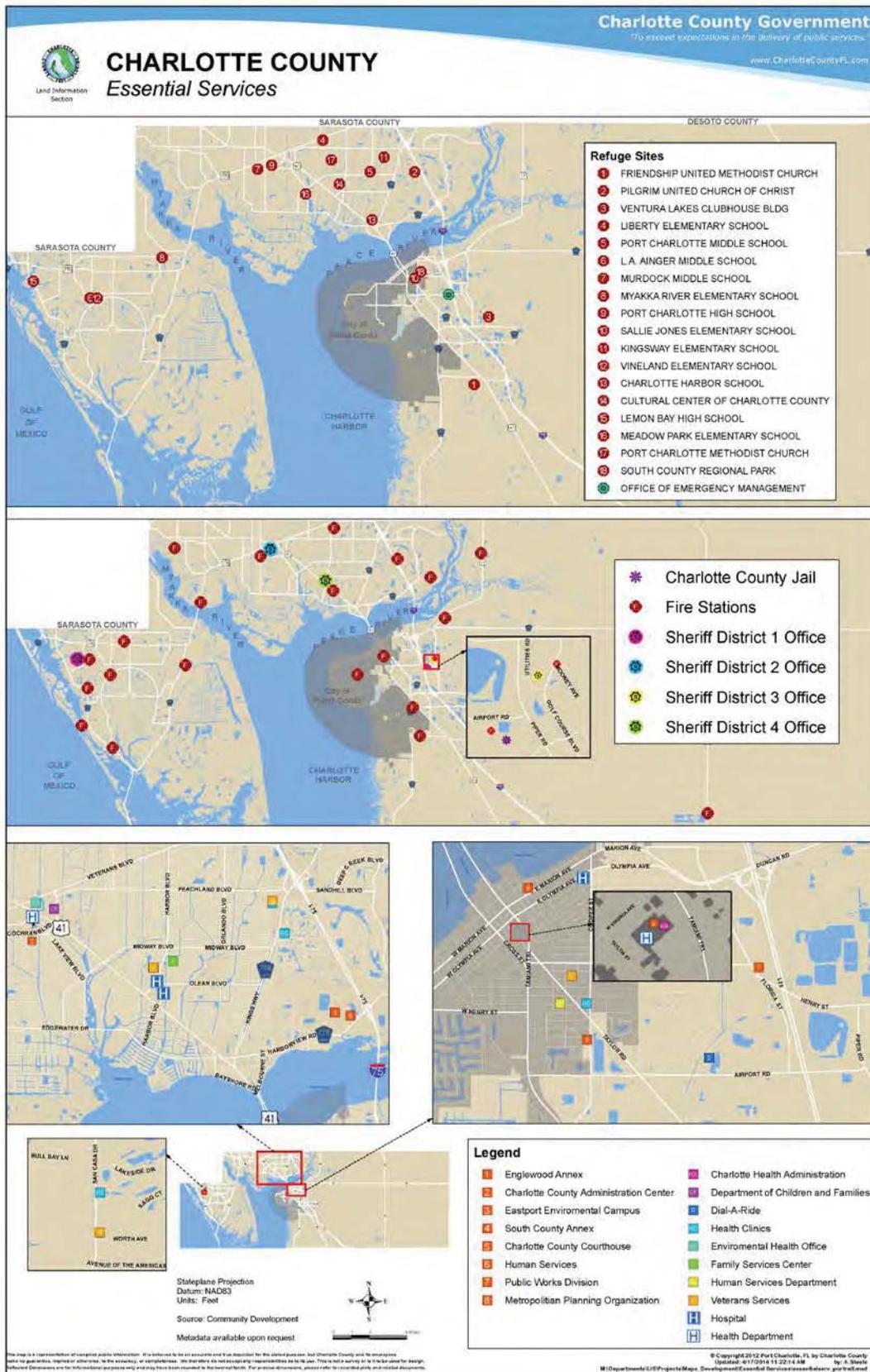
Since the repetitive loss properties stand to incur the most damage from a storm event, as history has proven, Charlotte County and the City of Punta Gorda are making meaningful efforts to acquire and destroy these properties, thus eliminating any future monetary losses. As of August 31, 2011, the number of NFIP policies in force in Charlotte County was 28,569 and 8,755 in Punta Gorda. Charlotte County has had 2,177 total losses which resulted in a payout totaling \$10,094,395. The City of Punta Gorda has had 574 total losses which resulted in a payout totaling \$2,146,291.

## CRITICAL FACILITIES

A critical facility is a structure which essential services and functions for victim survival, continuation of public safety actions, and/ or disaster recovery are performed. There are 104 structures in Charlotte County that are critical facilities. These structures are labeled essential services and are scattered throughout both Charlotte County and Punta Gorda (Map III.2-2).

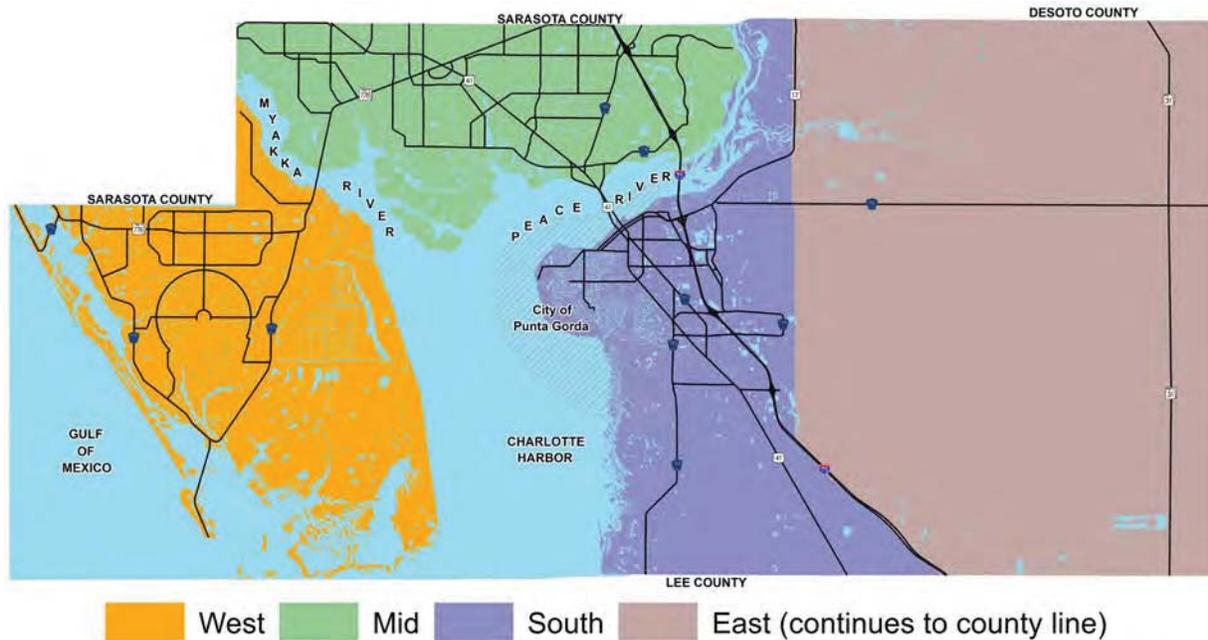


### Map III.2-2 Essential Services



## SECTION 3: LAND USE & DEVELOPMENT TRENDS

Map III.3-1. Charlotte County by Planning Zone



### **EAST COUNTY (EAST OF RANGE LINE 23E/24E AND INTERSTATE 75)**

Eastern Charlotte County is distinctively rural in nature. Very few public services are provided to the few residents of this county section. Currently the vast majority of this section of the county's land use is occupied by agriculture and preservation land. Due to East County's inland location and relatively large amount of agricultural land use, it stands to suffer more from certain disasters than the rest of the county. These disasters include wildfire, drought, freeze, and pests.

### **SOUTH COUNTY (WEST OF RANGE LINE 23E/24E AND SOUTH OF THE PEACE RIVER)**

This portion of the county contains the only municipality, the City of Punta Gorda. It is characterized by a greater mix of residential and commercial. This section of the county contains the county's most historically significant buildings. Everything else being equal, historical structures should receive more mitigation attention than non-historical structures.

### **MID COUNTY (NORTHWEST OF THE PEACE RIVER AND NORTHEAST OF THE MYAKKA RIVER)**

Despite not having any incorporated areas, this section of the county has more residents than the other three combined. The type of land use is mostly residential and commercial. However, vacant residential and commercial lands comprise a large portion of Mid County. While this means that the potential for growth is there, Charlotte County is not expected to experience significant levels of growth in the short term. Charlotte County provides full urban service across this section of the county.

### **WEST COUNTY (SOUTHWEST OF THE MYAKKA RIVER)**

West County's land use pattern is similar to that found in Mid County. The most distinguishing characteristic of West County is its miles of coastline. They encourage growth and development, but are more vulnerable to the extent of the impacts of tropical cyclones than the other sections of the county. Only this section of the county is susceptible to erosion.

## THE FUTURE: PROJECTIONS

### POPULATION

Charlotte County and its only municipality, the City of Punta Gorda, will continue to experience population growth in the ensuing decades. New residents will increase the demand for urban services and infrastructure – more potable water and sanitary sewage, additional roadways and roadway improvements, and the need for expanded police and fire protection to name a few.

According to the Smart Charlotte 2050 Comprehensive Plan the projected population of Charlotte County for 2015 is 168,000, up from the 160,380 of the 2010 US Census. For every five year period following, up until the year 2050, Charlotte County can expect to experience a fairly consistent amount of growth.

### Seasonal Population

Seasonal residents and tourists flock to Southwest Florida during the winter months between November and April, with most visiting during the months of January, February, and March. The greatest impact on infrastructure and services is encountered during this three month time span. According to the Smart Charlotte 2050 comprehensive plan over 16,000 seasonal residents visit the county throughout the year.

### Residential Land Use Needs

Projected housing demand and residential land allocation can be determined by the projected population and numbers of persons per dwelling unit. The projected number of dwelling units needed in the future would be determined for each area of the county by dividing persons per dwelling units into the projected populations. These figures provide an estimation of how many future homes will be needed, and in turn, the amount of land necessary to provide for them. Unfortunately, the only year for which population projection data *by planning zone* is available is for the distant year 2050 (Table III-1).

	West County		Mid County		South & East County		Punta Gorda	
Year	Population	Dwelling Units	Population	Dwelling Units	Population	Dwelling Units	Population	Dwelling Units
2015	37,482	29,822	82,642	48,677	13,651	12,612	22,385	8,140
2050	155,692	87,153	199,919	109,579	94,981	54,357	26,262	15,123

Source: Charlotte County Property Appraisers Data Analysis

Since hurricane Charley many buildings in Charlotte County, including critical infrastructure, have either been replaced by stronger more fortified buildings or the existing buildings have been hardened to be more resilient. Codes and standards have been strictly enforced to make sure new construction is being built to code. Flood controls are on a phased reconstruction cycle to improve flood control. Drainage in Punta Gorda is also in a phased reconstruction cycle to improved roadway flooding. Charlotte County as a whole is more resilient since the last update.

## SECTION 4: TROPICAL CYCLONE

### HAZARD IDENTIFICATION

Tropical cyclones are coastal storms that form over the ocean, within the tropics. These storms cover a smaller area than extra tropical coastal cyclones, the storm center is warmer than the surrounding air, and the strongest winds are about 100,000 feet above the ground. Tropical cyclones are categorized by wind speed, as shown in Table III.4-1. This Charlotte County Local Mitigation Strategy will describe, analyze, and attempt to mitigate only tropical storms and all 5 categories of hurricanes. Since tropical depressions are relatively weak and any mitigation activity designed with tropical storms/hurricanes in mind would also mitigate damage caused by tropical depressions, this plan will ignore tropical depressions.

<b>Category</b>	<b>Wind Speed</b>
Tropical Depression	Maximum sustained winds near the surface less than 39 mph
Tropical Storm	Winds of 39 – 73 mph
Hurricane	Winds of 74 mph or more

Source: FEMA/NWS “Hazardous Weather and Flooding Preparedness Course”

Tropical cyclones are generated by the rising and cooling of humid air over the ocean. They need the following ingredients to develop: ocean water over 80° F and about 200 feet deep; winds converging near the water surface; unstable air, so the warm air will continue rising; humidity up to approximately 18,000 feet, to supply heat energy; winds moving in one direction, to move the storm along without breaking it up; and upper atmosphere high pressure, to help move out the rising air of the storm (FEMA/NWS).

Hurricanes are classified using the following Saffir-Simpson Hurricane Damage Potential Scale, based on central barometric pressure and wind speed (Table III.4-2).

<b>Category</b>	<b>Central Pressure (Millibars)</b>	<b>Central Pressure (Inches)</b>	<b>Winds (mph)</b>	<b>Winds (Knots)</b>	<b>Damage</b>
<b>1</b>	>980	>28.94	74 - 95	64 – 82	Minimal
<b>2</b>	965 – 979	28.50 – 28.91	96 – 110	83 – 95	Moderate
<b>3</b>	945 – 964	27.91 – 28.49	111 – 129	96 – 112	Extensive
<b>4</b>	920 – 944	27.17 – 27.90	130 – 156	113 – 136	Extreme
<b>5</b>	<920	<27.17	>157	>137	Catastrophic

Source: FEMA/NWS “Hazardous Weather and Flooding Preparedness Course”

### POTENTIAL IMPACT

Hydro meteorological hazards associated with tropical cyclones include the following: coastal flooding caused by storm surge; riverine flooding caused by heavy rains; tornadoes; and windstorms due to extremely strong winds. These hazards are described below. For more information, please refer to the section dedicated to each of the hazards (Part III, Sections 4, 5, and 7.)

Historically, the worst damage from tropical cyclones comes from coastal flooding caused by storm surge. A storm surge is an abnormal rise in water level caused by wind and low-pressure forces; the lower the pressure of the storm, the greater the height of the storm surge. High winds and low pressure can build a wall of water out in the ocean about 10 feet high. The highest surges in the U.S. have reached 20 feet. When the surge reaches land, the wall of water can cause extensive coastal flooding (FEMA/NWS).

Hurricane-force winds also can cause extensive damage and death. The strongest winds in a hurricane occur from 10 to 30 miles from the center of the eye, in a region called the eye wall. Winds that extend outward from the eye wall in the front right quadrant are the most devastating. Precursor winds will affect land well before the most damaging winds of the eye (FEMA/NWS).

Storm surge is a type of flooding that is exclusively associated with tropical cyclones and is included in this profile for that reason. Surge is simply water that is pushed toward the shore by the force of the winds swirling around the storm. This advancing surge combines with the normal tides to create the tropical cyclone storm tide, which can increase the mean water level 15 feet or more. The level of surge in a particular area is also determined by the slope of the continental shelf. According to the National Hurricane Center (NHC), the greatest potential loss for life related to a tropical cyclone is from the storm surge.

## TROPICAL CYCLONE RISK ANALYSIS:

### **HISTORY OF TROPICAL CYCLONE EVENTS IN CHARLOTTE COUNTY**

The 2004 hurricane season was especially brutal to Charlotte County and the City of Punta Gorda; however, there have been no occurrences of a tropical cyclone since the last plan update. The direct hit from Hurricane Charley caused damage and destruction throughout the county. Ten years later, the county has essentially completely recovered from the massive devastation that that hurricane caused. This was in part made possible by the funding that the 2005 LMS made procurable.

According to the National Climatic Data Center of NOAA, there have been a total of 18 hurricane and tropical storm events officially reported in Charlotte County between November 13, 1994 and August 18, 2008. These events resulted in 16 deaths and 833 injuries. An estimated \$5.8 billion in property damage and \$300.5 million in crop damage is attributed to these events. Following is a brief description of the hurricane and tropical storm events that have directly threatened/impacted Charlotte County since August 14, 2004.

#### **August 13, 2004, Hurricane Charley:**

Hurricane Charley, a powerful but compact Category 4 hurricane made landfall August 13<sup>th</sup>. The center of Charley crossed the barrier islands of Cayo Costa and Gasparilla Island then moved up Charlotte Harbor before making landfall at Mangrove Point, just southwest of Punta Gorda. The airport in Punta Gorda recorded sustained winds of 87 mph with gusts to 112 mph before the wind equipment blew apart. No storm surge was reported but Charlotte Harbor reported a four foot drop in the water level. Hurricane Charley caused 4 direct fatalities, over \$5.4 billion (2004 USD) in damages, and damaged/destroyed over 16,000 homes and 656 commercial buildings.

### **September 25, 2004, Hurricane Jeanne:**

Hurricane Jeanne followed nearly the same path across Florida as Hurricane Frances three weeks earlier, and was the unprecedented 4th hurricane to damage Florida during the 2004 Hurricane Season. After four hurricanes in only six weeks, 69.0% of households applied for and received a total of \$38 million in Individual Assistance.

### **October 24, 2005, Hurricane Wilma:**

Hurricane Wilma produced tropical storm force winds across much of southwest and west central Florida. In Charlotte County, a peak wind gust from the north of 70 MPH was reported at the Punta Gorda Airport at 851 AM EDT. Heavy rains of 4 to 8 inches caused urban street flooding and filled ditches to capacity. State Road 31 was flooded 4 miles north of the Lee County Line. As of November 18th there were 931 insurance claims that totaled \$529,000 (NOAA).

## **PROBABILITY OF TROPICAL CYCLONE OCCURRENCE**

Due to the frequent occurrences of tropical cyclones in the Charlotte County area in the past, the probability that the county will experience more in the future is medium. The entire county is equally vulnerable to the effects of a tropical cyclone. While a Category 5 is possible, in any given year, Charlotte County could expect to see a Category 4 Hurricane make landfall within the county limits or within 50 miles of the county limits.

## **ESTIMATING POTENTIAL LOSSES**

Tropical storm damage is caused by storm surge, flooding, and winds. Storm surge is the most damaging of all tropical storm impacts. The potential risks associated with the storm surge aspect of tropical cyclones are the sole focus of this section's analysis. The risks associated with high winds and flooding are discussed in their respective sections of this plan.

The SLOSH (Sea, Lake, and Overland Surges from Hurricanes) model is the computer model developed by the National Weather Service for coastal inundation risk assessment and the prediction of storm surge. It estimates storm surge heights resulting from historical, hypothetical, or predicted hurricanes.

## **POTENTIAL FUTURE RISK**

Charlotte is a coastal county making it more vulnerable from the storms that come from the Gulf. This includes tropical cyclones, and high wind events. Damage from high winds, storm surge, and rain-induced flooding can impact all structures and utilities. The structures most susceptible to damage are older buildings, dilapidated housing, and other less hardened properties such as mobile homes. Widespread electrical outage is probable, as well as water and sewage backup in flooded areas. Depending on the intensity of the event, economic and environmental impacts can be severe. All populations may be impacted by these events, but those at highest risk are the elderly, the disabled, lower income, and the homeless.

Charlotte County has 47961 homes built before the code change in 1992 and 11848 mobile homes. This would make 60% of the homes in Charlotte County vulnerable to tropical cyclones.



## ***SECTION 5: FLOODING***

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### **HAZARD IDENTIFICATION**

According to FEMA, floods are the most common and widespread of all natural disasters, with the exception of fire. Flood water often damages property and can even kill. Floods can also cause damages such as pollution of the wells and city water systems, making them unsafe to use (IFAS Disaster Handbook). Freshwater flooding along rivers and streams can and does cause significant property damage and has the potential of causing personal injury and deaths.

A flood, as defined by the National Flood Insurance Program (NFIP) is: A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is your property) from:

- Overflow of inland or tidal waters;
- Unusual and rapid accumulation or runoff of surface waters from any source;
- Mudflow; or
- Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.

Floods can be slow or fast rising but generally develop over a period of days. Floods can come in the form of “flash floods,” which usually result from intense storms dropping large amounts of rain within a brief period. Flash floods occur with little or no warning and can reach full peak in only a few minutes (IFAS Disaster Handbook). Other floods are more gradual, as with a large storm front, a tropical storm, or a hurricane washing ashore (FEMA).

### **FLOODING RISK ANALYSIS**

#### **HISTORY OF FLOODING IN CHARLOTTE COUNTY**

There have been a total of 14 flood events officially reported in Charlotte County between September 5, 1988 and September 5, 2003 (National Climactic Data Center of NOAA). These events resulted in no deaths or injuries. However, they did cause an estimated \$6.65 million in property damage. No significant flooding events occurred within the update period.

#### **PROBABILITY OF FLOODING IN CHARLOTTE COUNTY**

The county’s very low elevation, coastal location, and climate all lead to the conclusion that the occurrence of a flood in Charlotte County is highly probable. The probability of freshwater flooding has been quantified by FEMA through the National Flood Insurance Program (NFIP). Areas subject to flooding, the 100 year floodplain, have been delineated in Flood Insurance Rate Maps (FIRM) for the County. The model used to determine the 100 year floodplain is a cumulative model, which means that it is based on several storm events; no one storm will inundate all the areas within the flood zone. This information was linked with the information from the property appraiser’s office to determine the 100 year floodplain designation for each parcel.

**ESTIMATING POTENTIAL LOSSES**

In order to determine the potential losses a flood could cause in Charlotte County, the floor elevation needed to be established for each structure in the County. This number was then subtracted from the depth of the flood waters to determine the level of flood water damage for each individual structure within the county. Using depth damage calculation tables provided by FEMA, the amount of building loss, content value loss, functional use loss, and total value loss were determined.

The estimations of potential losses due to a flood will be analyzed according to FEMA’s flood zone designations. These designations are used for the purposes of the National Flood Insurance Program (NFIP), and divide land areas into four separate categories of risk in Table V-1. See Map V-1 of the FEMA FIRM Zones on the following page.

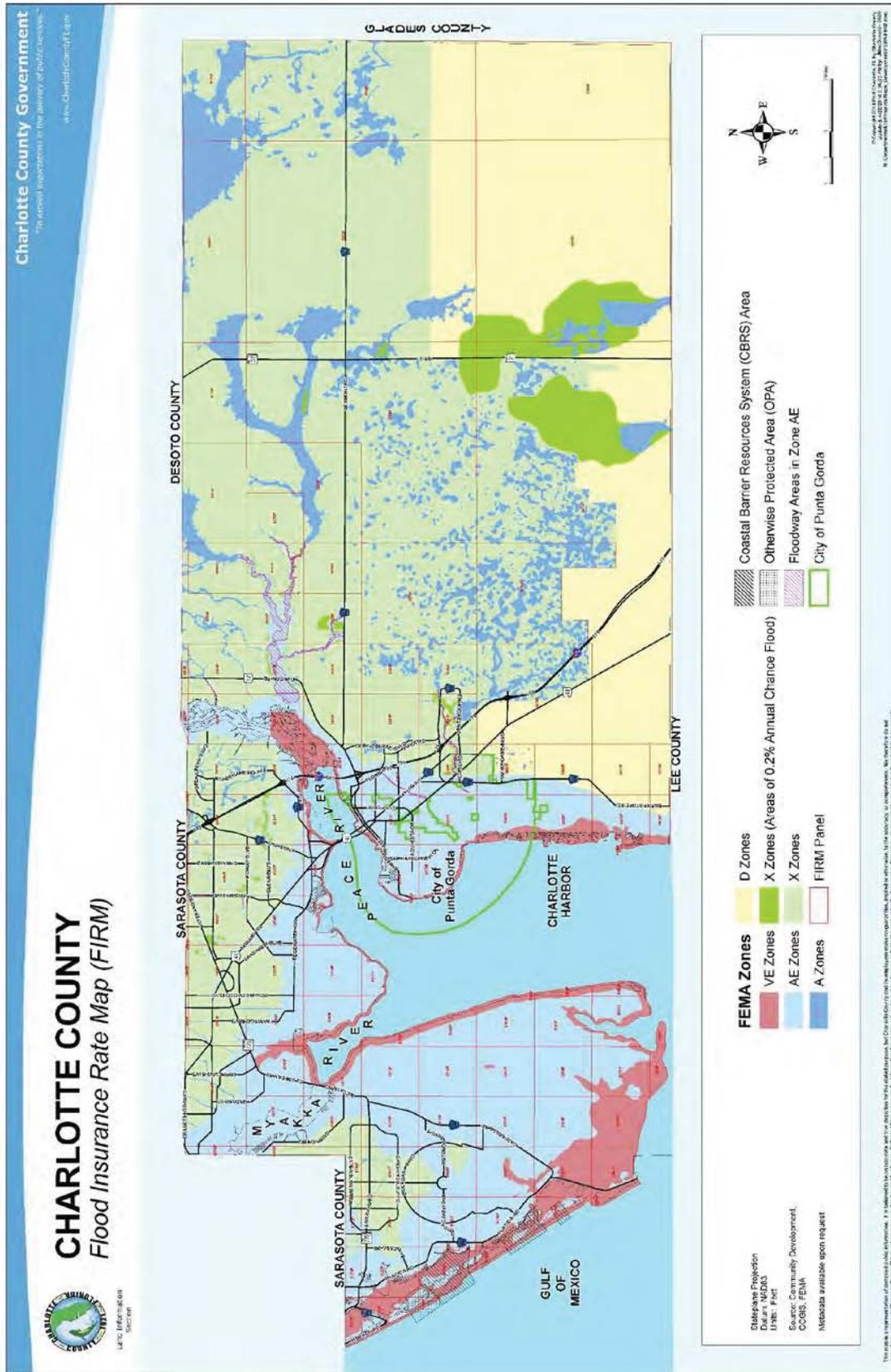
**Table III.5-1. Definitions of FIRM Flood Zones**

<b>Risk Level</b>	<b>Zone Codes</b>	<b>Description</b>
Medium to Low	B, C, and X	Areas outside the 1-percent annual chance floodplain, areas of 1% annual chance sheet flow flooding where average depths are less than 1 foot, areas of 1% annual chance stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 1% annual chance flood by levees. No Base Flood Elevations (BFE) or depths are shown within this zone.
High	A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. This area is also known as the “100 year flood plain.”
High - Coastal	V	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones.
Undetermined	D	. No flood hazard analysis has been conducted.

Source: FEMA Map Service Center

Please refer to the Charlotte County Flood Warning Program for information pertaining to warning and evacuating residents. This annex will describe the various types of flooding that could occur, provide procedures for disseminating warning information, and for determining, assessing and reporting the severity and magnitude of impact on flooded areas. This document will also establish the concept under which the county government will operate in response to flood emergencies and create a framework for expeditious, effective and coordinated employment of local resources.

Map III.5-1. Flood Insurance Rate Map (FIRM)



Since the purpose of this plan is to develop the most cost-effective and logical mitigation strategies, a catalog of structures in the moderate to low risk zones will not be provided here. Instead, tables V-2, V-3, and V-4 below provide structure counts and exposure value for the buildings in higher risk flood zones.

Table III.5-2: Estimated Values for Structures Located in Flood Zone A by Land Use						
	City of Punta Gorda		Charlotte County		Both Jurisdictions Combined	
Land Use	No. of Structures	Total Exposure	No. of Structures	Total Exposure	No. of Structures	Total Exposure
Agricultural	0	\$0	76	\$5,150,498	76	\$5,150,498
Commercial	60	\$58,355,552	507	\$126,297,282	567	\$184,652,834
Government	30	\$9,195,798	60	\$16,976,040	90	\$26,171,838
Industrial	0	\$0	95	\$18,650,455	95	\$18,650,455
Institutional	12	\$28,540,260	56	\$15,928,061	68	\$44,468,321
Misc.	22	\$13,876,093	73	\$7,270,976	95	\$21,147,069
Residential	3886	\$979,254,042	12,323	\$1,556,007,478	16209	\$2,535,261,520
Total	4,010	\$1,089,221,745	13,190	\$1,746,280,790	17,200	\$2,835,502,535

Source: Charlotte County property appraiser data analysis by Charlotte County LMS Working Group

Table III.5-3: Estimated Values for Structures Located in Flood Zone V by Land Use						
	City of Punta Gorda		Charlotte County		Both Jurisdictions Combined	
Land Use	No. of Structures	Total Exposure	No. of Structures	Total Exposure	No. of Structures	Total Exposure
Agricultural	0	\$0	76	\$5,269,368	76	\$5,269,368
Commercial	0	\$0	167	\$33,671,971	167	\$33,671,971
Government	9	\$12,305,602	27	\$1,122,397	36	\$13,427,999
Industrial	0	\$0	0	\$0	0	\$0
Institutional	0	\$0	0	\$0	0	\$0
Misc.	0	\$0	10	\$599,027	10	\$599,027
Residential	50	\$1,174,726	1647	\$896,516,805	1697	\$897,691,531
Total	59	\$13,480,328	1852	\$932,114,285	1911	\$945,594,613

Source: Charlotte County property appraiser data analysis by Charlotte County LMS Working Group

**Table III.5-4:  
Estimated Values for Structures Located in Flood Zone D by Land Use**

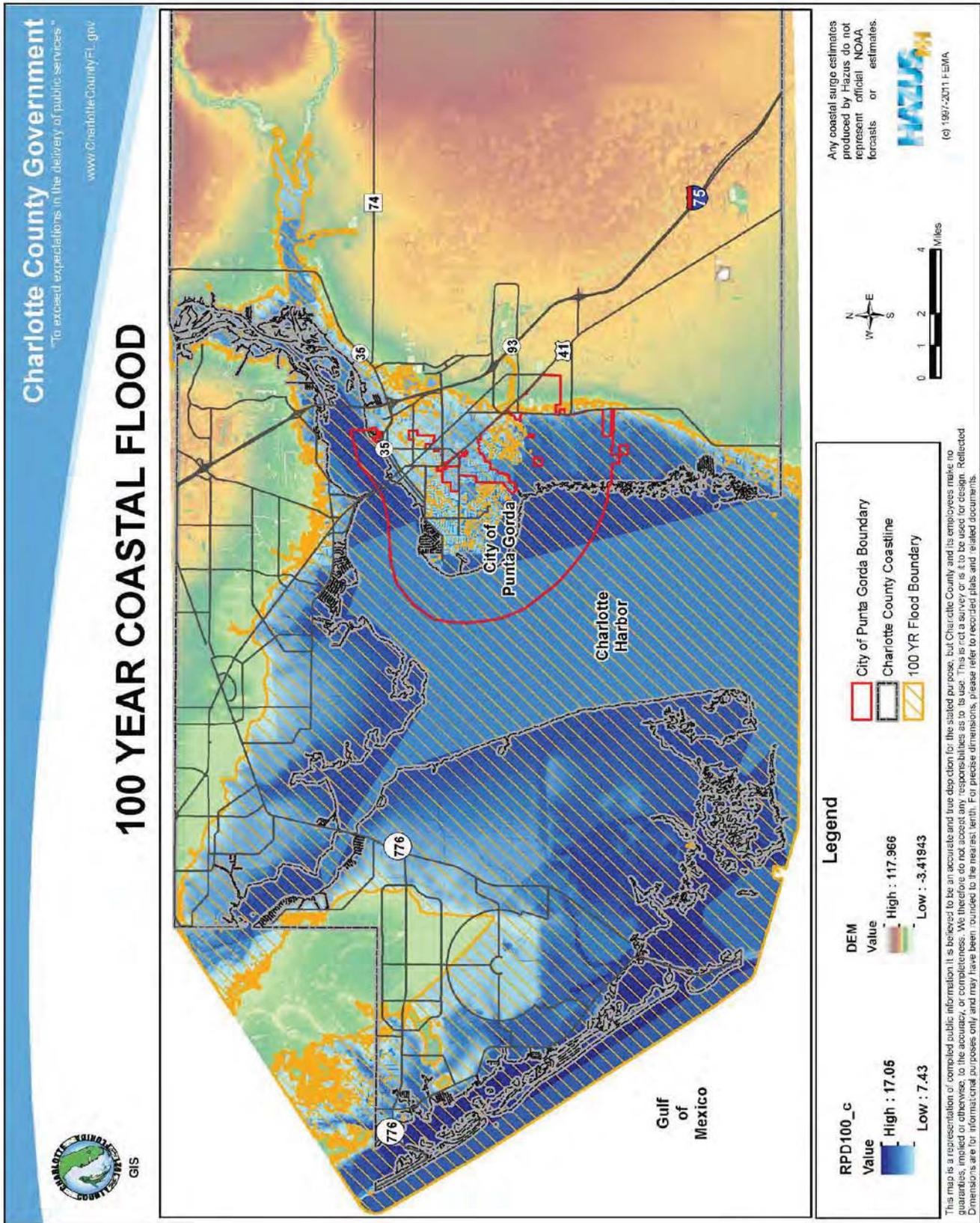
Land Use	City of Punta Gorda		Charlotte County		Both Jurisdictions Combined	
	No. of Structures	Total Exposure	No. of Structures	Total Exposure	No. of Structures	Total Exposure
Agricultural	0	\$0	162	\$9,910,877	162	\$9,910,877
Commercial	0	\$0	112	\$12,355,561	112	\$12,355,561
Government	0	\$0	50	\$41,804,510	50	\$41,804,510
Industrial	0	\$0	48	\$4,111,228	48	\$4,111,228
Institutional	0	\$0	16	\$1,774,971	16	\$1,774,971
Misc.	0	\$0	27	\$3,690,703	27	\$3,690,703
Residential	0	\$0	3041	\$270,293,008	3041	\$270,293,008
<b>Total</b>	<b>0</b>	<b>\$0</b>	<b>3456</b>	<b>\$343,940,858</b>	<b>3456</b>	<b>\$343,940,858</b>

Source: Charlotte County property appraiser data analysis by Charlotte County LMS Working Group

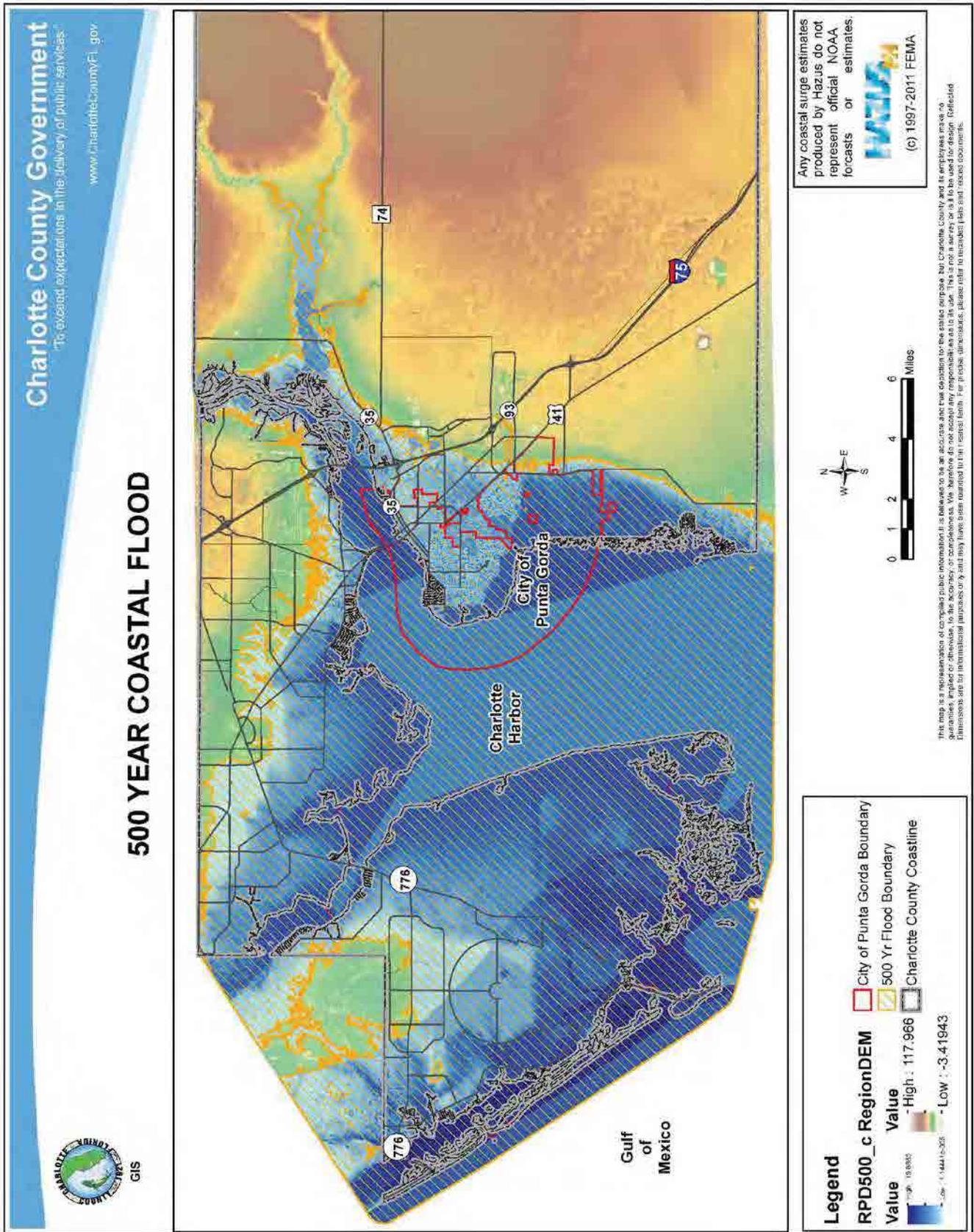
HAZUS was used to calculate displaced population, and buildings with substantial damage for the 100 year and 500 year flood. These maps are located below along with maps for the 100 year flood and 500 year flood.

These three flood zones would receive the most damage in a worst case scenario of 18 feet of storm surge. Almost all property in these zones would be flooded with over 8 feet of water. The rest of the county would only receive a few feet, if any, water.

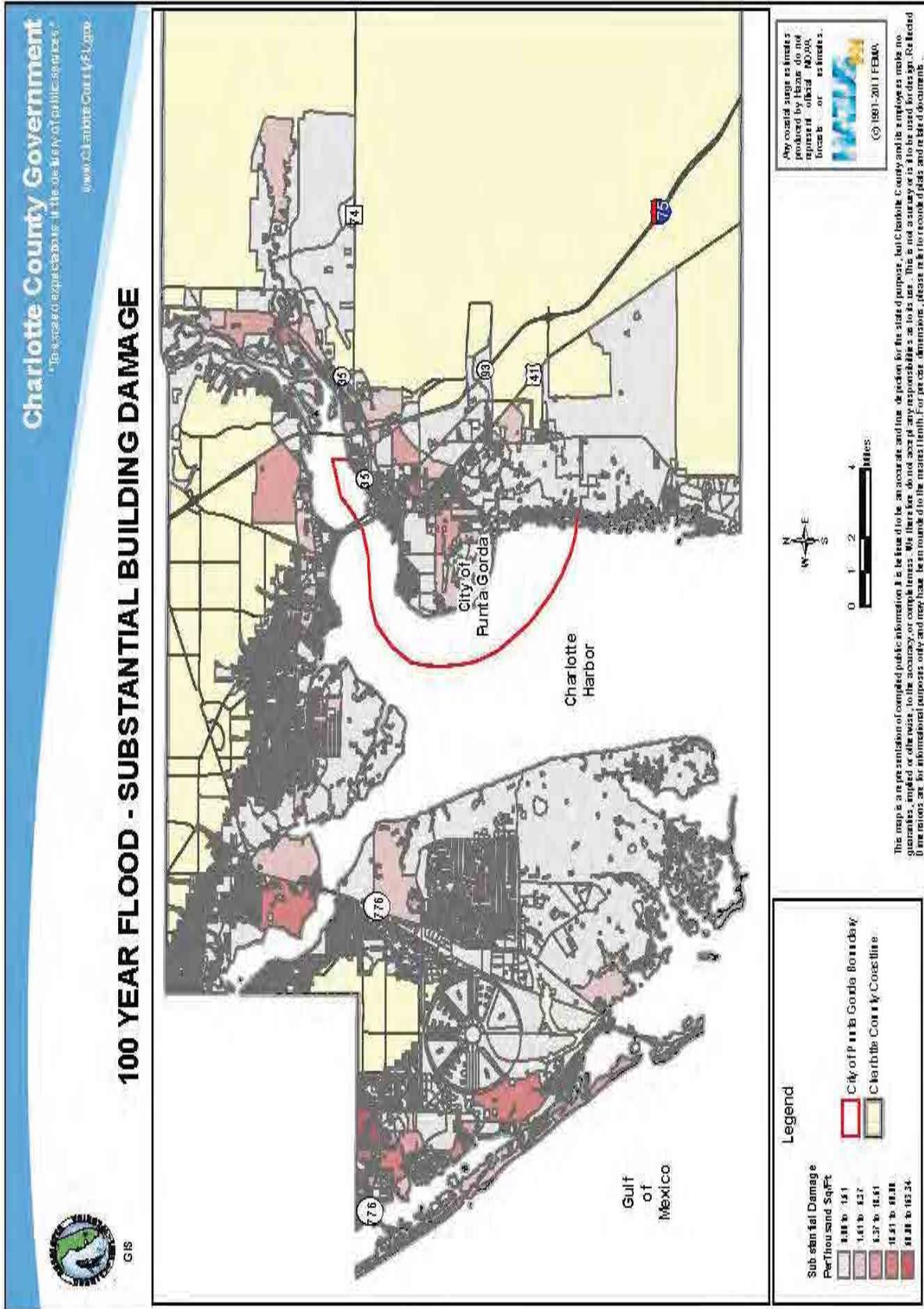
Map III.5-2. 100 Year Flood



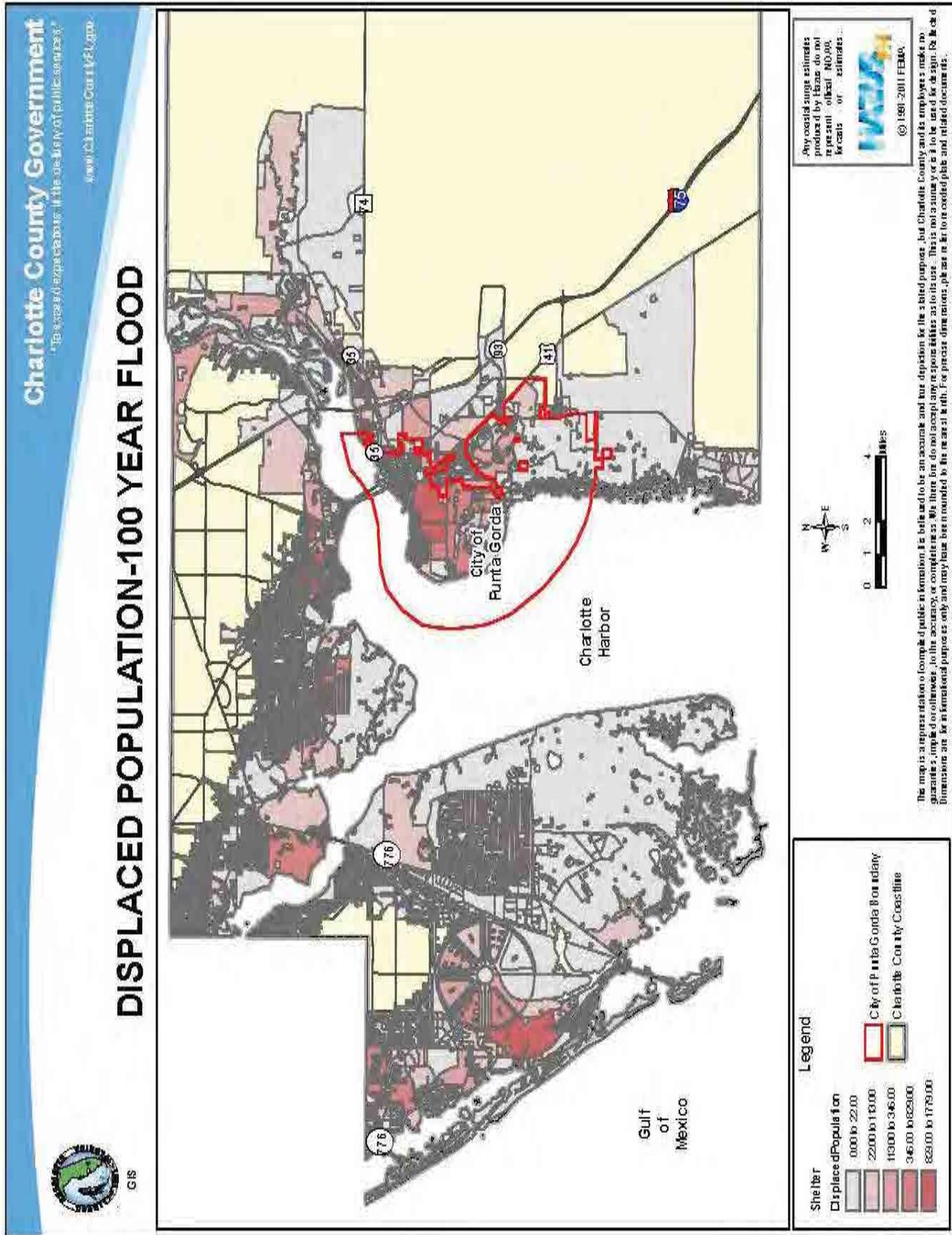
Map III.5-3. 500 Year Flood



Map III.5-4. 100 Year Flood Substantial Building Damage



Map III.5-5. 100 Year Flood displaced Population



## *SECTION 6: WILDFIRE*

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### HAZARD IDENTIFICATION

Fires are a natural part of the ecosystem in Florida. However, wildfires can present a substantial hazard to life and property in growing communities. There is a potential for losses due to wild land/urban interface (WUI) fires in Charlotte County.

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed, spread quickly, and are usually signaled by dense smoke that fills the area for miles around. Naturally occurring and nonnative species of grasses, brush, and trees fuel wildfires (FEMA guidebook).

A wildland fire is a wildfire in an area which development is essentially nonexistent, except for roads, railroads, power lines, and similar facilities. A wildland/urban interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wild land or vegetative fuels (FEMA guidebook).

Wildfires are nature's way of managing wild plant life and regenerating growth. But, they also can be the result of other factors. Wildfires can be caused by lightning, campfires, uncontrolled burns, smoking, vehicles, trains, equipment use, and arsonists. People start more than four out of every five wildfires, usually as debris burns, arson, or carelessness. Lightning strikes are the next leading cause of wildfires (FEMA).

Wildfire behavior is based on three primary factors: fuel, topography, and weather. The type and amount of fuel, as well as its burning qualities and level of moisture affect wildfire potential and behavior. The continuity of fuels, expressed in both horizontal and vertical components is also a factor, in that it expresses the pattern of vegetative growth and open areas. Topography is important because it affects the movement of air (and thus the fire) over the ground surface. The slope and terrain can change the rate of speed at which fire travels. Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity, and wind (both short and long term) affect the severity and duration of wildfires (FEMA guidebook).

### WILDFIRE RISK ANALYSIS

#### **HISTORY OF WILDFIRE IN CHARLOTTE COUNTY**

According to the Florida Forest Service, there has been a total 7 wild/forest fire events officially reported in Charlotte County since 2009. These events resulted in no deaths and 1 injury. However, they did burn over 2,292 acres with over \$ 100,000 in property damage. Following is a brief description of the wildfire events.

#### **March 20, 2011, Punta Gorda:**

A wildfire ignited from an unknown source, and burned 205 acres of trees and brush.

**April 28, 2011, Port Charlotte:**

A wildfire ignited after a lightning strike. This fire consumed a total of 230 acres of trees and brush.

**April 30, 2011, Punta Gorda:**

A wildfire ignited after a lightning strike, and burned 778 acres of trees and brush.

**June 6, 2011, Babcock Ranch:**

A wildfire ignited from an unknown source, and burned 243 acres of trees and brush.

**June 25, 2011, Punta Gorda:**

A wildfire ignited after a lightning strike, and burned 172 acres of trees and brush.

**April 11, 2012, Punta Gorda:**

A wildfire ignited from an unknown source, and burned 164 acres of trees and brush.

**March 6, 2013, Punta Gorda:**

A wildfire ignited from an unauthorized debris burn, and burned 500 acres of trees and brush.

**PROBABILITY OF WILDFIRE OCCURRENCE**

Given the history of wildfire occurrences and the current low levels of development in the county, the probability of future wildfire occurrences is considered as medium. We could expect at least one wildfire a year burning at least 100 acres.

**ESTIMATING POTENTIAL LOSSES**

The Charlotte County Property Appraiser's Office has fire risk areas designated on a parcel level. The value for each structure was also provided by the Charlotte County Property Appraiser's Office.

Currently, there are no standard loss estimation tables in existence for calculating losses to structures, contents, or functional use as a result of a wildfire event (FEMA guidebook). Loss estimation for wildfire events is difficult because there are so many factors that will influence where damage will occur and the amount of damage that will occur.

**POTENTIAL FUTURE RISK**

In assessing physical vulnerability, the most important factor is the extent to which structures get damaged when they are exposed to fire and heat. Structures located near the wildland/urban interface area are at the greatest risk for damage from wildfires.

The history of wildfires in Charlotte County mainly shows the burning of brush and timber in comparison to the destruction of structures. However, as development pushes forward into areas that are currently brush and timber, more structures will face the risk of wildfire damage. Map VI-1 below shows the Wildfire Levels of Concern throughout the County.

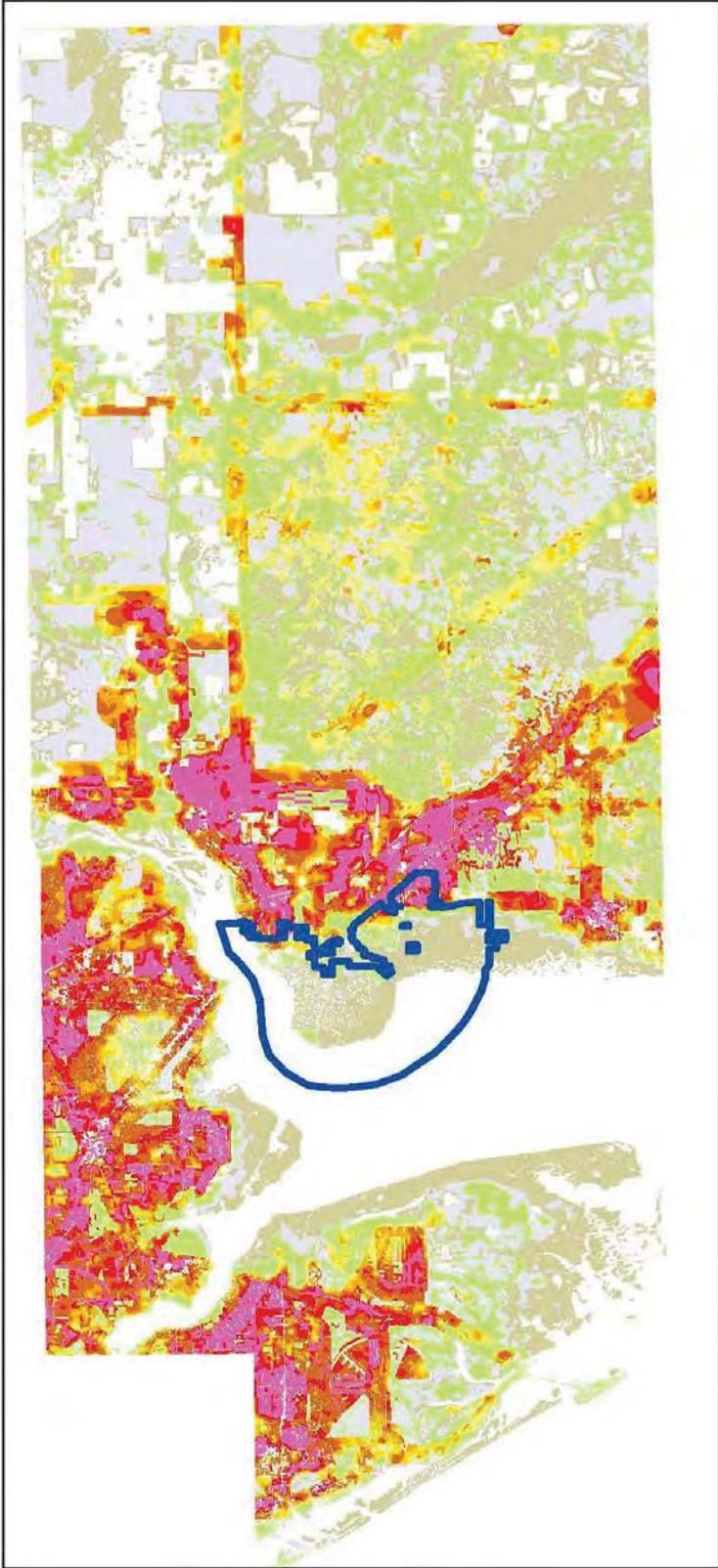
Table III.6-1: Wildfire Levels of Concern- Low						
	City of Punta Gorda		Charlotte County		Both Jurisdictions Combined	
Land Use	No. of Structures	Total Exposure	No. of Structures	Total Exposure	No. of Structures	Total Exposure
Agricultural	0	\$0	519	\$57,380,921	519	\$57,380,921
Commercial	223	\$173,585,409	1126	\$763,802,043	1349	\$937,387,452
Government	45	\$148,675,538	103	\$352,066,930	148	\$500,742,468
Industrial	28	\$8,072,605	334	\$115,169,993	362	\$123,242,598
Institutional	39	\$99,813,525	134	\$180,552,621	173	\$280,366,146
Misc.	3	\$2,053,792	53	\$12,015,131	56	\$14,068,923
Residential	12,737	\$2,487,026,431	73,024	\$9,642,995,253	85,761	\$12,130,021,680
Total	13,075	\$2,919,227,300	75,293	\$11,123,982,892	49,720	\$14,043,210,190

Table III.6-2: Wildfire Levels of Concern- Medium						
	City of Punta Gorda		Charlotte County		Both Jurisdictions Combined	
Land Use	No. of Structures	Total Exposure	No. of Structures	Total Exposure	No. of Structures	Total Exposure
Agricultural	0	\$0	8	\$680,460	8	\$680,460
Commercial	2	\$6,105,248	201	\$222,856,059	203	\$228,961,307
Government	1	\$1,012,844	12	\$63,357,606	13	\$16,307,595
Industrial	0	\$0	31	\$15,294,751	31	\$15,294,751
Institutional	0	\$0	29	\$60,415,376	29	\$60,415,376
Misc.	0	\$0	6	\$525,657	6	\$525,657
Residential	18	\$4,081,011	7289	\$754,474,458	7307	\$758,555,469
Total	21	\$11,199,103	7576	\$1,117,604,367	49,720	\$1,128,803,470

Table III.6-3: Wildfire Levels of Concern- High						
	City of Punta Gorda		Charlotte County		Both Jurisdictions Combined	
Land Use	No. of Structures	Total Exposure	No. of Structures	Total Exposure	No. of Structures	Total Exposure
Agricultural	0	\$0	3	\$922,370	3	\$922,370
Commercial	1	\$8,645,684	84	\$54,570,647	85	\$63,216,331
Government	0	\$0	10	\$2,619,476	10	\$2,619,476
Industrial	0	\$0	10	\$1,521,394	10	\$1,521,394
Institutional	0	\$0	5	\$4,290,111	5	\$4,290,111
Misc.	0	\$0	5	\$1,274,537	5	\$1,274,537
Residential	51	\$13,066,618	3331	\$630,762,369	3382	\$643,828,987
Total	52	\$21,712,302	3448	\$695,960,904	3500	\$717,673,206

Map III.6-1 Wildfire Levels of Concern

Wild Fire Levels of Concern



**Legend**

- City of Punta Gorda
- Charlotte County
- LOC**
- Non-Burnable
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- Level 6
- Level 7
- Level 8
- Level 9

## SECTION 7: TORNADO

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### HAZARD IDENTIFICATION

The National Weather Service defines a tornado as “a violently rotating column of air in contact with the ground and extending from the base of a thunderstorm. A condensation funnel does not need to reach to the ground for a tornado to be present; a debris cloud beneath a thunderstorm is all that is needed to confirm the presence of a tornado, even in the total absence of a condensation funnel” (National Weather Service, 2003).

Tornadoes are defined in terms of the Fujita Scale, which ranks tornadoes on the basis of wind speed and damage potential and separates them into six categories.

**Table III.7-1**

<b>The Fujita Scale</b>		
<b>STRENGTH</b>	<b>WIND SPEED</b>	<b>DAMAGE</b>
<b>EF-0</b>	<b>65-85</b>	<b>LIGHT</b>
<b>EF-1</b>	<b>86-110</b>	<b>MODERATE</b>
<b>EF-2</b>	<b>111-135</b>	<b>CONSIDERABLE</b>
<b>EF-3</b>	<b>136-165</b>	<b>SEVERE</b>
<b>EF-4</b>	<b>166-200</b>	<b>DEVASTATING</b>
<b>EF-5</b>	<b>&gt;200</b>	<b>INCREDIBLE</b>

### TORNADO RISK ANALYSIS

Using Charlotte County’s history of tornado events along with the National Oceanic Atmospheric Administration’s database the risk Charlotte County faces from high wind events was determined.

#### **HISTORY OF TORNADOES IN CHARLOTTE COUNTY**

There have been a total of 47 tornadoes officially reported in Charlotte County since January 1, 1950. (National Climactic Data Center of NOAA). These events resulted in 1 death and 4 injuries. An estimated \$9.18 million in property damage is attributed to these events. Following is a brief description of the tornado events that have occurred in Charlotte County since January 1, 2004.

There is no recorded history of a tornado with a classification greater than F2 striking in Charlotte County. Of the tornado events that have occurred in Charlotte County, 80% of them were F0 tornadoes and 12% of them were classified as F1 tornadoes. This means that the majority of the tornado events that occur in Charlotte County are events that cause only moderate damage. Since tornados are unpredictable this makes Charlotte County vulnerable to all 6 categories of tornados.

#### **June 21, 2006, Port Charlotte:**

A small but destructive tornado rapidly developed near the merger of the east and west coast sea breezes over Port Charlotte. One home was destroyed. Estimated damage was \$500,000.

### **June 21, 2006, Charlotte Harbor:**

A weak waterspout moved onshore as a tornado in the Harbor View mobile home park along the Peace River. Damage was limited to aluminum car ports and small sheds. Estimated damage was \$30,000.

### **January 27, 2012, Charlotte Harbor:**

A tornado touched down and caused significant roof damage to a single family home and an apartment complex. Damage was estimated at \$30,000.

## **PROBABILITY OF TORNADO OCCURRENCE**

While history shows that the probability of a tornado occurrence in Charlotte County is high, the probability of a severe tornado (F3 or higher) occurring is very low. On the other hand, even an F2 tornado has the potential to cause total destruction wherever it touches down, and it could touch down anywhere in the county.

## **ESTIMATING POTENTIAL LOSSES**

Identifying assets at risk for tornado damage is virtually impossible since tornadoes are so unpredictable. With that being said, it can be assumed that every structure has an equal chance of exposure to a tornado event. Therefore, all of the assets of Charlotte County should be included in the exposure zone. Please see the asset overview section (Part III, Section 2, Table III.2-1) of this report for a representation of Charlotte County and the city of Punta Gorda's Assets.

There is less than one recorded F3-F5 tornado per 3,700 mi<sup>2</sup> for Charlotte County (Map III.7-1). However, as FEMA points out, the nature of tornadoes is that they strike at random. While it is known that some places in the country experience tornadoes more frequently and at higher intensities than other places, it is very difficult to predict which portions of Charlotte County have a greater chance of being struck by a tornado than other portions. The entire county is considered when looking at the probability and location of occurrence for any strength tornado.

## **POTENTIAL FUTURE RISK**

The risk for tornado damage will increase as more and more people move to the area and more and more structures are built. The Land Uses and Development Trends section of this risk analysis addresses where some of this future growth is projected to occur. Please see this section for more information. Due to the unpredictability of tornado events, it is not possible to make a reasonable extent scale for this hazard.

Most tornadoes form from thunderstorms. You need warm, moist air from the Gulf of Mexico and cool, dry air from Canada. When these two air masses meet, they create instability in the atmosphere. Charlotte County is a coastal county making it more vulnerable. The structures most susceptible to damage are older buildings, dilapidated housing, and other less hardened properties such as mobile homes. All populations may be impacted by these events, but those at highest risk are the elderly, the disabled, lower income, and the homeless. **Charlotte County has 47961 homes built before the code change in 1992 and 11848 mobile homes. This would make 60% of the homes in Charlotte County vulnerable to tornadoes.**

# Map 11I.7-1. Tornado Activity in the United States



## TORNADO ACTIVITY IN THE UNITED STATES\*

Summary of Recorded EF3, EF4, and EF5 Tornadoes Per 2,470 Square Miles (1950-2006)

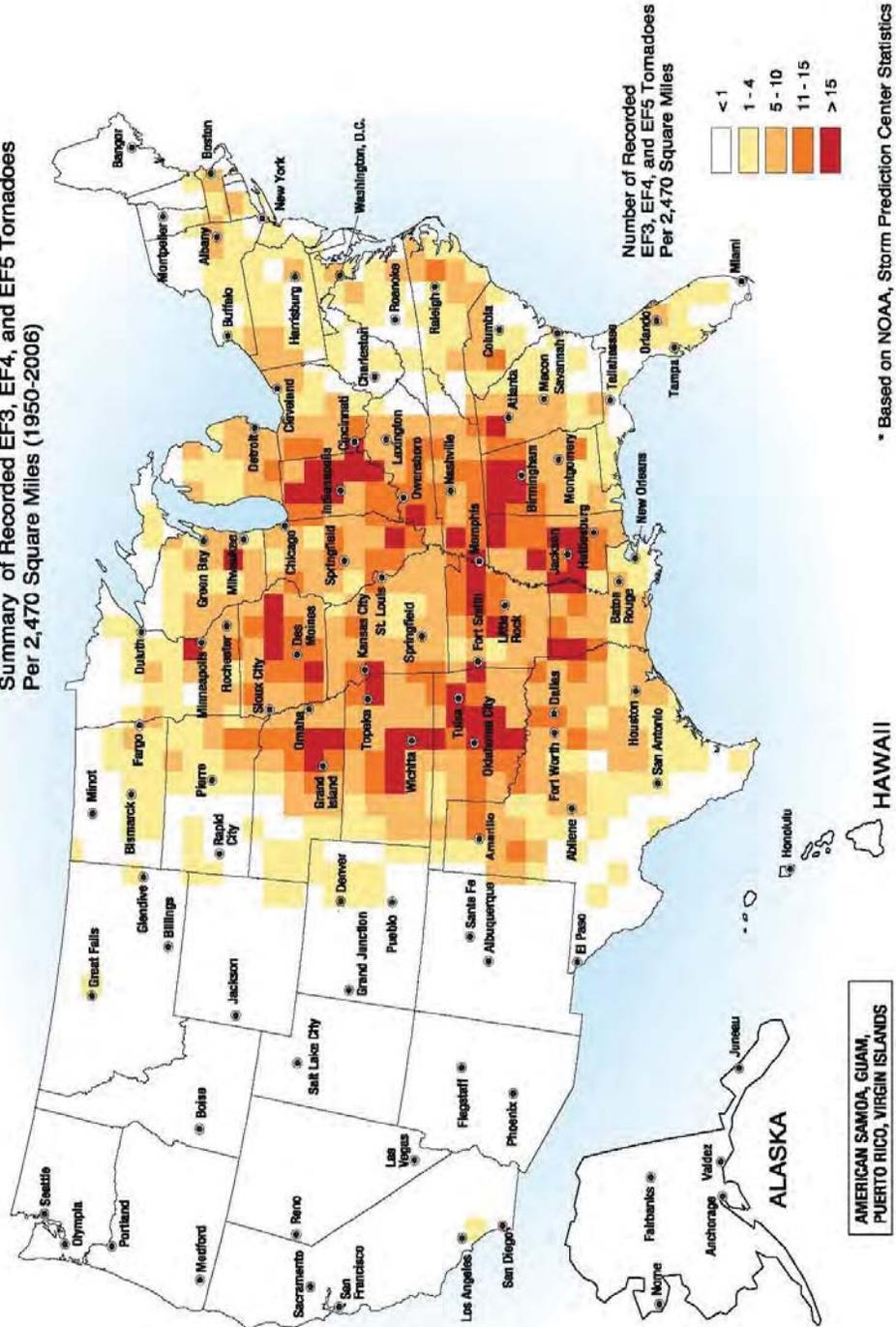


Figure I-2. The number of tornadoes recorded per 2,470 square miles

## ***SECTION 8: HIGH WIND EVENTS***

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### **HAZARD IDENTIFICATION**

While high wind events bring with them the threat of numerous individual hazards, the sole concern of this section of the LMS is with the high wind hazardous aspect of thunderstorms. Accordingly, the LMS Working Group ran multiple tropical cyclone models using HAZUS which simulated winds much higher than would be expected from a thunderstorm. This means that mitigation actions for tropical cyclone-type winds would also mitigate thunderstorm wind damage.

Thunderstorms result from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, it cools, condenses, and forms cumulonimbus clouds that can reach heights of over 12.45 miles. As the rising air reaches its dew point, water droplets and ice form and begin falling towards the Earth's surface. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft of cold air and moisture that spreads out at the Earth's surface, causing the strong winds commonly associated with thunderstorms.

### **HIGH WIND EVENT RISK ANALYSIS**

The potential threat to Charlotte County was ascertained by using the National Oceanic Atmospheric Administration's database along with Charlotte County's history of thunderstorms and high wind events.

### **HISTORY OF THUNDERSTORMS AND HIGH WIND EVENTS**

According to the National Climatic Data Center of NOAA, 2 significant thunderstorm/high wind events were recorded in Charlotte County in the last ten years. These events resulted in no deaths or injuries. An estimated \$105,000 thousand in property damage is attributed to these events. Following is a brief description of the thunderstorm/high wind events that have been recorded by NOAA in Charlotte County since 2004. Tropical cyclones always involve high winds.

#### **April 12, 2004, Regional:**

An unusually strong pressure gradient developed between small scale high and low pressure systems across central and southern Florida. A 41 knot wind gust was recorded at the Charlotte County Airport in Punta Gorda. Damage estimates from this event in the region reached \$55,000.

#### **June 10, 2012, South Charlotte:**

Several trees were uprooted and power poles knocked down. A mobile home sustained minor roof damage, and the roof of a shed was blown 150 feet away. A central pivot irrigation rig was also twisted and damaged by the wind. Damage estimates from this event in the region reached \$50,000.

## PROBABILITY OF THUNDERSTORM ASPECT OF HIGH WIND EVENT OCCURRENCE

Considering the area’s frequent past occurrence of events, along with the almost daily summer thunderstorm and seasonal tropical cyclones the county experiences, the probability of a thunderstorm or high wind event is high. The entire county is equally vulnerable to the effects of thunderstorms and/or high wind events.

Charlotte is a coastal county making it more vulnerable from the storms that come from the Gulf. This includes tropical cyclones, and high wind events. Damage from high winds, storm surge, and rain-induced flooding can impact all structures and utilities. The structures most susceptible to damage are older buildings, dilapidated housing, and other less hardened properties such as mobile homes. Widespread electrical outage is probable, as well as water and sewage backup in flooded areas. Depending on the intensity of the event, economic and environmental impacts can be severe. All populations may be impacted by these events, but those at highest risk are the elderly, the disabled, lower income, and the homeless. **Charlotte County has 47961 homes built before the code change in 1992 and 11848 mobile homes. This would make 60% of the homes in Charlotte County vulnerable to high wind events.**

## ESTIMATING POTENTIAL LOSSES

FEMA’s software program HAZUS-MH was used to estimate potential losses in a worst case scenario high wind event. These models depict events for both a tropical storm and all five categories of hurricanes making landfall directly on Charlotte County’s west coast moving due east. The group calibrated the numerical building inventory and monetary damage estimate data output from HAZUS in order to bring it up to date with the most recent available property appraiser data. As a result, the numbers in the following tables are rather rough, and should only be used to obtain a very general idea of potential losses in a worst case scenario high wind event.

The following tables and maps illustrate the wind damage predicted according to the six different scenarios. The building numbers in the tables represent the buildings that HAZUS predicts to suffer either “moderate,” “severe,” or “destruction” types of damage. HAZUS cannot distinguish between a county and the jurisdictions within a county, so the numbers here are the unincorporated Charlotte County and Punta Gorda aggregate numbers. The full reports of each scenario are located in Appendix 3.

Land Use	Moderate Damage	Severe Damage	Destruction
Agricultural	0	0	0
Commercial	0	0	0
Education	0	0	0
Government	0	0	0
Industrial	0	0	0
Religion	0	0	0
Residential	2	0	0
Total	2	0	0

According to HAZUS, there are an estimated 84,658 buildings in the study region with a total building replacement value of \$11.596 million (2002 dollars). Approximately 92% of the buildings are associated with residential housing. HAZUS estimates that there will not be any significant damage throughout the County in regards to the winds of a tropical storm.

Table III.8-2: Number of Structures Estimated to be Significantly Damaged by the Category 1 Hurricane's Wind in Charlotte County and the City of Punta Gorda by Land Use			
Land Use	Moderate Damage	Severe Damage	Destruction
Agricultural	34	16	2
Commercial	446	72	1
Education	6	1	0
Government	5	1	0
Industrial	135	32	2
Religion	22	3	0
Residential	3845	241	74
Total	4493	366	79

According to HAZUS, there are an estimated 84,658 buildings in the study region with a total building replacement value of \$11.596 million (2002 dollars). Approximately 92% of the buildings are associated with residential housing. HAZUS estimates that approximately 4,939 buildings will be moderately damaged which is over 6% of the total number of buildings in the study region. It is also estimated that approximately 366 buildings will have severe damage and 79 will be completely destroyed. The total property damage losses for a Category 1 hurricane's winds are estimated to be \$266 million.

Table III.8-3: Number of Structures Estimated to be Significantly Damaged by the Category 2 Hurricane's Wind in Charlotte County and the City of Punta Gorda by Land Use			
Land Use	Moderate Damage	Severe Damage	Destruction
Agricultural	117	82	23
Commercial	1403	934	27
Education	22	18	0
Government	14	13	0
Industrial	441	382	16
Religion	86	55	0
Residential	20,598	5877	2005
Total	22,681	7361	2071

According to HAZUS, there are an estimated 84,658 buildings in the study region with a total building replacement value of \$11.596 million (2002 dollars). Approximately 92% of the buildings are associated with residential housing. HAZUS estimates that approximately 22,681 buildings will be moderately damaged which is over 26% of the total number of buildings in the study region. HAZUS also estimates approximately 7,361 buildings will have severe damage and 2,071 buildings will be completely destroyed. The total property damage losses for a Category 2 hurricane's winds are estimated to be \$1.9 billion.

Land Use	Moderate Damage	Severe Damage	Destruction
Agricultural	110	213	75
Commercial	951	2713	230
Education	15	53	1
Government	8	34	0
Industrial	273	1089	53
Religion	73	182	8
Residential	22,569	26,576	17,500
<b>Total</b>	<b>23,999</b>	<b>30,808</b>	<b>17,867</b>

According to HAZUS, there are an estimated 84,658 buildings in the study region with a total building replacement value of \$11.596 million (2002 dollars). Approximately 92% of the buildings are associated with residential housing. HAZUS estimates that approximately 23,999 buildings will be moderately damaged which is over 28% of the total number of buildings in the study region. HAZUS also estimates approximately 30,808 buildings will have severe damage and 17,867 buildings will be completely destroyed. The total property damage losses for a Category 3 hurricane's winds are estimated to be \$8 billion.

Land Use	Moderate Damage	Severe Damage	Destruction
Agricultural	18	225	198
Commercial	172	2833	1250
Education	3	58	13
Government	2	36	8
Industrial	52	1139	292
Religion	12	199	79
Residential	4003	21,153	52,359
<b>Total</b>	<b>4263</b>	<b>25,644</b>	<b>54,199</b>

According to HAZUS, there are an estimated 84,658 buildings in the study region with a total building replacement value of \$11.596 million (2002 dollars). Approximately 92% of the buildings are associated with residential housing. HAZUS estimates that approximately 4,263 buildings will be moderately damaged and 25,644 buildings will be severely damaged. HAZUS also estimates approximately 52,359 buildings will be completely destroyed which is over 61% of the total number of buildings in the study region. The total property damage losses for a Category 4 hurricane's winds are estimated to be \$15.1 billion.

Land Use	Moderate Damage	Severe Damage	Destruction
Agricultural	2	112	300
Commercial	30	1638	2628
Education	1	35	40
Government	0	22	24
Industrial	11	683	802
Religion	2	105	185
Residential	643	10,548	66,798
Total	690	13,131	70,806

According to HAZUS, there are an estimated 84,658 buildings in the study region with a total building replacement value of \$11.596 million (2002 dollars). Approximately 92% of the buildings are associated with residential housing. HAZUS estimates that approximately 690 buildings will be moderately damaged and 13,131 buildings will have severe damage. HAZUS also estimates 70,806 buildings will be completely destroyed which is over 83% of the total number of buildings in the study region. The total property damage losses for a Category 5 hurricane's winds are estimated to be \$17.2 billion.

In a thunderstorm, wind gusts could be as high as 73 mph and sustained winds can be up to 39-73mph in our area, we could see up to 2 inch diameter hail and the lightning density for our county is 21-27 strikes per square mile per year.

## SECTION 9: COASTAL EROSION

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### HAZARD IDENTIFICATION

Charlotte County spends millions of dollars each year on projects that work to enhance the coastal environment. Coastal erosion is one of the biggest problems Charlotte County's beaches encounters. Aside from the potential tourism dollars that may be lost, there are people's homes and businesses that could potentially be damaged from coastal erosion.

NOAA defines beach erosion as "The carrying away of beach materials by wave action, tidal currents, littoral currents, or wind." Coastal erosion is a natural process even in pristine environments. However, in areas where human activity negatively impacts the shoreline, coastal erosion can become a serious problem. It is estimated that coastal erosion in the U.S. costs \$700 million annually. (National Sea Grant Office).

### COASTAL EROSION RISK ANALYSIS

Over the next 60 years, erosion may claim 1 out of 4 houses within 500 feet of the US shoreline (H. John Heinz Center Report, April 2000). This statistic helps form the basis of the 60-year Coastal Erosion Hazard Area. The 60-year Coastal Erosion Hazard Area represents the land expected to be lost to coastal erosion over the next 60 years. The Evaluation of Erosion Hazards Study prepared for FEMA by the H. John Heinz III Center for Science, Economics, and the Environment establishes this zone as land within 500 feet from the coastline.

Since the rate at which the beach erodes varies from place to place, for Charlotte County's analysis, all the properties located within the boundary of the Coastal Conservation Construction Line (CCCL) were designated as members of the Coastal Erosion Hazard Area. The value for each structure within this area was provided by the Charlotte County Property Appraiser's Office.

### **HISTORY OF COASTAL EROSION EVENTS IN CHARLOTTE COUNTY**

The history of coastal erosion events in Charlotte County is not easy to document. However, there are events that can be recorded such as tropical storms, hurricanes, and/or tornadoes that lead to coastal erosion. The following events, documented through the National Climatic Data Center of NOAA, discuss coastal erosion for Charlotte County. The extent of erosion annually is 4.4 cubic feet of sand loss per year any major storm could increase sand loss to over 10,000 cubic feet.

#### **August 13, 2004, Hurricane Charley:**

Hurricane Charley made landfall on the Southwest coast of Florida as a category 4 hurricane. It caused minor beach erosion on Englewood Beach, Port Charlotte State Recreation Area, and on the North end of Gasparilla Island. Knight Island suffered the largest amount of damage which resulted in over \$3.7 million dollars worth of beach restoration.

### **September 5, 2004, Hurricane Frances:**

Hurricane Frances struck Florida on its east coast. It caused a slight increase in the level of erosion in areas where Hurricane Charley had previously intensified the erosion process. Hurricane Frances caused major dune erosion on Don Pedro Island (FDEP).

### **September 23, 2004, Hurricane Jeanne:**

Hurricane Jeanne caused further erosion damage to the Don Pedro Island dune system.

### **August 19, 2008, Tropical Storm Fay:**

Tropical Storm Fay was the first storm in recorded history to make landfall four times in Florida. Even though she was only a tropical storm, Fay caused beach erosion to Knight Island which resulted in over \$3.0 million dollars worth of damage, and a loss of over 147,000 cubic yards of beach.

## **PROBABILITY OF COASTAL EROSION OCCURRENCE**

There have been no events occur in the past five years, the probability of an erosion event is medium. Accordingly, the LMS Working Group both analyzed the assets at risk to this hazard and considered potential projects that would reduce the impacts of an occurrence of this hazard.

## **ESTIMATING POTENTIAL LOSSES**

Over 2% of Charlotte County's structures are located in the coastal erosion hazard area. These structures account for 5.5% of the county's building value (\$652 million) and 5.0% of the county's estimated value (\$983 million). Erosion of the beaches is measured by the cost per cubic yard of sand, and also includes the cost of contractors and mobilization and demobilization.

As can be seen from Map III.9-2, all of the properties vulnerable to erosion are located in Charlotte County (there are none in Punta Gorda), and more specifically, all are on the islands in the Gulf Coast to the west of mainland Charlotte County.

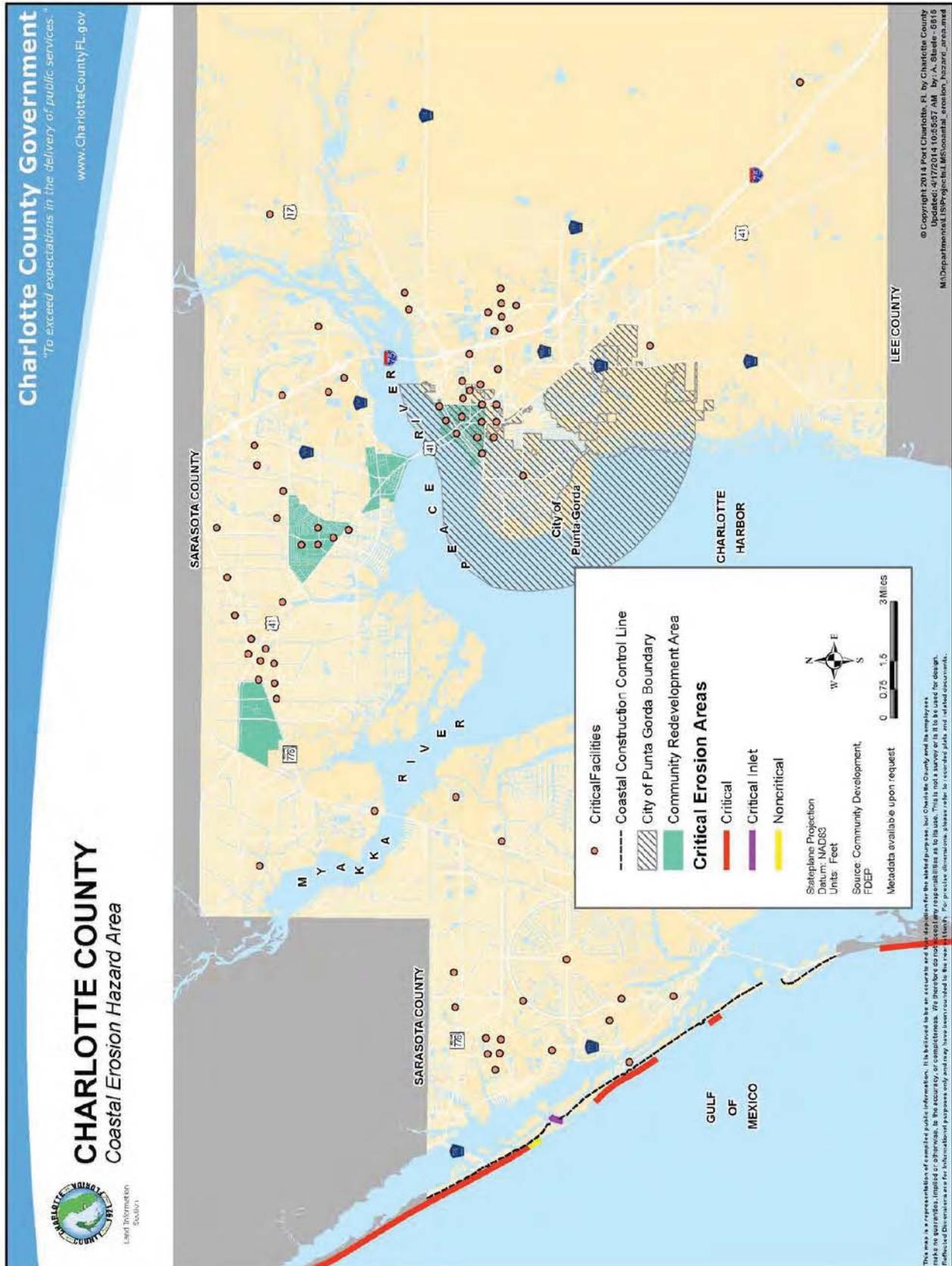
## **POTENTIAL FUTURE RISK**

While Charlotte County has several structures located in the Coastal Erosion Hazard Area, it is important to note that there are projects in the works to prevent erosion of Charlotte County's coastline. The primary vehicle for implementing the beach management planning recommendations is the Florida Beach Erosion Control Program. This is a program 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 of 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. There are currently three projects underway in Charlotte County that take advantage of this funding source.

There are currently three critically eroded areas (5.2 miles), and one noncritical eroded area (0.4 mile) in Charlotte County (See Map III.9-1).



Map III.9-2 Charlotte County Coastal Erosion Hazard Area



### Map III.9-3 Critically Eroded Beaches in Charlotte County



## ***SECTION 10: DROUGHT***

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### **HAZARD IDENTIFICATION**

A drought is a period of unusually persistent dry weather that persists long enough to cause serious problems such as crop damage and/or water supply shortages. The severity of the drought depends upon the degree of moisture deficiency, the duration, and the size of the affected area.

A prolonged drought can have a serious economic impact on a community. Increased demand for water and electricity may result in shortages of resources. Moreover, food shortages may occur if agricultural production is damaged or destroyed by a loss of crops or livestock. Heat related illness can be very serious for the elderly, small children, chronic invalids, overweight individuals, and those taking certain medications, drugs, or alcohol. A prolonged drought can have a serious economic impact on a community.

### **VULNERABILITY ANALYSIS**

#### **HISTORY OF DROUGHT IN CHARLOTTE COUNTY**

All areas of Charlotte County are equally susceptible to all types of droughts. This is especially the case during the dry season in January through May. However, Charlotte County has not experienced drought conditions since 2008.

#### **DROUGHT PROBABILITY**

Charlotte County's probability of a drought occurrence is moderate based on hydrological factors (precipitation).

#### **ESTIMATING POTENTIAL LOSSES**

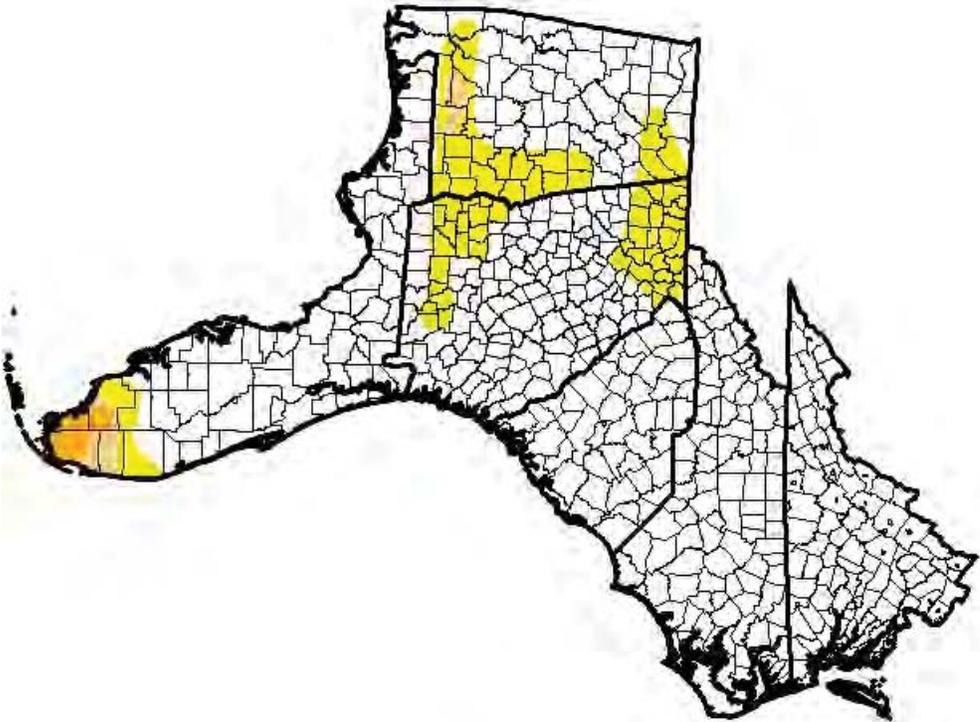
The Charlotte County assets that are most vulnerable to the threat of drought are agricultural. According to the Florida Department of Agriculture, Charlotte County contains 21,663 acres of citrus crops and over 19,000 head of livestock. Additionally, portions of the county's land are devoted to the production of other fruits and vegetables. Should a severe drought occur and persist, these assets will be hit the hardest, and the most severe consequence would be a long-term loss in revenue from citrus production.

#### **POTENTIAL FUTURE RISK**

Charlotte County is, always has been, and always will be vulnerable to drought. When water levels are low in both the Peace and Myakka Rivers, water treatment plants and sewer treatment plants lose their ability to withdraw water from them. In the future, we can expect this problem to become more evident because of the increase in population and therefore a higher demand on water resources. **A worst case scenario for drought in Charlotte County would be a severe drought. This is confirmed by the U.S drought monitor map on the following page as D2.**

# U.S. Drought Monitor Southeast

**April 21, 2015**  
 (Released Thursday, Apr. 23, 2015)  
 Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	88.15	13.85	2.19	0.99	0.00	0.00
<b>Last Week</b> 4/14/2015	63.34	36.66	4.01	0.60	0.00	0.00
<b>3 Months Ago</b> 1/20/2015	84.71	15.29	0.67	0.00	0.00	0.00
<b>Start of Calendar Year</b> 12/30/2014	85.13	14.87	0.87	0.00	0.00	0.00
<b>Start of Water Year</b> 9/30/2014	54.60	45.40	9.31	1.20	0.00	0.00
<b>One Year Ago</b> 4/22/2014	98.24	1.76	0.23	0.00	0.00	0.00

**Intensity:**

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

**Author:**  
 Anthony Artusa  
 NOAA/NWS/NCEP/CPC



<http://droughtmonitor.unl.edu/>

## ***SECTION 11: EXTREME HEAT***

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### **HAZARD IDENTIFICATION**

Temperatures that hover 10 degrees or more above the average high temperature of 92 °F for the region and last for several weeks are defined as extreme heat. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. A heat wave is an extended time interval of abnormally and uncomfortably hot and unusually humid weather. To be a heat wave, such a period should last at least one day, but conventionally it lasts from several days to several weeks (FDEM).

### **PROBABILITY OF AN EXTREME HEAT EVENT**

While NOAA does not have any record of an extreme heat event in Charlotte County, the probability of an event occurring in the future should be considered as low. Lee County, just south of Charlotte, does have recorded extreme heat events. This, taken into account with the facts that the average summer high temperature in Charlotte County can already be considered very hot, and that the world's climate as a whole is very dynamic, should not allow us to discount the possibility of an extreme heat event in Charlotte County. An extreme heat event can occur equally throughout the county.

### **ESTIMATING POTENTIAL LOSSES**

An extreme heat event would not have a direct impact on the county's physical assets. On the other hand, an event could entail potential negative impacts on the local economy through, for example, loss of revenue from tourists whom the heat might detract from visiting the area. More importantly, an extreme heat event could imperil the lives of the residents of Charlotte County, a disproportionate amount of who are elderly.

### **POTENTIAL FUTURE RISK**

The potential future risk that this hazard poses is expected to increase. As the county's population increases, it is obvious that the number of individuals exposed to and vulnerable to extreme heat will increase in kind.

### **HISTORY OF EXTREME HEAT IN CHARLOTTE COUNTY**

There has not been any occurrence of extreme heat. The below chart illustrates the extent in the event of a high heat event. **The highest recorded temperature in Florida was 109°F in 1931 therefore that is what Charlotte County could expect as the extent of extreme heat.**

Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity

## SECTION 12: EXOTIC PESTS AND DISEASE

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### HAZARD IDENTIFICATION

Because of its sub-tropical climate, unique animal and plant life, and robust \$6 billion agriculture industry, Florida is inherently susceptible to the introduction of foreign plant and animal pests and diseases. The State has been plagued by repeated outbreaks of exotic pests and diseases over the past few years. USDA and the Florida Department of Agriculture and Consumer Services (FDACS) spent about \$25 million to eradicate Mediterranean fruit fly (Medfly) outbreaks from Tampa and surrounding areas in 1997; efforts to eradicate bacterial citrus canker from Florida currently cost more than \$10 million annually (USDA).

Animal disease organisms can live for months in meat and meat products, such as sausage and many types of canned hams sold abroad. Foot-and-mouth disease, African swine fever, and classical swine fever (hog cholera) are a few of the several livestock diseases that could cost billions of dollars to eradicate if introduced to U.S. livestock. These diseases are not present in the United States, but are known to occur in many foreign countries from which travelers and importers bring meat products (USDA).

### EXOTIC PEST AND DISEASE RISK ANALYSIS

While exotic pest and disease infestations/outbreaks do not cause a direct impact on structures that can be measured in terms of numbers of buildings or total value, it can impact the County. The risk analysis for pest or disease outbreak focuses on the agricultural elements of the County.

### **HISTORY OF EXOTIC PEST AND DISEASE EVENTS IN CHARLOTTE COUNTY**

Following is a brief description of three recent outbreaks of citrus canker as tracked by the Department of Agriculture and Consumer Services.

#### **October 20, 2004, Charlotte County:**

Citrus canker was confirmed positive in 2 areas in Punta Gorda and in a Hamlin orange grove located in Township 40S, Range 26E, and Section 12 in eastern Charlotte County, east of Highway 31, near the Desoto County line. Hurricane Charley caused a widespread infection throughout the grove.

#### **January 25, 2005, Punta Gorda:**

Citrus canker was confirmed on three trees in the Deep Creek area of Punta Gorda.

#### **May 19, 2005, Charlotte County:**

Citrus canker was confirmed in a commercial citrus grove.

#### **July 2, 2005, Charlotte County:**

Three new commercial canker finds involving approximately 1,022 acres.

**August 6, 2005, Charlotte County:**

Nine new positive finds located in 40S27E22, 40S27E23, 40S27E24, 41S27E18, 40S27E35, 41S27E18 and 41S27E08.

**October 15, 2005, Charlotte County:**

Two new positive finds located in 40S24E34 and 40S27E16.

**October 16 to November 15, 2005, Charlotte County:**

Two new positive finds located in 40S27E31 and 40S27E19.

**November 2, 2005, Charlotte County:**

An expanded quarantine replaced the Farabee Grade quarantine.

**December 17, 2005 to January 14, 2006, Charlotte County:**

One new positive find located in 40S24E22.

**January 10, 2006, Charlotte County:**

All Charlotte County Environmental Protection (CCEP) activity ended.

**ESTIMATING POTENTIAL LOSSES**

The Charlotte County assets that are most vulnerable to the threat of exotic pests and diseases are agricultural. According to the Florida Department of Agriculture, Charlotte County contains over 18,000 acres of citrus crops, and over 19,000 head of livestock. Additionally, portions of the county's land are devoted to the production of other fruits and vegetables. Should a severe pest or disease outbreak occur, these assets will be hit the hardest, and the most severe consequence would be a long-term loss in revenue from citrus production.

**POTENTIAL FUTURE RISK**

Florida is a very popular travel destination and attracts visitors from all around the globe, visitors who could unintentionally be carrying objects like fruit infected with communicable diseases or hosting nonnative pests. Even with the increased population and risks the probability of a pest or disease outbreak is low.

## ***SECTION 13: DAM FAILURE***

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### **HAZARD IDENTIFICATION**

Dam failure can be caused by either floodwaters that raise the water level above the dam's capacity or by unsound dam construction leading to a breach in the dam. Residents and assets downstream from the dam are exposed to differing levels of risk to a dam failure depending on the dam's hazard potential classification and their distance from the failed dam.

### **DAM FAILURE RISK ANALYSIS**

The closest dam to Charlotte County is located on the Peace River in Desoto County at a distance of about five miles to the nearest point in Charlotte County. The area is triangular in shape and it is bordered on the SE by 0.94 miles of Kings Highway (769); bordered on the SW by 0.91 miles of Interstate 75; and bordered on the N by 0.96 miles of the Charlotte County/DeSoto County line. The hazard potential for this dam is considered as "high." All of the information in this section was found in the "Peace River/Manasota Regional Water Supply Authority Reservoir Emergency Action Plan."

### **HISTORY OF DAM FAILURE IN CHARLOTTE COUNTY**

There is no record of a past occurrence of a dam failure in Charlotte County.

### **PROBABILITY OF A DAM FAILURE**

Even though this is considered a high hazard risk dam, the probability of a failure actually occurring should be considered as low, given that a dam hazard risk analysis is determined relative to all other dams rather than all natural hazards.

### **ESTIMATING POTENTIAL LOSSES**

Should this new dam actually fail, the losses experienced in Charlotte County would be very minor. This is due to two circumstances: 1) only three buildings (all commercial) sit in the Charlotte County area predicted to be flooded by a dam failure; 2) the danger to the human population in the dam flood zone at the time of a breach is rather low since they would have sufficient time to be warned and evacuate (16 hours) before the flood water reaches one foot in the expected flood area. The three commercial properties in the exposure area are Wal-Mart, Murphy's Gas Station, and Wachovia Bank, and they amount to a total exposure value of \$3,778,627.

### **POTENTIAL FUTURE RISK**

The potential future risk posed by this dam should be expected to increase if either the capacity of the reservoir increases, further development of the area, or it is discovered that the dam is structurally unsound. In the event of a dam failure the extent of damage would only affect the three commercial properties near that area and would be minimal.

## ***SECTION 14: FREEZES***

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### **HAZARD IDENTIFICATION**

A freeze is a condition that exists when, over a widespread area, the surface temperature of the air remains below freezing (32°F or 0°C) for a sufficient time to constitute the characteristic feature of the weather. A freeze is a term used for the condition when vegetation is injured by these low air temperatures, regardless if frost is deposited. Frost is a cover of ice crystals produced by deposition of atmospheric water directly on a surface at or below freezing.

### **FREEZE RISK ANALYSIS**

While winter storms and freezes do not cause a direct impact on structures that can be measured in terms of numbers of buildings or total value, it can impact the county. The risk analysis for freezes focuses on the agricultural elements of the County.

### **HISTORY OF FREEZES IN CHARLOTTE COUNTY**

According to the National Climatic Data Center of NOAA, three freeze events were reported in Charlotte County since 2010. A description of these events follows.

#### **January 10, 2010 Charlotte County:**

Charlotte County had below freezing temperatures for around 10 hours, with temperatures below 28 degrees for 2 to 3 hours. The lowest temperature across the county of 23 degrees was set at a station in Port Charlotte. The county has 21,663 acres of harvested farmland, which translates into approximately \$2.56 million in crop damages.

#### **February 10, 2010 Charlotte County:**

Charlotte County felt sub-freezing temperatures for 1 to 2 hours across mainly eastern portions of the county. It has 21,663 acres of harvested farmland, which is approximately \$34 thousand in crop damages.

#### **December 15, 2010 Charlotte County:**

Charlotte County recorded sub-freezing temperatures for around 4 hours across mainly eastern portions of the county. The ASOS station at the Charlotte County Airport experienced the coldest temperature across the county of 29 degrees, which was a new record low for the station. The county has 21,663 acres of harvested farmland, which is approximately \$1.59 million in crop damages.

### **PROBABILITY OF A SEVERE FREEZE**

Charlotte County can expect a moderate freeze at least once every two years giving it a medium probability. A freeze can occur equally throughout the county. It is estimated that a severe freeze that can potentially destroy all crops can be expected once every 5-10 years on average. Freezes normally occur at night.

## **ESTIMATING POTENTIAL LOSSES**

The Charlotte County assets that are most vulnerable to the threat of freezes are agricultural. According to the Florida Department of Agriculture, Charlotte County contains over 21,663 acres of citrus crops, and 19,000 head of livestock. Additionally, portions of the county's land are devoted to the production of other fruits and vegetables. Should a severe freeze occur, these assets will be hit the hardest, and the most severe consequence would be a long-term loss in revenue from citrus production.

While the greatest economic impact of freezes is to agricultural production, freezes may also necessitate the opening of local shelters and the mobilization of personnel and resources for the protection of homeless persons or residents of sub-standard dwellings.

## **POTENTIAL FUTURE RISK**

All crops are susceptible to freeze damage. The primary winter growing season is November through March. As the population increases, the demand placed on farmers becomes higher. Due to this larger demand, we can expect to have higher financial losses in the future.

In the winter months, Charlotte County often sees temperatures drop below 32 degrees for as long as 4 to 6 hours with the lowest temperature being 22.

## SECTION 15 EARTHQUAKES:

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### HAZARD IDENTIFICATION

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. Earthquakes result from crust strain, volcanism, landslides, or the collapse of caverns. Earthquakes, which strike suddenly and without warning, can occur at any time of the year and at any time of the day or night.

Earthquakes are measured in terms of their magnitude. Magnitude is measured in terms of the Richter scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude (Table III.15-1).

Magnitude	Effect
0-2.0	Micro earthquakes, not felt.
2.0-2.9	Generally not felt or recorded.
3.0-3.9	Often felt, but rarely causes damage.
4.0-4.9	Shaking and rattling of items but no significant damage caused.
5.0-5.9	Affects weak construction, and causes mild damage to stronger construction.
6.0-6.9	Affects area up to 160 km from the epicenter, in populated areas.
7.0-7.9	"Major" earthquake, causes serious damage up to ~100 km
8.0-8.9	"Great" earthquake, great destruction, loss of life over several 100 km

### **POTENTIAL IMPACT:**

Earthquakes can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge, destructive ocean waves (tsunamis). The structures most susceptible to damage can depend on the material that the structure is made out of, the type of earthquake wave (motion) that is affecting the structure, and the ground on which the structure is built. Even though the entire county would be impacted in the event of an earthquake the damage (if any) would be minimal.

### EARTHQUAKE RISK ANALYSIS

#### **HISTORY OF HAZARD IN CHARLOTTE COUNTY**

According to the U.S. Geological Survey (USGS), only two recorded earthquakes (both very minor) have occurred near Charlotte County: both in Lee County in 1948, and 1930. The USGS southwest Florida has a 10% chance of a 5.8 magnitude earthquake near Charlotte County.

#### **PROBABILITY OF HAZARD OCCURRENCE**

Florida is situated on the trailing (or passive) margin of the North American Plate. This is the fundamental reason that Florida has an extremely low incidence of earthquakes. Due to the historically low probability that the Charlotte County area will experience an earthquake, the potential damages caused by earthquakes will not be analyzed in the risk assessment portion of this document.

## SECTION 16 SINKHOLES:

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### HAZARD IDENTIFICATION

Sinkholes are common where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that can naturally be dissolved by groundwater circulating through them. As the rock dissolves, spaces and caverns develop underground. Sinkholes are dramatic because the land usually stays intact for a while until the underground spaces just get too big. If there is not enough support for the land above the spaces then a sudden collapse of the land surface can occur. These collapses can be small, or, as this picture shows, or they can be huge and can occur where a house or road is on top.

The most damage from sinkholes tends to occur in Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania.

### SINKHOLE RISK ANALYSIS

#### **HISTORY OF HAZARD IN CHARLOTTE COUNTY**

Only one sinkhole has been recorded in Charlotte County and was repaired. Subsidence occurred in a roadway in a low density residential area in Englewood on April 28, 2010. There have been no other instances of sinkholes in Charlotte County.

#### **PROBABILITY OF HAZARD OCCURRENCE**

The probability of a sinkhole occurring in Charlotte County is very low.

#### **ESTIMATING POTENTIAL LOSSES**

Due to the historically low probability that Charlotte County area will experience sinkholes, the potential damages caused by sinkholes will not be analyzed in the risk assessment portion of this document.

Even though the entire county is considered when looking at the probability and location of occurrence for a sinkhole the impact would be minimal. **The extent of a sinkhole would be minimal since the only recorded sinkhole was less than five feet in diameter and depth and cause was a wash out.**

#### **Vulnerability**

Sinkholes are a fact of life in Florida. They occur because the entire state of Florida is underlain by limestone, a type of rock that is slowly dissolved by weak natural acids found in rain and in the pore spaces in soil. The abrupt formation of sinkholes may follow extreme rain producing events such as tropical storms or hurricanes. This is because the weight of a large amount of rain water at the earth's surface may bring about the collapse of an underground cavity if its limestone "ceiling" has become thin. Any structure above a sinkhole would sustain damage.

## SECTION 17 TSUNAMI:

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### HAZARD IDENTIFICATION

Tsunamis, also called seismic sea waves or, incorrectly, tidal waves, are a series of traveling ocean waves of extremely long length. They are generally caused by earthquakes occurring below or near the ocean floor, less commonly by submarine landslides, infrequently by submarine volcanic eruptions, and very rarely by large meteorite impacts in the ocean.

Offshore and coastal features can determine the size and impact of tsunami waves. Reefs, bays, entrances to rivers, undersea features, and the slope of the beach all help to modify the tsunami as it approaches the coastline. When the tsunami reaches the coast and moves inland the water level can rise many feet. In extreme cases, water level has risen to more than 50 feet for tsunamis of distant origin and over 100 foot for tsunami waves generated near the earthquake's epicenter.

### TSUNAMI RISK ANALYSIS

#### **HISTORY OF HAZARD IN CHARLOTTE COUNTY**

There is no historical record of a tsunami impacting any of Florida's coasts.

#### **PROBABILITY OF HAZARD OCCURRENCE**

According to MEMPHIS, Florida is located in a 500 year tsunami category which gives it a very low probability. The impact of such an event would be minimal and not a threat to life and property. The extent of the storm would be the same as high tide.

There are no significant earthquake sources within the Gulf of Mexico that are likely to generate tsunamis, despite recent seismic activity in the area. Tsunami propagation from significant earthquake sources outside the Gulf of Mexico, such as the northern Panama Convergence Zone, Northern South America, Cayman Trough, the Puerto Rico trench, or the Gibraltar area shows that wave amplitude is greatly attenuated by the narrow and shallow passages into the gulf, and as a result, these tsunami sources do not constitute a tsunami hazard to the Gulf of Mexico coast. (USGS <http://nws.weather.gov/nthmp/documents/GoM-Final01regionalAssessment.pdf>)

#### **ESTIMATING POTENTIAL LOSSES**

Due to the historically low probability that the Charlotte County area will experience a tsunami and its location in the 500 year tsunami risk zone, the potential damages caused by tsunamis will not be analyzed in the risk assessment portion of this document. In addition, many of the mitigation activities that would be done to mitigate for storm surge would simultaneously mitigate for potential tsunami damage. The entire county is considered when looking at the probability and location of occurrence for a tsunami but the effect would be the same as high tide. **Refer to the storm surge portion of this plan to address vulnerability of this type of hazard.**

## SECTION 18 HAZARDOUS MATERIALS:

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### HAZARD IDENTIFICATION

Hazardous materials are materials that if released, can pose a threat to human health or the environment. Hazardous material releases can cause acute or chronic health effects, damage to property, expensive cleanup/contractor costs, serious injury and even death. The storage of hazardous materials ranges from residential storage of household products to bulk storage of large volumes for industrial purposes. Hazardous materials are transported by various methods such as railcars, barges and trucks. For purposes of this study, only those locations where the bulk storage of hazardous materials is present will be addressed because the amount of bulk storage material affects its potential risk.

Charlotte County is vulnerable to both transportation accidents involving hazardous materials and hazardous material spills from fixed facilities. Major transportation routes include I-75, US 41, S.R. 776, C.R. 74, Kings Highway, and Veterans Blvd. Hazardous materials carriers are not prohibited from traveling on these roads, so the threat of accidents involving hazardous materials is always present. Charlotte County also has the Seminole Gulf Railroad which runs through many residential areas in Punta Gorda. This route is used mainly for carrying cargo, including hazardous materials. This adds to the threat of hazardous materials spills in Charlotte County should an accident occur.

Hazardous material spills from fixed facilities also present a threat. Currently, Charlotte County has 18 facilities that are registered as carrying extremely hazardous substances (EHS).

### HAZARDOUS MATERIALS RISK ANALYSIS

#### **HISTORY OF HAZARD IN CHARLOTTE COUNTY**

There have not been any major incidents involving hazardous materials.

#### **PROBABILITY OF HAZARD OCCURRENCE**

The threat of hazardous materials spills in Charlotte County is considered to be medium.

#### **ESTIMATING POTENTIAL LOSSES**

The worst case scenario would involve the release of a highly toxic hazardous material near a highly populated area. Local hazmat specialty teams would likely be taxed and require additional outside support. Acute medical care facilities would be overwhelmed.

Mass decontamination would be required; contamination of first responders, response vehicles, and medical treatment centers would exponentially complicate response actions. The hazardous material could potentially leach into the soil and affect the water supply. It could potentially take months or years to fully clean up a hazardous material release or spill, resulting in unknown costs.

## **SECTION 19 TERRORISM:**

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### **HAZARD IDENTIFICATION**

A terrorist incident could involve a wide variety of materials or actions, or combinations of materials and actions. These could range from uncomplicated incidents impacting relatively small areas, to highly complex incidents with very widespread physical or economic consequence. The response to such an incident would require specialized personnel and resources beyond the capabilities of Brevard County and its municipalities, and require assistance from mutual aid organizations, adjacent counties, the State of Florida and the Federal government.

Terrorism can originate from a number of sources, both international and domestic. The most common methods are the use of six different types: conventional (explosives), biological (Anthrax, etc.), radiological, cyber, chemical, and nuclear.

The critical infrastructures in Charlotte County could be considered potential targets for a terrorist attack and an attack on these locations could have important and potentially widespread consequences for adjacent neighborhoods or the community as a whole. This is described further in the next Section below, Critical Infrastructure Disruption.

### **TERRORISM RISK ANALYSIS**

#### **HISTORY OF HAZARD IN CHARLOTTE COUNTY**

There have not been any incidents caused by acts of terrorism.

#### **PROBABILITY OF HAZARD OCCURRENCE**

Terrorism vulnerabilities are low in Charlotte County; however, it is probable.

#### **ESTIMATING POTENTIAL LOSSES**

No location is immune from terrorism. Locations such as the Charlotte County Administration Building, the Charlotte County Justice Center, and the Punta Gorda City Hall can be defined as potential targets for terrorism, but no past or current indications have pointed to these being designated as known targets.

## SECTION 20 CRITICAL INFRASTRUCTURE DISRUPTIONS:

### HAZARD IDENTIFICATION

Charlotte County has many facilities and systems that are considered to be “Critical Infrastructure” whose continued and uninterrupted operation is necessary for the health, safety and well-being of the community. This hazard may become present through an accident, sabotage, or terrorism. This hazard includes, but is not limited to, utility disruptions, cyber-attack, computer threat, and communications system failures.

A “cyber terrorist attack” could also result in extensive disruption to computer networks, telecommunication systems or Internet services, and be intended to cause severe or widespread economic damage and/or physical impacts in the community.

This hazard can cause other hazardous incidents to occur. These may include, but are not limited to, hazardous material spills, delay of medical operations, and loss of ability to provide power or communications, and loss of ability to provide utility services.

### CRITICAL INFRASTRUCTURE DISRUPTION RISK ANALYSIS

#### **HISTORY OF HAZARD IN CHARLOTTE COUNTY**

There is no historical record of a tsunami impacting any of Florida’s coasts.

#### **PROBABILITY OF HAZARD OCCURRENCE**

The hazard of a Critical Infrastructure Disruption is a low threat in Charlotte County.

#### **ESTIMATING POTENTIAL LOSSES**

The actual extent of such a loss is dependent upon several factors including but not limited to type of disruption, scale, type of infrastructure affected, and the availability of resources to lessen the impact of the incident.

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# Part IV

## Mitigation Strategy

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# ***SECTION 1: MITIGATION GOALS AND OBJECTIVES***

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## **GOALS AND OBJECTIVES**

The following numbered listing does not reflect a prioritization. Priorities among the following goals and objectives, if any; as well as whether any or all of the goals and objectives are to appear in the completed Local Mitigation Strategy Document; will be determined by the Charlotte County/City of Punta Gorda LMS Working Group.

**GOAL 1: CHARLOTTE COUNTY SHALL REDUCE THE VULNERABILITY AND EXPOSURE OF THE PUBLIC BY PROTECTING LIVES AND PROPERTY FROM THE LOSSES OF NATURAL DISASTERS.**

### **Objective 1.1**

Maximize the protection of the public's health, safety, and welfare as they are related to natural disasters.

### **Objective 1.2**

Reduce the loss of personal and public property due to natural disasters through wind retrofits; flood proofing, relocation, demolition reconstruction, elevation, and private property acquisitions.

### **Objective 1.3**

Require the protection of natural resources (such as environmentally sensitive lands) in order to maximize their mitigative benefits and to safeguard them from damage caused by natural disasters.

### **Objective 1.4**

Ensure that Charlotte County's code and ordinances are sufficient to protect public property and safety.

### **Objective 1.5**

Develop advance plans for the safe evacuation of coastal residents and other high risk flood areas.

### **Objective 1.6**

Protect coastal resources, marine resources, and dune systems from the adverse effects of development.

### **Objective 1.7**

Ensure mitigation measures are effectively incorporated in the comprehensive system of coordinated planning, management, and land acquisition.

### **Objective 1.8**

Encourage land and water uses which are compatible with the protection of sensitive coastal resources having value and benefits as mitigative measures.

**Objective 1.9**

Prohibit development and other activities which disturb coastal dune systems, and ensure and promote the restoration of coastal dune systems that have been damaged.

**GOAL 2: IN ORDER TO ENHANCE HAZARD MITIGATION PLANNING AND SUBSEQUENT MITIGATION ACTIONS, THE CHARLOTTE COUNTY OFFICE OF EMERGENCY MANAGEMENT WILL TAKE A PROACTIVE LEAD TO ENSURE INTRA-GOVERNMENTAL COORDINATION WITHIN ITS OWN AGENCIES AND INTERGOVERNMENTAL COORDINATION BETWEEN OTHER AGENCIES.**

**Objective 2.1**

Implement disaster training programs and exercises.

**Objective 2.2**

Pre-establish and update a network of state and local contacts to coordinate Charlotte County needs.

**Objective 2.3**

Establish and protect the essential flow of information before, during, and after a disaster.

**Objective 2.4**

Encourage cooperation and participation between and among all Charlotte County departments in mitigation planning.

**Objective 2.5**

Ensure that the Charlotte County Hazard Mitigation Plan incorporates appropriate hazard mitigation measures as reflected in each agency's Emergency Support Function or Departmental Standard Operating Procedures.

**GOAL 3: REDUCE THE VULNERABILITY OF CRITICAL FACILITIES, PUBLIC FACILITIES, AND HISTORIC STRUCTURES FROM NATURAL DISASTERS.**

**Objective 3.1**

Disaster-proof existing and proposed critical facilities and historic structures, in regards to location and construction (see the County Critical Facility Inventory in the Critical Facility Section of the Risk Analysis Part of this LMS document).

**Objective 3.2**

Develop and maintain energy preparedness plans that will be both practical and effective under circumstances of disrupted energy supplies.

**Objective 3.3**

Incorporate hazard mitigation measures in any rehabilitation or reuse of existing public facilities, structures, buildings, and historic structures.

**GOAL 4: STRENGTHEN PLANS FOR POST-DISASTER, RECOVERY, AND MITIGATION PLANS.**

**Objective 4.1**

Analyze, review, and update the Charlotte County post-disaster, recovery, and mitigation plans.

**GOAL 5: IMPROVE COORDINATION OF EMERGENCY MANAGEMENT INFORMATION THROUGH THE MEDIA TO INCREASE PUBLIC AWARENESS AND PARTICIPATION IN PREPAREDNESS, RESPONSE, MITIGATION, AND RECOVERY.**

**Objective 5.1**

Develop and maintain a comprehensive, multi-media/multi-lingual public education campaign on emergency preparedness, response, mitigation, and recovery.

**Objective 5.2**

Provide educational programs and research to meet local, state, and regional planning growth management and hazard mitigation needs.

**Objective 5.3**

Establish a standardized format for use in dissemination of information to the media during a disaster.

**Objective 5.4**

Establish coordinated information and procedures for public information officers and media working in disasters.

**GOAL 6: CHARLOTTE COUNTY SHALL PROTECT AND ACQUIRE UNIQUE NATURAL HABITATS AND ECOLOGICAL SYSTEMS (SUCH AS WETLANDS, HARDWOOD HAMMOCKS, PALM HAMMOCKS, AND VIRGIN LONGLEAF PINE FORESTS) AND RESTORE DEGRADED NATURAL SYSTEMS TO A FUNCTIONAL CONDITION IN ORDER TO MAXIMIZE HAZARD MITIGATION VALUES.**

**Objective 6.1**

Conserve forests, wetlands, and coastal natural features to maintain their economic, aesthetic, and recreational values.

**Objective 6.2**

Acquire, retain, manage, and inventory public lands to provide conservation and related public benefits including hazard mitigation.

**Objective 6.3**

Promote the use of agricultural practices which are compatible with the protection of natural systems.

**Objective 6.4**

Encourage multiple use of forest resources, where appropriate, to provide for watershed protection, erosion control, and maintenance of water quality.

**Objective 6.5**

Protect and restore the ecological functions of wetland systems to ensure their long-term environmental, economic, and recreational values, including hazard mitigation practices.

**Objective 6.6**

Develop and implement a comprehensive planning, management, and acquisition program to ensure the integrity of Charlotte County's waterways.

**Objective 6.7**

Emphasize the acquisition and maintenance of ecologically intact systems in all land and water planning, management, and regulation.

## SECTION 2: MITIGATION INITIATIVES

### INTRODUCTION

Determining mitigation initiatives and prioritizing them is one of the most important functions of the LMS Working Group. By working together to determine which projects will provide the most benefit and what order they should be completed in, the LMS Working Group helps to maintain a focused effort to mitigate against natural hazard threats within the county.

### PRIORITIZING MITIGATION INITIATIVES

Once the vulnerability assessment and risk analysis are complete and the hazard mitigation opportunities have been identified, proper priorities must be established concerning each proposed project's impact on life safety, quality of life, cost effectiveness, and value to the overall community. This includes, but is not limited to, value as compared to other similar projects especially during times of limited funding availability. If a project is proven to be not cost effective, it will be removed from the list.

The benefit-cost review model used to establish the ranking (along with the LMS Working Group individual member's ranking of preference) is provided below. The list of projects submitted with this 2014 updated LMS is in ranked order following the review model.

#### HAZARD MITIGATION PROJECT EVALUATION CRITERIA WORKSHEET

This worksheet is used, as a consistent approach, to assign a numeric value to each project. It allows the Charlotte County Local Mitigation Strategy Work Group to prioritize projects relative to one another based on several factors outlined below.

#### ***Project Information***

Project Priority *	
Project Score	
Name of Project	
Brief Description of Project	
Hazard Mitigated*	
Hazard Mitigation Strategy*	
Hazard Mitigation Goals Achieved *	
Funding Source	
Jurisdiction(s) Project Benefit *	
Agency Responsible for Implementation	
Estimated Cost	
Timeframe for Project Completion	

\* Refer to The Charlotte County Local Mitigation Strategy Project List notes for assistance.

**Project Scoring**

**Cost or Cost Impact:** This would refer to the actual cost of the project over the life of the project and/or the cost impact that would occur because of the project.

Score	Points	Description
	4	No quantifiable Cost or Cost Impact, or the Cost/Cost Impact is less than 50,000
	3	Cost/Cost Impact is between \$50,000 and \$250,000
	2	Cost/Cost Impact is between \$250,001 and \$1,000,000
	1	Cost/Cost Impact is between \$1,000,001 and \$5,000,000
	0	Cost/Cost Impact exceeds \$5,000,000

**Probability of Funding:** How likely is it that this project could get funded?

Score	Points	Description
	4	Funding is available through local short-term budgeting (less than two years) or a grant for this type of project is available and the likelihood of success is high.
	3	Funding is available through local long-term budgeting (more than two years) or grants for this type of project are available, but the likelihood of success is moderate.
	2	Funding could only be accomplished through matching local dollars with funds from other sources; or would require a blend of funding sources.
	1	Funding could only be accomplished through post-disaster funding options.
	0	No funding sources can be identified.

**Probability of Community Acceptance:**

Score	Points	Description
	4	This type of project would likely be endorsed by the entire community.
	3	This type of project would benefit only those directly affected and would not adversely affect the rest of the community.
	2	This type of project could place some burden of cost on the community, but would likely be endorsed as an acceptable cost for the benefit received.
	1	This type of project would place a burden of cost on the community that might not win endorsement by residents and/or businesses.
	0	This type of project is not likely to be endorsed by the community.

**Estimated Ratio of Benefit vs. Cost:** The individual or entity proposing this project should have completed a “Consequence Analysis” to support the ration of benefit vs. cost.

Score	Points	Description
	4	Both quantitative and qualitative benefits make this a high priority project.
	3	The benefit of this project is 2 to 4, or more, times the cost and/or the qualitative benefits make the project one that should be given a relatively high priority.
	2	The benefit of this project is over 1, but less than 2 times the cost and/or the qualitative benefits make the project one that should be strongly considered.
	1	The benefit of this project is equal to or less than the cost and/or the benefits are difficult to quantify due to their qualitative nature.
	0	The ratio of benefits vs. cost cannot be quantified.

**Complexity of Implementation:** The following list shows examples of various items that can make a project more complex;

- Time involved for planning and/or completion.
- Involves numerous agencies and/or jurisdictions
- Permitting (Either the type of permitting required or the time period involved, or both)
- Difficulty in obtaining funding
- Requires a public vote
- Requires a public hearing

Score	Points	Description
	4	This project will be relatively easy to put in place in a short period of time.
	3	This project should not be very complex based on the items listed.
	2	This project will be somewhat complex due to one of the items listed.
	1	This is a complex project because it involves at least two of the items listed.
	0	This is a complex project because it involves three or more of the items listed.

**Addressed in Plans, Programs, and Policies:** The following list shows examples of various guiding principles that may affect, or be affected by, the project;

- Goals & Objectives of Sarasota LMS
- Comprehensive Growth Management Plans
- Comprehensive Emergency Management Plans
- Land Development Codes, Zoning Ordinances, or Building Codes
- Environmental, Conservation, Preservation and/or Reclamation plans, programs or policies.
- Statutes, Public Laws, other local laws, and/or other plans, programs, or policies.

Score	Points	Description
	4	This project is addressed in at least three of the items listed.
	3	This project is addressed in at least two of the items listed.
	2	This project is addressed in at least one of the items listed.
	1	Where this project is addressed in any plans, programs or policies is not clear.
	0	This project may not fall within the purview of Sarasota LMS.

**Health and Safety:**

<b>Score</b>	<b>Points</b>	<b>Description</b>
	4	This project could affect the Health & Safety of several jurisdictions (totaling over 250,000 people) and/or major portions of the county population.
	3	This project could affect the Health & Safety of between 50,000 and 250,000 people
	2	This project could affect the Health & Safety of between 1,000 and 50,000 people
	1	This project could affect the Health & Safety of less than 1,000 people.
	0	This project has no Health & Safety implications.

<b>Compilation of Scores</b>	
<b>Scores</b>	<b>Issues</b>
	Cost or Cost Impact
	Probability of Funding
	Probability of Community Acceptance
	Ration of Benefit vs. Cost
	Complexity of Implementation
	Consistency with other Plans, Programs, and Policies
	Health and Safety Considerations
	<u>Total Score</u>

**Table IV.1-1: 2015 Local Mitigation Strategy Projects**

Priority	Description of Project or Initiative	Goal for Hazards Mitigated	Mitigation Goals Achieved	Funding Source	Jurisdiction (Location)	Agency Responsible for Implementation	Estimated Costs	Status			Timeframe to Complete	
								New	Ongoing	Deferred		If Deferred Why?
The projects located in this color are completed projects.												
	Transit Annex	Hurricanes, Tornadoes and Tropical Storms	Yes	County Sales Tax, HMGP	All jurisdictions in Charlotte County	Transit	N/A	The Transit Annex was retrofitted for wind with new shutters.			N/A	
	Flood Control Culverts	Floods	Yes	County Sales Tax, SWFWM D FMAP, HMGP	All jurisdictions in Charlotte County	Public Works	\$10,800,000	This is an ongoing project. Five of the 17 flood control structures that are located on roadways has been rebuilt. Four are currently under construction and two are expected to start construction before the end of the county's fiscal year of 2015.			N/A	
1	Niagra 5.72 Flood Control Culvert	Floods	No	County Sales Tax, SWFWM D, FMAP, HMGP	All jurisdictions in Charlotte County	Public Works	\$900,000	This is an ongoing project. Five of the 17 flood control structures that are located on roadways has been rebuilt. Four are currently under construction and two are expected to start construction before the end of the county's fiscal year of 2015.			Within a one-year timeframe.	
2	Fordham 5.11 Flood Control Culvert	Floods	No	County Sales Tax, SWFWM D, FMAP, HMGP	All jurisdictions in Charlotte County	Public Works	\$900,000	This is an ongoing project. Five of the 17 flood control structures that are located on roadways has been rebuilt. Four are currently under construction and two are expected to start construction before the end of the county's fiscal year of 2015.			Within a one-year timeframe.	
3	Forham 4.60 Flood Control Culvert	Floods	No	County Sales Tax, SWFWM D, FMAP, HMGP	All jurisdictions in Charlotte County	Public Works	\$900,000	This is an ongoing project. Five of the 17 flood control structures that are located on roadways has been rebuilt. Four are currently under construction and two are expected to start construction before the end of the county's fiscal year of 2015.			Within a two-year timeframe.	
4	Lionhart 4.03 Flood Control Culvert	Floods	No	County Sales Tax, SWFWM D, FMAP, HMGP	All jurisdictions in Charlotte County	Public Works	\$900,000	This is an ongoing project. Five of the 17 flood control structures that are located on roadways has been rebuilt. Four are currently under construction and two are expected to start construction before the end of the county's fiscal year of 2015.			Within a two-year timeframe.	

Priority	Description of Project or Initiative	Goal for Hazards Mitigated	Mitigation Goals Achieved	Funding Source	Jurisdiction (Location)	Agency Responsible for Implementation	Estimated Costs	Status			If Deferred Why?	Timeframe to Complete
								New	Ongoing	Deferred		
The projects located in this color are completed projects.												
13	Wind Retrofit Douglas T. Nursing Home	Hurricanes, Tornadoes and Tropical	No	County Sales Tax, HMGP	All jurisdictions in Charlotte County	Facilities	TBD	This building is a Veterans nursing home and shutters installed to withstand possible wind damage.			Within a five-year timeframe	
14	Wind Retrofit Charlotte County Cultural	Hurricanes, Tornadoes and Tropical	No	HMGP	All jurisdictions in Charlotte County	Facilities	TBD	This building needs a wind retrofit and shutters installed to withstand possible wind damage.			Within a five-year timeframe	
15	Wind Retrofit Rebecca Neal Owens Meal Site	Hurricanes, Tornadoes and Tropical	No	HMGP	All jurisdictions in Charlotte County	Facilities	\$150,000	This building needs a wind retrofit and shutters installed to withstand possible wind damage.			Within a five-year timeframe	
16	Wind Retrofit Charlotte County Justice Center	Hurricanes, Tornadoes and Floods	No	HMGP	All jurisdictions in Charlotte County	Facilities	\$400,000	This building needs a wind retrofit and shutters installed to withstand possible wind damage.			Within a five-year timeframe	
17	Water Line Relocation from crossing on bridges to under	Floods	No	County Sales Tax, SWFWM D, FMAP,	All jurisdictions in Charlotte County	Utilities	\$50,000	The goal of this project is to remove water lines that cross canals on bridges which are prone to flooding and collapse to relocate water lines through directional bores under waterways.			Within a five-year timeframe	
18	Public Education	Hurricanes and Floods	No	HMGP	All jurisdictions in Charlotte County	Charlotte County Emergency Management	\$50,001	The Emergency Management and Community Development departments have many public education and outreach programs for the community to educate on preparedness, mitigation,			Within a five-year timeframe	
19	Wildfire Mitigation	Wildfires	No	HMGP, State Forestry Services	All jurisdictions in Charlotte County	Charlotte County Emergency Management	Wildfire	The county has several Firewise housing communities. It is a combined effort between the State Forestry Department and Emergency Management to expand this program by completing fire hazard.			Within a five-year timeframe	
	Fire Station 10	Hurricanes, Tropical Storms, Tornadoes	No	HMGP	All jurisdictions in Charlotte County	Charlotte County Fire/EMS	\$710,000	This project has been deferred until funding can be made available.			TBD	
	Corto Andra/ Boca Grande Area Drainage Improvements	Floods	No	County Sales Tax, HMGP	City of Punta Gorda	City of Punta Gorda	\$180,000	This project has been deferred until funding can be made available.			TBD	
	Fire Station 3	Hurricanes, Tropical Storms, Tornadoes	No	HMGP	All jurisdictions in Charlotte County	Charlotte County Fire/EMS	\$1,200,000	This project has been deferred until funding can be made available.			TBD	

Priority	Description of Project or Initiative	Goal for Hazards Mitigated	Mitigation Goals Achieved	Funding Source	Jurisdiction (Location)	Agency Responsible for Implementation	Estimated Costs	Status			If Deferred Why?	Timeframe to Complete
								New	Ongoing	Deferred		
The projects located in this color are completed projects.												
	Fire Station 5	Hurricanes, Tropical Storms, Tornadoes	No	HMGP	All jurisdictions in Charlotte County	Charlotte County Fire/EMS	\$1,300,000				This project has been deferred until funding can be made available.	TBD
	Fire Station 6	Hurricanes, Tropical Storms, Tornadoes	No	HMGP	All jurisdictions in Charlotte County	Charlotte County Fire/EMS	\$1,600,000				This project has been deferred until funding can be made available.	TBD
	Relocate Public Works Complex	All Hazards	No	County Sales Tax,	Charlotte County	Facilities	Undetermined				This project has been deferred until funding can be made available.	TBD
7	Purchase a reverse 911 system that could be operated from the EOC.	All Hazards	No	County Sales Tax, HMGP	All jurisdictions in Charlotte County	Charlotte County Emergency Management	\$25,000				This project has been deferred until funding can be made available.	TBD

The LMS group included mitigation projects for only exiting buildings and infrastructure but for new projects that were considered a priority because of their impact on life safety, protection of property, or the community’s resilience.

## ***SECTION 3: NFIP COMPLIANCE***

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Charlotte County and the City of Punta Gorda are active participants of the National Flood Insurance Program (NFIP). Both jurisdictions began participating in the NFIP in 1991. The current FIRM maps for the area took effect on May 5, 2003. The Floodplain Administrator is the County Building Official or his designee, and that individual is housed in the Building Construction Services Department. In an effort to ensure continued compliance with the program, each participating community will:

1. Continue to enforce their adopted Floodplain Management Ordinance requirements, which include regulating all new development and substantial improvements in Special Flood Hazard Areas (SFHAs).
2. Continue to maintain all records pertaining to floodplain development, which shall be available for public review.
3. Continue to notify the public when there are proposed changes to the floodplain ordinance or Flood Insurance Rate Maps (FIRMs).
4. Continue to promote flood insurance for all properties.
5. Continue Community Rating System (CRS) outreach programs.

Currently, Charlotte County has a few regulations that surpass the NFIP minimum standards. The first is the cumulative for substantial improvement/ substantial damage being 5 years rather than the annual requirement of the NFIP. Another is in the un-numbered A zones, structures must be built three feet above the highest adjacent natural grade which is a foot higher than the NFIP two feet requirement.

### **COMMUNITY RATING SYSTEM (CRS)**

The Community Rating System (CRS) is a voluntary program for NFIP participating communities. The goals of the CRS are to reduce flood losses, to facilitate accurate insurance ratings, and to promote the awareness of flood insurance. The CRS has been developed to provide incentives for communities to go above and beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding. The incentives are in the form of premium discounts. Currently both Charlotte County and the City of Punta Gorda are NFIP compliant, with CRS rankings of 5 and 6 respectively. Charlotte County residents receive a 25% discount and City of Punta Gorda residents receive a 20% discount on their flood insurance premiums.

Since the risk to the hazard of flooding in Charlotte County and the City of Punta Gorda is overwhelmingly high, County and City officials are actively seeking to improve their standings in the CRS. The Local Mitigation Strategy Working Group has made it clear that flood mitigation and NFIP compliance is a top priority by ranking projects relevant to this goal first, second, and third overall (see Mitigation Projects).

The LMS Working Group also wants to keep the initiative of Reducing or Eliminating All Losses in Repetitive Loss Areas, which is an ongoing initiative that was listed in the previous LMS document.

## **STORMWATER MANAGEMENT PLAN**

Charlotte County has developed a Master Stormwater Management Plan (MSMP) and has begun implementation of the capital improvement projects identified as a result of the areas studied.

The Master Stormwater Management Plan (MSMP) was developed in two phases. Phase 1 included development, mapping, and delineation of the drainage basins in Charlotte County; ranking and prioritizing basins based on needs; and a pilot study. The pilot study affected two basins in western Charlotte County known as Oyster Creek and Direct to Myakka River. The study was later referred to as the Oyster Creek / Newgate Drainage Study. As a result of the pilot study, Charlotte County consulted with a technical contractor to perform a detailed hydrologic and hydraulic analysis of the Oyster Creek / Newgate Area. From this analysis, ten capital projects were recommended. Charlotte County has completed construction of these capital projects.

The Phase II MSMP focused on the top ten priority basins identified in Phase I, which included two basins in West County, five basins in Mid County, and three basins in South County. Of these ten, the following basins received a detailed analysis: two basins in West County (which were identified for the pilot study) Oyster Creek and Direct to Myakka River and three basins in Mid County: Pellam - Auburn Basin, Fordham - Niagara Basin, and the Little Alligator Basin. The three basins in South County, which were determined to be less dependent on structural controls, were identified as basins which conveyed overland flow to primary drainage ditches, creeks, or rivers, and therefore, any flooding associated within these basins was directly related to the need for a maintenance program. Maintenance of these primary drainage ditches in south Charlotte County can now be addressed and funded through the South Charlotte Stormwater Unit (MSBU).

### **REDUCING OR ELIMINATING ALL LOSSES IN REPETITIVE LOSS AREAS**

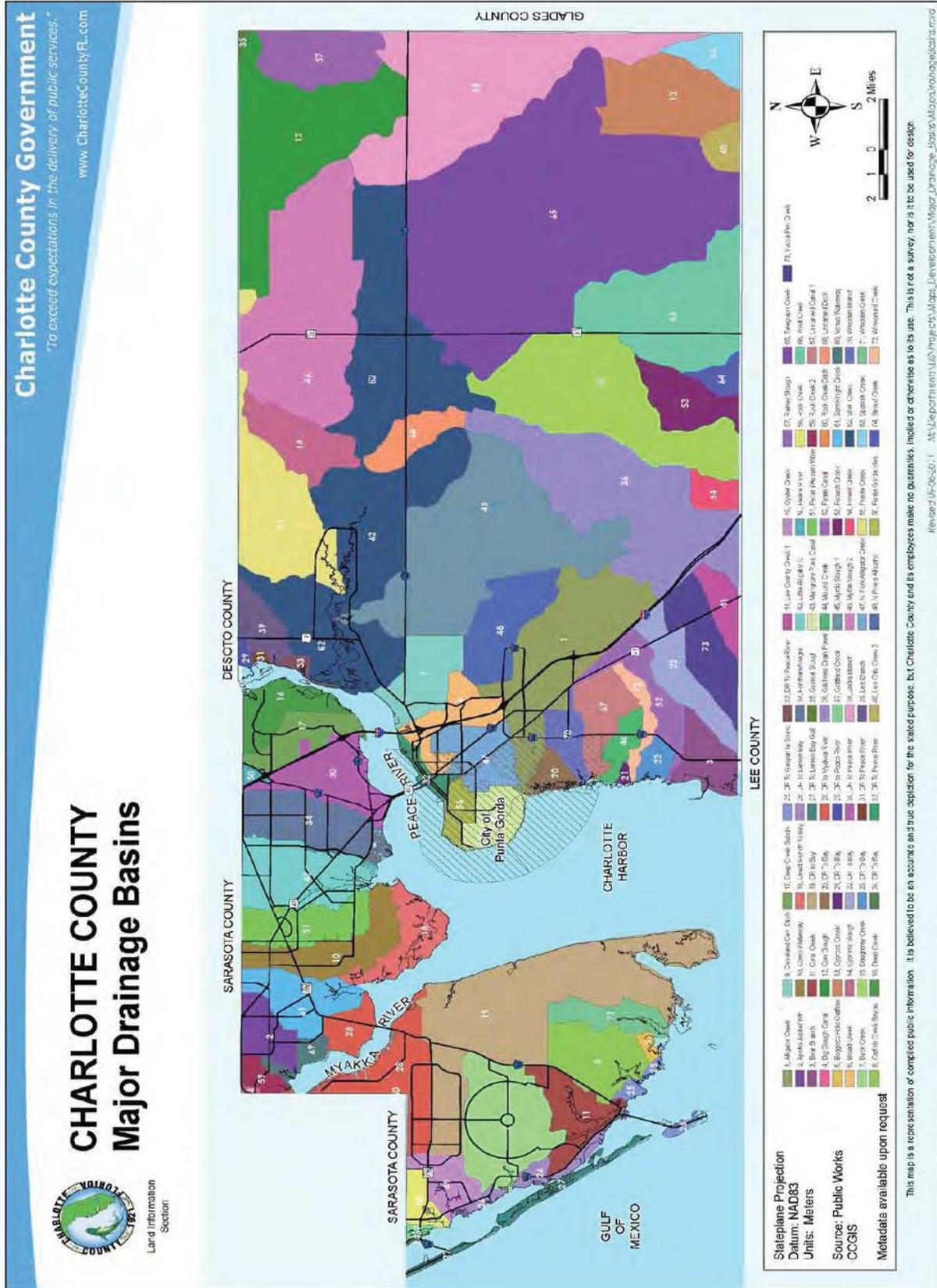
The current planning for this initiative includes the following:

1. Continue to contact all repetitive loss properties on an annual basis to notify them of their flood risk.
2. Notify all repetitive loss property owners of ways that they can reduce flood losses.
3. Maintain database of property owners interested in reducing their flood losses.
4. Notify State of any interest in owners reducing flood losses and facilitate the search for the appropriate funding.

### **Discussion**

This initiative has been in place for several years. Each year, in coincidence with Community Rating System requirements, the County notifies these properties of their flood risk and ways which property owners can reduce their flood risk. This initiative cannot be followed through until there is interest from the repetitive loss property owners. Funding for this project is possible through the Flood Mitigation Assistance Program. Once interest is shown from these property owners, funding from this source will be sought. In a post-disaster scenario, funding from the Hazard Mitigation Grant Program may be sought.

Map IV.3-1 Charlotte County Major Drainage Basins



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## Part V

# Plan Maintenance Process

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## ***SECTION 1: UPDATING THE PLAN***

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### **PLAN UPKEEP**

The Florida Division of Emergency Management (DEM) Local Mitigation Strategy Contract with Charlotte County requires that the LMS Working Group establish an annual process/schedule for updating and revising the Local Mitigation Strategy document to reflect new information, revised goals, and/or new initiatives. The proposal is to revise and update the LMS document during one period each year or after a major disaster declaration in which new mitigation initiatives need to be proposed based on damage assessment. The department responsible for monitoring the plan is the Office of Emergency Management, and the person responsible is the LMS vice Chair. The plan is monitored for changes in policies, procedures, along with any changes that would affect the plan on an ongoing basis. The goals and objectives are considered during this process to ensure they are effective and current with information sources utilized in the following schedule would also be utilized by the workgroup in order to update the LMS.

### **GENERAL UPDATING**

#### **SPRING UPDATE PERIOD**

##### **Hurricanes**

As the annual hurricane season begins on June 1, updating hurricane-related sections of the LMS should be completed prior to May 1 (allowing one month for review/revision). The entire LMS Working Group should be involved in the update process because hurricanes should be considered “county-wide disasters” involving the whole community. Focus should be given to any changes/improvements to evacuation routes, shelter/equipment inventories, any new infrastructure or infrastructure concerns, and population growth. The update should reflect any lessons learned, or changes made to procedures after the previous hurricane season. Information sources include, but are not limited to, the current Regional Hurricane Evacuation Study Update, State/American Red Cross Shelter Guidelines, Census or BEBR data, information generated by the State’s annual hurricane exercise, and statewide experience from recent hurricane events.

##### **Severe Thunderstorms**

This category includes weather phenomena such as tornadoes, sleet or hail, high winds, lightning, and rainfall flooding. In Southwest Florida, these are typically late winter or spring events. Therefore, this section of the LMS should probably be updated prior to April 1. This would hopefully allow review/revision to be completed prior to work on the Hurricane portion. LMS members involved in this update should include building department officials, mobile home/RV park representatives, power and communications company representatives, campground/outdoor recreation area operators, storm water system operators, agricultural agents, and others as needed. The focus of the update should be on reducing future vulnerability to these types of natural hazards; as well as preparing local personnel and resources for periodic small-scale (less than county-wide) evacuations due to these events. Information utilized in the update would primarily be experience gained during the previous storm season.

### **Wildfires**

This section refers to fires which arise (through natural or manmade events) in rural or wild areas, and which may or may not affect human lives and property. As many of these fires are started by lightning and tend to occur in the late winter or early spring, it may be prudent to update this section of the LMS document in conjunction with the Severe Thunderstorm Section (prior to April 1). LMS Working Group members involved in the update should include emergency management and fire personnel, forestry or wildlife officials, agricultural interests, GIS programmers, and residents of areas likely to be affected by wildfires. Focus should be on reducing the likelihood of fire occurrence or using such methods as controlled burns, debris removal activities, and other methods. Secondary focus should be given to improving response and containment methods. Information utilized in the update could include data gathered from the previous fire season and information derived from state and federal resources.

### **WINTER UPDATE PERIOD**

#### **Freezes**

Charlotte County is generally subject to a moderate freeze once every two years. While the greatest economic impact of freezes is to agricultural production, freezes may also necessitate the opening of local shelters and mobilization of personnel and resources for the protection of homeless persons or residents of sub-standard dwellings. Since freezes tend to occur in January or February of each year, the update should probably be accomplished prior to December 1 (to allow review/revision time). LMS Working Group members involved in the update should include extension service agents, agricultural interests, shelter operators, social service agencies, police, fire and EMS personnel, and others as needed. The group's focus should be on improving responses to freeze events. Information utilized in the update effort would primarily be derived from review of the previous year's freeze occurrences, and critiquing of actions taken in response to those events.

#### **Droughts**

In Southwest Florida, drought is primarily a late winter occurrence. Its greatest impact is on agricultural production, with secondary impacts on public water supplies. To avoid impacting the spring update activities, the drought section update should be completed prior to February 1 of each year. The primary LMS members involved should include extension agents, forestry and fire officials (for the wildfire connection), agricultural interests, utility personnel, and representatives of the South West Florida Water Management District and/or storm water operators. Focus should be given to ameliorating drought conditions through water resource allocation, water supply rationing/restrictions, and the use of drought resistant crops (where feasible). Information utilized in the update could include experiences of LMS Working Group members, Water Management District records and knowledge, and data on utility operations.

#### **Exotic Pests and Disease**

Disease refers to diseases of plants and animals, as opposed to human diseases. Such diseases may effect native vegetation or wildlife (with possible spread to domestic plants or animals) or may be confined to domestic livestock or crops. In certain instances (such as rabies), these diseases may pose a threat to human beings. Occurrence of disease is not restricted to any particular time of year. This section will be updated in the winter because the spring update period is likely to be more concerned with storm event disasters. The LMS Working Group

members assigned to this update task could include agricultural interests, forestry or wildlife officials, extension services, South West Florida Water Management District, emergency management and public health officials, and/or veterinary interests. Focus should be given to improving disease tracking and prevention (both in the natural environment and in domestic crops and livestock), and in developing response procedures. Information sources include reports and written materials from all relevant agencies and interests, as well as member experience.

### **New Regulations**

New regulations can be referred to as a change in City/County code in regards to building restrictions. This section could be updated in the winter or spring update period, whichever one allows for more time. The LMS Working Group members assigned to this update task could include building officials, zoning officials, and emergency management.

### **ANNUAL LMS UPDATE REQUIREMENT**

Chapter 27p-22 (Hazard Mitigation Grant Program) requires submittal of an Annual LMS Update to the Florida Division of Emergency Management by the last working weekday of each January. To meet this deadline, the following items will be updated in late December/early January of each year. This update will be completed by Office of Emergency Management staff (or their designee) with input from Working Group members.

- Working Group membership- will be updated to incorporate changes.
- Goals and Objectives- will be reviewed for changes.
- Mitigation Initiatives- projects will be monitored and reprioritized as needed.
- Existing Planning Mechanisms- will be monitored and changed as needed.
- Changes to the Working Group Organization and/or Planning Process- as needed.
- Refer to general updating section to review process.

### **5-YEAR LMS UPDATE REQUIREMENT**

To meet the 5-year LMS Update requirement, Office of Emergency Management staff (or their designee) with input from Working Group members will review the entire document to be sure that the information included accurately reflects the status of Charlotte County and the City of Punta Gorda. The process will include a thorough revision of every section of the plan and will seek to actively involve the LMS Working Group and the public throughout the entire update process. All sections of the LMS document will be updated as necessary. This will allow the public and other organizations to have opportunities for involvement and input for the update.

The Working Group strives to include the public in its LMS process. To that end, efforts to reach out to more sectors of public are underway. Some of these efforts are as follows:

- Make the Charlotte County/City of Punta Gorda Local Mitigation Strategy document available for review at local libraries and governmental offices.
- Place the LMS document and/or links to it on several websites to increase exposure. These websites include, but are not limited to, the Charlotte County official website, the City of Punta Gorda official website, and the Southwest Florida Regional Planning Council website.
- Place announcements of future LMS Working Group meetings on websites, in newspapers, and emails to increase exposure.

- Place the mitigation pamphlet that was developed during this current five-year update process at local institutions, available free to the public.

While these efforts to include the public in the overall LMS process are important, it is not an easy task. Interest in hazard mitigation increased due to the impacts of the 2004 hurricane season, but has since begun to wane. Some individuals fallaciously believe, in fact, that since the devastation Charlotte County suffered in 2004 was so profound that it must be a very long time before something similar happens again. It is one of the tasks of the LMS Working Group to overcome such obstacles in obtaining and maintaining public involvement.

### **LMS Changes and Modifications**

This plan is a living document that is subject to changes in defining procedural methods and techniques. A change to the plan does not require ratification by the Charlotte County Board of County Commissioners unless there is a major change in policy. Authority for changes to this plan is delegated to the Charlotte County Division of Emergency Management. The Charlotte County Emergency Management Director is responsible for the coordination of changes with affected agencies, and after concurrence, may make changes to this plan. All changes will be applied electronically and the updates will be available automatically. A notification of the changes will be sent to all stakeholders.

### **EVALUATING THE PLAN**

The local hazard mitigation plan is to be evaluated on an annual basis by the Office of Charlotte County Emergency Management. The Office of Charlotte County Emergency Management was selected as the organization to evaluate the mitigation plan since the Office serves as support staff for LMS working group, a committee with representatives from all of the participating jurisdictions and organizations. In this role, the Office of Emergency Management has responsibility for maintaining the master copy of the LMS, for scheduling and facilitating meetings of the LMS working group, and collaborating with adjacent counties, the State of Florida and the Federal Emergency Management Agency regarding the mitigation plan. In addition, frequently, the Office of Emergency Management is the contact point and coordinator for post-disaster funding opportunities for implementation of the proposed mitigation initiatives incorporated into the plan.

The following represents evaluation criteria:

- Assessing recent emergency events and their impact, as well as the resultant influence and/or adjustments that are needed in the mitigation planning process
- Evaluating the progress in addressing the established mitigation goals and objectives, primarily through the development and implementation of initiatives for each goal and objective to ensure progress is being made
- Assessing the extent to which the mitigation plan is effectively interacting with other jurisdictional plans and programs related to mitigation issues, such as being incorporated into a jurisdiction's comprehensive plan, emergency management plan, capital improvement plan, storm water management plan, etc.

## SECTION 2: INCORPORATION OF THE LMS INTO OTHER PLANNING MECHANISMS

The fact that there was a markedly increased level of participation by individuals representing many different divisions of local government during the current update period bodes well for the prospect of the approved LMS being meaningfully incorporated into other local planning mechanisms.

- Comprehensive Emergency Management Plan: The CEMP has been approved from the state. Once the LMS is approved the CEMP will be updated to reflect the most current data.
- Charlotte County Standard Building Code: It is hoped that the individuals in charge of maintaining the building codes will review the LMS for potential hazard vulnerabilities that the code as it stands might not sufficiently address. A copy of this approved LMS will be provided on the counties website for review.
- Long Range Transportation Plan (LRTP): The current LRTP (2030) contains very few elements directly related to natural hazard mitigation. Aspects of goal 3, of the LMS (Reduce the vulnerability of critical facilities, public facilities, and historic structures from natural hazards.) are particularly relevant to the LRTP and the Charlotte County Emergency Management office will work with the MPO in incorporating it into the 2035 LRTP.
- Article 14, City of Punta Gorda Land Development Regulations, Flood Damage Prevention: This article addresses building codes and other regulations for structures located in all areas of special flood hazard within the City of Punta Gorda's jurisdiction. Included under this regulation are a minimum finished floor elevation and a requirement to obtain a flood proofing certificate. Decisions informed by the updated flood hazard evaluation in this LMS could result in further additions to this article.
- City of Punta Gorda Emergency Plan: Just as the county's CEMP could benefit from updated hazard information in the LMS, Punta Gorda's stands to as well. Since this LMS is a Charlotte County-Punta Gorda multijurisdictional plan, the city has actively participated in the update process.
- City of Punta Gorda Comprehensive Plan: This document in its present form already contains extensive hazard mitigation initiatives. Nevertheless, the city will examine the approved LMS update for elements that could further improve the hazard mitigation aspect of its comprehensive plan.
- City of Punta Gorda Downtown Redevelopment Plan: During the ongoing annual update process, the city has the potential to strengthen this plan by proposing mitigation initiatives, informed by content in the LMS, which will harden vulnerable downtown structures against disaster.

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Appendix A

Local Mitigation Strategy

Working Group Meeting

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# 2014 Work Group

The screenshot shows the website for Charlotte County, Florida, with the URL [www.charlottecountyfl.gov/news/Pages/Local-Mitigation-Strategy-Working-Group-Annual-Meeting-June-27.aspx](http://www.charlottecountyfl.gov/news/Pages/Local-Mitigation-Strategy-Working-Group-Annual-Meeting-June-27.aspx). The page features a navigation menu with options like HOME, NEWS, TRANSPARENCY, WORKING, LIVING, PLAYING, and QUESTIONS. A large banner image displays the word "NEWS" on a newspaper roll. Below the banner, a "Popular Links" sidebar lists various local government resources. The main content area is titled "Local Mitigation Strategy Working Group Annual Meeting June 27" and includes a date of "6/23/2014" and a "For Immediate Release" notice. The article text states: "CHARLOTTE COUNTY, Fla. (June 23, 2014) – The Charlotte County/Punta Gorda Local Mitigation Strategy Working Group will hold its annual public meeting at 11:30 a.m. June 27 at the Charlotte County Public Safety Building, 26571 Airport Road, Punta Gorda. The Local Mitigation Strategy is designed to lessen the human environmental and economic cost of disaster events. The public is invited to the meeting, and may provide input. For more information contact the Charlotte County Office of Emergency Management at 941.833.4000."

Obama for refusing to follow his advice, insisted on MSNBC's "Morning Joe" that, "Gen. (David)

undercut Iraq's stability. Subsequent action by Bush's transition appointees to eliminate

The Charlotte County/Punta Gorda Local Mitigation Strategy Working Group will hold its annual public meeting at 11:30 a.m on June 27 at the Charlotte County Public Safety Building located at 26571 Airport Road in Punta Gorda. The Local Mitigation Strategy is designed to lessen the human environmental and economic costs of disaster events.

The public is invited to the meeting, and may provide input. For more information contact the Charlotte County Office of Emergency Management at 941.833.4000.



**From:** Pinder, Ellen  
**Cc:** Dallenbach, Mike; Jubb, Claire; Taylor, Marianne; Hawkins-Garland, Dee; Jones, Brian; Hebert, Robert; Johnston, David; Haque, Hovie; Mallet, Gerard; Edwards, Kevin; Bliss, Karen; Stickley, Lynne; Trepal, Matthew; Koenig, Mike; Baird, Tracie; Pederzoli, Gary; Allen, Richard; Sallade, Wayne; Ellis, Steven; Nocheck, Elizabeth; Free, Tim; Scott, Tommy; Polk, Paul; Graham, Scott; "Rick Christman"; "patrick.mahoney@freshfromflorida.com"; "Ray Briggs"; "Ray Briggs"; "Mitchell Austin"; "Patrick Fuller (patrick.fuller@em.myflorida.com)"; Pinder, Ellen; English, Brian; Jones, Elaine  
**Subject:** Local Mitigation Strategy Planning Meeting  
**Date:** Tuesday, June 17, 2014 2:49:23 PM  
**Attachments:** image001.png  
image002.png

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Planning Committee,

The Office of Emergency Management would like to invite you to our annual Local Mitigation Strategy Update meeting to be held at the Emergency Operations on the 27<sup>th</sup> of June at 11:30am.

The purpose of the annual LMS meeting is to discuss initiatives that are ongoing or any future projects that might be applicable to the County and/or your specific discipline. The LMS plan is developed by the county to reduce and or eliminate the risks associated with natural and man-made hazards. This meeting will decide what projects will be added to the 2015 LMS plan that will be sent to the state and FEMA for approval.

I have attached the project evaluation worksheet and the project ranking notes. Please talk with your department about possible projects that can be added to the 2015 LMS plan update.

The 2013 projects list has also been attached. Please look through the 2013 list and update your departments project statuses.

If you have any questions please call my office.

## Ellen F. Pinder

**From:** Pinder, Ellen  
**To:** "agabites@comcast.net"; Allen, Richard; "patrick.fuller@em.myflorida.com"; "maustin@ci.punta-gorda.fl.us"; Baird, Tracie; "bartone@flva.state.fl.us"; Bliss, Karen; "henry.kurban@doh.state.fl.us"; "Lane@Englewood-Fire.com"; "christe@doacs.state.fl.us"; "jerry.oliv@yourcharlotteschools.net"; "april.prestipino@yourcharlotteschools.net"; "david.lupinetti@yourcharlotteschools.net"; Dallenbach, Mike; Taylor, Marianne; Polk, Paul; Graham, Scott; Edwards, Kevin; Nocheck, Elizabeth; Haque, Hovie; Ellis, Steven; "rhiggs@ci.punta-gorda.fl.us"; "hoibbs@pgorda.us"; Pinder, Ellen; Hamell, Gary; Hebert, Robert; "alan.holbach@charlottefl.com"; "jacobsh@redcross-charlotte.org"; Jones, Brian; Koenig, Mike; "john.fanning@chomelesscoalition.org"; Mallet, Gerard; "Milosky, Bernard"; "linda.landry@hcahealthcare.com"; Pederzoli, Gary; "sherman.mbinson@ccso.org"; "darin.chandler@ccso.org"; Sallade, Wayne; "cland@edison.edu"; Jones, Tina; "mhoney@doacs.state.fl.us"; Stickley, Lynne; "joseph.pepe@flhealth.gov"; Trepal, Matthew; "walker@wfrpc.org"; Milligan, David; Salomon, Teri; Scott, Tommy; Jubb, Claire; Johnston, David; Hawkins-Garland, Dee  
**Subject:** LMS Projects List Approval  
**Date:** Monday, October 20, 2014 11:12:47 AM  
**Attachments:** 2015 LMS Projects - November 2013.xlsx  
**Importance:** High

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LMS Workgroup,

Over the last few months, the LMS workgroup has been compiling all the project submissions for the 2015 Local Mitigation Strategy project list. The attached list is the completed project list with the ranking order that was decided by the workgroup. Please go over the list and make sure the projects associated with your department are correct. Please make sure you approve or reject this submission. (There should be an option at the top of this email.)

Please contact me at my office or by email if you have any questions or would like more information.

Thanks,

Ellen F. Pinder



*Friday*  
*June 27<sup>th</sup>, 2014*  
*11:30 AM*  
*CHARLOTTE*  
*COUNTY EOC*

*Charlotte*  
*County/City of*  
*Punta Gorda*  
*Local Mitigation*  
*Strategy (LMS)*  
*Working Group*



## **AGENDA**

- *Welcome & Introductions*
  
- *What is the Local Mitigation Strategy?*
  - *What projects were funded because Charlotte County had an approved LMS?*
  - *How does this process work?*
  
- *Work Group*
  - *Project proposals*
  - *Sections Update*
  
- *Final project submission July 31st*
  
  
- *Adjournment*

LMS Working Group Sign In  
June, 27 2014

	PRINTED NAME	AGENCY	CONTACT #	EMAIL	SIGNATURE
1	Lynne Stucky	CC EM	833-4004	lynne.stucky@charlottefl.com	<i>Lynne Stucky</i>
2	EUGEN PINDER	CC-EM	833-4003	EUGEN.PINDER@CHARLOTTEFL.COM	<i>Eugen Pinder</i>
3	APRIL PRESHINO	CCPS	257-0808	april.preshino@yourcharlotteschools.net	<i>April Preshino</i>
4	David Luivetti	CCPS	255-0808	David.Luivetti@yourcharlotteschools.net	<i>David Luivetti</i>
5	Karen Blis	CC-Engineering	575-3642	Karen.Blis@charlottefl.com	<i>Karen Blis</i>
6	MIKE DESJARDIS	CCPS	255-0808	Mike.Desjardis@yourcharlotteschools.net	<i>Mike Desjardis</i>
7	Jonny Nasser	CCPS	833-4000	jonny.nasser@charlottefl.com	<i>Jonny Nasser</i>
8	GARY PEDEER	GIS	574-5512	GARY.PEDEER@UT.COM	<i>Gary Pedeer</i>
9	Dawn King	Facilities	833-5610	dawn.king@yourcharlotteschools.net	<i>Dawn King</i>
10	KAREN ARDS	IT-GIS	764-5527	KAREN.ARD@CHARLOTTEFL.COM	<i>Karen Ards</i>
11	MIKE DALLEBACH	Public Works	575-3635	MIKE.DALLEBACH@CHARLOTTEFL.COM	<i>Mike Dallebach</i>
12	LAINE SLIB	Com Dev	943-1241	laine.slub@charlottefl.com	<i>Laine Slub</i>
13	Chip Hogue	Com Dev	628-1080	Chip.Hogue@charlottefl.com	<i>Chip Hogue</i>
14	Holden Gibbs	PGFD	575-5529	holdengibbs@pgfd.us	<i>Holden Gibbs</i>
15	Jason Fair	FIRE/EMS	628-0369	JASON.FAIR@CHARLOTTEFL.COM	<i>Jason Fair</i>
16	Marianne Taylor	Fire/EMS Public Safety	833-5600	Marianne.taylor@charlottefl.com	<i>Marianne Taylor</i>
17	Ray Briggs	PGFD	628-4616	rbriggs@pgfd.us	<i>Ray Briggs</i>
18	MICHELLE AUSPIN	PUNTA GORDA	575-3335	M.AUSPIN@PUNTA.GORDA.US	<i>Michelle Auspin</i>
19	Wayne Salgado	Char. EM	833-4001	Wayne.Salgado@charlottefl.com	<i>Wayne Salgado</i>
20	Scott Gubman	CC Property Appraiser	7743-1493	scottg@charlottefl.com	<i>Scott Gubman</i>
21	EUGEN PINDER	C.C. - C.I.M	833-4003	EUGEN.PINDER@CHARLOTTEFL.COM	<i>Eugen Pinder</i>
22	DAVID MILLIGAN	FACILITIES	743-1394	DAVID.MILLIGAN@CHARLOTTEFL.COM	<i>David Milligan</i>
23	TERI SALOMON	FACILITIES	743-1905	Teri.Salomon@Charlotfl.com	<i>Teri Salomon</i>
24	Bruce R. Bullett	CCH	764-4509	Bruce.Bullett@charlottefl.com	<i>Bruce R Bullett</i>
25	JOSIA PEPE	FL COH-CHAROTC	624-7200	JOSIA.PEPE@FLCOH.GOV	<i>Josia Pepe</i>





**Tuesday**  
**December, 11th 2013**  
**9:30 AM**  
**CHARLOTTE**  
**COUNTY EOC**

**Charlotte**  
**County/City of**  
**Punta Gorda**  
**Local Mitigation**  
**Strategy (LMS)**  
**Working Group**



## **AGENDA**

- **Welcome & Introductions**
  
- **Housekeeping**
  
- **Old Business**
  - **LMS Update**
  - **Projects Update**
  - **Grants**
  - **Post Development Plan**
  
- **New Business**
  - **New Projects/New Opportunities**
  - **Better Oppourtunties**
  
- **Questions / Comments**
  
- **Next Meeting Date**

PRINTED NAME	AGENCY	CONTACT #	EMAIL	SIGNATURE
1	Richard Cooper	585-1996	Richard.Cooper@floridapower.com	<i>Richard Cooper</i>
2	Bernard Mulesky	764-4304	Bernard.Mulesky@floridapower.com	<i>Bernard Mulesky</i>
3	Richard Christman	460-1333	Richard.Christman@floridapower.com	<i>Richard Christman</i>
4	Edward Vuolo	575-5737	Edward.Vuolo@floridapower.com	<i>Edward Vuolo</i>
5	Amber Jalle	621-7281	Amber.Jalle@floridapower.com	<i>Amber Jalle</i>
6	Dr. H. Charlotte	621-7265	Charlotte.H@floridapower.com	<i>Dr. H. Charlotte</i>
7	MIKE DALLENBACH	575-5655	Mike.Dallenbach@floridapower.com	<i>Mike Dallenbach</i>
8	Paul Polk	743-1471	Paul.Polk@floridapower.com	<i>Paul Polk</i>
9	Clairie Subah	743-1241	Clairie.Subah@floridapower.com	<i>Clairie Subah</i>
10	Tom Free	575-3640	Tom.Free@floridapower.com	<i>Tom Free</i>
11	Ray Brigg	575-5529	Ray.Brigg@floridapower.com	<i>Ray Brigg</i>
12	Mike Jones	575-5529	Mike.Jones@floridapower.com	<i>Mike Jones</i>
13	Stephen Bowman	764-4919	Stephen.Bowman@floridapower.com	<i>Stephen Bowman</i>
14	Mike Koenig	764-4595	Mike.Koenig@floridapower.com	<i>Mike Koenig</i>
15	Mike Walker	935-5003	Mike.Walker@floridapower.com	<i>Mike Walker</i>
16	James Stuckey	941-2019	James.Stuckey@floridapower.com	<i>James Stuckey</i>
17	Patrick Thompson	941-2019	Patrick.Thompson@floridapower.com	<i>Patrick Thompson</i>
18	Patricia Fuller	575-8235	Patricia.Fuller@floridapower.com	<i>Patricia Fuller</i>
19	MARK GERING	941-2019	Mark.Gering@floridapower.com	<i>Mark Gering</i>
20	Thomas Mawer	743-1242	Thomas.Mawer@floridapower.com	<i>Thomas Mawer</i>

PRINTED NAME	AGENCY	CONTACT #	EMAIL	SIGNATURE
26	Kevin Edwards	941-764-5507	Kevin.Edwards@floridapower.com	<i>Kevin Edwards</i>
27	George MacCoy	941-833-4000	George.MacCoy@floridapower.com	<i>George MacCoy</i>
28	Lyndee Sticker	941-833-4000	Lyndee.Sticker@floridapower.com	<i>Lyndee Sticker</i>
29	Bill VanHelden			<i>Bill VanHelden</i>
30				

# 2012 Work Group

The Sun Classified Page 12 E/N/Sunday, January 30, 2011

**NOTICE OF**  
after the sale.  
Publish: January 23, 30, 2011  
232598 2527709

**NOTICE OF MEETING**  
**3126**

The Charlotte County/Punta Gorda Local Mitigation Strategy Working Group will host its annual public meeting February 3, 2011 at 10am at the Charlotte County Public Safety Complex located at 26571 Airport Road, Punta Gorda. The Local Mitigation Strategy is designed to lessen the human, environmental, and economic costs of disaster events. For more information, please contact the Charlotte County Office of Emergency Management at 941-833-4000.  
Publish: January 30, 2011  
163352 2531413

**NOTICE OF SALE**

**OTHERS** &  
Bids &  
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Newspapers  
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ONLY S ea. \$30  
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941-697-

or stainless  
ond \$24,  
**CARPENTE**

wood, windo  
counter rep  
941-627-06

**HOUSEHOLD**

**PLANT STAND** 36" tall.  
Green. Drawer. Photo av  
941-266-1016

**POOL TABLE** Picture 30x  
es black framed pool  
sticks. \$30, OBO 941-731

**PRINT BY MARCUS**  
Framed, Signed with Pape  
941-889-7592

**PRINT BY TRACY DE**  
Signed, Framed & Nu  
\$130 941-889-7592

**PROPANE TURKEY** des  
used once! \$35, OBO  
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**REVERSE OSMOSIS WA**  
TEM WATERSHIELD. \$50  
863-722-0015

**RUG DOCTOR** Mighty  
hose, upholstery tool ar  
solution. \$325 201-224-

**SALTON HOT Tray Gre**  
ties. Excellent conditi  
941-475-1275

**SEWING MACHINE** Mor  
diti. condition \$50 C



**Tuesday**  
**July 31, 2012**  
**10 AM**  
**CHARLOTTE**  
**COUNTY EOC**

**Charlotte**  
**County/City of**  
**Punta Gorda**  
**Local Mitigation**  
**Strategy (LMS)**  
**Working Group**



## **AGENDA**

- **Welcome & Introductions**
  
- **Housekeeping**
  
- **Old Business**
  - **LMS Update**
  - **Grants**
  - **Post Development Plan**
  
- **New Business**
  
- **Questions / Comments**
  
- **Next Meeting Date**
  
- **Adjournment**

# 2011 Work Group

# SUN

NEWSPAPERS  
Charlotte • DeSoto • Englewood • North Port • Venice

**PUBLISHER'S AFFIDAVIT OF PUBLICATION**

STATE OF FLORIDA  
COUNTY OF CHARLOTTE:

Before the undersigned authority personally appeared Diane Brinckman, who on oath says that she is legal clerk of the (Charlotte Sun, Englewood Sun, The Arcadian, North Port Sun, Venice Gondolier Sun), a newspaper published at Charlotte Harbor in Charlotte County, Florida; that the attached copy of advertisement, being a Notice of Meeting, was published in said newspaper in the issues of:

January 30, 2011

Affiant further says that the said newspaper is a newspaper published at Charlotte Harbor, in said Charlotte County, Florida, and that the said newspaper has heretofore been continuously published in said Charlotte County, Florida, Sarasota County, Florida and DeSoto County, Florida, each day and has been entered as periodicals matter at the post office in Punta Gorda, in said Charlotte County, Florida, for a period of 1 year next preceding the first publication of the attached copy of advertisement; and affiant further says that he or she has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

The Charlotte County/Punta Gorda Local Mitigation Strategy Working Group will host its annual public meeting February 3, 2011 at 10am at the Charlotte County Public Safety Complex located at 26571 Airport Road, Punta Gorda. The Local Mitigation Strategy is designed to lessen the human, environmental, and economic costs of disaster events. For more information, please contact the Charlotte County Office of Emergency Management at 941-833-4000.  
Published: January 30, 2011  
169552 / 2581413

*Diane Brinckman*  
(Signature of Affiant)

Sworn and subscribed before me this 31st day of January 2011.

# 12.78

*Amber Freeman*  
(Signature of Notary Public)



Personally known  OR Produced Identification   
Type of Identification Produced \_\_\_\_\_

*Dana - Need Receiver (if was pulled) or Check*

### Charlotte County LMS Workgroup Meeting – February 3, 2011

Name	Agency	Phone	Email
Dana Harper	CCEM	941 833 4000	dana.harper@charlottefl.com
Lynne Stickley	CCEM	941 833 4004	Lynne.Stickley@charlottefl.com
GARY PEDERZULLI	GIS	941 764-3512	GARY.PEDERZULLI@CHARLOTTEFL.COM
Henry Byrden	DOH	941-624-7200	henry-byrden@doh.state.fl.us
CHAD LORENZ	PERSE POWER RES. MED. CTR	941-766-4750	chad.lorenz@hma.com
MITCHELL AUSGIA	CITY OF PUNTA GORDA	575-3335	MASTIN@CI.PUNTA-GORDA.FL.US
MIKE DALLENBACH	CHARLOTTE COUNTY PUBLIC WORKS	941-575-5635	MIKE.DALLENBACH@CHARLOTTEFL.COM
Patrick Maloney	DOF	941-737-9056	patrick.maloney@fresh-from-florida.com
Jie Shao	CC Building & Growth Management	941-743-1272	jie.shao@charlottefl.com
Gerry Mauret	CCEM	941 833 4000	gerard.mauret@charlottefl.com

Charlotte County LMS Workgroup Meeting – February 3, 2011

Name	Agency	Phone	Email
BERNIE MILOSKY	CCU	941-764-4304	BERNARD.MILOSKY@CHARLOTTEFL.COM
Wayne Sawade	CCEM	941 8334001	wayne.sawade@charlottefl.com

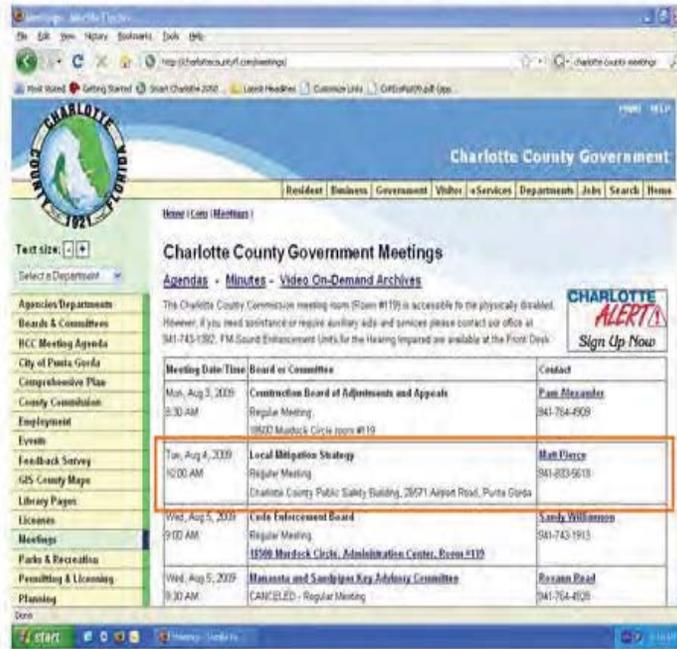
**Local Mitigation Strategy Working Group  
Agenda**

February 3, 2011  
10 am

1. Welcome and Introductions
2. LMS Update
3. Grants (Utilities and SRL)
4. Post Disaster Redevelopment Plan
5. Questions/ Comments

# 2010 Work Group

Figure II-3. County Website Public Notification of the Second LMS Meeting



Charlotte County LMS Workgroup Meeting - June 30, 2009

Name	Agency	Phone	Email
(Lanea) Luca Bass	Kimberly Place	(941) 625-0030	(Lanea) luca_1971@yahoo.com
Karen Bliss	Charlotte County PW	941-575-3642	Karen.Bliss@charlottefl.com
John DeGiovine	Charlotte Co PW	941-575-3650	John.degiovine@charlottefl.com
STEVEN ELLIS	CC GROWTH MGMT	941-764-4954	steven.ellis@charlottefl.com
Kevin Edwards	IT	941-764-5507	Kevin.edwards@charlottefl.com
Vince LaBarra	BCS	743-1214	VinceL@charlottefl.com
Chip Hague	BCS	683-1080	Chip.Hague@charlottefl.com
Lynne Stokley	EM Dept	833-4004	Lynne.Stokley@ " " " "
Richard Allen	Charlotte County	764-4393	Richard.Allen@char.St.com
Alan Helber	CC PW	575-3624	alan.helber@charlottefl.com
MIKE DALLENBACH	CC PW	575-3635	MIKE.DALLENBACH@CHARLOTTEFL.COM
Norma Overmyer	Brookdale Senior Living - Sterling House	941-743-9300	NORMA.OVERMYER@BrookdaleSeniorLiving.com

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# Appendix B

## Hazard Summary Sheets

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*List of Hazard Summary Sheets*

**Flooding** ..... B.2

**Tropical Storm/ Category 1 Hurricane**..... B.3

**Category 2 Hurricane** ..... B.4

**Category 3 Hurricane**..... B.5

**Category 4 Hurricane**..... B.6

**Category 5 Hurricane**..... B.7

**Severe Weather and Tornadoes**..... B.8

**Wildfire**..... B.9

**Drought**..... B.10

**Extreme Heat**..... B.11

**Winter Storms/ Freezes** ..... B.12

**Erosion** ..... B.13

**Sinkholes** ..... B.14

**Seismic Events** ..... B.15

**Tsunami** ..... B.16

**Solar Storm**..... B.17

**Technological Hazards** ..... B.18

**Hazardous Materials** ..... B.19

**Nuclear Power Plant**..... B.20

**Mass Migration** ..... B.21

**Terrorism**..... B.22

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Flooding</b>	<input type="checkbox"/> Annual event <input checked="" type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years
Flooding occurs in the county when there is severe weather or is cyclone-related.	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• High risk to loss of life and injury, displacement, increased distress</li> <li>• May affect drinking water; can increase risks to health</li> <li>• Risk to life and safety while responding to populations affected by flooding</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• Operations may be interrupted if affected by flooding</li> <li>• Staffing difficulties are possible (personnel unable to drive to work)</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• High impact</li> <li>• Utility outages, transportation infrastructure closures, and isolated populations</li> <li>• Varying levels of damage to structures in low-lying areas</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• High risk to disruption of basic life support systems, typically for short duration</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• The public's confidence in the county's ability to respond to a flooding situation would be based on our ability to restore services in a timely manner.</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• Impact dependent on severity of flooding</li> <li>• High impact on insurance industry</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• Increased risk of exposure to hazardous materials</li> <li>• Displacement of wildlife may increase public health and safety issues</li> <li>• Increased arboviral vectors</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Tropical Storm/Category 1 Hurricane</b>	<input checked="" type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years
Forty-four land-falling Category 1 hurricanes have affected the state since 1851. 136 tropical storms have affected the state since 1900.	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Injuries or casualties caused by preventable circumstances</li> <li>• Increased fatigue and distress</li> <li>• Food and water issues if residents are unprepared to shelter in place for duration of event</li> <li>• Injuries/fatalities possible when responding to calls for service during the event</li> <li>• Increased fatigue and stress from hazardous conditions</li> <li>• Status of responder’s family will affect the responder’s ability to perform his/her duties</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• Local governments may have to shut down non-essential functions for duration of event</li> <li>• Charlotte County EOC is rated to withstand the winds of a Category 5 hurricane</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• Minor damage to buildings and structures</li> <li>• Damage primarily to unanchored mobile homes; some damage to poorly constructed signs</li> <li>• Also, some coastal road flooding and minor pier damage</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Minor disruption in the service delivery.</li> <li>• Some operations may choose to continue business while others may suspend actions</li> </ul>
<i>Public’s Confidence in Jurisdiction’s Governance</i>	<ul style="list-style-type: none"> <li>• The public’s confidence in the county’s ability to respond to a hurricane would be based on our ability to restore services in a timely manner.</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• Highly unlikely to affect the overall economic condition; however, uncontrolled rumors could worsen the situation</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• Negligible damage to environment</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Category 2 Hurricane</b>	<input type="checkbox"/> Annual event <input checked="" type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years
<p>Thirty-four land falling Category 2 hurricanes have affected the state since 1851.</p>	
<i>Impacts</i>	
<b>Public and Responders</b>	<ul style="list-style-type: none"> <li>• Evacuation of homes near coast that cannot withstand Category 1 hurricane conditions</li> <li>• Injuries/fatalities caused from preventable circumstances.</li> <li>• Injuries/fatalities possible when responding to calls for service after the event</li> <li>• Increased fatigue and stress from hazardous conditions</li> <li>• Status of responder's family will affect the responder's ability to perform his/her duties</li> </ul>
<b>Continuity of Operations and Program Operations</b>	<ul style="list-style-type: none"> <li>• Local governments will shut down non-essential functions for duration of event</li> <li>• Implementation of continuity of operations (COOP) for essential functions.</li> <li>• County EOC is rated to withstand the winds of a Category 5 Hurricane</li> </ul>
<b>Property, Facilities, and Infrastructure</b>	<ul style="list-style-type: none"> <li>• Considerable damage to mobile homes, poorly constructed signs, and piers</li> <li>• Some roofing material, door, and window damage of buildings</li> <li>• Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane center</li> <li>• Small craft in unprotected anchorages break moorings</li> </ul>
<b>Delivery of Services</b>	<ul style="list-style-type: none"> <li>• Disruption in the delivery of services for the duration of the event</li> <li>• Non-essential services are suspended for several days to a week until recovery functions are implemented</li> </ul>
<b>Public's Confidence in Jurisdiction's Governance</b>	<ul style="list-style-type: none"> <li>• The public's confidence in the county's ability to respond to a hurricane would be based on our ability to restore services in a timely manner.</li> </ul>
<b>Economic Condition</b>	<ul style="list-style-type: none"> <li>• Low impact to the industries in the area of storm's path; however, could also affect industries in other areas if import/export schedules are interrupted</li> <li>• Uncontrolled rumors could worsen the situation</li> </ul>
<b>Environment</b>	<ul style="list-style-type: none"> <li>• Considerable damage to shrubbery and trees, with some trees blown down</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Category 3 Hurricane</b>	<input type="checkbox"/> Annual event <input checked="" type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years
Twenty-nine land falling Category 3 hurricanes have impacted the state since 1851, with 4 occurring in the 2004 and 2005 seasons (2004: Ivan, Jeanne; 2005: Dennis, Wilma).	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Evacuation of low-lying residences within several blocks of the shoreline may be required</li> <li>• Increased fatigue and distress</li> <li>• Food and water issues if residents are unprepared to shelter in place for duration of event</li> <li>• Injuries/fatalities caused from hazardous conditions</li> <li>• Injuries/fatalities possible when responding to calls for service after the event</li> <li>• Increased fatigue and stress from hazardous conditions</li> <li>• Status of responder's family will affect the responder's ability to perform his/her duties</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• May have to relocate if government offices are damaged</li> <li>• Implementation of COOP for essential functions</li> <li>• County EOC is rated to withstand the winds of a Category 5 Hurricane.</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• Some structural damage to small residences and utility buildings, with a minor amount of curtain wall failures</li> <li>• Low-lying escape routes are cut by rising water 3-5 hours before arrival of the center of the hurricane</li> <li>• Debris</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Disruption in the delivery of services for the duration of the event</li> <li>• Non-essential services are suspended for several weeks to a month until recovery operations are implemented</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• The public's confidence in the county's ability to respond to a hurricane would be based on our ability to restore services in a timely manner.</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• Low to moderate impact to the industries in the area of storm's path; however, could also affect industries in other areas if import/export schedules are interrupted</li> <li>• Uncontrolled rumors could worsen the situation</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• Damage to shrubbery and trees, with foliage blown off trees and large trees blown down.</li> <li>• Terrain continuously lower than 5 feet above sea level may be flooded inland 8 miles</li> <li>• Increase in debris and hazardous materials</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Category 4 Hurricane</b>	<input type="checkbox"/> Annual event <input checked="" type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years
Six land falling Category 4 hurricanes have affected the state since 1851.	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Massive evacuation of residential areas as far inland as 6 miles</li> <li>• Injuries/fatalities caused from hazardous conditions (e.g., flood, fire, downed electrical lines).</li> <li>• Injuries/fatalities possible when responding to calls for service after the event</li> <li>• Increased fatigue and stress from hazardous conditions</li> <li>• Status of the responder's family will affect the responder's ability to perform his/her duties</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• May have to relocate if government offices are damaged; implementation of COOP for essential functions.</li> <li>• County EOC is rated to withstand the winds of a Category 5 Hurricane.</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• More extensive curtain wall failures, with some complete roof structure failures on small residences</li> <li>• Complete destruction of mobile homes</li> <li>• Extensive damage to doors and windows</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Disruption in the delivery of services for the duration of the event</li> <li>• Non-essential services are suspended for a month to several months until recovery operations are implemented</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• The public's confidence in the county's ability to respond to a hurricane would be based on our ability to restore services in a timely manner.</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• Moderate to extensive impact to the industries in the area of storm's path; however, could also affect industries in other areas if import/export schedules are interrupted</li> <li>• Uncontrolled rumors could worsen the situation</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• Shrubs and trees are blown down</li> <li>• Terrain lower than 10 feet above sea level may be flooded, requiring massive evacuation of residential areas as far inland as six miles</li> <li>• Contamination of inland environment with seawater mixed with debris and other hazardous materials could affect aquifer</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Category 5 Hurricane</b>	<input type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input checked="" type="checkbox"/> Greater than 30 years
<p>The Labor Day Hurricane in 1935 and Hurricane Andrew in 1992 are the only land falling Category 5 storms in a 100-year period for the state.</p>	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Massive evacuation of residential areas on low ground within 5–10 miles of the shoreline may be required</li> <li>• Injuries/fatalities possible when responding to calls for service after the event</li> <li>• Increased fatigue and stress from hazardous conditions</li> <li>• Status of the responder’s family will affect the responder’s ability to perform his/her duties</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• May have to relocate if local government offices are damaged</li> <li>• Implementation of COOP for essential functions</li> <li>• County EOC is rated to withstand the winds of a Category 5 hurricane</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• Complete roof failure on many residences and industrial buildings</li> <li>• Some complete building failures, with small utility buildings blown over or away</li> <li>• Complete destruction of mobile homes</li> <li>• Major damage to lower floors of structures located less than 15 feet above sea level and within 500 yards of the shoreline</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Disruption in the delivery of services for the duration of the event</li> <li>• Non-essential services are suspended for a month to several months until recovery operations are implemented</li> </ul>
<i>Public’s Confidence in Jurisdiction’s Governance</i>	<ul style="list-style-type: none"> <li>• The public’s confidence in the county’s ability to respond to a hurricane would be based on our ability to restore services in a timely manner.</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• Extensive to catastrophic impact to the industries in the area of storm’s path; however, could also affect industries in other areas if import/export schedules are interrupted</li> <li>• Uncontrolled rumors could worsen the situation</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• All shrubs, trees, and signs blown down</li> <li>• Contamination of inland environment with seawater mixed with debris and other hazardous materials could affect aquifer</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Severe Weather and Tornadoes</b>	<input checked="" type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years
<p>Severe weather affects Florida every day during the summer season. However, extensive severe weather events occur an average of five times annually, most often in the spring and fall. Extreme strong winds level tropical storm force and intense lengthy period of lightning. Annually, fatalities occur as a result of tornadoes.</p>	
<i>Impacts</i>	
<b>Public and Responders</b>	<ul style="list-style-type: none"> <li>• Potential for minimal loss of life and injuries resulting from severe weather</li> <li>• Potential for mass fatalities and large number of injuries resulting from tornadoes</li> <li>• Requires shelter operations</li> <li>• Major impact on mental and physical health</li> <li>• Injuries/fatalities possible in areas affected by tornadoes</li> <li>• Protective actions required for responders from hazards; personal protective equipment (PPE) is required for emergency worker safety from downed utility line, hazardous materials, and debris; basic responder needs must be met.</li> <li>• Status of responder's family will affect the responder's ability to perform his/her duties</li> </ul>
<b>Continuity of Operations and Program Operations</b>	<ul style="list-style-type: none"> <li>• Impact unlikely to cause relocation of government operations as a result of severe weather; locally affected government agencies may be forced to relocate to continue essential operations as a result of impact from tornadoes</li> </ul>
<b>Property, Facilities, and Infrastructure</b>	<ul style="list-style-type: none"> <li>• Severe weather may cause utility outages and transportation infrastructure closures</li> <li>• Tornadoes may cause massive failures in electrical, communications, and other critical infrastructures</li> </ul>
<b>Delivery of Services</b>	<ul style="list-style-type: none"> <li>• Local disruption in services, typically of short duration.</li> <li>• With regard to tornadoes, the area impacted may have widespread disruptions</li> <li>• 911 systems may be overwhelmed</li> </ul>
<b>Public's Confidence in Jurisdiction's Governance</b>	<ul style="list-style-type: none"> <li>• The public's confidence in the counties ability to respond to a tornado would be based on our ability to restore services in a timely manner.</li> </ul>
<b>Economic Condition</b>	<ul style="list-style-type: none"> <li>• Moderate to extensive impact on affected area's economy depending on the type of hazard</li> </ul>
<b>Environment</b>	<ul style="list-style-type: none"> <li>• Moderate impact</li> <li>• Impact on environmental tolerances can easily be overwhelmed from any of the hazards classified under severe weather</li> <li>• Debris and hazardous materials could be released into the environment</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Wildfire</b>	<input checked="" type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years
Wildfires occur annually in Florida. Since 2009, there have been 284 fires and 5150 acres burned in Charlotte County.	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Health affected from smoke inhalation</li> <li>• Displacement possible</li> <li>• Special needs populations will require more attention</li> <li>• Increased distress</li> <li>• Increased exposure to smoke inhalation</li> <li>• High risk to health and safety of responders</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• If affected, operations may have to be relocated or suspended</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• Moderate impact to the transportation and utility infrastructure, damage to properties</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Moderate impact to the delivery of services</li> <li>• Services likely to be temporarily interrupted in affected areas</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• Extensive impact to wildlife and vegetation</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• Impact on Florida's agricultural and timber industry</li> <li>• High impact on insurance industry</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• The public's confidence is reflected in the Governor's approval rating. The Governor kept a high approval rating during the 2007 wildfires.</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Drought</b>	<input type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input checked="" type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years
<p>Since 1900, nine drought cycles (typically of two-year periods) have occurred in Florida. Most often, the area of impact was regional rather than Statewide. Most summer seasons have micro-heat waves based on a geographic area of Florida. Florida averages 12 heat-related fatalities annually.</p>	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Drought conditions may require water use restrictions, which could cause distress to agricultural concerns</li> <li>• Increase in heat-related illnesses</li> <li>• Infants and children, elderly and access and functional needs populations, and pets may require more attention</li> <li>• Increased risk of dehydration</li> <li>• Prolonged exposure to severe conditions</li> <li>• Overexertion required by job will increase risk of heat-related illness</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• Low impact to government</li> <li>• Prolonged drought periods may require the suspension of services</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• Low impact to property, facilities, and infrastructure</li> <li>• Heat-sensitive components may be compromised</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Low impact to the delivery of services</li> <li>• Non-essential services (e.g., park and recreational area watering, public property watering) may be suspended</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• Extensive impact to wildlife and vegetation</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• High impact to agri-business, public utilities, and other industries reliant upon water for production or services</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• Low impact</li> <li>• A reduction in ground water supplies creates a situation conducive to sinkholes</li> <li>• Non-domesticated animals will be directly impacted Flora may die off</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Extreme Heat</b>	<input checked="" type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years
<p>While extended extreme heat events are not as common, the State of Florida routinely experiences excessive heat outlooks, watches, and warnings/advisories throughout the State.</p>	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Extreme heat leads to an increase in heat-related illnesses</li> <li>• Infants and children, elderly and access and functional needs populations, and pets may require more attention</li> <li>• Increased risk of dehydration</li> <li>• Prolonged exposure to severe conditions</li> <li>• Overexertion required by job will increase risk of heat-related illness</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• Negligible impact to government</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• Negligible impact to property, facilities and infrastructure</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Low impact to the delivery of services</li> <li>• Non-essential services (e.g., outdoor government activities) may be suspended to mitigate impacts to staff and attendees.</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• Extensive impact to wildlife and vegetation</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• High impact to tourism, agri-business, public utilities, and other industries tasked with caring for the population or providing services for comfort</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• Low impact</li> <li>• A reduction in ground water supplies creates a situation conducive to sinkholes</li> <li>• Non-domesticated animals will be directly impacted Flora may die off</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Winter Storms/Freezes</b>	<input type="checkbox"/> Annual event <input checked="" type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years
<p>During the winter of 1989–1990, 26 Floridians died of hypothermia. Because of normally mild temperatures, Florida homes often lack adequate heating and insulation and the Florida outdoor lifestyle leads to danger for those not prepared. In addition to the actual temperature, when the wind blows, a wind chill is experienced on exposed skin.</p>	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Risk of hypothermia and extreme loss of heat if residents are not prepared for conditions</li> <li>• Infants and children, elderly and access and functional needs populations, and pets will require more attention</li> <li>• Low impact to emergency workers</li> <li>• Exposure to extended periods of cold weather increases the risk for hypothermia, frostbite, fatigue, etc.</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• Low impact to government</li> <li>• Prolonged severe cold weather periods may strain utility company</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• High impact</li> <li>• Risk of electrical outages and frozen or broken water pipes</li> <li>• Road closures due to ice or debris on roadway</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Low Impact</li> <li>• Impacted services would include medical facilities, nursing homes, and assisted living facilities</li> <li>• Organizations that use vehicles to provide services could be subjected to harsher conditions</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• Extensive impact to wildlife and vegetation</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• Prolonged periods of extreme cold weather could greatly affect agriculture, especially susceptible plant and animal industries within the state</li> <li>• Impact on Florida's produce can have national repercussions</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• Moderate impact</li> <li>• Damage or loss of susceptible plants and animals</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Erosion</b>	<input checked="" type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years
<p>During the 2004 and 2005 hurricane seasons, tropical storms and hurricanes made landfall along the counties coastline. Nearly all of the counties sandy beach shorelines were affected.</p>	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Low impact on majority of public</li> <li>• There may be isolated incidents of distressed citizens</li> <li>• Public may not be able to visit beaches while erosion repair is underway</li> <li>• Low impact to responders</li> <li>• There may be isolated incidents of responding to calls</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• Minimal impact on operations</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• Moderate impact on property near or on the coastlines</li> <li>• Facilities and infrastructure near the coast could be impacted</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Low impact</li> <li>• Services normally provided in the areas near the coast may be shut down during repairs</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• Coastal erosion is a concern within the county. How erosion is prevented and corrected can affect public confidence. Residents on the coast, whose property value declines because of erosion, may lose confidence if no actions are taken to restore the coastline of their property</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• \$3 million and \$5 million per mile to restore a coastal shore</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• Moderate impact to coastline. Beaches serve as a natural barrier</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Sinkholes</b>	<input type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input checked="" type="checkbox"/> Greater than 30 years
<p>There is only one known sinkhole in Charlotte County. Sinkholes are a common naturally occurring geological phenomenon and one of the predominant landforms in Florida.</p>	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Low impact on public outside of immediate collapse</li> <li>• Risk to health if drinking water is contaminated due to sinkhole encroaching into the aquifer</li> <li>• Low impact to emergency workers</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• Minimal effect on the state's COOP</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• Minimal impact overall, but isolated homes or businesses may be affected</li> <li>• Sinkholes can affect the infrastructure by draining unfiltered water from streams, lakes, and wetlands directly into the aquifer. If a sinkhole directly affects a structure, it could be extremely costly to repair.</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Low impact on delivery of services</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• Residents affected by sinkholes may look to local and state governments for assistance.</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• Low impact to all industries</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• Moderate impact to the environment; sinkholes can affect the environment by threatening water supplies by draining water from streams, lakes, and wetlands directly into the aquifer; this could affect wildlife habitats</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Seismic Events</b>	<input type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input checked="" type="checkbox"/> Greater than 30 years
<p>Seismic events were more common approximately 30–100 years ago, ranging from slight tremors to a 6 on Modified Mercalli intensity scale.</p>	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Moderate impact</li> <li>• Risk to health and safety from falling debris</li> <li>• Stress and fatigue are also possible if incident is severe enough</li> <li>• Risk to life and safety while responding to affected populations</li> <li>• Stress and fatigue from working long hours</li> <li>• Status of responder's family will affect the responder's ability to perform his/her duties</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• Moderate impact</li> <li>• Alternate facilities may be unusable; COOP of last resort will be used</li> <li>• Resources to continue operations may be limited (i.e., phones, Internet)</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• High impact</li> <li>• Major damage to property, facilities, and infrastructure</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• High impact on services if infrastructure is disrupted</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• Public's confidence will be reflected in the response to the situation.</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• High impact on overall economic condition if seismic event is severe enough</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• High impact</li> <li>• Fallen trees and debris could be hazardous for wildlife</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Tsunami</b>	<input type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input checked="" type="checkbox"/> Greater than 30 years
Even though Charlotte County is located next to the Gulf of Mexico the risk of a Tsunami is low. According to NOAA the surge of a Tsunami would be very insignificant due to the depth and mass of the Gulf of Mexico.	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Minimal impacts to the public; more than two-thirds of the population resides near the coast</li> <li>• May be overwhelmed with calls for response due to increased stress on residents.</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• There would be minimal impact on the county after a Tsunami.</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• Minimal impact on property near or on the coastlines, may cause beach erosion.</li> <li>• There would be minimal impact on the county after a Tsunami.</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• There would be minimal impact on the county after a Tsunami.</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• There would be minimal impact on the county after a Tsunami.</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• There would be minimal impact on the county after a Tsunami.</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• There would be minimal impact on the county after a Tsunami.</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Solar Storm</b>	<input type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input checked="" type="checkbox"/> Greater than 30 years
An emerging threat with potential impacts to the electric grid, satellites, and technology.	
<i>Impacts</i>	
<b>Public and Responders</b>	<ul style="list-style-type: none"> <li>• More frequent, minor solar storms have a low impact on the overall population.</li> <li>• Rare, major solar storms would have a high impact on the overall population.</li> <li>• Responders may have difficulty due to widespread disruptions in the electric grid and lack of fuel.</li> </ul>
<b>Continuity of Operations and Program Operations</b>	<ul style="list-style-type: none"> <li>• Low impact to COOP for more frequent minor solar storms</li> <li>• Rarer, major solar storms would severely disrupt COOPs because of widespread disruptions to the electric grid, and communications</li> </ul>
<b>Property, Facilities, and Infrastructure</b>	<ul style="list-style-type: none"> <li>• Minor impacts for more frequent solar storms because the infrastructure can handle small energy fluctuations</li> <li>• Major solar storms could severely affect Infrastructure on a regional level if there are disruptions to the electric grid</li> </ul>
<b>Delivery of Services</b>	<ul style="list-style-type: none"> <li>• Low impacts to delivery of service from more frequent solar storms</li> <li>• Potential for high impact on delivery of services if wide spread disruption to power.</li> <li>• Communications, and GPS services could also be disrupted leading to difficulties in delivery of services</li> </ul>
<b>Public's Confidence in Jurisdiction's Governance</b>	<ul style="list-style-type: none"> <li>• High confidence in handling minor, more frequent solar storms</li> <li>• Low confidence in handling rare, major solar storms</li> </ul>
<b>Economic Condition</b>	<ul style="list-style-type: none"> <li>• Potential for high to catastrophic impact on industries if the electricity grid fails.</li> </ul>
<b>Environment</b>	<ul style="list-style-type: none"> <li>• Low impact to the environment overall</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Technological Hazards</b>	<input type="checkbox"/> Annual event <input checked="" type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years
The State Watch Office receives information regarding technological hazards on a daily basis. The type and magnitude vary.	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Low impact on the overall population. Risk to health and safety in areas of occurrence</li> <li>• Shelter-in-place may cause distress and fatigue</li> <li>• Low impact to health and safety of responders as long as training and PPE are up-to-date and meet specifications</li> <li>• Critical Incident Stress Debriefing may be required</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• Low impact to COOP</li> <li>• Operations within the vicinity areas affected</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• Facilities near the affected areas may have to shut down</li> <li>• Properties may have to undergo decontamination</li> <li>• Infrastructure on a regional level could be severely affected if shut down</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Low impact on delivery of services</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• High confidence in the county governance based on compliance of regulations. Florida has many facilities that house extremely hazardous materials per the EPA's listing of said chemicals all year round.</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• Low impact on the overall economic condition</li> <li>• Plenty of facilities in the State of Florida with duplicative nature can ensure there would never be a shortage of materials</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• Low impact to the environment overall; however, the areas affected could have moderate impact depending on the type of hazard</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Hazardous Materials</b>	<input checked="" type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years
782 hazardous materials events were reported to the State Watch Office from July 2011 to June 15, 2012. 6.8 percent of these reports involved evacuation of individuals from the area of impact.	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• High impact to the health and safety of people living in the impacted area</li> <li>• May require shelter-in-place</li> <li>• Protective actions required for responders</li> <li>• Critical Incident Stress Debriefing may be required</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• Low impact to COOP</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• High impact to property, facilities, and infrastructure</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Low impact to the delivery of services</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• The public's confidence will be reflected in the response to .</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• Low impact to the economic and financial community of the impacted area</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• High impact to the areas of highest concentration</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Nuclear Power Plant</b>	<input type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input type="checkbox"/> Every 30 years or less <input checked="" type="checkbox"/> Greater than 30 years
<p>The closest nuclear power plant is located 115 miles away on the opposite coast of Charlotte County.</p>	
<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Low impact to the health and safety of personnel.</li> <li>• Protective actions required to protect responders from radiation exposure</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• Low impact to COOP</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• Low impact to property, facilities, and infrastructure</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Low impact to the delivery of services</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• Due to the location of the tow power plants in Florida the publics confidence is high.</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• Low impact to the economic and financial community of the impacted area</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• Low impact to the areas of highest concentration of radiological particulate</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Mass Migration</b>	<input type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input checked="" type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years

The State of Florida’s refugee program is the largest in the nation, resettling more than 25,000 refugees and Cuban/Haitian entrants each year. Florida also becomes home to more than 2,000 asylum-seekers eligible for services each year.

<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Mass influx to population density will affect the public, most likely in the southern part of the state and along major transit routes</li> <li>• Possible increase in crime rate</li> <li>• Civil disturbances may occur if presence of migrating population upsets the current residents of the area</li> <li>• Moderate impact on responders</li> <li>• Responders may be overwhelmed by increased calls to service</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• Civil unrest could lead to disruption in operations in affected areas</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• Moderate impact to property, facilities, and infrastructure</li> <li>• Influx in population could overtax these resources</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• Moderate impact on services due to overwhelming demand caused by population influx</li> <li>• Medical services, in particular, may be unable to meet the demand</li> </ul>
<i>Public’s Confidence in Jurisdiction’s Governance</i>	<ul style="list-style-type: none"> <li>• How the county responds to incidents of mass migration will affect the public’s confidence. Members of the public may be of the same background as the people who migrate and may react to how the migrants are treated.</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• Moderate impact</li> <li>• Increased demands of deliverable goods</li> <li>• Increased crime in the affected areas could affect the tourism industry</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• Massive increase in population could strain environment</li> </ul>

## Hazard Summary

<i>Hazard</i>	<i>Frequency of Occurrence</i>
<b>Terrorism</b>	<input type="checkbox"/> Annual event <input type="checkbox"/> Every 5 years or less <input type="checkbox"/> Every 10 years or less <input checked="" type="checkbox"/> Every 30 years or less <input type="checkbox"/> Greater than 30 years

On September 11, 2001, the United States was attacked by terrorists. Florida has many targets of opportunity for terrorists—political, industrial, historical, and military. South Florida experienced an Anthrax outbreak in 2001. In addition, several terrorist plots directed at Florida residents have been thwarted in recent years.

<i>Impacts</i>	
<i>Public and Responders</i>	<ul style="list-style-type: none"> <li>• Moderate impact to the health and safety of people as the result of a CBRNE dispersal</li> <li>• Low impact if a result from a cyber-attack on an industry (identity theft or banking attack)</li> <li>• This could increase stress and fatigue</li> <li>• Localized higher impacts near any attacks involving explosives</li> <li>• Protective actions required to protect responders from hazardous exposure</li> <li>• Increase in stress and fatigue</li> </ul>
<i>Continuity of Operations and Program Operations</i>	<ul style="list-style-type: none"> <li>• High impact on the COOP if CBRNE dispersal is in vicinity</li> </ul>
<i>Property, Facilities, and Infrastructure</i>	<ul style="list-style-type: none"> <li>• High impact to property, facilities, and infrastructure depending on what is targeted</li> </ul>
<i>Delivery of Services</i>	<ul style="list-style-type: none"> <li>• High impact to the delivery of services if either form of terrorism is conducted; a cyber attack on the mail system could result in delays; a delay in receiving mail financially affects the state</li> </ul>
<i>Public's Confidence in Jurisdiction's Governance</i>	<ul style="list-style-type: none"> <li>• National and state security have become important topics in light of current events. Poor prevention and response to an attack within the state could result in low public confidence.</li> </ul>
<i>Economic Condition</i>	<ul style="list-style-type: none"> <li>• High impact to the economic condition of the impacted area, since terrorism attempts to change the operations of a target</li> <li>• Industries, infrastructure, and/or the delivery of services could be shut down from the incident</li> </ul>
<i>Environment</i>	<ul style="list-style-type: none"> <li>• High impact to environment if CBRNE dispersal</li> <li>• Florida's aquifer system is close to the surface, which results in extremely low tolerances for the notification of spills</li> </ul>

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# Appendix C

## HAZUS Reports

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# Tropical Storm

## Hazus-MH: Hurricane Event Report

**Region Name:** Flood and Hurricane

**Hurricane Scenario:** Probabilistic 10-year Return Period

**Print Date:** Friday, June 06, 2014

**Disclaimer:**

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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## General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Florida

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 713.81 square miles and contains 23 census tracts. There are over 63 thousand households in the region and has a total population of 141,627 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 84 thousand buildings in the region with a total building replacement value (excluding contents) of 11,596 million dollars (2006 dollars). Approximately 92% of the buildings (and 81% of the building value) are associated with residential housing.

## Building Inventory

### General Building Stock

Hazus estimates that there are 84,658 buildings in the region which have an aggregate total replacement value of 11,596 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Tot
Residential	9,397,477	81.0%
Commercial	1,602,176	13.8%
Industrial	286,386	2.5%
Agricultural	42,817	0.4%
Religious	175,778	1.5%
Government	32,764	0.3%
Education	58,131	0.5%
<b>Total</b>	<b>11,595,529</b>	<b>100.0%</b>

### Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 722 beds. There are 33 schools, 22 fire stations, 4 police stations and 1 emergency operation facilities.

## Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

## Building Damage

### General Building Stock Damage

Hazus estimates that about 23 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 10 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	441	99.25	3	0.70	0	0.04	0	0.01	0	0.00
Commercial	4,248	99.04	39	0.91	2	0.05	0	0.00	0	0.00
Education	74	99.25	1	0.74	0	0.00	0	0.00	0	0.00
Government	46	99.36	0	0.64	0	0.00	0	0.00	0	0.00
Industrial	1,484	99.15	13	0.84	0	0.01	0	0.00	0	0.00
Religion	291	99.41	2	0.59	0	0.01	0	0.00	0	0.00
Residential	77,638	99.52	356	0.46	20	0.03	0	0.00	0	0.00
<b>Total</b>	<b>84,222</b>		<b>413</b>		<b>22</b>		<b>0</b>		<b>0</b>	

Table 3: Expected Building Damage by Building Type : 10 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	3,781	99.01	37	0.97	1	0.02	0	0.00	0	0.00
Masonry	44,263	99.45	230	0.52	15	0.03	0	0.00	0	0.00
MH	11,513	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	3,181	98.93	33	1.02	2	0.06	0	0.00	0	0.00
Wood	21,512	99.52	99	0.46	4	0.02	0	0.00	0	0.00

### Essential Facility Damage

Before the hurricane, the region had 722 hospital beds available for use. On the day of the hurricane, the model estimates that 722 hospital beds (only 100.00%) are available for use. After one week, 100.00% of the beds will be in service. By 30 days, 100.00% will be operational.

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		Expected Loss of Use < 1 day
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	
EOCs	1	0	0	1
Fire Stations	22	0	0	22
Hospitals	3	3	0	3
Police Stations	4	0	0	4
Schools	33	0	0	33

## Induced Hurricane Damage

### Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 33,548 tons of debris will be generated. Of the total amount, 25,788 tons (77%) is Other Tree Debris. Of the remaining 7,760 tons, Brick/Wood comprises 20% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 61 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 6,231 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

## Social Impact

### Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 1 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 141,627) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the hurricane is 15.1 million dollars, which represents 0.13 % of the total replacement value of the region's buildings.

### Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 15 million dollars. 0% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 97% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

**Table 5: Building-Related Economic Loss Estimates**  
(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Property Damage</u>						
	Building	13,218.92	365.49	42.97	40.35	13,667.73
	Content	893.27	11.16	0.97	0.53	895.93
	Inventory	0.00	0.00	0.27	0.09	0.36
	<b>Subtotal</b>	<b>14,102.18</b>	<b>376.65</b>	<b>44.21</b>	<b>40.97</b>	<b>14,564.02</b>
<u>Business Interruption Loss</u>						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	342.57	7.44	0.14	0.26	350.40
	Rental	223.44	0.00	0.00	0.00	223.44
	Wage	0.00	0.00	0.00	0.00	0.00
	<b>Subtotal</b>	<b>566.01</b>	<b>7.44</b>	<b>0.14</b>	<b>0.26</b>	<b>573.84</b>
<u>Total</u>						
	<b>Total</b>	<b>14,668.19</b>	<b>384.09</b>	<b>44.35</b>	<b>41.23</b>	<b>15,137.86</b>

### Appendix A: County Listing for the Region

Florida  
- Charlotte

### Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		Total
		Residential	Non-Residential	
Florida				
Charlotte	141,627	9,397,477	2,198,052	11,595,529
<b>Total</b>	<b>141,627</b>	<b>9,397,477</b>	<b>2,198,052</b>	<b>11,595,529</b>
<b>Study Region Total</b>	<b>141,627</b>	<b>9,397,477</b>	<b>2,198,052</b>	<b>11,595,529</b>

# Category 1 Hurricane

## Hazus-MH: Hurricane Event Report

**Region Name:** Flood and Hurricane

**Hurricane Scenario:** Probabilistic 20-year Return Period

**Print Date:** Friday, June 06, 2014

**Disclaimer:**

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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## General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Florida

**Note:**

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 713.81 square miles and contains 23 census tracts. There are over 63 thousand households in the region and has a total population of 141,627 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 84 thousand buildings in the region with a total building replacement value (excluding contents) of 11,596 million dollars (2006 dollars). Approximately 92% of the buildings (and 81% of the building value) are associated with residential housing.

## Building Inventory

### General Building Stock

Hazus estimates that there are 84,658 buildings in the region which have an aggregate total replacement value of 11,596 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Tot
Residential	9,397,477	81.0%
Commercial	1,602,176	13.8%
Industrial	286,386	2.5%
Agricultural	42,817	0.4%
Religious	175,778	1.5%
Government	32,764	0.3%
Education	58,131	0.5%
<b>Total</b>	<b>11,595,529</b>	<b>100.0%</b>

### Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 722 beds. There are 33 schools, 22 fire stations, 4 police stations and 1 emergency operation facilities.

## Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

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## Building Damage

### General Building Stock Damage

Hazus estimates that about 461 buildings will be at least moderately damaged. This is over 1% of the total number of buildings in the region. There are an estimated 1 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 20 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	414	93.25	24	5.35	4	1.00	2	0.37	0	0.02
Commercial	4,011	93.62	228	5.32	48	1.11	2	0.05	0	0.00
Education	71	94.49	4	4.98	0	0.52	0	0.01	0	0.00
Government	43	93.03	3	6.16	0	0.79	0	0.02	0	0.00
Industrial	1,415	94.55	71	4.77	9	0.59	1	0.09	0	0.01
Religion	277	94.43	15	5.13	1	0.43	0	0.01	0	0.00
Residential	73,425	94.12	4,196	5.38	385	0.49	6	0.01	1	0.00
<b>Total</b>	<b>79,656</b>		<b>4,541</b>		<b>448</b>		<b>11</b>		<b>1</b>	

Table 3: Expected Building Damage by Building Type : 20 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	3,585	93.86	207	5.43	27	0.71	0	0.01	0	0.00
Masonry	41,689	93.67	2,547	5.72	286	0.60	5	0.01	0	0.00
MH	11,492	99.82	18	0.14	4	0.03	0	0.00	1	0.01
Steel	3,004	93.42	189	5.25	41	1.26	2	0.07	0	0.00
Wood	20,184	93.38	1,350	6.24	77	0.36	4	0.02	0	0.00

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## **Essential Facility Damage**

Before the hurricane, the region had 722 hospital beds available for use. On the day of the hurricane, the model estimates that 514 hospital beds (only 71.00%) are available for use. After one week, 100.00% of the beds will be in service. By 30 days, 100.00% will be operational.

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		Expected Loss of Use < 1 day
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	
EOCs	1	0	0	1
Fire Stations	22	0	0	22
Hospitals	3	3	0	2
Police Stations	4	0	0	4
Schools	33	0	0	31

## **Induced Hurricane Damage**

### **Debris Generation**

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 212,734 tons of debris will be generated. Of the total amount, 179,077 tons (84%) is Other Tree Debris. Of the remaining 33,657 tons, Brick/Wood comprises 33% of the total, Reinforced Concrete/Steel comprises 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 442 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 22,618 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

## **Social Impact**

### **Shelter Requirement**

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 59 households to be displaced due to the hurricane. Of these, 13 people (out of a total population of 141,627) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the hurricane is 80.5 million dollars, which represents 0.69 % of the total replacement value of the region's buildings.

### Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 80 million dollars, 1% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 92% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

**Table 5: Building-Related Economic Loss Estimates**  
(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Property Damage</u>						
	Building	63,406.65	2,647.64	363.07	384.40	67,001.75
	Content	4,471.87	610.54	116.98	69.78	5,269.17
	Inventory	0.00	14.77	28.59	5.42	48.78
	<b>Subtotal</b>	<b>67,878.52</b>	<b>3,472.96</b>	<b>508.64</b>	<b>459.60</b>	<b>72,319.71</b>
<u>Business Interruption Loss</u>						
	Income	0.00	652.16	4.21	33.81	690.19
	Relocation	3,716.18	589.96	25.01	62.96	4,374.10
	Rental	2,124.94	306.36	3.00	5.58	2,439.89
	Wage	0.00	426.23	7.02	224.06	657.32
	<b>Subtotal</b>	<b>5,841.12</b>	<b>1,954.72</b>	<b>39.24</b>	<b>326.42</b>	<b>8,161.49</b>
<u>Total</u>						
	<b>Total</b>	<b>73,719.64</b>	<b>5,427.67</b>	<b>547.88</b>	<b>786.02</b>	<b>80,481.21</b>

### Appendix A: County Listing for the Region

Florida  
Charlotte

### Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		Total
		Residential	Non-Residential	
<b>Florida</b>				
Charlotte	141,627	9,397,477	2,198,052	11,595,529
<b>Total</b>	<b>141,627</b>	<b>9,397,477</b>	<b>2,198,052</b>	<b>11,595,529</b>
<b>Study Region Total</b>	<b>141,627</b>	<b>9,397,477</b>	<b>2,198,052</b>	<b>11,595,529</b>

# Category 2 Hurricane

## Hazus-MH: Hurricane Event Report

**Region Name:** Flood and Hurricane

**Hurricane Scenario:** Probabilistic 50-year Return Period

**Print Date:** Friday, June 06, 2014

**Disclaimer:**

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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## General Description of the Region

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The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Florida

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 713.81 square miles and contains 23 census tracts. There are over 63 thousand households in the region and has a total population of 141,627 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 84 thousand buildings in the region with a total building replacement value (excluding contents) of 11,596 million dollars (2006 dollars). Approximately 92% of the buildings (and 81% of the building value) are associated with residential housing.

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## Building Inventory

### General Building Stock

Hazus estimates that there are 84,658 buildings in the region which have an aggregate total replacement value of 11,596 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Tot
Residential	9,397,477	81.0%
Commercial	1,602,176	13.8%
Industrial	286,386	2.5%
Agricultural	42,817	0.4%
Religious	175,778	1.5%
Government	32,764	0.3%
Education	58,131	0.5%
<b>Total</b>	<b>11,595,529</b>	<b>100.0%</b>

### Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 722 beds. There are 33 schools, 22 fire stations, 4 police stations and 1 emergency operation facilities.

Hurricane Event Summary Report

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## Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name: Probabilistic

Type: Probabilistic

Hurricane Event Summary Report

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## Building Damage

### General Building Stock Damage

Hazus estimates that about 6,211 buildings will be at least moderately damaged. This is over 7% of the total number of buildings in the region. There are an estimated 113 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 50 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	285	64.18	94	21.14	41	9.25	21	4.70	3	0.73
Commercial	2,830	65.99	809	18.86	537	12.51	111	2.59	2	0.05
Education	51	68.12	14	18.93	8	10.61	2	2.34	0	0.00
Government	30	65.96	9	18.83	5	11.73	1	2.48	0	0.00
Industrial	1,021	68.18	289	17.99	161	10.78	44	2.94	2	0.12
Religion	197	67.24	63	21.60	27	9.36	5	1.81	0	0.00
Residential	55,253	70.82	17,521	22.46	4,741	6.08	393	0.50	106	0.14
<b>Total</b>	<b>59,667</b>		<b>18,780</b>		<b>5,520</b>		<b>577</b>		<b>113</b>	

Table 3: Expected Building Damage by Building Type : 50 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	2,556	66.93	684	17.90	490	12.84	89	2.33	0	0.00
Masonry	30,447	68.41	10,793	24.25	2,957	6.64	274	0.62	36	0.08
MH	11,297	98.13	112	0.97	73	0.63	5	0.04	26	0.23
Steel	2,130	66.25	529	16.47	446	13.86	108	3.35	2	0.07
Wood	14,695	67.98	5,807	25.94	1,179	5.45	111	0.51	24	0.11

### Hurricane Event Summary Report

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### Essential Facility Damage

Before the hurricane, the region had 722 hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (only 0.00%) are available for use. After one week, 0.00% of the beds will be in service. By 30 days, 100.00% will be operational.

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
EOCs	1	0	0	1
Fire Stations	22	0	0	22
Hospitals	3	3	0	0
Police Stations	4	0	0	4
Schools	33	4	0	4

### Hurricane Event Summary Report

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## Induced Hurricane Damage

### Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 635,709 tons of debris will be generated. Of the total amount, 520,895 tons (82%) is Other Tree Debris. Of the remaining 114,814 tons, Brick/Wood comprises 49% of the total, Reinforced Concrete/Steel comprises of 1% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 2294 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 57,462 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

## Social Impact

### Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 598 households to be displaced due to the hurricane. Of these, 154 people (out of a total population of 141,627) will seek temporary shelter in public shelters.

## Hurricane Event Summary Report

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## Economic Loss

The total economic loss estimated for the hurricane is 405.1 million dollars, which represents 3.49 % of the total replacement value of the region's buildings.

### Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 405 million dollars. 2% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 80% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

**Table 5: Building-Related Economic Loss Estimates**

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Property Damage</u>						
	Building	240,386.48	30,819.13	4,980.56	4,710.45	280,896.62
	Content	40,034.88	14,830.64	3,051.32	1,961.15	59,877.98
	Inventory	0.00	511.42	626.13	84.96	1,222.51
	<b>Subtotal</b>	<b>280,421.36</b>	<b>46,161.19</b>	<b>8,658.01</b>	<b>6,756.56</b>	<b>341,997.11</b>
<u>Business Interruption Loss</u>						
	Income	78.40	2,517.23	64.75	320.77	2,981.15
	Relocation	29,602.85	7,997.71	624.55	1,236.56	39,461.67
	Rental	11,928.34	4,149.53	58.57	106.71	16,243.16
	Wage	184.79	2,663.04	108.56	1,432.54	4,388.94
	<b>Subtotal</b>	<b>41,794.38</b>	<b>17,327.52</b>	<b>856.44</b>	<b>3,096.58</b>	<b>63,074.92</b>
<u>Total</u>						
	<b>Total</b>	<b>322,215.74</b>	<b>63,488.71</b>	<b>9,514.45</b>	<b>9,853.14</b>	<b>405,072.03</b>

## Hurricane Event Summary Report

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**Appendix A: County Listing for the Region**

Florida  
- Charlotte

**Appendix B: Regional Population and Building Value Data**

	Population	Building Value (thousands of dollars)		Total
		Residential	Non-Residential	
Florida				
Charlotte	141,627	9,397,477	2,198,052	11,595,529
Total	141,627	9,397,477	2,198,052	11,595,529
Study Region Total	141,627	9,397,477	2,198,052	11,595,529

# Category 3 Hurricane

## Hazus-MH: Hurricane Event Report

**Region Name:** Flood and Hurricane

**Hurricane Scenario:** Probabilistic 200-year Return Period

**Print Date:** Friday, June 06, 2014

**Disclaimer:**

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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## General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Florida

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 713.81 square miles and contains 23 census tracts. There are over 63 thousand households in the region and has a total population of 141,627 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 84 thousand buildings in the region with a total building replacement value (excluding contents) of 11,596 million dollars (2006 dollars). Approximately 92% of the buildings (and 81% of the building value) are associated with residential housing.

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Hurricane Event Summary Report

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## Building Inventory

### General Building Stock

Hazus estimates that there are 84,658 buildings in the region which have an aggregate total replacement value of 11,596 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Tot
Residential	9,397,477	81.0%
Commercial	1,602,176	13.8%
Industrial	286,386	2.5%
Agricultural	42,817	0.4%
Religious	175,778	1.5%
Government	32,764	0.3%
Education	58,131	0.5%
<b>Total</b>	<b>11,595,529</b>	<b>100.0%</b>

### Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 722 beds. There are 33 schools, 22 fire stations, 4 police stations and 1 emergency operation facilities.

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Hurricane Event Summary Report

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## Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name: Probabilistic  
Type: Probabilistic

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Hurricane Event Summary Report

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**General Building Stock Damage**

Hazus estimates that about 32,987 buildings will be at least moderately damaged. This is over 38% of the total number of buildings in the region. There are an estimated 6,026 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

**Table 2: Expected Building Damage by Occupancy : 200 -year Event**

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	133	29.88	98	22.05	87	19.60	96	21.68	30	6.78
Commercial	1,354	31.58	796	18.55	1,001	23.35	1,083	24.78	75	1.74
Education	26	34.91	14	18.89	15	20.50	19	25.38	0	0.32
Government	20	42.51	9	20.65	9	20.31	8	16.43	0	0.10
Industrial	465	31.03	256	17.09	308	20.55	447	29.89	22	1.44
Religion	103	35.20	68	23.31	59	20.27	60	20.54	2	0.68
Residential	27,050	34.67	21,279	27.28	14,485	18.57	9,302	11.92	5,898	7.56
<b>Total</b>	<b>29,150</b>		<b>22,521</b>		<b>15,966</b>		<b>10,995</b>		<b>6,026</b>	

**Table 3: Expected Building Damage by Building Type : 200 -year Event**

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	1,163	30.47	634	16.60	900	23.56	1,118	29.27	4	0.11
Masonry	14,007	31.47	13,230	29.73	8,885	19.96	5,678	12.76	2,707	6.08
MH	10,663	92.62	139	1.21	164	1.42	64	0.56	483	4.20
Steel	1,015	31.58	468	14.56	731	22.74	937	29.14	64	1.98
Wood	6,891	30.95	6,645	30.74	4,129	19.10	2,707	12.53	1,443	6.68

**Essential Facility Damage**

Before the hurricane, the region had 722 hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (only 0.00%) are available for use. After one week, 0.00% of the beds will be in service. By 30 days, 29.00% will be operational.

**Table 4: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
EOCs	1	0	0	1
Fire Stations	22	10	0	15
Hospitals	3	3	2	0
Police Stations	4	1	0	3
Schools	33	21	0	1

## Induced Hurricane Damage

### Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,101,522 tons of debris will be generated. Of the total amount, 413,523 tons (38%) is Other Tree Debris. Of the remaining 687,999 tons, Brick/Wood comprises 73% of the total, Reinforced Concrete/Steel comprises of 8% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 22,297 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 130,562 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

## Social Impact

### Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 11,386 households to be displaced due to the hurricane. Of these, 2,773 people (out of a total population of 141,627) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the hurricane is 3536.5 million dollars, which represents 30.50 % of the total replacement value of the region's buildings.

### Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 3,537 million dollars. 2% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 79% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates  
(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<b>Property Damage</b>						
	Building	1,777,965.18	235,762.60	46,616.69	30,619.69	2,090,964.16
	Content	656,622.39	168,114.80	39,236.54	19,018.25	882,991.96
	Inventory	0.00	4,447.04	7,986.53	633.90	13,067.47
	<b>Subtotal</b>	<b>2,434,587.56</b>	<b>408,324.44</b>	<b>93,839.75</b>	<b>50,271.83</b>	<b>2,987,023.60</b>
<b>Business Interruption Loss</b>						
	Income	1,422.39	55,457.14	863.63	756.33	58,499.48
	Relocation	251,436.59	46,404.28	2,907.50	6,517.02	307,265.39
	Rental	88,500.93	30,088.75	431.81	570.28	119,591.77
	Wage	3,351.09	57,104.92	1,468.51	2,235.06	64,159.58
	<b>Subtotal</b>	<b>344,711.00</b>	<b>189,055.08</b>	<b>5,671.44</b>	<b>10,078.69</b>	<b>549,516.22</b>
<b>Total</b>						
	<b>Total</b>	<b>2,779,298.56</b>	<b>597,379.52</b>	<b>99,511.20</b>	<b>60,350.53</b>	<b>3,536,539.81</b>

**Appendix A: County Listing for the Region**

Florida  
: Charlotte

**Appendix B: Regional Population and Building Value Data**

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Florida				
Charlotte	141,627	9,397,477	2,198,052	11,595,529
<b>Total</b>	<b>141,627</b>	<b>9,397,477</b>	<b>2,198,052</b>	<b>11,595,529</b>
<b>Study Region Total</b>	<b>141,627</b>	<b>9,397,477</b>	<b>2,198,052</b>	<b>11,595,529</b>

# Category 4 Hurricane

## Hazus-MH: Hurricane Event Report

**Region Name:** Flood and Hurricane

**Hurricane Scenario:** Probabilistic 500-year Return Period

**Print Date:** Friday, June 06, 2014

**Disclaimer:**

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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## General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Florida

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 713.81 square miles and contains 23 census tracts. There are over 63 thousand households in the region and has a total population of 141,627 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 84 thousand buildings in the region with a total building replacement value (excluding contents) of 11,596 million dollars (2006 dollars). Approximately 92% of the buildings (and 81% of the building value) are associated with residential housing.

## Building Inventory

### General Building Stock

Hazus estimates that there are 84,658 buildings in the region which have an aggregate total replacement value of 11,596 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Tot
Residential	9,397,477	81.0%
Commercial	1,602,176	13.8%
Industrial	286,386	2.5%
Agricultural	42,817	0.4%
Religious	175,778	1.5%
Government	32,764	0.3%
Education	58,131	0.5%
<b>Total</b>	<b>11,595,529</b>	<b>100.0%</b>

### Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 722 beds. There are 33 schools, 22 fire stations, 4 police stations and 1 emergency operation facilities.

## Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

## Building Damage

### General Building Stock Damage

Hazus estimates that about 65,276 buildings will be at least moderately damaged. This is over 77% of the total number of buildings in the region. There are an estimated 12,862 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 500 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	19	4.22	59	13.39	124	27.86	180	40.63	62	13.90
Commercial	245	5.72	387	9.01	1,133	26.41	2,358	54.99	166	3.88
Education	5	6.25	7	9.09	18	24.16	45	59.85	0	0.65
Government	3	5.84	3	7.60	10	22.09	29	63.95	0	0.52
Industrial	93	6.24	125	8.38	342	22.87	895	59.79	41	2.72
Religion	15	5.10	34	11.75	83	28.40	156	53.14	5	1.81
Residential	4,504	5.77	13,882	17.79	24,481	31.38	22,559	28.92	12,588	16.14
<b>Total</b>	<b>4,884</b>		<b>14,499</b>		<b>26,191</b>		<b>26,223</b>		<b>12,862</b>	

Table 3: Expected Building Damage by Building Type : 500 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	224	5.88	242	6.34	895	23.43	2,449	64.13	9	0.22
Masonry	1,794	4.03	8,007	17.99	14,235	31.98	14,218	31.95	6,253	14.05
MH	9,860	85.64	169	1.47	391	3.40	172	1.49	921	8.00
Steel	205	6.38	190	5.91	711	22.12	1,978	61.54	130	4.05
Wood	795	3.68	4,080	18.87	7,148	33.07	6,379	29.51	3,214	14.87

### Essential Facility Damage

Before the hurricane, the region had 722 hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (only 0.00%) are available for use. After one week, 0.00% of the beds will be in service. By 30 days, 0.00% will be operational.

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities:		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
EOCs	1	1	0	0
Fire Stations	22	21	0	15
Hospitals	3	3	3	0
Police Stations	4	4	0	0
Schools	33	33	0	0

## Induced Hurricane Damage

### Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 2,301,696 tons of debris will be generated. Of the total amount, 993,780 tons (43%) is Other Tree Debris. Of the remaining 1,307,916 tons, Brick/Wood comprises 78% of the total, Reinforced Concrete/Steel comprises of 8% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 44846 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 186,778 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

## Social Impact

### Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 29,251 households to be displaced due to the hurricane. Of these, 7,216 people (out of a total population of 141,627) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the hurricane is 7870.5 million dollars, which represents 67.87 % of the total replacement value of the region's buildings.

### Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 7,870 million dollars. 2% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 77% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Property Damage</u>						
	Building	3,828,426.65	545,838.68	97,501.01	90,554.65	4,562,320.99
	Content	1,502,006.72	415,801.94	84,472.48	60,794.15	2,083,075.29
	Inventory	0.00	11,022.96	16,470.02	1,459.97	28,952.96
	<b>Subtotal</b>	<b>5,330,433.37</b>	<b>972,663.58</b>	<b>198,443.51</b>	<b>152,808.77</b>	<b>6,654,349.23</b>
<u>Business Interruption Loss</u>						
	Income	6,417.82	127,769.90	1,823.37	1,526.64	137,537.53
	Relocation	530,509.64	102,143.16	5,717.59	18,529.23	656,899.61
	Rental	183,915.31	66,735.05	968.11	2,074.17	253,692.63
	Wage	15,114.48	144,992.91	3,102.50	4,782.13	187,972.02
	<b>Subtotal</b>	<b>735,957.06</b>	<b>441,641.01</b>	<b>11,611.57</b>	<b>26,892.17</b>	<b>1,216,101.81</b>
<u>Total</u>						
	<b>Total</b>	<b>6,066,390.43</b>	<b>1,414,304.59</b>	<b>210,055.08</b>	<b>179,700.94</b>	<b>7,870,451.04</b>

**Appendix A: County Listing for the Region**

Florida  
- Charlotte

**Appendix B: Regional Population and Building Value Data**

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Florida				
Charlotte	141,627	9,397,477	2,198,052	11,595,529
Total	141,627	9,397,477	2,198,052	11,595,529
Study Region Total	141,627	9,397,477	2,198,052	11,595,529

# Category 5 Hurricane

## Hazus-MH: Hurricane Event Report

**Region Name:** Flood and Hurricane

**Hurricane Scenario:** Probabilistic 1000-year Return Period

**Print Date:** Friday, June 06, 2014

**Disclaimer:**

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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## General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Florida

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 713.81 square miles and contains 23 census tracts. There are over 63 thousand households in the region and has a total population of 141,627 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 84 thousand buildings in the region with a total building replacement value (excluding contents) of 11,596 million dollars (2006 dollars). Approximately 92% of the buildings (and 81% of the building value) are associated with residential housing.

## Building Inventory

### General Building Stock

Hazus estimates that there are 84,658 buildings in the region which have an aggregate total replacement value of 11,596 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Tot
Residential	9,397,477	81.0%
Commercial	1,602,176	13.8%
Industrial	286,386	2.5%
Agricultural	42,817	0.4%
Religious	175,778	1.5%
Government	32,764	0.3%
Education	58,131	0.5%
<b>Total</b>	<b>11,595,529</b>	<b>100.0%</b>

### Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 722 beds. There are 33 schools, 22 fire stations, 4 police stations and 1 emergency operation facilities.

## Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

## Building Damage

### General Building Stock Damage

Hazus estimates that about 73,523 buildings will be at least moderately damaged. This is over 87% of the total number of buildings in the region. There are an estimated 22,873 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 1000 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	21	4.62	29	6.63	85	19.10	223	50.26	86	19.39
Commercial	170	3.96	207	4.82	752	17.54	2,835	66.11	325	7.56
Education	4	5.90	4	5.64	12	16.09	53	70.47	1	1.89
Government	4	8.33	3	6.93	8	17.56	30	66.19	0	0.99
Industrial	69	4.62	68	4.57	213	14.25	1,084	72.40	62	4.16
Religion	12	4.00	20	6.73	60	20.62	189	64.55	12	4.10
Residential	3,352	4.30	7,171	9.19	17,759	22.76	27,345	35.05	22,386	28.69
<b>Total</b>	<b>3,632</b>		<b>7,503</b>		<b>18,890</b>		<b>31,760</b>		<b>22,873</b>	

Table 3: Expected Building Damage by Building Type : 1000 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	156	4.09	142	3.71	561	14.70	2,939	76.96	20	0.53
Masonry	1,201	2.70	3,834	8.61	10,037	22.55	17,300	38.87	12,134	27.26
MH	9,798	85.11	121	1.05	291	2.53	163	1.41	1,140	9.90
Steel	149	4.85	114	3.54	437	13.59	2,288	71.18	226	7.04
Wood	559	2.59	2,013	9.31	5,202	24.06	7,893	36.52	5,948	27.52

### Essential Facility Damage

Before the hurricane, the region had 722 hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (only 0.00%) are available for use. After one week, 0.00% of the beds will be in service. By 30 days, 0.00% will be operational.

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
EOCs	1	1	0	1
Fire Stations	22	21	0	5
Hospitals	3	3	3	0
Police Stations	4	4	0	1
Schools	33	32	1	0

## Induced Hurricane Damage

### Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 2,642,212 tons of debris will be generated. Of the total amount, 704,654 tons (27%) is Other Tree Debris. Of the remaining 1,937,558 tons, Brick/Wood comprises 80% of the total, Reinforced Concrete/Steel comprises of 9% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 69328 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 204,349 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

## Social Impact

### Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 42,008 households to be displaced due to the hurricane. Of these, 10,341 people (out of a total population of 141,627) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the hurricane is 10872.5 million dollars, which represents 93.76 % of the total replacement value of the region's buildings.

### Building-Related Losses

The building related losses are broken into two categories, direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 10,873 million dollars. 2% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 77% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

**Table 5: Building-Related Economic Loss Estimates**  
(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Property Damage</u>						
	Building	5,287,969.65	741,298.40	130,856.80	115,368.22	6,275,493.08
	Content	2,158,267.16	598,560.89	118,185.02	81,111.57	2,956,124.64
	Inventory	0.00	15,185.33	23,102.10	2,040.42	40,327.85
	<b>Subtotal</b>	<b>7,446,236.81</b>	<b>1,355,044.63</b>	<b>272,143.92</b>	<b>198,520.21</b>	<b>9,271,945.56</b>
<u>Business Interruption Loss</u>						
	Income	8,207.02	172,536.81	2,433.05	2,062.59	185,239.48
	Relocation	697,247.39	129,507.17	6,554.75	22,054.95	855,364.27
	Rental	245,639.69	86,755.25	1,185.00	2,397.58	335,977.53
	Wage	19,329.56	195,084.03	4,160.75	5,426.83	224,000.16
	<b>Subtotal</b>	<b>970,422.67</b>	<b>583,883.27</b>	<b>14,333.56</b>	<b>31,941.96</b>	<b>1,600,581.45</b>
<u>Total</u>						
	<b>Total</b>	<b>8,416,659.48</b>	<b>1,939,927.89</b>	<b>286,477.48</b>	<b>230,462.17</b>	<b>10,933,527.01</b>

**Appendix A: County Listing for the Region**

Florida  
- Charlotte

**Appendix B: Regional Population and Building Value Data**

	Building Value (thousands of dollars)			Total
	Population	Residential	Non-Residential	
Florida				
Charlotte	141,627	9,397,477	2,198,052	11,595,529
Total	141,627	9,397,477	2,198,052	11,595,529
Study Region Total	141,627	9,397,477	2,198,052	11,595,529

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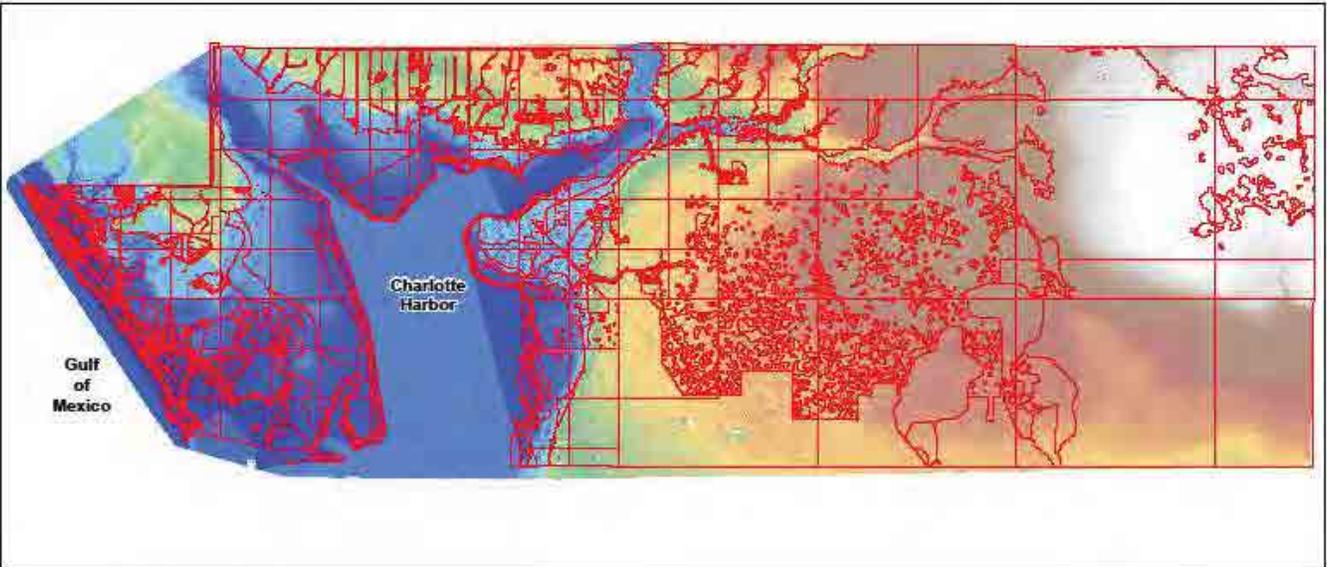
# Appendix D

## FEMA Flood Zones

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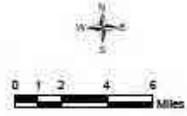


### 100 YEAR FLOOD With FEMA Flood Zones



#### Legend

- FEMA Flood Zones W LOMR
- CoastalRPD100**
- Value**
- High : 17.0461
- Low : 7.43866e-005
- RegionDEM**
- Value**
- High : 117.966
- Low : -3.41943



Any coastal surge estimates produced by Hazus do not represent official NOAA forecasts or estimates.

(c) 1997-2011 FEMA

This map is a representation of compiled public information. It is believed to be an accurate and true depiction for the stated purpose, but Charlotte County and its employees make no guarantee, implied or otherwise, to the accuracy or completeness. We therefore do not accept any responsibility as to its use. This is not a survey or is to be used for design. Reflected dimensions are for informational purposes only and may have been rounded to the nearest tenth. For precise dimensions, please refer to recorded plans and related documents.

To view FEMA Flood Zones double click on map and set view to 800%.