VOLUSIA COUNTY, FLORIDA

MULTI-JURISDICTIONAL LOCAL MITIGATION STRATEGY

FEBRUARY 2010

PREPARED BY THE VOLUSIA PREPARES LMS WORKING GROUP

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SECTION 1 – INTRODUCTION

This section of the Plan provides a general introduction to the Volusia County Multi-jurisdictional Local Mitigation Strategy (LMS). It consists of the following five subsections:

- **Background**
- **Purpose**
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- **Authority**
- **Summary of Plan Contents**

1.1 BACKGROUND

Natural hazards, such as hurricanes, floods and tornadoes, are a part of the world around us. Their occurrence is natural and inevitable, and there is little we can do to control their force and intensity. We must consider these hazards to be legitimate and significant threats to human life, safety and property.

Volusia County, Florida is vulnerable to a wide range of natural hazards, including hurricanes and tropical storms, flooding, tornadoes and wildfires. These hazards threaten the life and safety of county residents, and have the potential to damage or destroy both public and private property and disrupt the local economy and overall quality of life of individuals who live, work and vacation in the community.

While the threat from hazardous events may never be fully eliminated, there is much we can do to lessen their potential impact upon our community and our citizens. By minimizing the impact of hazards upon our built environment, we can prevent such events from resulting in disasters. The concept and practice of reducing risks to people and property from known hazards is generally referred to as *hazard mitigation*.

FEMA Definition of Hazard Mitigation:

"Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards."

Hazard mitigation techniques include both structural measures, such as strengthening or protecting buildings and infrastructure from the destructive forces of potential hazards and non-structural measures, such as the adoption of sound land use policies and the creation of public awareness programs. It is widely accepted that the most effective mitigation measures are implemented at the local government level, where decisions on the regulation and control of development are ultimately made. A comprehensive mitigation approach addresses hazard vulnerabilities that exist today and in the foreseeable future. Therefore it is essential that projected patterns of future development are evaluated and considered in terms of how that growth will increase or decrease a community's overall hazard vulnerability.

As a community formulates a comprehensive strategy to hazard mitigation, a key component is to develop, adopt and update a Local Mitigation Strategy. A LMS/hazard mitigation plan establishes the broad community vision and guiding principles for reducing hazard risk and further proposes specific mitigation actions to eliminate or reduce identified vulnerabilities. Each of the jurisdictions has adopted the LMS by resolution (**Appendix A**).

The Volusia County Multi-jurisdictional Local Mitigation Strategy has evolved over the years, as more thoroughly described in Section 2: Planning Process. The Volusia Prepares LMS Working Group (LMS Working Group) has developed Bylaws and Operating Procedures (**Appendix B**) to formalize the LMS update process and working group. The Plan documents and represents the County's and participating local jurisdictions' sustained efforts to incorporate hazard mitigation principles and practices into the routine government activities and functions of Volusia County and its participating jurisdictions and partners. This includes documenting the goals and objectives that Volusia County deems necessary to protect people and property from hazards. At its most inner core, the Plan recommends specific actions to combat hazard vulnerability and protect its residents from losses to those hazards that pose the greatest risk. Actions go beyond recommending micro-level solutions such as elevation, retrofitting and acquisition projects, and also address macro-level solution. Examples of macro-level actions that contribute to reducing the future vulnerability of Volusia County include local policies on community growth and development, incentives for natural resource protection and public awareness and outreach activities. Finally, the Plan is a living document, with implementation, evaluation and update procedures included to help achieve meaningful objectives and successful outcomes over time.

1.1.1 Disaster Mitigation Act of 2000

In an effort to reduce the Nation's mounting natural disaster losses, the U.S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) in order to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 of DMA 2000 emphasizes the need for state and local government entities to closely coordinate on mitigation planning activities, and makes the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for federal mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP) and the newly-created Pre-Disaster Mitigation (PDM) program, both of which are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security. Communities with an adopted and federally-approved hazard mitigation plan thereby become pre-positioned and are more apt to receive available mitigation funds before and after the next disaster strikes.

The Volusia County Multi-jurisdictional LMS has been prepared in coordination with FEMA Region IV and the Florida Division of Emergency Management to ensure that the Plan meets all applicable DMA 2000 and state requirements. A *Local Mitigation Plan Review Crosswalk*, found in **Appendix C**, provides a summary of federal and state minimum standards and notes the location where each requirement is met within the Plan.

1.2 PURPOSE

The purpose of the Volusia County Multi-jurisdictional LMS is to:

- Provide a comprehensive update to the *Volusia County Local Hazard Mitigation Plan*, as amended in 2005 that is compliant with federal and state requirements.
    - This Plan is intended to assist participating jurisdictions to comply with requirements in order to expedite the response and recovery process. In addition, compliance is often required to obtain state and federal funding for pre-disaster mitigation projects and post-disaster situations. This Plan allows participating jurisdictions to quickly assemble the necessary grant application materials when seeking funding.

- Provide a methodical, substantive approach to mitigation planning.
    - The use of a methodical approach ensures that each step in the planning process builds upon the last, resulting in a high level of assurance that proposed mitigation actions have a valid basis.

- Enhance public awareness and understanding of hazard mitigation planning.
    - Engaging the public in the local mitigation planning process shapes the goals, objectives and policies in this Plan. Further, it provides a method for educating the public on how to protect themselves from the impacts of hazards.

- Create a decision tool for management.
    - This plan provides local managers, leaders and officials with the tools needed to reduce vulnerabilities to future hazard events.

- Enhance local policies for hazard mitigation capability.
    - The Capability Assessment found in Section 7 outlines the policies in Volusia County and the participating jurisdictions to reduce hazard vulnerability. Volusia County the participating jurisdictions aim to enhance and create policies to address mitigating the impacts of a hazard is such policies do not already exist.

- Assure inter-jurisdictional coordination of mitigation-related programming.
    - By creating a multi-jurisdictional plan, this Plan ensures coordination of mitigation activities. This ensures that mitigation actions proposed or implemented by one jurisdiction will be compatible with the actions pursued by another.

- Provide jurisdiction-specific hazard mitigation vulnerability assessments and actions.
    - The vulnerability of each jurisdiction will be outlaid in the Vulnerability Assessment. Further, each jurisdiction, based on its vulnerability, will have actions to address hazard vulnerability.

1.3 SCOPE

The focus of the Volusia County Multi-jurisdictional LMS is on those hazards deemed to be "high" or "moderate" risk as determined through a detailed hazard risk assessment conducted for Volusia County. Other hazards that pose a "low" or "negligible" risk will continue to be evaluated during future updates to the Plan, but they may not be fully addressed until they are determined to be of high or moderate risk. This enables Volusia County and its participating jurisdictions to prioritize mitigation actions based on those hazards which are understood to present the greatest risk to lives and property.

The geographic scope (i.e., the planning area) for the Plan includes all areas within the unincorporated jurisdiction of Volusia County and the participating incorporated municipalities: Daytona Beach, Daytona Beach Shores, DeBary, Deland, Deltona, Edgewater, Holly Hill, Lake Helen, New Smyrna Beach, Oak Hill, Orange City, Ormond Beach, Pierson, Ponce Inlet, Port Orange and South Daytona. In addition, other entities, such as the Volusia County School Board, Halifax Medical Center, various Florida Hospital locations, American Red Cross and the Daytona Beach International Airport participated in the planning process. See Section 2, Table 2.1 for a full list of participating entities.

1.4 AUTHORITY

The Volusia County Multi-jurisdictional LMS has been developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans, and has been adopted by Volusia County and its participating jurisdictions and partners in accordance with standard local procedures. Copies of local adoption resolutions are provided in Appendix A. The Plan shall be routinely monitored and revised to maintain compliance with the following provisions, rules and legislation:

- Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390); and
- FEMA's Interim Final Rule published in the Federal Register on February 26, 2002, at 44 CFR Part 201.

1.5 SUMMARY OF PLAN CONTENTS

The contents of this Plan are designed and organized to be as reader-friendly and functional as possible. While significant background information is included on the processes used and studies completed (i.e., risk assessment, capability assessment), this information is separated from the more meaningful planning outcomes or actions (i.e., mitigation strategy, mitigation action plans).

Section 2: ***Planning Process***, provides a complete narrative description of the process used to prepare the Plan. This includes the identification of who was involved, who participated on the planning team, and how the public and other stakeholders were involved. It also includes a detailed summary for each of the key meetings held along with any associated outcomes.

The ***Community Profile***, located in Section 3, describes the general makeup of Volusia County, including prevalent geographic, demographic and economic characteristics. In addition, building characteristics

and land use patterns are discussed. This baseline information provides a snapshot of the planning area and thereby assists local officials recognize those social, environmental and economic factors that ultimately play a role in determining community vulnerability to hazards.

The Risk Assessment is presented in three sections: Section 4: ***Hazard Identification***; Section 5: ***Hazard Profiles***; and Section 6: ***Vulnerability Assessment***. Together, these sections serve to identify, analyze and assess the overall risk posed to Volusia County and the participating jurisdictions from hazards. The risk assessment also attempts to define any hazard risks that may uniquely or exclusively affect specific areas of Volusia County or its participating jurisdictions and partners.

The Risk Assessment builds on available historical data from past hazard occurrences, establishes detailed profiles for each hazard, and culminates in a hazard risk ranking based on conclusions about the frequency of occurrence, spatial extent and potential impact of each hazard. FEMA's HAZUS$^{®MH}$ loss estimation methodology and Mapping for Emergency Management, Parallel Hazard Information System (MEMPHIS) results were also used in evaluating known hazard risks by their relative long-term cost in expected damages. In essence, the information generated through the risk assessment serves a critical function as Volusia County and the participating jurisdictions seek to determine the most appropriate mitigation actions to pursue and implement—enabling it to prioritize and focus its efforts on those hazards of greatest concern and those structures or planning areas facing the greatest risk(s).

The ***Capability Assessment***, found in Section 7, provides a detailed analysis of the capacity in Volusia County and the participating jurisdictions to implement meaningful mitigation strategies and identifies existing opportunities to increase and enhance that capacity. Specific capabilities addressed in this section include planning and regulatory capability, staff and organizational (administrative) capability, technical capability, fiscal capability and political capability. Information was obtained through the use of detailed survey questionnaires for local officials and an inventory and examination of existing plans, ordinances and relevant documents. The purpose of this assessment is to identify any existing gaps, weaknesses or conflicts in programs or activities that may hinder mitigation efforts, and to identify those activities that should be built upon in establishing a successful and sustainable local hazard mitigation program.

The ***Community Profile***, ***Risk Assessment*** and ***Capability Assessment*** collectively serve as a basis for determining the goals for the Volusia County Multi-jurisdictional LMS, each contributing to the development, adoption and implementation of a meaningful and manageable *Mitigation Strategy* that is based on accurate background information.

The ***Mitigation Strategy***, found in Section 8, consists of broad countywide goal statements as well as an analysis of hazard mitigation techniques for Volusia County and its participating jurisdictions and partners to consider in reducing hazard vulnerabilities. The Strategy provides the foundation for a detailed ***Mitigation Action Plan***, found in Section 9, which links specific mitigation actions for each County department or agency to locally-assigned implementation mechanisms and target completion dates. Together, these sections are designed to make the Plan both strategic (through the identification of long-term goals) but also functional through the identification of short-term and immediate actions that will guide day-to-day decision-making and project implementation.

In addition to the identification and prioritization of possible mitigation projects, emphasis is placed on the use of program and policy alternatives to help make Volusia County and the participating

jurisdictions less vulnerable to the damaging forces of hazards while improving the economic, social and environmental health of the community. The concept of multi-objective planning was emphasized throughout the planning process, particularly in identifying ways to link, where possible, hazard mitigation policies and programs with complimentary community goals related to disaster recovery, housing, economic development, recreational opportunities, transportation improvements, environmental quality, land development and public health and safety.

Section 10: ***Plan Maintenance Procedures***, includes the measures that Volusia County and the participating jurisdictions will take to ensure the Plan's continuous long-term implementation. The procedures also include the manner in which the Plan will be regularly evaluated and updated to remain a current and meaningful planning document.

SECTION 2 – PLANNING PROCESS

44 CFR Requirement

44 CFR Part 201.6(c)(1): The plan shall include documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process and how the public was involved.

This section describes the planning process undertaken by Volusia County in the development of the 2009 Multi-jurisdictional Local Mitigation Strategy. It consists of the following six subsections:

- **Overview of Hazard Mitigation Planning**
- **History of Hazard Mitigation Planning in Volusia County**
- **Preparing the 2009 Plan**
- **The Volusia Prepares Local Mitigation Strategy Working Group**
- **Community Meetings and Workshops**
- **Involving the Public and Identified Stakeholders**

2.1 OVERVIEW OF HAZARD MITIGATION PLANNING

Local hazard mitigation planning is the process of organizing community resources, identifying and assessing hazard risks and determining how to best minimize or manage those risks. This process results in a hazard mitigation plan that identifies specific mitigation actions, each designed to achieve both short-term planning objectives and a long-term community vision.

To ensure the functionality of a hazard mitigation plan, responsibility is assigned for each proposed mitigation action to a specific individual, department or agency along with a schedule or target completion date for its implementation. Plan maintenance procedures are established for the routine monitoring of implementation progress, as well as the evaluation and enhancement of the mitigation plan itself. These plan maintenance procedures ensure that the plan remains a current, dynamic and effective planning document over time that becomes integrated into the routine local decision making process.

Mitigation planning offers many benefits, including:

- **saving lives and property**
- **saving money**
- **speeding recovery following disasters**
- **reducing future vulnerability through wise development and post-disaster recovery and reconstruction**
- **expediting the receipt of pre-disaster and post-disaster grant funding**
- **demonstrating a firm commitment to improving community health and safety**

Typically, mitigation planning is described as having the potential to produce long-term and recurring benefits by breaking the repetitive cycle of disaster loss. A core assumption of hazard mitigation is that

the investments made before a hazard event will significantly reduce the demand for post-disaster assistance by lessening the need for emergency response, repair, recovery and reconstruction. Furthermore, mitigation practices will enable local residents, businesses and industries to re-establish themselves in the wake of a disaster, getting the community economy back on track sooner and with less interruption.

The benefits of mitigation planning go beyond solely reducing hazard vulnerability. Measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, maintaining environmental health and enhancing recreational opportunities. Thus, it is vitally important that any local mitigation planning process be integrated with other concurrent local planning efforts, and any proposed mitigation strategies must take into account other existing community goals or initiatives that will help complement or hinder their future implementation.

2.2 HISTORY OF HAZARD MITIGATION PLANNING IN VOLUSIA COUNTY

Volusia County's hazard mitigation planning efforts began in 1997 with the formation of the Volusia Prepares Committee. The Volusia 2020 Committee developed the first LMS in 1999 (adopted 2000), as part of the Florida Department of Community Affairs LMS Initiative. The last version of the LMS was updated in 2004 (adopted in 2005). This multijurisdictional planning effort was led by Volusia Prepares, with support from the Mitigation 20/20 program.

2.3 PREPARING THE 2009 LMS

The 2009 LMS update was prepared by the Volusia Prepares LMS Working Group with assistance from PBS&J, a consultant who provided professional mitigation planning services. The LMS Update process was lead by the LMS Working Group Chair, Robert Rogers, Volusia County Emergency Management Plans Coordinator Larry LaHue and Volusia County LMS Coordinator Pat White. The LMS was updated during June to August, 2009.

Per the contractual scope of work[1], the consultant team utilized the mitigation planning process recommended by FEMA (Publication Series 386) and recommendations provided by Florida Division of Emergency Management mitigation planning staff. A Local Mitigation Plan Crosswalk, found in Appendix C, provides a detailed summary of FEMA's current minimum standards of acceptability for compliance with the DMA 2000 and notes the location of where each requirement is met within the Plan. These standards are based upon FEMA's Interim Final Rule as published in the Federal Register on February 26, 2002, in Part 201 of the 44 Code of Federal Regulations.

The 2009 LMS was prepared using an updated plan outline and incorporated relevant content from the 2005 LMS. The LMS Working Group updated various parts of the 2005 LMS, as exemplified below:

- *Stakeholders*
  The LMS Working Group identified additional stakeholders that they would like to participate in the LMS update process. These stakeholders were invited to subsequent meetings.

[1] A copy of the negotiated contractual scope of work between Volusia County and PBS&J is available through Volusia County upon request.

- *Plan Outline*
  The LMS Working Group agreed to revise the plan outline that was proposed by the consultant.

- *Hazards*
  The LMS Working Group decided to include natural hazards in the 2009 LMS update, per DMA 2K requirements. Societal and technical hazards occurrences have not varied over the past five years, and many of these hazards are addressed through other emergency preparedness and response plans (e.g., Comprehensive Emergency Management Plan, Emergency Response Plan, Emergency Action Plan, etc.).

- *Hazards Identification Scoring*
  Each jurisdiction reviewed the hazards scores that were included in the 2005 LMS (Comparison of Jurisdictional Relative Risk) and modified the scores for each hazard to reflect changes in the impacted area; probability of occurrence; and affects to the built and natural environment and economy.

- *Goals and Objectives*
  During a facilitated discussion at the Mitigation Strategy Meeting, the LMS Working Group reviewed the goals and objectives and deemed them to still be appropriate. As such, no changes were made.

- *Vulnerability Assessment*
  The Vulnerability Assessment was updated using HAZUS and MEMPHIS data, as well as the most recent local parcel data for GIS analysis. Hazard maps, hazards exposure and loss estimates were also included. See Sections 4, 5 and 6 for further information.

- *Hazard Mitigation Initiatives*
  The LMS Working Group decided to create a new Excel-based mitigation initiative status and scoring system. The consultant provided a proposed system that was reviewed and modified by the LMS Working Group. See Section 9 for further information.

- *LMS Working Group Bylaws and Operating Procedures*
  The LMS Working Group updated the Bylaws and Operating Procedures with the facilitated assistance from the consultant.

Additionally, a Capability Assessment was prepared, which was not included in the 2005 LMS.

The process used to update this LMS included:

- Conducted the Preliminary Meeting with Volusia County Emergency Management to establish planning process, roles, responsibilities, etc. in preparation for the Kickoff Meeting.
- Conducted the Kickoff Meeting with the Volusia Prepares LMS Working Group
- Offered Kickoff Meeting for the general public
- Developed the Vulnerability Assessment
- Developed the Capability Assessment

- Conducted two Mitigation Strategy Workshops with the Volusia Prepares LMS Working Group and invited the general public to attend. The first meeting focused on plan section development and the second focused on incorporating review comments into the draft plan.
- Developed the Mitigation Strategy
- Developed a new tracking and scoring system for the Mitigation Initiatives
- Updated the Mitigation Initiatives status and scoring of potential projects
- Updated the LMS Plan Maintenance process

Each of these planning steps resulted in critical work products and outcomes that collectively make up the Plan. These elements have been included as separate sections of the Plan (further described in Section 1: Introduction).

The jurisdictions will consider using content from the LMS into other planning initiatives.

2.4 VOLUSIA PREPARES LOCAL MITIGATION STRATEGY WORKING GROUP

In order to guide the development of this Plan, Volusia County reconvened its Volusia Prepares LMS Working Group that was created under past planning efforts, including the most recent plan amendment in 2004/2005. The LMS Working Group participants who participated in the 2009 LMS update are the same jurisdictions and stakeholders that participated in the 2005 LMS update. The LMS Working Group included representatives of various public, private and non-profit organizations throughout county. The LMS Working Group represented a community-based planning team made up of local government officials and other key stakeholders identified to serve as critical partners in the planning process.

Opportunities were provided for all Volusia County jurisdictions, agencies, businesses, academia and other interested parties to participate in the LMS update process. All Volusia Prepares information is emailed out to over 125 city managers, business owners, chambers of commerce, agencies, non-profits, emergency managers and other county LMS coordinators.

Several non-profits (e.g., American Red Cross, Volusia Interfaiths/Agencies Networking in Disaster and United Cerebral Palsy) participated in the LMS update process and have approved initiatives in the LMS. There is a Volusia Prepares Business group that has developed a Business Operations Center and emergency business database. They've also held several business planning workshops.

Beginning in March 2009, the Volusia County Prepares LMS Working Group members engaged in regular discussions as well as local meetings and planning workshops to discuss and complete tasks associated with preparing the Plan. This working group coordinated together on all aspects of plan preparation and provided valuable input to the process. In addition to regular meetings, committee members routinely communicated and were kept informed through a dedicated e-mail distribution list and Internet Web site.

Specifically, the tasks assigned to the LMS Working Group members included:

- Participate in LMS update meetings and workshops.
- Provide best available data as required for the risk assessment portion of the Plan.

- Help complete the local Capability Assessment Survey and provide copies of any mitigation or hazard-related documents for review and incorporation into the Plan.
- Support the development of the Mitigation Strategy, including the design and adoption of community goal statements.
- Help design and propose appropriate mitigation actions for their department/agency for incorporation into the Mitigation Action Plan. Provide a status update and assign a priority score to existing Mitigation Actions.
- Review and provide timely comments on all study findings and draft plan deliverables.
- Support the adoption of the 2009 Volusia County Multi-jurisdictional Local Mitigation Strategy by all participating jurisdictions.

Table 2.1 lists the members of the Volusia County Prepares LMS Working Group who were responsible for participating in the development of the Plan.

TABLE 2.1: Volusia County Prepares LMS Working Group

NAME	JURISDICTION
Ellen Newton	American Red Cross
John Carleton	Daytona Beach
Carl Schweizer	Daytona Beach International Airport
Arlene Smith	Daytona Beach International Airport
Lili Morgese	Daytona Beach Shores
Jim McCroskey	Daytona Beach Shores
Theresa Evans	Daytona Beach Shores
Alan Williamson	DeBary
Mike Grebosz	Deland
Deputy Fire Chief Bob Rogers	Deltona
Tyna Lynn Hilton	Edgewater
Joe Daly	Edgewater Fire Department
Donald Morin	Florida Hospital Bert Fish
Steve Cantwell	Florida Hospital Orange City
Sarah Fanton	Florida Hospital Orange City
Margaret Epting	Florida Hospital Ormond Beach
Kevin Noel	Halifax Medical Center
Doug Gutierrez	Holly Hill
Don Findell	Lake Helen
Lt. Randy Wright	New Smyrna Beach
Virginia Haas	Oak Hill
Paul Johnson	Orange City
Richard Benton	Ormond Beach
Loretta Moisio	Ormond Beach
Debbie Bass	Pierson
Peg Hunt	Ponce Inlet

TABLE 2.1: Volusia County Prepares LMS Working Group

NAME	JURISDICTION
Chris Weir	Port Orange
Jeanne Willard	South Daytona
Jessica Bevilacqua	United Cerebral Palsy
Mary Ann Borstad	Volusia Interfaiths/Agencies Networking in Disaster
Larry LaHue	Volusia County Emergency Management
Pat White	Volusia County Emergency Management
Stephanie Rochow	Volusia County Environmental Management
Kathy Weaver	Volusia County Fire Department
Chuck Luther	Volusia County Health Department
Paul Minshen	Volusia County Health Department
Nancy Church	Volusia County IT
John Gamble	Volusia County Public Works
Greg Aikens	Volusia County School Board
Chip Kent	Volusia County School Board
Charlie Graves	Volusia County School Board

2.5 COMMUNITY MEETINGS AND WORKSHOPS

The preparation of this Plan required a series of meetings and workshops for facilitating discussion, gaining consensus and initiating data collection efforts with local government staff, community officials and other identified stakeholders. More importantly, the meetings and workshops prompted continuous input and feedback from relevant participants throughout the drafting stages of the Plan. Below is a summary of the key meetings and community workshops held during the development of the plan update.[2] In many cases, routine discussions and additional meetings were held by local staff to accomplish planning tasks specific to their department or agency, such as the approval of specific mitigation actions for their jurisdiction, department or agency to undertake and include in the Mitigation Action Plan.

The following is a summary of the meetings that occurred during the LMS update planning process. Meeting invitations, agendas, minutes and rosters are provided in **Appendix D**.

Kickoff Meeting
June 4, 2009

The Kickoff Meeting was held at the Volusia County Emergency Operations Center and was attended by the LMS Working Group. The primary purpose of the call was to explain the proposed planning process in detail, describe individual roles and responsibilities and begin initial data collection efforts.

[2] Copies of the agendas, sign-in sheets, minutes and handout materials for all meetings and workshops are available through Volusia County upon request.

Discussions focused the key objectives, project tasks, schedule and staffing. The LMS Working Group was asked to identify additional stakeholders, new plans, data and studies to incorporate into the LMS update. The LMS Working Group was also presented with a proposed plan outline, to which they agreed. The LMS Working Group also decided to include natural hazards in the update, per DMA 2K requirements. Each jurisdiction was asked to update their Hazards Identification (Comparison of Jurisdictional Relative Risk from 2005 LMS).

Mitigation Strategy Meeting
July 8, 2009

The Mitigation Strategy Meeting was held at the Daytona Beach International Airport. The purpose of this meeting was to review and update the LMS goals and objectives, Bylaws and Standard Operating Procedures. The LMS Working Group was also introduced to the Capability Assessment process and the new proposed hazard mitigation initiative tracking and scoring system.

Mitigation Strategy Meeting
August 21, 2009

The Mitigation Strategy Meeting was held at the Volusia County Schools Facilities Services Building. The purpose of this meeting was to discuss and determine how to incorporate review comments that were provided by the LMS Working Group. Each jurisdiction also identified ownership of the critical facilities that were included in the vulnerability assessment.

2.6 INVOLVING THE PUBLIC AND IDENTIFIED STAKEHOLDERS

The public and community stakeholders were invited to three meetings (i.e., May 29, 2009 at 6 p.m., July 7, 2009 at 1 p.m., and August 17, 2009 at 10 a.m.) throughout the LMS planning process (see **Appendix D**). A press release was issued from Volusia County Community Information, by the Volusia County Public Information Officer, to invite the public to participate in the LMS development and provide comments on the LMS. The press release included background information about the LMS process, the agenda topics, date, time and location information. Public feedback would have been received by emails, at meetings, or by contacting the LMS Coordinator. However, to-date, no public comments have been received. In addition, the LMS was also placed on the Volusia County Emergency Management's Website: http://www.volusia.org/emergency/.

As listed in Table 2.1, the LMS Working Group includes representation from various stakeholders in the community, in addition to the participating jurisdictions' local government staff.

Kickoff Meeting
June 4, 2009

A public meeting was held on the evening of June 4, 2009, to inform the citizenry about the LMS update. The meeting was held at the City of Daytona Beach Police Department. Nathan Slaughter from PBS&J provided an overview of hazard mitigation and brief description of the process involved in updating the LMS. Public Participation surveys were available at the meeting.

Mitigation Strategy Meeting
July 8, 2009

The regular meeting of the Volusia Prepares LMS Working Group, held on July 8, 2009, was also advertised as a public meeting. A full description of the items discussed at this meeting can be found earlier in this section under Section 2.5.

Mitigation Strategy Meeting
August 21, 2009

The regular meeting of the Volusia Prepares LMS Working Group, held on July 8, 2009, was also advertised as a public meeting. A full description of the items discussed at this meeting can be found earlier in this section under Section 2.5.

SECTION 3 – COMMUNITY PROFILE

This section of the Plan provides an overview of Volusia County, Florida. It consists of the following five subsections:

- **Geography and the Environment**
- **Population and Demographics**
- **Housing, Infrastructure and Land Use**
- **Employment and Industry**
- **Development Trends**

3.1 GEOGRAPHY AND THE ENVIRONMENT

Volusia County was established in 1854 as a prosperous steamboat landing area. It lies on the central coast of eastern Florida and is comprised of 1,103 square miles of land and 329 square miles of water (bounded to the north and south by the coastal counties of Flagler and Brevard). Several counties border Volusia County to the west including Putnam, Marion, Lake and Seminole. The County is located approximately 40 miles from Orlando, 95 miles from Jacksonville and 105 miles from Tampa, Florida.

There are 16 incorporated areas within Volusia County, of which Deltona is the largest in terms of population. An orientation map of the Volusia County study area is provided as **Figure 3.1**. The participating jurisdictions in this plan include Daytona Beach, Daytona Beach Shores, DeBary, Del and Deltona, Edgewater, Holly Hill, Lake Helen, New Smyrna Beach, Oak Hill, Orange City, Ormond Beach, Pierson, Ponce Inlet, Port Orange, South Daytona, and the unincorporated area of Volusia County.

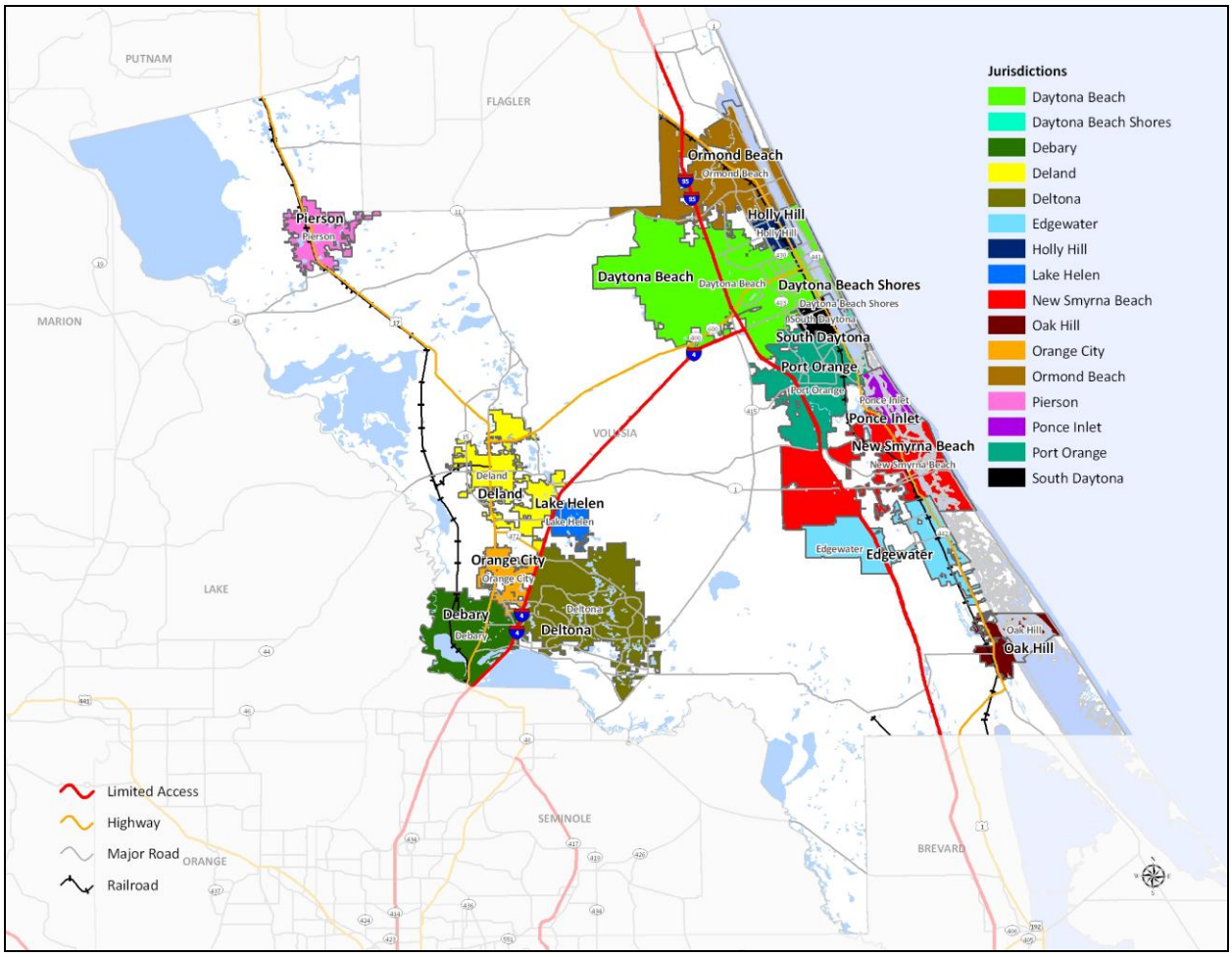
Forest land accounts for approximately 65 percent of the land area in Volusia County[1]. There is an abundance of public land in Volusia County. For example, the northern portion of the county, abutting Flagler County, is located in the North Peninsula State Recreation Area. In addition, the southern coastal portion of the county, adjacent to Brevard County, is part of the Canaveral National Seashore.

The climate in Volusia County is considered sub-tropical with generally warm, humid temperatures year-round. The average winter temperature is 62 degrees Fahrenheit. The average summer temperature is 81 degrees Fahrenheit, though it typically exceeds 90 degrees Fahrenheit in the months of June, July, and August. The average annual precipitation is 49 inches.

The dominant surface water resources in Volusia County are Mosquito Lagoon, Lake George (27,884 acres), Lake Monroe (5,423 acres), and Lake Harney (3,210 acres)[2]. There are many other water areas throughout the County, which are fed by numerous creeks, bayous and other minor tributaries.

[1] http://www.sfrc.ufl.edu/Extension/county/volusi.htm
[2] Volusia County Comprehensive Plan, Figure 1-2 Legend for Water Bodies

FIGURE 3.1: Volusia County Study Area Map



Source: Volusia County GIS

3.2 POPULATION AND DEMOGRAPHICS

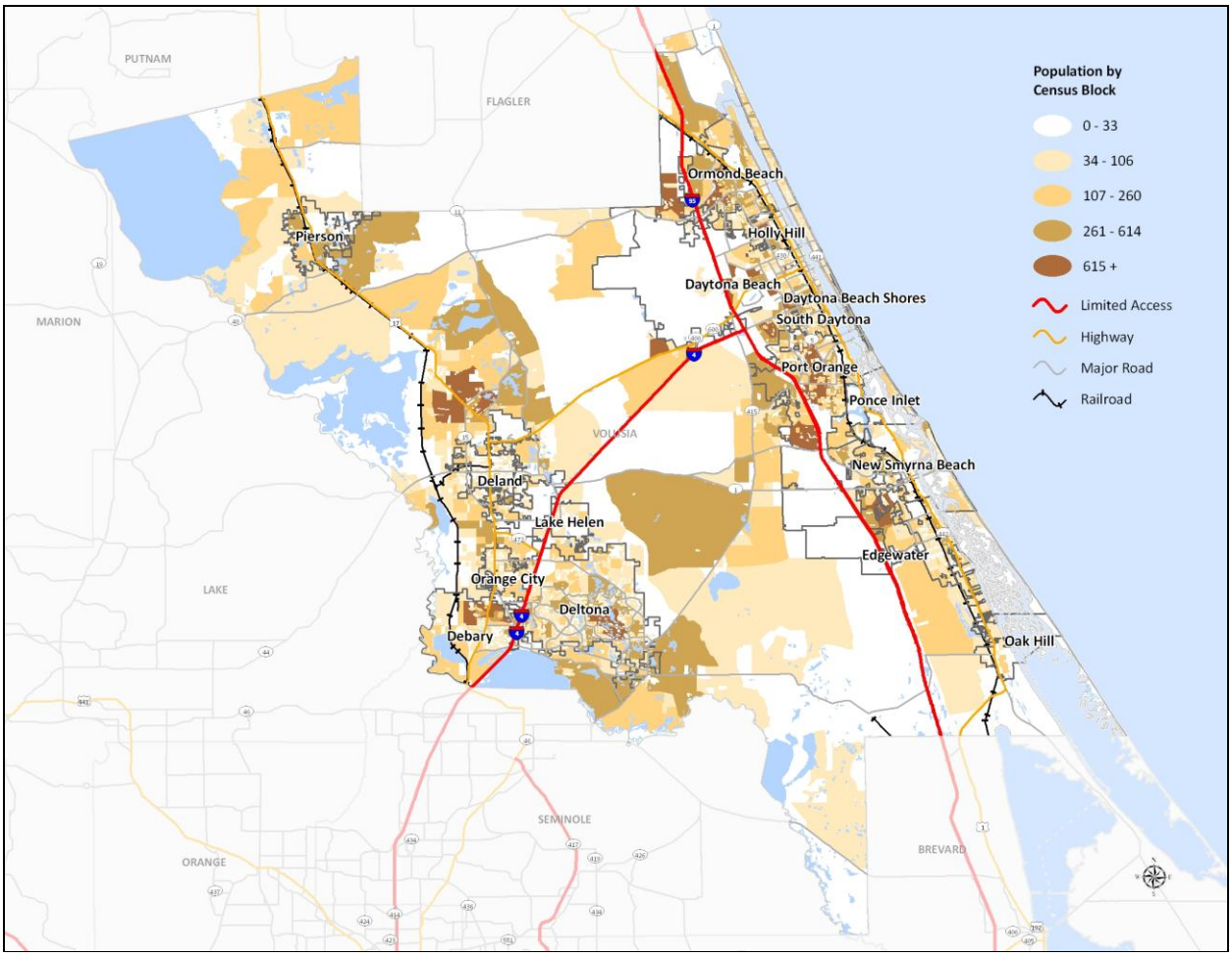
According to the U.S. Census Bureau, the 2008 estimated population of Volusia County was 498,036. This represents a 12.3 percent increase from 2000, when the population was 443,341, and a slightly lower change compared to the State percent change of 14.7 percent. **Table 3.1** provides the 2000 populations of the cities and unincorporated areas within Volusia County along with the 2008 population estimates as provided by the U.S. Census Bureau and the Volusia County Department of Economic Development. In addition, **Figure 3.2** shows the population distribution by block group in Volusia County.

TABLE 3.1: Population of Cities and Unincorporated Areas in Volusia County

JURISDICTION	2000 POPULATION	2008 POPULATION ESTIMATE
Daytona Beach	64,112	66,362
Daytona Beach Shores	4,299	4,582
DeBary	15,559	19,564
Deland	20,904	25,478
Deltona	69,543	86,201
Edgewater	18,688	21,977
Holly Hill	12,119	12,797
Lake Helen	2,743	2,850
New Smyrna Beach	20,048	24,335
Oak Hill	1,378	1,828
Orange City	6,604	8,090
Ormond Beach	36,301	41,000
Pierson	2,596	2,936
Ponce Inlet	2,513	3,102
Port Orange	45,823	57,234
South Daytona	13,177	13,484
Unincorporated	106,880	125,700

Source: U.S. Census Bureau, Volusia County Department of Economic Development

Figure 3.2: Population of Cities and Unincorporated Areas in Volusia County



Source: U.S. Census Bureau

According to the 2006 U.S. Census American Community Survey, the median age for the County was 42.6 years. This is slightly higher than the Florida median age of 39.8 years of age. It is estimated that 20.4 percent of the County's population is made up of persons that are 65 years old and over, which is expectedly higher than the State figure of 16.8 percent.

The racial mix in Volusia County is predominately white, but has other notable populations. White persons make up 84.9 percent of the County's population. Black or African American persons accounted for 9.6 percent of the Volusia County population, less than the state percentage of 15.4 percent. Asians comprised 1.3 percent of the population compared to the State's 2.2 percent. People of Hispanic or Latino descent comprised 9.8 percent of the population in the County.

3.3 HOUSING, INFRASTRUCTURE, AND LAND USE

3.3.1 Housing

According to the Census Bureau's 2006 American Community Survey, there were 203,394 housing units in Volusia County. Of these structures, 74 percent are single-unit and 17 percent are multi-unit. The remaining 9 percent are mobile homes or other types of housing. The median value of owner-occupied housing units was $201,700, compared to the $230,600 average in Florida and the $185,200 national average.

3.3.2 Infrastructure

Infrastructure is categorized in this Plan as Transportation and Utilities, as these elements are vital in a disaster event, both for evacuation and for response and recovery efforts. Volusia County is endowed with multi-modes of transportation and has several utility providers.

Transportation

Volusia County has several transportation options whether traveling by automobile, rail, or air. There are two federal interstates which run through the County: Interstate 95 runs north to south along the coast, and Interstate 4 runs northeast, connecting the County to Orlando, and merging with I-95 near Daytona Beach. There are also four federal highways (U.S. 1, U.S. 17, U.S. 40 and U.S. 92). There are also three major railway transportation providers (Amtrak, CSX, and Florida East Coast Railway), and a number of regional airports. The major area airport is Daytona Beach International Airport. In addition, Port Canaveral, a deep water port, and one of the busiest cruise ports in the world, is located about 70 miles south of Volusia County in Brevard County.

Utilities

Florida Power and Light, Progress Energy, City of New Smyrna Beach Utilities Commission, and Clay Electric Cooperative serve the electricity needs in Volusia County. The natural gas suppliers are Florida Public Utilities and TECO People's Gas. Water and sewer services are provided by a number of different sources including Volusia County Utilities, North Peninsula Utilities Corporation, and municipal governments.

3.3.3 Land Use

Table 3.2 shows the remaining land available for development in Volusia County as of 2009. A majority of the jurisdictions plan to use the remaining open space for residential development.

TABLE 3.2: Undeveloped Land in Volusia County

JURISDICTION	UNDEVELOPED AREA	PERCENT UNDEVELOPED	PROPOSED USE
Daytona Beach	14 square miles	12%	Residential
Daytona Beach Shores	0	0	n/a
DeBary	2.5 square miles	10%	Parks, Industrial, Mixed-Use
Deland	5.6 square miles	35%	Residential, Industrial
Deltona	6.9 square miles	18%	Residential, Mixed-Use
Edgewater	5.9 square miles	40%	Residential, Mixed-Use
Holly Hill	0.13 square miles	3%	Residential
Lake Helen	1 square mile	50%	Residential, Commercial
New Smyrna Beach	27.3 square miles	78%	Residential, Other
Oak Hill	2.54 square miles	20%	Residential
Orange City	3.1 square miles	47%	Residential, Commercial
Ormond Beach	7.61 square miles	21%	Various
Pierson	1.1 square miles	14%	Residential, Parks
Ponce Inlet	0.225 square miles	3%	Residential
Port Orange	5.5 square miles	20%	Residential, Commercial
South Daytona	0.5 square miles	13%	unknown
Unincorporated Area	307.5 square miles	33%	Parks, Residential, Mixed-Use

3.4 EMPLOYMENT AND INDUSTRY

Volusia County began as prosperous steamboat landing town in the early 1800s. Today, employment is based largely in the public sector. According to the 2008 Area Workforce Report, the civilian labor force in Volusia County is approximately 259,500. The top employer is Volusia County Schools with 8,351 employees, Halifax Health with 4,327 employees, and Volusia County Government with 3,728 employees.

From an industry perspective, Volusia County has a high number of construction businesses (2,495), retail trade establishments (1,912), and professional, scientific and technical service businesses (1,469 establishments)[3]. These figures reflect the high proportion of people working in the construction, education, and tourism industries. The industries that received the highest average annual wages were management of companies and enterprises ($69,129), utilities ($64,077), and finance and insurance ($44,841).

[3] Volusia County, Department of Economic Development (2007).

In 2007, the estimated median household income for Volusia County was $42,276, significantly less than the State and U.S. medians of $47,804 and $50,740, respectively. However, income in Volusia has been rising steadily since 1997[3].

3.5 DEVELOPMENT TRENDS

Volusia County experienced substantial growth between 2000 and 2005, as indicated by U.S. Census residential building permit data. After this period, growth begins to decline but it is still growing a relatively strong rate (**Table 3.3**). In addition, the county population grew 2.2 percent in 2006, 1 percent in 2007 and is projected to grow by 1.9 percent in 2009.

TABLE 3.3: Annual Residential Building Permit Data, Volusia County

YEAR	SINGLE FAMILY UNITS	MULTI-FAMILY UNITS	TOTAL
2000	3,088	59	3,147
2001	5,033	79	5,112
2002	4,131	40	4,171
2003	5,033	79	5,112
2004	4,820	100	4,920
2005	5,068	118	5,186
2006	2,906	55	2,961
2007	1,520	57	1,577
2008	1,031	22	1,053

Source: U.S. Census Bureau

There is currently one major development planned in Edgewater that will incorporate highly clustered, mixed use, low impact development. Of the 585 acres of wetlands on-site, 68 percent will be used as conservation easement. The development will include green building standards (e.g., water wise, Energy Star and dark skies protection). Although not officially approved, this development is proposed to contain 8,500 residential structures and 3.3 million square feet for commercial use.

The vulnerability of these new structures is as follows:

- The City maintains a floodplain management ordinance, which includes development standards that comply with NFIP participation requirements. Flood vulnerability would be further reduced, as the ordinance shall require that any new construction have the lowest finished floor elevated to at least one foot above the established 100-year (1-percent annual chance) flood elevation.
- All residential and commercial properties are proposed to be built directly west of I-95, and would not be susceptible to erosion, surge and tsunami hazards.
- Sinkhole risk is very low in this area.
- Structures could be damaged by high winds that exceed the wind design levels.
- Based on a cursory review of the proposed siting and the existing wildfire hazard areas, it appears that some of the areas might be wildfire-susceptible. However, this will depend on actual siting, buffers and construction materials (e.g., soffits).

No other development is planned throughout Volusia County at this time for critical facilities or infrastructure due to budgetary issues.

SECTION 4 – HAZARD IDENTIFICATION

This section is the first of three sections that assess the risk of Volusia County and the participating jurisdictions to natural hazards. This section identifies a wide range of hazards that could potentially impact the County. Section 5: ***Hazard Profiles***, provides more detailed information about how the identified hazards specifically impact the County and participating jurisdictions. Section 6: ***Vulnerability Assessment*** provides detailed analyses results that indicate the amount of damages that could occur in the County as a result of the identified hazards. Together, these sections serve to identify, analyze and assess the overall risk posed to Volusia County and the participating jurisdictions from hazards. The risk assessment also attempts to define any hazard risks that may uniquely or exclusively affect specific areas of Volusia County or its participating jurisdictions and partners.

Volusia County and the participating jurisdictions are vulnerable to a wide range of natural hazards[1] that threaten life and property. Upon a review of the full range of natural hazards suggested under FEMA planning guidance, Volusia County and the participating jurisdictions have identified a number of hazards that are to be addressed in this Multi-jurisdictional LMS. These hazards were identified through an extensive process that utilized input from the Local Mitigation Strategy Working Group (LMS Working Group) members, research of past disaster declarations in the County, a review of previous hazard mitigation plans in the County, and a review of the current Florida Hazard Mitigation Plan. Readily available online information from reputable sources such as federal and state agencies was also evaluated to supplement information from these key sources.

Table 4.1 lists the full range of natural hazards initially identified for consideration in the Plan and provides a brief description for each. This table includes thirteen individual hazards categorized by the following types: atmospheric, hydrologic, geologic, and other. Some of these hazards are considered to be interrelated or cascading (i.e., hurricanes can cause flooding, storm surge and tornadoes), but for preliminary hazard identification purposes these distinct hazards are broken out separately. It should also be noted that some hazards, such as drought or winter storms may impact a large area yet cause little damage, while other hazards, such as a tornado, may impact a small area yet cause extensive damage.

TABLE 4.1: Descriptions of the Full Range of Initially Identified Hazards

HAZARD	DESCRIPTION
ATMOSPHERIC	
Hail	A hail event is caused by any storm that produces hailstones that fall to the ground; usually used when the amount or size of the hail is considered significant. Hail is formed when updrafts in thunderstorms carry raindrops in to parts of the atmosphere where the temperatures are below freezing.

[1] FEMA's current regulations and interim guidance under the Disaster Mitigation Act of 2000 (DMA 2000) require, at a minimum, an evaluation of a full range of natural hazards. An evaluation of human-caused hazards (e.g., technological hazards, terrorism, etc.) is encouraged, though not required, for plan approval. Volusia County has focused solely on natural hazards at this time. Incorporation of human-caused hazards may be evaluated in future versions of the plan, as it is a "living document" which will be monitored, evaluated and updated regularly.

TABLE 4.1: Descriptions of the Full Range of Initially Identified Hazards

HAZARD	DESCRIPTION
Hurricane and Tropical Storm Wind	Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and with a diameter averaging 10 to 30 miles across. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation and tornadoes. Coastal areas are also vulnerable to the additional forces of storm surge, wind-driven waves and tidal flooding which can be more destructive than cyclone wind. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea and Gulf of Mexico during the official Atlantic hurricane season, which extends from June through November.
Lightning	Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes, but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes thunder. On average, 73 people are killed each year by lightning strikes in the United States.
Severe Winter Storm	Severe winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Ice storms occur when moisture falls and freezes immediately upon impact on trees, powerlines, communication towers, structures, roads and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.
Thunderstorm	Thunderstorms are caused by air masses of varying temperatures meeting in the atmosphere. Rapidly rising warm moist air fuels the formation of thunderstorms. Thunderstorms may occur singularly, in lines, or in clusters. They can move through an area very quickly or linger for several hours.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. Tornadoes are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size and duration of the storm.
HYDROLOGIC	
Coastal Erosion	Landward displacement of a shoreline caused by the forces of waves and currents define coastal erosion. Coastal erosion is measured as the rate of change in the position or horizontal displacement of a shoreline over a period of time. It is generally associated with episodic events such as hurricanes and tropical storms, nor'easters, storm surge and coastal flooding but may also be caused by human activities that alter sediment transport. Construction of shoreline protection structures can mitigate the

TABLE 4.1: Descriptions of the Full Range of Initially Identified Hazards

HAZARD	DESCRIPTION
	hazard, but may also exacerbate it under some circumstances.
Drought	A drought is a prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality. High temperatures, high winds, and low humidity can worsen drought conditions and also make areas more susceptible to wildfire. Human demands and actions have the ability to hasten or mitigate drought-related impacts on local communities.
Flood	The accumulation of water within a water body which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream ocean, lake or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine, coastal, or shallow flooding (where shallow flooding refers to sheet flow, ponding and urban drainage).
Storm Surge	A storm surge is a large dome of water often 50 to 100 miles wide and rising anywhere from four to five feet in a Category 1 hurricane up to more than 30 feet in a Category 5 storm. Storm surge heights and associated waves are also dependent upon the shape of the offshore continental shelf (narrow or wide) and the depth of the ocean bottom (bathymetry). A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water close to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. Storm surge arrives ahead of a storm's actual landfall and the more intense the hurricane is, the sooner the surge arrives. Storm surge can be devastating to coastal regions, causing severe beach erosion and property damage along the immediate coast. Further, water rise caused by storm surge can be very rapid, posing a serious threat to those who have not yet evacuated flood-prone areas.
GEOLOGIC	
Sinkhole	Sinkholes are formed when the underlying limestone or other rock type collapses, resulting in a depression. Limestone is soluble in natural water which causes the collapse.
Tsunami	A series of waves generated by an undersea disturbance such as an earthquake. The speed of a tsunami traveling away from its source can range from up to 500 miles per hour in deep water to approximately 20 to 30 miles per hour in shallower areas near coastlines. Tsunamis differ from regular ocean waves in that their currents travel from the water surface all the way down to the sea floor. Wave amplitudes in deep water are typically less than one meter; they are often barely detectable to the human eye. However, as they approach shore, they slow in shallower water, basically causing the waves from behind to effectively "pile up", and wave heights to increase dramatically. As opposed to typical waves which crash at the shoreline, tsunamis bring with them a continuously flowing 'wall of water' with the potential to cause devastating damage in coastal areas located immediately along the shore.
OTHER	
Wildfire	An uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low

TABLE 4.1: Descriptions of the Full Range of Initially Identified Hazards

HAZARD	DESCRIPTION
	humidity, low rainfall, and high winds all work to increase risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors. Over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning.

SECTION 5 – HAZARD PROFILES

44 CFR Requirement

44 CFR Part 201.6(c)(2)(i):
The risk assessment shall include a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

5.1 OVERVIEW

This section includes detailed hazard profiles for each of the hazards identified in the previous section as significant enough for further evaluation through the risk assessment in Volusia County. This includes the following natural hazards:

- **Atmospheric**
  - Hail
  - Hurricane and Tropical Storm
  - Lightning
  - Severe Winter Storm
  - Thunderstorm
  - Tornado
- **Hydrologic**
  - Coastal Erosion
  - Drought
  - Flood
  - Storm Surge
- **Geologic**
  - Sinkhole
  - Tsunami
- **Other**
  - Wildfire

Each hazard profile described in this section includes a general description of the hazard, its location and extent, notable historical occurrences and the probability of future occurrences. It also includes specific items noted by members of the Local Mitigation Strategy Working Group (LMS Working Group) as it relates to unique historical or anecdotal hazard information for Volusia County or a particular jurisdiction. The probability of future occurrence is expressed as “high” (expected to occur at least every five years), “moderate” (expected to occur at least every 25 years), “low” (expected to occur at least every 100 years, and “very low” (is possible to occur, despite their being no recorded occurrences).

Major Disaster Declarations

In 1988, the Robert T. Stafford Disaster Relief and Emergency Assistance Act was enacted to support state and local governments when disasters overwhelm local resources. This law, as amended, establishes a process for requesting and obtaining a Presidential Disaster Declaration, defines the type and scope of assistance available from the federal government, and sets the conditions for obtaining that assistance. The Federal Emergency Management Agency (FEMA), now part of the Emergency Preparedness and Response Directorate of the Department of Homeland Security, is tasked with coordinating the response. Since 1965, Volusia County has received numerous presidential disaster declarations for such hazards as hurricanes, tornados, floods and severe freezes (**Table 5.1**).

TABLE 5.1: Presidential Disaster Declarations

EVENT	DECLARATION DATE	DECLARATION NUMBER
Severe Storms, Tornadoes, and Flooding	05/15/79	586
Tornadoes, Flooding, High Winds & Tides, Freezing	03/13/93	982
Tropical Storm Gordon, Tornadoes, Flooding	11/28/94	1043
Tropical Storm Josephine	10/15/96	1141
Severe Storms, High Winds, Tornadoes, Flooding	02/25/98	1195
Extreme Fire Hazard	07/03/98	1223
Hurricane Floyd	09/22/99	1300
Hurricane Irene	10/28/99	1306
Severe Freeze	02/06/01	159
Hurricane Charlie/Bonnie	08/13/04	1539
Hurricane Frances	09/04/04	1545
Hurricane Ivan	09/15/04	1551
Hurricane Jeanne	09/26/04	1561
Hurricane Katrina Evacuation	09/05/05	3220
Severe Storms, Tornadoes	02/03/07	1679
Severe Storms, Tornadoes, and Flooding	02/08/07	1680
Tropical Storm Fay	08/21/08	3288
Severe Storms, Flooding, Tornadoes, Straight-line Winds	05/27/09	1840

Source: Federal Emergency Management Agency

Volusia County Emergency Management has had 52 significant disaster events that resulted in the activation of their Emergency Operations Center. There were 73 percent that were natural hazard events, underscoring that natural hazards pose a very high risk to Volusia County. **Table 5.2** lists these events by type, area of impact, EOC activation level, the estimated number of parcels (properties) that were damaged and loss estimates.

TABLE 5.2: Significant Activation Events

Date of Event	Type Of Event	Area of Event	EOC Level Activation	Damage Estimate	
				# Parcels	Dollars
3/13/1993	Wind Storm	County-Wide	Level 2 (Part)	1273	16,948,355
5/4/1994	Tornado	Holly Hill	Level 2 (Part)	273	6,680,000
9/6/1994	I-4 Chemical Spill	SW Volusia	Level 1 (Mon)	N/A	N/A
11/17/1994	T.S. Gordon	County-Wide	Level 2 (Part)	658	10,602,924
8/3/1995	Hurricane Erin	Edgewater	Level 3 (Full)	31	65,052
3/11/1996	Wind Storm	Daytona Beach	Level 1 (Mon)	8	28,000
7/10/1996	Hurricane Bertha	County-Wide	Level 2 (Part)	N/A	N/A
9/5/1996	Hurricane Fran	County-Wide	Level 2 (Part)	N/A	N/A
10/8/1996	T.S. Josephine	County-Wide	Level 1 (Mon)	193	1,232,343
4/23/1997	Tornado	NSB Peninsula	Level 2 (Part)	79	525,600
7/5/1997	Tornado	Oak Hill	Level 1 (Mon)	6	33,000
11/2/1997	Tornado	NSB Main & Penn	Level 2 (Part)	318	11,070,722
2/2/1998	Wind Storm	Bethune Beach	Level 1 (Mon)	1	20,000
2/22/1998	Tornado	Daytona Beach	Level 2 (Part)	616	9,435,553
6/22/1998	Fire Storm "98"	County-Wide	Level 4 (Fullx)	22	2,126,013
7/28/1998	Tornado	Daytona Beach	Level 1 (Mon)	46	159,000
1/3/1999	Wind Storm	SR 415 Area	Level 1 (Mon)	8	9,100
1/9/1999	Wind Storm	Daytona Beach	Level 1 (Mon)	11	59,000
9/14/1999	Hurricane Floyd	East Side	Level 1 (Full)	433	18,655,353
10/16/1999	Hurricane Irene	East Side	Level 2 (Part)	185	16,809,266
1/1/2000	Y2K	County-Wide	Level 1 (Full)	N/A	N/A
5/31/2000	Wildfires 2000	County-Wide	Level 2 (Part)	N/A	N/A
9/16/2000	Hurricane Gordon	County-Wide	Level 2 (Part)	N/A	N/A
9/19/2000	Wind Storm	Deland	Level 2 (Part)	18	68,836
3/13/2001	Tornado	Daytona Beach	Level 2 (Part)	172	3,210,995
9/11/2001	Nat'l Terrorism Event	County-Wide	Level 2 (Part)	N/A	N/A
9/14/2001	T.S. Gabrielle	County-Wide	Level 2 (Part)	44	474,135
11/15/2001	Rain Event	East Volusia	Level 2 (Part)	39	561,300

TABLE 5.2: Significant Activation Events

Date of Event	Type Of Event	Area of Event	EOC Level Activation	Damage Estimate	
				# Parcels	Dollars
4/18/2002	Amtrak Derailment	Putnam Co.	Level 2 (Part)	N/A	5,000
9/4/2002	T.S. Edouard	County-Wide	Level 2 (Part)	N/A	N/A
1/13/2003	Water Plant Breach	Debary	Level 2 (Part)	N/A	30,000
7/3/2004	Pepsi 400 Dis Race	Daytona Beach	Level 2 (Part)	N/A	N/A
8/13/2004	Hurricane Charley	County-Wide	Level 1 (Full)	5719	106,900,000
9/4/2004	Hurricane Frances	County-Wide	Level 1 (Full)	26964	393,900,000
9/25/2004	Hurricane Jeanne	County-Wide	Level 1 (Full)	UNK	59,500,000
7/2/2005	Pepsi 400 Dis Race	Daytona Beach	Level 2 (Part)	N/A	N/A
9/8/2005	T.S. Ophelia	County-Wide	Level 2 (Part)	Beach	N/A
10/23/2005	Hurricane Wilma	County-Wide	Level 2 (Part)	3	752,000
2/19/2006	Daytona 500 Race	Daytona Beach	Level 2 (Part)	N/A	N/A
7/1/2006	Pepsi 400 Dis Race	Daytona Beach	Level 2 (Part)	N/A	N/A
8/29/2006	T.S. Ernesto	County- Wide	Level 2 (Part)	N/A	N/A
12/25/2006	Tornado	Deland-Dab	Level 3 (Mon)	210	32,000,000
2/2/2007	Tornado	Deland-NSB	Level 2 (Part)	771	60,557,921
2/18/2007	Daytona 500 Race	Daytona Beach	Level 2 (Part)	N/A	N/A
5/6/2007	Airport Road Fire	Vol/Flag Cnty	Level 2 (Part)	N/A	N/A
7/7/2007	Pepsi 400 Dis Race	Daytona Beach	Level 2 (Part)	N/A	N/A
2/17/2008	Daytona 500 Race	Daytona Beach	Level 2 (Part)	N/A	N/A
7/5/2008	Coke 400 Dis Race	Daytona Beach	Level 2 (Part)	N/A	N/A
8/18/2008	T.S. Fay	County-Wide	Level 1 (Full)	240	13,580,016
2/15/2009	Daytona 500 Race	Daytona Beach	Level 2 (Part)	N/A	N/A
5/17/2009	May Rain Storm	County-Wide	Level 2 (Part)	1654	69,516,703
7/7/2009	Coke Zero 400	Daytona Beach	Level 2 (Part)	N/A	N/A
7/24/2009	Port Orange Tornado	Port Orange	Level 3 (Monitor)	175	2,810,661
			Totals------>	**40,170**	**838,326,848**

Source: Volusia County Emergency Management Division (Revised 8/11/09)

ATMOSPHERIC HAZARDS

5.2 HAIL

5.2.1 Background

Hail frequently accompanies thunderstorms and has potential to cause substantial damage. Early in the developmental stages of a hail, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until they develop sufficient weight to fall as precipitation. Hail precipitation falls in sphere or irregularly shaped masses greater than 0.75 inches in diameter. The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size.

5.2.2 Location and Spatial Extent

Hail is often produced during a thunderstorm event which has no geographic limitations to the area it affects. Therefore, it is assumed that all of Volusia County is uniformly at risk to a hail event. Impacts typically include downed power lines and trees and damage to vehicles and mobile homes.

5.2.3 Historical Occurrences

According to the National Climatic Data Center, there have been 106 recorded hail events in Volusia County since 1983, as shown in **Table 5.3**[1]. Hail has caused a total of $231,092 (2009 dollars) in property damage, but has not resulted in any injuries or deaths. Hail sizes for these events range from 1.00 inches to 2.75 inches in diameter. The locations of historically recorded hail events are shown in **Figure 5.1**. The emergency management officials from the Volusia County jurisdictions determined that only hail that was greater than one inch in diameter was to be listed in **Table 5.3**.

[1] A Hail event that affects several jurisdictions on the same day is classified as a single event.

TABLE 5.3: Historical Hail Impacts

LOCATION	DATE	MAGNITUDE (inches)	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 dollars)	DESCRIPTION
Volusia County	8/16/1963	1.00	0/0	$0	Not Available
Volusia County	2/7/1971	2.75	0/0	$0	Not Available
Volusia County	3/13/1971	1.75	0/0	$0	Not Available
Volusia County	5/29/1971	1.75	0/0	$0	Not Available
Volusia County	4/4/1973	1.00	0/0	$0	Not Available
Volusia County	6/10/1975	1.75	0/0	$0	Not Available
Volusia County	5/12/1976	1.50	0/0	$0	Not Available
Volusia County	4/18/1978	1.00	0/0	$0	Not Available
Volusia County	4/8/1982	1.50	0/0	$0	Not Available
Volusia County	4/29/1982	1.75	0/0	$0	Not Available
Volusia County	6/8/1985	1.00	0/0	$0	Not Available
Volusia County	6/18/1987	1.75	0/0	$0	Not Available
Volusia County	5/24/1988	1.50	0/0	$0	Not Available
Volusia County	2/21/1989	1.00	0/0	$0	Not Available
Volusia County	3/23/1989	1.25	0/0	$0	Not Available
Volusia County	5/1/1989	1.00	0/0	$0	Not Available
Volusia County	6/26/1990	1.00	0/0	$0	Not Available
Volusia County	5/2/1992	1.00	0/0	$0	Not Available
Edgewater	1/11/1993	1.50	0/0	$77,700	Strong downburst winds damaged 9 mobile homes. Most had aluminum awnings, carports, and family rooms ripped away. Trees and power lines were downed. Up to golf ball-sized hail also fell.
Daytona Beach	3/31/1993	1.75	0/0	$0	Golfball-sized hail fell at the Daytona Beach Airport.
Daytona Beach	6/19/1995	2.50	0/0	$36,809	Severe thunderstorms blew down dozens of trees in Deltona and produced one inch-diameter hail.
Daytona Beach	3/28/1996	1.75	0/0	$0	Strong downburst winds blew down trees destroyed a pool screen and produced two and one-half-inch-diameter hail in the Spruce Creek Village.

TABLE 5.3: Historical Hail Impacts

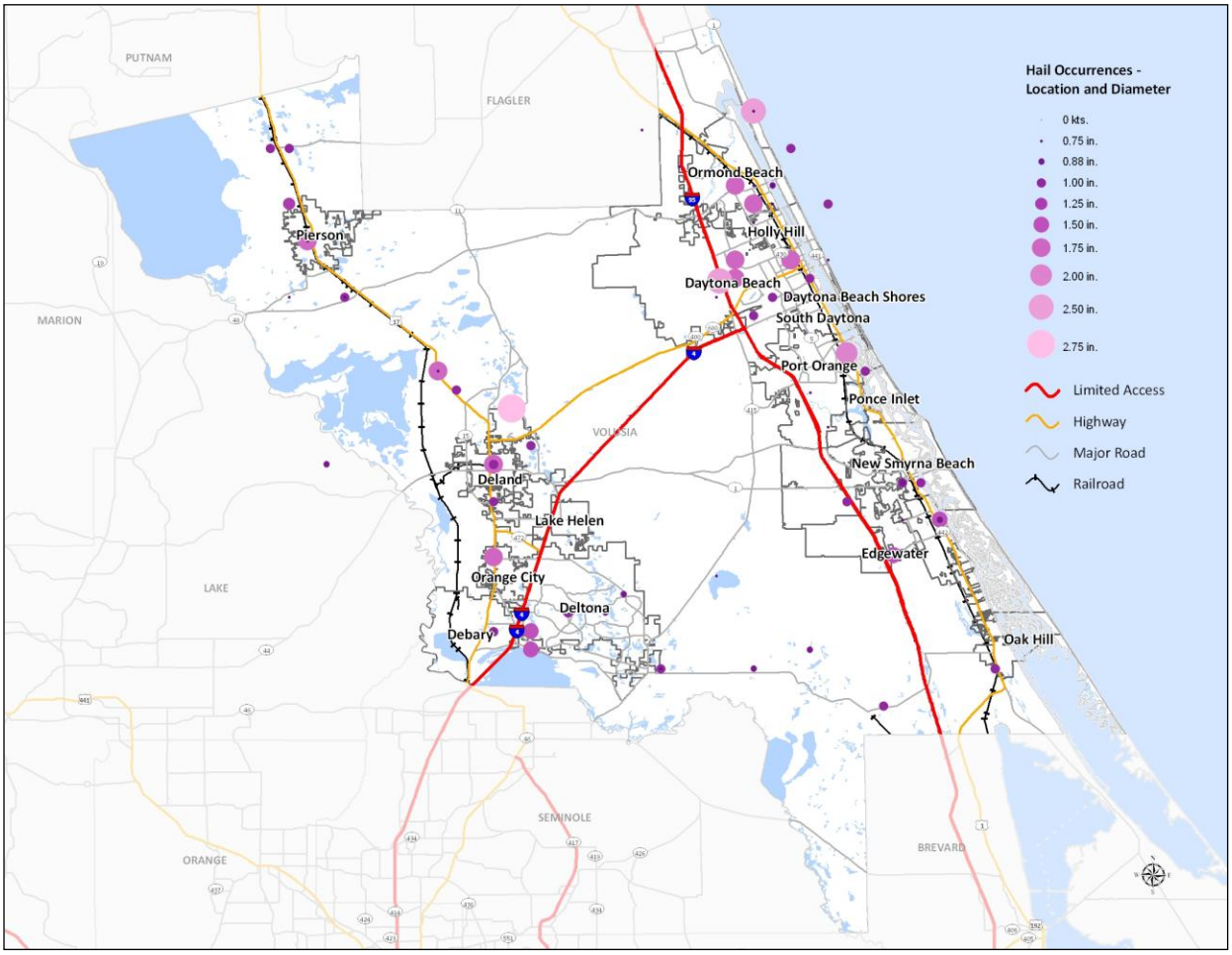
LOCATION	DATE	MAGNITUDE (inches)	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 dollars)	DESCRIPTION
Barberville	6/15/1996	1.00	0/0	$0	Hail the size of quarters fell in Barberville, while quarter-sized hail fell in DeBary.
DeBary	6/15/1996	1.00	0/0	$0	
Daytona Beach	8/25/1996	1.00	0/0	$0	Not Available
Deltona	7/7/1997	1.00	0/0	$0	Not Available
DeBary	8/13/1997	1.00	0/0	$0	Not Available
Deltona	2/28/1998	1.00	0/0	$0	Not Available
Deland	3/20/1998	1.25	0/0	$0	Not Available
New Smyrna Beach	3/20/1998	1.00	0/0	$0	
Daytona Beach	6/25/1998	1.75	0/0	$0	Not Available
Port Orange	1/9/1999	1.00	0/0	$4,032	A few mobile homes were damaged by falling trees and quarter size hail in Port Orange.
Pierson	5/6/1999	1.75	0/0	$0	Not Available
Orange City	5/9/1999	1.75	0/0	$0	Not Available
Oak Hill	4/15/2000	1.00	0/0	$0	Not Available
Deland	9/19/2000	1.75	0/0	$0	Not Available
Oak Hill	3/29/2001	1.00	0/0	$0	Not Available
De Land	3/31/2001	1.00	0/0	$0	Not Available
New Smyrna Beach	8/21/2001	1.00	0/0	$0	Not Available
Deltona	3/19/2003	1.00	0/0	$0	Not Available
Deland	4/25/2003	1.00	0/0	$0	Not Available
Deland	7/18/2003	1.00	0/0	$0	Not Available
Oak Hill	7/21/2003	1.00	0/0	$0	Not Available
Deland	10/7/2003	1.00	0/0	$0	Not Available
Port Orange	7/8/2004	2.00	0/0	$0	Not Available
Maytown	10/19/2004	1.00	0/0	$0	Not Available
Seville	3/25/2005	1.00	0/0	$0	Not Available
Daytona Beach	5/4/2005	1.75	0/0	$112,551	Not Available
Holly Hill	6/28/2006	1.75	0/0	$0	Not Available

TABLE 5.3: Historical Hail Impacts

LOCATION	DATE	MAGNITUDE (inches)	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 dollars)	DESCRIPTION
Deland	7/17/2006	1.00	0/0	$0	Not Available
Glencoe	3/7/2008	1.00	0/0	$0	A cold front moving across central Florida produced a line of thunderstorms that moved southeast across the area. One inch hail was reported in Port Orange. Quarter size hail was reported at Interstate 95 and Highway SR44, near Glencoe, and in Daytona Beach. The public reported nickel size hail in Deltona.
Port Orange	3/7/2008	1.00	0/0	$0	
Daytona Beach	3/7/2008	1.00	0/0	$0	
Seville	7/5/2008	1.00	0/0	$0	Quarter-sized hail was reported. A sea breeze thunderstorm produced hail and wind gusts in interior parts of East Central Florida.

Source: National Climatic Data Center

FIGURE 5.1: Locations of Historical Hail Events in Volusia County



Source: National Climatic Data Center

5.2.4 Probability of Future Occurrences

Based on the frequency of hail events in the past, the probability of future hail occurrences in Volusia County is high. Over the past 45 years, Volusia County has been impacted by two or more hail events per year. It can be expected that future hail events will continue to cause minor to severe damage to property and vehicles throughout Volusia County.

5.3 HURRICANE AND TROPICAL STORM

5.3.1 Background

Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. A tropical cyclone refers to any such circulation that develops over tropical waters. Tropical cyclones act as a "safety-valve," limiting the continued build-up of heat and energy in tropical regions by maintaining the atmospheric heat and moisture balance between the tropics and the pole-ward latitudes. The primary damaging forces associated with hurricanes and tropical storms are high-level sustained winds, heavy precipitation, and tornadoes. Coastal areas are also vulnerable to the additional forces of storm surge, wind-driven waves and tidal flooding which can be more destructive than cyclone wind.

The key energy source for a tropical cyclone is the release of latent heat from the condensation of warm water. Their formation requires a low-pressure disturbance, warm sea surface temperature, rotational force from the spinning of the earth and the absence of wind shear in the lowest 50,000 feet of the atmosphere. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season, which encompasses the months of June through November. The peak of the Atlantic hurricane season is in early to mid-September, and the average number of storms that reach hurricane intensity per year in this basin is about six.

As an incipient hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. Hurricane intensity is further classified by the Saffir-Simpson Scale (**Table 5.4**), which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense[2].

TABLE 5.4: Saffir-Simpson Scale

CATEGORY	MAXIMUM SUSTAINED WIND SPEED (MPH)	MINIMUM SURFACE PRESSURE (MILLIBARS)	STORM SURGE (FEET)
Tropical Storm	39–73	n/a	0–2
1	74–95	Greater than 980	3–5
2	96–110	979–965	6–8
3	111–130	964–945	9–12
4	131–155	944–920	13–18
5	155 +	Less than 920	19+

Source: National Hurricane Center

[2] Although a tropical storm is not part of the Saffir-Simpson Scale, it is listed here for comparative purposes.

The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds, barometric pressure and storm surge potential, which are combined to estimate potential damage. Categories 3, 4, and 5 are classified "major" hurricanes. Hurricanes within this range comprise only 20 percent of total tropical cyclone landfalls, but they account for over 70 percent of the damage in the United States. **Table 5.5** describes the damage that could be expected for a tropical storm and each category of hurricane. Damage during hurricanes may also result from spawned tornadoes, storm surge and inland flooding associated with heavy rainfall that usually accompanies these storms.

TABLE 5.5: Hurricane Damage Classifications

STORM CATEGORY	DAMAGE LEVEL	WIND SPEED	DESCRIPTION OF DAMAGES	PHOTO EXAMPLE
Tropical Storm	MINOR	39-73 mph	Breaks twigs and branches off trees, damages signboards, and windows may break.	
1	MINIMAL	74-95 mph	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage.	
2	MODERATE	96-110 mph	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected moorings may break their moorings.	
3	EXTENSIVE	111-130 mph	Some structural damage to small residences and utility buildings, with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures, with larger structures damaged by floating debris. Terrain may be flooded well inland.	
4	EXTREME	131-155 mph	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.	
5	CATASTROPHIC	155+ mph	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.	

Sources: National Hurricane Center; Federal Emergency Management Agency,
Tropical Storm Photo: FEMA/George Armstrong; Other Photos: PBS&J Photo Library

5.3.2 Location and Spatial Extent

Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States. Coastal areas are directly exposed to the brunt of a landfalling storm, but its impact is often felt hundreds of miles inland. Volusia County is susceptible to all of the hazards wrought by hurricanes and tropical storms. All areas throughout the county are susceptible to the accompanying hazard effects including extreme wind, flooding, and tornadoes. In addition, the coastal areas of the county are extremely susceptible to the added effects of storm surge, wave action, coastal erosion and tidal flooding[3].

5.3.3 Historical Occurrences

According to NOAA historical storm track records, 89 hurricane or tropical storm tracks have passed within 75 miles of Volusia County since 1850.[4] This includes: zero (0) Category 5 hurricanes; three (3) Category 4 hurricanes; eight (8) Category 3 hurricanes; nine (9) Category 2 hurricanes; twenty-one (21) Category 1 hurricanes; and forty-eight (48) tropical storms. Of the 134 recorded storm events, 25 had tracks that traversed directly through Volusia County. **Table 5.6** provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 100 miles of Volusia County) and Category of the storm based on the Saffir-Simpson Scale. **Figure 5.3** shows the track of each recorded storm in relation to Volusia County and eastern Florida.

TABLE 5.6: Historical Storm Tracks within 75 Miles of Volusia County (1850–2006)

DATE OF OCCURRENCE	STORM NAME	MAXIMUM WIND SPEED (MPH)	STORM CATEGORY
10/20/1941	Not Named	35	Tropical Storm
10/19/1944	Not Named	65	Category 1 Hurricane
06/24/1945	Not Named	80	Category 1 Hurricane
09/16/1945	Not Named	110	Category 1 Hurricane
10/08/1946	Not Named	40	Tropical Storm
11/02/1946	Not Named	35	Tropical Storm
09/23/1947	Not Named	50	Tropical Storm
08/27/1946	Not Named	130	Category 4 Hurricane
09/06/1950	EASY	85	Category 2 Hurricane
10/18/1950	KING	75	Category 1 Hurricane
10/09/1953	HAZEL	55	Tropical Storm
09/11/1960	DONNA	105	Category 3 Hurricane
08/27/1964	CLEO	75	Category 1 Hurricane
09/10/1964	DORA	100	Category 3 Hurricane
06/04/1968	ABBY	55	Tropical Storm

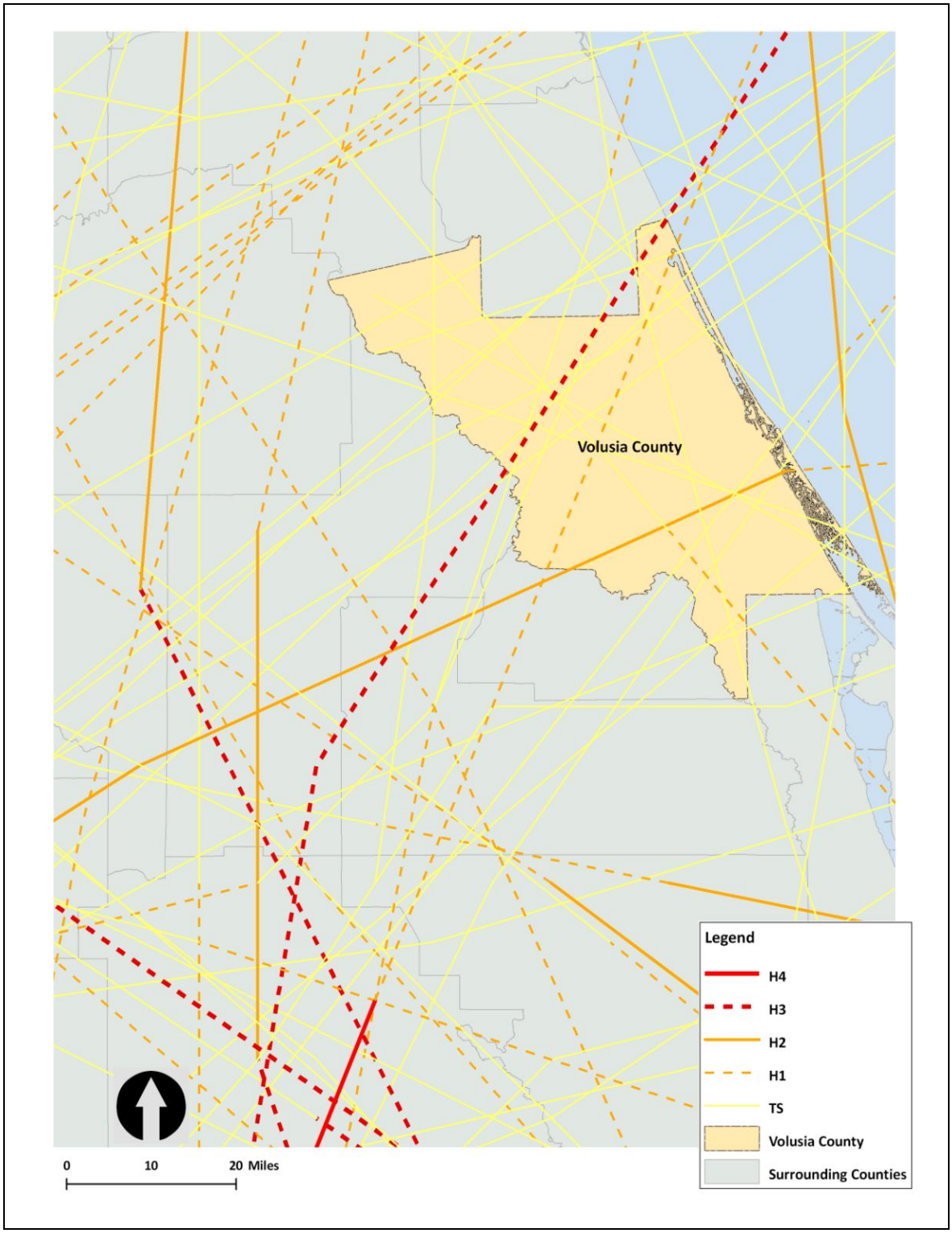
[3] Distinct hazard area locations for flooding, storm surge, and coastal erosion are discussed elsewhere in this section.
[4] These storm track statistics do not include tropical depressions or extratropical storms. Though these related hazard events are less severe in intensity, they may indeed cause significant local impact in terms of rainfall and high winds.

TABLE 5.6: Historical Storm Tracks within 75 Miles of Volusia County (1850–2006)

DATE OF OCCURRENCE	STORM NAME	MAXIMUM WIND SPEED (MPH)	STORM CATEGORY
10/19/1968	GLADYS	70	Category 1 Hurricane
8/20/1976	DOTTIE	45	Tropical Storm
09/03/1979	DAVID	85	Category 2 Hurricane
09/04/1979	DAVID	85	Category 2 Hurricane
08/19/1981	DENNIS	40	Tropical Storm
08/25/1983	BARRY	40	Tropical Storm
09/10/1984	DIANA	60	Tropical Storm
09/28/1984	ISIDORE	45	Tropical Storm
07/24/1985	BOB	60	Tropical Storm
10/10/1985	ISABEL	45	Tropical Storm
08/28/1988	CHRIS	40	Tropical Storm
11/23/1988	KEITH	55	Tropical Storm
11/17/1994	GORDON	55	Tropical Storm
08/02/1995	ERIN	75	Category 1 Hurricane
08/24/1995	JERRY	35	Tropical Storm
10/16/1999	IRENE	65	Category 1 Hurricane
09/14/2001	GABRIELLE	60	Tropical Storm
08/13/2004	CHARLEY	125	Category 4 Hurricane
09/05/2004	FRANCES	80	Category 1 Hurricane
09/26/2004	JEANNE	95	Category 2 Hurricane
10/05/2005	TAMMY	45	Tropical Storm

Source: National Oceanic and Atmospheric Administration

FIGURE 5.2: Historical Storm Tracks within 75 Miles of Volusia County



Source: National Oceanic and Atmospheric Administration

Some of the notable tropical cyclone events that occurred in Volusia County within the last two decades are described below (Information from National Climatic Data Center, National Oceanic and Atmospheric Administration, National Weather Service and National Hurricane Center):

Tropical Storm Gordon, 1994
Tropical Storm Gordon made landfall in South Florida on November 13, 1994. Gordon caused a total of 8 deaths, 43 injuries, and $400 million in damages ($605,793,853; 2009 dollars). It affected a number of Florida Counties, including Dade and Brevard, but Volusia was hit especially hard. Volusia County experienced $500,000 in both agricultural and property damage. Single-family, multi-family, and mobile home structures (a total of 1236 units) reported flood damage and losses were estimated at over $26 million.

Hurricane Floyd, 1999
On September 15, 1999, the center of Hurricane Floyd passed about 115 statute miles off the coast of Central Florida, causing substantial damage to the coastal counties of Brevard and Volusia. Winds gusts near 70 miles per hour were reported in both counties. In total, Floyd caused over $61 million in property damage, but there were no reports of deaths or injuries ($81,978,899; 2009 dollars). Over $42 million in damages were reported in Volusia County, $10 million of which was attributed directly to coastal erosion. In addition, over 300 homes were damaged from wind and falling trees.

Hurricane Irene, 1999
Hurricane Irene reached hurricane status over the Florida Straits and the calm of the center moved over Key West on October 15, 1999. Most of the hurricane force winds were confined to the east of Irene's center over the lower to middle Keys. As Hurricane Irene moved across Southeast Florida, it brought tropical storm conditions with sustained winds between 39 and 73 miles per hour. Hurricane Irene caused considerable damage in South Florida due to flooding. In some residential areas, flooding lasted for a week, displacing several hundred people and isolating thousands more. Volusia County estimated that damages to approximately 185 properties; totaling more than $16.8 million. The total losses (agricultural and property) were estimated near $800 millions in of the state of Florida. An estimated 700,000 costumers lost electricity. There were eight indirect deaths reported in Florida.

Hurricane Charley, 2004
Hurricane Charley produced wind gusts over 80 miles per hour as it traversed Volusia County on August 13, 2004. The storm caused over $106 million in property damages in Volusia County. In addition, two fatalities were attributed to Hurricane Charley. Widespread power outages, roadway flooding, and fallen trees also occurred. A strong F1 tornado also touched down in South Daytona Beach contributing to the total damage from the event.

Hurricane Frances, 2004
Hurricane Frances, a Category 2 storm, made landfall on September 4, 2004 in Martin County, Florida. As it moved north, Volusia County experienced hurricane force wind for several hours. Daytona Beach International Airport recorded wind gusts of 94 miles per hour. In addition to wind impacts, over 13 inches of rain fell in Volusia County which caused substantial flooding. Wind and flooding impacts resulted in damages of over $390 million within Volusia County. Total damage estimates for all impacted counties include over $4.8 billion for property damage and $93.2 million for crop damage. Despite widespread and severe damage, no deaths or injuries were reported.

Hurricane Jeanne, 2004
Hurricane Jeanne made landfall on the east coast of Florida on September 26, 2004, with winds estimated at 120 mph. Widespread rainfall of up to eight inches accompanied Hurricane Jeanne as it moved across eastern, central and northern Florida. A narrower band of 11 to 13 inches was observed in the vicinity of the eyewall track over Osceola, Broward and Indian River counties of east central Florida. A storm surge of approximately four ft above normal astronomical tide levels was measured at Trident Pier at Port Canaveral, Florida about an hour after landfall. Storm surge flooding of up to six feet above normal tides likely occurred along the Florida east coast from the vicinity of Melbourne southward to Ft. Pierce. Damages were estimated to be over $59 million in Volusia County. The American Insurances Service Group reported that Frances caused a total of $4.11 billion in Florida. There were three direct deaths reported in Florida, although the total death toll is estimated to be more than 3,000.

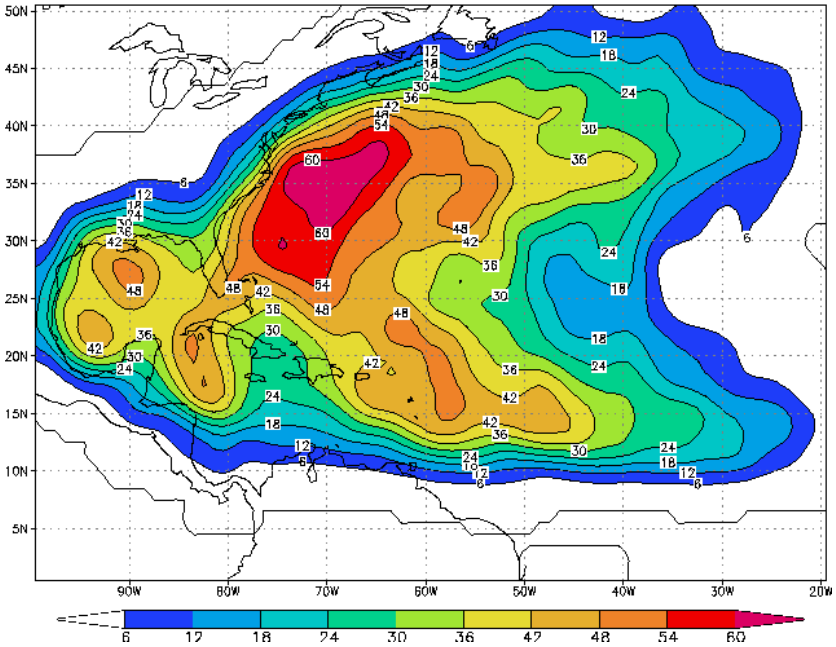
Tropical Storm Fay, 2008
Moving over Key West, Tropical Storm Fay made its first Florida landfall on August 18, 2008. As the tropical storm drifted north in the Volusia County off shore waters, hours of heavy rain fell across southern Volusia County. Tropical Storm Fay's primary impact was inland flooding. Rainfall amounts ranged from three to five inches over Miami-Dade and Broward counties and seven to 10 inches over northern Collier, Hendry and Glades counties near the center path of Fay. Storm surges were relatively minimal for this tropical storm. In Florida, wind damage was confined to mostly downed trees and power lines, plus minor roof damage to homes. Homes, personal property and motor vehicles were the primary damage losses in the United States. Volusia County reported damages in excess of $13.5 million. The total damage estimate, compiled by the Property Claim Services, is $245 million, including $195 million in Florida. Flood damage losses reported by the National Flood insurance Program were about $36 million.

5.3.4 Probability of Future Occurrences

The probability of future hurricane and tropical storm events for Volusia County is high. According to NOAA statistical data, Volusia County is located in an area with an annual probability of a named storm between 36 and 42 percent.

Figure 5.3 shows for any particular location what the chance is that a tropical storm or hurricane will affect the area sometime during the Atlantic hurricane season. This illustration was created by the National Oceanic and Atmospheric Administration's Hurricane Research Division using data from 1944 to 1999 and counting hits when a storm or hurricane was within approximately 100 miles (165 km) of each location.

FIGURE 5.3: Empirical Probability of a Named Hurricane or Tropical Storm



Source: National Oceanic and Atmospheric Administration

The probability of storm occurrences will vary significantly based on the return interval for different categories of magnitude. The probability of less intense storms (lower return periods) is higher than more intense storms (higher return periods). **Table 5.7** profiles the average potential peak gust wind speeds for each jurisdiction that can be expected in Volusia County during a hurricane event for various return periods according to FEMA's HAZUS-MH®.

TABLE 5.7: Average Peak Gust Wind Speeds (MPH) vs. Return Period

JURISDICTION	10-YEAR	20-YEAR	50-YEAR	100-YEAR	200-YEAR	500-YEAR	1,000-YEAR
Daytona Beach	70.9	84.2	100.0	110.7	120.2	130.9	138.7
Daytona Beach Shores	71.8	85.4	101.4	112.3	121.7	132.4	140.3
DeBary	69.4	82.3	97.6	107.6	116.5	125.8	132.6
Deland	69.0	81.8	97.0	107.2	116.0	125.7	132.0
Deltona	69.8	82.6	98.2	108.6	117.6	126.9	133.9
Edgewater	71.9	85.6	101.7	112.2	121.5	131.5	138.9
Holly Hill	70.7	84.2	99.7	110.2	119.9	130.8	138.7
Lake Helen	69.6	82.7	97.9	108.3	117.4	126.7	133.6
New Smyrna Beach	72.0	85.7	101.9	112.4	121.8	131.8	139.4

TABLE 5.7: Average Peak Gust Wind Speeds (MPH) vs. Return Period

JURISDICTION	10-YEAR	20-YEAR	50-YEAR	100-YEAR	200-YEAR	500-YEAR	1,000-YEAR
Oak Hill	73.1	87.0	103.7	114.0	123.4	133.7	140.7
Orange City	69.2	82.1	97.3	107.4	116.3	125.7	132.4
Ormond Beach	70.5	84.0	99.5	110.2	119.8	130.6	138.4
Pierson	67.5	80.2	95.2	105.0	113.4	123.5	130.2
Ponce Inlet	71.8	85.5	101.6	112.3	121.7	132.0	140.0
Port Orange	71.2	84.7	100.5	111.4	120.7	131.0	138.9
South Daytona	71.2	84.7	100.6	111.4	120.7	131.3	139.2
Unincorporated	70.3	83.6	99.1	109.6	118.8	128.9	136.2

5.4 LIGHTNING

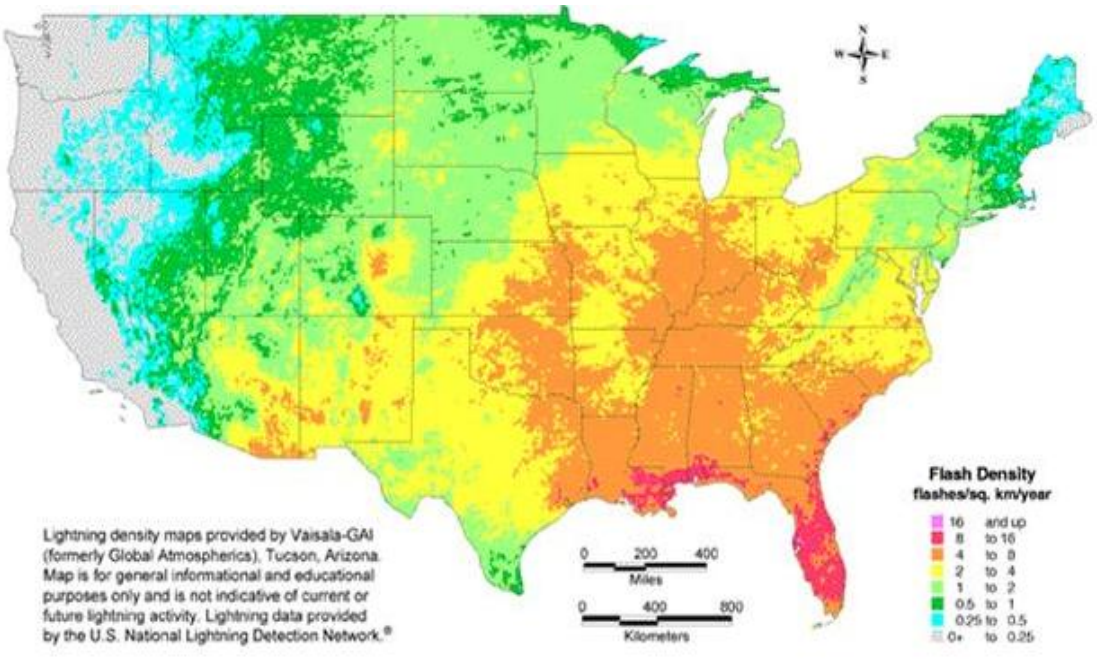
5.4.1 Background

Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes the thunder which often accompanies lightning strikes. While most often affiliated with severe thunderstorms, lightning often strikes outside of heavy rain and might occur as far as 10 miles away from any rainfall.

According to FEMA, an average of 300 people is injured and 80 people are killed in the United States each year by lightning. Direct lightning strikes also have the ability to cause significant damage to buildings, critical facilities, and infrastructure. Lightning is also responsible for igniting wildfires that can result in widespread damages to property before firefighters have the ability to contain and suppress the resultant fire[5].

Volusia County is located in a region of the country that is particularly susceptible to lightning. **Figure 5.4** shows a lightning flash density map for the years 1996-2000 based upon data provided by Vaisala's U.S. National Lightning Detection Network (NLDN®).

FIGURE 5.5: Lightning Flash Density in the United States



Source: Vaisala U.S. National Lightning Detection Network

[5]Wildfires are discussed in Section 5.14.

5.4.2 Location and Spatial Extent

Lightning occurs randomly and is, therefore, impossible to predict where it will strike. It is assumed that all of Volusia County is uniformly exposed to lightning which strikes in very small, specific geographic areas. Impacts from lightning have included deaths and injuries, damage to electrical systems, and fires that have destroyed residential and commercial property.

5.4.3 Historical Occurrences

According to the National Climatic Data Center, there have been a total of 24 recorded lightning events in Volusia County since 1993 that resulted in $1,096,580 in damages (2009 dollars), as listed in **Table 5.8**. However, these are only the lightning events that have been reported to NCDC. According to the emergency managers from various Volusia County jurisdictions thousands of lightning strikes occur each day during the summer afternoon thunderstorms. For example, in 1997 the Port Orange Police Department was struck by lightning twice in a two week period, each time knocking out the 911 consoles. In addition, during September 2007, there was a lightning event that occurred in Port Orange causing damages totaling $310,000 to a property which had an appraisal value of $350,000 and another which occurred in July 2009, causing damages of $30,000 to a property which had an appraisal value of $275,000. Volusia has the second greatest number of lightning strikes in Florida, behind the Tampa Bay area. The corridor between I-75 and I-95 in the North Central Florida area experiences a high number of lightning strikes. **Table 5.8** is merely a sample of the lightning strikes that have occurred in the county.

TABLE 5.8: Historical Lightning Occurrences

LOCATION	DATE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 dollars)	DESCRIPTION
Holly Hill	7/23/1994	0/1	$0	A 17-year-old male riding a bike was hospitalized with burns to his chest after lightning struck the boy.
New Smyrna Beach	9/18/1994	1/1	$0	A fast moving thunderstorm, which had produced rain for only a few minutes, produced the flash which struck the victims directly. One death and one injury resulted.
New Smyrna Beach	6/24/1995	0/1	$0	A lifeguard on top of a high observation tower was struck and injured by lightning.
Ormond Beach	6/28/1995	0/1	$0	A woman was injured by lightning while talking on a telephone in her home.
Daytona Beach	9/23/1995	1/1	$0	Two men were struck by a lone lightning bolt. Both men were hospitalized in critical condition. One of the two died three days later.
DeBary	6/15/1996	0/0	$285,935	Fires started by lightning destroyed two condominiums.
New Smyrna Beach	6/19/1996	0/0	$100,077	Fire started by lightning severely damaged a house.

TABLE 5.8: Historical Lightning Occurrences

LOCATION	DATE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 dollars)	DESCRIPTION
Edgewater	8/20/1997	0/1	$0	Lightning knocked a plumber unconscious while he was under a mobile home.
New Smyrna Beach	8/3/1999	0/0	$4,032	A Volusia County Sheriff's Office horse was killed by lightning while standing under a tree.
Daytona Beach	7/4/2002	0/0	$24,597	Lightning started a fire that damaged an apartment building in Daytona Beach.
Daytona Beach	7/4/2002	0/8	$0	Eight spectators were struck and injured by lightning at Daytona Beach International Speedway. Two of the victims were hospitalized. Six were treated and released at the scene.
Port Orange	8/3/2002	1/0	$0	A 62 year-old man was killed by lightning outside his home.
Edgewater	8/20/2002	0/0	$18,448	Lightning started a fire that damaged a carpet store in Edgewater.
Oak Hill	7/21/2003	0/0	$35,822	Fire started by lightning destroyed a mobile home.
Deltona	8/25/2003	0/0	$298,513	Fire from a lightning strike destroyed a church in Deltona.
Port Orange	9/14/2003	0/0	$298,513	Lightning struck a warehouse in Port Orange.
Daytona Beach	6/3/2004	0/2	$0	Two spectators suffered minor injuries from a lightning strike at Daytona Beach International Speedway.
Pierson	7/7/2004	0/2	$0	Two convenience store workers were briefly hospitalized after being injured by a lightning strike while working in the store kitchen.
Edgewater	5/24/2005	0/1	$0	A 27 year-old man was seriously injured by lightning while in a wooded area near Edgewater.
Deland	7/29/2005	0/0	$0	Lightning strikes downed trees and power lines in Deland.
DeBary	5/26/2006	0/1	$0	A woman carrying a child outside was struck by lightning. The child was uninjured. The woman was transported to a hospital in critical condition.
Deltona	6/25/2007	0/0	$26,523	Lightning heavily damaged a home in Deltona.
Ponce Park	9/12/2007	0/2	$0	A small boat was struck by lightning in the Halifax River, resulting in minor injuries for two people.
DeBary	7/16/2008	0/0	$4,120	Lightning ignited a barn fire near DeBary.

Source: National Climatic Data Center

5.4.4 Probability of Future Occurrences

The probability of occurrence for future lightning events in Volusia County is high. According to NOAA, Volusia County is located in an area of the country that experiences 8-16 lightning flashes per square kilometer per year (approximately 20,224 to 40,448 flashes countywide per year). Given this regular frequency of occurrence, it can be expected that future lightning events will continue to threaten life and property throughout Volusia County.

5.5 SEVERE WINTER STORM

5.5.1 Background

A winter storm can range from a moderate snow over a period of a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. It may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Some winter storms might be large enough to affect several states, while others might affect only localized areas. Occasionally, heavy snow might also cause significant property damages, such as roof collapses on older buildings. All winter storm events have the potential to present dangerous conditions to Volusia County. Larger snowfalls pose a greater risk, reducing visibility due to blowing snow and making driving conditions treacherous. A heavy snow event is defined by the National Weather Service as an accumulation of 4 of more inches in 12 hours or less. A blizzard is the most severe form of winter storm. It combines low temperatures, heavy snow, and winds of 35 miles per hour or more, which reduces visibility to a quarter mile or less for at least three hours. Winter storms are often accompanied by sleet, freezing rain, or an ice storm.

Sleet is defined as partially frozen raindrops or refrozen snowflakes that form into small ice pellets before reaching the ground. They typically bounce when they hit the ground and do not stick to the surface. However, it does accumulate like snow, posing similar problems and has the potential to accumulate into a layer of ice on surfaces. Freezing rain, conversely, usually sticks to the ground, creating a sheet of ice on the roadways and other surfaces. All of the winter storm elements – snow, low temperatures, sleet, ice, etc- have the potential to cause significant hazard to a community. Even small accumulations can down power lines and trees limbs and create hazardous driving conditions. Further, Communication and power may be disrupted for days.

5.5.2 Location and Spatial Extent

Nearly the entire continental United States is susceptible to winter storms, but the degree of exposure typically depends on the normal expected severity of local winter weather. Volusia County, being in the southern portion of the nation, rarely experiences winter weather events, and thus has a much lower risk than more northern areas of the country. Typically, there have not been many winter storms that have caused damage in Volusia County. However, there were two severe winter storms that killed many of the orange groves in the 80's. Future impacts throughout Volusia County could include damage to crops, nurseries and tree farms (e.g., Pierson is the fern capital of the world), and other vegetation; sleet could increase the number of vehicular accidents); and the increased use of alternate heating sources in homes (e.g., space heaters) could cause potential structural fires.

5.5.3 Historical Occurrences

Despite the rare chance of winter storm occurrence, one snow event was reported in 2008 according to NCDC. On January 3, 2008, cold breezes off the Atlantic produced brief snow flurries along the coast of Volusia County. On January 9, 2010 sleet was reported in Volusia County. According to an Emergency Operations Management Volusia County manager, there were also two severe winter freezes in the mid

to late 80's. These events killed many orange groves in Volusia County and around the state. There were no reports of death, injuries, or property damage as a result of the winter weather.

5.5.4 Probability of Future Occurrences

There is a low probability of future winter storm occurrences. Winter storm events will remain an infrequent occurrence in Volusia County. Given the average winter temperature of 61.5 degrees Fahrenheit, it is highly unlikely that a winter event beyond light snow will occur.

5.6 Thunderstorm

5.6.1 Background

Thunderstorms are common throughout Florida and occur throughout the year. Although thunderstorms generally affect a small area, they are very dangerous given their ability to produce accompanying hazards including high winds, hail, and lightning which all may cause serious injury or death, in addition to property damage[6].

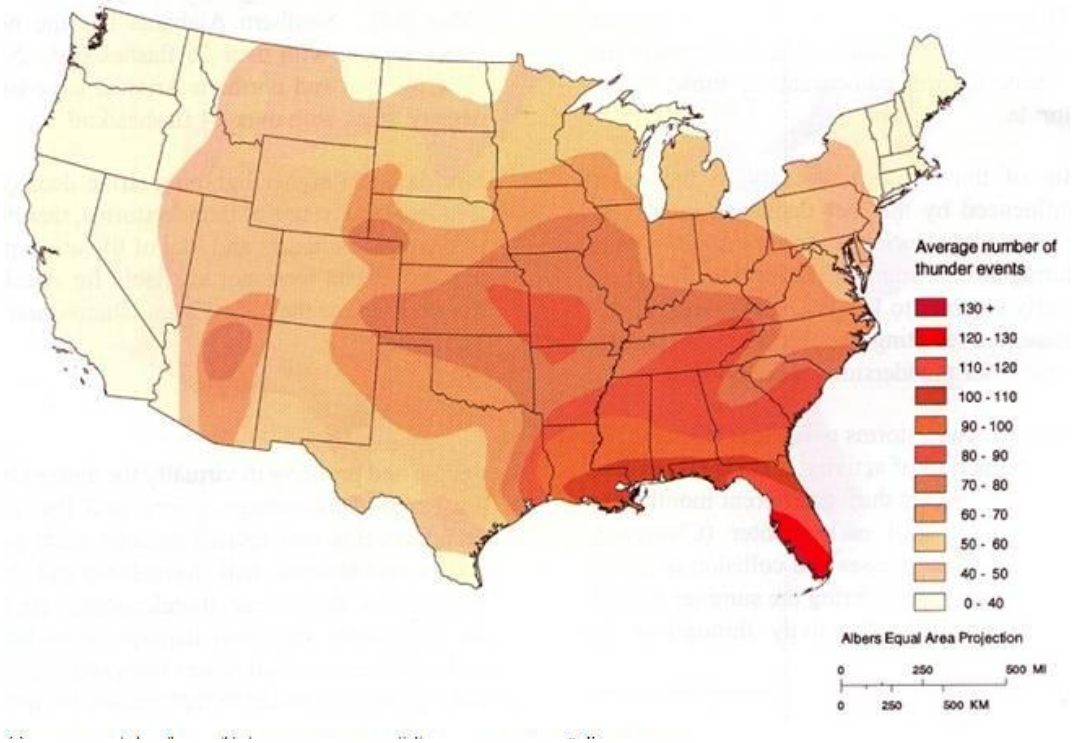
According to the National Weather Service, more than 100,000 thunderstorms occur each year, though only about 10 percent of these storms are classified as "severe." A severe thunderstorm occurs when the storm produces one of three elements: 1) Hail of three-quarters of an inch; 2) Tornado; 3) Winds of at least 58 miles per hour.

Three conditions need to occur for a thunderstorm to form. First, it needs moisture to form clouds and rain. Second, it needs unstable air, such as warm air that can rise rapidly (this often referred to as the "engine" of the storm). Finally, thunderstorms need lift, which comes in the form of cold or warm fronts, sea breezes, mountains, or the sun's heat. When these conditions occur, air masses of varying temperatures meet, and a thunderstorm is formed. These storm events can occur singularly, in lines, or in clusters. Further, they can move through an area very quickly or linger for several hours.

The National Weather Service collected data for thunder events and lightning strike density for the 30-year period from 1948 to 1977. A series of maps were generated showing the annual average thunder event duration, the annual average number of thunder events and the mean annual density of lightning strikes. **Figure 5.5** illustrates thunderstorm hazard severity based on the annual average number of thunder events from 1948 to 1977. Volusia County falls into the range of an average of 110 – 120 thunderstorm events annually.

[6] Lightning and Hail are discussed in detail as separate hazards in this section.

Figure 5.5: Average Annual Number of Thunder Events



Source: Federal Emergency Management Agency

5.6.2 Location and Spatial Extent

Severe thunderstorms and their related hazardous elements (including lightning, hail, and straight-line winds) are not confined to any geographical boundaries and typically are widespread events (**Figure 5.5**). Further, while thunderstorms can occur in all regions of the United States, they are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. Therefore, it is assumed that Volusia County would be uniformly exposed to these hazards and that the spatial extent of that impact would potentially be large.

5.6.3 Historical Occurrences

According to the National Climatic Data Center, Volusia County has experienced 148 thunderstorm events since 1950. Of these events, 141 occurred in the Volusia County study area. Further, 34 of these thunderstorm events resulted in property damage totaling $2,552,499 (2009 dollars). **Table 5.9** shows historic thunderstorm events, including thunderstorm winds and high winds, which resulted in property damage in Volusia County. (Other windstorms, such as tornadoes and hurricanes, are addressed separately in this section.) In addition to property damage, these severe thunderstorm events resulted in two injuries and over $70,000 in crop damage (2009 dollars).

TABLE 5.9: Historical Thunderstorm Occurrences Resulting in Property Damage

LOCATION	DATE	TYPE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 Dollars)	DESCRIPTION
Deland	3/13/1993	Thunderstorm Winds	0/0	$7,770	Strong thunderstorm winds knocked down trees and power lines and blew in windows.
Ormond Beach	3/13/1993	Thunderstorm Winds	0/0	$77,700	Strong thunderstorm winds blew down trees, bent or broke telephone poles, and damaged mobile homes.
Port Orange	03/13/1993	Thunderstorm Winds	0/0	$1,554	Strong thunderstorm winds downed trees and power lines.
Holly Hill	3/13/1993	Thunderstorm Winds	0/0	$7,770	Strong winds blew several trees onto a house in Holly Hill. A gust of 64 mph was recorded at Daytona Beach.
Deland	3/13/1993	Thunderstorm Winds	0/0	$7,770	Strong thunderstorm winds destroyed shutters and damaged roofs.
Florida East Coast	2/18/1994	High Winds	0/0	$757,242	A rare gale center (only the 12th in the past 83 years) formed off the Florida southeast coast and drifted west. On shore winds averaging 30 to 40 mph with gusts to around 55 mph impacted the entire Florida east coast and caused beach erosion and mostly minor coastal flooding. Especially hard hit was the coast from Brevard to Palm Beach County (including Volusia County), where some beach front homes were nearly undermined.
Edgewater	6/21/1994	Thunderstorm Winds	0/0	$757,242	Severe thunderstorms blew down trees in Edgewater.
Volusia County	8/21/1994	Thunderstorm Winds	0/0	$1,514	Trees were blown down and dime size hail fell in Edgewater.
Port Orange	5/28/1996	Thunderstorm Winds	0/0	$14,297	Severe thunderstorm winds blew down trees and power lines and damaged 2 mobile homes in Port Orange.
South Daytona	6/22/1996	Thunderstorm Winds	0/0	$50,039	Trees and power lines were blown down and a travel trailer was blown over in South Daytona.

TABLE 5.9: Historical Thunderstorm Occurrences Resulting in Property Damage

LOCATION	DATE	TYPE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 Dollars)	DESCRIPTION
Ormond Beach	8/14/1996	Thunderstorm Winds	0/0	$2,859	Thunderstorm winds blew down trees in Ormond Beach.
Deltona	10/27/1997	Thunderstorm Winds	0/0	$20,964	Thunderstorm winds blew down numerous trees in Deltona. Some trees fell on houses.
Volusia County	2/02/1998	High Wind	0/0	$68,809	Strong sustained surface wind knocked down trees over much of Volusia County and damaged a gas station pump shelter in Daytona Beach.
Barberville	2/16/1998	Thunderstorm Winds	0/0	$27,523	Thunderstorm winds blew down trees and damaged a mobile home near Barberville and Pierson.
Deltona	6/21/1998	Thunderstorm Winds	0/0	$13,762	Thunderstorm winds blew down lots of trees and power lines in Deltona.
Deltona	1/03/1999	Thunderstorm Winds	0/0	$13,439	Thunderstorm winds blew down lots of trees and power lines in Deltona.
New Smyrna Beach	5/19/1999	Thunderstorm Winds	0/0	$13,439	Power lines were blown down west of New Smyrna Beach.
Pierson	3/27/2000	Thunderstorm Winds	0/0	$19,572	Severe thunderstorm winds blew down trees on a house near Pierson.
Deltona	7/26/2000	Thunderstorm Winds	0/1	$15,657	Thunderstorm winds blew down power lines and trees in the Deltona Area. One woman was injured when a tree fell on her car as she was driving in Deltona.
Orange City	9/03/2000	Thunderstorm Winds	0/0	$39,143	Thunderstorm winds blew down numerous trees and power lines in Orange City. Falling trees damaged six residences.
Emporia	9/04/2000	Thunderstorm Winds	0/0	$13,048	Thunderstorm winds blew down a large shed cover at a fern nursery.
Daytona Beach	3/13/2001	Thunderstorm Winds	0/1	$38,003	Strong microburst winds hit the barrier island in Daytona Beach destroying a large tent and a beach tollbooth. One person was injured.
Daytona Beach	6/16/2001	Thunderstorm Winds	0/0	$19,002	Thunderstorm winds blew a 50 foot section off the roof of a restaurant in Daytona Beach.

TABLE 5.9: Historical Thunderstorm Occurrences Resulting in Property Damage

LOCATION	DATE	TYPE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 Dollars)	DESCRIPTION
New Smyrna Beach	8/21/2001	Thunderstorm Winds	0/0	$20,268	Thunderstorm winds swept across the New Smyrna Beach Airport overturning a small plane and damaging six others.
DeBary	8/05/2002	Thunderstorm Winds	0/0	$12,299	Thunderstorm winds blew down trees on a mobile home in Debary.
Deltona	3/07/2003	Thunderstorm Winds	0/0	$1,194	Thunderstorm winds blew down numerous trees and power lines in Deltona.
Deltona	3/19/2003	Thunderstorm Winds	0/0	$119,405	Strong thunderstorm winds swept across the Deltona area blowing down dozens of trees that damaged houses and vehicles.
Holly Hill	7/12/2003	Thunderstorm Winds	0/0	$21,493	Thunderstorm winds destroyed a large gas station roof awning in Holly Hill.
Osteen	4/08/2004	Thunderstorm Winds	0/0	$255,040	Thunderstorm winds produced widespread damage to a mobile home community southwest of Osteen. Many of the homes had damage to attached sun rooms, awnings and sheds. About 15 trees were blown down. The event was accompanied by a large amount of small hail.
Port Orange	6/16/2005	Thunderstorm Winds	0/0	$45,020	Thunderstorm winds overturned a mobile home and damaged two others east of Port Orange.
Daytona Beach	6/17/2005	Thunderstorm Winds	0/0	$11,255	Thunderstorm winds blew down a large tree which damaged a truck.
Deltona	5/28/2006	Thunderstorm Winds	0/0	$27,318	Thunderstorm winds downed power lines and power transformers in Deltona. downed trees
Daytona Beach Airport	7/15/2007	Thunderstorm Winds	0/0	$21,218	Thunderstorm winds peeled back part of a roof on an apartment complex on the barrier island. A band of thunderstorms moved from central Florida to the coast and Lake Okeechobee producing hail, strong winds and funnel clouds.
Deland	4/03/2008	Thunderstorm	0/0	$1,030	Thunderstorm winds blew down

TABLE 5.9: Historical Thunderstorm Occurrences Resulting in Property Damage

LOCATION	DATE	TYPE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 Dollars)	DESCRIPTION
		Winds			large tree branches that took out power lines in Deland. Afternoon pulse thunderstorms produced wind damage in Deland.
Edgewater	4/05/2008	Thunderstorm Winds	0/0	$8,240	Thunderstorm winds blew down trees and power lines in Edgewater. A pre-frontal squall line produced widespread wind damage and hail across central Florida.
New Smyrna Beach	4/05/2008	Thunderstorm Winds	0/0	$12,360	Thunderstorm winds blew down trees and power lines in New Smyrna Beach. A pre-frontal squall line produced widespread wind damage and hail across central Florida.
Ormond Beach	6/19/2008	Thunderstorm Winds	0/0	$2,060	Ormond Beach dispatch reported trees down on power lines at Nova Road. The daily east coast sea breeze pushed inland and produced thunderstorms over coastal sections of Central Florida.
Fatio	6/21/2008	Thunderstorm Winds	0/0	$5,150	Law enforcement reported three trees down across County Road 42.The daily east coast sea breeze pushed inland and produced thunderstorms over coastal and interior sections of Central Florida.
Beresford	6/21/2008	Thunderstorm Winds	0/0	$1,030	Law enforcement reported a large tree down across State Road 44.The daily east coast sea breeze pushed inland and produced thunderstorms over coastal and interior sections of Central Florida.

Source: National Climatic Data Center

5.6.4 Probability of Future Occurrences

Thunderstorms are frequent in Volusia County. During the summer, Volusia County experiences a thunderstorm nearly every afternoon. They will undoubtedly continue to occur, thereby threatening the lives, safety, and property in Volusia County. Therefore, the probability of future occurrences is high.

5.7 TORNADO

5.7.1 Background

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes and other tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. According to the National Weather Service, tornado wind speeds normally range from 40 to more than 300 miles per hour and are a few yards wide. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction, carving a path over a mile wide and several miles long and turning normally harmless objects into deadly missiles.

Each year, an average of over 800 tornadoes are reported nationwide, resulting in an average of 80 deaths and 1,500 injuries (NOAA, 2007). They are more likely to occur during the months of March through May and can occur at any time of day, but are likely to form in the late afternoon and early evening. Further, the tornadoes associated with tropical cyclones are most frequent in September and October when the incidence of tropical storm systems is greatest. The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, including residential dwellings (particularly mobile homes). The magnitude of tornadic activity is reported using the Enhanced Fujita Scale (**Table 5.10**). However, tornado magnitudes prior to 2005 were classified using the traditional version of the Fujita Scale (**Table 5.11**).

TABLE 5.10: Enhanced Fujita Scale for Tornadoes (Effective 2005 and after)

F-SCALE NUMBER	INTENSITY	WIND SPEED (MPH)	TYPE OF DAMAGE DONE
F0	GALE	65–85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
F1	MODERATE	86–110	Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	SIGNIFICANT	111–135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	SEVERE	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
F4	DEVASTATING	166–200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	INCREDIBLE	Over 200	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.

Source: National Weather Service

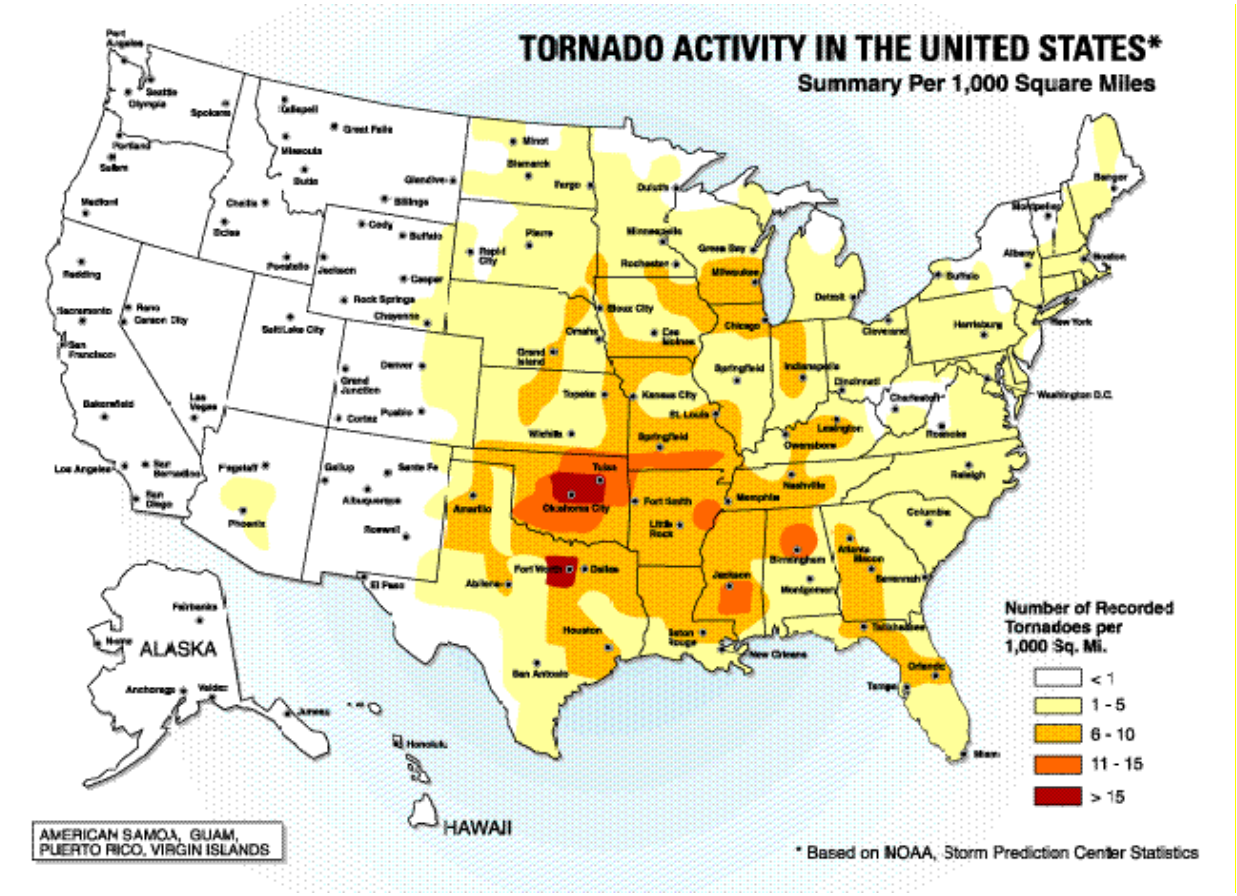
TABLE 5.11: The Fujita Scale (Effective Prior to 2005)

F-SCALE NUMBER	INTENSITY	WIND SPEED (MPH)	TYPE OF DAMAGE DONE
F0	GALE	40–72	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
F1	MODERATE	73–112	Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	SIGNIFICANT	113–157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	SEVERE	158–206	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
F4	DEVASTATING	207–260	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	INCREDIBLE	261–318	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	INCONCEIVABLE	319–379	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies.

Source: National Weather Service

According to the NOAA Storm Prediction Center (SPC), the highest concentration of tornadoes in the United States has been in Oklahoma, Texas, Kansas and Florida. Although the Great Plains region of the Central United States does favor the development of the largest and most dangerous tornadoes (earning the designation of “tornado alley”), Florida experiences the greatest number of tornadoes per square mile of all U.S. states (SPC, 2002). **Figure 5.6** shows tornado activity in the United States based on the number of recorded tornadoes per 1,000 square miles.

FIGURE 5.6: Tornado Activity in the United States



Source: Federal Emergency Management Agency

5.7.2 Location and Spatial Extent

Based on historic data, tornadoes occur throughout the state of Florida at a rate of 1-10 confirmed touchdowns per 1,000 square miles. Florida tornadoes typically impact a relatively small area; however, events are completely random and it is not possible to predict specific areas that are more susceptible to a tornado strike over time. Therefore, it is assumed that all of Volusia County is uniformly exposed to this hazard. April, May, and June are considered the peak months for Florida tornadoes.

5.7.3 Historical Occurrences

According to the National Climatic Data Center, there have been a total of 69 recorded tornado events in Volusia County since 1953. Each of these events occurred in the Volusia County study area as listed in **Table 5.12**. Two deaths, 106 injuries, and nearly $949 million in property damage (2009 dollars) resulted from these events. The magnitude of these tornadoes ranged from F0 to F3 in intensity, with approximate locations for each shown in **Figure 5.7**.

TABLE 5.12: Historical Tornado Impacts

LOCATION	DATE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 DOLLARS)	DESCRIPTION
Volusia County	5/8/1950	F1	0/0	$27,851	Not Available
Volusia County	7/12/1959	unknown	0/0	$0	Not Available
Volusia County	10/12/1959	unknown	0/0	$0	Not Available
Volusia County	7/14/1960	unknown	0/0	$0	Not Available
Volusia County	7/19/1960	unknown	0/0	$0	Not Available
Volusia County	8/29/1961	F2	0/0	$188,115	Not Available
Volusia County	7/7/1963	F1	0/0	$21,995	Not Available
Volusia County	8/9/1963	unknown	0/0	$0	Not Available
Volusia County	1/12/1964	F0	0/0	$21,772	Not Available
Volusia County	8/28/1964	unknown	0/0	$0	Not Available
Volusia County	8/30/1968	F2	0/0	$160,999	Not Available
Volusia County	7/22/1969	unknown	0/0	$18,329	Not Available
Volusia County	10/2/1969	unknown	0/0	$0	Not Available
Volusia County	7/17/1970	F0	0/0	$0	Not Available
Volusia County	8/27/1971	F2	0/1	$16,624	Not Available
Volusia County	5/20/1972	F2	0/0	$134,368	Not Available
Volusia County	6/19/1972	F1	0/0	$134,368	Not Available
Volusia County	8/22/1972	F2	0/0	$134,368	Not Available
Volusia County	4/11/1975	F0	0/0	$12,504	Not Available
Volusia County	4/14/1975	F0	0/0	$0	Not Available
Volusia County	5/15/1975	F0	0/0	$104,204	Not Available
Volusia County	8/9/1975	F0	0/0	$12,504	Not Available
Volusia County	5/22/1976	F0	0/0	$987,344	Not Available
Volusia County	5/23/1976	F0	0/0	$0	Not Available
Volusia County	7/3/1976	F0	0/0	$11,848	Not Available
Volusia County	4/18/1978	F1	0/0	$861,249	Not Available
Volusia County	6/9/1978	F0	0/0	$10,335	Not Available
Volusia County	7/27/1978	F0	0/0	$0	Not Available
Volusia County	8/13/1978	F1	0/1	$86,125	Not Available

TABLE 5.12: Historical Tornado Impacts

LOCATION	DATE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 DOLLARS)	DESCRIPTION
Volusia County	9/4/1978	F0	0/0	$10,335	Not Available
Volusia County	9/22/1978	F0	0/0	$0	Not Available
Volusia County	9/27/1978	F0	0/0	$0	Not Available
Volusia County	1/24/1979	unknown	0/0	$77,363	Not Available
Volusia County	5/5/1979	F1	0/0	$773,633	Not Available
Volusia County	5/8/1979	F1	0/6	$7,736,328	Not Available
Volusia County	9/3/1979	F2	0/0	$1,624,629	Not Available
Volusia County	9/29/1979	F0	0/0	$0	Not Available
Volusia County	3/7/1982	F1	0/0	$25,000	Not Available
Volusia County	6/17/1982	F1	0/0	$253,000	Not Available
Volusia County	4/15/1983	F1	0/0	$6,765	Not Available
Volusia County	4/23/1983	F1	0/0	$56,375	Not Available
Volusia County	11/20/1983	F2	0/0	$5,637,514	Not Available
Volusia County	4/14/1984	F0	0/0	$53,991	Not Available
Volusia County	6/27/1984	F1	0/0	$5,399,069	Not Available
Volusia County	2/8/1986	F0	0/0	$51,206	Not Available
Volusia County	3/14/1986	F1	0/1	$51,206	Not Available
Volusia County	1/21/1988	F1	0/0	$474,030	Not Available
Volusia County	5/11/1988	F0	0/0	$0	Not Available
Volusia County	11/9/1990	F0	0/3	$5155	Not Available
Edgewater	10/7/1996	F2	0/0	$3,431,216	In Edgewater, a 400 yard wide F2 tornado touched down near I-95. The smaller F0 tornadoes in Pierson, Deltona, and Daytona Beach Shores caused minor in the affected areas, including blowing out 12 windows in Daytona Beach Shores.
Pierson	10/7/1996	F0	0/0	$0	
Deltona	10/7/1996	F0	0/0	$0	
Daytona Beach Shores	10/7/1996	F0	0/0	$7,148	
New Smyrna Beach	4/23/1997	F0	0/0	$0	The F0 tornado downed trees and damaged dozens of homes, including 20 in New Smyrna Beach alone.
Pierson	4/23/1997	F0	0/0	$83,856	
Port Orange	4/23/1997	F0	0/0	$167,713	
New Smyrna Beach	4/23/1997	F0	0/0	$349,402	

TABLE 5.12: Historical Tornado Impacts

LOCATION	DATE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 DOLLARS)	DESCRIPTION
Oak Hill	7/5/1997	F0	0/0	$41,928	The brief touchdown damaged 2 houses and 8 mobile homes.
New Smyrna Beach	11/2/1997	F3	0/32	$19,566,485	A rapidly intensifying tornado initially touched down in New Smyrna Beach about 1 mile west of U.S. Highway 1 between Enterprise and Wayne Avenues. The tornado moved east northeast at about 50 mph damaging several homes and downing trees and power lines. It lifted just west of Highway 1 after passing Chisholm Elementary School. The tornado then struck New Smyrna Beach High School producing Fujita Scale F1 damage. As the tornado intensified to a strong F3 category, it passed through the Venetian Villas subdivision and the Diamond Head Condominiums. A number of large well built homes were destroyed. Many of the units in the 10 story Diamond Head Condominiums received major damage as high winds blew out exterior glass walls and blew furniture into the adjoining Indian River Lagoon. The tornado then crossed the Intracoastal Waterway and passed over the barrier island between Robinson Road and East Street where a number of large well built homes were almost completely destroyed. The tornado then moved over the Atlantic Ocean. In all 32 people were injured, six requiring hospitalization. Thirty one homes were destroyed and 290 were damaged. Damage estimates were near 14 million dollars.
Emporia	2/16/1998	F0	0/0	$111,808	Sixteen mobile homes were damaged and one was destroyed.
Daytona Beach	2/22/1998	F2	1/3	$5,504,681	This tornado cell caused extensive damage and two deaths throughout Volusia County. In Daytona beach one person was killed and three others were injured while in a mobile home. In
Osteen	2/23/1998	F3	1/0	$1,376,170	
Oak Hill	2/23/1998	F2	0/0	$688,085	

TABLE 5.12: Historical Tornado Impacts

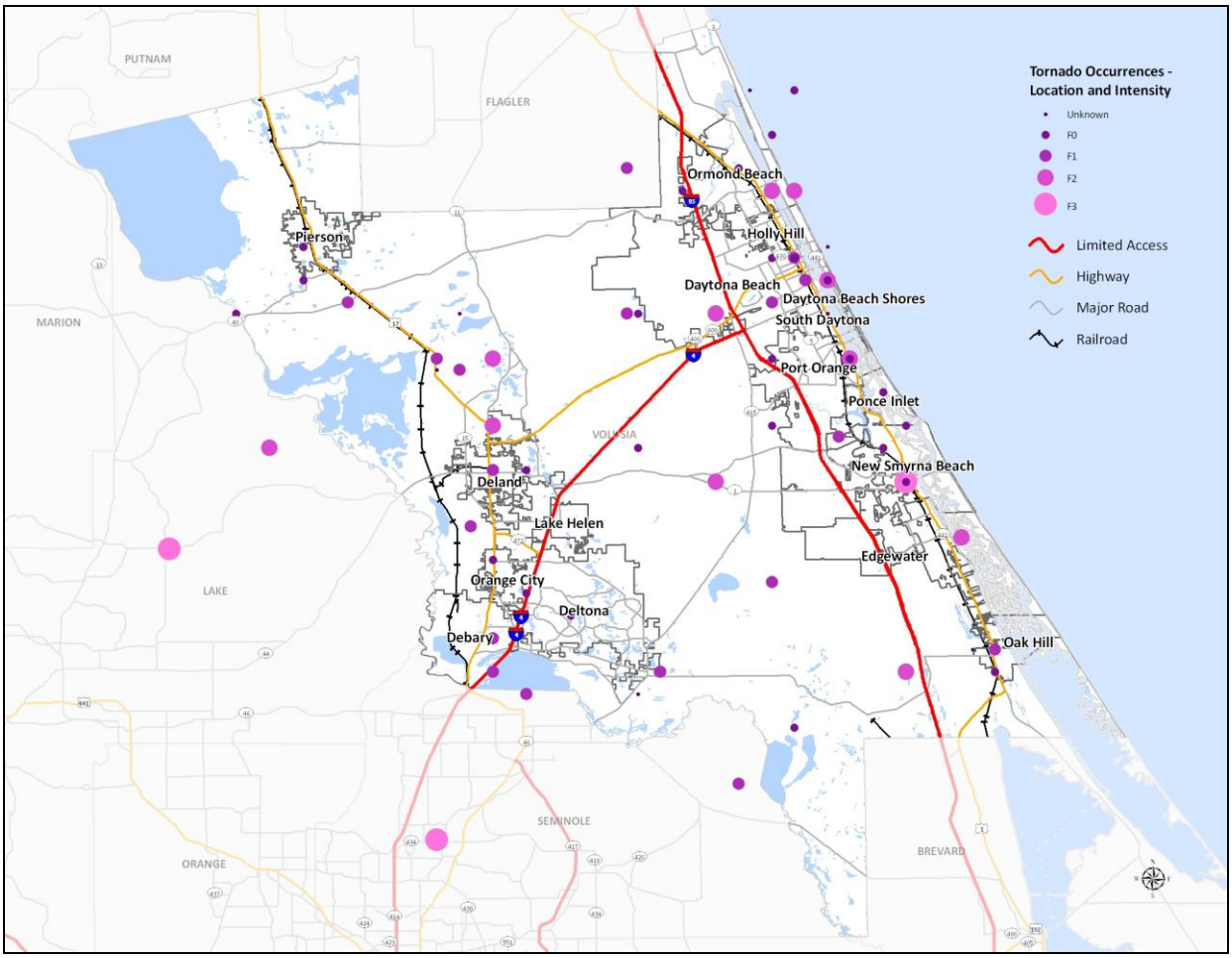
LOCATION	DATE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 DOLLARS)	DESCRIPTION
					Osteen, a man staying in a recreational vehicle was killed.
Port Orange	7/28/1998	F0	0/0	$137,617	Thirty-three mobile homes were damaged with this F0 tornado.
New Smyrna Beach	9/17/2000	F0	0/0	$13,048	This tornado caused minor damage including power outages and downed signs and trees.
Daytona Beach	3/13/2001	F1	0/5	$6,333,850	This F1 damaged over 100 houses and dozens of vehicles, many due to fallen trees. Five people were injured.
New Smyrna Beach	9/14/2001	F0	0/0	$70,939	This tornado was a result of a rainstorm associated with Tropical Storm Gabriel. Twelve mobile homes were damaged and three were destroyed.
Daytona Beach	8/8/2004	F0	0/0	$0	A waterspout came ashore, blowing branches from trees.
South Daytona	8/13/2004	F1	0/0	$0	This tornado cell was associated with Hurricane Charley. It caused minor damage to homes, commercial buildings, and trees.
Daytona Beach Shores	8/13/2004	F0	0/1	$0	
Deland	12/25/2006	F2	0/5	$2,731,818	An F2 tornado touched down just west of North Stone Street in Deland and moved northeast crossing Highway 17. It moved across the Fernwood mobile home community and continued northeast over Meadowlea Estates mobile home community. It lifted just north of Carter Road. Fifty two residences were destroyed and 162 were damaged. Five people were seriously injured.
Daytona Beach (Airport)	12/25/2006	F2	0/6	$54,636,350	The same system that caused fived injuries and damaged 162 homes in Deland touched down at Daytona Beach International, destroying 40 Embry Riddle University aircraft and the two story administration building. East of Embry Riddle Aeronautical University, 48 apartments units were destroyed and 200 were damaged.
Beresford	2/2/2007	F3	0/42	$55,166,800	The tornado that killed 13 people

TABLE 5.12: Historical Tornado Impacts

LOCATION	DATE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 DOLLARS)	DESCRIPTION
New Smyrna Beach (Airport)	2/2/2007	F1	0/0	$6,365,400	in Lake County moved east across the St. Johns River, crossed into Volusia county at Lake Beresford and moved across Deland as an F3 tornado. It was still moving east northeast at 50 MPH as it damaged 277 and destroyed 106 residences in the Deland area. There were no fatalities in Volusia County but 42 people were injured.
Lake George	7/7/2007	F0	0/0	$31,827	Tornado-force winds caused damage to a restaurant and apartment complex.
Port Orange	7/24/2009	F0	0/1		This tornado was caused by a seabreeze merger, when winds from both coasts meet and cause the rotation. Although it was classified as the mildest of twisters, it caused damage to 163 homes in Port Orange. Of these, seven were totally destroyed, eight had major damage, and twenty-six had moderate damage. The same system produced a waterspout that came ashore in Ormond Beach, destroying a catamaran.
Ormond Beach	7/24/2009	F0	0/0		

Source: National Climatic Data Center

FIGURE 5.7: Locations of Historical Tornado Events in Volusia County



Source: National Oceanic and Atmospheric Administration

5.7.4 Probability of Future Occurrences

The probability of a future tornado affecting Volusia County is high. According to historical records, Volusia County experiences, on average, more than one (1.2) confirmed tornado events annually. While the majority of these events are small in terms of size, intensity and duration, a greater number of stronger storms (i.e., F2 and F3 tornadoes) have been reported in the past decade. Further, even a minor tornado can cause substantial damage. In conclusion, tornadoes pose a significant threat to lives and property in Volusia County.

HYDROLOGIC HAZARDS

5.8 COASTAL EROSION

5.8.1 Background

Coastal erosion is a hydrologic hazard defined as the wearing away of land and loss of beach, shoreline, or dune material and is measured as the rate of change in the position or horizontal (landward) displacement of a shoreline over a period of time. Short-term erosion typically results from episodic natural events such as hurricanes and storm surge, windstorms and flooding hazards, but may be exacerbated by human activities such as boat wakes, removal of dune and vegetative buffers, shoreline hardening and dredging. Long-term erosion is a function of multi-year impacts such as wave action, sea level rise, sediment loss, subsidence and climate change. Climatic trends can change a beach from naturally accreting to eroding due to increased episodic erosion events caused by waves from an above-average number of storms and high tides, or the long-term effects of fluctuations in sea level.

Natural recovery from erosion can take years, often decades. If a beach or dune system does not recover quickly enough naturally, coastal and upland property may be exposed to further damage in subsequent coastal erosion and flooding events. Human actions to supplement natural coastal recovery, such as beach nourishment, dune stabilization and shoreline protection structures (e.g., sea walls, groins, jetties, etc.) can mitigate the hazard of coastal erosion, but may also exacerbate it under some circumstances.

Death and injury are not associated with coastal erosion; however, it can cause the destruction of buildings and infrastructure and represents a major threat to the local economies of coastal communities that rely on the financial benefits of recreational beaches.

5.8.2 Location and Spatial Extent

All coastal areas in Volusia County are susceptible to coastal erosion. Using Florida Department of Environment field data beginning in 1972, it is clear that Volusia County shorelines are moving due to erosion, accretion, and beach nourishment projects[7]. Further, nearly half of the 47 miles of shoreline in Volusia County are classified as critically eroded.

The beach ridge in Volusia County ranges from 300 – 3,000 feet in width. A majority of the county, ranging approximately from Ormond Beach to Bethune Beach, has fine-grained quartz sand. Sand in areas north and south of this area consist of a shell-quartz mixture and have steeper slopes than the central county. The southernmost mile of shoreline in Volusia County makes up part of the Canaveral National Seashore Park, while the northernmost area is part of the North Peninsula State Recreation Area.

[7] Foster, Emmet and Jenny Cheng. Shoreline Beach Change Estimates, Volusia County, 2000. Office of Beaches and Coastal Systems, Florida Department of Environmental Protection; Beaches and Shores Research Center, Florida State University.

5.8.3 Historical Occurrences

According to the National Climatic Data Center, there have been five events with reported coastal erosion impacts in Volusia County since 1998, as shown in **Table 5.13**. Because the erosion events were part of other hazard events (e.g., storm surge and hurricanes), the monetary damage for the erosion alone is unknown.

TABLE 5.13: Historical Coastal Erosion Impacts

LOCATION	DATE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 dollars)	DESCRIPTION
Volusia County	9/14/1999	0/0	$56,444,488	Hurricane Floyd caused significant beach erosion in Volusia County. Of the property damage estimates, over $13 million was attributed to beach erosion.
St. Lucie and Volusia Counties	10/14/1999	0/0	$68,539,735	Hurricane Irene caused beach loss of four to ten feet in the affected areas with damage in the millions.
Brevard and Volusia Counties	9/04/2001	0/0	$6,333,850	Storm tide from a tropical storm reached two feet above normal, causing significant beach erosion.
St. Lucie and Volusia Counties	9/25/2004	0/0	$440,408,221	Severe beach erosion was reported from Hurricane Jeanne, a category 3 storm.
Volusia County	8/21/2008	0/0	Unknown	New Smyrna Beach experienced a loss of 50 feet of new sand due to wind gust of over 45 MPH from Tropical Storm Fay. Even Orange and Seminole counties experienced riverine erosion along the St. Johns River.

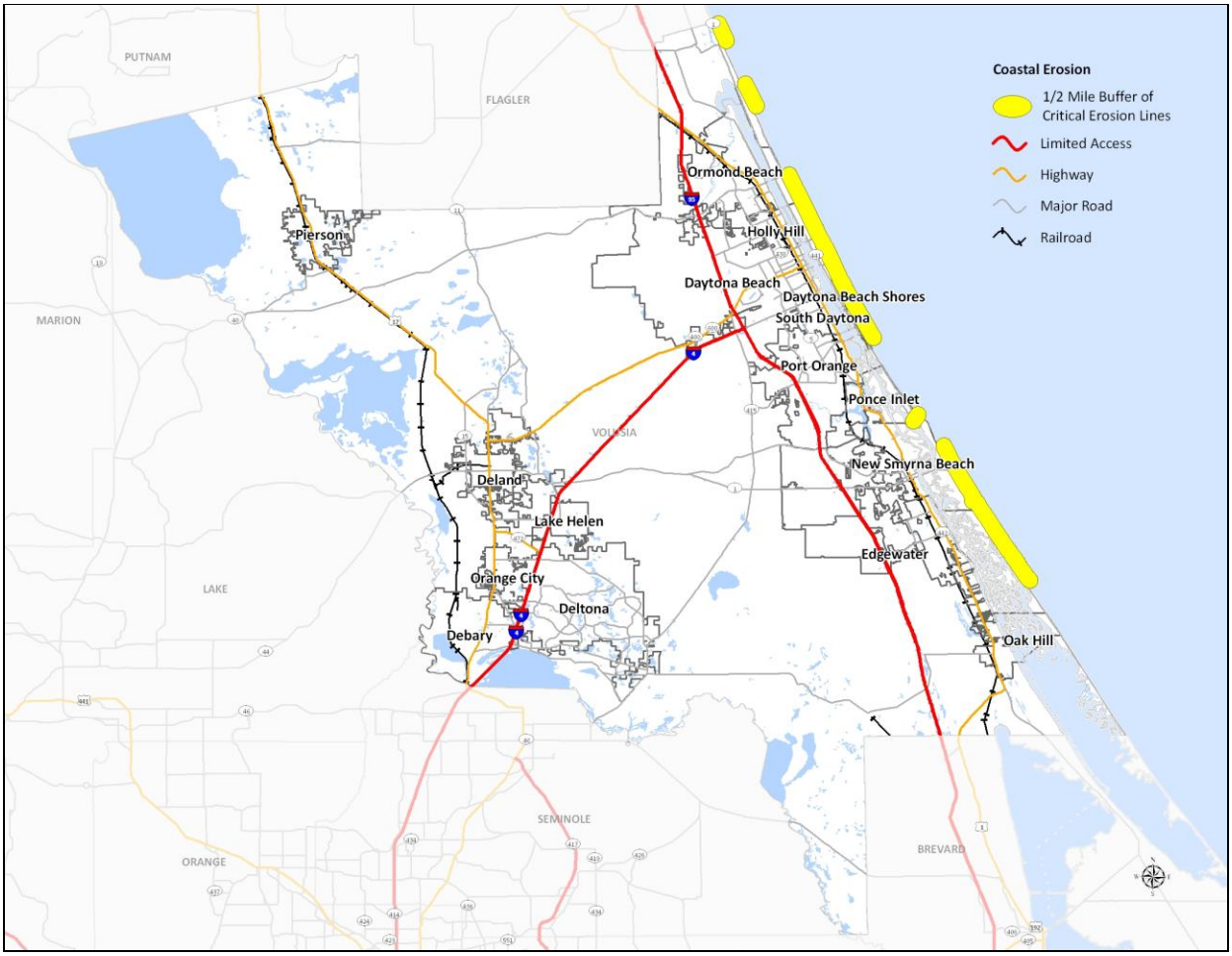
Source: National Climatic Data Center

The severity of coastal erosion is typically measured through a quantitative assessment of annual shoreline change for a given beach cross-section of profile (feet or meters per year) over a long period of time. Erosion rates vary as a function of shoreline type and are influenced primarily by episodic events, but can be used in land use and hazard management to define areas of critical concern.

According to the Florida Bureau of Beaches and Coastal Systems, a division within the Florida Department of Environmental Protection, there are 4 critically eroded beaches in Volusia County, totaling over 22 miles of beachfront[8]. These areas are highlighted in **Figure 5.8**. A critical beach erosion area is defined as an area where natural or human processes has caused or contributed to the erosion or recession of the beach or dune system (Florida Bureau of Beaches and Coastal Systems). The largest contiguous area of critically eroded beach is an 11 mile stretch between Ormond Beach and Daytona Beach Shores. This area is threatening recreation and development opportunities in the area. There are also 8 miles of critically eroded beachfront between New Smyrna Beach and Bethune Beach. In addition, there are two segments of critically eroded beach in northern Volusia that threaten State Road A1A.

[8] Office of Beaches and Coastal Systems, Florida Department of Environmental Protection, 2009.

FIGURE 5.8: Critical Erosion Areas in Volusia County



Source: Florida Department of Environmental Protection, Division of Beaches and Coastal Systems

5.8.4 Probability of Future Occurrences

The probability of the continuing occurrence of coastal erosion in the coastal areas of Volusia County is high. Florida's Bureau of Beaches and Coastal Systems estimates an average of a one foot loss annually for Volusia County in stable or accretionary areas. The area between Ormond Beach and Daytona Beach Shores are eroding at a rate between zero and 0.5 feet annually, according to a 2000 study. Northern areas of the county, including the North Peninsula State Recreation Area, lose between 0.5 and 1.5 feet annually. Areas south of the Ormond Beach to Daytona Beach Shores stretch have a lower expected erosion rate due to extensive armoring (e.g., beach walls and revetments). However, natural erosion is occurring southward from South of Ponce de Leon Inlet. Loss rates are as high as 1.5 feet per year and decrease heading in southerly direction.

The damaging impacts of coastal erosion are lessened through continuous (and costly) beach nourishment and structural shoreline protection measures. However, it is likely that the impacts of coastal erosion will increase in severity due to future episodic storm events.

5.9 DROUGHT

5.9.1 Background

Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. High temperatures, high winds, and low humidity can exacerbate drought conditions. In addition, human actions and demands for water resources can hasten drought-related impacts. Droughts are typically classified into one of four types[9]:

- **Meteorological:** The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
- **Hydrologic:** The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- **Agricultural:** Soil moisture deficiencies relative to water demands of plant life, usually crops.
- **Socioeconomic:** The effect of demands for water exceeding the supply as a result of a weather-related supply shortfall.

Droughts are slow-onset hazards, but over time can have very damaging affects to crops, municipal water supplies, recreational uses, and wildlife. If droughts extend over a number of years, the direct and indirect economic impact can be significant.

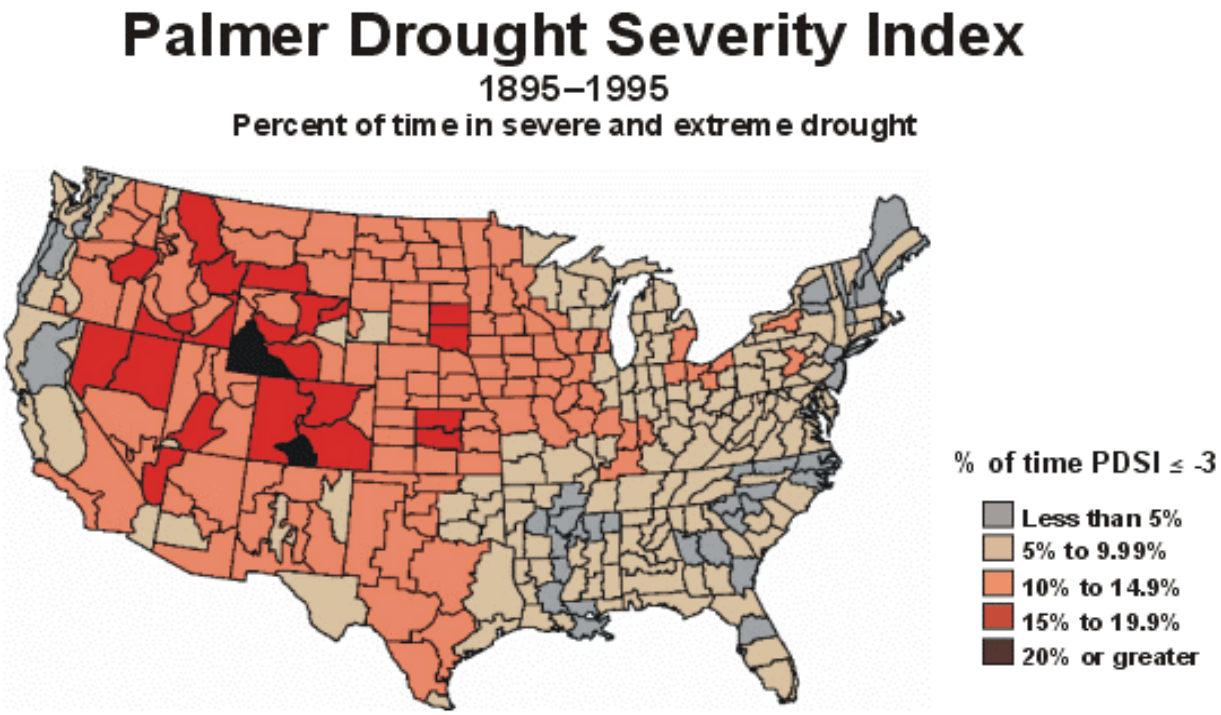
5.9.2 Location and Spatial Extent

The Palmer Drought Severity Index (PDSI) is based on observed drought conditions and range from -0.5 (incipient dry spell) to -4.0 (extreme drought). Evident in **Figure 5.9**, the Palmer Drought Severity Index Summary Map for the United Stated, droughts affect most areas of the United States, but are less severe in the Eastern United States.

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. According to the Palmer Drought Severity Index (Figure 5.9), Florida has the relatively low risk for drought hazard. However, local areas may experience much more severe and/or frequent drought events than what is represented on the Palmer Drought Severity Index map. Further, it is assumed that Volusia County would be uniformly exposed to drought, making the spatial extent potentially widespread. Periods of drought can exacerbate the ignition of wildfires that can damage the natural and built environment, as has occurred before in Volusia County.

[9] Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, FEMA

Figure 5.9: Palmer Drought Severity Index Summary Map for the United States



Source: National Drought Mitigation Center

5.9.3 Historical Occurrences

Secondary research was conducted to determine the historical drought occurrences in Volusia County. It was determined that general drought conditions were present throughout Florida in 1981, 1985, 1998-1999, and 2001. Volusia County is part of the St. Johns River Water Management District, which monitors well levels throughout its jurisdiction. The Keetch Bryam Drought Index is a numerical scale (0-800) that measures the amount of moisture in the soil. A zero indicates wet, full saturation conditions while an 800 represents extreme drought conditions. It is often used to assess the danger of wildfires but is also an indication of drought. Therefore, it is reported where information is available. The following highlight some of the events from the aforementioned years.

1981: Drought conditions were reported throughout Southern Florida. Three firefighters narrowly escaped injury while fighting a drought-related wildfire. Officials from St. Johns River Water Management District ordered a mandatory 15 percent reduction in water use for public water supply, industrial, commercial and self-supplied users[10].

1985: A short, six-month drought was reported in Volusia County. In addition to sparking wildfires, it led to a water warning calling for voluntary water usage restrictions[11]. On June 20, 1985, the water warning

[10] "Winds, Dry Weather Worsen Central Florida Fires. Ocala Star-Banner. Associated Press. July 1, 1981.
[11] "Fires Still Rage in Volusia County." Evening Independent. Associated Press.

was expanded throughout St. Johns Water Management District. Volusia County had been placed under the warning months earlier[12]. On August 14, the warning was lifted as counties were able to meet usage demands due to recent rainfall.

1998: Volusia County reported a Drought Index reading of 700. Wildfires were abundant throughout the County. This year was reported as having the driest conditions in 50 years. The drought did not officially end until 2002[13].

Jan 1999: Volusia County reported a Drought Index of 500.

May 2000: The May Drought Index was reported at 432 – 570. By early 2001 the Drought Index average for Volusia County was 601.

5.9.4 Probability of Future Occurrences

It is assumed that all of Volusia County is uniformly exposed to a drought event. As with any location, some areas of the county may be affected more severely than others during a drought. Given the frequency of previous events, warm temperatures, and average rainfall, the probability of future drought events is high.

[12] "St. John's Water District Expands Warning Area." Gainesville Sun. Associated Press. June 20, 1985.
[13] NAVARRO, MIREYA. "Thousands Flee Florida Homes as Fires Surge." July 2, 1998. Section A, page 1, New York Times.

5.10 FLOOD

5.10.1 Background

Flooding is the most frequent and costly natural hazard in the United States, a hazard that has caused more than 10,000 deaths since 1900. Nearly 90 percent of presidential disaster declarations result from natural events where flooding was a major component.

Floods generally result from excessive precipitation, and can be classified under two categories: general floods, precipitation over a given river basin for a long period of time along with storm-induced wave or tidal action; and flash floods, the product of heavy localized precipitation in a short time period over a given location. The severity of a flooding event is typically determined by a combination of several major factors, including: stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and the degree of vegetative clearing and impervious surface.

A general flood is usually a long-term event that may last for several days. The primary types of general flooding include riverine, coastal, and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Coastal flooding is typically a result of storm surge, wind-driven waves and heavy rainfall produced by hurricanes, tropical storms and other large coastal storms[14]. Urban flooding occurs where manmade development has obstructed the natural flow of water and decreased the ability of natural groundcover to absorb and retain surface water runoff.

Most *flash flooding* is caused by slow-moving thunderstorms in a local area or by heavy rains associated with hurricanes and tropical storms. However, flash flooding events may also occur from a dam or levee failure within minutes or hours of heavy amounts of rainfall, or from a sudden release of water held by a retention basin or other stormwater control facility. Although flash flooding occurs most often along mountain streams, it is also common in urbanized areas where much of the ground is covered by impervious surfaces.

The periodic flooding of lands adjacent to rivers, streams and shorelines (land known as floodplain) is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. Floodplains are designated by the frequency of the flood that is large enough to cover them. For example, 100-year floodplain by the 1 percent annual chance flood.

The frequency of flood events, such as the 1 percent annual chance flood, is determined by plotting a graph of the size of all known floods for an area and determining how often floods of a particular size occur. Another way of expressing the flood frequency is the chance of occurrence in a given year, which is the percentage of the probability of flooding each year. For example, the 1 percent annual chance flood refers to area in the 100-year floodplain and has a 1 percent chance of occurring in any given year. Similarly, the 0.2 percent flood covers the 500-year floodplain and has a 0.2 percent chance of occurring in any given year. The recurrence interval of a flood is defined as the average time interval, in years,

[14] While briefly mentioned here, coastal flooding is more thoroughly addressed under the "storm surge" hazard.

expected between a flood event of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence interval.

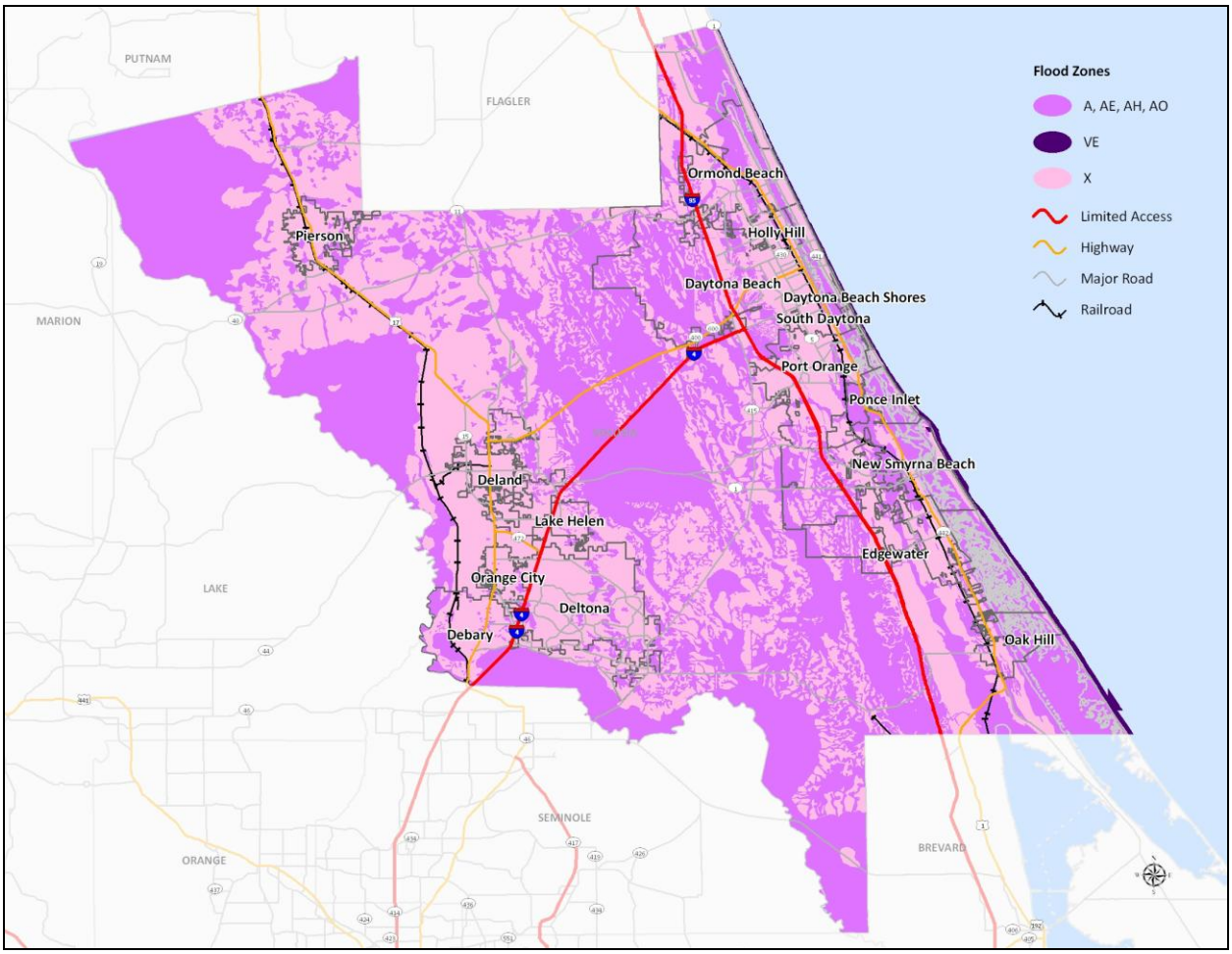
5.10.2 Location and Spatial Extent

Many areas of Volusia County are susceptible to riverine and urban (stormwater) flooding, and its coastal areas are also very susceptible to tidal and coastal flooding due to coastal storm events including storm surge.[15] **Figure 5.10** illustrates the location and extent of currently mapped Special Flood Hazard Areas for Volusia County based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.[16] This includes Zones A/AE (100-year floodplain), Zone VE (100-year coastal flood zones, associated with wave action) and Zone X (500-year floodplain). It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Impacts have included flooding of hundreds of homes, schools, and roads, including the blockage of I-95 in Ormond Beach during a 2004 flash flood. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas.

Volusia County is currently in the process of updating their FIRMs, so the spatial extent of the floodplain may change.

[15] Storm surge is addressed separately within this section.

FIGURE 5.10: Special Flood Hazard Areas in Volusia County



Source: Federal Emergency Management Agency

5.10.3 Historical Occurrences

According to the National Climatic Data Center, there have been 12 reported flood events in Volusia County since 1993. According to the data as shown in **Table 5.14**, there was over $21 million in property damage (not including recorded agricultural losses) during this period (2009 dollars).

TABLE 5.14: Historical Flood Impacts in Volusia County

LOCATION	DATE	TYPE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 dollars)	DESCRIPTION
Peninsular	9/15/1994	Flooding	0/0	$757,242	Two synoptic-scale systems, one tropical and one non-tropical brought heavy rain to most of peninsular Florida the last half of September. Other sections of Florida, particularly northeast and east central, experienced urban flooding which closed roads and flooded schools and homes in Duval County and flooded subdivisions in Flagler, Volusia, St. Johns and Brevard counties as well as in Wakulla County in northwest Florida.
Countywide	10/11/1994	Flood	0/0	$757,242	Heavy rains across much of northeast Florida caused widespread flooding of roadways and vehicles and minor flooding of schools, businesses and residences. Strong onshore winds caused significant beach erosion and minor coastal flooding along portions of the northeast coast.
Oak Hill	9/19/1999	Flash Flood	0/0	$13,439	Heavy rain of 2 to 4 inches produced flooding in Oak Hill. Two homes had minor flooding.
Edgewater	9/14/2001	Flash Flood	0/0	$316,693	Rainfall from Tropical Storm Gabrielle flooded about 25 homes and apartments in Edgewater and New Smyrna Beach. About 5 homes were flooded along the Tomoka River in Daytona Beach. Roadway and small stream flooding was reported over much of the county.
Ponce Park	11/14/2001	Flash Flood	0/0	$633,385	Showers and thunderstorms dumped over 5 inches of rain in coastal sections of Volusia County. Thirty-five homes in the Ponce Inlet, Daytona Beach and Ormond by the Sea areas received some water damage.
Deltona	8/19/2002	Urban Flood	0/0	$0	Thunderstorms produced street flooding in Deltona.
Ormond Beach	8/8/2004	Flash Flood	0/0	$0	Heavy rain in the morning hours brought 24 hour rain totals to near 7 inches. Widespread street flooding with water in two homes in Ormond Beach was reported. A lane of Interstate 95 was blocked by flood waters.
Countywide	9/5/2004	Flash Flood	0/0	$0	From 10 to 12 inches of rain from the northern rainbands of Hurricane Frances produced widespread flooding of homes, businesses and roads across most of the coastal communities as well as in Deltona, and Deland.

TABLE 5.14: Historical Flood Impacts in Volusia County

LOCATION	DATE	TYPE	DEATHS/ INJURIES	PROPERTY DAMAGE (2009 dollars)	DESCRIPTION
Countywide	9/9/2004	Flood	0/0	$5,564,516	Hurricane Frances produced 6 to 10 inches of heavy rain over much of the middle and upper St. Johns River Basin. Beginning on September 9th, water levels began to reach flood stage on the middle basin mainly around Geneva, and Sanford. Levels continued to rise well above flood stage and began to fall slightly until Hurricane Jeanne followed the same track across the state. Significant flooding followed with a record crest of 10.1 feet being reached at the Lake Harney Gage. In Volusia County many roads and dozens of homes were flooded, mainly in the Stone Island and surrounding communities. River levels remained above flood stage through the remainder of the month.
Countywide	8/21/2008	Flash Flood	0/0	$13,390,000	As Tropical Storm Fay drifted north in the Volusia County off shore waters, hours of torrential rain fell across southern Volusia county. Close to 200 homes were flooded. Damage was near $13 million. Torrential rain from Tropical Storm Fay produced widespread flooding across Brevard and central and southern Volusia counties.

Source: National Climatic Data Center

According to the emergency management officials from the Volusia County jurisdictions, another significant flood event occurred during the Memorial Day Weekend in May 2009 that was not included in the NCDC database. This event caused high rains and four feet of storm surge. There was between $60 – 75 million in damages along the coastline from Ormond Beach to New Smyrna Beach. Approximately 1,000, infrastructure and various critical facilities were damaged. Daytona Beach, alone, had approximately 650 damaged homes.

5.10.4 Historical Summary of Insured Flood Losses

All jurisdictions in Volusia County participate in the National Flood Insurance Program (NFIP). According to FEMA flood insurance policy records as of April 2009, there have been 1,385 flood losses reported in Volusia County through the NFIP since 1970, totaling more than $35 million in claims payments. **Table 5.15** provides flood insurance policy and claim summary information for each of the participating jurisdictions. The reported losses include both inland (freshwater) and coastal flooding events. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood losses in Volusia County were either uninsured, denied claims payment, or not reported.

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TABLE 5.15: NFIP Policy and Claim Information

JURISDICTION	NUMBER OF FLOOD INSURANCE POLICIES	NUMBER OF LOSSES REPORTED	TOTAL PAYMENTS
Daytona Beach	7,310	346	$3,554,101.63
Daytona Beach Shores	5,228	60	$246,738.43
DeBary	842	75	$3,969,089.70
Deland	197	12	$327,686.00
Deltona	1,024	22	$321,991.36
Edgewater	1,557	78	$454,786.44
Holly Hill	1,005	69	$472,129.11
Lake Helen	16	0	$0
New Smyrna Beach	8,831	370	$3,020,871.55
Oak Hill	143	3	$35,573.36
Orange City	139	7	$690,412.26
Ormond Beach	5,944	318	$1,481,163.79
Pierson	1	0	$0
Ponce Inlet	2,557		$781,507.15
Port Orange	3,839	100	$6,069,056.89
South Daytona	1,183	241	$3,302,584.60
Volusia County	12,241	1,044	$11,060,159.58
TOTAL	**52,057**	**1,385**	**$35,787,851.85**

5.10.5 Repetitive Loss Properties

FEMA defines a repetitive loss (RL) property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Currently there are over 122,000 repetitive loss properties nationwide.

According to FEMA repetitive loss property records (as of April 2009), there are 155 “non-mitigated” repetitive loss properties located in Volusia County. These properties have accounted for a total of 352 losses and more than $8 million in claims payments under the NFIP. Without mitigation, these properties will likely continue to experience flood losses. **Table 5.16** provides summary information about repetitive loss properties in Volusia County.

TABLE 5.16: Repetitive Flood Loss Property Summary

JURISDICTION	LOSSES REPORTED FROM RL PROPERTIES	NUMBER OF RL PROPERTIES				
		TOTAL	RESIDENTIAL	COMMERCIAL	GOVERNMENTAL	TOTAL PAYMENTS
Daytona Beach	28	13	5	8	0	$545,661.16
Daytona Beach Shores	NA	NA				NA
DeBary	4	2	2	0	0	$199,902.80
Deland	NA	NA				NA
Deltona	8	2	2	0	0	$294,198.25
Edgewater	6	1	1	0	0	$51,518.07
Holly Hill	NA	NA				NA
Lake Helen	NA	NA				NA
New Smyrna Beach	63	21	17	4	0	$ 1,140,311.76
Oak Hill	NA	NA				NA
Orange City	NA	NA				NA
Ormond Beach	28	14	14	0	0	$206,367.98
Pierson	NA	NA				NA
Ponce Inlet	2	1	1	0	0	$7,173.00
Port Orange	27	13	13	0	0	$491,498.78
South Daytona	23	10	10	0	0	$612,568.45
Volusia County	165	71	69	2	0	$5,076,250.25
TOTAL	**352**	**148**	**134**	**14**	**0**	**$8,639,622.40**

5.10.6 Probability of Future Occurrences

Flood events will remain a frequent occurrence in Volusia County, and future probability of occurrences is high. The probability of future flood events based on magnitude and according to best available data is illustrated in Figure 5.10, which indicates those areas susceptible to the 1 percent annual chance flood (100-year floodplain); the 1 percent annual chance flood with wave action (100-year coastal floodplain); and the 0.2 percent annual chance flood (500-year floodplain). Further, as described in other hazard profiles, it is highly likely that Volusia County will continue to experience inland and coastal flooding associated with large tropical storms, hurricanes and storm surge events.

Anticipated sea level rise will increase the probability and intensity of future tidal flooding. Rising sea level over time will decrease the return period (increasing the frequency) of significant flood events. For example; sea level rise of 1 foot over a typical project analysis period (50 years) may cause a flood event currently of annual probability 2 percent (50-year flood) to become an event of 10 percent annual probability (10-year flood). This rise in sea level will increase the probability and intensity of tidal flooding events, and exacerbate the loss of coastal wetlands and erosion of sand beaches that act as protective buffers against flood events.

5.11 STORM SURGE

5.11.1 Background

Storm surge occurs when the water level of a tidally influenced body of water increases above the normal astronomical high tide and is most common in conjunction with coastal storms with massive low-pressure systems with cyclonic flows such as hurricanes, tropical storms and nor'easters. The low barometric pressure associated with these storms causes the water surface to rise, and storms making landfall during peak tides have surge heights and more extensive flood inundation limits. Storm surges will inundate coastal floodplains by dune overwash, tidal elevation rise in inland bays and harbors, and backwater flooding through coastal river mouths. The duration of a storm is the most influential factor affecting the severity and impact of storm surges.

A storm surge is often described as a wave that has outrun its generating source and become a long period swell. It is often recognized as a large dome of water that may be 50 to 100 miles wide and generally rising anywhere from four to five feet in a Category 1 hurricane to over 20 feet in a Category 5 storm. The storm surge arrives ahead of the storm center's actual landfall and the more intense the storm is, the sooner the surge arrives. Water rise can be very rapid, posing a serious threat to those who have not yet evacuated flood-prone areas. The surge is always highest in the right-front quadrant of the direction in which the storm is moving. As the storm approaches shore, the greatest storm surge will be to the north of the low-pressure system or hurricane eye. Such a surge of high water topped by waves driven by hurricane force winds can be devastating to coastal regions, causing severe beach erosion and property damage along the immediate shoreline.

Storm surge heights and associated waves are dependent on not only the storm's intensity but also upon the shape of the offshore continental shelf (narrow or wide) and the depth of the ocean bottom (bathymetry). A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water close to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. The storms that generate the largest coastal storm surges can develop year-round, but they are most frequent from late summer to early spring.

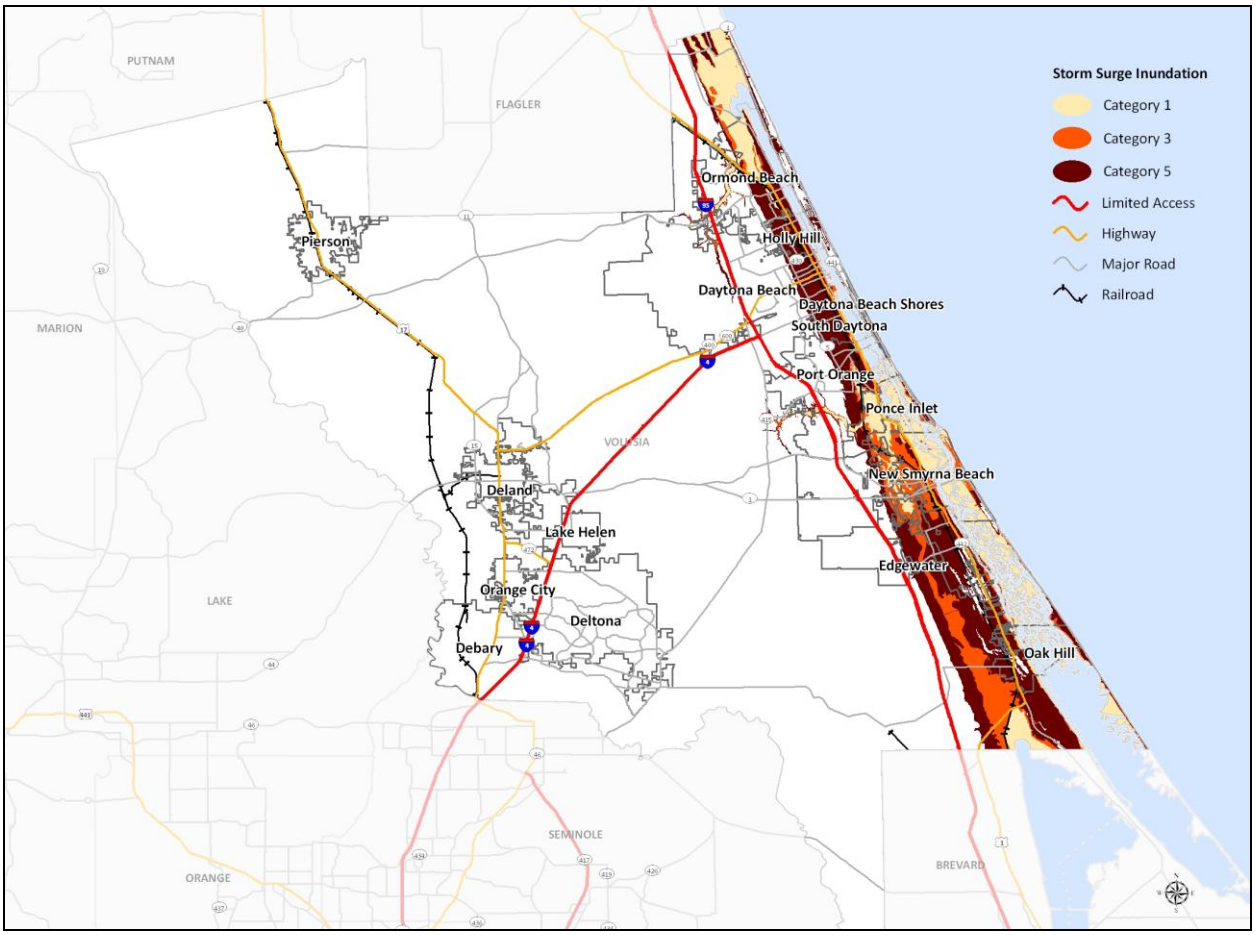
5.11.2 Location and Spatial Extent

Many areas in Volusia County are subject to potential storm surge inundation. **Figure 5.11** illustrates hurricane storm surge inundation zones for Volusia County derived from geo-referenced SLOSH (Sea, Lake and Overland Surge from Hurricanes) data produced by the USACE in coordination with NOAA. SLOSH is a modeling tool used to estimate storm surge for coastal areas resulting from historical, hypothetical or predicted hurricanes taking into account maximum expected levels for pressure, size, forward speed, track and winds. Therefore, the SLOSH data is best used for defining the potential maximum surge associated with various storm intensities for any particular location.

As shown in the figure, all of Volusia County's coastal areas are at high risk to storm surge inundation in addition to most riverine floodplains along major rivers in southern portions of the area. While areas not located immediately along the coast or major rivers may not be directly impacted by storm surge

inundation except in extreme storm events, they might experience flooding caused by storm surge and extremely high tides that affect the drainage of areas further inland.

FIGURE 5.11: Storm Surge Inundation Zones in Volusia County



Source: National Oceanic and Atmospheric Administration

5.11.3 Historical Occurrences

Volusia County has experienced storm surge events associated with hurricanes, nor'easters and tropical storms. Storm surge incidents have not been recorded separately from these three events.

5.11.4 Probability of Future Occurrences

There is a high probability that Volusia County will continue to experience storm surge associated with large tropical storms, hurricanes and squalls combined with high tides, based on the frequency of past tropical cyclones. As noted in the preceding section (under *Flood*), anticipated sea level rise will increase the probability and intensity of future storm surge events. This rise in sea level will increase the probability and intensity of tidal flooding events, but will also contribute to the loss of coastal wetlands and erosion of sand beaches that act as protective buffers against storm surge events.

GEOLOGIC HAZARDS

5.12 SINKHOLE

5.12.1 Background

Sinkholes are a natural and common geologic feature in areas with underlying limestone and other rock types that are soluble in natural water. Most limestone is porous, allowing the acidic water of rain to percolate through their strata, dissolving some limestone and carrying it away in solution. Over time, this persistent erosional process can create extensive underground voids and drainage systems in much of the carbonate rocks. Collapse of overlying sediments into the underground cavities produces sinkholes.

The three general types of sinkholes are: subsidence, solution, and collapse. *Subsidence sinkholes* form gradually where the overburden (the sediments and water that rest on the limestone) is thin and only a veneer of sediments is overlying the limestone. *Solution sinkholes* form where no overburden is present and the limestone is exposed at land surface. *Collapse sinkholes* are most common in areas where the overburden is thick, but the confining layer is breached or absent. Collapse sinkholes can form with little warning and leave behind a deep, steep-sided hole.

Sinkholes occur in many shapes, from steep-walled holes to bowl or cone shaped depressions. Sinkholes are dramatic because the land generally stays intact for a while until the underground spaces 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. Under natural conditions, sinkholes form slowly and expand gradually. However, human activities such as dredging, constructing reservoirs, diverting surface water and pumping groundwater can accelerate the rate of sinkhole expansions, resulting in the abrupt formation of collapse sinkholes.

Although a sinkhole can form without warning, specific signs can signal potential development:

- Slumping or falling fenceposts, trees or foundations;
- Sudden formation of small ponds;
- Wilting vegetation;
- Discolored well water; and/or
- Structural cracks in walls, floors.

Sinkhole formation is exacerbated by urbanization. Development increases water usage, alters drainage pathways, overloads the ground surface and redistributes soil. According to FEMA, the number of human-induced sinkholes has doubled since 1930 and insurance claims for damages as a result of sinkholes has increased 1,200 percent from 1987 to 1991, costing nearly $100 million.

5.12.2 Location and Spatial Extent

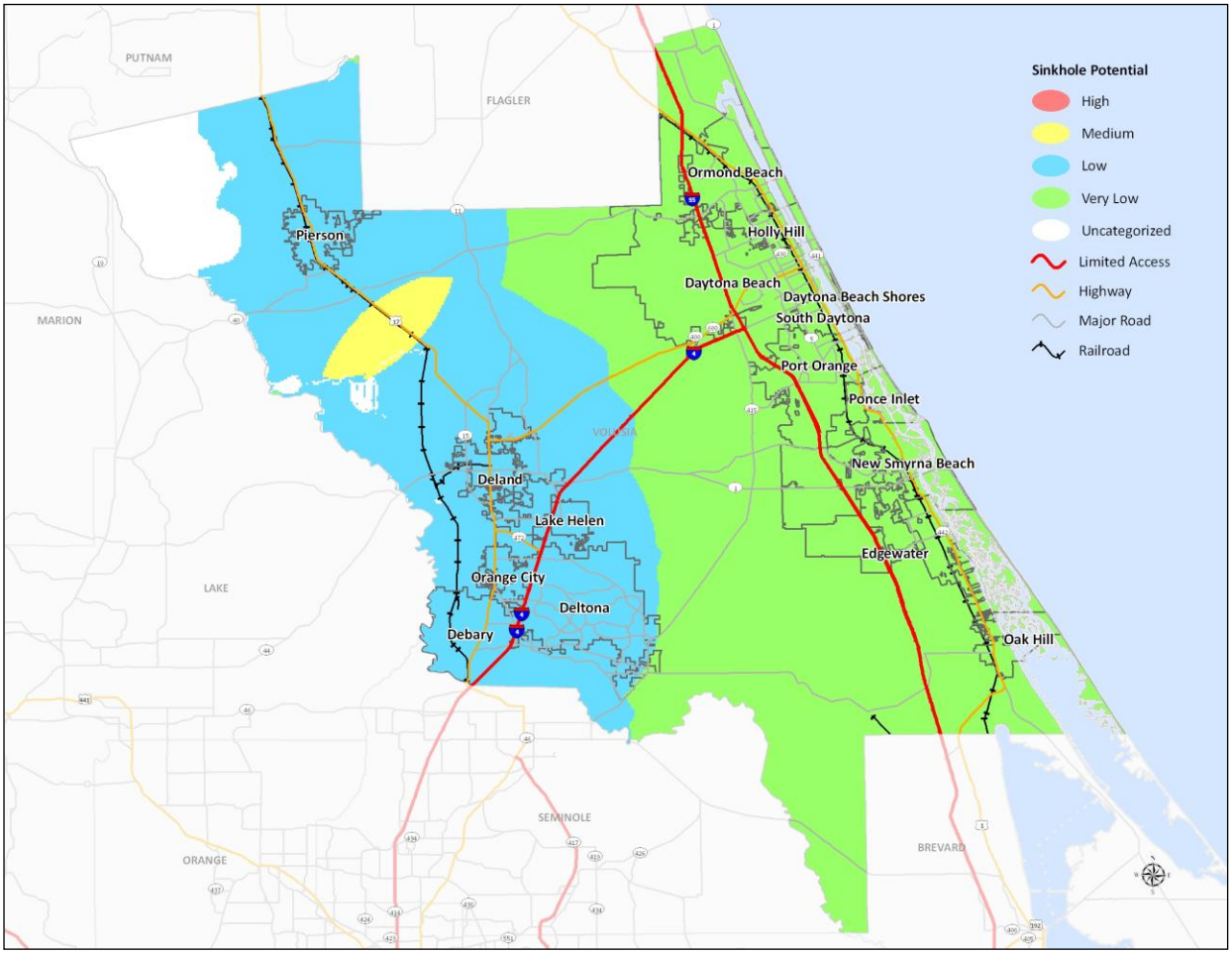
Sinkholes are typically localized occurrences that cannot be mapped to any specific geographic boundaries.

5.12.3 Historical Occurrences

There were 80 sinkholes in Volusia County between 1973 and 2005. **Figure 5.12** shows the location of these sinkholes. Seventy-eight of these sinkholes were located in the Volusia County study area as shown in **Table 5.17**, as reported to the NCDC. In 2004 there was a major sinkhole that occurred in Deland. In December 2004, a sinkhole devoured a 160-foot area, swallowing all four lanes of Howland Boulevard, cracked the walls of a nearby home and caused the evacuation of 20 homes. It was estimated that it would take 1 million cubic yards of dirt to the fill the hole.

No other sinkholes have occurred since 2005.

FIGURE 5.12: Historical Sinkhole Location in Volusia County



Source: MEMPHIS

TABLE 5.17: Historical Sinkholes in Volusia County

LOCATION	DATE	SIZE (feet)			DETAILS
		Length	Width	Depth	
Pierson	12/12/1973	60.00	60.00	0.00	There are many small lakes in the area. The sinkhole was adjacent.
Pierson	12/13/1973	100.00	100.00	40.00	Depth varies from 20' to 40'. It happened during pumping for freeze protection.
Pierson	12/17/1973	10.00	10.00	2.00	None
Pierson	12/15/1975	25.00	25.00	20.00	It happened during pumping for freeze protection.
Pierson	1/10/1976	3.00	3.00	1.00	It happened during pumping for freeze protection.
Pierson	12/1/1976	15.00	15.00	0.00	None
Pierson	1/15/1977	0.00	0.00	0.00	None
Pierson	1/19/1977	30.00	30.00	12.00	Near other small sinks and lakes.
Orange City	4/10/1977	70.00	70.00	50.00	Near 501
Pierson	1/3/1979	39.00	32.00	0.00	None
Pierson	1/9/1979	22.00	27.00	7.00	None
Pierson	1/9/1979	19.00	16.00	3.00	None
Deland	4/17/1979	6.00	6.00	10.00	None
Deland	1979	9.00	9.00	4.00	None
Deland	7/16/1981	13.00	13.00	18.00	None
Deland	10/27/1981	3.00	3.00	8.00	None
Pierson	12/15/1981	50.00	50.00	20.00	A sink also occurred here in 1973.
Orange City	1/9/1982	2.00	2.00	2.00	None
Debary	4/9/1982	20.00	20.00	15.00	None
Deland	4/11/1982	7.25	6.50	3.33	None
Deland	4/14/1982	3.00	3.00	1.00	Occurred at the national guard armory.
Lake Helen	7/25/1982	4.00	3.00	3.00	None
Orange City	10/4/1982	12.00	12.00	6.00	None
Holly Hills	4/7/1983	20.00	0.00	15.00	None
New Smyrna Beach	5/28/1983	5.00	0.00	7.00	There are multiple holes in the area varying from 1 to 5 feet in diameter and 2 to 7 feet deep.
Pierson	12/26/1983	130.00	100.00	35.00	None

TABLE 5.17: Historical Sinkholes in Volusia County

LOCATION	DATE	SIZE (feet)			DETAILS
		Length	Width	Depth	
Pierson	12/26/1983	50.00	50.00	35.00	Very cold at this time, pumping for freeze protection.
Pierson	12/26/1983	10.00	10.00	0.33	Very cold at this time, pumping for freeze protection.
Pierson	12/26/1983	15.00	15.00	0.60	Very cold at this time, pumping for freeze protection.
Pierson	12/26/1983	25.00	25.00	20.00	Very cold at this time, pumping for freeze protection. Occurred next to a fernery.
Orange City	4/24/1984	7.00	7.00	6.00	Approximately 200 yards from ST 17-92, in the center of the west bound lane.
Seville	1/21/1985	60.00	60.00	25.00	Many wells in the area went dry. Sink in the northeast corner of Crystal Lake which has been dry for months. Six days later, the sink was filled with water, but no rain. Heavy freeze protection pumping at this time.
Pierson	1/21/1985	20.00	20.00	3.00	Six Sinks in the area. Heavy freeze protection pumping at this time.
Pierson	1/21/1985	10.50	12.75	4.00	Six Sinks in the area. Heavy freeze protection pumping at this time.
Pierson	1/21/1985	62.00	62.00	15.00	Six Sinks in the area. Heavy freeze protection pumping at this time.
Pierson	1/21/1985	53.00	50.00	12.00	Six Sinks in the area. Heavy freeze protection pumping at this time.
Pierson	1/21/1985	20.00	26.00	2.00	Six Sinks in the area. Heavy freeze protection pumping at this time.
Orange City	10/13/1985	35.00	25.00	0.13	Settlement causing cracks and distortion to house. The sink is completely under the house. Cement pressure grouting will be performed Jammal and Associates report.
Pierson	1/29/1986	23.20	21.70	7.00	Near other sinkholes.
Deland	2/1/1986	5.00	4.00	4.50	This sinkhole is on the slope of Lake Louise.
Port Orange	4/3/1987	10.00	10.00	1.00	None
Orange City	5/19/1987	95.00	95.00	1.00	Reactivation of ancient sink.
Pierson	5/27/1987	48.00	28.00	10.00	Sinkhole on divide between stone pond and unnamed pond. .
Pierson	5/29/1987	0.00	0.00	3.00	None

TABLE 5.17: Historical Sinkholes in Volusia County

LOCATION	DATE	SIZE (feet)			DETAILS
		Length	Width	Depth	
Deland	9/1/1987	5.50	6.50	11.00	A backhoe operator drove up to the edge of the area and it suddenly collapsed.
Deland	3/17/1989	13.00	13.00	10.00	S.R. 11 – The sink is in the right of way on the west side of the highway.
Orange City	10/31/1991	22.00	22.00	20.00	1910 Clara Ave, residence.
Orange City	3/7/1993	130.00	130.00	35.00	825 & 835 Lansdowne Ave.
Orange City	3/7/1993	15.00	15.00	1.00	560 Marilea Ct.
Orange City	5/8/1994	50.00	50.00	25.00	581 Sparkman Ave
Orange City	8/29/1994	5.00	5.00	1.50	I-4 at the Saxon Boulevard Ramp
Deland	8/24/1995	10.00	8.00	5.00	Sinkhole is in backyard.
Deland	1/10/1996	5.00	5.00	2.00	Located at Old Reynolds Road.
Deland	1/10/1996	50.00	50.00	11.00	Located at Old Reynolds Road.
Deltona	10/12/1996	0.00	0.00	0.00	Located at a residence.
Deland	8/30/1998	18.00	18.00	5.00	U.S. HWY 17/92 in Deland located on the east side of the highway in bank driveway.
Debary	5/26/2000	0.00	0.00	0.00	148 MARSELLA Road in a Debary housing subdivision. One home deemed unsafe and two have structural damage.
Lake Helen	6/14/2000	1.00	1.00	3.00	Located on west Main Street under a home; it is not causing structural damage.
Deland	7/21/2000	25.00	25.00	15.00	The sinkhole is located under a home that is under construction. No structural damage to home.
Orange City	8/26/2000	3.00	3.00	3.00	Sinkhole is still growing; 20 feet from structure.
Orange City	9/22/2000	2.00	2.00	10.00	Sinkhole is 6 feet from structure. No structural damage on private property.
Sanford	9/28/2000	5.00	5.00	3.00	DEBARY. STATION 28+35, Located 5 feet right of Benson Junction Road.
Debary	10/17/2000	2.00	2.00	6.00	Located on private property.
Pierson	12/21/2000	50.00	50.00	15.00	Located on Shaw Lake Road between Turner Road and Hilsenbeck Road. Ten feet from South side of the road. . .
Pierson	12/21/2000	30.00	35.00	35.00	A portion of Shaw Lake Road was barricaded due to sinkhole impact.

TABLE 5.17: Historical Sinkholes in Volusia County

LOCATION	DATE	SIZE (feet)			DETAILS
		Length	Width	Depth	
Deland	12/29/2000	35.00	35.00	3.00	A sinkhole occurred 50 feet from structure but structure is stable at this time.
Deland	3/22/2001	6.00	4.00	5.00	Sinkhole was located in the road. A garbage truck hit it. It is now being repaired.
Deland	4/30/2001	20.00	20.00	3.00	Sink occurred on private property near a retention pond.
Debary	7/18/2001	4.00	4.00	2.00	Sink on private property.
Welaka	10/15/2001	7.00	7.00	1.50	U.S. 17 North of Seville going southbound.
Orange City	8/25/2002	3.00	3.00	0.00	Closed one land of road to repair sink in right of way.
Orange City	9/30/2002	6.00	6.00	2.00	Sinkhole in intersection.
Orange City	1/15/2003	5.00	5.00	0.50	Half inch pavement dip.
Deland	6/2/2004	15.00	15.00	8.00	Sinkhole in the road. No damage or injuries occurred.
Deland	9/8/2004	4.00	4.00	2.50	Sinkhole on private property; no damage.
Deland	9/29/2004	25.00	25.00	20.00	Sinkhole on private property. The hole is partly under the garage. The owner was advised not to stay in the home until the sinkhole is fixed.
Orange City	1/9/2005	250.00	150.00	0.00	Sinkhole damaged 2 homes beyond repair and is also impacting road.
Osteen	8/17/2005	4.00	2.00	2.00	Sinkhole on private property.
Lake Dias	8/17/2005	4.00	4.00	3.00	None

5.12.4 Probability of Future Occurrences

There is a high probability of future sinkhole occurrences in Volusia County. The county averages 2.5 sinkholes annually, according to the historic data. Activities that increase the risk of sinkhole are ground-water pumping, construction and development practices, and breakages in water lines, though they can also occur due to natural or geological factors.

5.13 TSUNAMI

5.13.1 Background

The word tsunami is Japanese and means "harbor wave." A tsunami is a wave or series of waves most commonly caused by an earthquake or by a large undersea landslide, volcanic eruption or other undersea disturbance. From the area of disturbance, tsunami waves will travel outward in all directions and can originate hundreds or even thousands of miles away from affected coastal areas.

In the open ocean, tsunami waves travel at speeds of up to 600 miles per hour but are too small to be observed, and the time between wave crests may be five to 90 minutes. As the waves approach shallow coastal waters, they slow down and may rise to several feet or, in rare cases, tens of feet. Although the waves slow down as they reach shallow water, the energy remains constant and when tsunami waves crash into the shoreline they may be as high as 100 feet. The first wave is almost never the largest; successive waves may be spaced tens of minutes apart and continue arriving for many hours. The coastal areas at greatest risk are less than 50 feet above sea level and within one mile of the shoreline. Tsunamis can cause great loss of life and property damage where they come ashore, and most tsunami deaths are the result of drowning. Associated risks include water pollution, damaged gas lines, and flooding.

Tsunami activity is a greater risk along the Pacific Rim states (Washington, Oregon, California Alaska and Hawaii), but is still possible along the East Coast of the United States. In fact, as many as 40 tsunami or tsunami-like events have been reported along the East Coast since the early 1600s. Additionally, models and methodologies do not currently exist to accurately assess the tsunami hazard as it would relate to an inland community along the East Coast.

Although an East Coast tsunami would be rare, two off-shore areas are currently under investigation according to a 2002 National Geophysical Data Center report. One area of interest consists of large cracks northeast of Cape Hatteras, North Carolina that could foretell of the early stages of an underwater landslide resulting in a tsunami. The other area of interest consists of submarine canyons approximately 150 kilometers from Atlantic City, New Jersey. Significant factors for consideration with regard to these areas are recent discoveries along the East Coast that demonstrate the existence of pressurized hydrates and pressurized water layers in the continental shelf. This has produced speculation among the scientific community on possible triggers that could cause sudden and perhaps violent releases of compressed material that could factor into landslide events and the resulting tsunami waves.

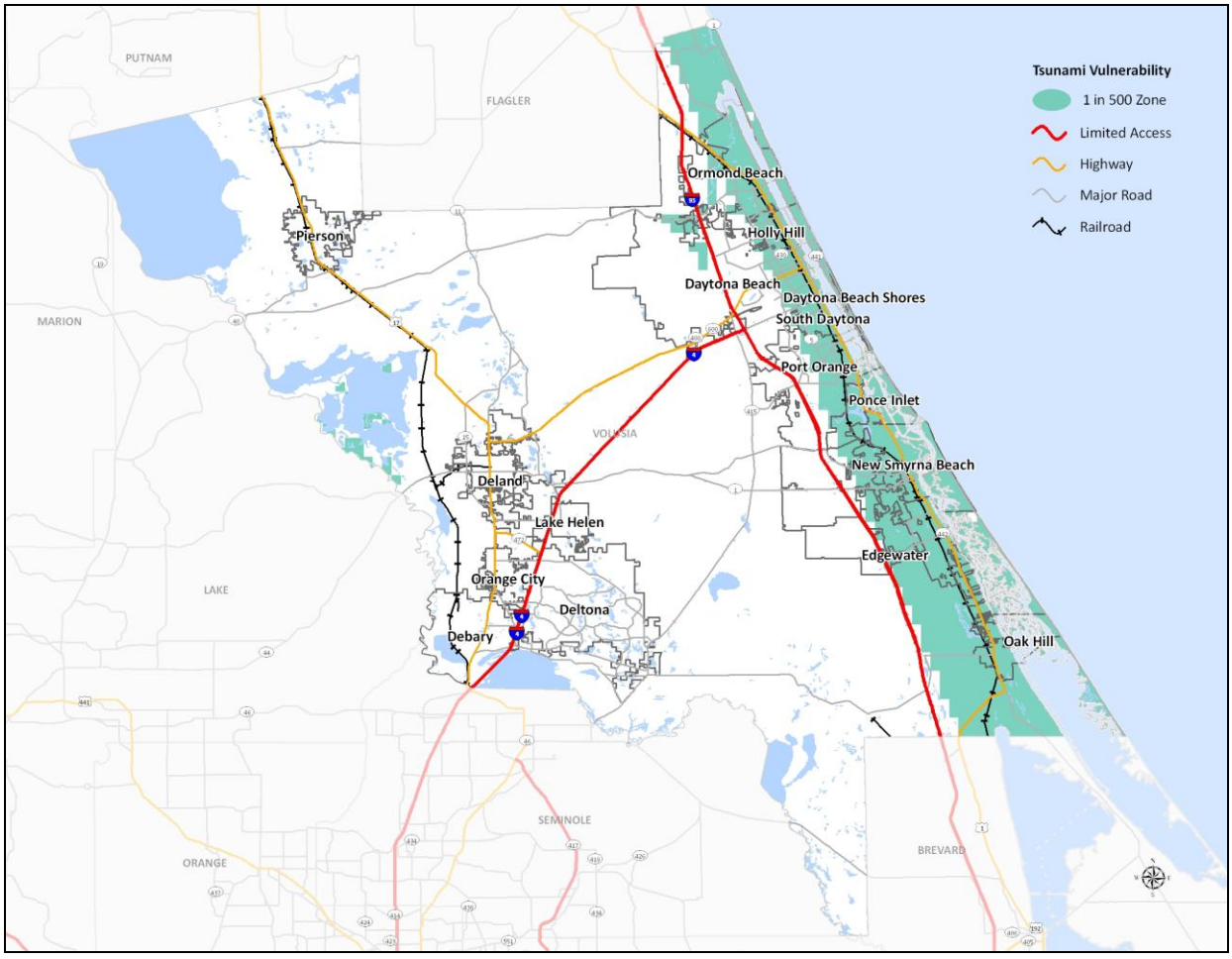
In August 2008, a qualitative tsunami hazard assessment prepared by NOAA and USGS indicated that the U.S. Atlantic coast has a very low tsunami risk[17]. This qualitative assessment was based on National Geophysical Data Center (NGDC) and United States Geological Survey (USGS) databases. Specifically, Atlantic coast tsunami vulnerability was deemed very low based on very low wave runup, low tsunami hazard frequency, and no reported fatalities.

[17] NOAA and USGS. 2008. *U.S. States and Territories National Tsunami Hazard Assessment: Historical Record and Sources for Waves.* August 2008.

5.13.2 Location and Spatial Extent

The potential location and extent of the tsunami hazard for Volusia County is similar and slightly more extensive than the established flood hazard area. A tsunami event could cover all or any part of Volusia County. However, the coastal areas are most at risk. **Figure 5.13** indicates the areas in Volusia County most at risk to a tsunami hazard based on the location of the 500 year tsunami inundation zone based on MEMPHIS data. The coastal areas are at the greatest risk to high velocity waves that could cause severe to catastrophic damage to structures and infrastructure. Specifically, massive amounts of vegetative and construction debris would result, boats would be washed ashore, impacted buildings could collapse, trees could be uprooted, above ground power poles and lines could collapse, and underground utilities could be unearthed and destroyed.

FIGURE 5.13: Tsunami Vulnerability Areas



5.13.3 Historical Occurrences

Historical records do not indicate any past significant tsunami occurrences for Volusia County, and such an event is generally considered possible but unlikely. However, the potential for tsunami impacts along

the entire Eastern United States coast does exist as evidenced by other recorded tsunami occurrences in the area.

Although different from a tsunami, a rogue wave is a relatively large (i.e., larger in height than a tsunami) and spontaneous ocean wave that can cause similar impacts. On July 3 1992, a 27 mile long, 18 foot rogue wave came onshore between Ormond Beach to New Smyrna Beach, centered at Daytona Beach. Sailboats crashed ashore, 200 cars were damaged and approximately 75 people were injured resulting in two hospitalizations. It is theorized that an underwater landslide caused the rogue wave, potentially categorizing this wave as a type of tsunami, or it was the result of a squall line.

5.13.4 Probability of Future Occurrences

The probability of a future tsunami event affecting Volusia County is considered to be very low, as indicated in the 2008 NOAA-USGS tsunami hazards assessment. However, the consequences of even a moderate tsunami striking Volusia County would devastating to lives, development, and the ability of the county to function.

OTHER HAZARDS

5.14 WILDFIRE

5.14.1 Background

A wildfire is any fire occurring in a wildland area (i.e. grassland forest, brush land) except for fire under prescription.[18] Wildfires are part of the natural management of forest ecosystems, but may also be caused by human factors. Nationally, over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning.

There are three classes of wildland fires: surface, ground and crown fire. A surface fire is the most common of these three classes and burns along the floor of a forest, moving slowly and killing or damaging trees. A ground fire (muck fire) is usually started by lightning or human carelessness and burns on or below the forest floor. Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees. Wildland fires are usually signaled by dense smoke that fills the area for miles around.

Wildfire probability depends on local weather conditions, outdoor activities such as camping, debris burning, and construction, and the degree of public cooperation with fire prevention measures. Drought conditions and other natural hazards (such as tornadoes, hurricanes, etc.) increase the probability of wildfires by producing fuel in both urban and rural settings. Forest damage from hurricanes and tornadoes may also block interior access roads and fire breaks, pull down overhead power lines, or damage pavement and underground utilities.

Many individual homes and cabins, subdivisions, resorts, recreational areas, organizational camps, businesses and industries are located within high wildfire hazard areas. Further, the increasing demand for outdoor recreation places more people in wildlands during holidays, weekends and vacation periods. Unfortunately, wildland residents and visitors are rarely educated or prepared for wildfire events that can sweep through the brush and timber and destroy property within minutes.

Wildfires can result in severe economic losses as well. Businesses that depend on timber, such as paper mills and lumber companies, experience losses that are often passed along to consumers through higher prices. In cases, this has resulted in the loss of jobs. The high cost of responding to and recovering from wildfires can deplete state resources and increase insurance rates. The economic impact of wildfires can also be felt in the tourism industry if roads and tourist attractions are closed due to health and safety concerns.

State and local governments can impose fire safety regulations on home sites and developments to help curb wildfire. Land treatment measures such as fire access roads, water storage, helipads, safety zones, buffers, firebreaks, fuel breaks and fuel management can be designed as part of an overall fire defense

[18] Prescription burning, or “controlled burn,” undertaken by land management agencies is the process of igniting fires under selected conditions, in accordance with strict parameters.

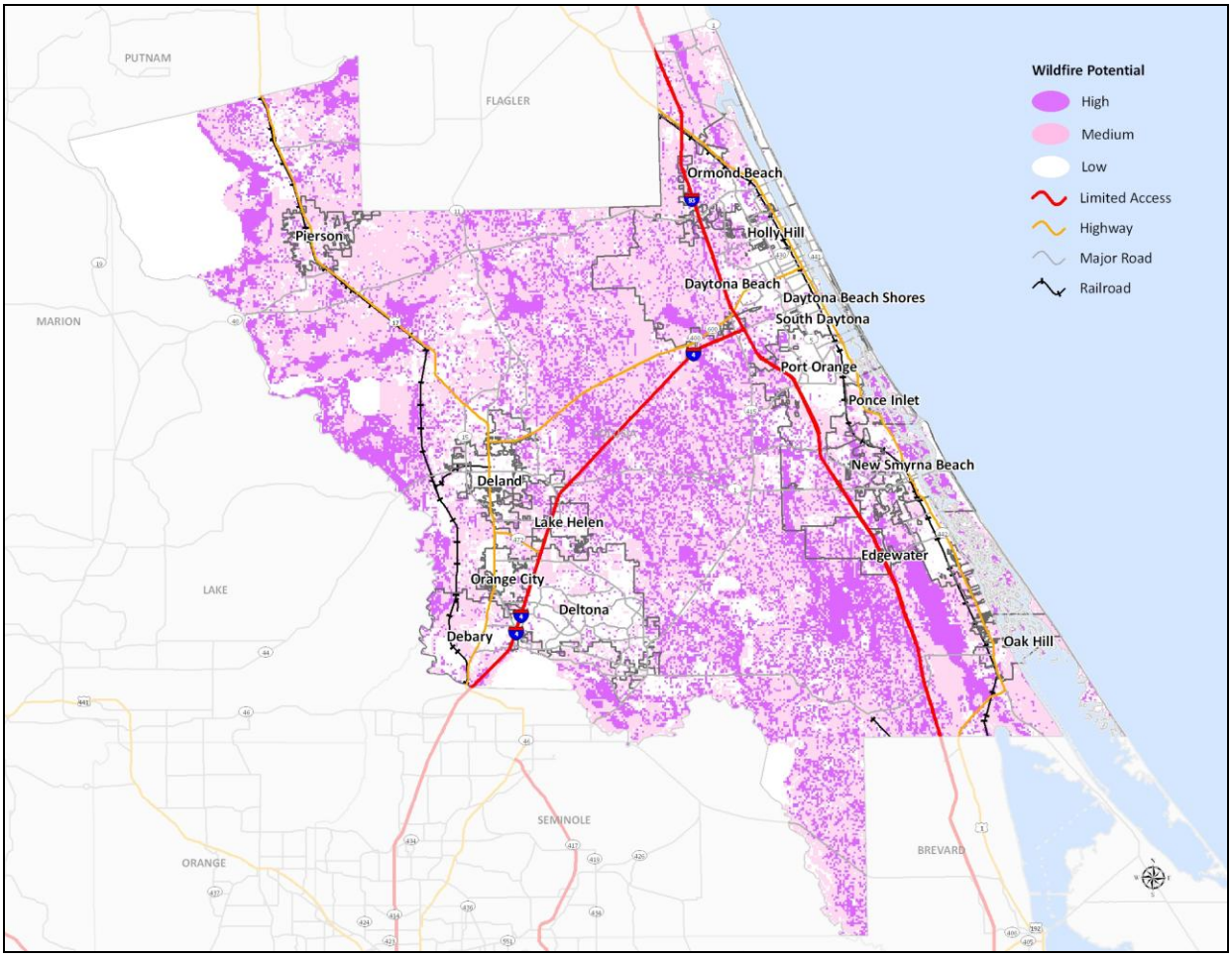
system to aid in fire control. Fuel management, prescribed burning and cooperative land management planning can also be encouraged to reduce fire hazards.

5.14.2 Location and Spatial Extent

Volusia County is uniformly exposed to wildfire risk. Although the county typically receives a high amount of precipitation each year (around 50 inches), there is risk of wildfire due to the hot, dry summer months. Further, drought and drought-like conditions may occur which could increase the probability of wildfire occurrence.

The wildfire potential for Volusia County is shown is **Figure 5.14**. All areas of the county may be susceptible to wildfire, and the wildland-urban interface is an area of concern as more property may be at risk to fire damage in these areas. Further, a large portion of the County is at high risk to wildfire events. These areas are dispersed throughout the County.

FIGURE 5.14: Wildfire Risk in Volusia County



Source: MEMPHIS

5.14.3 Historical Occurrences

According to the Florida Division of Forestry, Florida experiences an average of 3,060 wildfires annually, burning nearly 154,000 acres[19]. The most common cause of Florida wildfire events is lightning which ignited over 700 fires annually between 2000 and 2009. Volusia County experienced 1,306 fires that burned over 22,600 acres between January 2000 and August 2009. Lightning caused nearly half of these fires. **Table 5.18** lists the number of reported wildfire occurrences in Volusia County between the years 2000 and 2008.

TABLE 5.18: Historical Wildfire Occurrences in Volusia County

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	Annual Average
Number of Fires	203	116	31	71	145	64	213	195	121	129
Acres Burned	2,043	383	371	2,011	746	198	5,037	1,826	1,482	1,566

Source: Florida Division of Forestry

It should also be noted that 1998 was a particularly significant year for wildfires in Volusia County. That year, drought conditions were prevalent throughout the County. A total of 233 wildfires were reported, the largest single cause being lightning. In all, over 163,000 acres were burned. The fires threatened 29,000 homes and hindered travel as wildfires jumped highways. However, after weeks of burning, just six houses, one mobile home, and two businesses were destroyed, totaling $2.1 million ($2,889,598; 2009 dollars). Timber, conversely, took the brunt of the damage with losses of over $60 million ($85,570,222; 2009 dollars). No fatalities or civilian injuries were reported but ten firefighters did have minor injuries.
Source:

5.14.4 Probability of Future Occurrences

There is a high probability of future wildfire events in Volusia County, especially during drought cycles and abnormally dry conditions, based on prior occurrence. Volusia County experienced nearly 130 wildfires per year from 2000 – 2008.

[19] Average information based on information between January 2000 and August 2009.

5.15 CONCLUSIONS ON HAZARD RISK

The hazard profiles presented in this section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies and technical reports.

5.15.1 Hazard Risk Scoring

In order to provide a comprehensive assessment of each hazard in each jurisdiction, the hazards were scored by the participating jurisdictions based on a number of vulnerability factors including area impacted, health and safety of the population, property, environment, and economic vulnerability. Each of these factors has been assigned a number between one and five, based on risk, with five being the greatest. The values then were summed and multiplied by the probability of occurrence factor, which is also a 1 to 5 scale. The resulting value is a risk rating for each hazard within a specific jurisdiction. Each participating jurisdiction updated their hazards scores in June and July of 2009, based on the initial scores that were provided during the 2004 LMS update. **Table 5.19** provides the top three hazard vulnerabilities that were identified by each participating jurisdiction within Volusia County. A complete list of hazards for each jurisdiction as well as the score for each hazard and vulnerability factor can be found in **Appendix F**. Further, the Vulnerability Assessment (Section 6) provides hazards exposure and loss estimates to further analyze vulnerability and risk at the jurisdictional level.

TABLE 5.19: Snapshot of Hazard Risk Ranking

	Hazard Risk Ranking		
	First	**Second**	**Third**
Daytona Beach			
	High Winds	Hail	Storm Surge,Tsunami
Daytona Beach Shores			
	All Natural Hazards	Flooding	Storm Surge, Tsunami
DeBary			
	Flooding	High Winds	Lightning
Deland			
	High Wind	Hail	Severe Winter Storm
Deltona			
	Lightning	Severe Winter Storm	Drought
Edgewater			
	Thunderstorm	Severe Winter Storm	Drought

TABLE 5.19: Snapshot of Hazard Risk Ranking

	Hazard Risk Ranking		
	First	Second	Third
Holly Hill			
	High Winds	All Natural Hazards	Lightning
Lake Helen			
	High Winds	Flooding	Drought
New Smyrna Beach			
	High Winds	Flood	Storm Surge
Oak Hill			
	Flooding	Flooding	Wildfire
Orange City			
	Lightning	High Winds	Drought
Ormond Beach			
	High Winds	Flooding	Storm Surge
Pierson			
	Wildfire	Wind	Drought
Ponce Inlet			
	High Winds	Storm Surge/Tsunami	Flooding
Port Orange			
	High Winds	Lightning	Severe Winter Storm
South Daytona			
	Flooding	Storm Surge, Tsunami	All Natural Hazards
Unincorporated Volusia County			
	High Winds	Flooding	Wildfire

5.15.2 Final Determinations

The conclusions drawn from the hazard profiling and Vulnerability Assessment process for Volusia County resulted in the classification of risk for each identified hazard according to three categories: High, Moderate and Low Risk (**Table 5.20**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Volusia County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in the *Vulnerability Assessment* section. It should be noted that although some hazards are classified below as posing low risk, their occurrence of

varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

TABLE 5.20: Conclusions on Hazard Risk for Volusia County	
HIGH RISK	Flooding Hurricane and Tropical Storm (High Winds) Lightning Tornado Wildfire Drought
MODERATE RISK	Erosion Hail Storm Surge Thunderstorm
LOW RISK	Severe Winter Storm Sinkhole Tsunami

SECTION 6 – VULNERABILITY ASSESSMENT

44 CFR Requirement

44 CFR Part 201.6(c)(2)(ii): The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. The description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of: (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; (B) An estimate of the potential losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

6.1 OVERVIEW

This section builds upon the information provided in Section 5: *Hazard Profiles* by identifying and characterizing an inventory of assets in Volusia County, and then assessing the potential impact and amount of damages that can be expected to be caused by each identified hazard event. The primary objective of the vulnerability assessment is to quantify exposure and the potential loss estimates for each hazard. In so doing, Volusia County and its participating jurisdictions and partners may better understand their unique risks to identified hazards and be better prepared to evaluate and prioritize specific hazard mitigation actions.

This section begins with an explanation of the methodology applied to complete the hazard vulnerability assessment, followed by a summary description of the asset inventory as compiled for Volusia County. The remainder of this section focuses on the results of the vulnerability assessment, and is organized by hazard as listed below.

- **Atmospheric**
  - Hail
  - Hurricane and Tropical Storm
  - Lightning
  - Severe Winter Storm
  - Thunderstorm
  - Tornado
- **Hydrologic**
  - Coastal Erosion
  - Drought
  - Flood
  - Storm Surge
- **Geologic**
  - Sinkhole

- Tsunami

- **Other**
  - Wildfire

6.2 ASSESSMENT METHODOLOGY

This vulnerability assessment was conducted utilizing two distinct methodologies: (1) a Geographic Information System (GIS)-based analysis; and (2) applying a statistical risk assessment approach. Each approach provides estimates for the potential impact of hazards by using a common, systematic framework for evaluation, including historical occurrence information. The results of the vulnerability assessment are provided for each hazard listed above.

A GIS-based analysis was conducted for seven hazards:

- hurricane and tropical storm;
- riverine flood;
- coastal flood (storm surge);
- coastal erosion;
- tsunami;
- sinkhole; and
- wildfire.

A statistical risk assessment approach was used to analyze six hazards:

- hail;
- thunderstorm;
- lightning;
- tornado;
- severe winter storm; and
- drought.

6.2 GIS-Based Analysis

For the GIS-based assessment, digital data was collected from local, state and national sources. ESRI® ArcGIS™ 9.2 was used to assess risk utilizing digital data including local tax records for individual parcels and georeferenced point locations for critical facilities. Using these data layers, risk was assessed by estimating the assessed building value associated with parcels determined to be located in identified hazard areas. HAZUS-MH was also used to model hurricane force winds and estimate potential losses. To estimate population in hazard areas, Census 2000 population data by census block was obtained from HAZUS-MH and census blocks intersecting with hazard areas were used to determine exposed population counts.

Census 2000 was used for analyses as it is available by census block. There are other population estimates that are provided by reputable sources; however, they are only available at the jurisdiction

level (e.g., county or city). Jurisdictional level population estimates cannot be used to accurately conduct GIS analyses to determine how much of the population is exposed to various hazards based on geographic location (i.e., census block or tract level). The next decennial census population data will be available in April 2011, at which time the county will consider reassessing the populations that are vulnerable to various hazards.

The objective of the GIS-based analysis was to determine the estimated vulnerability of people, buildings and critical facilities to the identified hazards for Volusia County using best available geospatial data. In so doing, local databases made available through Volusia County such as local tax assessor records, parcel boundaries and critical facilities data, were used in combination with digital hazard data. The results of the analysis provided an estimated number of people, as well as the numbers and values of buildings and critical facilities determined to be potentially at risk to those hazards with delineable geographic hazard boundaries. These hazards included flood, storm surge, dam failure, wildfire and technological hazards. A more specific description of the GIS-based analysis for each particular hazard is provided under the vulnerability assessment section of each respective hazard.

MEMPHIS

Mapping for Emergency Management, Parallel Hazard Information System (MEMPHIS) was used in this assessment for Volusia County. MEMPHIS was accessed to obtain hazards shapefile data for coastal erosion, tsunami, sinkhole and wildfire to determine property and critical facility exposure and loss estimates[1]. For more information about MEMPHIS, please visit http://lmsmaps.kinanco.com/.

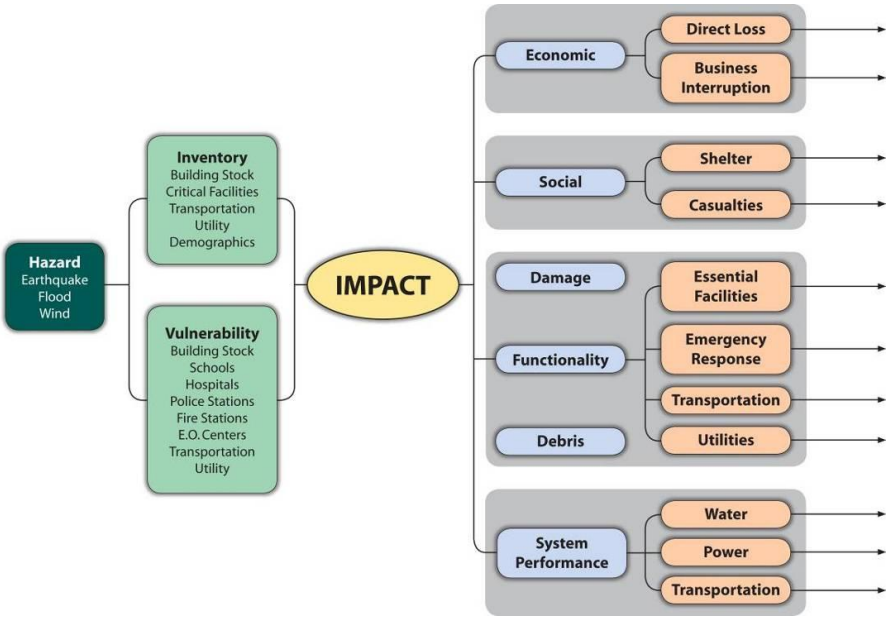
HAZUS-MH

HAZUS-MH is FEMA's standardized loss estimation software program built upon an integrated GIS platform (**Figure 6.1**) to conduct analysis at a regional level (i.e., not on a structure-by-structure basis). The HAZUS-MH risk assessment methodology is parametric, in that distinct hazard and inventory parameters (e.g., wind speed and building types) were modeled using the HAZUS-MH software to determine the impact (i.e., damages and losses) on the built environment. This risk assessment applied HAZUS-MH to produce countywide profiles and estimate losses for three hazards at the jurisdictional level. At the time this analysis was completed, HAZUS-MH MR-3 (September 2007) was used to estimate potential losses from hurricane winds, coastal flood, and earthquake using HAZUS-MH default building stock inventory data. The results of the HAZUS-MH model analysis include annualized loss estimates for each participating jurisdiction in Volusia County so that potential loss values may be compared to one another throughout Volusia County. In generating loss estimates through HAZUS-MH, some data normalization was necessary to account for recognized differences between actual assessed building values as provided by Volusia County and estimated replacement building value data as provided within HAZUS-MH. In order to account for the difference between modeled and actual values, the ratio of

[1] MEMPHIS was created by Kinetic Analysis Corporation under contract with the Florida Department of Community Affairs in support of the Florida Local Mitigation Strategy Project. For more information about MEMPHIS, please visit http://lmsmaps.kinanco.com/.

estimated losses produced by HAZUS-MH as compared to total HAZUS-MH building inventory was used to estimate percent damage. The percent damage ratio was then applied to the local assessed values of each jurisdiction to estimate potential losses and loss ratios in Volusia County for this analysis.

Figure 6.1: Conceptual Model of HAZUS-MH Methodology



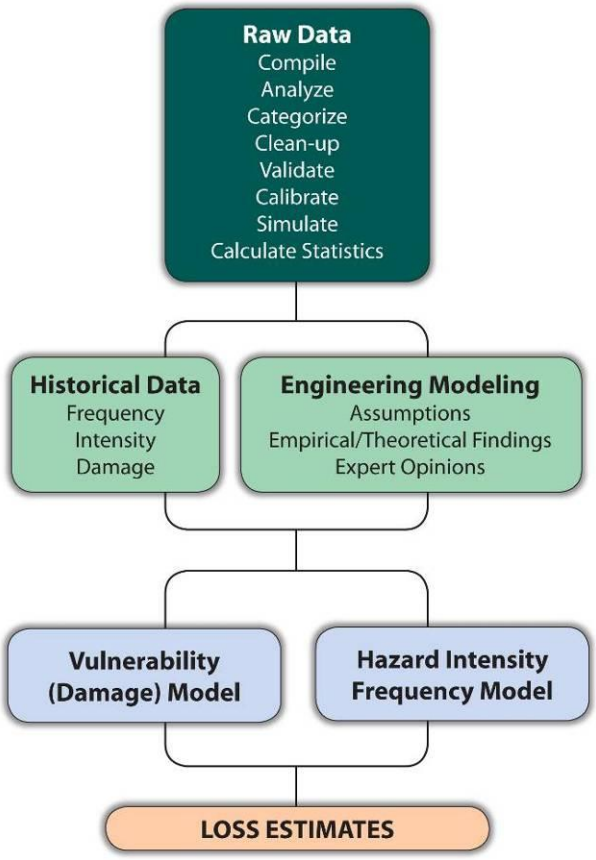
6.3 Statistical Risk Assessment Methodology

The statistical risk assessment approach was applied to analyze hazards of concern that were outside the scope of HAZUS-MH and the GIS-based risk assessment. This methodology uses a statistical approach and mathematical modeling of risk to predict a hazard's frequency of occurrence and estimated impacts based on recorded or historic damage information. This methodology was used to assess risk to the extreme temperatures, hail, tornado, winter storm and drought hazards. Available historical data for each hazard was used and statistical evaluations were performed. The general steps used in the statistical risk assessment methodology are summarized below:

1. Compile data from local, state and national sources, as well as literature;
2. Clean up data, including removal of duplicate records and update losses to account for inflation;
3. Identify patterns in frequency, intensity, vulnerability and loss
4. Statistically and probabilistically extrapolate the patterns; and
5. Produce meaningful results, including the development of annualized loss estimates.

Figure 6.2 illustrates a conceptual model of the statistical risk assessment methodology as applied to the Volusia County area.

Figure 6.2: Conceptual Model of the Statistical Risk Assessment Methodology



The vulnerability assessment findings are presented in terms of potential annualized losses, wherever possible. In general, presenting results in the annualized form is useful in three ways:

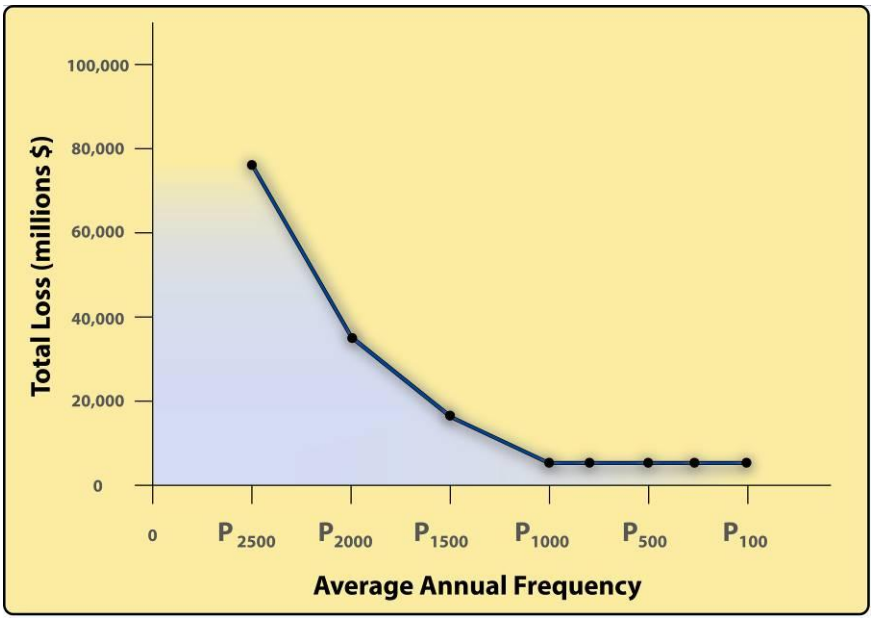
1. This approach accounts for the contribution of potential losses from all future disasters;
2. Annualized results for different hazards are readily comparable, thus easier to rank; and
3. The use of annualized losses is the most objective approach for evaluating mitigation alternatives.

Annualized losses for the hazards where the parametric approach was utilized were computed in a three-step process:

1. Compute/estimate losses for a number of scenario events with different return periods [e.g., 10-year, 100-year, 200-year, 500-year, etc.];
2. Approximate the Probability versus Loss Curve through curve fitting; and
3. Calculate the area under the fitted curve to obtain annualized losses.

This approach is illustrated graphically in **Figure 6.3**. For other hazards where the statistical approach was used, the computations are based primarily on the observed historical losses.

Figure 6.3: Graphical Representation of the Annualized Loss Methodology



The economic loss results are presented here using two interrelated risk indicators: Annualized Loss and Annualized Loss Ratio. The Annualized Loss is the estimated long-term weighted average value of losses to property in any single year in a specified geographic area (i.e., municipal jurisdiction). The Annualized Loss Ratio expresses estimated annualized loss normalized by assessed building value.

The estimated Annualized Loss (AL) addresses the key idea of risk: the probability of the loss occurring in the study area (largely a function of building construction type and quality). By annualizing estimated losses, the AL factors in historic patterns of frequent smaller events with infrequent but larger events to provide a balanced presentation of the risk. The Annualized Loss Ratio (ALR) represents the AL as a fraction of the assessed value of the local inventory. This ratio is calculated using the following formula:

ALR = Annualized Losses / Total Exposure

The ALR gauges the relationship between average annualized loss and assessed values. This ratio can be used as a measure of vulnerability in the areas and since it is normalized by assessed value, it can be directly compared across different geographic units such as metropolitan areas, counties or municipalities.

Loss estimates provided in this vulnerability assessment are based on best available data, and the methodologies applied result in an approximation of risk. These estimates should be used to understand

relative risk from hazards and potential losses. Uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from approximations and simplifications that are necessary for a comprehensive analysis (e.g., incomplete inventories, demographics or economic parameters).

Findings for each hazard are detailed in the hazard-by-hazard vulnerability assessment that follows.

6.3 ASSET INVENTORY

An inventory of Volusia County's georeferenced assets was created in order to identify and characterize those properties potentially at risk to the identified hazards. By understanding the type and number of assets that exist and where they are located in relation to known hazard areas, the relative risk and vulnerability for such assets can be assessed. Three categories of assets were created and assessed through GIS analysis, including:

1. Improved Property: Includes all improved properties in unincorporated areas according to local parcel data provided by Volusia County. The information has been expressed in terms of the number of parcels, number of buildings, and total assessed value of improvements (buildings and accessory structures) that may be exposed to the identified hazards. Most improved parcels in Volusia County are residential.

2. Critical Facilities: Includes Volusia County's emergency operations centers, fire stations, police stations, schools and hospitals.

3. Critical Infrastructure: Includes primary roads and active railroads.

Improved Property

Table 6.1 lists the number of parcels with improved property (i.e., structures) and the total assessed value of improvements[2] for unincorporated Volusia County and the incorporated areas (study area of vulnerability assessment). The study area is depicted in **Figure 6.4**. The population by census block has been illustrated in lieu of the parcels, which would not be meaningful at the countywide scale map. The population by census block is illustrated to show where populations are concentrated in the study region. According to the U.S. Census American Community Survey (2005-2006), there are 2.39 people per household. There were 2.32 people per household according to the U.S. Census 2000 population county.

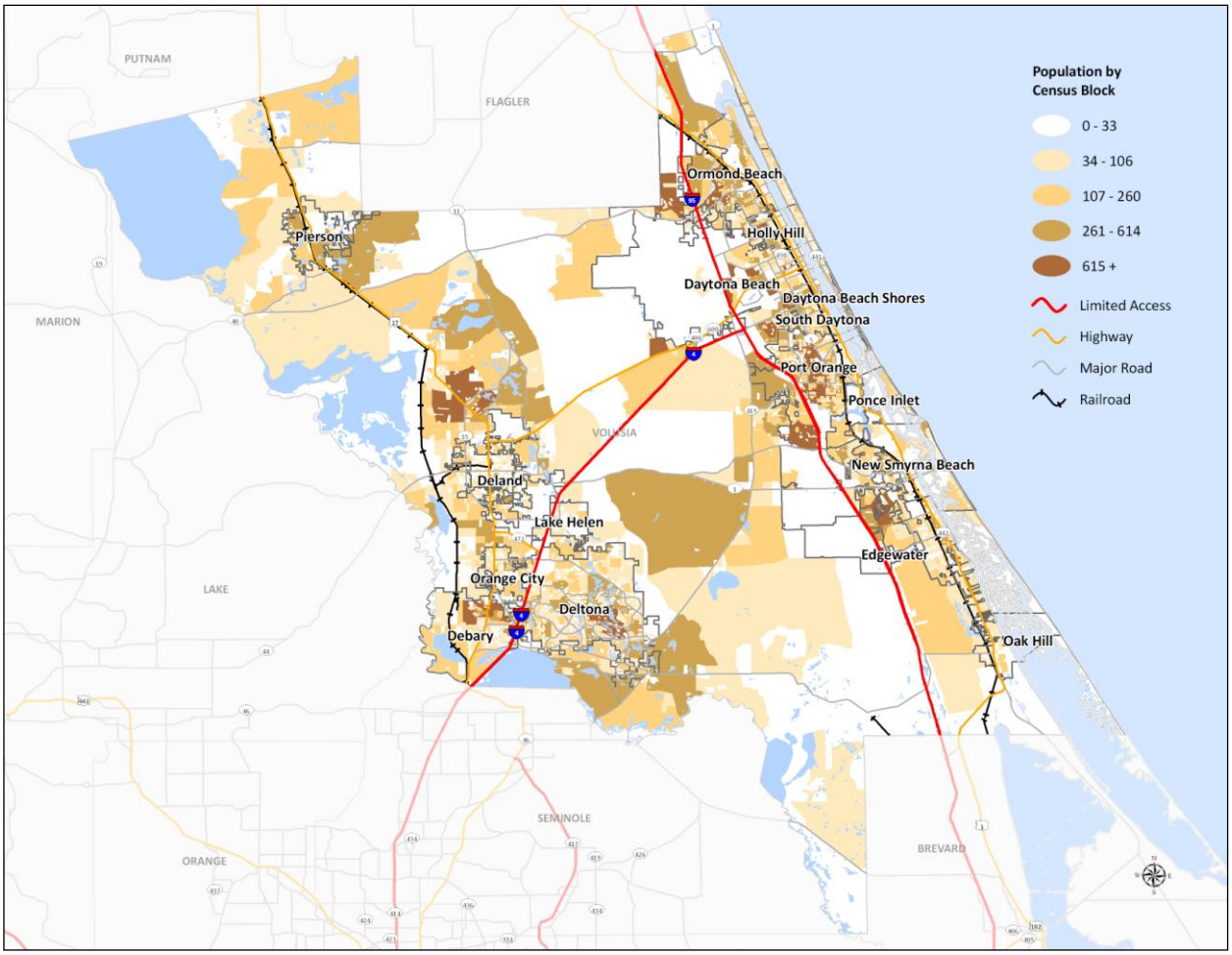
[2] Total assessed values for improvements is based on 2009 Volusia County tax assessor records.

TABLE 6.1: Volusia County Improved Property

JURISDICTION	TOTAL ESTIMATED NUMBER OF IMPROVED PARCELS	TOTAL IMPROVED VALUE OF PARCELS
Daytona Beach	18,756	3,113,758,732
Daytona Beach Shores	536	108,379,184
De Bary	8,360	855,016,726
De Land	8,579	1,379,957,569
Deltona	33,225	2,642,766,558
Edgewater	9,355	806,296,779
Holly Hill	4,538	432,668,504
Lake Helen	1,099	92,912,745
New Smyrna Beach	11,073	1,436,053,516
Oak Hill	888	67,557,864
Orange City	2,665	446,136,500
Ormond Beach	15,531	2,269,411,643
Pierson	590	49,333,302
Ponce Inlet	1,102	169,838,467
Port Orange	20,423	2,469,426,353
South Daytona	4,554	482,748,537
Unincorporated	45,780	4,680,525,914
TOTAL	**187,054**	**$21,502,788,893**

Source: Volusia County GIS Department

FIGURE 6.4: Volusia County LMS Study Region with Population by Census Block



Critical Facilities

Table 6.2 lists Volusia County's critical facilities, as identified by each jurisdiction in Volusia County.

A full listing of the critical facilities and their exposure to each hazard included in this vulnerability assessment is located in **Appendix E**. This information is not available for public distribution as it contains sensitive information. The critical facilities data is on file with Volusia County Emergency Management.

TABLE 6.2: Volusia County Critical Facilities

JURISDICTION	Number	Value
Daytona Beach	78	978,564,666
Daytona Beach Shores	6	12,991,984
De Bary	7	10,387,976
De Land	83	268,969,570
Deltona	58	208,422,296
Edgewater	20	13,771,627
Holly Hill	16	61,206,040
Lake Helen	6	5,978,411
New Smyrna Beach	24	76,610,053
Oak Hill	5	2,065,859
Orange City	16	144,987,713
Ormond Beach	10	24,176,310
Pierson	5	5,856,275
Ponce Inlet	9	6,901,961
Port Orange	52	146,089,101
South Daytona	37	20,726,485
Unincorporated	26	40,072,133
TOTAL	**458**	**$2,027,778,460**

Source: Volusia County GIS Department

Infrastructure and Lifelines

Table 6.3 lists Volusia County's primary roads and railroads.

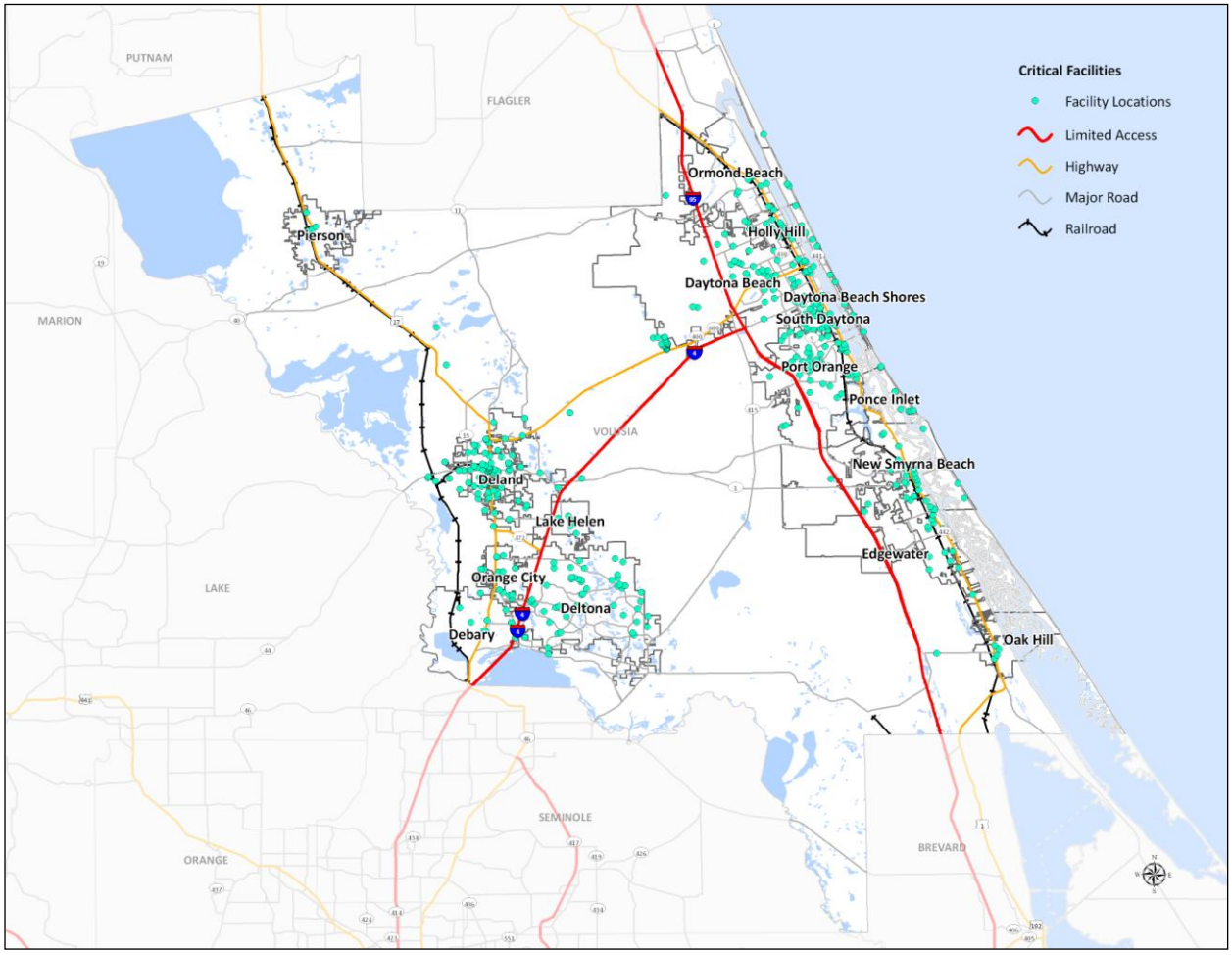
TABLE 6.3: Infrastructure

JURISDICTION	Limited Access (mi)*	Highway (mi)*	Railroad (mi)**
Daytona Beach	5.02	8.66	3.56
Daytona Beach Shores	-	-	-
De Bary	0.22	5.35	6.87
De Land	-	7.64	1.18
Deltona	6.28	0.02	-
Edgewater	2.20	7.32	5.41
Holly Hill	-	2.73	2.56
Lake Helen	1.10	-	-
New Smyrna Beach	-	6.30	6.69
Oak Hill	-	2.88	1.93
Orange City	-	4.27	-
Ormond Beach	3.41	5.02	7.89
Pierson	-	3.21	4.03
Ponce Inlet	-	0.27	-
Port Orange	10.61	3.40	4.94
South Daytona	-	2.51	2.36
Unincorporated	62.53	50.84	51.05
TOTAL	**91.36**	**110.42**	**98.48**

Source: Volusia County GIS Department

Figure 6.5 illustrates the general locations of the critical facilities and infrastructure according to currently georeferenced point and line locations.

FIGURE 6.5: Volusia County Critical Facilities



6.4 HAIL

As it cannot be predicted where hail may fall, all existing and future buildings, facilities and populations in Volusia County are considered to be equally exposed to this hazard and could potentially be impacted. It is important to note that only reported hail events have been factored into this vulnerability assessment[3].

To estimate losses due to hail, the National Climatic Data Center (NCDC) historical hail event loss data for occurrences in the county were used to develop a hail stochastic model. In this model:

- Losses were scaled for inflation;
- Average historic hail damageability was used to generate losses for historical hail events where losses were not reported;
- Expected annualized losses were calculated through a non-linear regression of historical data; and
- Probabilistic losses were scaled to account for would-be losses where no exposure/instrument was present at the time of the event.

Table 6.4 shows total exposure and potential annualized property losses and annualized percent loss ratios resulting from hail for Volusia County. While all of Volusia County's inventoried assets are equally exposed to hail, any anticipated future damages or losses are expected to be minimal.

[3] It is possible that additional hail events may have occurred since 1950 that were not reported to NCDC and are not accounted for in this analysis.

TABLE 6.4: Total Exposure and Potential Annualized Losses from Hail

JURISDICTION	EXPOSURE (TOTAL IMPROVED VALUE OF PARCELS)	NUMBER OF IMPROVED PARCELS AT RISK	ANNUALIZED LOSSES	ANNUALIZED PERCENT LOSS RATIO
Daytona Beach	3,113,758,732	18,756	2,489	0.000%
Daytona Beach Shores	108,379,184	536	0	0.000%
De Bary	855,016,726	8,360	0	0.000%
De Land	1,379,957,569	8,579	0	0.000%
Deltona	2,642,766,558	33,225	0	0.000%
Edgewater	806,296,779	9,355	1,295	0.000%
Holly Hill	432,668,504	4,538	0	0.000%
Lake Helen	92,912,745	1,099	0	0.000%
New Smyrna Beach	1,436,053,516	11,073	0	0.000%
Oak Hill	67,557,864	888	0	0.000%
Orange City	446,136,500	2,665	0	0.000%
Ormond Beach	2,269,411,643	15,531	0	0.000%
Pierson	49,333,302	590	0	0.000%
Ponce Inlet	169,838,467	1,102	0	0.000%
Port Orange	2,469,426,353	20,423	67	0.000%
South Daytona	482,748,537	4,554	0	0.000%
Unincorporated	4,680,525,914	45,780	0	0.000%
TOTAL	**$21,502,788,893**	**187,054**	**$3,851**	0.000%

Source: National Climatic Data Center and Volusia County GIS Department

6.5 HURRICANE AND TROPICAL STORM

Since hurricanes and tropical storms often impact large areas and cross jurisdictional boundaries, all existing and future buildings, facilities and populations are considered to be exposed to this hazard and could potentially be impacted. Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, coastal erosion, high winds and precipitation, thus it is difficult to estimate total potential losses from these cumulative effects. The current HAZUS-MH hurricane model only analyzes hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes. Therefore only hurricane winds are analyzed in this section. Vulnerability to storm surge resulting from hurricanes is addressed individually in a separate section.

A probabilistic scenario was created using HAZUS-MH to assess the vulnerability of Volusia County to hurricane winds. Default HAZUS-MH wind speed data and damage functions were used to determine the annual expected loss at the census tract level. **Table 6.5** shows estimated exposure, potential annualized losses for residential and commercial buildings and the annualized percent loss ratio for each jurisdiction in Volusia County.

TABLE 6.5: Total Exposure and Potential Annualized Losses from Hurricane Wind and Tropical Storm

JURISDICTION	Exposure (Total Improved Value Of Parcels)	Residential Building Losses	Commercial Building Losses	Total Annualized Expected Property Losses	Annualized Percent Loss Ratio
Daytona Beach	3,113,758,732	5,220,580	954,257	10,229,498	0.33%
Daytona Beach Shores	108,379,184	1,416,333	79,257	2,235,170	2.06%
De Bary	855,016,726	669,760	58,154	1,067,971	0.12%
DeLand	1,379,957,569	1,469,217	350,353	3,127,843	0.23%
Deltona	2,642,766,558	3,652,951	273,600	5,809,187	0.22%
Edgewater	806,296,779	1,299,162	141,814	2,226,736	0.28%
Holly Hill	432,668,504	829,030	180,478	1,802,272	0.42%
Lake Helen	92,912,745	163,939	16,114	285,682	0.31%
New Smyrna Beach	1,436,053,516	3,901,394	524,844	7,210,537	0.50%
Oak Hill	67,557,864	149,372	17,773	275,639	0.41%
Orange City	446,136,500	628,160	147,780	1,222,528	0.27%
Ormond Beach	2,269,411,643	3,207,270	540,132	6,031,426	0.27%
Pierson	49,333,302	127,939	14,908	225,221	0.46%
Ponce Inlet	169,838,467	636,115	46,389	1,017,749	0.60%
Port Orange	2,469,426,353	3,653,346	414,496	6,286,779	0.25%
South Daytona	482,748,537	1,037,500	211,961	1,993,339	0.41%
Unincorporated	4,680,525,914	5,027,147	470,767	8,416,476	0.18%
Total	**$21,502,788,893**	**$33,089,213**	**$4,443,077**	**$59,464,050**	-

Source: HAZUS-MH

6.6 LIGHTNING

As it cannot be predicted where lightning may strike, all existing and future buildings, facilities and populations in Volusia County are considered to be exposed to this hazard and could potentially be impacted. It is important to note that only reported lightning strikes have been factored into this vulnerability assessment[4].

To estimate losses due to lightning, NCDC historical lightning loss data for occurrences in the County were used to develop a lightning stochastic model. In this model:

- Losses were scaled for inflation;
- Average historic lightning damageability was used to generate losses for historical lightning events where losses were not reported;
- Expected annualized losses were calculated through a non-linear regression of historical data; and
- Probabilistic losses were scaled to account for would-be losses where no exposure/instrument was present at the time of the event.

Table 6.6 shows total exposure and potential annualized property losses and percent loss ratios resulting from the lightning hazard for Volusia County. Based on local knowledge, emergency managers in Volusia County are aware that approximately 4,000 lightning strikes occur each week during summer afternoon thunderstorms. Although, the annualized losses from lightning in Volusia County are low, the probability and frequency are high. Therefore, it is anticipated that lightning will continue to threaten life and pose property damage throughout the county.

4 It is possible that additional lightning strikes may have occurred since 1950 that were not reported to NCDC and are not accounted for in this analysis.

TABLE 6.6: Total Exposure and Potential Annualized Losses from Lightning

JURISDICTION	EXPOSURE (TOTAL IMPROVED VALUE OF PARCELS)	NUMBER OF IMPROVED PARCELS AT RISK	ANNUALIZED LOSSES	ANNUALIZED PERCENT LOSS RATIO
Daytona Beach	3,113,758,732	18,756	410	0.000%
Daytona Beach Shores	108,379,184	536	0	0.000%
De Bary	855,016,726	8,360	4,834	0.000%
De Land	1,379,957,569	8,579	0	0.000%
Deltona	2,642,766,558	33,225	5,417	0.000%
Edgewater	806,296,779	9,355	307	0.000%
Holly Hill	432,668,504	4,538	0	0.000%
Lake Helen	92,912,745	1,099	0	0.000%
New Smyrna Beach	1,436,053,516	11,073	1,735	0.000%
Oak Hill	67,557,864	888	0	0.000%
Orange City	446,136,500	2,665	0	0.000%
Ormond Beach	2,269,411,643	15,531	0	0.000%
Pierson	49,333,302	590	0	0.000%
Ponce Inlet	169,838,467	1,102	0	0.000%
Port Orange	2,469,426,353	20,423	4,975	0.000%
South Daytona	482,748,537	4,554	0	0.000%
Unincorporated	4,680,525,914	45,780	0	0.000%
TOTAL	**$21,502,788,893**	**187,054**	**$17,678**	0.000%

Source: National Climatic Data Center and Volusia County GIS Department

6.7 SEVERE WINTER STORM

Severe winter storms, typically consisting of snow and ice, infrequently occur in Volusia County.

Since it cannot be predicted where severe winter storms (as defined in the *Hazard Profiles* section) may occur, all existing and future buildings, facilities and populations are considered to be exposed to this hazard and could potentially be impacted. It is important to note that only reported severe winter storm occurrences have been factored into this vulnerability assessment[5].

To estimate losses due to extreme wind, NCDC historical thunderstorm wind loss data for occurrences in the County were used to develop an extreme wind stochastic model. In this model:

- Losses were obtained and scaled for inflation;
- Average historic extreme wind damageability was used to generate losses for historical thunderstorm wind events where losses were not reported;
- Expected annualized losses were calculated through a non-linear regression of historical data; and
- Probabilistic losses were scaled to account for would-be losses where no exposure/instrument was present at the time of the event.

Table 6.7 shows total exposure and potential annualized property losses and percent loss ratios resulting from severe winter storm for Volusia County. While all of Volusia County's inventoried assets are equally exposed to severe winter storm, any anticipated future damages or losses are expected to be minimal.

[5] It is possible that additional extreme wind events may have occurred since 1950 that were not reported to NCDC and are not accounted for in this analysis.

TABLE 6.7: Total Exposure and Potential Annualized Losses from Severe Winter Storm

JURISDICTION	EXPOSURE (TOTAL IMPROVED VALUE OF PARCELS)	NUMBER OF IMPROVED PARCELS AT RISK	ANNUALIZED LOSSES	ANNUALIZED PERCENT LOSS RATIO
Daytona Beach	3,113,758,732	18,756	0	0.000%
Daytona Beach Shores	108,379,184	536	0	0.000%
De Bary	855,016,726	8,360	0	0.000%
De Land	1,379,957,569	8,579	0	0.000%
Deltona	2,642,766,558	33,225	0	0.000%
Edgewater	806,296,779	9,355	0	0.000%
Holly Hill	432,668,504	4,538	0	0.000%
Lake Helen	92,912,745	1,099	0	0.000%
New Smyrna Beach	1,436,053,516	11,073	0	0.000%
Oak Hill	67,557,864	888	0	0.000%
Orange City	446,136,500	2,665	0	0.000%
Ormond Beach	2,269,411,643	15,531	0	0.000%
Pierson	49,333,302	590	0	0.000%
Ponce Inlet	169,838,467	1,102	0	0.000%
Port Orange	2,469,426,353	20,423	0	0.000%
South Daytona	482,748,537	4,554	0	0.000%
Unincorporated	4,680,525,914	45,780	0	0.000%
TOTAL	**$21,502,788,893**	**187,054**	**$0**	0.000%

Source: National Climatic Data Center and Volusia County GIS Department

6.8 THUNDERSTORM

Thunderstorms frequently occur in Volusia County. Since it cannot be predicted where thunderstorms may occur, all existing and future buildings, facilities and populations are considered to be exposed to this hazard and could potentially be impacted. It is important to note that only reported thunderstorm occurrences have been factored into this vulnerability assessment[6].

To estimate losses due to extreme wind, NCDC historical thunderstorm wind loss data for occurrences in the county were used to develop an extreme wind stochastic model. In this model:

- Losses were obtained and scaled for inflation;
- Average historic extreme wind damageability was used to generate losses for historical thunderstorm wind events where losses were not reported;
- Expected annualized losses were calculated through a non-linear regression of historical data; and
- Probabilistic losses were scaled to account for would-be losses where no exposure/instrument was present at the time of the event.

Table 6.8 shows total exposure and potential annualized property losses and percent loss ratios resulting from thunderstorms for Volusia County. Although, the annualized losses from thunderstorms in Volusia County are low, the probability and frequency are high. Therefore, it is anticipated that thunderstorms will continue to threaten life and pose property damage throughout the county.

[6] It is possible that additional extreme wind events may have occurred since 1950 that were not reported to NCDC and are not accounted for in this analysis.

TABLE 6.8: Total Exposure and Potential Annualized Losses from Thunderstorm

JURISDICTION	EXPOSURE (TOTAL IMPROVED VALUE OF PARCELS)	NUMBER OF IMPROVED PARCELS AT RISK	ANNUALIZED LOSSES	ANNUALIZED PERCENT LOSS RATIO
Daytona Beach	3,113,758,732	18,756	2,638	0.000%
Daytona Beach Shores	108,379,184	536	0	0.000%
De Bary	855,016,726	8,360	205	0.000%
De Land	1,379,957,569	8,579	8,111	0.001%
Deltona	2,642,766,558	33,225	3,529	0.000%
Edgewater	806,296,779	9,355	12,783	0.002%
Holly Hill	432,668,504	4,538	429	0.000%
Lake Helen	92,912,745	1,099	0	0.000%
New Smyrna Beach	1,436,053,516	11,073	768	0.000%
Oak Hill	67,557,864	888	0	0.000%
Orange City	446,136,500	2,665	652	0.000%
Ormond Beach	2,269,411,643	15,531	1,377	0.000%
Pierson	49,333,302	590	326	0.001%
Ponce Inlet	169,838,467	1,102	0	0.000%
Port Orange	2,469,426,353	20,423	1,015	0.000%
South Daytona	482,748,537	4,554	834	0.000%
Unincorporated	4,680,525,914	45,780	20,583	0.000%
TOTAL	**$21,502,788,893**	**187,054**	**$53,250**	0.000%

Source: National Climatic Data Center and Volusia County GIS Department

6.9 TORNADO

Historical evidence shows that Volusia County is vulnerable to tornadic activity. This hazard can result from severe thunderstorm activity or may occur during a major tropical storm or hurricane. Since it cannot be predicted where a tornado may touch down, all existing and future buildings, facilities and populations are considered to be exposed to this hazard and could potentially be impacted. It is important to note that only reported tornadoes have been factored into this vulnerability assessment[7].

To estimate losses due to tornadoes, NCDC historical tornado loss data for occurrences in the County were used to develop a tornado stochastic model. In this model:

- Losses were scaled for inflation;
- Average historic tornado damageability was used to generate losses for historical tornadic events where losses were not reported;
- Expected annualized losses were calculated through a non-linear regression of historical data; and
- Probabilistic losses were scaled to account for would-be losses where no exposure/instrument was present at the time of the event.

Table 6.9 shows total exposure and potential annualized property losses and percent loss ratios resulting from the tornado hazard for Volusia County. Although, the annualized losses from tornadoes vary in Volusia County, the probability and frequency are high for tornadic activity is high throughout the County. Therefore, it is anticipated that tornadoes will continue to threaten life and pose property damage throughout the County.

7 It is possible that additional tornado events may have occurred since 1950 that were not reported to NCDC and are not accounted for in this analysis.

TABLE 6.9: Total Exposure and Potential Annualized Losses from Tornado

JURISDICTION	EXPOSURE (TOTAL IMPROVED VALUE OF PARCELS)	NUMBER OF IMPROVED PARCELS AT RISK	ANNUALIZED LOSSES	ANNUALIZED PERCENT LOSS RATIO
Daytona Beach	3,113,758,732	18,756	1,251,126	0.040%
Daytona Beach Shores	108,379,184	536	119	0.000%
De Bary	855,016,726	8,360	14,631	0.002%
De Land	1,379,957,569	8,579	135,515	0.010%
Deltona	2,642,766,558	33,225	172	0.000%
Edgewater	806,296,779	9,355	57,187	0.007%
Holly Hill	432,668,504	4,538	0	0.000%
Lake Helen	92,912,745	1,099	0	0.000%
New Smyrna Beach	1,436,053,516	11,073	439,421	0.031%
Oak Hill	67,557,864	888	12,280	0.018%
Orange City	446,136,500	2,665	0	0.000%
Ormond Beach	2,269,411,643	15,531	123,890	0.005%
Pierson	49,333,302	590	1,398	0.003%
Ponce Inlet	169,838,467	1,102	172	0.000%
Port Orange	2,469,426,353	20,423	22,834	0.001%
South Daytona	482,748,537	4,554	305	0.000%
Unincorporated	4,680,525,914	45,780	991,598	0.021%
TOTAL	**$21,502,788,893**	**187,054**	**$3,050,648**	0.014%

Source: National Climatic Data Center and Volusia County GIS Department

HYDROLOGIC HAZARDS

6.10 COASTAL EROSION

All of the coastal areas in Volusia County are prone to coastal erosion, and nearly half of the 47 miles of shoreline are considered critically eroded. Coastal erosion is typically measured as the annual shoreline change for a given beach cross-section of profile over a long period of time. The NCDC has reported five events involving coastal erosion in Volusia County since 1998. However, these events also include losses from hurricane impacts such as storm surges. The NCDC reported events include losses for jurisdictions outside of Volusia County. As such, it is not possible to determine annualized losses from coastal erosion for the coastal jurisdictions in Volusia County.

Coastal erosion exposure was assessed by quantifying the number of people and property that are located within 0.5 miles inland from the shoreline in areas where critical erosion has been documented by the Florida Department of Environmental Protection.

Table 6.10 provides the number of people and number and value of improved parcels (properties with structures) that are susceptible to coastal erosion. Coastal erosion is very likely to continue impacting the coastal areas of Volusia County. There are currently over 5,000 improved properties that are at risk to coastal erosion in Daytona Beach, Daytona Beach Shores, New Smyrna Beach, Ormond Beach and areas in unincorporated Volusia County.

Jurisdictions with critically eroded beaches in Volusia County actively participate in the federal beach nourishment program.

TABLE 6.10: Total Exposure from Coastal Erosion

JURISDICTION	AT-RISK AREAS (within 0.5 miles of critical erosion)			
	NUMBER OF PEOPLE AT RISK	NUMBER OF IMPROVED PARCELS AT RISK	PERCENTAGE OF IMPROVED PARCELS AT RISK	VALUE OF PARCELS AT RISK
Daytona Beach	4,502	1,428	7.61%	299,158,596
Daytona Beach Shores	3,303	379	70.71%	84,001,016
New Smyrna Beach	2,661	1,356	12.25%	157,731,953
Ormond Beach	872	468	3.01%	81,132,737
Ponce Inlet	25	12	1.09%	3,193,502
Unincorporated	3,751	1,518	3.32%	188,036,944
TOTAL	**15,114**	**5,161**	**2.76%**	**$813,254,748**

Source: Florida Department of Environmental Protection and Volusia County GIS Department

6.11 DROUGHT

Volusia County is uniformly vulnerable to drought. Drought is typically associated with crop damage, and not necessarily the built environment (i.e., improved property). However, research (as noted in the *Hazards Profiles* section) has shown that drought conditions have caused wildfires in 1985 and 1988.

Losses were estimated based on occurrences that were reported to the NCDC[8].

To estimate losses due to extreme drought, NCDC historical drought loss data for occurrences in the County were used to develop an extreme wind stochastic model. In this model:

- Losses were obtained and scaled for inflation;
- Average historic extreme wind damageability was used to generate losses for historical thunderstorm wind events where losses were not reported;
- Expected annualized losses were calculated through a non-linear regression of historical data; and
- Probabilistic losses were scaled to account for would-be losses where no exposure/instrument was present at the time of the event.

Table 6.11 shows total exposure and potential annualized property losses and percent loss ratios resulting from drought for Volusia County. Although, the annualized losses are $0, it should be noted that drought conditions can exacerbate wildfire potential. Wildfire losses are not quantified in this assessment, as drought related (i.e., wildfire) losses are reported separately. Wildfire exposure and losses are provided in this vulnerability assessment as a separate hazard. The probability of drought events in Volusia County is high.

[8] It is possible that additional extreme wind events may have occurred since 1950 that were not reported to NCDC and are not accounted for in this analysis.

TABLE 6.11: Total Exposure and Potential Annualized Losses from Drought

JURISDICTION	EXPOSURE (TOTAL IMPROVED VALUE OF PARCELS)	NUMBER OF IMPROVED PARCELS AT RISK	ANNUALIZED LOSSES	ANNUALIZED PERCENT LOSS RATIO
Daytona Beach	3,113,758,732	18,756	0	0.000%
Daytona Beach Shores	108,379,184	536	0	0.000%
De Bary	855,016,726	8,360	0	0.000%
De Land	1,379,957,569	8,579	0	0.000%
Deltona	2,642,766,558	33,225	0	0.000%
Edgewater	806,296,779	9,355	0	0.000%
Holly Hill	432,668,504	4,538	0	0.000%
Lake Helen	92,912,745	1,099	0	0.000%
New Smyrna Beach	1,436,053,516	11,073	0	0.000%
Oak Hill	67,557,864	888	0	0.000%
Orange City	446,136,500	2,665	0	0.000%
Ormond Beach	2,269,411,643	15,531	0	0.000%
Pierson	49,333,302	590	0	0.000%
Ponce Inlet	169,838,467	1,102	0	0.000%
Port Orange	2,469,426,353	20,423	0	0.000%
South Daytona	482,748,537	4,554	0	0.000%
Unincorporated	4,680,525,914	45,780	0	0.000%
TOTAL	**$21,502,788,893**	**187,054**	**$0**	0.000%

Source: National Climatic Data Center and Volusia County GIS Department

6.12 FLOOD

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using FEMA's preliminary Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records (2009). The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for improved properties that were confirmed to be located within an identified Zone A/AE (100-year floodplain), Zone VE (100-year coastal flood zone, associated with wave action), and Zone X (500-year floodplain).

It is important to note that Volusia County is currently in the process of updating their flood maps, which are scheduled to be completed by 2011. It is recommended that the flood analyses be revised once the new flood maps are available.

Tables 6.12 through **6.14** list the number of people and improved parcels (properties with structures), the percentage of properties and the property values that are located in the 100-year (A/AE), coastal 100-year (VE) and 500-year (X) floodplains.

TABLE 6.12: Volusia County Improved Property at Risk to 100-Year Flood (A/AE Zones)

JURISDICTION	NUMBER OF PEOPLE AT RISK	NUMBER OF IMPROVED PARCELS AT RISK	PERCENTAGE OF IMPROVED PARCELS AT RISK	VALUE OF IMPROVED PARCELS AT RISK
Daytona Beach	9,559	2,583	13.77%	541,615,872
Daytona Beach Shores	13	2	0.37%	306,994
De Bary	1,507	385	4.61%	48,678,666
De Land	4	57	0.66%	11,193,375
Deltona	3,874	842	2.53%	69,523,160
Edgewater	1,830	644	6.88%	71,431,615
Holly Hill	818	355	7.82%	41,801,597
Lake Helen	98	50	4.55%	4,411,763
New Smyrna Beach	9,474	4,592	41.47%	646,515,375
Oak Hill	219	284	31.98%	21,547,190
Orange City	2	8	0.30%	43,982,377
Ormond Beach	5,943	2,131	13.72%	332,512,855
Pierson	776	24	4.07%	2,477,146
Ponce Inlet	495	240	21.78%	43,818,351
Port Orange	7,882	3,468	16.98%	419,351,137
South Daytona	2,119	327	7.18%	61,870,961
Unincorporated	19,711	6,556	14.32%	770,855,505

TABLE 6.12: Volusia County Improved Property at Risk to 100-Year Flood (A/AE Zones)

JURISDICTION	NUMBER OF PEOPLE AT RISK	NUMBER OF IMPROVED PARCELS AT RISK	PERCENTAGE OF IMPROVED PARCELS AT RISK	VALUE OF IMPROVED PARCELS AT RISK
TOTAL	**64,400**	**22,548**	**12.05%**	**$3,131,893,939**

Source: FEMA Flood Insurance Rate Map and Volusia County GIS Department

TABLE 6.13: Volusia County Improved Property at Risk to Coastal 100-Year Flood (VE Zones)

JURISDICTION	NUMBER OF PEOPLE AT RISK	NUMBER OF IMPROVED PARCELS AT RISK	PERCENTAGE OF IMPROVED PARCELS AT RISK	VALUE OF IMPROVED PARCELS AT RISK
Daytona Beach	0	0	0.00%	0
Daytona Beach Shores	0	1	0.19%	79,907
De Bary	0	0	0.00%	0
De Land	0	0	0.00%	0
Deltona	0	0	0.00%	0
Edgewater	0	0	0.00%	0
Holly Hill	0	0	0.00%	0
Lake Helen	0	0	0.00%	0
New Smyrna Beach	226	91	0.82%	15,122,692
Oak Hill	0	0	0.00%	0
Orange City	0	0	0.00%	0
Ormond Beach	0	0	0.00%	0
Pierson	0	0	0.00%	0
Ponce Inlet	0	2	0.18%	743,594
Port Orange	0	0	0.00%	0
South Daytona	0	0	0.00%	0
Unincorporated	138	47	0.10%	8,355,247
TOTAL	**364**	**141**	**0.08%**	**$24,301,440**

Source: FEMA Flood Insurance Rate Map and Volusia County GIS Department

Although, it would appear counter-intuitive that there are not parcels located in the VE zone in beachfront communities, this analysis was based on the existing mapped floodplain. The Volusia County jurisdictions are aware of this issue and are addressing this during the flood map revision process.

TABLE 6.14: Volusia County Improved Property at Risk to 500-Year Flood (X Zones)

JURISDICTION	NUMBER OF PEOPLE AT RISK	NUMBER OF IMPROVED PARCELS AT RISK	PERCENTAGE OF IMPROVED PARCELS AT RISK	VALUE OF IMPROVED PARCELS AT RISK
Daytona Beach	54,336	16,173	86.23%	2,572,142,860
Daytona Beach Shores	4,330	533	99.44%	107,992,283
De Bary	14,189	7,975	95.39%	806,338,060
De Land	21,516	8,522	99.34%	1,368,764,194
Deltona	65,692	32,383	97.47%	2,573,243,398
Edgewater	17,674	8,711	93.12%	734,865,164
Holly Hill	11,412	4,183	92.18%	390,866,907
Lake Helen	2,645	1,049	95.45%	88,500,982
New Smyrna Beach	11,602	6,390	57.71%	774,415,449
Oak Hill	1,541	604	68.02%	46,010,674
Orange City	8,204	2,657	99.70%	402,154,123
Ormond Beach	30,885	13,400	86.28%	1,936,898,788
Pierson	1,924	566	95.93%	46,856,156
Ponce Inlet	2,018	860	78.04%	125,276,522
Port Orange	38,923	16,955	83.02%	2,050,075,216
South Daytona	11,334	4,227	92.82%	420,877,576
Unincorporated	80,354	39,177	85.58%	3,901,315,162
TOTAL	**378,579**	**164,365**	**87.87%**	**$18,346,593,514**

Source: FEMA Flood Insurance Rate Map and Volusia County GIS Department

6.13 STORM SURGE

The storm surge assessment was conducted by identifying the people and property that are located in storm surge inundation zones using data provided by Volusia County[9].

Tables 6.15 through **6.17** list the number of people and improved parcels (properties with structures), the percentage of properties and the property values that are located in the Category 1, 3 and 5 storm surge zones, respectively.

TABLE 6.15: Volusia County Improved Property at Risk to Category 1 Storm Surge

JURISDICTION	NUMBER OF PEOPLE AT RISK	NUMBER OF IMPROVED PARCELS AT RISK	PERCENTAGE OF IMPROVED PARCELS AT RISK	VALUE OF IMPROVED PARCELS AT RISK
Daytona Beach	2,203	235	1.25%	61,679,613
Daytona Beach Shores	29	15	2.80%	4,194,226
De Bary	0	0	0.00%	0
De Land	0	0	0.00%	0
Deltona	0	0	0.00%	0
Edgewater	128	100	1.07%	17,331,780
Holly Hill	165	50	1.10%	4,849,093
Lake Helen	0	0	0.00%	0
New Smyrna Beach	3,891	1,455	13.14%	225,477,916
Oak Hill	44	161	18.13%	12,435,887
Orange City	0	0	0.00%	0
Ormond Beach	961	384	2.47%	70,628,776
Pierson	0	0	0.00%	0
Ponce Inlet	356	124	11.25%	20,494,373
Port Orange	1,896	588	2.88%	50,830,148
South Daytona	1,223	318	6.98%	49,934,428
Unincorporated	2,031	855	1.87%	118,673,529
TOTAL	**12,927**	**4,285**	**2.29%**	**$636,529,769**

Source: Volusia County GIS Department

[9] Volusia County provided surge inundation zones for Categories 1, 3 and 5.

TABLE 6.16: Volusia County Improved Property at Risk to Category 3 Storm Surge

JURISDICTION	NUMBER OF PEOPLE AT RISK	NUMBER OF IMPROVED PARCELS AT RISK	PERCENTAGE OF IMPROVED PARCELS AT RISK	VALUE OF IMPROVED PARCELS AT RISK
Daytona Beach	4,320	518	2.76%	130,880,376
Daytona Beach Shores	36	28	5.22%	5,402,183
De Bary	0	0	0.00%	0
De Land	0	0	0.00%	0
Deltona	0	0	0.00%	0
Edgewater	1,353	430	4.60%	40,090,657
Holly Hill	695	230	5.07%	22,973,942
Lake Helen	0	0	0.00%	0
New Smyrna Beach	15,501	7,357	66.44%	891,592,413
Oak Hill	88	217	24.44%	17,156,941
Orange City	0	0	0.00%	0
Ormond Beach	2,152	946	6.09%	179,215,060
Pierson	0	0	0.00%	0
Ponce Inlet	980	256	23.23%	48,526,119
Port Orange	4,631	1,783	8.73%	170,876,337
South Daytona	1,858	354	7.77%	58,702,709
Unincorporated	5,595	2,729	5.96%	282,987,158
TOTAL	**37,209**	**14,848**	**7.94%**	**$1,848,403,895**

Source: Volusia County GIS Department

TABLE 6.17: Volusia County Improved Property at Risk to Category 5 Storm Surge

JURISDICTION	NUMBER OF PEOPLE AT RISK	NUMBER OF IMPROVED PARCELS AT RISK	PERCENTAGE OF IMPROVED PARCELS AT RISK	VALUE OF IMPROVED PARCELS AT RISK
Daytona Beach	29,031	7,514	40.06%	965,508,864
Daytona Beach Shores	864	115	21.46%	19,006,502
De Bary	0	0	0.00%	0
De Land	0	0	0.00%	0
Deltona	0	0	0.00%	0
Edgewater	17,042	8,094	86.52%	684,327,009
Holly Hill	12,029	4,436	97.75%	412,943,666
Lake Helen	0	0	0.00%	0
New Smyrna Beach	18,553	8,908	80.45%	1,084,911,817
Oak Hill	1,377	750	84.46%	58,895,058
Orange City	0	0	0.00%	0
Ormond Beach	16,093	6,709	43.20%	856,539,065
Pierson	0	0	0.00%	0
Ponce Inlet	1,481	837	75.95%	130,573,524
Port Orange	22,220	9,164	44.87%	874,095,320
South Daytona	13,273	4,472	98.20%	473,807,328
Unincorporated	15,371	8,134	17.77%	748,503,054
TOTAL	**147,334**	**59,133**	**31.61%**	**$6,309,111,207**

Source: Volusia County GIS Department

GEOLOGIC HAZARDS

6.14 SINKHOLE

Based on historic incidents, the unincorporated areas of Volusia County have been vulnerable to sinkhole hazards, with 78 occurring in the study region between 1973 and 2005. Per the *Hazards Profiles* section, most of the county is at a low to very low risk from sinkholes. However, there is an area within the unincorporated western part of the county that is at medium risk to sinkhole hazards.

MEMPHIS data was used to determine the number of people and improved properties that are susceptible to sinkhole hazards. According to the MEMPHIS analysis, there are 256 people and 115 improved properties valued at over $7 million that are in medium risk sinkhole hazard locations in the unincorporated areas of Volusia County.

Per the MEMPHIS sinkhole assessment methodology[10], sinkhole potential was determined based on points that were assigned to locations in Volusia County. Four classes of points were assigned, for distance to historic sinkholes, geology, and soils:

2 points if cell was within 2000m of an existing sinkhole;
1 point if cell between 2000m and 5000m of an existing sinkhole;
1 point if the cell was in the same USGS surface geologic unit as an existing sinkhole;
1 point if the cell was in the same NRCS soil unit as an existing sinkhole.

Each cell as assigned a value from 0 to 4:

0: no significant risk
1: low risk
2: moderate risk
3: high risk
4 very high risk

The likelihood of experiencing future sinkholes is high in the area identified in Volusia County.

[10] MEMPHIS assessment methodology: http://lmsmaps.kinanco.com/methodqr.html

6.15 TSUNAMI

Although, historically there have been no occurrences of tsunamis in Volusia County, the potential exists. The likelihood is low, but the consequences would be catastrophic.

Table 6.18 lists the number of people and improved parcels (properties with structures), the percentage of properties and the property values that are located in the tsunami inundation zone, based on MEMPHIS data. There were several gaps in the MEMPHIS data that excluded the barrier islands along the shoreline. These areas appeared to be susceptible to tsunami inundation and/or potential inhabitability due to infrastructure loss in low lying areas. To be conservative, the analysis was performed by accounting for these barrier island areas as well.

TABLE 6.18: Volusia County Improved Property at Risk to Tsunami

JURISDICTION	NUMBER OF PEOPLE AT RISK	NUMBER OF IMPROVED PARCELS AT RISK	PERCENTAGE OF IMPROVED PARCELS AT RISK	VALUE OF IMPROVED PARCELS AT RISK
Daytona Beach	45,910	12,841	68.46%	1,678,914,461
Daytona Beach Shores	4,343	536	100.00%	108,379,184
De Bary	0	0	0.00%	0
De Land	0	0	0.00%	0
Deltona	0	0	0.00%	0
Edgewater	19,504	9,354	99.99%	806,218,563
Holly Hill	12,201	4,533	99.89%	429,857,493
Lake Helen	0	0	0.00%	0
New Smyrna Beach	20,791	10,110	91.30%	1,253,431,731
Oak Hill	1,760	888	100.00%	67,557,864
Orange City	0	0	0.00%	0
Ormond Beach	28,559	11,384	73.30%	1,545,623,219
Pierson	0	0	0.00%	0
Ponce Inlet	2,513	1,102	100.00%	169,838,467
Port Orange	30,218	11,397	55.80%	1,131,602,766
South Daytona	13,453	4,548	99.87%	481,675,529
Unincorporated	29,382	14,132	30.87%	1,347,435,508
TOTAL	**208,634**	**80,825**	**43.21%**	**$9,020,534,785**

Source: MEMPHIS and Volusia County GIS Department

OTHER HAZARDS

6.16 WILDFIRE

Volusia County is uniformly exposed to wildfire risk, especially during the hot dry summer months and drought conditions. MEMPHIS data was used to determine the number of people and improved properties that are susceptible to medium and high wildfire risk. The MEMPHIS wildfire potential risk map accounts for the mode of fuel types to determine the risk category. Each fuel model was assigned a code (i.e. “low”, “medium”, or “high”) based on the fires spreading potential during a climatologically “dry” year. The fuel models indicate the ability of a fire to start and spread in the given terrain type, and are used as the input to the Fire Potential Index as well as fire spreading models.

Table 6.19 lists the number of people and improved parcels (properties with structures), the percentage of properties and the property values that are located in the medium and high risk wildfire zones.

TABLE 6.19: Volusia County Improved Property at Risk to Wildfire

JURISDICTION	NUMBER OF PEOPLE AT RISK	NUMBER OF IMPROVED PARCELS AT RISK	PERCENTAGE OF IMPROVED PARCELS AT RISK	VALUE OF IMPROVED PARCELS AT RISK
Daytona Beach	7,785	2,879	15.35%	367,774,772
Daytona Beach Shores	0	1	0.19%	1,037,664
De Bary	5,998	3,739	44.72%	276,138,817
De Land	3,819	2,383	27.78%	168,960,593
Deltona	15,003	6,487	19.52%	307,332,505
Edgewater	2,361	1,264	13.51%	76,200,531
Holly Hill	1,382	597	13.16%	48,418,783
Lake Helen	1,149	333	30.30%	22,918,827
New Smyrna Beach	4,671	2,939	26.54%	286,927,290
Oak Hill	916	397	44.71%	17,313,018
Orange City	1,305	419	15.72%	81,685,892
Ormond Beach	10,797	4,861	31.30%	470,274,680
Pierson	2,231	361	61.19%	17,946,371
Ponce Inlet	391	355	32.21%	53,468,430
Port Orange	9,931	5,554	27.19%	434,378,041
South Daytona	1,726	643	14.12%	44,228,607
Unincorporated	39,995	18,659	40.76%	1,492,034,741
TOTAL	**109,460**	**51,871**	**27.73%**	**$4,167,039,562**

Source: MEMPHIS and Volusia County GIS Department

6.18 CONCLUSIONS ON HAZARD VULNERABILITY

The results of this vulnerability assessment are useful in at least three ways:

- Improving our understanding of the risk associated with the natural hazards in Volusia County through better understanding of the complexities and dynamics of risk, how levels of risk can be measured and compared, and the myriad of factors that influence risk. An understanding of these relationships is critical in making balanced and informed decisions on managing risk.

- Providing a baseline for policy development and comparison of mitigation alternatives. The data used for this analysis presents a current profile of risk in Volusia County. Future updates will enable comparison of the changes in risk over time. Baselines of this type can support the objective analysis of policy and program options for risk reduction in the region.

- Comparing the risk among the natural hazards addressed. The ability to quantify the risk to all these hazards relative to one another helps in a balanced, multi-hazard approach to risk management at each level of governing authority. This ranking provides a systematic framework to compare and prioritize the very disparate natural hazards that are present in Volusia County. This final step in the risk assessment provides the necessary information for local officials to craft a mitigation strategy to focus resources on only those hazards that pose the most threat to the county.

SECTION 7 – CAPABILITY ASSESSMENT

This section of the Plan discusses the capability of Volusia County and the participating municipal jurisdictions to implement hazard mitigation activities. It consists of the following four subsections:

- **What is a Capability Assessment?**
- **Conducting the Capability Assessment**
- **Capability Assessment Findings**
- **Conclusions of the Capability Assessment**

7.1 WHAT IS A CAPABILITY ASSESSMENT?

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a comprehensive mitigation strategy, and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs or projects.[1] As in any planning process, it is important to try to establish which goals, objectives and/or actions are feasible, based on an understanding of the organizational capacity of those agencies or departments tasked with their implementation. A capability assessment helps to determine which mitigation actions are practical and likely to be implemented over time, given a local government's planning and regulatory framework. This capability assessment also highlights the positive mitigation measures already in place, or being implemented at the local government level, which should continue to be supported and enhanced through future mitigation efforts.

The capability assessment completed for Volusia County and its jurisdictions serves as a critical planning step and an integral part of the foundation for designing an effective multi-jurisdictional hazard mitigation strategy. Coupled with the *Risk Assessment*, the *Capability Assessment* helps identify and target meaningful mitigation actions for incorporation in the *Mitigation Strategy* portion of the Hazard Mitigation Plan. It helps establish the goals and objectives for the Volusia County Region to pursue under this Plan and ensures that those goals and objectives are realistically achievable under given local conditions.

7.2 CONDUCTING THE CAPABILITY ASSESSMENT

In order to facilitate the inventory and analysis of local government capabilities throughout Volusia County, a detailed *Capability Assessment Survey*[2] was distributed to Volusia County staff and to staff from participating local municipal jurisdictions. The survey questionnaire, which was completed by

[1] While the Interim Final Rule for implementing the Disaster Mitigation Act of 2000 does not require a local capability assessment to be completed for local hazard mitigation plans, it is a critical step to develop a mitigation strategy that meets the needs of each jurisdiction while taking into account their own unique abilities. The Rule does state that a community's mitigation strategy should be "based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools" (44 CFR, Part 201.6(c)(3)).

[2] The *Capability Assessment Survey* instrument used to assess county and municipal capabilities is available through Volusia County upon request.

applicable local government officials, requested information on a variety of "capability indicators" such as existing local plans, policies, programs or ordinances that contribute to and/or hinder the community's ability to implement hazard mitigation actions.

At a minimum these survey results provide an inventory of existing local plans, ordinances, programs and resources in place or under development in addition to their overall effect on hazard loss reduction. The survey instrument thereby not only helps accurately assess each jurisdiction's degree of local capability, but also serves as a good source of introspection for those jurisdictions wishing to improve their capability. The identification of opportunities and specific actions to be proposed as part of the community's mitigation strategy often develop as an outcome of completing a capability assessment.

7.3 CAPABILITY ASSESSMENT FINDINGS

The findings of the capability assessment are summarized in this Plan to provide insight into the capacity of Volusia County and the participating jurisdictions to implement hazard mitigation activities. All information is based upon the responses provided by local government officials to the *Capability Assessment Survey*.

7.3.1 Planning and Regulatory Capability

Planning and regulatory capability is based on the implementation of plans, ordinances and programs that demonstrate a local jurisdiction's commitment to guiding and managing growth, development and redevelopment in a responsible manner while maintaining the general welfare of the community. It includes emergency response and mitigation planning, comprehensive land use planning and transportation planning in addition to the enforcement zoning or subdivision ordinances and building codes that regulate how land is developed and structures are built, as well as protecting environmental, historic and cultural resources in the community. Although some conflicts can arise, these planning initiatives generally present significant opportunities to integrate hazard mitigation principles and practices into the local decision making process.

This assessment is designed to provide a general overview of the key planning and regulatory tools or programs in place or under development for Volusia County and the participating jurisdictions, along with their potential effect on loss reduction. This information will help identify opportunities to address existing gaps, weaknesses or conflicts with other initiatives in addition to integrating the implementation of this Plan with existing planning mechanisms, where appropriate.

Table 7.1 provides a summary of the relevant local plans, ordinances and programs already in place or under development for Volusia County and the participating jurisdictions. An (x) mark indicates that the given item is currently in place and being implemented by the local jurisdiction, or that it is currently being developed for future implementation. A more detailed discussion on each jurisdiction's planning and regulatory capability follows, along with the incorporation of additional information based on the narrative comments provided by local officials in response to the survey questionnaire.

Following the inventory of local plans, programs and policies is a description of each element upon which the local jurisdiction's capability score was based.

TABLE 7.1: Relevant Plans, Ordinances and Programs

JURISDICTION	Local Mitigation Strategy	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan	Stormwater Management Plan	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Floodplain Ordinance (or Flood Damage Prevention Ordinance)	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-disaster Redevelopment / Reconstruction Ordinance	Building Code	Fire Code	National Flood Insurance Program	NFIP Community Rating System
Daytona Beach	X	X	X	X	X			X	X	X		X	X	X		X	X			X	X	X	X
Daytona Beach Shores	X	X			X			X		X		X			X	X		X		X	X	X	X
DeBary	X	X	X	X	X	X	X	X			X	X	X		X	X	X			X	X	X	
Deland	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X		X	X		
Deltona	X	X		X				X	X	X		X	X			X	X	X		X	X	X	
Edgewater	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X
Holly Hill	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X			X	X	X	X
Lake Helen	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X		X	X	X	
New Smyrna Beach	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Oak Hill	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Orange City	X	X	X	X	X		X	X	X	X		X		X		X	X			X	X	X	X
Ormond Beach	X	X		X	X			X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Pierson	X	X						X		X		X				X	X			X	X	X	
Ponce Inlet	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X
Port Orange	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
South Daytona	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X			X	X	X	X
Volusia County	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X

7.3.2 Emergency Management

Hazard mitigation is widely recognized as one of the four primary phases of emergency management. Other phases include preparedness, response and recovery. In reality, each phase is interconnected with hazard mitigation as **Figure 7.1** suggests. Planning for each phase is a critical part of a comprehensive emergency management program and a key to the successful implementation of hazard mitigation actions. As a result, the *Capability Assessment Survey* asked several questions regarding emergency management plans in order to assess the jurisdiction's willingness to plan and their level of technical planning proficiency.

FIGURE 7.1: The Four Phases of Emergency Management

Local Mitigation Strategy (LMS): Also called a hazard mitigation plan, the local mitigation strategy represents a community's blueprint for how it intends to reduce the impact of natural and human-caused hazards on people and the built environment. The essential elements of a local mitigation strategy include a risk assessment, capability assessment, mitigation strategy and the mitigation projects list.

- Volusia County and its jurisdictions developed the first version of their local mitigation strategy in 1999 (adopted 2000) and updated the plan in 2004 (adopted 2005). The plan is currently undergoing a revision that will be completed in 2009.

Disaster Recovery Plan: A disaster recovery plan serves to guide the physical, social, environmental and economic recovery and reconstruction process following a disaster. In many instances, hazard mitigation principles and practices are incorporated into local disaster recovery plans with the intent of capitalizing on opportunities to break the cycle of repetitive disaster losses.

- Survey results indicate that 10 of the jurisdictions have their own disaster recovery plan. A potential mitigation action that should be considered is for all participating jurisdictions to develop their own disaster recovery plan that would incorporate mitigation opportunities into the disaster recovery process.

Emergency Operations Plan: An emergency operations plan outlines responsibilities and the means by which resources are deployed to respond to an emergency or disaster. Many communities choose to update their emergency operations plan before events occur to better prepare for future disasters. This is an example of hazard mitigation.

- Volusia County Emergency Management maintains the emergency operations plan that also covers their respective jurisdictions. In general, emergency operations planning has been determined to have a moderate effect on loss reduction, as its emphasis focuses on preparedness and response operations rather than hazard mitigation activities.

Continuity of Operation Plan: A continuity of operations plan establishes a chain of command line of succession, and plans for backup or alternate emergency response resources in case of an extreme emergency. Developing a continuity of operation plan is an example of hazard mitigation.

- Survey results indicate that 14 of jurisdictions in Volusia County have a continuity of operations plan in place. Each of the other jurisdictions is encouraged to consider preparing their own continuity of operations plans as a possible mitigation action for inclusion this Plan.

7.3.3 General Planning

The implementation of hazard mitigation activities should involve agencies and individuals beyond the emergency management profession. Other stakeholders may include local planners, public works officials, economic development specialists and others. Because in many instances, concurrent local planning efforts help achieve or complement hazard mitigation goals, even though they are not specifically designed as such, the *Capability Assessment Survey* asked questions regarding each jurisdiction's general planning capabilities and the degree to which hazard mitigation is integrated into other ongoing planning efforts.

Comprehensive Land Use Plan: A comprehensive land use plan establishes the overall vision for a community, and serves as a guide for future governmental decision making. Typically a comprehensive plan is comprised of a summary of current and expected demographic conditions, land use, transportation elements and community facilities. Given the broad nature of the plan and its regulatory standing in many communities, the integration of hazard mitigation measures into the comprehensive plan can greatly enhance the likelihood of achieving risk reduction goals, objectives and actions.

- All jurisdictions within the region have a comprehensive land use plan as required by state law.

Capital Improvements Plan: A capital improvements plan guides the scheduling of spending for public improvement projects. A capital improvements plan can serve as an important mechanism to guide

future development away from identified hazard areas. Limiting public spending in hazardous areas is one of the most effective long-term mitigation actions available to local governments.

- Volusia County has a Capital Improvements Element (CIE) that is part of the Comprehensive Plan. The Capital Improvement Plan should be considered a local funding source for mitigation projects recommended as part of the Local Mitigation Strategy and the implementation of those actions will help to reduce disaster damages.

Historic Preservation Plan: A historic preservation plan is intended to preserve historic structures or districts within a community. An often overlooked aspect of the historic preservation plan is the assessment of buildings and sites located in areas subject to natural hazards to include the identification of the most effective way to reduce future damages.[3] This may involve retrofitting or relocation techniques that account for the need to protect buildings that do not meet current building standards or are within a historic district that cannot easily be relocated out of harms way.

- There are eight jurisdictions that have a historic preservation plan.

Zoning Ordinances: Zoning represents the means by which land use is controlled by local governments. As part of a community's police power, zoning is used to protect the public health, safety and welfare of those within a given jurisdiction. A zoning ordinance is the mechanism through which zoning is implemented. Since zoning regulations enable municipal governments to limit the type and density of development, it can serve as a powerful tool, especially when applied in identified hazard areas.

- All of the participating jurisdictions have a zoning ordinance.

Subdivision Ordinances: A subdivision ordinance is generally intended to regulate the development of housing, commercial and industrial uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Subdivision design that accounts for natural hazards can dramatically reduce the exposure of future development.[4]

- There are 16 jurisdictions that have a subdivision ordinance.

Building Codes, Permitting and Inspections: Building Codes regulate construction standards. In many communities permits must be issued and inspections of work must take place for new construction. Decisions regarding the adoption of building codes (that account for hazard risk), the type of permitting process required both before and after a disaster, and the enforcement of inspection protocols all affect the level of hazard risk faced by a community.

- All Volusia County jurisdictions have adopted and enforce the Florida Building Code.

[3] See Protecting the Past from Natural Disasters. 1989. Nelson, Carl. National Trust for Historic Preservation: Washington D.C.
[4] For additional information regarding the use of subdivision regulations in reducing flood hazard risk, see Subdivision Design in Flood Hazard Areas. 1997. Morris, Marya. Planning Advisory Service Report Number 473. American Planning Association: Washington D.C.

The adoption and enforcement of building codes by local jurisdictions is routinely assessed through the Building Code Effectiveness Grading Schedule (BCEGS) program developed by the Insurance Services Office, Inc. (ISO).[5] Under the BCEGS program, ISO assesses the building codes and enforcement of these codes in a particular community, with special emphasis on mitigation of losses from natural hazards. The results of BCEGS assessments are routinely provided to ISO's member private insurance companies, which in turn may offer ratings credits for new buildings constructed in communities with strong BCEGS classifications. The concept behind this is that communities with well-enforced, up-to-date codes should have fewer losses, and insurance rates can reflect that in these communities.

In conducting the assessment ISO collects information related to personnel qualifications and continuing education, as well as the number of inspections performed per day. This type of information, combined with local building codes, is used to determine a grade for that jurisdiction. The grades range from 1 to 10, with the lower grade being more ideal. A BCEGS grade of 1 represents exemplary commitment to building code enforcement, and a grade of 10 indicates less than minimum recognized protection. **Table 7.2** lists the BCEGS ratings for the jurisdictions in the region.

TABLE 7.2: BCEGS Ratings in the Region

JURISDICTION	BCEGS RESIDENTIAL RATING	BCEGS COMMERCIAL RATING	YEAR LAST RATED
Daytona Beach	4	3	2007
Daytona Beach Shores			
DeBary			
Deland			
Deltona			
Edgewater			
Holly Hill			
Lake Helen	4	4	2000
New Smyrna Beach			
Oak Hill			
Orange City			
Ormond Beach	3	3	2004
Pierson			
Ponce Inlet			
Port Orange			
South Daytona			
Volusia County			

Source: Jurisdictions

[5] Participation in BCEGS is voluntary and may be declined by local governments if they do not wish to have their local building codes evaluated.

7.3.4 Floodplain Management

Flooding represents the greatest natural hazard facing the nation. At the same time the tools available to reduce the impacts associated with flooding are among the most developed when compared to other hazard-specific mitigation techniques. In addition to approaches that cut across hazards such as education, outreach, and the training of local officials, the *National Flood Insurance Program* (NFIP) contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary for local governments; however, program participation is strongly encouraged by FEMA as a first step for implementing and sustaining an effective hazard mitigation program. It is therefore used as part of this assessment as a key indicator for measuring local capability.

In order for a county or municipality to participate in the NFIP they must adopt a local flood damage prevention ordinance which requires jurisdictions to follow established minimum building standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings will be protected from damage by a 100-year flood event, and that new development in the floodplain will not exacerbate existing flood problems or increase damage to other properties.

A key service provided by the NFIP is the mapping of identified flood hazard areas. Once completed, the Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials and the private sector about the likelihood of flooding in their community.

All jurisdictions in Volusia County participate in the NFIP. The following is a prioritized list of actions that the jurisdictions are doing to remain compliant with the NFIP:

Volusia County NFIP Actions

1. Adopt and enforce local floodplain regulations, ordinances and codes that require new and substantially improved structures to be designed and constructed to minimize or eliminate future flood damages (e.g., one-foot freeboard requirement for new construction in the one percent annual chance flood hazard area).
2. Identify repetitive loss structures and cost effective measures to reduce or eliminate future losses (e.g., acquisition, elevation, relocation, etc.).
3. Participate in the Community Rating System, to exceed floodplain management requirements of the NFIP.
4. Implement storm drainage improvements to reduce or alleviate severe flooding.
5. Conduct public outreach on the NFIP by providing flood protection information to residents.
6. Maintain current Flood Insurance Rate Maps (FIRM)s for each jurisdiction.
7. Notify homeowners of FIRM changes.
8. Require permits for all development in the A and V zones per the FIRM.
9. Collect and maintain elevation certificates.

An additional indicator of floodplain management capability is the active participation of local jurisdictions in the *Community Rating System* (CRS). The CRS is an incentive-based program that encourages counties and municipalities to undertake defined flood mitigation activities that go beyond the minimum requirements of the NFIP, adding extra local measures to provide protection from flooding. All of the 18 creditable CRS mitigation activities are assigned a range of point values. As points are accumulated and reach identified thresholds, communities can apply for an improved CRS class. Class ratings, which run from 10 to 1, are tied to flood insurance premium reductions as shown in **Table 7.3.** As class ratings improve (the lower the number the better), the percent reduction in flood insurance premiums for NFIP policyholders in that community increases.

Community participation in the CRS is voluntary. Any community that is in full compliance with the rules and regulations of the NFIP may apply to FEMA for a CRS classification better than class 10. The CRS application process has been greatly simplified over the past several years, based on community comments intended to make the CRS more user friendly, and extensive technical assistance available for communities who request it.

Over half the jurisdictions in Volusia County participate in the CRS program.

TABLE 7.3: CRS Premium Discounts, By Class

CRS CLASS	PREMIUM REDUCTION
1	45%
2	40%
3	35%
4	30%
5	25%
6	20%
7	15%
8	10%
9	5%
10	0

Source: FEMA

TABLE 7.4: CRS Participation in Volusia County

JURISDICTION	CRS CLASSIFICATION	DISCOUNT FOR SFHA
Daytona Beach	6	20%
Daytona Beach Shores	7	15%
DeBary	NA	NA
Deland	NA	NA
Deltona	NA	NA
Edgewater	8	10%
Holly Hill	8	5%
Lake Helen	NA	NA
New Smyrna Beach	7	15%
Oak Hill	NA	NA
Orange City	NA	NA
Ormond Beach	7	15%
Pierson	NA	NA
Ponce Inlet	6	20%
Port Orange	7	15%
South Daytona	7	15%
Volusia County	6	20%

Source: Volusia County

Floodplain Management Plan: A floodplain management plan (or a flood mitigation plan) provides a framework for action regarding the corrective and preventative measures put in place to reduce flood-related impacts. Floodplain management plans are similar to hazard mitigation plans except for the fact that they focus solely on flood hazards and identifying specific actions to address flooding problems within a jurisdiction.

- There are 13 jurisdictions that have a floodplain management plan.

Stormwater Management Plan: A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures intended to reduce the impact of minor urban flooding. Stormwater management plans are an excellent way for local governments to regulate stormwater flow within the jurisdiction and to prevent future stormwater problems.

- There are 15 jurisdictions that have a stormwater management plan.

7.4 CONCLUSIONS OF THE CAPABILITY ASSESSMENT

The capability of Volusia County and the participating jurisdictions varies greatly from jurisdiction to jurisdiction. **Table 7.5** lists the total number of jurisdictions that have plans, ordinances and programs in place or under development.

TABLE 7.5: Relevant Plans, Ordinances and Programs

Plan, Ordinance or Program	Total Number of Jurisdictions
Local Mitigation Strategy	17
Comprehensive Land Use Plan	17
Floodplain Management Plan	13
Open Space Management Plan	14
Stormwater Management Plan	15
Natural Resource Protection Plan	8
Flood Response Plan	12
Emergency Operations Plan	17
Continuity of Operations Plan	14
Evacuation Plan	16
Disaster Recovery Plan	9
Capital Improvements Plan	17
Economic Development Plan	12
Historic Preservation Plan	9
Floodplain Ordinance (or Flood Damage Prevention Ordinance)	13
Zoning Ordinance	17
Subdivision Ordinance	16
Unified Development Ordinance	8
Post-disaster Redevelopment / Reconstruction Ordinance	4
Building Code	17
Fire Code	17
National Flood Insurance Program	17
NFIP Community Rating System	10

The *Capability Assessment* and *Risk Assessment* serve as the foundation for a meaningful hazard mitigation strategy. During the process of identifying the goals and mitigation actions each jurisdiction

must consider not only their level of hazard risk but also their existing capability to minimize or eliminate that risk.

In jurisdictions where the overall hazard risk is considered to be high, specific mitigation actions that account for these conditions should be considered. This may include less costly actions such as minor ordinance revisions or public awareness activities. If necessary, specific capabilities may need to be improved in order to better address recurring threats. Similarly, in cases where the hazard vulnerability is low, more emphasis can be placed on actions that may impact future vulnerability, such as guiding development away from known hazard areas using various regulatory measures.

SECTION 8 – MITIGATION STRATEGY

This section of the Plan provides the blueprint for Volusia County and the participating jurisdictions to become less vulnerable to its identified hazards. It is based on general consensus of the Volusia Prepares LMS Working Group (LMS Working Group) and the findings and conclusions of the *Capability Assessment* and *Risk Assessment*. It consists of the following five subsections:

- **Introduction**
- **Mitigation Goals**
- **Identification and Analysis of Mitigation Techniques**
- **Selection of Mitigation Techniques for Volusia County**
- **Mitigation Success Stories**
- **Plan Update Requirement**

8.1 INTRODUCTION

The intent of the local Mitigation Strategy is to provide Volusia County and the participating jurisdictions with the goals that will serve as guiding principles for future mitigation policy and project administration, along with an analysis of mitigation techniques deemed available to meet those goals and reduce the impact of identified hazards. It is designed to be comprehensive, strategic and functional in nature:

- In being *comprehensive*, the development of the strategy includes a thorough review of all hazards and identifies extensive mitigation measures intended to not only reduce the future impacts of high risk hazards, but also to assist the County and participating jurisdictions achieve compatible economic, environmental and social goals.

- In being *strategic*, the development of the strategy ensures that all policies and projects proposed for implementation are consistent with pre-identified, long-term planning goals.

- In being *functional,* each proposed mitigation action is linked to established priorities and assigned to specific departments or individuals responsible for their implementation with target completion deadlines. When necessary, funding sources are identified that can be used to assist in project implementation.

The first step in designing the Mitigation Strategy includes the identification of countywide mitigation goals. Mitigation goals represent broad statements that are achieved through the implementation of more specific, action-oriented objectives. These actions include both hazard mitigation policies (such as the regulation of land in known hazard areas through a local ordinance), and hazard mitigation projects that seek to address specifically targeted hazard risks (such as the acquisition and relocation of a repetitive loss structure).

SECTION 8: MITIGATION STRATEGY

The second step involves the identification, consideration and analysis of available mitigation measures to help achieve the identified mitigation goals. This is a long-term, continuous process, sustained through the development and maintenance of this Plan. Alternative mitigation measures will continue to be considered as future mitigation opportunities become identified, as data and technology improve, as mitigation funding becomes available, and as this Plan is maintained over time.

The third and last step in designing the Mitigation Strategy is the selection and prioritization of specific mitigation actions, referred to as Hazard Mitigation Initiatives, for Volusia County and participating jurisdictions (provided separately in Section 9: *Mitigation Action Plan*). The Mitigation Action Plan (MAP) represents an unambiguous and functional plan for action and is considered to be the most essential outcome of the mitigation planning process.

The MAP includes a prioritized listing of proposed hazard mitigation actions (policies and projects) for Volusia County and its participating jurisdictions and partners to carry out with accompanying information such as those departments or individuals assigned responsibility for their implementation, potential funding sources and an estimated target date for completion, serving as an important tool for monitoring success or progress over time. The cohesive collection of actions listed in the MAP can also serve as an easily understood menu of mitigation policies and projects for those local decision makers who want to quickly review the recommendations and proposed actions of the Hazard Mitigation Plan.

In preparing the Mitigation Action Plan for Volusia County, the LMS Working Group considered the overall hazard risk and capability to mitigate the effects of hazards as determined through the risk and capability assessment process, in addition to meeting the adopted countywide mitigation goals and unique needs of the community. Prioritizing the proposed mitigation actions was based on the following 11 factors:

- Population Benefited
- Health and Safety Considerations
- Environmental Impact
- Consistency with Other Plans and Programs
- Reduces Risk of Future Property Damage
- Supports Essential or Critical Services
- Probability of Receiving Funding for Implementation
- Feasibility of Implementation
- Community Rating System
- Repetitive Loss Mitigation
- Benefit Cost Ratio (to be conducted prior to submitting a project for grant consideration)

The mitigation initiative scoring system is provided in **Table 8.1**.

TABLE 8.1: Mitigation Initiative Scoring System

Prioritization Criteria	Scoring				
Population Benefited	**4** - Project will benefit a multi-jurisdictional area.	**3** - Project will benefit a jurisdictional area.	**2** - Project will benefit less than 100% of a jurisdiction (i.e., neighborhood).		
Health and Safety Considerations *Add 1 point for projects that benefit a multi-jurisdictional area.	**4** - Project would benefit 75% or more of the population.	**3** - Project would benefit 50-74% of the population.	**2** - Project would benefit 25-49%of the population.	**1** - Project would benefit less than 25% of the population.	
Environmental Impact	**1** - Project improves the environment.	**0** - Risk to the environment is undetermined.	**(-1)** - Project poses risk to the environment.		
Consistency with other Plans and Programs	**4** - Project is incorporated into the LMS, CEMP and Comprehensive Plan, and supports the National Flood Insurance Program (i.e., for flood related projects).	**3** - Project is incorporated into at least two of these plans.	2 **-** Project is incorporated into at least one of these plans.	**1** - Project is consistent with other local standards, aside from LMS, CEMP and Comprehensive Plan.	
Reduces Risk of Future Property Damage	**4 -** Mitigates a hazard of high frequency or risk.	**3 -** Mitigates a hazard of moderate frequency or risk.	**2 -**Mitigates a hazard of low frequency or risk.	**1 -** Mitigates a hazard of very low frequency or risk.	
Supports Essential or Critical Services	**5** - Project will ensure continuity of operations for essential infrastructure or services.	**3** - Project will support infrastructure or services with loss/damage history.	**1** - Project will support infrastructure or services without loss/damage history.	**0** - Project's operation will have no impact on community infrastructure or services if disrupted.	
Probability of Receiving Funding for Implementation	**4** - Limited funding potential exists.	**3** -Potential funding sources are other state or federal grants or similar funding sources.	**2** - Potential funding is readily available through emergency preparedness or mitigation funding sources.	**0** - Potential funding is readily available through local funding sources (e.g., budgeting, capital improvements).	
Feasibility of Implementation	**4** - Project would be relatively easy to implement in one year.	**3** - Project would be easy to implement in three years.	**2** - Project would be easy to implement in five years.	**0** - Project would be difficult to implement.	
Community Rating System	**4** - Project supports all four elements of CRS flood-related activities (public information, mapping and regulations, damage reduction and flood preparedness).	**3** - Project supports three CRS elements.	**2** - Project supports two CRS elements.	**1** - Project supports one CRS element.	**0** - Project does not support any CRS element.
Repetitive Loss Mitigation	**4** - Project protects 50% or more of Repetitive Loss (RL) structures.	**2** - Project protects less than 50% of RL structures.	**0** - Project does not protect a RL structure.		
Benefit Cost Ratio	**5** - Project has a Benefit Cost Ratio (BCR) of "1" or higher, using FEMA approved software.	**3** - Project has a BCR of less than "1" using FEMA approved software.	**0** - The BCR can not be determined.		

8.2 MITIGATION GOALS

44 CFR Requirement

44 CFR Part 201.6(c)(3)(i):
The mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

As part of the Plan upgrade conducted in 2009, the LMS Working Group revisited the goals from the existing Plan. This was done at a facilitated discussion and brainstorming session of the LMS Working Group on July 8, 2009 (for more details, please see the summary of the second LMS Update meeting in Section 2: *Planning Process*). The review ensures that the previously identified goals remain valid. As a result of this review, the LMS Working Group recommended that the existing goals (**Table 8.2**) remain the same. Each of the following goal statements represent a broad target for Volusia County and its participating jurisdictions and partners to achieve through the implementation of its more detailed Mitigation Action Plan provided in Section 9: *Mitigation Action Plan*. They are intended to reflect the unique needs and wishes of the communities of Volusia County to have a more "disaster resistant" future.

TABLE 8.2: Mitigation Goals

GOAL 1: LOCAL GOVERNMENT WILL HAVE THE CAPABILITY TO DEVELOP, IMPLEMENT AND MAINTAIN EFFECTIVE MITIGATION PROGRAMS
***Objective 1*:** Data and information needed for defining hazards, risk areas, and vulnerabilities in the community will be obtained.
***Objective 2*:** The capability to effectively utilize available data and information related to mitigation planning and program development will be available.
***Objective 3*:** The effectiveness of mitigation initiatives implemented in the community will be measured and documented.
***Objective 4*:** Up-to-date technical skills in mitigation planning and programming will be available for the community.
***Objective 5*:** There will be a program to derive mitigation "lessons learned" from each significant disaster event occurring in or near the community.
GOAL 2: ALL SECTORS OF THE COMMUNITY WILL WORK TOGETHER TO CREATE A DISASTER RESISTANT COMMUNITY BY THE YEAR 2020
Objective 1: A business continuity and recovery program will be established and implemented in the community.

Objective 2: Local agencies and organizations will establish specific interagency agreements for the development and implementation of mitigation-related projects and programs.

Objective 3: Local elected governing bodies will promulgate the local mitigation plan and support community mitigation programming.

Objective 4: Outreach programs to gain participation in mitigation programs by business, industry, institutions and community groups will be developed and implemented.

Objective 5: The community will be periodically updated regarding local efforts in mitigation planning and programming.

Objective 6: The community's public and private sector organizations will partner to promote hazard mitigation programming throughout the community.

GOAL 3: THE COMMUNITY WILL HAVE THE CAPABILITY TO INITIATE AND SUSTAIN EMERGENCY RESPONSE OPERATIONS DURING AND AFTER A DISASTER

Objective 1: Designated evacuation routes will be relocated, retrofitted, or modified to remain open before, during and after disaster.

Objective 2: Designated evacuation shelters will be retrofitted or relocated to ensure their operability during and after disaster events.

Objective 3: Emergency services organizations will have the capability to detect emergency situations and promptly initiate emergency response operations.

Objective 4: Local emergency services facilities will be retrofitted or relocated to withstand the structural impacts of disasters.

Objective 5: Response capabilities will be available to protect visitors, special needs individuals, and the homeless from a disaster's health and safety impacts.

Objective 6: Shelters or structures for vehicles and equipment needed for emergency services operation will be retrofitted or relocated to withstand disaster impacts.

Objective 7: Utility and communications systems supporting emergency services operations will be retrofitted or relocated to withstand the impacts of disasters.

Objective 8: Vehicle access routes to key health care facilities will be protected from blockage as a result of a disaster.

GOAL 4: THE CONTINUITY OF LOCAL GOVERNMENT OPERATIONS WILL NOT BE SIGNIFICANTLY DISRUPTED BY DISASTERS

Objective 1: Buildings and facilities used for the routine operations of government will be retrofitted or relocated to withstand the impacts of disasters.

Objective 2: Community redevelopment plans will be prepared to guide decision-making and resource allocation by local government in the aftermath of a disaster.

Objective 3: Important local government records and documents will be protected from the impacts of disasters.

Objective 4: Plans and programs will be available to assist local government employees in retrofitting or relocating their homes to ensure their availability during a disaster.

Objective 5: Plans will be developed, and resources identified, to facilitate reestablishing local government operations after a disaster.

Objective 6: Redundant equipment, facilities, and/or supplies will be obtained to facilitate reestablishing local government operations after a disaster.

GOAL 5: THE THREAT OF DISASTERS TO THE HEALTH, SAFETY AND WELFARE OF THE COMMUNITY'S RESIDENTS AND VISITORS WILL BE MINIMIZED

Objective 1: Adequate systems for notifying the public at risk and providing emergency instruction during a disaster will be available in all identified hazard areas.

Objective 2: Effective structural measures will be developed to protect residential areas from the physical impacts of disasters.

Objective 3: Facilities in the community posing an extra health or safety risk when damaged or disrupted will be made less vulnerable to the impacts of a disaster.

Objective 4: Public and private medical and health care facilities in the community will be retrofitted or relocated to withstand the impacts of disasters.

Objective 5: Residential structures will be removed or relocated from defined hazard areas.

Objective 6: Residential structures will be retrofitted to withstand the physical impacts of disasters.

Objective 7: Safety devices on transportation networks will not fail because of a disaster.

Objective 8: Structures, facilities and systems serving visitors to the community will be prepared to meet their immediate health and safety needs.

Objective 9: There will be adequate resources, equipment and supplies to meet victims' health and safety needs after a disaster.

GOAL 6: THE POLICIES AND REGULATIONS OF LOCAL GOVERNMENT WILL SUPPORT EFFECTIVE HAZARD MITIGATION PROGRAMMING THROUGHOUT THE COMMUNITY

Objective 1: All reconstruction or rehabilitation of local government facilities will incorporate techniques to minimize the physical or operational vulnerability to disasters.

Objective 2: Land use policies, plans and regulations will discourage or prohibit inappropriate location of structures or infrastructure components in areas of higher risk.

Objective 3: Local government will ensure that hazard mitigation needs and programs are given appropriate emphasis in resource allocation and decision-making.

Objective 4: Local governments will establish and enforce building and land development codes that are effective in addressing the hazards threatening the community.

Objective 5: Local governments will protect high hazard natural areas from new or continuing development.

Objective 6: Local jurisdictions will participate fully in the National Flood Insurance Program and the associated Community Rating System.

Objective 7: New local government facilities will be located outside of hazard areas and/or will be designed to not be vulnerable to the impacts of such hazards.

Objective 8: Reconstruction and rehabilitation of structures and utilities in the community will incorporate appropriate hazard mitigation techniques.

Objective 9: Regulations will be established and enforced to ensure that public and private property maintenance is consistent with minimizing vulnerabilities to disaster.

GOAL 7: RESIDENTS OF THE COMMUNITY WILL HAVE HOMES, INSTITUTIONS AND PLACES OF EMPLOYMENT THAT ARE LESS VULNERABLE TO DISASTERS

Objective 1: Economic incentive programs for the general public, businesses and industry to implement structural and non-structural mitigation measures will be established.

Objective 2: Local government will support key employers in the community in the implementation of mitigation measures for their facilities and systems.

Objective 3: Programs for removal, relocation or retrofitting of vulnerable structures and utilities in hazard areas will be established and implemented.

Objective 4: The vulnerability to disasters of schools, libraries, museums, and other institutions important to the daily lives of the community will be minimized.

GOAL 8: THE ECONOMIC VITALITY OF THE COMMUNITY WILL BE ENHANCED BY THE MITIGATION STRATEGY, PRE- AND POST-DISASTER RECOVERY PLANNING

Objective 1: Components of the infrastructure needed by the community's businesses and industries will be protected from the impacts of disaster.

Objective 2: Local government emergency response and disaster recovery plans will appropriately consider the needs of key employers in the community.

Objective 3: Local government will encourage community businesses and industries to make their facilities and operations disaster resistant.

Objective 4: Local government will establish programs, facilities and resources to support business resumption activities by impacted local businesses and industry.

Objective 5: Local government will implement programs to address public perceptions of community condition and functioning in the aftermath of a disaster.

Objective 6: Local government will strive to diversify the employment base of the community.

GOAL 9: THE AVAILABILITY AND FUNCTIONING OF THE COMMUNITY'S INFRASTRUCTURE WILL BE MINIMALLY DISRUPTED BY A DISASTER

Objective 1: Local governments will encourage hazard mitigation programming by private sector organizations owning or operating key community utilities.

Objective 2: Routine maintenance of the community's infrastructure will be done to minimize the potential for system failure because of or during a disaster.

Objective 3: Sources of energy normally used by the community will not be unwarrantedly vulnerable to the impacts of a disaster.

Objective 4: The telecommunications systems and facilities serving the community will not be unwarrantedly vulnerable to the impacts of a disaster.

Objective 5: Transportation facilities and systems serving the community will be constructed and/or retrofitted to minimize the potential for disruption during a disaster.

Objective 6: Water and sewer services in the community will not fail because of a disaster.

GOAL 10: MEMBERS OF THE COMMUNITY WILL UNDERSTAND THE HAZARDS THREATENING LOCAL AREAS AND THE TECHNIQUES TO MINIMIZE VULNERABILITY TO THOSE HAZARDS

Objective 1: All interested individuals will be encouraged to participate in hazard mitigation planning and training activities.

Objective 2: Education programs in risk communication and hazard mitigation will be established and implemented.

Objective 3: Managers of public facilities will be knowledgeable in hazard mitigation techniques and the components of the community's mitigation plan.

Objective 4: Technical training in mitigation planning and programming will be given to appropriate local government employees.

Objective 5: The owners and operators of businesses and industries in the community will be knowledgeable in appropriate hazard mitigation techniques.

Objective 6: The public living or working in defined hazard areas will be aware of that fact, understand their vulnerability and know appropriate mitigation techniques

Objective 7: The public will have facilitated access to information needed to understand their vulnerability to disasters and effective mitigation techniques

8.3 IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES

44 CFR Requirement

44 CFR Part 201.6(c)(3)(ii):
The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effect of each hazard, with particular emphasis on new and existing buildings and infrastructure.

In formulating the local Mitigation Strategy for Volusia County, a wide range of activities were considered in order to help achieve the established mitigation goals in addition to addressing any specific and targeted hazard concerns. These activities were discussed by the LMS Working Group at meetings held over the course of plan development. In general, all activities considered by the LMS Working Group can be classified under one of the following six (6) broad categories of mitigation techniques.

1. Prevention
Preventative measures are intended to keep hazard problems from getting worse, and are typically administered through government programs or regulatory actions that influence the way land is developed and buildings are built. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

- Planning and zoning
- Building codes
- Open space preservation
- Floodplain regulations
- Stormwater management regulations
- Drainage system maintenance

- Capital improvements programming
- Riverine / fault zone setbacks

2. Property Protection
Property protection measures involve the modification of existing buildings and structures to help them better withstand the forces of a hazard, or removal of the structures from hazardous locations. Examples include:

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (e.g., windproofing, floodproofing, seismic design techniques, etc.)
- Safe rooms, shutters, shatter-resistant glass
- Insurance

3. Natural Resource Protection
Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions. Such areas include floodplains, wetlands, steep slopes and sand dunes. Parks, recreation or conservation agencies and organizations often implement these protective measures. Examples include:

- Floodplain protection
- Watershed management
- Riparian buffers
- Forest and vegetation management (e.g., fire resistant landscaping, fuel breaks, etc.)
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

4. Structural Projects
Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event through construction. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Dams / levees / dikes / floodwalls
- Diversions / detention / retention
- Channel modification
- Storm sewers

5. Emergency Services
Although not typically considered a “mitigation” technique, emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Evacuation planning and management
- Emergency response training and exercises
- Sandbagging for flood protection
- Installing temporary shutters for wind protection

6. Public Education and Awareness
Public education and awareness activities are used to advise residents, elected officials, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects
- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children educational programs
- Hazard expositions

8.4 SELECTION OF MITIGATION TECHNIQUES FOR VOLUSIA COUNTY

In order to determine the most appropriate mitigation techniques for Volusia County, the LMS Working Group thoroughly reviewed and considered the findings of the *Capability Assessment* and *Risk Assessment*. Other considerations included each individual mitigation action's effect on overall risk to life and property, health and safety, the environment, plan consistency, its ease of implementation and general cost-effectiveness, and funding availability (if necessary).

FEMA guidance for meeting the planning requirements of the Disaster Mitigation Act of 2000 specifies that local governments should prioritize their mitigation actions based on the level of risk a hazard poses to life and property. In response to this requirement, the LMS Working Group used and completed a Mitigation Techniques Matrix (**Table 8.3**) to make certain they addressed, at a minimum, those hazards posing the greatest threat.

TABLE 8.3: Mitigation Techniques Matrix for Volusia County

MITIGATION TECHNIQUE	EXAMPLE HIGH RISK HAZARDS			
	FLOOD	WIND (HURRICANE, TORNADO AND TROPICAL STORM	STORM SURGE (COASTAL JURISDICTIONS)	LIGHTNING
Prevention	✓	✓	✓	
Property Protection	✓	✓	✓	
Natural Resource Protection	✓	✓	✓	
Structural Projects	✓	✓	✓	
Emergency Services	✓	✓	✓	✓
Public Education & Awareness	✓	✓	✓	✓

The Mitigation Techniques Matrix provides the LMS Working Group with the opportunity to cross-reference each of the priority high risk hazards (as determined by through the *Risk Assessment)* with the aforementioned comprehensive range available mitigation techniques, including prevention; property protection; natural resource protection; structural projects; emergency services; and public education and awareness. However, it is important to note that Volusia County's Mitigation Action Plan includes an array of actions targeting multiple hazards, and is not necessarily limited to only those classified as high risk.

8.5 MITIGATION SUCCESS STORIES

Completed mitigation projects in any community represent a proactive approach to reducing vulnerability. It can often be difficult to convince a community to use funds for an imminent disaster when no danger is present and local, state, and federal funding sources pose a competitive application process. However, the payoff for these proactive actions can be immense. Mitigation helps to avert loss of life and injury, reduce damage to public and private property, lessen expenditure of resources and exposure to risk for first responders, reduce costs of disaster response and recovery, accelerate recovery

of communities and businesses affected by disasters, and enhance community resiliency[1]. Many of the jurisdictions in Volusia County have completed mitigation projects that reduced vulnerability. Some of these examples are profiled below.

Daytona Beach
The City of Daytona Beach City Hall is a critical facility that houses many of the City's emergency response personnel. It is a central point of information for its residents and a place where many critical decisions are made. The City received HMGP funds after the 2004 hurricanes and those grant funds were used to install hurricane resistant impact glass through the entire facility. This critical facility won't need to be evacuated for minor hurricanes and the contents now have protection against wind events.

The City used HMGP funds from the 2004 hurricanes to retrofit all the doors and windows at the Public Works complex which is also a critical facility. This facility was hardened and upgraded with impact glass and hurricane rated doors. This facility is the main location for the Public Works response personnel handling road repairs, signs, vehicle maintenance, debris removal, garbage pick up, etc.

Edgewater
The City of Edgewater has demonstrated a proactive operation by embarking on mitigation projects using city and grant funds to prevent further damage or loss of public and private properties.

- The City purchased a repetitive loss home on West Pine Bluff, demolished it and constructed a retention pond to eliminate flooding in the neighborhood.
- City owned facilities were improved to be more storm resistant using city and grant funds.
- Stormwater pipe was lined in the Wildwood Subdivision to prevent the continual flooding using city funds.
- The Environmental Services Department Stormwater Division provides continual maintenance to all canals, swales, and retention points to eliminate problems with the stormwater system throughout the city.
- Seagrass was planted along the riverbank at Kennedy Park to eliminate erosion of shoreline.

South Daytona
After Tropical Strom Gordon, the City of South Daytona set an aggressive course to eliminate the flooding of homes. To achieve this, South Daytona increased stormwater utility fees to fund many of the needed improvements to protect residents and their homes and made major changes to the building standards. While the system is not perfect, the number of homes with storm water damage in the most recent storm dropped from 300 homes during Gordon to 16. This reflects an 80 percent reduction in homes flooded.

8.6 PLAN UPDATE REQUIREMENT

Because of FEMA requirements for plan updates the existing Mitigation Actions (as identified in the 2005 plan) were reviewed by each agency responsible identified for implementing the action. For each action, an update on the implementation status (completed, deleted, or deferred) was provided and milestones achieved or impediments to implementation of the actions were identified. These updates

[1] "Recommendations for an Effective National Mitigation Effort." National Emergency Management Association (NEMA), 2009.

have been provided in Section 9: *Mitigation Action Plan*. In addition to revisiting the previously adopted mitigation actions, many new actions were identified by the LMS Working Group through the 2009 plan update process.

SECTION 9 – MITIGATION ACTION PLAN

44 CFR Requirement

44 CFR Part 201.6(c)(3)(iii): The mitigation strategy shall include an action plan describing how the actions identified in paragraph (c)(2)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction.

This section includes the listing of the mitigation actions proposed by Volusia County and its participating jurisdictions and partners. It has been designed to achieve the mitigation goals and objectives established in Section 8: Mitigation Strategy, and will be maintained on a regular basis according to the plan maintenance procedures established in Section 10: Plan Maintenance Procedures.

As described in the previous section, the Mitigation Action Plan, or MAP, represents an unambiguous and functional plan for action. Each proposed mitigation action has been identified as an effective measure (policy or project) to reduce hazard vulnerability for Volusia County.

Most importantly, implementation mechanisms are provided for each action, including the designation of a lead agency or department responsible for implementing the action. Specific information regarding project cost and timeframe for its completion are on file with Volusia County Emergency Management. These implementation mechanisms ensure that Volusia County Local Mitigation Strategy remains a functional document that can be monitored for progress over time.

Table 9.1 describes the key elements of the Mitigation Action Plan.

SECTION 9: MITIGATION ACTION PLAN

Table 9.1: Key Elements of the Mitigation Action Plan

Priority	Indicates whether the action is a "low" priority, "moderate" priority or "high" priority based on the established prioritization criteria: • Low = A score of 10 or less • Moderate = A score between 11 and 24 • High = A score of 25 or higher
Jurisdiction	Identifies the geographic location where the initiative is located.
Responsible Organization	Identifies the local agency, department or organization that is best suited to implement the proposed action.
Hazard(s)	Lists the hazard(s) the proposed action is designed to mitigate against.
Mitigation Technique Category	Indicates the mitigation technique that the proposed action is designed to help achieve. Categories include: • E = Emergency Services • P = Prevention • PE = Public Education • PP = Property Protection • S = Structural
Initiative	Identifies a specific action that, if accomplished, will reduce vulnerability and risk in the impact area. Actions may be in the form of local policies (i.e., regulatory or incentive-based measures), programs or structural mitigation projects and should be consistent with any pre-identified mitigation goals and objectives. An identification number is provided. The county has additional information on file for each initiative (e.g., location, damage history, specific mitigation measure, estimated cost, etc.)
Funding	If applicable, indicates how the cost to complete the action will be funded. For example, funds may be provided from existing operating budgets or general funds, a previously established contingency fund, a cost-sharing federal or state grant program, etc. See key to potential funding sources below.
Approved by LMS Working Group	Identifies the date when the initiative was approved by the LMS Working Group
Completion Date	Indicates when the action was completed. Remember that some actions will require only a minimal amount of time, while others may require a long-term or continuous effort.
Status	The status indicators for each initiative is as follows: • C = Completed • D = Deferred • N = New • T = Terminated • U = Updated

Scoring and Prioritization
Each mitigation initiative has been scored by the responsible jurisdiction. The scoring system is included in Section 8: Mitigation Strategy (Table 8.1).

Prioritizing the proposed mitigation actions was based on the following 11 factors:

- Population Benefited
- Health and Safety Considerations
- Environmental Impact
- Consistency with Other Plans and Programs
- Reduces Risk of Future Property Damage
- Supports Essential or Critical Services
- Probability of Receiving Funding for Implementation
- Feasibility of Implementation
- Community Rating System
- Repetitive Loss Mitigation
- Benefit Cost Ratio (to be conducted prior to submitting a project for grant consideration)

Each mitigation initiative was scored on 10 of these 11 factors. The jurisdictions have not run an official benefit cost analysis (BCA) for the initiatives at this time. The jurisdictions did include a general BCA in the mitigation initiative application that was submitted to Volusia County Emergency Management. However, the BCA will be run for the initiatives following a disaster to factor in all known damage costs.

The mitigation initiatives are not listed in exact priority order, though each has been assigned a priority level of “low”, “moderate”, or “high”. Once the BCA is run, a numerical priority will be assigned.

Funding
Mitigation initiatives are typically funded through local revenue or grant programs such as the Hazard Mitigation Grant Program, the Severe Repetitive Loss Program or the Flood Mitigation Assistance program. No funding is currently available for the mitigation initiatives. As funding is made available the funding source will be updated in for the mitigation initiative in the Mitigation Action Plan. Possible future funding sources are listed for each initiative using the corresponding number as listed below with the name of the program.

Mitigation Funding Sources:

1. Pre-Disaster Mitigation (PDM) competitive grants

The PDM program was authorized by Section §203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended by Section §102 of the Disaster Mitigation Act of 2000, to assist communities to implement hazard mitigation programs designed to reduce overall risk to the population and structures before the next disaster occurs. Eligible projects include:

- Property acquisition or relocation;
- Structural and non-structural retrofitting (e.g. elevation, storm shutters, and hurricane clips);
- Minor structural hazard control on protection (e.g. culverts, floodgates, retention basins); and
- Localized flood control projects that are designed to protect critical facilities and are not part of a larger flood control system.

- Ineligible activities include;
- Major flood control projects;
- Engineering designs are not integral to a proposed project;
- Feasibility and drainage studies that are not integral to a proposed project;
- Flood studies that are not and mapping; and
- Response and communication equipment (e.g. warning systems, generators that are not integral to a proposed project).

Florida Department of Community Affairs
Division of Emergency Management
2555 Shumard Oak Blvd.,
Tallahassee, FL 32399-2100 (850) 413-9966

2. State Homeland Security Program (SHSP)

This core assistance program provides funds to build capabilities at the state and local levels and to implement the goals and objectives included in state homeland security strategies and initiatives in their State Preparedness Report. Consistent with the Implementing Recommendations of the 9/11 Act of 2007 (Public Law 110-53) (9/11 Act), states are required to ensure that at least 25 percent of SHSP appropriated funds are dedicated towards law enforcement terrorism prevention-oriented planning, organization, training, exercise, and equipment activities, including those activities which support the development and operation of fusion centers.

Florida Department of Community Affairs
Division of Emergency Management
2555 Shumard Oak Blvd.,
Tallahassee, FL 32399-2100

3. Community Development Block Grant (CDBG)

The Community Development Block Grants (CDBG) provide for long-term needs, such as acquisition, rehabilitation or reconstruction of damaged properties and facilities and redevelopment of disaster-affected areas. Funds may also be used for emergency response activities, such as debris clearance and demolition, extraordinary increases in the level of necessary public services. Eligible projects include the following:

- Voluntary acquisition or if appropriate, elevation of storm damaged structures (can be used as match for FMA projects in low income areas);
- Relocation payments for displaced people and businesses;
- Rehabilitation or reconstruction of residential and commercial buildings;
- Assistance to help people buy homes, including down payment assistance and interest rate subsidies; and
- Improvement to public sewer and water facilities

Department of Housing and Urban Development www.HUD.gov
Community Planning and Development
451 7th Street, SW
Washington, DC 20410

4. Flood Mitigation Assistance (FMA)

To fund cost effective measures to States and communities that reduce or eliminate the long term risk of flood damage to buildings, manufactured homes, and other insurable structures.

Program Implementation Division
Federal Emergency Management Agency
500 C Street SW
Washington, DC 20472
(202) 646-3619

5. Hazard Mitigation Grant Program (HMGP)

To prevent future losses of lives and property due to disaster; to implement State or local hazard mitigation plans; to enable mitigation measures to be implemented during immediate recovery from a disaster; and to provide funding for previously identified mitigation measures to benefit the disaster area.

Director
Program Implementation Division
Mitigation Directorate
FEMA
500 C Street SW
Washington, DC 20472
(202) 646-4621

6. Public Assistance Program (406 Hazard Mitigation)

To provide supplemental assistance to States, local governments, and certain private nonprofit organizations to alleviate suffering and hardship resulting from major disasters or emergencies declared by the President. Public Assistance (PA) provides funding for the repair, restoration, reconstruction, or replacement of a public facility or infrastructure damaged or destroyed by a disaster. Eligible applicants at the county level include local governments and certain private non-profit (PNP) organizations. Eligible PNP's include educational, emergency, medical, rehabilitation, and temporary or permanent custodial care facilities, utilities, and other PNP facilities which provide essential governmental services to the general public. PA 406 Funds are available for permanent work: Category C -road systems and bridges, Category D - water control facilities, Category E - public buildings and contents, Category F - public utilities, and Category - G parks and recreational facilities. Funding can be used to restore to mitigate future damages if cost beneficial and technically feasible. Code and standard upgrades are eligible for older facilities that must be repaired in accordance with codes and standards that were adopted after the original construction. PA funds may not be used when other funding sources are available, such as insurance, to avoid the duplication of benefits.

Infrastructure Support Division
Response and Recovery Directorate
FEMA
500 C Street SW
Washington, DC 20472
(202) 646-3026

7. Severe Repetitive Loss Program (residential structures only)

To prevent further losses from flooding on homes that experience NFIP insured severe repetitive flood losses. Minimum of 4 NFIP claims @ $5,000 or more OR 2 claims payment (with building payments only) exceeding market value of building. Funding is federal 90 % - non-federal 10%. Mitigation reconstruction can only be funded through SRL (max federal share $150,000 for construction). If awarded, must accept mitigation offer within 45 days; failure to accept offer will cause an increase in insurance premium rate by 150% at renewal.

Project Completion

All mitigation initiatives are expected to take more than one year to be completed. As funding sources are identified, the anticipated project completion will be updated for the mitigation initiative in the Mitigation Action Plan.

Mitigation Initiative Status

The open mitigation initiatives are listed in the Action Plan in **Table 9.2**.

If a mitigation initiative does not have a status indicator, it is considered "open".

No changes have been made to the deferred projects, as no funding is currently available.

The county is in the process of transitioning to this new scoring system and information is still being collected by several of the jurisdictions. Mitigation initiatives that are highlighted in yellow are pending the scoring process by the jurisdiction. All mitigation actions and status are provided in **Appendix F** as part of the Individual Jurisdictional Mitigation Plans.

Flood Vulnerability Reduction

All mitigation initiatives included in the Action Plan that propose to reduce flood hazard vulnerability advance the intent of the National Flood Insurance Program (NFIP), as they will meet the current local floodplain regulations adopted by the jurisdictions as required by the NFIP. Two of the scoring factors used to determine the priority of the actions specifically address the intent of the NFIP and the Community Rating System (CRS). These two factors consider whether the initiative supports elements of the CRS and reduces repetitive flood losses.

Volusia County is highly committed to reducing flood losses in support of the NFIP, and has predominantly used local funding to implement these projects. From 1999 to 2008, 75 flood hazard vulnerability reduction initiatives have been completed and 69 are open. Of the 136 open mitigation initiatives, 50 percent support flood hazard vulnerability reduction.

Examples of these initiatives include: acquiring and relocating repetitive loss structures, relocating critical facilities from the 100-year floodplain, floodproofing equipment at water treatment plants, performing drainage improvement projects and creating new topographic maps based on newly collected Light Detection and Ranging (LiDAR) data.

All Hazard Mitigation Initiatives

Many initiatives address all hazards in the mitigation project. At least one All hazard initiative has been individually identified by most jurisdictions and VOL-0027 is an All Hazards initiative that is the responsibility of the LMS Working Group as a whole.

Table 9.2: Mitigation Action Plan: Open Mitigation Initiatives by Jurisdiction

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
H	Daytona Beach	City of Daytona Beach Fire	Flood	PP	Vol-0413- 607 Aberdeen RepLoss; Acquisition and Demolition.	4, 5, 7		< 1 yr	N
H	Daytona Beach	City of Daytona Beach Fire	Flood	PP	Vol-0418 - 125 Palm Place RepLoss; Acquisition and Demolition	4, 5, 7		< 1 yr	N
H	Daytona Beach	City of Daytona Beach Fire	Flood	PP	401 Jean St - RepLoss; Acquisition and Demolition	4, 5, 7		< 1 yr	N
H	Daytona Beach	City of Daytona Beach Fire	Flood	PP	501 Jean St - RepLoss; Acquisition and Demolition	4, 5, 7		< 1 yr	N
H	Daytona Beach	City of Daytona Beach Fire	Flood	PP	601 Jean St - RepLoss; Acquisition and Demolition	4, 5, 7		< 1 yr	N
H	Daytona Beach	Utilities	Flood	PP	VOL-0165 Stormwater/flood abatement	5	10/1/2001	2011	D
M	Daytona Beach	Utilities	Flood	PP	VOL-0166 A-5 barrier peninsula watershed Ocean Dunes Rd/Ocean Dunes Tr/Wisteria Rd.	5	10/1/2001	2010	D
M	Daytona Beach	Utilities	Flood	S	VOL-0168 B-3 Halifax River drainage basin-Wilder Outfall Study	5	8/1/2001	2010	D
M	Daytona Beach	Utilities	Flood	S	VOL-0364 North Street & Mark Avenue Stormwater Improvements	5	8/30/2005	2011	D
H	Daytona Beach Shores	City of Daytona Beach Shores	All	PP	VOL-0411 Replace the roof at Daytona Beach Shores City Hall	5	1/7/2009	< 1 yr	N
H	DeBary	City of DeBary	Flood	S	VOL-0288 City of DeBary Emergency Outfall System	5	12/7/2004	< 1 yr	
M	DeBary	City of DeBary	Wind	PP	VOL-0341 Provide hurricane shutters for doors & windows at Sheriff's Office	5	1/12/2005	< 1 yr	

Table 9.2: Mitigation Action Plan: Open Mitigation Initiatives by Jurisdiction

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
L	DeBary	City of DeBary	All	ES	VOL-0347 Programmable message boards/trailers	5	1/12/2005	< 1 yr	
M	DeBary	City of DeBary	All	PE	VOL-0390 Community Information using an AM radio frequency EAS	2, 5	3/7/2006	< 1 yr	
H	DeBary	City of DeBary	Flood	S	VOL-0403 Gravity Overflow Systems	5	11/18/2008	< 1 yr	
H	DeBary	City of DeBary	Flood	S	VOL-0404 East Side Flood Management System Upgrade	5	11/18/2008	< 1 yr	
H	DeLand	City of DeLand	Flood	PP	VOL-0349 Acquisition and expansion of stormwater for DeLand Middle School	5	2/14/2005	< 1 yr	D
H	DeLand	City of DeLand	All	PP	VOL-0350 Hardening DeLand City Hall	5	2/14/2005	< 1 yr	D
H	DeLand	City of DeLand	Flood	PP	VOL-0351 Acquire flooded property along New Hampshire between Amelia Ave & Garfield	4, 5, 7	2/14/2005	< 1 yr	U
H	DeLand	City of DeLand Public Services	Flood	ES	VOL-0054 Purchase/install emergency generator for Pistol Range Road	5	8/1/1999	< 1 yr	U
H	DeLand	City of DeLand Public Services	Flood	S	VOL-0241 Acquisition and expansion of stormwater ponds	5	10/13/2004	< 1 yr	U
H	DeLand	City of DeLand Public Services	Flood	S	VOL-0242 Raise head works and effluent pump station	5	10/13/2004	< 1 yr	U
H	DeLand	City of DeLand Public Works	Flood	S	VOL-0002 Construct a stormwater pumping station and force main	5	8/1/1999	< 1 yr	U

Table 9.2: Mitigation Action Plan: Open Mitigation Initiatives by Jurisdiction

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
M	Deltona	City of Deltona Fire Rescue	All	PE	VOL- 0376 Public Education Specialist	2, 5	8/1/1999	< 1 yr	
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0085 Outfall improvements for Pioneer Lake	5	8/1/1999	< 1 yr	
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0086- Outfall improvements for Castle Lake	5	8/1/1999	< 1 yr	
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0090 Culvert improvements at Enterprise-Osteen Road	5	8/1/1999	< 1 yr	
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0406 Lake Lapanocia Pump Station	5	1/7/2009	< 1 yr	N
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0407 Piedmont Pump Station	5	1/7/2009	< 1 yr	N
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0408 Kingsway/Lehigh Culvert	5	1/7/2009	< 1 yr	N
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0409 Tivoli & Wheeling Pump	5	9/21/2005	< 1 yr	
M	Edgewater	City of Edgewater	Flood	PP	VOL-0421 Acquire repetitive flood loss home at 1864 Sabal Palm Drive	4,5,7	6/17/2009	< 1 yr	N
H	Edgewater	City of Edgewater	Flood	ES	VOL-0424 Purchase two (2) portable 6" pumps	5	6/17/2009	< 1 yr	N
H	Edgewater	City of Edgewater	Flood	S	VOL-0426 Retrofit lift station #5 & #1	5	6/17/2009	< 1 yr	N
H	Edgewater	City of Edgewater	All	ES	VOL-0428 Permanent emergency backup generator and gas line for IT Bldg (115 E Park Ave)	5	6/17/2009	< 1 yr	N

Table 9.2: Mitigation Action Plan: Open Mitigation Initiatives by Jurisdiction

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
M	Edgewater	City of Edgewater Fire Department	All	ES	VOL-0070 Purchase emergency back-up generator for the YMCA/shelter	5	8/1/1999	< 1 yr	U
H	Edgewater	City of Edgewater Fire Department	Wind	PP	VOL-0316 Install window & Storm protection to Utilities office	5	12/8/2004	< 1 yr	U
M	Edgewater	City of Edgewater Fire Department	Flood	PP	VOL-0334R Acquire repetitive loss home at 125 Cheeta Drive	4,5,7	1/12/2005	< 1 yr	U
L	Holly Hill	City of Holly Hill	Flood	S	VOL-0278 Trailer mounted emergency pumps	5		< 1 yr	
L	Holly Hill	City of Holly Hill	Flood	PP	VOL-0357 Cave Avenue Structure purchase	5	2/14/2005	< 1 yr	
L	Holly Hill	City of Holly Hill Public Works	Flood	S	VOL-0279 State Avenue (6th - 8th St) Department Stormwater	5	1/12/2005	< 1 yr	
L	Holly Hill	City of Holly Hill Public Works	Flood	S	VOL-0280 Tuscaloosa Street drainage Department improvements	5	1/12/2005	< 1 yr	
L	Holly Hill	City of Holly Hill Public Works	Flood	S	VOL-0281 Eagle Drive and Peacock Rd Department Drainage Improvements	5	1/12/2005	< 1 yr	
L	Holly Hill	City of Holly Hill Public Works	Flood	S	VOL-0282 Espanola Ave Drainage Department Improvements	5	1/12/2005	< 1 yr	
L	Holly Hill	Holly Hill Public Safety	All	ES	VOL-0183 Purchase a passenger van/trailer and traffic control equipment	2,5	11/17/2002	< 1 yr	

Table 9.2: Mitigation Action Plan: Open Mitigation Initiatives by Jurisdiction

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
H	Lake Helen	City of Lake Helen	All	PP	VOL-0051 Renovate to harden the Police building	5	8/1/1999	< 1 yr	
H	Lake Helen	City of Lake Helen	Wind	PP	VOL-0216 Storm Shutters for Police Department and EOC	5	10/13/2004	< 1 yr	
L	New Smyrna Beach	City of New Smyrna Beach Fire	All	ES	VOL-0103R Relocate and replace Fire Department Station #50 (main station)	5	8/1/1999	< 1 yr	U
L	New Smyrna Beach	City of New Smyrna Beach	Wind	ES	Vol-0385- Fire Station 50 Impact Resistant Glass	5	9/10/2007	< 1 yr	U
M	New Smyrna Beach	City of New Smyrna Beach	Flood	PP	Vol-0386-Central Beachside Flood Mitigation Project Phase II	5	9/10/2007	< 1 yr	U
L	New Smyrna Beach	City of New Smyrna Beach	Wind	PP	Vol-0394-Installing Impact Resistant Windows in the New Smyrna City Gym	5	9/10/2007	< 1 yr	U
M	New Smyrna Beach	City of New Smyrna Beach	Flood	S	VOL-0410 New Smyrna Beach Central Beachside Storm Water Management Project	5	1/7/2009	< 1 yr	U
L	New Smyrna Beach	City of New Smyrna Beach	Wind	PP	Vol-384- Wind Resistance Protective Measures	5	9/10/2007	2010	U
H	Oak Hill	City Hall	All	PP	VOL--0217 Harden City Hall/Police	5	10/13/2004	< 1 yr	
H	Orange City	City of Orange City	Flood	S	VOL-0398 - Fawn Ridge Subdivision	5	10/7/2008	< 1 yr	
H	Orange City	City of Orange City	Flood	S	VOL-0399 Treemont Drainage Project	5	10/7/2008	< 1 yr	
M	Ormond Beach	City of Ormond Beach	All	PP	VOL-0151 Purchase hurricane shutters and generator power for the Performing Arts Center	5	12/1/2000	< 1 yr	

Table 9.2: Mitigation Action Plan: Open Mitigation Initiatives by Jurisdiction

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
H	Ormond Beach	City of Ormond Beach	All	ES	VOL-0194 Purchase 30 emergency radios for use during emergencies	2,5	11/18/2002	< 1 yr	
H	Ormond Beach	City of Ormond Beach	Flood	PP	VOL-0400 Elevate Whitley residence, 350 Cumberland Avenue	4,5,7	10/7/2008	< 1 yr	
M	Ormond Beach	City of Ormond Beach Public Works	Flood	S	Vol-0325R Hand Ave/ Laurel Creek Pump Station Generator & Central Park Pond Interconnects	5	1/11/2005	< 1 yr	
M	Ormond Beach	City of Ormond Beach Public Works	Flood	S	VOL-0328 Hand Avenue roadway & Drainage improvements	5	1/11/2005	< 1 yr	
M	Ormond Beach	City of Ormond Beach Fire	Flood	S	Vol-0387- Thompson Creek Stormwater Department Improvement	5	9/10/2007	< 1 yr	
M	Ormond Beach	City of Ormond Beach Public Works	Flood	S	VOL-0050 Drainage improvements to areas of "Old Ormond" (mainland)	5	8/1/1999	< 1 yr	
M	Ormond Beach	City of Ormond Beach Public Works	Flood	S	VOL-0353 Hand Avenue	5		< 1 yr	
	Pierson	Town of Pierson	Wind	PP	VOL-0028 Harden the Town Hall by installing motorized roll down shutters	5	9/1/1999	< 1 yr	
	Pierson	Town of Pierson	All	P	VOL-0218 Secure water supply	2,5	10/13/2004	< 1 yr	
	Pierson	Town of Pierson	All	ES	VOL-0219 Establish an Emergency Operations Center in Community Center	5	10/13/2004	< 1 yr	

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Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Pierson	Town of Pierson	Wind	PP	VOL-0220 Establish an MH retrofit tie-down program	5	10/13/2004	< 1 yr	
	Pierson	Town of Pierson	Flood	S	VOL-0221 Establish stormwater management maintenance program	5	10/13/2004	< 1 yr	
H	Ponce Inlet	Ponce Inlet Fire Department	All	ES	VOL-0173 Purchase the equipment necessary to equip a mobile command center	2,5	1/1/2002	< 1 yr	
H	Ponce Inlet	Town of Ponce Inlet	Wind	PP	VOL-0419 Install Hurricane Windows & Entrance Doors on Fire Station	5	6/16/2009	< 1 yr	
H	Ponce Inlet	Town of Ponce Inlet	Flood	S	VOL-0420 Purchase 4" Pump for flood control	5	6/16/2009	< 1 yr	
M	Port Orange	City of Port Orange	Flood	PP	VOL-0130 Purchase Seabird Island; remove mobile homes, and convert the area into a park	5	12/1/2000	< 1 yr	N
M	Port Orange	City of Port Orange	All	ES	VOL-0169R Retrofit the Port Orange Cypress Head golf course banquet area	5	10/1/2001	< 1 yr	N
H	Port Orange	City of Port Orange	Wind	S	VOL-0176 Install FDOT traffic signal arms that can withstand 140MPH wind load	5	1/1/2002	< 1 yr	N
H	Port Orange	City of Port Orange	Flood	S	VOL-0228 Taylor Woods and S. Williamson Drainage retrofit	5	10/13/2004	< 1 yr	N
H	Port Orange	City of Port Orange	Flood	S	VOL-0229 Taylor RD Drainage retrofit	5	10/13/2004	< 1 yr	N
H	Port Orange	Port Orange Emergency	Flood	S	VOL-0391 B-23 Canal Seawall Improvement	5	9/10/2007	< 1 yr	N

Table 9.2: Mitigation Action Plan: Open Mitigation Initiatives by Jurisdiction

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
		Management							
	Private Non-Profits	Evangelical Lutheran Good	Wind	PP	VOL-0362 Providing hurricane shutters for Samaritan Society nursing homes in Daytona Beach & Deland	5	4/8/2005	< 1 yr	
H	South Daytona	City of South Daytona	All	PP	Vol-0389-South Daytona EOC/Public Works Facility	5	1/10/2007	< 1 yr	
	Volusia County (Unincorporated)	Environmental Management	Flood	NRP	VOL-0265 Habitat Stabilization/Revegetation Project	5	10/13/2004	< 1 yr	
	Volusia County (Unincorporated)	Environmental Management	Surge	PP	VOL-0266 Shoreline Erosion Control and Restoration Project	5	10/13/2004	< 1 yr	
H	Volusia County (Unincorporated)	Florida Hospital Fish Memorial	Flood	S	VOL-0405 Florida Hospital Fish Memorial Orange City Retention Pond Project	5	1/7/2009	< 1 yr	N
M	Volusia County (Unincorporated)	Public Works	All	PP	VOL-0255 Volusia County Public Works Eastside Service Center	5	10/13/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Public Works	All	ES	VOL-0256 Mosquito Control Helicopter Hangar	5	10/13/2004	< 1 yr	U
H	Volusia County (Unincorporated)	Public Works	Wind	S	VOL-0257 Mast Arm Replacement for Traffic Signals	5	10/13/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Public Works	All	S	VOL-0300 Onsite generator for New Hope Villas of Seville wastewater treatment	5		< 1 yr	U

Table 9.2: Mitigation Action Plan: Open Mitigation Initiatives by Jurisdiction

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Volusia County (Unincorporated)	Public Works	All	PE	VOL-0323 Overhead School Zone Signs	5			
M	Volusia County (Unincorporated)	United Cerebral Palsy of East Central Florida	Wind	PP	VOL-0401 Harden facility to withstand hurricane force winds & meet ARC 4496 shelter standards	5	11/18/2008	< 1 yr	U
M	Volusia County (Unincorporated) All Jurisdictions	Volusia Prepares Working Group	All	PP/PE/P/S	VOL-0027 LMS Steering Committee support a home mitigation education & incentive program	5	6/1/1999	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency	Flood	PP	VOL-0259 1001 Shockney DR Mitigation	4,5,7	10/13/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0320 DEMO/REBUILD REPETITIVE LOSS HOME AT 1633 SPRING GARDEN DRIVE ASTOR	4,5,7	12/7/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0321R Elevate & retrofit rep loss property at 1490 Stone Trail, Enterprise	4,5,7	2/14/2005	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0336 Demo/rebuild repetitive loss property at 979 Shockney Drive	4,5,7	1/12/2005	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	PE	VOL-0366 Understanding Volusia County's demographics to anticipate behavior & mitigate hazards	2,5	9/12/2005	< 1 yr	D
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	PE	VOL-0367 Volusia Prepares Business	2,5	9/20/2005	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	PE	VOL-0368 Condominium mitigation video	5	9/20/2005	< 1 yr	U

Table 9.2: Mitigation Action Plan: Open Mitigation Initiatives by Jurisdiction

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0380 1007 Shockney DR Mitigation	4,5,7	10/13/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0382 Demo/Rebuild 1021 Shockney Drive due to repetitive flood losses	4,5,7	4/14/2005	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	P	VOL-0023 Develop and implement a Community Emergency Management Academy	2,5	8/1/1999	< 1 yr	D
H	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	S	VOL-0180 Conduct a causeway/bridge vulnerability assessment	5	8/1/2002	< 1 yr	D
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0201 Increase the base flood elevation requirement	5	11/1/2002	< 1 yr	D
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Wind	PP	VOL-0202 Prohibit the placement of new/replacement manufactured homes in the wind-born debris	5	11/1/2002	< 1 yr	D
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	ES	VOL-0204 Integrate and expand the existing CERT programs	2,5	11/1/2002	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0267 Stone Island Flood Mitigation Project	4,5,7	10/13/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0268 Tomoka Estates Flood Mitigation Project	4,5,7	10/13/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0269 Repetitive Loss Property Mitigation	4,5,7	10/13/2004	< 1 yr	U

Table 9.2: Mitigation Action Plan: Open Mitigation Initiatives by Jurisdiction

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0115 Replace existing Fire Station 23	2,5	8/1/1999	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0153 Construct a structural collapse training facility	2,5	12/1/2000	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0154 Purchase specialized rescue equipment	2,5	12/1/2000	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0270 Emergency Power for 4 County Fire Stations	5	10/13/2004	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0271 Training Facility Improvements	2,5	10/13/2004	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0274 Weather Stations for 22 Fire Stations	2,5	10/13/2004	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0290 Replace Fire Station 43 in Seville	5	12/8/2004	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0291 Replace Fire Station 13 in Ormond Beach	5	12/8/2004	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0292 Replace Fire Station 15 in Daytona Beach	5	12/8/2004	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0293 Replace Fire Station 41 in DeLeon Springs	5	12/8/2004	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0294 Replace Fire Station 32 in DeLand	5	12/8/2004	< 1 yr	

Table 9.2: Mitigation Action Plan: Open Mitigation Initiatives by Jurisdiction

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Volusia County (Unincorporated)	Volusia County Health Department	All	ES	VOL-0031To provide emergency power to operate the medical clinics	2,5	8/1/1999	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department	All	ES	VOL-0175 Install a backup generator at the new Health Department building	5	1/1/2002	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department	All	PE	VOL-0252 VCHD Public Information Disaster Initiative	2,5	10/13/2004	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department	Wind	PP	VOL-0324 Harden roof on main Health Dept building	5		< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department - Daytona Clinic	All	ES	VOL-0249 Emergency Communications	2,5	10/13/2004	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department - Daytona Clinic	All	ES	VOL-0250 Emergency Backup Power	5	10/13/2004	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department - Daytona Clinic	All	ES	VOL-0251 Emergency Prime Mover Vehicle	5	10/13/2004	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department - Daytona Clinic	All	ES	VOL-0030 To provide emergency power to operate the medical clinics	5	8/1/1999	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department - DeLand Clinic	All	ES	VOL-0253 Emergency Response	2,5	10/13/2004	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department - Env. Health Lab	All	ES	VOL-0029 Provide emergency generator power at Environmental Health Lab	5	8/1/1999	< 1 yr	

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Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Volusia County (Unincorporated)	Volusia County Private Agencies	All	PP	VOL-0026 Develop a countywide contractor licensing program	5		< 1 yr	
	Volusia County (Unincorporated)	Volusia County Private Agencies	All	PP	VOL-0045 Protect United Way Headquarters with generator & window protection	5		< 1 yr	
	Volusia County (Unincorporated)	Volusia County Private Agencies	All	ES	VOL-0132 Fund CERV program	5		< 1 yr	
M	Volusia County (Unincorporated)	Volusia County Private Agencies	Flood	S	VOL-0181 Infrastructure placement in Tomoka Estates Subdivision	2,5	5/21/2004	< 1 yr	U
	Volusia County (Unincorporated)	Volusia County Road & Bridge	Flood	S	VOL-0035 Replace Orange Avenue Bridge with Fixed High Level Bridge	5	8/1/1999	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Road & Bridge	Flood	S	VOL-0038 Replace Bridge #794010 (Taylor Road over B-19)	5	8/1/1999	< 1 yr	
M	Volusia County (Unincorporated)	Volusia County Sheriff's Dept	All	ES	VOL-0198 Updated 09/10/08 Construct a hardened, centralized evidence storage facility	5	11/1/2002	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Emergency Management	All	ES, PP	VOL-0053 Purchase/install emergency generator for Volusia County Fairgrounds	5	8/1/1999	< 1 yr	U

SECTION 10 – PLAN MAINTENANCE PROCEDURES

44 CFR Requirement

44 CFR Part201.6(c)(4)(i):
The plan shall include a plan maintenance process that includes a section describing the method and schedule of monitoring, evaluating and updating the mitigation plan within a five-year cycle.

44 CFR Part 201.6(c)(4)(ii):
The plan maintenance process shall include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

This section of the Plan discusses how the Mitigation Strategy and Mitigation Action Plan will be implemented and how the LMS will be evaluated and enhanced over time. This section also discusses how the public will continue to be involved in a sustained hazard mitigation planning process. It consists of the following three subsections:

- **Implementation**
- **Monitoring, Evaluation and Enhancement**
- **Continued Public Involvement**

10.1 IMPLEMENTATION

Each agency, department or other partners participating under the Volusia County Multi-jurisdictional LMS is responsible for implementing specific mitigation actions as prescribed in the Mitigation Action Plan. Every proposed action listed in the Mitigation Action Plan is assigned to a specific "lead" agency or department in order to assign responsibility and accountability and increase the likelihood of subsequent implementation.

In addition to the assignment of a local lead department or agency, an implementation time period or a specific implementation date has been assigned in order to assess whether actions are being implemented in a timely fashion. Volusia County and its participating jurisdictions and partners will seek outside funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments[1]. When applicable, potential funding sources have been identified for proposed actions listed in the Mitigation Action Plan.

Plan Integration
The LMS Working Group has identified and will continue to examine opportunities to integrate the LMS into other planning documents and vice versa to more comprehensively reduce hazard vulnerabilities.

[1] A listing of key federal hazard mitigation funding sources can be found in the *Guide to Funding and Technical Assistance Programs*, provided as a separate annex to this Plan.

This includes integrating the LMS requirements into other local planning documents, processes or mechanisms as follows:

- Ensure that the goals and strategies of new and updated local planning documents for their agencies or departments are consistent and do not conflict with the goals and actions of the LMS and will not contribute to increased hazard vulnerability in the County.
- Include LMS Vulnerability Assessment in CEMP updates.
- Include a reference to the LMS in the Local Government Comprehensive Plan.
- Consider including hazard maps in the Local Government Comprehensive Plan future land use section.
- Review the Capital Improvement Plan to determine whether any projects should be included in the LMS.

The 2005 LMS has been integrated into other planning processes. For examples:

- Many of the jurisdictions incorporated the Vulnerability Assessment into their CEMP updates.
- The Public Works Department reviewed their Capital Improvements project list for projects to include in the LMS Mitigation Action Plan.
- The 2002 Local Government Comprehensive Plan includes policies for flood, sinkhole, surge and wildfire hazards vulnerability reduction (e.g., protection of natural environment, acquiring and protecting land in the Coastal High Hazard Are (CHHA) and floodplains, limiting development in the CHHA, regulation of stormwater and disallowance of future landfills in high aquifer recharge or karst areas, etc.).

Opportunities to integrate the requirements of this Plan into other local planning mechanisms shall continue to be identified through future meetings of the LMS Working Group and through the five-year review process described herein. Although it is recognized that there are many possible benefits to integrating components of this Plan into other local planning mechanisms, the development and maintenance of this stand-alone LMS is deemed by the Volusia County LMS Working Group to be the most effective and appropriate method to implement local hazard mitigation actions at this time.

10.2 MONITORING, EVALUATION AND ENHANCEMENT

Periodic revisions and updates of the LMS are required to ensure that the goals of the Plan are kept current and account for potential changes in hazard vulnerability and mitigation priorities. In addition, revisions may be necessary to ensure that the Plan is in full compliance with applicable federal and state regulations. Periodic evaluation of the Plan will also ensure that specific mitigation actions are being reviewed and carried out according to the Mitigation Action Plan.

The Volusia LMS Working Group is responsible for monitoring and updating the LMS on a regular basis: annually, every five years, or following a major disaster or major development activity throughout Volusia County.

The Volusia County LMS Working Group will continue to meet at least annually and following any disaster events warranting a reexamination of the mitigation actions being implemented or proposed

for future implementation. This will ensure that the Plan is continuously updated to reflect changing conditions and needs within Volusia County. If determined appropriate or as requested, an annual report on the Plan will be developed and presented to the Volusia County Council in order to report progress on the actions identified in the Plan and to provide information on the latest legislative requirements and/or changes to those requirements.

10.2.1 Five (5) Year Plan Review

The Plan will be thoroughly reviewed by the LMS Working Group every five years to determine whether there have been any significant changes in Volusia County that may, in turn, necessitate changes in the types of mitigation actions proposed. New development in identified hazard areas, increased exposure to hazards, the increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the necessary content of the Plan.

The plan review provides Volusia County officials with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures. The plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented as assigned. Volusia County Emergency Management Services department will be responsible for reconvening the LMS Working Group and conducting the five-year review.

LMS Evaluation Criteria
During the five-year plan review process, the following questions will be considered as criteria for "evaluating" the LMS by assessing the effectiveness and appropriateness of the Plan:

- Do the goals address current and expected conditions?
- Has the nature or magnitude of risks changed?
- Are the current resources appropriate for implementing the Plan?
- Are there implementation problems, such as technical, political, legal or coordination issues with other agencies?
- Have the outcomes occurred as expected?
- Did the County and participating agencies and other partners participate in the plan implementation process as assigned?

Following the five-year review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and plan amendment process outlined herein. Upon completion of the review and update/amendment process, the Volusia County LMS will be submitted to the State Hazard Mitigation Officer at the Florida Division of Emergency Management (FDEM) for final review and approval in coordination with the Federal Emergency Management Agency (FEMA).

10.2.2 Disaster Declaration

Following a disaster declaration, the Volusia County LMS will be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility of the Volusia County Emergency Management Services department to reconvene the

LMS Working Group and ensure the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

10.2.3 Reporting Procedures

The results of the five-year review will be summarized by the LMS Working Group in a report that will include an evaluation of the effectiveness of the Plan and any required or recommended changes or amendments. The report will also include an evaluation of implementation progress for each of the proposed mitigation actions, identifying reasons for delays or obstacles to their completion along with recommended strategies to overcome them.

10.2.4 Plan Amendment Process

Upon the initiation of the amendment process, Volusia County and its participating jurisdictions and partners will forward information on the proposed change(s) to all interested parties including, but not limited to, all directly affected County departments, residents, and businesses. Information will also be forwarded to the Florida Division of Emergency Management. This information will be disseminated in order to seek input on the proposed amendment(s) for not less than a 45-day review and comment period.

At the end of the 45-day review and comment period, the proposed amendment(s) and all comments will be forwarded to the LMS Working Group for final consideration. The committee will review the proposed amendments along with the comments received from other parties, and, if acceptable, the committee will submit a recommendation for the approval and adoption of changes to the Plan to the Volusia County Council within 60 days.
In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered by the LMS Working Group:

- There are errors, inaccuracies or omissions made in the identification of issues or needs in the Plan;
- New issues or needs have been identified which are not adequately addressed in the Plan;
- There has been a change in information, data, or assumptions from those on which the Plan is based.

Upon receiving the recommendation from the LMS Working Group and prior to adoption of the Plan, the County will hold a public hearing if deemed necessary. The Volusia County Council will review the recommendation from the LMS Working Group (including the factors listed above) and any oral or written comments received at the public hearing. Following that review, the County Council will take one of the following actions:

- Adopt the proposed amendments as presented
- Adopt the proposed amendments with modifications
- Refer the amendments request back to the LMS Working Group for further revision, or
- Defer the amendment request back to the LMS Working Group for further consideration and/or additional hearings

10.3 CONTINUED PUBLIC INVOLVEMENT

44 CFR Requirement

44 CFR Part 201.6(c)(4)(iii):
The plan maintenance process shall include a discussion on how the community will continue public participation in the plan maintenance process

Public participation is an integral component to the mitigation planning process and will continue to be essential as this Plan evolves over time. As described above, significant changes or amendments to the Plan shall require a public hearing prior to any adoption procedures.

Other efforts to involve the public in the maintenance, evaluation and revision process will be made as necessary. These efforts may include:

- Advertising meetings of the LMS Working Group in local newspapers, public bulletin boards and/or County office buildings
- Designating willing and voluntary citizens and private sector representatives as official members of the LMS Working Group
- Utilizing local media to update the public of any maintenance and/or periodic review activities taking place
- Utilizing the Volusia County website to advertise any maintenance and/or periodic review activities taking place, and
- Keeping copies of the Plan in public libraries

APPENDIX A: PLAN ADOPTION - LOCAL RESOLUTIONS

APPENDIX B: BYLAWS AND OPERATING PROCEDURES

Bylaws of the Volusia County Local Mitigation Strategy (LMS) Working Group

Article I. Purpose

CHAPTER 9G-22 of the Florida Administrative Code requires each county electing to participate in the Hazard Mitigation Grant Program (HMGP) to have a formal LMS Working Group and a current LMS.

The purpose of the Local Mitigation Strategy (LMS) Working Group is to make the county disaster resistant by identifying actions that can be taken to reduce or eliminate the exposure of human life or property to harm from a man-made or natural disaster through a partnership between government, businesses, organizations, associations and citizens. The Working Group will develop, monitor, implement and maintain a comprehensive plan for hazard mitigation to accomplish this goal.

The working group shall be known as the *"Volusia Prepares LMS Working Group."*

Article II. Membership and Participation

Membership is open to all municipalities, private organizations, civic organizations, Native American Tribes or authorized tribal organizations, water management districts, independent special districts and non-profit organizations. Membership is voluntary however only active members in good standing will be eligible for grant funding.

Article III. Organizational Structure

The Working Group shall have a chairperson and vice-chairperson elected by voice vote of the membership. Any member is eligible for election to one of these positions. Each shall serve a term of one year and be eligible for re-election for an unlimited number of terms.

The chair will preside at each meeting of the Working Group, as well as establish temporary subcommittees and assign personnel to them. The vice chair will fulfill the duties and responsibilities of the chair in his or her absence.

Technical, clerical and other types of support activities to the Working Group will be provided by Volusia County Emergency Management Services. Other jurisdictions and organizations may also provide such services on a voluntary basis upon request of the chair.

Article IV. Objectives

The objectives of the Volusia Prepares LMS Working Group are:

1. To keep the Volusia County Local Mitigation Strategy (LMS) document current by incorporating new initiatives, objectives and goals.
2. To utilize the LMS document to identify recent risk assessment data and mitigation priorities.
3. To regularly update the countywide risk assessment to accommodate new areas of vulnerability.
4. To inventory current mitigation projects and initiatives, develop a tracking mechanism for project follow-through and establish evaluation criteria to measure the success of mitigation projects.
5. To develop and maintain overall policies and procedures and integrate priorities of mitigation efforts.
6. To facilitate comprehensive effectiveness by integrating hazard mitigation into other countywide planning efforts.
7. To vote on proposed action plans and initiatives.
8. To develop a strategy to constantly identify and recruit new partners.
9. To develop a systematic method to share knowledge and market the need for being disaster resistant.
10. To identify incentives for individuals and organizations to implement mitigation strategies (financial, regulatory, insurance, etc.)
11. To promote accomplishments to elected officials and community.
12. Assess the most at-risk businesses and pursue businesses for participation in the development of a small to medium-sized business emergency preparedness mentoring program.
13. Promote business continuity planning by presenting the Volusia County Disaster Planning Workshop.
14. Encourage development of employer/employee emergency operations plans.
15. Encourage businesses to mitigate current hazards by supplying them with a business disaster plan template and information, performing energy audit/hazard analysis, and allowing them to tour other businesses that have reduced risk in the workplace.
16. To incorporate mitigation initiatives into long-term business planning by providing guidance to prospective businesses on choosing a disaster resistant location and mitigating possible hazards.
17. To work with local financial institutions and/or insurance companies to provide low or no interest loans or premium reduction for homeowners committed to mitigating their house or property.
18. To identify incentives for individuals and organizations to implement mitigation strategies (financial, regulatory, insurance, etc.).
19. To utilize existing disaster-resistant construction literature to market the advantages of building a disaster-resistant home.
20. To provide low to no cost mitigation to low-moderate income homeowners and special needs populations.

21. To identify incentives for individuals and organizations to implement mitigation strategies (financial, regulatory, insurance, etc.).
22. To participate and support volunteerism through community groups such as Citizen Corp and Community Emergency Response Teams (CERT).

Article V. Responsibilities

The Working Group is responsible for:

1. The oversight and coordination of all actions and decisions by the Group and is solely responsible for formal actions in the name of the Group, including the release of reports, development of resolutions, issuance of position papers and similar activities.
2. Identifying, analyzing and monitoring the hazards threatening Volusia County and the vulnerabilities of the community to those hazards, as well as to assist in the definition of actions to mitigate the impacts of those hazards; to define structural and non-structural actions needed to decrease the human, economic and environmental impacts of disasters, and to plan a strategy for implementation of those initiatives in both the pre- and post-disaster time frame; to define the general financial vulnerability of the community to the impacts of disasters; to assist with identification of initiatives to minimize vulnerabilities; and to seek funding sources for all priority mitigation initiatives identified in the mitigation strategy.
3. To secure public input and comment on the efforts of the Group; to inform the public about the activities of the Group; to conduct public information and education programs regarding hazard mitigation; to assist with the conduct of public hearings; and, to promote public acceptance of the strategy developed by the Group.
4. To incorporate the business sector's mitigation needs into the LMS document.
5. To promote disaster preparedness and mitigation at the community/individual level through partnerships and volunteerism.
6. The municipalities must provide to the County on an annual basis (Oct 31):
    a. updates to hazard mitigation initiatives,
    b. vulnerability assessment information, and
    c. repetitive loss properties information.

Article VI. Actions by the Working Group

A. Authority for Actions

Only the Working Group has the authority to take final actions in the name of Volusia Prepares.

B. Meetings, Voting and Quorum

1. Meetings will be conducted in accord with the most current Robert's Rules of Order, if and when deemed necessary by the chair of the meeting.
2. Regular meetings will be scheduled at least quarterly. Any organization that fails to attend three out of four consecutive regular quarterly meetings shall not be eligible to participate in the Hazard Mitigation Grant Program (HMGP) or receive monies from that grant. Organizations will again be eligible for grant funding after representative attends three (3) consecutive regular quarterly meetings.
3. All final actions and decisions made in the name of Volusia Prepares will be by affirmative vote of a quorum of Working Group. A quorum shall consist of voting members present. Each member shall have one vote.
4. Special meetings may be called under emergency situations or when there are other extenuating circumstances that are judged by both the chair and vice-chair of the Working Group to prohibit scheduling of a regular meeting. A quorum for special meetings shall consist of voting members present. Each member shall have one vote.
5. When required by statute, the policies of Volusia County, or when deemed necessary by the Working Group, a public hearing regarding actions under consideration for implementation by the Working Group will be held.
6. All meetings and other forms of action taken by the Working Group will be documented and made available for inspection by the public.

VII. Adoption of and Amendments to the Bylaws

The bylaws of Volusia Prepares may be adopted and/or amended by affirmative vote of two thirds (2/3) majority of the members present at the time of the vote. All proposed changes to the bylaws shall be provided to the membership not less than ten (10) working days prior to such a vote.

VIII. Dissolution of the Working Group

Volusia Prepares may be dissolved by affirmative vote of two-thirds (2/3) majority of the members at the time of the vote, by order of a court of competent jurisdiction, and/or instruction of the Volusia County governing body. At the time of dissolution, all remaining documents, records, equipment and supplies belonging to Volusia Prepares will be transferred to Volusia County for disposition.

APPROVED March 11, 2009

Operating Procedures for the
Volusia Prepares Local Mitigation Strategy Working Group
Volusia County, Florida

1.0 Background and Purpose

The Volusia Prepares Local Mitigation Strategy Working Group (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 principal component of the Volusia County Local Mitigation Strategy (LMS). The fundamental purpose of this plan is to guide, coordinate and facilitate the efforts of the agencies, organizations, and individuals participating in the Working Group as they seek funding, authorities or other resources necessary for implementation of the identified mitigation initiatives.

The LMS Working Group has established an organizational structure to support its operations, and has adopted bylaws that govern the membership and functioning of the group. To complement these bylaws, these procedures have been prepared to define how this organizational structure identifies, evaluates and processes the mitigation initiatives needed to reduce the community's vulnerability to future disasters. The procedures identify the steps through which newly proposed mitigation initiatives are evaluated and coordinated among the participants in the LMS Working Group, and then incorporated into the local mitigation plan. The procedures also define how the local mitigation plan will be routinely updated, enhanced and maintained in the future.

2.0 Overview of the Procedure

This procedure defines the fundamental operations by the LMS Working Group to develop, expand and maintain the local mitigation strategy, including the following:

- Support of the organization and its operations,
- Identification of the natural, technological and societal hazards threatening the community
- Evaluation of the human, economic and environmental vulnerabilities to those hazards,
- Assessment of the existing framework of policies, plans and requirements of the community as related to the capability to eliminate, reduce or mitigate the community's vulnerabilities to the identified hazards,
- Identification, characterization, justification and prioritization of new initiatives to eliminate, reduce or mitigate the community's vulnerabilities,
- Evaluation and coordination of new mitigation initiatives by the LMS Working Group,
- Resolution of conflicts between participants in the planning regarding proposed mitigation initiatives and their implementation,
- Incorporation of mitigation initiatives into the plan for future implementation,
- Coordination of the implementation of mitigation initiatives in the plan,

- Periodic review of the status of implementation of the initiatives incorporated into the local mitigation plan, and assessment of their priority for the ensuing planning period, and
- Preparation and distribution of updated editions of the local mitigation plan to the community for review and adoption by the jurisdictions and organizations represented on the LMS Working Group.

3.0 Development and Maintenance of the LMS Working Group's Organization

The categories and types of participants that are eligible for membership in the LMS Working Group are specified in the bylaws. Participants in the LMS Working Group include many different types of agencies, organizations and individuals, such as government agencies, regional authorities, community and neighborhood groups, business associations, private businesses and industries, local institutions, and even interested individuals. Organizational participants in the LMS Working Group have the following duties:

- To assign individuals to serve as agency or organizational representatives on the LMS Working Group,
- To have these representatives attend meetings and contribute to the discussions and decision making conducted by the LMS Working Group,
- To provide expertise, information or perspective on the identification and definition of hazards threatening the community,
- To conduct technical evaluations of the vulnerabilities of the facilities, systems, neighborhoods, operations and/or valuable resources for which they are responsible or otherwise depend upon,
- To identify, characterize, prioritize and propose for incorporation into the plan various structural and non-structural mitigation initiatives that would eliminate, reduce or mitigate the vulnerabilities of their facilities, systems, operations or resources to the impacts of future disasters,
- To adopt, endorse or otherwise approve their portion of the local mitigation plan,
- To strive to implement the mitigation initiatives identified by the organization and incorporated into the plan by the LMS Working Group as the resources and/or authorities to do so become available,
- To continue to appraise the LMS Working Group of the implementation status of the organization's proposed mitigation initiatives incorporated into the plan, and
- To support or otherwise participate in the LMS Working Group's activities in the community to further develop its overall mitigation capability.

The bylaws of the Volusia County LMS Working Group also establish the organizational structure and responsibilities for development, maintenance and implementation of the local mitigation plan.

A program staff functioning under the direction of the LMS Working Group will establish a schedule of meetings of the committees, notify individuals of the meeting time and locations, and otherwise support the committees in their activities. The program staff will also routinely issue reports regarding the status of participation of the agencies and organizations with membership in the LMS Working Group, as well as on the progress of these agencies and organizations in developing and maintaining their role in the strategy. To do this, the program

staff will maintain a list of the public and private organizations and agencies making up the LMS Working Group.

The program staff will also support the organization through the following operations:

- Scheduling meetings of the LMS Working Group,
- Supporting meetings as needed by preparing agendas and facilitating discussion, as well as preparing and distributing summaries of meetings,
- Training and informing participants in the technical and administrative operations needed for development and maintenance of the strategy,
- Assisting with the technical analyses, when necessary,
- Processing information and data provided by the participants for its use in the local mitigation plan,
- Supporting agency and organizational efforts for the implementation of the mitigation initiatives incorporated into the plan,
- Maintaining the computer database of the mitigation initiatives proposed by the participants and incorporated into the plan, and
- Providing other such information and support as feasible to accomplish the mission of the LMS Working Group.

4.0 Increasing Community Awareness and Understanding of Hazard Mitigation

One of the key roles of the Volusia County LMS Working Group is to increase the general public's awareness of the benefits of hazard mitigation and the available techniques for making the community more disaster resistant. An important assessment necessary for the effective development and maintenance of the Volusia County Local Mitigation Strategy is to evaluate the current level of the public's understanding of, acceptance for and willingness to implement a range of mitigation initiatives. Periodically, the LMS Working Group will survey portions of the community or otherwise solicit information regarding the public's perspective on mitigation needs and programs, as well as the factors that make the public more vulnerable to disasters than is warranted.

The LMS Working Group will be responsible for ensuring that processes undertaken for the development, implementation and maintenance of the Volusia County Local Mitigation Strategy have adequately considered public needs and viewpoints. As needed, the LMS Working Group will encourage appropriate participating agencies and organizations to propose mitigation initiatives that would, upon implementation, further public understanding and utilization of good mitigation practices.

5.0 Identification of the Hazards Threatening the Community

The LMS Working Group is responsible for initial and ongoing efforts to identify the natural, technological and societal hazards threatening the community. The purpose of this analysis is to define those locations, facilities or systems within Volusia County that may be vulnerable to the impacts of those hazards and warrant further assessment. For the convenience of subsequent planning, the analysis will be conducted, as much as feasible, on the basis of local government jurisdictional boundaries.

In its discretion, the LMS Working Group may conduct this analysis on behalf of all jurisdictions, or may request each local government jurisdiction to conduct the analysis independently using the common methodology provided in the 2009 LMS Update. To the extent information is available, the LMS Working Group and/or the individual jurisdiction will utilize data provided in a geographic information system (GIS) format for those identified hazards that have been so characterized. When feasible, information and data resulting from the LMS Working Group's efforts will be recorded a GIS format as well. In the absence of available GIS data, the analysis will be conducted on the basis of "best judgment" by the planning participants.

The hazard identification analysis will be accomplished through the following general methodology:

- Identifying all significant natural hazards that threaten Volusia County
- Defining or estimating the geographic and/or operational scope of the areas and/or community functions within Volusia County that could be impacted by the hazard,
- Determining or estimating the probability or frequency of occurrence of the hazard event,
- Defining, estimating or predicting the general consequences of the event to human health and safety, to property, to valuable environmental resources and the economic vitality of the community.
- Deriving a measure of risk to reflect the relative significance of hazard being addressed to the jurisdiction being evaluated.

The measure of relative risk may then be used by the jurisdiction and/or the LMS Working Group to guide and prioritize the subsequent mitigation planning process. The hazard identification process is intended to encompass both developed areas of Volusia County as well as those likely to be developed in the future.

Hazard identification information and other findings from this analysis will be made available for use by the public and other interested organizations and agencies. As applicable, the findings of the analysis will be included in the individual jurisdictional and/or organizational sections of the Volusia County LMS.

6.0 Vulnerability Assessment

Considering the relative risk of the identified hazards for each local jurisdiction, the participants in the LMS Working Group will then conduct an assessment of the vulnerability of specific facilities, systems, and/or neighborhoods within those jurisdictions, as applicable to their authorities, responsibilities and/or interests. The LMS Working Group is responsible for promoting the use of an agreed upon assessment process to ensure county uniformity in the technical approach by all participating jurisdictions. The LMS Working Group is also responsible for monitoring progress in implementation of the vulnerability assessment process.

The vulnerability assessments of specific facilities will be conducted by those agencies, organizations or individuals represented on the LMS Working Group that have established operational control over the facilities, or otherwise have been designated as responsible for their operation and maintenance. Vulnerability assessments will include evaluation of the potential for physical damage due to the occurrence of the hazards identified as threatening the community.

The vulnerability assessment process will identify structures and infrastructure that are vulnerable to damage or failure in the event of the occurrence of a specified hazard. This finding is then available for the LMS Working Group participants to use in the development of proposed mitigation initiatives needed to eliminate, reduce or otherwise mitigate those vulnerabilities.

For each update of the plan, the LMS Working Group will identify those structures and infrastructure thought to be vulnerable to the impacts of a disaster that have not yet be subject to a vulnerability assessment. The LMS Working Group will strive to obtain assessments for all potential vulnerable structures and infrastructure until the entire community has been evaluated.

In addition, to the extent feasible, the LMS Working Group will strive to obtain vulnerability assessments for undeveloped land that is likely to be developed in the future. This will be done to identify the mitigation actions necessary during the land's development, should it occur, to protect new facilities, systems and neighborhoods from future hazard events. These identified mitigation actions will be formulated as proposed mitigation initiatives for incorporation into the plan and that would, upon implementation, guide the development of the land in the desired manner.

The findings from the vulnerability assessment will be made available for use by the public and other interested organizations and agencies. As applicable, the findings of the analysis will be included in the individual jurisdictional and/or organizational sections of the Volusia County Local Mitigation Strategy.

7.0 Evaluation of Existing Policies, Plans and Regulations

Using the results of the hazard identification and vulnerability assessment process, the LMS Working Group will maintain an ongoing effort to evaluate the existing policies, plans and regulations of the local government jurisdictions in the planning area. This analysis will be used to define the capabilities of the local jurisdictions' policies, plans and regulations to effectively control or manage the identified hazards and/or eliminate or minimize the vulnerability to those hazards. The LMS Working Group will implement a common analysis methodology to define the following characteristics of the policy, planning and regulatory framework of Volusia County and its local jurisdictions:

- The existing array of policies, plans and regulations established by local jurisdictions in Volusia County that are relevant to the control and management of hazards and vulnerabilities to those hazards,
- Shortfalls or gaps in the policies, plans and regulations of the local jurisdictions to adequately eliminate or reduce vulnerabilities to identified hazards,
- Inconsistencies or conflicts between the policies, plans and regulations of local jurisdictions resulting in reduced capabilities to eliminate or reduce vulnerabilities to identified hazards, and
- Inadequacies of local jurisdiction's policy, planning or regulatory framework to fully comply with state or federal hazard mitigation requirements.

This analysis may be conducted by the LMS Working Group, the program staff and/or individual local jurisdictions using the methodology established. The findings of the analysis will be available for the applicable participating local jurisdictions to identify mitigation initiatives to modify or enhance the existing policy, planning and regulatory framework and to incorporate these initiatives into the corresponding section of the Volusia County LMS.

8.0 Identification and Characterization of Proposed Mitigation Initiatives

All agencies and organizations participating in the Volusia County LMS Working Group are encouraged to propose mitigation initiatives for processing and incorporation into the local mitigation strategy, based on the findings of the hazard identification, vulnerability assessment, and evaluation of policies, plans and regulations. Formulation of mitigation initiatives will be done only by those individual agencies, organizations or jurisdictions participating in the LMS Working Group that have the responsibility or authority to implement the identified mitigation initiative should the resources and/or authorities become available to do so. When needed, the LMS Working Group may request an agency, organization or jurisdiction that has such responsibility or authority for its cooperation and support to formulate proposed mitigation initiatives determined to be needed based on the results of the hazard identification, vulnerability assessment or evaluation of policies, plans and regulations.

The identification and characterization of proposed mitigation initiatives for incorporation into the Volusia County LMS will be in accord with a common methodology agreed upon by the LMS Working Group. Proposed mitigation initiatives may be structural, non-structural or combined structural and non-structural, and will be identified and characterized by representatives of the agency or organization intending to propose that initiative for incorporation into the strategy. The program staff may offer assistance and guidance to the participating agency or organization regarding the process to identify and characterize mitigation initiatives, but the participant is responsible for the validity of the information utilized to characterize the proposed initiative. A participating agency or organization may identify and characterize as many mitigation initiatives as desired to propose for incorporation into the Volusia County LMS.

9.0 Prioritization and Submission of Proposed Mitigation Initiatives

In order to most effectively allocate limited resources available for implementation of mitigation actions in the community, all initiatives proposed for incorporation into the plan will be prioritized in accord with the common methodology included in the 2009 LMS Update. The participating agency or organization proposing each initiative is responsible for use of this methodology.

Upon completion of the identification, characterization and prioritization of a mitigation initiative proposed for incorporation into the strategy, the participating agency or organization will submit the proposal to the Volusia Prepares Coordinator for review and coordination with other proposed mitigation initiatives. The submittal will be on a schedule and in a format established by the Volusia Prepares Coordinator for this purpose.

10.0 Review and Coordination of Proposed Mitigation Initiatives

The LMS Working Group is responsible for ensuring the inter-jurisdictional and inter-organizational review and coordination of proposed mitigation initiatives. To accomplish this responsibility, the Volusia Prepares Coordinator will do the following:

- Establish a schedule for the participants to submit proposed mitigation initiatives to be considered for incorporation into the next edition of the Volusia County Local Mitigation Strategy,
- Ensure the use the established scoring methodology by all participating agencies and organizations in Volusia County for the identification, characterization and prioritization of proposed mitigation initiatives.
- Distribute the guidance as needed to facilitate complete and accurate submittals by the participants,
- Review each proposed mitigation initiative received for completeness, adherence to the prescribed methodology, the validity of the characterization information and data used by the participant, and the likelihood that the proposal will actually mitigate the hazard(s) or vulnerability(ies) of concern,
- Compare proposed mitigation initiatives with others already incorporated into the plan or being submitted during the current planning period to ensure an absence of conflict or redundancy in purpose,
- If needed, return the proposed mitigation initiatives to the submitting agency or organization for additional information or analysis and resubmittal, and
- Prepare a recommendation for action by the LMS Working Group to incorporate the proposed mitigation initiative into the Volusia County LMS and to consent to the participant listing the proposed initiative in their section of the plan. In preparing a recommendation, the LMS Working Group will make every reasonable effort to work with the agency or organization proposing an initiative.

11.0 Incorporation of Proposed Mitigation Initiatives into the Strategy

The LMS Working Group will review the proposed mitigation initiatives for incorporation into the Volusia County LMS. In the event that the LMS Working Group refuses to incorporate the proposed mitigation initiative into the local mitigation plan, a full explanation for the action will be provided to the participant and suggestions made regarding corrective actions that could be taken to enable the proposal to be so incorporated. The proposing agency or organization would then be responsible for taking such actions and resubmitting the proposal for incorporation into the strategy.

No proposed mitigation initiative will be considered as incorporated into the plan until it is the given an affirmative majority vote by the LMS Working Group for incorporation into the plan.

12.0 Resolving Conflicts

In the event that a mitigation initiative proposed by a participating agency or organization is determined by the LMS Working Group to be in conflict with one or more other initiatives in the plan or being submitted by others, the LMS Working Group will take action to resolve the conflict. This will be done in the following manner:

- The participants proposing the conflicting mitigation initiatives will be notified of the findings of the LMS Working Group and requested to make any such modifications to the proposals needed to resolve the conflicts,
- Should the participants be initially unwilling or unable to make such modifications to their proposed mitigation initiatives, the LMS Working Group will schedule and hold a detailed discussion of the matter and involve both participants and any other interested parties,
- In the event that such detailed discussions do not result in voluntary action on the part of the participants making the proposals, the LMS Working Group will formulate a recommendation to resolve the conflict. In making this recommendation, in its discretion, the LMS Working Group may give preference to the proposal already incorporated into the strategy, to that first submitted for review, and/or to the proposal achieving the highest priority score in accord with scoring methodology.
- The LMS Working Group will review the recommendation and take any such action as deemed appropriate to reconcile the conflict prior to incorporation of the proposal(s) into the next edition of the strategy.

13.0 Incomplete Processing of Proposed Mitigation Initiatives

If proposed mitigation initiatives are submitted to the LMS Working Group after the deadline established for that purpose, in its discretion, they may decline to include the proposed initiatives in the next edition of the plan. However, the LMS Working Group will retain the submissions, and review and process the initiatives in accord with this procedure for purposes of incorporating them into the subsequent edition of the plan. These unprocessed mitigation initiatives will be termed "pending" mitigation initiatives, and may be listed in the next published edition of the plan under that term. Pending mitigation initiatives will not be eligible for funding or resources made available through the LMS Working Group and/or the Volusia County LMS in the same manner as would proposed initiatives that are fully processed, prioritized and incorporated into the strategy. The participating agencies and organizations may separately, in their discretion, pursue implementation of pending mitigation initiatives at any time.

14.0 Implementation of Proposed Mitigation Initiatives

Following its incorporation into the Volusia County LMS, each participating agency or organization is responsible to attempting to secure the funding, resources or other approvals and permits necessary to implement the proposed mitigation initiative. The LMS Working Group will provide such support to the agency or organization as is feasible at the time, but the agency or organization itself maintains full legal, financial and administrative responsibility for implementation of the proposed action.

On request of the agency or organization attempting to implement an approved mitigation initiative, the LMS Working Group will certify to any identified party that the proposed mitigation initiative was subjected to the LMS Working Group's review and coordination process, and that it has been approved for incorporation into the strategy. If desired, this certification and documentation of an initiative's incorporation into the plan may be delegated by the Steering Committee to the program staff.

15.0 Monitoring of Implementation of Mitigation Initiatives

The LMS Working Group will be responsible for monitoring the status of implementation of proposed mitigation initiatives incorporated into the LMS. On an annual basis, the participating agencies and organizations will make information available to identify if one or more of the following actions have been accomplished by the agency or organization proposing the initiative:

- Initial actions to obtain funding, permits, approvals or other resources needed to begin implementation of the initiative,
- Any necessary design or development actions have been initiated or completed, or if funding has been obtained,
- Complete implementation of the mitigation initiative,
- If the agency or organization proposing the initiative no longer intends to implement the initiative, and/or
- Additional information or analysis has been developed that would modify the priority originally assigned to the initiative upon its incorporation into the strategy.

In monitoring the implementation status of the mitigation initiatives incorporated into the Volusia County LMS, the LMS Working Group will evaluate the continued priority for implementation to be afforded each initiative incorporated into the strategy. This determination will be made with consideration of the following factors:

- The proposed initiative's relationship to current or more recent hazard identification and risk assessment evaluations conducted by the LMS Working Group,
- Recent experience with hazard events in Volusia County and the relevance to the proposed initiative to mitigating the vulnerabilities to those hazards,
- The initiative's predicted current and/or continuing acceptance to the community for implementation, and
- The current probability of receiving funding for implementation from local, state or federal sources and its consistency with current local, state and federal program priorities.

On an annual basis, and for preparation of the next updated edition of the plan, jurisdictions will recommend that an initiative be designated as priority for initiation, continued at its currently designated priority, or deferred for future action. The jurisdictions will also provide the LMS Working Group with a status update for each initiative.

The LMS Working Group will finalize the list of approved proposed mitigation initiatives to be incorporated into the next updated edition of the Volusia County LMS.

16.0 Approval and Issuance of the Volusia County Local Mitigation Strategy

On an annual cycle, the Volusia County LMS Working Group will approve and issue an update of the LMS. To do this, the LMS Working Group will, by affirmative majority vote, allow release of the updated version of the strategy, which will contain at least the following information:

- The currently approved listing of the mitigation initiatives proposed by participating agencies and organizations,
- A statement of the LMS Working Group's goals and objectives for initiative implementation for the coming planning period,
- Updated information regarding the findings of the hazard identification, vulnerability assessment and evaluation of policies, plans and regulations,
- Progress on implementation of the mitigation initiatives previously incorporated into the strategy,
- A listing of the currently participating agencies and organizations and the status of their participation,
- The current edition of the LMS Working Group's bylaws and operating procedures.

The updated plan will contain any proposed and approved or pending mitigation initiatives processed by the LMS Working Group during the preceding planning period.

Each major jurisdiction and/or organization participating in the mitigation planning process will have a separate section of the plan document specifically intended to list the findings of any analyses done for that jurisdiction. This separate section will also contain the complete list of mitigation initiatives proposed by that jurisdiction or organization.

The LMS Working Group will announce the completion, approval and release of the plan. Prior to or concurrent with formal action to release the plan, the LMS Working Group may determine that a public hearing or public forum is necessary or required to allow the community an opportunity to review and comment on the strategy. Upon such a determination, the LMS Working Group will take the necessary actions to plan, conduct and document the hearing process.

The LMS Working Group will also take such actions as feasible to make the Volusia County LMS readily available to members of the public and other interested organizations and agencies. At a minimum, a full copy of the plan will be available to each participating jurisdiction or organization.

Upon release of the Volusia County LMS, the LMS Working Group will request the governing body of each participating jurisdiction or organization to take action to adopt, approve and/or endorse their designated section of the plan. It is not necessary for individual jurisdictions or organizations to take any action concerning the portions of the plan pertaining to another jurisdiction or organization. Upon approval of their portion of the Volusia County LMS, the participating jurisdiction or organization will notify the LMS Working Group. In the event that their portion of the plan is rejected or disapproved in whole or in part, the LMS Working Group will be notified of the reasons for the rejection or disapproval. The representatives of that jurisdiction or organization will then be requested to work with the LMS Working Group to address and resolve the impediments interfering with receipt of approval or endorsement by the participating jurisdiction or organization.

17.0 Approval of Supplements to the Plan

When indicated, the LMS Working Group may, in its sole discretion, elect to approve issuance of a supplement to the currently approved LMS. This supplement may contain one or more proposed mitigation initiatives that have been fully processed by the LMS Working Group. Upon its issuance, the supplement and the mitigation initiatives contained therein are considered to be an integral part of the Volusia County LMS pending the approval of the supplement by the governing body of the jurisdiction or organization that proposed the initiatives.

18.0 Assistance with Initiative Funding and Implementation

Each participating agency and organization is responsible for implementation of the mitigation initiatives contained within their portion of the Volusia County LMS when the necessary resources, funding, authorities and/or authorizations to do so become available. The Volusia County LMS Working Group will, nevertheless, offer assistance and support to the participating agencies and organizations in implementing their proposed mitigation initiatives as appropriate opportunities arise.

The LMS Working Group, with the support of the program staff will, during each planning cycle, attempt to obtain information regarding upcoming state and federal programs which may offer opportunities for participating agencies and organizations to receive funding for initiative implementation. The LMS Working Group will assess the proposed mitigation initiatives listed in the current approved edition of the Volusia County LMS for all jurisdictions and organizations, and identify the proposed mitigation initiatives matching the funding requirements and/or limitations of the applicable state and federal program. The LMS Working Group will then select the proposed initiatives in descending order of priority ranking and, in turn, notify the participating agency or organization of the potential availability of funding for initiative implementation. If it wished to apply for the funding available, the applicable agency or organization would be responsible for then agreeing to complete the necessary application forms, provide any matching funds, etc. If the agency or organization was unable or unwilling to undertake the application process, the LMS Working Group and/or program staff would notify the agency or organization with the next highest ranked proposed mitigation initiative listed in the current strategy. In the event that two or more proposed mitigation initiatives listed in the plan were eligible for the funding opportunity and had the same priority ranking, the LMS Working Group and/or program staff would simultaneously notify the proposing agencies or organizations.

This action by the LMS Working Group and program staff is only intended to facilitate implementation of the various initiatives listed in the Volusia County LMS. Nothing in this procedure or the bylaws of the LMS Working Group is intended to prohibit, interfere with or discourage any participating agency or organization from seeking the funding, resources or authorities at any time to implement proposed mitigation initiatives listed in the Volusia County LMS.

19.0 Assessment of Recent Disaster Events

Within 60 days following a significant disaster or emergency event impacting Volusia County or any of its municipal jurisdictions, the LMS Working Group will conduct an analysis of the event to capture any “lessons learned” for the purpose of continuing development of the LMS. The

LMS Working Group, with the support of the program staff, will classify the event based on the hazard category and assess the magnitude of the event and the community's reaction to it. The direct and indirect damage, response and recovery costs will also be gathered or estimated. Any mitigation techniques in place in the impacted areas would be assessed for their apparent effectiveness in decreasing damages. The type and extent of the damages that were experienced would also be evaluated to determine the types of mitigation initiatives that should be incorporated into the plan to avoid similar losses during future hazard events of the same type. Based on this assessment, the LMS Working Group would recommend to one or more of the participating agencies or organizations that they propose appropriate mitigation initiatives for incorporation into the next edition of the plan.

APPENDIX D: MEETING INFORMATION

This appendix includes meeting invitations, agendas, minutes and rosters.

Volusia Prepares

THE VOLUSIA COUNTY PARTNERSHIP FOR DISASTER MITIGATION AND RECOVERY

TO: All Volusia County City/Town Managers
FROM: Robert Rogers, Volusia Prepares Chair
DATE: May 11, 2009
SUBJECT: Local Mitigation Strategy 5-Year Update

The purpose of the Volusia County Local Mitigation Strategy (LMS) Task Force, otherwise known as "Volusia Prepares", is to decrease the vulnerability of the citizens, governments, businesses and institutions of Volusia County to the future human, economic and environmental costs of natural, technological and societal disasters. The Federal Emergency Management Agency (FEMA) regulations for LMS plans require that all Hazard Mitigation plans be reviewed and updated as appropriate and resubmitted to FEMA for approval every 5 years. Our current plan will expire February 28, 2010, with a final draft due to Florida Division of Emergency Management (FDEM) by August 28, 2009.

As you are aware, based on program regulations local governments must officially adopt a FEMA approved hazard mitigation plan in order to apply for and /or receive grants and some other types of assistance such Public Assistance. **Participation is mandatory** to continue to be eligible for the following mitigation grant programs administered by FEMA:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation Competitive (PDM-C)
- Floor Mitigation Assistance (FMA)
- Repetitive Flood Claims Program (RFC)
- Severe Repetitive Loss Pilot Program (SRL)

FEMA anticipates that many communities will face challenges completing plan updates prior to expiration. However, FEMA will not make any obligation of funds while the plan has elapsed. The requirement is that a local government must have a FEMA-approved plan to receive grant funds. In order for our plan to receive FEMA approval, the updated plan must meet the following basic requirements to receive approval:

- The risk assessment must provide the factual basis for activities proposed in the mitigation strategy to reduce losses form identified hazards.
- The mitigation strategy should be based on local risk assessments and vulnerability analyses.
- The mitigation strategy section must include an action plan describing how the actions identified will be prioritized, implemented and administered by the local jurisdiction, as well as provide an update on the implementation status of each of the initiatives identified in the existing plan
- There must be a formal plan maintenance process that describes the method and schedule for monitoring, evaluating, and updating the mitigation plan within a five (5) year cycle.

Once approved by the Florida DEM the plan will be forwarded to FEMA for final approval. "Volusia Prepares" By-Laws state that each eligible jurisdiction must participate in all regular quarterly meetings. Upon missing 3 consecutive regular quarterly meetings, the jurisdiction will be considered as no longer participating in the Local Mitigation Strategy and will not be eligible for any contingent grant funding. Volusia County Emergency Management has contracted with PBS&J to assist us through the update process. The time constraints of this update make it imperative that a member of your staff is assigned as an LMS Liaison and attend all of these meetings in order to accomplish these tasks. They will be responsible to update information specific to your city regarding risk assessment and vulnerability analyses.

A municipal – local participating jurisdiction kick off meeting will be held on **June 4, 2009 at 9:00 AM** at the Volusia County Emergency Operations Center, 49 Keyton Drive, Daytona Beach, FL 32124. A public meeting will be held **June 4, 2009 at 6:00 PM** at the Daytona Beach Police Dept., 129 Valor Blvd, "Comstat Room", Daytona Beach, FL. Subsequent additional public and municipal meetings will be held to involve all areas of the community to complete the update.

Volusia County FLORIDA

NEWS FOR IMMEDIATE RELEASE

May 29, 2009

Contact: Shelley Szafraniec, APR
Community Information Specialist
(386) 822-5062, ext. 2871

'VOLUSIA PREPARES' GROUP TO MEET JUNE 4 TO REVIEW FIVE-YEAR UPDATE TO LOCAL MITIGATION STRATEGY

A meeting of "Volusia Prepares," the working group for Volusia County's Local Mitigation Strategy (LMS), will be Thursday, June 4, at 6 p.m., at the Daytona Beach Police Department, 129 Valor Blvd., Daytona Beach. The meeting is open to the public, and public participation is encouraged.

The purpose of the countywide LMS is to identify strategies to reduce the impact of natural and manmade disasters before they occur. The June 4 planning meeting will provide information on changes in pre-disaster mitigation requirements, planning, and grant funding.

As required by the State of Florida Emergency Management Division and the Federal Emergency Management Agency (FEMA), Volusia County Emergency Management is working on a five-year update to the LMS. In addition, the Disaster Mitigation Act of 2000 ties local hazard mitigation plans to future disaster and grant funding availability.

A copy of the LMS is available for review at the Volusia County Emergency Management Division, 49 Keyton Drive, Daytona Beach. Residents and guests who are unable to attend the meeting but would like to make comments should mail them to Volusia County Emergency Management, 49 Keyton Drive, Daytona Beach, FL, 32124 or send comments via e-mail to pwhite@co.volusia.fl.us.

In accordance with the Americans with Disabilities Act and Florida Statutes, persons with disabilities needing special accommodation to participate in the proceedings should request assistance at least two business days before the meeting.

For additional information or to request accommodation, please call Pat White, Volusia County Emergency Management's Volusia Prepares coordinator, at (386) 254-1500.

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Volusia County Local Mitigation Strategy Update

Kickoff Meeting

Volusia County Emergency Operations Center
49 Keyton Drive, Daytona Beach, FL 32124
June 4, 2009
9:00 AM – Noon

AGENDA

1) **Introductions**

2) **Icebreaker Exercise**

3) **Project Overview**
   a) Key Objectives
   b) Project Tasks
   c) Project Schedule
   d) Project Staffing

4) **Roles & Responsibilities**
   a) PBS&J
   b) Volusia County
   c) Participating Jurisdictions

5) **Getting Started**
   a) Identify additional stakeholders
   b) Identify new data, plans, studies and reports to incorporate into update
   c) Review proposed LMS Update Outline
   d) Discuss hazards to assess
   e) Jurisdictions review and update "Comparison of Jurisdictional Relative Risk" (from 2004 LMS)

6) **Next Steps**
   a) Initiate data collection efforts
   b) Conduct public outreach
   c) Conduct Capability Assessment
   d) Update status on Mitigation Initiatives
   e) Schedule Mitigation Strategy meeting

7) **Questions, Issues or Concerns**

Volusia County Local Mitigation Strategy Update

Kickoff Meeting

Volusia County Emergency Operations Center
49 Keyton Drive, Daytona Beach, FL 32124
June 4, 2009

MINUTES

Attendees: See attached roster.

1) Introductions

Volusia Prepares Local Mitigation Strategy Working Group (LMS Working Group) Chair and City of Deltona Deputy Fire Chief, Robert Rogers, opened the meeting. He emphasized the need to update the plan and participate in the planning process. The LMS Working Group introduced themselves, including Larry LaHue, Volusia County Emergency Management Plans Coordinator, and Pat White, Volusia County LMS Coordinator. PBS&J, the consultant that is assisting with the LMS update, was also introduced.

2) Icebreaker Exercise

PBS&J Senior Planner, Nathan Slaughter, facilitated the icebreaker exercise. He introduced six hazard mitigation techniques (prevention, property protection, natural resource protection, structural projects, emergency services and public education and awareness). He asked the LMS Working Group what types of hazard mitigation techniques they would spend their limited money on. The results will be presented at the next meeting.

3) Project Overview

Mr. Slaughter presented the key objectives, project tasks, project schedule and project staffing. The main tasks include documenting the planning process, conducting the risk and capabilities assessments, updating the mitigation strategy and the plan maintenance sections. The draft LMS update will be developed by August 2009 by PBS&J, under the guidance of the LMS Working Group.

4) Roles & Responsibilities

a) PBS&J was hired to provide technical assistance and planning guidance. They will conduct the risk and capabilities assessments, facilitate the LMS Working Group and public meetings and prepare the LMS.

b) Volusia County will be the central point of contact (Larry LaHue). The County will actively participate in the planning process and mitigation strategy development; arrange LMS Working Group meetings; provide guidance, data and information; conduct a review and provide comments on the draft LMS update; and adopt the LMS. The County will also communicate and coordinate with participating

jurisdictions, the Florida Division of Emergency Management (FDEM) and the Federal Emergency Management Agency (FEMA).

c) Participating Jurisdictions will actively participate in the planning process and mitigation strategy development, attend LMS Working Group meetings; provide feedback, conduct a review and provide comments on the draft LMS update, and adopt the LMS.

5) Getting Started

Lisa Flax, PBS&J Project Manager, facilitated the exchange of information for the LMS update.

a) The LMS Working Group identified additional stakeholders to be included in the planning process.

b) The LMS Working Group was asked to identify and provide any new data, plans, studies and reports.

c) The proposed LMS Update Outline was presented and discussed.

d) The LMS Working Group discussed which hazards to update LMS. The hazards vulnerability assessment will be conducted for natural hazards.

e) Each jurisdiction was asked to update their hazards ranking, entitled the "Comparison of Jurisdictional Relative Risk" (from 2004 LMS). Some provided updates at the meeting and the rest will submit their hazards ranking for inclusion in the update.

6) Next Steps

a) Data collection efforts will continue. Existing data has been identified on Volusia.org and at the County.

b) A public outreach meeting was conducted on June 4, 2009 at 6:00 p.m. in Daytona Beach.

c) The Capability Assessment will be conducted to determine existing plans and resources in place that support hazard mitigation.

d) All jurisdictions will update the status on their Mitigation Initiatives

e) The next Mitigation Strategy meeting is scheduled for July 8, 2009.

7) Questions, Issues or Concerns

- Include impacts from the hazard events that have occurred over the past five years (e.g., tornadoes, flooding, wildfire and heavy rains).
- All hazard mitigation techniques will be considered for mitigation initiatives by the jurisdictions.
- Include hazard mitigation successes in the update. Emphasize how projects have benefited the citizens in Volusia County. Include that most of the funding has been local.
- It was questioned whether the mitigation action submittal process could be streamlined.

Volusia Prepares Kickoff Meeting

June 4th 9:00:00 AM

Name (Please Print Clearly)	Organization	Phone	E-Mail
Larry Laltve	VCEM	3862541500	llghve@co.volusia.fl.us
Kiem Nguyen	City of Deland	386 626 7097	nguyenk@deland.org
Nathan Slaughter	PBSJ	919-314-9582	nrslaughter@pbsj.com
Don Findsen	Lake Helen	386-228-2121	DONFINDSEN@AOL.COM
Joe Borelli	Holly Hill	386 248-9488	JBORELLI@HollyHillFL.ORG
Alan Williamson	City of DeBary	668 2040	awilliamson@debary.org
Mike Gorbosz	City of Deland	626-7110	gorboszm@deland.org.
Joe Daly	City of Ew	424-2441	JDALY CITY OF OAKEWATER.ORG
Karen Baum	City of Daytona Beach	386-671-5422	BAUMK@DBFD.US.
David Hamstra	DeBary	407-421-8062	dwh@feconline.com
Christopher J. Weir	Port Orange	386-506-5805	cweir@port-orange.org
John Gamble	VC PW	386-736-5965 x5582	
Jay Thurnett	Daytona Beach	671-8806	thurnettj@codb.us
Carl Schweizer	DBIA	547-1781	cschweizer@co.volusia.fl.gov
Randy Wright	NSBFD	547-9976	rwright@cityofnsb.com
Uli Morgese	City of D.B.S.	763-5376	umorgese@cityofdbs.org
Greg Thomas	VCHD	274-0702	Greg_Thomas@DOH.State.FL.US

Volusia Prepares Kickoff Meeting

June 4th 9:00:00 AM

Name (Please Print Clearly)	Organization	Phone	E-Mail
LISA flax	PBS&J	904-363-8451	lkflax@pbsj.com
PEG HUNT	TOWN OF PONCE INLET	386 3226729	phunt@ponce-inlet.org
Kathy Weaver	VCFS	386-804-1586	kweaver@co.volusia.fl.us
BOB ROGERS	DELTONA	386-575-0305	RROGERS@DELTONAFL.GOV
Jerold Weaver	Orange City	386-775-5450	
Bill Redmann	Oak Hill	386-345-3522	BILLIR@AOL.com
JEANNE WILLARD	SOUTH DAYTONA	386-334-5634	JWILLARD2009@LIVE.COM
TynaLynn thilton	Edgewater	386-424-2494	thilton@cityofedgewater.org
JOHN CARLETON	DAY BEACH	386-671-5423	CARLETON JOHN@DBFD.US
JESSICA BEVILACQUA	UCPECF	3862746474	JBEVILACQUA@UCPECF.ORG
Virginia Haas	OAK HILL	386-352-3512	haasv@oakhillfl.com
Loretta Moisio	Ormond Beach	386-676-3345	moisio@ormondbeach.org
Chip Kent	VCSB	255-4677	CNKENT@volusia.k12.fl.us
KENT DONAHUE	CITY OF PORT ORANGE	386-506-5501	KDONAHUE@PORT-ORANGE.ORG

NEWS FOR IMMEDIATE RELEASE

July 7, 2009

Contact: Shelley Szafraniec, APR
Community Information Specialist
(386) 822-5062, ext. 2871

VOLUSIA PREPARES MEETING SCHEDULED FOR JULY 8

The next meeting of the Volusia County local mitigation strategy working group, Volusia Prepares, will be at 1 p.m. Wednesday, July 8, at the Daytona Beach International Airport, 700 Catalina Drive (in the Airport Room on the first floor of the main terminal). The meeting is open to the public.

Volusia Prepares began in 1998 as part of a statewide initiative of the Florida Division of Emergency Management. The purpose of the group is to identify strategies to reduce the impact of natural and man-made disasters before they occur.

In 2000, the U.S. Congress passed the Disaster Mitigation Act, which required states to establish mitigation strategy groups to reduce the cost of disasters. The federal government estimates that for every dollar spent to reduce the impact of disasters before they occur, four dollars are saved in recovery expenses.

The July 8 meeting will provide information on changes in pre-disaster mitigation requirements, planning, and grant funding.

As required by the State of Florida Emergency Management Division and Federal Emergency Management Agency, Volusia County Emergency Management is working on a five-year update to the county's local mitigation strategy.

A copy of the local mitigation strategy is available for review at the Volusia County Emergency Management Division, 49 Keyton Drive, Daytona Beach. If you are unable to attend the meeting but would like to make comments, please e-mail pwhite@co.volusia.fl.us

In accordance with the Americans with Disabilities Act and Florida Statutes, persons with disabilities needing special accommodation to participate in the proceedings should request assistance before the meeting.

For additional information or to request accommodation, please contact Pat White with Volusia County Emergency Management at (386) 254-1500.

-30-

From: Pat White [pwhite@co.volusia.fl.us]
Sent: Tuesday, July 07, 2009 10:54 AM
To: Joe Daly; Paul Johnson; Lili Morgese; Joseph Daly; Tyna Lynn Hilton; Randy Wright; Karen Baum; Carletonjohn@dbfd.us; Alan Williamson; Mike Grebosz; Robert Rogers; Steve Aldrich; CityLH@hotmail.com; Jeanne Willard; Virginia Haas; Richard Benton; Loretta Moisio; Paul Johnson; DAVID HAMSTRA; Peg Hunt; Chris Weir; Patty Rippey; Debbie Bass; Chip Kent; Greg Akin
Cc: Larry LaHue; Flax, Lisa K
Subject: Volusia Prepares LMS Update Workshop Reminder

Follow Up Flag: Follow up
Flag Status: Red

REMINDER! The workshop for the Local Mitigation Strategy 5-year update is tomorrow, July 8, 2009, 1:00 PM - 5:00 PM at the Daytona Beach International Airport, Main Terminal, Airport Room. It is located on the 1st floor, west end of the building.

Park in Short Term Parking - parking is free - parking passes will be distributed at the workshop.

It is mandatory to participate in this process to be considered for grant funding contingent on having a FEMA approved LMS (Hazard Mitigation Grant Program (HMGP); Pre-Disaster Mitigation Competitive (PDM-C); Floor Mitigation Assistance (FMA); Repetitive Flood Claims Program (RFC); Severe Repetitive Loss Program (SRL).

If you have any questions or need further information, please let me know.

Pat White, Volusia Prepares Coordinator
Volusia County Emergency Management
49 Keyton Drive, Daytona Beach, FL 32124
386-258-4088, Ext 1245 Fax 386-248-1742
email: pwhite@co.volusia.fl.us

Volusia County
FLORIDA

Volusia County Local Mitigation Strategy Update

Mitigation Strategy Meeting

Daytona Beach International Airport
Main Terminal, Airport Room
700 Catalina Drive
Daytona Beach, FL 32114
July 8, 2009
1:00 – 5:00 PM

AGENDA

1) **Welcome**

2) **Kickoff Meeting Minutes Adoption**

3) **LMS Goals Update**

4) **Draft Risk Assessment Presentation**

5) **By-Laws and Operating Procedures Update**

6) **Capability Assessment Overview**

7) **Hazard Identification Update**
   a) Review and modify scoring system

8) **Hazard Mitigation Initiatives Update**
   a) Review proposed tracking system
   b) Review proposed scoring system
   c) Begin re-scoring initiatives

9) **Next Steps**
   a) Jurisdictions to finalize Hazard Identification scoring (July 9, 2009)
   b) LMS Task Force to finalize Hazard Mitigation Initiative scoring (July22, 2009)
   c) LMS Task Force to provide hazard mitigation success stories (July 22, 2009)
   d) Jurisdictions to provide Capability Assessment (July 22, 2009)
   e) Consultant to provide draft LMS for LMS Task Force's review (August 7, 2009)
   f) LMS Task Force to provide comments (August 21, 2009)
   g) Schedule meeting to present final draft plan to Task Force (TBD; proposed August 21, 2009)

Volusia County
FLORIDA

Volusia County Local Mitigation Strategy Update

Mitigation Strategy Meeting

Daytona Beach International Airport
Main Terminal, Airport Room
700 Catalina Drive
Daytona Beach, FL 32114
July 8, 2009, 1:00 – 5:00 PM

MINUTES

Attendees: See attached roster.

1) Introductions

Volusia County Local Mitigation Strategy (LMS) Task Force Chair and Deltona Deputy Fire Chief, Robert Rogers, opened the meeting and thanked everyone for attending. PBS&J Project Manager, Lisa Flax presented the minutes from the previous meeting (6/4/09) for discussion. After a brief discussion, it was determined that there were minor changes that were needed to be made. The meeting minutes were approved unanimously by the LMS Working Group, pending revisions as requested.

2) LMS Goals Update

PBS&J Project Manager, Lisa Flax facilitated discussion about the need to review the goals and objectives from the existing plan to determine if they are still applicable. A handout of the existing goals and objectives was provided and after a general discussion, it was determined that the existing goals and objectives are still applicable. Don Findell from Lake Helen made a motion to leave the goals and objectives as they are. Joe Daly from Edgewater seconded the motion, which was unanimously approved.

3) Draft Risk Assessment

Ms. Flax presented the preliminary maps and analysis for the risk assessment sections of the plan. The following comments were made regarding the items presented:

- The risk assessment will only be conducted for natural hazards
- PBS&J needs to get the most up-to-date base map materials directly from the County's GIS Department (Nancy Church)
- Daytona Shores information needs to be added
- References to Daytona should be changed to Daytona Beach

- Critical facilities data will be circulated to the jurisdictions in the upcoming weeks – this information will need to be reviewed and updated by the jurisdictions as needed
- Information that is considered not for public use (critical facilities) may need to be incorporated into a protected section of the plan
- Flood hazard zones for Lake Helen and Pierson are not shown on the flood maps – need to determine why

4) By-Laws and Operating Procedures Update

Ms. Flax presented the existing by-laws and operating procedures for review and discussion. It was determined that the following changes should be made to the by-laws:

- The municipalities must provide to the County on an annual basis (Oct 31):
  - updates to initiatives
  - vulnerability assessment information and
  - repetitive loss properties information
- Final draft plan is due in August – changes to by-laws will be voted on at that time

5) Capability Assessment Overview

PBS&J Senior Planner, Nathan Slaughter presented the local capability assessment survey for review and discussion. He discussed the purpose of evaluating local capabilities and provided a brief overview of each section of the survey. He asked each municipality to fill out and return a survey by July 22, 2009.

6) Hazard Mitigation Initiatives Update

Ms Flax discussed the need to review and update the existing Mitigation Initiatives list. The method for scoring each initiative was reviewed and discussed. Several changes to the scoring system were made based on discussions with and consensus of the Task Force. Each jurisdictions was asked to review and provide updates on their existing initiatives and to provide

7) Next Steps

- Updated Hazard Identification information from each jurisdiction is due July 9
- Hazard Mitigation Initiatives need to be updated and new initiatives need to be submitted by July 22
- Mitigation success stories are due July 22
- Capability Assessment surveys are due July 22
- Draft of LMS update is due August 7
- Next meeting to discuss the draft is August 21

Entity	Representative, Title	Phone	Fax	e-mail	Address
City of Edgewater	Tyna Hilton Envir Admin	424-2494	424-2465	thilton@cityofedgewater.org	110 Rhode Island EW FL 32132
CITY OF EDGEWATER	JOE DALY FIRE DEPT	424-2445	424-2450	JDALY@CITYOFEDGEWATER.COM	11
City of Orange City	Jerold Weaver P.W. Superintendent	775-5450			
LAKE HELEN	DON FINDELL	228-2121	228-9714	DONFINDELL@AOL.COM	
City of DeBary	Alan Williamson	668-2040		awilliamson@debary.org	
V.C. HEALTH DEPT.	CHUCK LUTHER	822-6241			
DELTONA	BOB ROGERS	575-0305	860-7198	RROGERS@DELTONAFL.GOV	
ORMOND BEACH	RICHARD BENTON	676 3342	—	BENTON@ORMONDBEACH.ORG	
VOLUSIA Co. Schools	CHARLIE GRAVES	947-8787	947-5845	CGGRAVES@VOLUSIA.K12.FL.US	
[illegible]					
Port Orange Fire	CHRISTOPHER WEIR	386-506-5405	386-756-5405	CWEIR@PORT-ORANGE.ORG	
SOUTH DAYTONA	JEANNE WILLARD	386-334-5634		JWILLARD2009@LIVE.COM	
Volusia County EM	Larry LaHue	386-254-1500	386-248-1742	llahue@co.volusia.fl.us	49 Keyton Dr Daytona Beach FL 32124
Volusia County IT	Nancy Church	386 736 5973		nchurch@co.volusia.fl.us	
city of OAK HILL	VIRGINIA HAAS	386-345-3522		haasv@oakhillfl.com	234 S US Hwy 1
Airport- DBIA	Carl Schweizer	386-248-8030 x8372		cschweizer@co.volusia.fl.us	
Pierson	Debbie Bass, Clerk	386-749-2661		pierson@uspinet.net	
Volusia Co. EM	Pat White	386 254 1500	248 1742	pwhite@co.volusia.fl.us	
Mike Grebosz	City of DeLand	386 626 7110	626-7140	mgrebosz@deland.org	
Kieu Nguyen	City of DeLand	626 7097		nguyenk@deland.org	
City of Daytona B.S.	Assist City Mgr	527-0703		jmccroskey@cityofdbs.org	

Volusia County
FLORIDA

Volusia LMS Update
Mitigation Stratey Meeting - July 8, 2009
Sign-In Roster

Entity	Representative, Title	Phone	Fax	e-mail	Address
City of Daytona Beach	Karen Baum - Emer. Mgmt	386-671-5422	386-671-5888	baumk@dbfd.us.	129 Valor Blvd. Daytona Beach FL 32114
Town of Ponce Inlet	Peg Hunt, Admin Spec	386 322-6729	386 322-6718	phunt@ponce-inlet.org	4875 S Peninsula Dr. Ponce Inlet 32127
City of Holly Hill	Sgt. Gina Baker	386- 248-9485	386- 248-9480	gbaker@hollyhillfl.org	1065 Ridgewood AVE HH FL 32174
VC PW	John Gamble	7365965527		jgamble@co.volusia.fl.us	123 W Indiana
Randy Wright	City of NSB	542-9976	424-2155	rwright@cityofnsb.com	210 Sams Ave NSB 32169
New Smyrna Bch	Randy Wright				

NEWS FOR IMMEDIATE RELEASE

Aug. 17, 2009

Contact: Shelley Szafraniec, APR
Community Information Specialist
(386) 822-5062, ext. 2871

'VOLUSIA PREPARES' GROUP TO MEET AUG. 21 TO REVIEW FIVE-YEAR UPDATE TO LOCAL MITIGATION STRATEGY

A meeting of "Volusia Prepares," the working group for Volusia County's Local Mitigation Strategy (LMS), will be at 10 a.m. Friday, Aug. 21, at Volusia County Schools Facilities Services, 3750 Olson Drive, Daytona Beach. The meeting is open to the public and public participation is encouraged.

The purpose of the countywide LMS is to identify strategies to reduce the impact of natural and manmade disasters before they occur. The agenda for the Aug. 21 meeting includes a review of an update for Volusia County's five-year mitigation strategy. This update is required by the State of Florida Emergency Management Division and the Federal Emergency Management Agency (FEMA).

A copy of the mitigation strategy is available for review at the Volusia County Emergency Management Division, 49 Keyton Drive, Daytona Beach. Residents and guests who are unable to attend the meeting but would like to make comments should mail them to Volusia County Emergency Management, 49 Keyton Drive, Daytona Beach, FL, 32124 or send comments via e-mail to pwhite@co.volusia.fl.us.

In accordance with the Americans with Disabilities Act and Florida Statutes, persons with disabilities needing special accommodation to participate in the proceedings should request assistance at least two business days before the meeting.

For additional information or to request accommodation, please call Pat White, Volusia County Emergency Management's Volusia Prepares coordinator, at (386) 254-1500.

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Volusia County Local Mitigation Strategy Update

Mitigation Strategy Meeting

Volusia County Schools Facilities Services
3750 Olson Drive, Daytona Beach
August 21, 2009
10:00 AM – 12:00 PM

AGENDA

1) **Welcome**
2) **Discussion of Review Comments for Draft LMS**
3) **Jurisdictions to Identify Ownership of Critical Facilities**
4) **Wrap Up**

Volusia County Local Mitigation Strategy Update

Mitigation Strategy Meeting

Volusia County Schools Facilities Services
3750 Olson Drive, Daytona Beach
August 21, 2009
10:00 AM – 12:00 PM

MINUTES

Attendees: See attached roster.

1) **Welcome**
The members of the LMS Working Group were welcomed to the meeting to discuss their review comments and update the critical facilities inventory.

2) **Discussion of Review Comments for Draft LMS**
The LMS Working Group provided comments for the draft LMS either in writing prior to this meeting or during the meeting. Examples of revisions that were requested for the plan sections are as follows:

1. No changes
2. Fix formatting and revise the LMS Working Group list
3. Remove Flagler Beach from the maps and tables and update land use information for Daytona Beach Shores
4. No changes
5. Delete historical hail records that were for less than one inch; include descriptions of Hurricanes Irene and Jeanne and Tropical Storm Fay; emphasize that thousands of lightning strikes occur during summer afternoons, which is not reflected in the historical data that is available; include additional hazards events as noted; and designate drought as a high risk
6. Mention in the flood assessment that new floodplain data will be available in 2011; and explain that the 2000 Census population estimates were used to map the population as more recent estimates were not available for mapping at the jurisdictional level.
7. Update Table 7.1 with information provided and complete the conclusions, and revise Holly Hill's CRS rating to an 8.
8. Add an "s" on to the end of a word.
9. No changes
10. No changes

3) **Jurisdictions to Identify Ownership of Critical Facilities**
Each jurisdiction identified the ownership of their critical facilities.

4) **Wrap Up**
The modifications will be included in the final draft that will be provided to the County.

LMS Meeting

Friday, August 21, 2009

Jurisdiction	Representative	Title	Phone Number	Email Address
Cities				
Daytona Beach	JOHN CARLETON	EMERG OPERATIONS MGR	386-671-5473	CARLETONJOHN@DBFD.US
	MARK Rollier	Facilities Director	386-631-5028	MFOLLIER@UCPECF.ORG
Daytona Beach Shores	Lili Morgese	Grants Administrator	386-763-5376	lmorgese@cityofdbs.org
DeBary				
DeLand	Mike Grebosz	operations Manager	386-626-7110	grebosz m@deland.org
Deltona	BOB ROGERS	DEPUTY CHIEF	386-575-0305	RROGERS@DELTONAFL.GOV
Edgewater	JOE DALY	FIRE DEPUTY CHIEF	386-424-2445	JDALY@CITYOFEDGEWATER.ORG
	Tyna Hilton	Environmental Administrator	386-424-2494	thilton@cityofedgewater.org
Holly Hill	Doug Gutierrez	Community Development Director	248-9424	dgutierrez@hollyhillfl.org
Lake Helen	DON FINDELL	CITY ADMINISTRATOR	386-228-2121	DOOFINDELL@AOL.COM
New Smyrna Beach	Randy Wright	Division Chief	386-547-9976	rwright@cityofnsb.com
Oak Hill				
Orange City	Jerold WEAVER	P.W. Superintendent	386-775-7454	

LMS Meeting

Friday, August 21, 2009

Jurisdiction	Representative	Title	Phone Number	Email Address
Ormond Beach	RICHARD BENTON	SENIOR PLANNER	676 3342	BENTONR@ORMONDBEACH.ORG
Pierson				
Ponce Inlet	PEG HUNT	ADMIN. SPEC.	322-6729	PHUNT@PONCE-INLET.ORG
Port Orange	CHRISTOPHER J. WEIR	DIVISION CHIEF/FM	386-506-5905	CWEIR@PORT-ORANGE.ORG.
South Daytona	JEANNE WILLARD	PIO (386)	334-5634	JWILLARD2009@LIVE.COM
VC Health Department				
VC School Board	RUSSELL TYSINGER	DIRECTOR OF MAINTENANCE & OPS	(386) 947-8786	RETYSING@VOLUSIA.K12.FL.US
County Departments				
VC Emergency Mgmt	Pat White	VP Coordinator	386 254-1500 X1245	pwhite@co.volusia.fl.us
VC Environmental				
VC Fire Services	Stephen Plummer	Deputy Fire Chief	(386) 736-5940	Splummer@co.volusia.fl.us

LMS Meeting

Friday, August 21, 2009

Jurisdiction	Representative	Title	Phone Number	Email Address
Hometown News (media)	Wayne Grant		336-441-6965	WGRANT@hometownnewsol.com

APPENDIX F: INDIVIDUAL JURISDICTIONAL MITIGATION PLANS

An individual jurisdictional mitigation plan has been prepared for each of the participating jurisdictions. Each plan includes the following information that was updated during June – August of 2009:

- **Background**
- **Hazard Identification Ranking**
- **Action Plan – Mitigation Initiatives**

Background information includes the jurisdiction's population estimate based on 2008 U.S. Census estimates, the industry(ies) that comprise the local economy , the amount of vacant acreage and the proposed use for the vacant lands.

The hazard ranking provides each jurisdiction's perception of the level of risk associated with each hazard that could impact their community. Historic and recent disaster events are useful for targeting the mitigation needs of the community based on the type, location and magnitude of the impacts experienced, along with the community's exposure and losses these various hazards. The community can use this information to help identify mitigation initiatives to reduce hazard vulnerability from the hazards that are most likely to impact the jurisdiction.

The Action Plan is a listing of all of the jurisdictions mitigation initiatives.

F.1 Daytona Beach

Background

Daytona Beach is a slowly growing area with a population of 66,362. Twelve percent of its land, or 14 square miles, is left to be developed, primarily for residential use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.1: Hazard Risk Score for Daytona Beach

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
High Winds	4	5	2	3	1	3	65
Hail	4	4	1	2	0	1	32
Storm surge, Tsunami	1	3	1	3	2	3	30
Flooding	2	4	1	1	0	2	24
Major Fire -Wildland	1	4	1	2	1	1	24
Severe Winter Storm	1	4	1	1	1	1	20
Lightning	1	5	1	1	0	1	20
Drought	3	2	1	1	2	1	16
Landslide, Erosion	1	1	0	1	1	1	4
Subsidence/Expansive Soils	1	1	1	1	0	1	4
Earthquake	1	1	0	1	0	1	3
Volcano Activity	0	1	0	0	0	0	0
						Total Risk	242

Action Plan – Mitigation Initiatives

Table F.2: Daytona Beach Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Daytona Beach	City of Daytona Beach Fire	Wind Flood	PP	VOL-0010 Purchase storm shutters and raise the location of emergency generator at Fire Station #1.		8/1/1999	2006	C
	Daytona Beach	City of Daytona Beach Fire	Wind Flood	PP	VOL-0011 Purchase storm shutters and raise location of the emergency generator at Fire Station #3.		8/1/1999	N/A	T
	Daytona Beach	City of Daytona Beach Fire	Wind Flood	PP	VOL-0056 Purchase storm shutters and raise location of the emergency generator at Fire Station #2		8/1/1999	2006	C
	Daytona Beach	City of Daytona Beach Fire	Wind	PP	VOL-0057 2004 Purchase storm shutters for Fire Station #4		8/1/1999	2004	C
	Daytona Beach	City of Daytona Beach Fire	Wind	PP	VOL-0058 Purchase storm shutters at Fire Station #5.		8/1/1999	2004	C
	Daytona Beach	City of Daytona Beach Fire	Wind	PP	VOL-0059 Purchase storm shutters at Fire Station #6.		8/1/1999	2004	C
	Daytona Beach	City of Daytona Beach Fire	Wind	PP	VOL-0263 Hurricane Shutters and Emergency Generators		10/13/2004	N/A	T
H	Daytona Beach	City of Daytona Beach Fire	Flood	PP	Vol-0413- 607 Aberdeen RepLoss; Acquisition and Demolition.	4,5,7		< 1 yr	N

Table F.2: Daytona Beach Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
H	Daytona Beach	City of Daytona Beach Fire	Flood	PP	Vol-0418 - 125 Palm Place RepLoss; Acquisition and Demolition	4,5,7		< 1 yr	N
H	Daytona Beach	City of Daytona Beach Fire	Flood	PP	401 Jean St - RepLoss; Acquisition and Demolition	4,5,7		< 1 yr	N
H	Daytona Beach	City of Daytona Beach Fire	Flood	PP	501 Jean St - RepLoss; Acquisition and Demolition	4,5,7		< 1 yr	N
H	Daytona Beach	City of Daytona Beach Fire	Flood	PP	601 Jean St - RepLoss; Acquisition and Demolition	4,5,7		< 1 yr	N
	Daytona Beach	City of Daytona Beach-Utilities	Flood	S	VOL-0043-Pelican/Grandview Exfiltration Drainage to Hartford Ave. Outfall		8/1/1999	N/A	T
	Daytona Beach	Daytona Beach City Manager	Surge	PP	VOL-0167 Restore/preserve the historic Daytona Beach Main Street Pier.		8/1/2001	2004	C
	Daytona Beach	Daytona Beach City Manager	All	PP	VOL-0170 Replace aging commercial structures in boardwalk areas		8/1/2001	N/A	T
	Daytona Beach	Daytona Beach Partnership	All	PE	VOL-0275 Waterfronts FL Best Practicing Demo-Disaster Planning		10/13/2004	N/A	T
	Daytona Beach	Public Works	Flood	S	VOL- 0042 Lenox/Grandview Exfiltration Drainage System		8/1/1999	2005	C
	Daytona Beach	Utilites	Flood	S	VOL-0044 R B5/B6 Phase 2 - Nova Canal Drainage Basin		8/1/1999	N/A	T
	Daytona Beach	Utilities	Flood	S	VOL-0157 Stormwater project for Daytona Beach		10/1/2001	N/A	T

Table F.2: Daytona Beach Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Daytona Beach	Utilities	Flood	PP	VOL-0164 Flood abatement project/aquifer recharge		10/1/2001	N/A	T
H	Daytona Beach	Utilities	Flood	PP	VOL-0165 Stormwater/flood abatement	5	10/1/2001	2011	D
M	Daytona Beach	Utilities	Flood	PP	VOL-0166 A-5 barrier peninsula watershed Ocean Dunes Rd/Ocean Dunes Tr/Wisteria Rd.	5	10/1/2001	2010	D
M	Daytona Beach	Utilities	Flood	S	VOL-0168 B-3 Halifax River drainage basin-Wilder Outfall Study	5	8/1/2001	2010	D
	Daytona Beach	Utilities	All	P	VOL-0276 Articulating Excavator Purchase		10/13/2004	2004	C
	Daytona Beach	Utilities	Flood	S	VOL-0277 Bay Street Stormwater Improvements PW3/PW7 - Phase 1-5 Phase 1 only		10/13/2004	2006	C
M	Daytona Beach	Utilities	Flood	S	VOL-0364 North Street & Mark Avenue Stormwater Improvements	5	8/30/2005	2011	D
	Daytona Beach	Utilities	All	PE	VOL-0365 Hurricane & Flood Protection Public Education and Outreach		8/30/2005	2007	T

F.2 Daytona Beach Shores

Background
Daytona Beach Shores is a rapidly growing area with a population of 4,582. It is considered to be fully developed.

Hazard Identification
The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.3: Hazard Risk Score for Daytona Beach Shores

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
All Natural Hazards	4	1	2	3	2	3	14
Flooding	4	1	2	3	2	3	14
Storm surge, Tsunami	4	1	2	3	2	3	14
High Winds	4	1	2	3	2	2	13
						Total Risk	55

Action Plan – Mitigation Initiatives

Table F.4: Daytona Beach Shores Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Daytona Beach Shores	City of Daytona Beach Shores	Flood	S	VOL-0012 Protect wastewater collection and transmission system		8/1/1999		T
	Daytona Beach Shores	City of Daytona Beach Shores	All	PP	VOL-0041 Increase the structural integrity of the main roof section for the City Hall Complex		8/1/1999		T
	Daytona Beach Shores	City of Daytona Beach Shores	All	PP	VOL-0224 Upgrade new Public Safety Complex		10/13/2004		T
	Daytona Beach Shores	City of Daytona Beach Shores	All	PP	VOL-0392 Replace window at the DBS City Hall with Impact Resistant		9/10/2007		C
H	Daytona Beach Shores	City of Daytona Beach Shores	All	PP	VOL-0411 Replace the roof at Daytona Beach Shores City Hall	5	1/7/2009	> 1 yr	N

F.3 DeBary

Background

DeBary is a rapidly growing area with a population of 19,564. Ten percent of its land, or 2.5 square miles, is left to be developed, primarily for parks, industrial or mixed use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.5: Hazard Risk Score for DeBary

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
Flooding	2	4	0	1	1	3	28
High Winds	1	2	2	3	1	2	18
Lightning	1	2	1	1	1	2	12
Major Fire -Wildland	1	2	1	1	1	2	12
Subsidence/Expansive Soils	1	2	1	1	1	2	12
Hail	1	2	1	1	1	1	10
Landslide, Erosion	1	1	0	1	1	2	5
Severe Winter Storm	0	1	0	0	0	0	0
Drought	0	1	0	0	0	0	0
Storm surge, Tsunami	0	1	0	0	0	0	0
Earthquake	0	1	0	0	0	0	0
Volcano Activity	0	1	0	0	0	0	0
						Total Risk	97

Action Plan – Mitigation Initiatives

Table F.6: DeBary Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	DeBary	City of DeBary	Wind	PP	VOL-0215 Retrofit EOC		10/13/2004		T
	DeBary	City of DeBary	All	PP	VOL-0342 Generator for VC Sherriff's Office Debary Sub-station		1/12/2005		T
	DeBary	City of DeBary	Wind	PP	VOL-0343 Purchase storm shutters for Debary EOC		1/12/2005		T
	DeBary	City of DeBary	All	PP	VOL-0344 Generator for City Hall		1/12/2005		T
	DeBary	City of DeBary	Wind	PP	VOL-0345 Install storm shutters on Debary City Hall		1/12/2005		T
	DeBary	City of DeBary	All	PP	VOL-0346 Purchase 15 - 800 MHz radios		1/12/2005		D
	DeBary	City of DeBary	Flood	PP	VOL-0356R-Acquire residential repetitive flood loss property @ 117/119 East Highbanks Rd		2/14/2005		C
H	DeBary	City of DeBary	Flood	S	VOL-0288 City of DeBary Emergency Outfall System	5	12/7/2004	< 1 yr	
M	DeBary	City of DeBary	Wind	PP	VOL-0341 Provide hurricane shutters for doors & windows at Sheriff's Office	5	1/12/2005	< 1 yr	
L	DeBary	City of DeBary	All	ES	VOL-0347 Programmable message boards/trailers	5	1/12/2005	< 1 yr	
M	DeBary	City of DeBary	All	PE	VOL-0390 Community Information using an AM radio frequency EAS	2,5	3/7/2006	< 1 yr	
	DeBary	City of DeBary	Flood	PP	VOL-0402 Acquire 14 Flood prone residential residences		11/18/2008		C
H	DeBary	City of DeBary	Flood	S	VOL-0403 Gravity Overflow Systems	5	11/18/2008	< 1 yr	
H	DeBary	City of DeBary	Flood	S	VOL-0404 East Side Flood Management System Upgrade	5	11/18/2008	< 1 yr	

F.4 DeLand

Background

DeLand is a rapidly growing area with a population of 25,478. Thirty-five percent of its land, or 5.6 square miles, is left to be developed, primarily for residential and industrial use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.7: Hazard Risk Score for DeLand

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
High Winds	4	4	1	2	2	1	40
Hail	4	4	1	2	2	0	36
Severe Winter Storm	4	4	1	1	2	0	32
Major Fire -Wildland	2	4	1	1	2	1	28
Flooding	1	4	1	1	1	1	20
Drought	1	4	1	0	1	0	12
Lightning	4	1	2	1	1	0	8
Landslide, Erosion	1	1	1	1	1	0	4
Earthquake	0	1	0	0	0	0	0
Dam/Levee Failure	0	1	0	0	0	0	0
Subsidence/Expansive Soils	0	1	0	0	0	0	0
Volcano Activity	0	1	0	0	0	0	0
Storm surge, Tsunami	0	1	0	0	0	0	0
						Total Risk	**180**

Action Plan – Mitigation Initiatives

Table F.8: DeLand Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	DeLand	City of DeLand	All	PP	VOL-0055 Install protective doors at fire station		8/1/1999		C
H	DeLand	City of DeLand	Flood	PP	VOL-0349 Acquisition and expansion of stormwater for DeLand Middle School	5	2/14/2005	< 1 yr	D
H	DeLand	City of DeLand	Wind	PP	VOL-0350 Hardening DeLand City Hall	5	2/14/2005	< 1 yr	D
H	DeLand	City of DeLand	Flood	PP	VOL-0351 Acquire flooded property along New Hampshire between Amelia Ave & Garfield	4,5,7	2/14/2005	< 1 yr	U
	DeLand	City of DeLand	Flood	S	VOL-0369 Stormwater storage project in the Crystal Cove Sub-division		9/21/2005	2010	C
	DeLand	City of DeLand	Wind	PP	Vol-0388-Hurricane Shutters for Fire Station 81 and 83		9/10/2007		C
H	DeLand	City of DeLand Public Services	Flood	ES	VOL-0054 Purchase/install emergency generator for Pistol Range Road	5	8/1/1999	< 1 yr	U
H	DeLand	City of DeLand Public Services	Flood	S	VOL-0241 Acquisition and expansion of stormwater ponds	5	10/13/2004	< 1 yr	U
H	DeLand	City of DeLand Public Services	Flood	S	VOL-0242 Raise head works and effluent pump station	5	10/13/2004	< 1 yr	U
H	DeLand	City of DeLand Public Works	Flood	S	VOL-0002 Construct a stormwater pumping station and force main	5	8/1/1999	< 1 yr	U
	DeLand	City of DeLand Public Works	Flood	ES	VOL-0052 Emergency generators at the K-Mart Earl Brown Park and Painter Pond stormwater		8/1/1999		C

F.5 Deltona

Background

Deltona is a rapidly growing area with a population of 86,201. Eighteen percent of its land, or 6.9 square miles, is left to be developed, primarily for residential and mixed use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.9: Hazard Risk Score for Deltona

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
Lightning	4	5	1	1	1	2	45
Severe Winter Storm	4	4	2	1	1	1	36
Drought	4	4	2	1	1	1	36
Major Fire -Wildland	1	4	1	2	2	2	32
Hail	2	5	1	1	1	1	30
Flooding	1	4	2	1	1	1	24
Earthquake	2	1	2	2	1	1	8
Landslide, Erosion	1	1	1	1	1	1	5
Subsidence/Expansive Soils	1	1	1	1	1	1	5
Storm surge, Tsunami	0	1	0	0	0	0	0
Volcano Activity	0	1	0	0	0	0	0
						Total Risk	**221**

Action Plan – Mitigation Initiatives

Table F.10: Deltona Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Deltona	City of Deltona	Flood	PP	Vol-0285 Acquisition of residential home at 2013 Montero Circle Deltona		1/12/2005		T
	Deltona	City of Deltona	Flood	PP	VOL-0286 Acquisition of residential home at 1300 Melshire Ave		1/12/2005		T
	Deltona	City of Deltona	Flood	PP	VOL-0287 Acquisition of 2560 Tulsa Dr Deltona		1/12/2005		T
	Deltona	City of Deltona	Flood	PP	VOL-0335 Acquire 2018 Montero Circle		1/12/2005		T
	Deltona	City of Deltona Development	Flood	S	VOL-0047 Storm Services protection for Development Services		8/1/1999		T
	Deltona	City of Deltona Development	All	ES	VOL-0048 Install Services connection to provide generator for back-up electrical power		8/1/1999		T
M	Deltona	City of Deltona Fire Rescue	All	PE	VOL- 0376 Public Education Specialist	5	8/1/1999	< 1 yr	
	Deltona	City of Deltona Fire Rescue	Flood	PP	VOL-0046-Relocate Fire Station #62		1/1/2002		C
	Deltona	City of Deltona Fire Rescue	All	ES	VOL-0179-Establish a CERT program for the City of Deltona		11/1/2002		C
	Deltona	City of Deltona Fire Rescue	All	ES	VOL-0195-Community-wide information & warning system		8/1/2003		C
	Deltona	City of Deltona Fire Rescue	Flood	PP	VOL-0211- Acquire residential home		8/1/2003		C
	Deltona	City of Deltona Fire Rescue	Flood	S	VOL-0212- Tulsa DR Stormwater retrofit		8/1/1999		C
	Deltona	City of Deltona Public Works	Flood	S	VOL-0073 Lake level management program for Lake Theresa Basin lakes		8/1/1999		C

Table F.10: Deltona Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Deltona	City of Deltona Public Works	Flood	S	VOL-0074 Direct some of the stormwater from Sterling Lake to Baton Lake thru pump system		8/1/1999		T
	Deltona	City of Deltona Public Works	Flood	S	VOL-0075 Construct a permanent pump station within the sub-basin		8/1/1999		T
	Deltona	City of Deltona Public Works	Flood	S	VOL-0076 Install a backup pump system		8/1/1999		T
	Deltona	City of Deltona Public Works	Flood	S	VOL-0077 Pump systems should either be enlarged or an emergency pump system set up		8/1/1999		T
	Deltona	City of Deltona Public Works	Flood	S	VOL-0078 Pump systems should either be enlarged or an emergency pump system		8/1/1999		T
	Deltona	City of Deltona Public Works	Flood	S	VOL-0079 Pump systems should either be enlarged or an emergency pump system		8/1/1999		T
	Deltona	City of Deltona Public Works	Flood	S	VOL-0080 Pump systems should either be enlarged or an emergency pump system set up		8/1/1999		C
	Deltona	City of Deltona Public Works	Flood	S	VOL-0081 Provide a pumping system from the drainage retention area (DRA)		8/1/1999		C
	Deltona	City of Deltona Public Works	Flood	S	VOL-0082 Culvert improvements for drainage retention area		8/1/1999		C
	Deltona	City of Deltona Public Works	Flood	S	VOL-0083 "Big Ditch" connection between Lake Mitnik and Lake Doyle		8/1/1999		C
	Deltona	City of Deltona Public Works	Flood	S	VOL-0084 Outfall improvements for drainage retention area adjacent to Beechdale Drive		8/1/1999		C
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0085 Outfall improvements for Pioneer Lake	5	8/1/1999	< 1 yr	

Table F.10: Deltona Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0086- Outfall improvements for Castle Lake	5	8/1/1999	< 1 yr	
	Deltona	City of Deltona Public Works	Flood	S	VOL-0087- Outfall improvements for drainage retention area south of Elkcam Boulevard		8/1/1999		C
	Deltona	City of Deltona Public Works	Flood	S	VOL-0088-Culvert improvements at Elkcam Boulevard		8/1/1999		C
	Deltona	City of Deltona Public Works	Flood	S	VOL-0089- Culvert improvements at Humphrey BLVD		8/1/1999		C
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0090 Culvert improvements at Enterprise-Osteen Road	5	8/1/1999	< 1 yr	
	Deltona	City of Deltona Public Works	Flood	S	VOL-0091-Culvert improvement at Braddock Road		8/1/1999		C
	Deltona	City of Deltona Public Works	Flood	S	VOL-0092- Culvert improvement at Brickell Drive		8/1/1999		C
	Deltona	City of Deltona Public Works	Flood	S	VOL-0093-Culvert improvement at Harbor Drive		8/1/1999		C
	Deltona	City of Deltona Public Works	Flood	S	VOL-0094- Culvert improvements for Enterprise-Osteen Road		8/1/1999		C
	Deltona	City of Deltona Public Works	Flood	S	VOL-0095-Culvert improvements for Doyle Road		1/7/2009		C
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0406 Lake Lapanocia Pump Station	5	1/7/2009	< 1 yr	N
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0407 Piedmont Pump Station	5	1/7/2009	< 1 yr	N
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0408 Kingsway/Lehigh Culvert	5	1/7/2009	< 1 yr	N
M	Deltona	City of Deltona Public Works	Flood	S	VOL-0409 Tivoli & Wheeling Pump	5	9/21/2005	< 1 yr	

F.6 Edgewater

Background

Edgewater is a rapidly growing area with a population of 21,977. Forty percent of its land, or 5.9 square miles, is left to be developed, primarily for residential and mixed use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.11: Hazard Risk Score for Edgewater

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
Thunderstorm	4	5	1	1	1	1	40
Severe Winter Storm	4	4	2	1	1	1	36
Drought	2	4	1	1	1	0	20
High Winds	4	2	1	2	1	1	18
Hurricane	4	2	1	2	1	1	18
Flooding	2	2	1	1	1	1	12
Lightning	1	2	1	1	1	1	10
Storm surge, Tsunami	0	1	2	2	2	2	8
Major Fire -Wildland	2	1	1	1	2	1	7
Tornado	1	1	2	2	1	1	7
Hail	1	2	0	1	0	1	6
Sinkhole	1	1	1	1	1	1	5
Landslide, Erosion	1	1	0	1	0	0	2
Subsidence/Expansive Soils	0	1	0	0	0	0	0
Earthquake	0	1	0	0	0	0	0
						Total Risk	189

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Table F.12: Edgewater Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Edgewater	City of Edgewater	Flood	S	VOL-0001 Install new "wet well mounted, non-clog" pump station		8/1/1999		T
	Edgewater	City of Edgewater	All	ES	VOL-0310 Storm harden emergency services structures		8/1/1999		T
M	Edgewater	City of Edgewater	Flood	PP	VOL-0421 Acquire repetitive flood loss home at 1864 Sabal Palm Drive	4,5,7	6/17/2009	< 1 yr	N
H	Edgewater	City of Edgewater	All	ES	VOL-0424 Purchase two (2) portable 6" pumps	5	6/17/2009	< 1 yr	N
H	Edgewater	City of Edgewater	Flood	S	VOL-0426 Retrofit ift station #5 & #1	5	6/17/2009	< 1 yr	N
H	Edgewater	City of Edgewater	All	ES	VOL-0428 Permanent emergency back up generator and gas line for IT Bldg (115 E Park Ave)	5	6/17/2009	< 1 yr	N
	Edgewater	City of Edgewater Fire Department	Wind	PP	VOL-0006- Install Protective Window Coverings & storm Protection to Public Works critical facility		8/1/1999		C
	Edgewater	City of Edgewater Fire Department	All	ES	VOL-0064 Purchase three (3) laptop computers		8/1/1999		T
	Edgewater	City of Edgewater Fire Department	All	ES	VOL-0068 Replace non-functional back-up paging system		8/1/1999		T
M	Edgewater	City of Edgewater Fire Department	All	ES	VOL-0070 Purchase emergency back-up generator for the YMCA	5	8/1/1999	< 1 yr	U
	Edgewater	City of Edgewater Fire Department	All	ES	VOL-0071-Re-Activated-Purchase replacement generator for Police Department		8/1/1999		C
	Edgewater	City of Edgewater Fire Department	All	PE	VOL-0072 Develop and implement a public education program		8/1/1999		T

Table F.12: Edgewater Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Edgewater	City of Edgewater Fire Department	All	ES	VOL-0196 Purchase a passenger van		11/18/2002		T
	Edgewater	City of Edgewater Fire Department	Wind	PP	VOL-0311-Install window & Storm protection to Fire Station #57		1/12/2005		C
	Edgewater	City of Edgewater Fire Department	Wind	PP	VOL-0312 Install window & Storm protection to Parks & Rec Maintenance		12/8/2004		C
	Edgewater	City of Edgewater Fire Department	Wind	PP	VOL-0313- Install window & storm protection to the Police Station		12/8/2004		C
	Edgewater	City of Edgewater Fire Department	Wind	PP	VOL-0314- Install window & storm protection to the Fire Station #55 & Fire Admin		12/8/2004		C
	Edgewater	City of Edgewater Fire Department	Wind	PP	VOL-0315-Install window & storm protection to the City Hall & Community Center		12/8/2004		C
H	Edgewater	City of Edgewater Fire Department	Wind	PP	VOL-0316 Install window & Storm protection to Utilities office	5	12/8/2004	< 1 yr	U
	Edgewater	City of Edgewater Fire Department	Flood	PP	VOL-0317R-Completed- Acquisition of home at 135 Wildwood Avenue, Edgewater		12/8/2004		C
	Edgewater	City of Edgewater Fire Department	All	ES	VOL-0332- Harden and provide backup power to key emergency service structure		1/12/2005		T
	Edgewater	City of Edgewater Fire Department	Flood	PP	VOL-0333R-Completed-Acquire repetitive flood loss home at 120 W. Pine Bluff		1/12/2005		C
M	Edgewater	City of Edgewater Fire Department	Flood	PP	VOL-0334R Acquire repetitive loss home at 125 Cheeta Drive	4,5,7	1/12/2005	4,5,7	U
	Edgewater	City of Edgewater Fire Department	All	ES	VOL-197 Purchase a generator and hardened enclosure @ Fire/Rescue Assn		11/18/2002		C

Holly Hill

Background

Holly Hill is a slowly growing area with a population of 12,797. Three percent of its land, or 0.13 square miles, is left to be developed, primarily for residential use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.13: Hazard Risk Score for Holly Hill

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
High Winds	4	5	1	1	1	3	50
All Natural Hazards	4	5	1	1	0	1	35
Lightning	4	5	0	1	0	1	30
Hail	4	5	0	1	0	1	30
Flooding	1	2	1	2	1	3	16
Drought	0	4	0	1	1	1	12
Landslide, Erosion	1	2	1	1	1	1	10
Severe Winter Storm	4	1	1	1	0	2	8
Subsidence/Expansive Soils	1	1	1	1	1	1	5
Storm surge, Tsunami	0	1	0	0	0	0	0
Earthquake	0	1	0	0	0	0	0
Volcano Activity	0	1	0	0	0	0	0
Major Fire -Wildland	0	1	0	0	0	0	0
						Total Risk	196

Action Plan – Mitigation Initiatives

Table F.14: Holly Hill Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
L	Holly Hill	City of Holly Hill	Flood	S	VOL-0278 Trailer mounted emergency pumps	5		< 1 yr	
L	Holly Hill	City of Holly Hill	Flood	PP	VOL-0357 Cave Avenue Structure purchase	5	2/14/2005	< 1 yr	
	Holly Hill	City of Holly Hill Public Works	Flood	S	VOL-0098 Install new storm sewers and Department catch basins		8/1/1999		C
	Holly Hill	City of Holly Hill Public Works	Flood	S	VOL-0099 Storm sewers Department and inlets for three streets		8/1/1999		C
L	Holly Hill	City of Holly Hill Public Works	Flood	S	VOL-0279 State Avenue (6th - 8th St) Department Stormwater	5	1/12/2005	< 1 yr	
L	Holly Hill	City of Holly Hill Public Works	Flood	S	VOL-0280 Tuscaloosa Street drainage Department improvements	5	1/12/2005	< 1 yr	
L	Holly Hill	City of Holly Hill Public Works	Flood	S	VOL-0281 Eagle Drive and Peacock Rd Department Drainage Improvements	5	1/12/2005	< 1 yr	
L	Holly Hill	City of Holly Hill Public Works	Flood	S	VOL-0282 Espanola Ave Drainage Department Improvements	5	1/12/2005	< 1 yr	
	Holly Hill	Holly Hill Public Safety	Wind	PP	VOL-0007-R Install storm shutters on Fire Station #1		12/18/2002		C
	Holly Hill	Holly Hill Public Safety	Wind	PP	VOL-0008-R Install storm shutters on City Hall/Police Bldg		12/18/2002		C
L	Holly Hill	Holly Hill Public Safety	All	ES	VOL-0183 Purchase a passenger van/trailer and traffic control equipment	2,5	11/17/2002	< 1 yr	

Table F.14: Holly Hill Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Holly Hill	Holly Hill Public Safety	All	ES	VOL-0207R Purchase ONE programmable message signs		12/18/2002		C
	Holly Hill	Holly Hill Public Safety	All	ES	VOL-0214 Purchase portable generators		12/18/2002		C
	Holly Hill	Holly Hill Public Safety	Flood	PP	VOL--0222 Sunrise Park Seawall		10/13/2004		C
	Holly Hill	Holly Hill Public Safety	All	ES	VOL--0223 Construction of city EOC		10/13/2004		C

F.7 Lake Helen

Background

Lake Helen is a slowly growing area with a population of 2,850. Fifty percent of its land, or 1 square mile, is left to be developed, primarily for residential and commercial use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.15: Hazard Risk Score for Lake Helen

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
High Winds	4	5	1	2	3	3	65
Flooding	1	4	1	2	1	2	28
Drought	4	4	1	1	1	2	36
Lightning	1	5	1	1	1	1	25
Major Fire -Wildland	1	4	2	2	2	2	36
Severe Winter Storm	4	4	1	2	2	2	44
Hail	4	4	1	3	2	3	52
Volcano Activity	0	1	0	0	0	0	0
Landslide, Erosion	0	1	0	0	0	0	0
Subsidence/Expansive Soils	1	4	1	1	2	2	28
Storm surge, Tsunami	0	1	0	0	0	0	0
						Total Risk	314

Action Plan – Mitigation Initiatives

Table F.16: Lake Helen Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
H	Lake Helen	City of Lake Helen	All	PP	VOL-0051 Renovate to harden the Police building	5	8/1/1999	< 1 yr	
H	Lake Helen	City of Lake Helen	Wind	PP	VOL-0216 Storm Shutters for Police Department and EOC	5	10/13/2004	< 1 yr	
	Lake Helen	City of Lake Helen	All	PP	VOL-0331 Install 6 new overhead doors & fencing around public works compound		1/11/2005		T
	Lake Helen	Marshall, Provost & Associates	Fire	P	VOL-0145 Construct 1.6 miles of water line, fire			2001	C

F.8 New Smyrna Beach

Background

New Smyrna Beach is a rapidly growing area with a population of 24,335. Seventy-eight percent of its land, or 27.3 square miles, is left to be developed, primarily for residential and other use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.17: Hazard Risk Score for New Smyrna Beach

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
Flooding	2	5	2	1	1	3	45
High Winds	4	4	2	3	2	3	56
Major Fire -Wildland	1	4	1	2	2	2	32
Landslide, Erosion	1	5	0	1	1	2	25
Lightning	4	5	1	0	0	0	25
Storm surge, Tsunami	1	3	3	2	2	3	33
Hail	1	1	0	0	0	0	1
Earthquake	1	1	0	0	0	0	1
Drought	2	4	0	0	0	0	8
Subsidence/Expansive Soils	1	1	1	1	1	1	5
Volcano Activity	0	1	0	0	0	0	0
						Total Risk	231

Action Plan – Mitigation Initiatives

Table F.18: New Smyrna Beach Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	New Smyrna Beach	City of New Smyrna Beach	Flood	S	VOL-0100 Relieve flooding at the Greenbriar Apartments on Roberts Road	NSB	8/1/1999	2006	C
	New Smyrna Beach	City of New Smyrna Beach	Flood	S	VOL-0101 Improvement to the West Canal basin	NSB	8/1/1999	2005	C
	New Smyrna Beach	City of New Smyrna Beach	Flood	S	VOL-0102 Mitigate periodic flooding in the Golf Course Canal drainage basin		8/1/1999		T
L	New Smyrna Beach	City of New Smyrna Beach Fire	All	ES	VOL-0103R Relocate and replace Fire Department Station #50 (main station)	5	8/1/1999	< 1 yr	U
	New Smyrna Beach	City of New Smyrna Beach Fire	Flood	PP	VOL-0104R Relocate Fire Station #53 to Department a site further west	NSB	8/1/2003	2009	T
	New Smyrna Beach	City of New Smyrna Beach Fire	All	PP	VOL-0105R Replace & relocate NSB Department police headquarters with a hardened facility	NSB	8/1/2003	2009	C
	New Smyrna Beach	City of New Smyrna Beach	Wind	PP	VOL-0106R Install storm shutters on City Hall	FEMA	8/1/1999	2004	C
	New Smyrna Beach	City of New Smyrna Beach Fire	All	ES	VOL-0107 Install emergency Department generators at Fire Stations 52 and 54		8/1/1999		T
	New Smyrna Beach	City of New Smyrna Beach Fire	All	ES	VOL-0188 Equip new EOC Department		11/1/2002		T
	New Smyrna Beach	City of New Smyrna Beach Fire	All	ES	VOL-0189 Equip a mobile emergency Department response vehicle		11/1/2002		T
	New Smyrna Beach	City of New Smyrna Beach Fire	All	ES	VOL-0192 Establish a community Department emergency response team		11/1/2002		T

Table F.18: New Smyrna Beach Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	New Smyrna Beach	City of New Smyrna Beach Fire	All	ES	VOL-0193R Purchase and enclose in a Department hardened enclosure four (4) generators (CHANGED TO (3) GENERATORS	NSB	11/1/2002	2009	C
	New Smyrna Beach	City of New Smyrna Beach	All	ES	VOL-0208 Institute a comprehensive community warning program		1/1/2004		T
	New Smyrna Beach	City of New Smyrna Beach Fire	Flood	PP	VOL-0213R Relocate Fire Stations #52 Department	NSB	2/1/2003	2009	C
M	New Smyrna Beach	City of New Smyrna Beach	Flood	PP	VOL-0359 Acquire property at Willard Street for drainage improvements		4/8/2005		T
	New Smyrna Beach	City of New Smyrna Beach	Flood	PP	VOL-0360-Acquire property at Glenwood Avenue		4/8/2005		T
L	New Smyrna Beach	City of New Smyrna Beach	Wind	ES	Vol-0385- Fire Station 50 Impact Resistant Glass	5	9/10/2007	< 1 yr	U
M	New Smyrna Beach	City of New Smyrna Beach	Flood	PP	Vol-0386-Central Beachside Flood Mitigation Project Phase II	5	9/10/2007	< 1 yr	U
L	New Smyrna Beach	City of New Smyrna Beach	Wind	PP	Vol-0394-Installing Impact Resistant Windows in the New Smyrna City Gym	5	9/10/2007	< 1 yr	U
M	New Smyrna Beach	City of New Smyrna Beach	Flood	S	VOL-0410 New Smyrna Beach Central Beachside Storm Water Management Project	5	1/7/2009	< 1 yr	U
L	New Smyrna Beach	City of New Smyrna Beach	Wind	PP	Vol-384- Wind Resistance Protective Measures	5	9/10/2007	< 1 yr	U
	New Smyrna Beach	Emergency Management	Flood	S	VOL-0237 North Street Drainage Improvements -Islesboro		10/13/2004		T
	New Smyrna Beach	Emergency Management	Flood	PP	VOL-0238 4 Cunningham DR Property Acquisition		9/29/2004		T

Table F.18: New Smyrna Beach Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	New Smyrna Beach	Emergency Management	Flood	PP	VOL-0239 Sunset DR Property Acquisition	FEMA	9/29/2004		C
	New Smyrna Beach	Emergency Management	Flood	S	VOL-0240 Country Club Chalet Flood Mitigation Project Utilities Commission		9/29/2004	2007	C
	New Smyrna Beach	Utilities Commission	Wind	PP	VOL-0393 Install Storm Shutters		9/10/2007		C

F.9 Oak Hill

Background

Oak Hill is a rapidly growing area with a population of 1,828. Twenty percent of its land, or 2.5 square miles, is left to be developed, primarily for residential use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.19: Hazard Risk Score for Oak Hill

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
High Winds	4	4	1	3	1	1	40
Storm surge, Tsunami	3	3	2	3	1	3	36
Flooding	2	5	1	2	1	2	40
Major Fire -Wildland	3	4	1	2	1	1	32
Landslide, Erosion	1	4	0	1	2	2	24
Drought	3	2	1	1	1	1	14
Hail	1	4	0	1	0	1	12
Lightning	1	2	1	1	0	1	8
Severe Winter Storm	1	2	0	1	1	1	8
Earthquake	0	1	0	0	0	0	0
Volcano Activity	0	1	0	0	0	0	0
Tornado	2	4	1	1	1	1	24
Thunderstorm	1	5	1	1	1	1	25
Hurricane & TS Winds	1	5	1	1	1	1	25
						Total Risk	**288**

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Table F.20: Oak Hill Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
H	Oak Hill	City Hall	ALL	PP	VOL--0217 Harden City Hall/Police	5	10/7/2004	< 1 yr	U

F.10 Orange City

Background

Orange City is a rapidly growing area with a population of 8,090. Forty-seven percent of its land, or 3.1 square miles, is left to be developed, primarily for residential and commercial use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.21: Hazard Risk Score for Orange City

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
Drought	1	2	1	1	1	2	12
High Winds	4	4	1	1	0	1	28
Lightning	2	5	2	1	1	1	35
Hail	1	2	1	1	1	1	10
Subsidence/Expansive Soils	0	1	1	1	0	1	3
						Total Risk	88

Action Plan – Mitigation Initiatives

Table F.22: Orange City Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Orange City	City of Orange City	Flood	S	VOL-0032 Correct flooding problem at City Hall Annex		8/1/1999	39722	C
	Orange City	City of Orange City	Flood	S	VOL-0033 Construction of a stormwater pump station for Post Office area		8/1/1999	39522	C
	Orange City	City of Orange City	ALL	PP	VOL-0358 Harden Public Works Facility		4/7/2005		T
H	Orange City	City of Orange City	Flood	S	VOL-0398 - Fawn Ridge Subdivision	5	10/7/2008	< 1 yr	
H	Orange City	City of Orange City	Flood	S	VOL-0399 Treemont Drainage Project	5	10/7/2008	< 1 yr	
	Orange City	City of Orange City Building	Wind	PP	VOL-0019 Storm shutters for Fire Station Department		8/1/1999	39339	C
	Orange City	City of Orange City Building	Wind	PP	VOL-0020 Storm shutters for Police Department Station and EOC		8/1/1999	39339	C
	Orange City	City of Orange City Building	Wind	PP	VOL-0021 Emergency generators for Department Police, Fire and EOC		8/1/1999	39248	C

F.11 Ormond Beach

Background

Ormond Beach is a rapidly growing area with a population of 41,000. Twenty-one percent of its land, or 37.6 square miles, is left to be developed for various land uses.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.23: Hazard Risk Score for Ormond Beach

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
Drought	1	2	1	1	2	1	12
Flooding	2	5	1	2	2	2	45
Storm surge, Tsunami	1	5	1	2	2	2	40
Severe Winter Storm	1	1	1	1	1	1	5
Major Fire -Wildland	1	2	1	1	1	1	10
Lightning	4	5	1	1	1	1	40
High Winds	4	5	1	2	0	2	45
Hail	4	2	1	2	0	2	18
Landslide, Erosion	1	2	1	1	1	3	14
Subsidence/Expansive Soils	1	2	1	1	1	1	10
						Total Risk	239

Action Plan – Mitigation Initiatives

Table F.24: Ormond Beach Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Ormond Beach	City of Ormond Beach	Flood	S	VOL-0298 Thompson Creek Stormwater Improvement		12/7/2004		T
	Ormond Beach	City of Ormond Beach	Flood	PP	VOL-0352 Fire Station #93 shutter. Status: Received a State EMPATF grant to do this; however, was unable to after review of flood plain maps; funds used at FS #94.		2/14/2005		C
	Ormond Beach	City of Ormond Beach Public Works	Flood	PP	VOL-0329 Melrose Avenue Seawall and Lisa Lake Dredging		1/11/2005	Not scheduled	D
M	Ormond Beach	City of Ormond Beach	ALL	PP	VOL-0151 Purchase hurricane shutters and generator power for the Performing Arts Center	5	12/1/2000	< 1 yr	
H	Ormond Beach	City of Ormond Beach	All	ES	VOL-0194 Purchase 30 emergency radios for use during emergencies	2,5	11/18/2002	< 1 yr	
H	Ormond Beach	City of Ormond Beach	Flood	PP	VOL-0400 Elevate Whitley residence, 350 Cumberland Avenue	4,5,7	10/7/2008	< 1 yr	
M	Ormond Beach	City of Ormond Beach Public Works	Flood	S	Vol-0325R Hand Ave/ Laurel Creek Pump Station Generator & Central Park Pond Interconnects	5	1/11/2005	< 1 yr	
M	Ormond Beach	City of Ormond Beach Public Works	Flood	S	VOL-0328 Hand Avenue roadway & Drainage improvements	5	1/11/2005	< 1 yr	
	Ormond Beach	City of Ormond Beach	Flood	S	VOL-0326 Peninsula Pump Station Improvements		1/11/2005	2006	C
	Ormond Beach	City of Ormond Beach	Flood	S	VOL-0327 Peninsula Pump Station Emergency Power Generators		1/11/2005	2006	C

Table F.24: Ormond Beach Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Ormond Beach	City of Ormond Beach	All	PE	VOL-0375 Public Notification Signs - Electronic Changeable Copy		2/22/2006		C
	Ormond Beach	City of Ormond Beach Fire	Wind	PP	VOL-0003 - Remove existing Department Fire Station #92 and replace with hardened facility		8/1/1999	2006	C
	Ormond Beach	City of Ormond Beach Fire	All	ES	VOL-0299 Weather Station and generator Department Fire Station 92		12/7/2004	2006	C
	Ormond Beach	City of Ormond Beach Fire	All	ES	VOL-0373 Ormond Beach Fire Corps Department		2/22/2006	2006	C
	Ormond Beach	City of Ormond Beach Public Works	Flood	S	VOL-0049 Drainage improvements to Ellinor Village		8/1/1999	2006	C
	Ormond Beach	City of Ormond Beach Public Works	Flood	S	VOL-0061 Drainage improvements to areas of "Old Ormond" (Barrier Island)		8/1/1999	2002-2005	C
	Ormond Beach	City of Ormond Beach Public Works	Wind	PP	VOL-0330 City Hall Shutters		1/11/2005	2007	C
M	Ormond Beach	City of Ormond Beach Fire	Flood	S	Vol-0387- Thompson Creek Stormwater Department Improvement	5	9/10/2007	< 1 yr	
M	Ormond Beach	City of Ormond Beach Public Works	Flood	S	VOL-0050 Drainage improvements to areas of "Old Ormond" (mainland)	5	8/1/1999	< 1 yr	
M	Ormond Beach	City of Ormond Beach Public Works	Flood	S	VOL-0353 Hand Avenue	5		< 1 yr	

F.12 Pierson

Background

Pierson is a moderately growing area with a population of 2,936. Fourteen percent of its land, or 1.1 square miles, is left to be developed for residential and park use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.25: Hazard Risk Score for Pierson

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
Major Fire -Wildland	2	5	1	2	2	2	45
High Winds	4	4	1	2	1	3	44
Drought	4	4	1	2	1	3	44
Severe Winter Storm	3	4	1	1	1	3	36
Hail	3	4	0	1	1	2	28
Lightning	1	5	1	1	1	1	25
Flooding	1	4	1	1	1	1	20
Subsidence/Expansive Soils	1	2	1	1	2	1	12
Volcano Activity	0	1	0	0	0	0	0
Landslide, Erosion	0	1	0	0	0	0	0
Earthquake	0	1	0	0	0	0	0
Storm surge, Tsunami	0	1	0	0	0	0	0
						Total Risk	254

Action Plan – Mitigation Initiatives

Table F.26: Pierson Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Pierson	Town of Pierson	Wind	PP	VOL-0028 Harden the Town Hall by installing motorized roll down shutters	5	9/1/1999	< 1 yr	
	Pierson	Town of Pierson	All	P	VOL-0218 Secure water supply	2,5	10/13/2004	< 1 yr	
	Pierson	Town of Pierson	All	ES	VOL-0219 Establish an Emergency Operations Center in Community Center	5	10/13/2004	< 1 yr	
	Pierson	Town of Pierson	Wind	PP	VOL-0220 Establish an MH retrofit tie-down program	5	10/13/2004	< 1 yr	
	Pierson	Town of Pierson	Flood	S	VOL-0221 Establish stormwater management maintenance program	5	10/13/2004	< 1 yr	

F.13 Ponce Inlet

Background

Ponce Inlet is a rapidly growing area with a population of 3,102. Three percent of its land, or 0.225 square miles, is left to be developed for residential use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.27: Hazard Risk Score for Ponce Inlet

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
High Winds	4	5	2	3	2	3	70
Lightning	2	5	1	1	1	1	30
Major Fire -Wildland	1	4	1	1	2	2	28
Flooding	2	4	1	2	1	2	32
Hail	1	4	1	1	1	1	20
Severe Winter Storm	1	4	1	0	2	1	20
Storm surge, Tsunami	4	4	1	3	2	3	52
Drought	1	4	0	0	1	0	8
Landslide, Erosion	1	1	0	0	0	0	1
Earthquake	0	1	0	0	0	0	0
Subsidence/Expansive Soils	0	1	0	0	0	0	0
Volcano Activity	0	1	0	0	0	0	0
Hurricane & TS Wind	0	0	0	0	0	0	0
Sinkhole	0	0	0	0	0	0	0
Thunderstorm	0	0	0	0	0	0	0
Tornado	0	0	0	0	0	0	0
						Total Risk	261

Action Plan – Mitigation Initiatives

Table F.28: Ponce Inlet Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Ponce Inlet	Ponce Inlet Fire Department	Wind	PP	VOL-0096 Storm protection for the Ponce Inlet Town Hall Complex		8/1/1999	N/A	T
H	Ponce Inlet	Ponce Inlet Fire Department	All	ES	VOL-0173 Purchase the equipment necessary to equip a mobile command center	2,5	1/1/2002	< 1 yr	
H	Ponce Inlet	Town of Ponce Inlet	Wind	PP	VOL-0419 Install Hurricane Windows & Entrance Doors on Fire Station	5	6/16/2009	< 1 yr	
H	Ponce Inlet	Town of Ponce Inlet	Flood	S	VOL-0420 Purchase 4" Pump for flood control	5	6/16/2009	< 1 yr	
	Ponce Inlet	Town of Ponce Inlet Community	Flood	PP	VOL-0209 Public Acquisition Effort Services (55 Beach Street)		10/9/2003	38471	C

F.14 Port Orange

Background

Port Orange is a rapidly growing area with a population of 57,234. Twenty percent of its land, or 5.5 square miles, is left to be developed for residential and commercial use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.29: Hazard Risk Score for Port Orange

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
Lightning	4	5	1	2	0	1	40
Severe Winter Storm	4	4	1	1	2	2	40
High Winds	4	5	1	2	1	2	50
Major Fire -Wildland	1	4	1	2	2	2	32
Hail	3	4	1	2	0	2	32
Storm surge, Tsunami	1	5	1	2	1	2	35
Flooding	1	4	1	2	0	2	24
						Total Risk	253

Action Plan – Mitigation Initiatives

Table F.30: Port Orange Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Port Orange	City of Port Orange	Flood	S	VOL-0004- 2001 Provide flood protection to two main lift stations		8/1/1999		C
	Port Orange	City of Port Orange	Flood	S	VOL-0005 Provide flood protection for the pump rooms at the Garnsey Water Plant		8/1/1999		C
	Port Orange	City of Port Orange	Flood	NRP	VOL-0013 Water reuse program, expanding the reuse system		8/1/1999		C
	Port Orange	City of Port Orange	All	P	VOL-0014 Create a digital base map of the City		8/1/1999	2007	C
	Port Orange	City of Port Orange	All	ES	VOL-0015 2002 Supply Fire Station #1 with emergency generator power		8/1/1999		C
	Port Orange	City of Port Orange	Flood	S	VOL-0017 2002 Increase emergency generator power at the sewer plant		8/1/1999		C
	Port Orange	City of Port Orange	Flood	S	VOL-0018R Flood Protection in the Cambridge Basin area of Port Orange		8/1/1999	2007	C
	Port Orange	City of Port Orange	All	PP	VOL-0063 2001 Replace Fire Station #1 located on Commonwealth Blvd		8/1/1999		C
M	Port Orange	City of Port Orange	Flood	PP	VOL-0130 Purchase Seabird Island; remove mobile homes, and convert the area into a park	5	12/1/2000	< 1 yr	N
	Port Orange	City of Port Orange	All	ES	VOL-0137 To purchase a city wide emergency notification system		12/1/2000		T

Table F.30: Port Orange Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Port Orange	City of Port Orange	Fire	ES	VOL-0143 To purchase a military all-wheel drive vehicle for fire-fighting purposes		12/1/2000	2008	C
	Port Orange	City of Port Orange	Flood	S	VOL-0144 To build a lake to hold water from storm water runoff and excess reclaimed water		12/1/2000		C
	Port Orange	City of Port Orange	All	ES	VOL-0156 2005 Retrofit 33kw generator when a larger generator is obtained		10/1/2001		C
	Port Orange	City of Port Orange	All	ES	VOL-0159 2005 Generator for city hall		10/1/2001		C
	Port Orange	City of Port Orange	All	ES	VOL-0161 Install a generator at the Allen Green civic center		10/1/2001		C
	Port Orange	City of Port Orange	All	ES	VOL-0162-Purchase 6 portable radios to be used at shelters		10/1/2001		T
	Port Orange	City of Port Orange	All	ES	VOL-0163 2003 Install a larger generator at FD #3		10/1/2001		C
M	Port Orange	City of Port Orange	All	ES	VOL-0169R Retrofit the Port Orange Cypress Head golf course banquet area	5	10/1/2001	< 1 yr	N
	Port Orange	City of Port Orange	All	ES	VOL-0171- 2003 Retrofit the Allen Green Civic Center to meet ARC 4496 shelter standards		10/1/2001		C
H	Port Orange	City of Port Orange	Wind	S	VOL-0176 Install FDOT traffic signal arms that can withstand 140MPH wind load	5	1/1/2002	< 1 yr	N
	Port Orange	City of Port Orange	Surge	S	VOL-0180 Shoreline protection along the Halifax River IVO the Chamber of Commerce Building		8/1/2002		C
	Port Orange	City of Port Orange	All	All	VOL-0187 Develop a Post-Disaster Redevelopment Plan		11/1/2002		C

Table F.30: Port Orange Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Port Orange	City of Port Orange	All	ES	VOL-0199 Construct a 2,500 square foot emergency shelter		11/1/2002		C
	Port Orange	City of Port Orange	Flood	S	VOL-0225- Cambridge Basin North Flood Mitigation Project		10/13/2004		C
	Port Orange	City of Port Orange	Flood	S	VOL-0226- Cambridge Basin South Flood Mitigation Project		10/13/2004		C
	Port Orange	City of Port Orange	Flood	S	VOL-0227 Cambridge Basin Central Flood Mitigation Project		10/13/2004		C
H	Port Orange	City of Port Orange	Flood	S	VOL-0228 Taylor Woods and S. Williamson Drainage retrofit	5	10/13/2004	< 1 yr	N
H	Port Orange	City of Port Orange	Flood	S	VOL-0229 Taylor RD Drainage retrofit	5	10/13/2004	< 1 yr	N
	Port Orange	City of Port Orange	Flood	S	VOL-0230 R Spruce Creek RD South Drainage retrofit		10/13/2004		C
	Port Orange	City of Port Orange	Flood	S	VOL-0231 Wellfield Vulnerability Reduction		10/13/2004		C
	Port Orange	City of Port Orange	Flood	S	VOL-0232 Rainfall collection, weather monitoring system		10/13/2004		C
	Port Orange	City of Port Orange	Flood	S	VOL-0233 2005 Stormwater pipe lining		10/13/2004		C
	Port Orange	City of Port Orange	Flood	S	VOL-0234 B-19 Canal Drainage retrofit		10/13/2004		C
	Port Orange	City of Port Orange	Flood	S	VOL-0235 B-23 Phase II Canal drainage retrofit and flood attenuation project		10/13/2004		C
	Port Orange	City of Port Orange	Surge	S	VOL-0236 Seawall and embankment restoration		10/13/2004		C

Table F.30: Port Orange Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Port Orange	City of Port Orange	Wind	PP	VOL-0295- Retrofit Fire Station 2 with Hurricane doors & shutters		12/8/2004		C
	Port Orange	City of Port Orange	All	ES	VOL-0296R-Port Orange Performing Arts Pavilion - shelter		12/8/2004		C
	Port Orange	City of Port Orange	Flood	S	VOL-0297- Mitigation of wooden boat dock & launch areas		1/12/2005		C
	Port Orange	City of Port Orange	All	ES	VOL-0348- Shelter retrofit of Port Orange Gym		2/14/2005		T
	Port Orange	City of Port Orange	Flood	S	VOL-0363- Cambridge Basin Design & Engineering		4/14/2005		C
	Port Orange	City of Port Orange	Flood	PP	VOL-0383-Purchase six homes in the Cambridge Basin		7/18/2007	2008	C
	Port Orange	Port Orange Emergency Management	Flood	PP	VOL-0383 Purchase 6 homes in the Cambridge Basin		7/17/2007	2008	C
H	Port Orange	Port Orange Emergency Management	Flood	S	VOL-0391 B-23 Canal Seawall Improvement	5	9/10/2007	< 1 yr	N

F.15 South Daytona

Background
South Daytona is a slowly growing area with a population of 13,484. Thirteen percent of its land, or 0.5 square miles, is left to be developed for unknown use.

Hazard Identification
The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.31: Hazard Risk Score for South Daytona

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
Flooding	1	4	0	2	1	1	20
Storm surge, Tsunami	1	4	0	2	1	1	20
All Natural Hazards	1	1	0	0	0	0	1
						Total Risk	41

Action Plan – Mitigation Initiatives

Table F.32: South Daytona Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	South Daytona	City of South Daytona	All	ES	???? - Provide additional parking at the Piggotte Center for evacuees parking		8/1/2002		C
	South Daytona	City of South Daytona	Wind	PP	VOL-0009 Provide storm shutters for Youth Activity Center storm shelter		8/1/1999		C
	South Daytona	City of South Daytona	All	ES	VOL-0120 - Purchase a variable message for installation		12/1/2000		C
	South Daytona	City of South Daytona	Flood	S	VOL-0210 - Country Club Manor Subdivision		11/6/2003		C
	South Daytona	City of South Daytona	Wind	PP	VOL-0243 - Storm shutters for City Hall		10/13/2004		C
	South Daytona	City of South Daytona	Flood	S	VOL-0244 Golfview Subdivision Retrofit- PHASE V STORMWATER		10/13/2004		T
	South Daytona	City of South Daytona	Flood	S	VOL-0245 Lantern park retrofit - PHASE V STORMWATER		10/13/2004		T
	South Daytona	City of South Daytona	Flood	S	VOL-0246- Reed Canal Reconstruction Design		10/13/2004		C
	South Daytona	City of South Daytona	Flood	S	VOL-0247 Western RD Stormwater Improvements		10/13/2004		T
	South Daytona	City of South Daytona	Flood	S	VOL-0248 Greenbriar Subdivision Retrofit		10/13/2004		T
	South Daytona	City of South Daytona	Flood	S	VOL-0378- Stevens Canal Outflow Pond		9/13/2006		T

Table F.32: South Daytona Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	South Daytona	City of South Daytona	Wind	PP	VOL-0379- Hardening-Brian Ave Fire Station		9/13/2006		T
H	South Daytona	City of South Daytona	All	PP	Vol-0389-South Daytona EOC/Public Works Facility	5	1/10/2007	< 1 yr	
	South Daytona	City of South Daytona	Flood	S	Vol-0395-Reed Canal Basin Stormwater Treatment Facility		9/10/2007		T
	South Daytona	South Daytona Fire Department	Wind	PP	VOL-0135 - Installation of shatter resistant glass to Fire Station		12/1/2000		C
	South Daytona	South Daytona Fire Department	Wind	PP	VOL-0136- Purchase armor screen to protect fire station		12/1/2000		C

F.16 Volusia County (Unincorporated)

Background

The unincorporated area of Volusia County is a rapidly growing area with a population of 125,700. Thirty-three percent of its land, or 307.5 square miles, is left to be developed for parks, residential and mixed use.

Hazard Identification

The hazards of concern that were identified by this jurisdiction are as follows:

TABLE F.33: Hazard Risk Score for Volusia County (Unincorporated)

Hazard	Impacted Area	Probability of Occurrence	Health & Safety	Property	Environment	Economic	Total Rating
High Winds	4	5	1	2	2	2	55
Flooding	3	5	1	2	2	3	55
Major Fire -Wildland	3	5	1	2	2	2	50
All Natural Hazards	4	4	2	2	1	3	48
Subsidence/Expansive Soils	3	5	1	2	2	2	50
Lightning	4	5	1	2	1	1	45
Severe Winter Storm	4	4	1	0	1	2	32
Landslide, Erosion	1	4	1	1	2	2	28
Storm surge, Tsunami	3	4	2	2	1	3	44
Drought	4	4	0	0	1	2	28
Hail	1	2	1	1	0	1	8
Volcano Activity	0	1	0	0	0	0	0
Earthquake	0	1	0	0	0	0	0
						Total Risk	443

Action Plan – Mitigation Initiatives

Table F.34: Volusia County (Unincorporated) Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Volusia County (Unincorporated)	Daytona Beach International	Wind	PP	VOL-0371 Hurricane Mitigation Armor Screens		11/11/2005		C
	Volusia County (Unincorporated)	Environmental Management	Flood	NRP	VOL-0265 Habitat Stabilization/Revegetation Project	5	10/13/2004	< 1 yr	
	Volusia County (Unincorporated)	Environmental Management	Surge	PP	VOL-0266 Shoreline Erosion Control and Restoration Project	5	10/13/2004	< 1 yr	
H	Volusia County (Unincorporated)	Florida Hospital Fish Memorial	Flood	S	VOL-0405 Florida Hospital Fish Memorial Orange City Retention Pond Project	5	1/7/2009	< 1 yr	N
	Volusia County (Unincorporated)	Halifax Medical Center -Daytona	All	ES	VOL-0353 Emergency Domestic Water		2/14/2005		C
	Volusia County (Unincorporated)	Halifax Medical Center -Daytona	All	ES	Vol-0354 Oxygen Storage Protection		2/14/2005		C
	Volusia County (Unincorporated)	Halifax Medical Center -Daytona	All	ES	VOL-0355 Add Patient Room Air Conditioning to Emergency Power		2/14/2005		C
	Volusia County (Unincorporated)	Halifax Medical Center -Daytona	Wind	PP	VOL-0377-Hurricane Shutters for Patient Care Facilities		5/17/2006		T
	Volusia County (Unincorporated)	Library Services	Wind	PP	VOL-0361 Regional Library Hardening Project		4/8/2005		T
	Volusia County (Unincorporated)	Public Works	All	All	VOL-0254 GPS Units		10/13/2004		C
M	Volusia County (Unincorporated)	Public Works	All	PP	VOL-0255 Volusia County Public Works Eastside Service Center	5	10/13/2004	< 1 yr	U

Table F.34: Volusia County (Unincorporated) Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
M	Volusia County (Unincorporated)	Public Works	All	ES	VOL-0256 Mosquito Control Helicopter Hangar	5	10/13/2004	< 1 yr	U
H	Volusia County (Unincorporated)	Public Works	Wind	S	VOL-0257 Mast Arm Replacement for Traffic Signals	5	10/13/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Public Works	All	S	VOL-0300 Onsite generator for New Hope Villas of Seville wastewater treatment	5		< 1 yr	U
	Volusia County (Unincorporated)	Public Works	All	PP	VOL-0301 Onsite generator for Medowlea on River water treatment plant				T
	Volusia County (Unincorporated)	Public Works	All	PP	VOL-0302 Onsite generator for Pine Island Water Treatment Plant				C
	Volusia County (Unincorporated)	Public Works	All	PP	VOL-0303 Onsite generator for Deltona N. Treatment Plant, Well #4				T
	Volusia County (Unincorporated)	Public Works	All	PP	VOL-0304 Onsite generator for LIFT STATION SW-60 (Orange City Regional)				C
	Volusia County (Unincorporated)	Public Works	All	PP	VOL-0305 Onsite generator for LIFT STATION SW-56 (Riviera Bella Lift Station)				C
	Volusia County (Unincorporated)	Public Works	All	PP	VOL-0306 Onsite generator for LIFT STATION SW-31 (Pine Valley Ct. Lift Station)				T
	Volusia County (Unincorporated)	Public Works	All	PP	VOL-0307 Onsite generator for Lift Station SW-33 (Glen Abbey North)				C
	Volusia County (Unincorporated)	Public Works	All	PP	VOL-0308 Onsite generator for Lift Station SW-5 (Eustace Lift Station)				T

Table F.34: Volusia County (Unincorporated) Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Volusia County (Unincorporated)	Public Works	All	PP	VOL-0309 Onsite generator for Lift Station SW-23 (Debary Elementary Lift Station)				C
	Volusia County (Unincorporated)	Public Works	All	PP	VOL-0322 Generators to harden the Mosquito Control facilities				C
	Volusia County (Unincorporated)	Public Works	All	PE	VOL-0323 Overhead School Zone Signs	5		< 1 yr	
M	Volusia County (Unincorporated)	School Board of Volusia County	Wind	PP	VOL-0097 Furnish and install window and door protectives on buildings 3, 4 & 6, Galaxy Middle School		8/1/1999		C
M	Volusia County (Unincorporated)	United Cerebral Palsy of East Central Florida	Wind	PP	VOL-0401 Harden facility to withstand hurricane force winds & meet ARC 4496 shelter standards	5	11/18/2008	< 1 yr	U
M	Volusia County (Unincorporated)	VOL2020 MP Subcommittee	All	PP/PE/P/S	VOL-0027 LMS Steering Committee support a home mitigation education & incentive program	5	6/1/1999	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency	Wind	ES	VOL-0205 Hire a consulting firm to prepare an integrated countywide debris management plan		1/29/2004	2007	C
M	Volusia County (Unincorporated)	Volusia County Emergency	Flood	PP	VOL-0259 1001 Shockney DR Mitigation	4,5,7	10/13/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0206- 985 Shockney DR Mitigation		1/29/2004	2005	C
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0258 496 Palm AV Mitigation		10/13/2004	2005	C

Table F.34: Volusia County (Unincorporated) Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0261 Stone Island Estates RD Elevation Project		10/13/2004		T
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0320 DEMO/REBUILD REPETITIVE LOSS HOME AT 1633 SPRING GARDEN DRIVE ASTOR	4,5,7	12/7/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0321R Elevate & retrofit rep loss property at 1490 Stone Trail, Enterprise	4,5,7	2/14/2005	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0336 Demo/rebuild repetitive loss property at 979 Shockney Drive	4,5,7	1/12/2005	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0337 Acquire/demolish 235 S. Blue Lake Avenue DeLand		1/12/2005	2006	C
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Wind	PP	VOL-0340 Residential Construction Mitigation Program		1/12/2005	2006	C
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	PE	VOL-0366 Understanding Volusia County's demographics to anticipate behavior & mitigate hazards	2,5	9/12/2005	< 1 yr	D
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	PE	VOL-0367 Volusia Prepares Business	2,5	9/20/2005	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	PE	VOL-0368 Condominium mitigation video	5	9/20/2005	< 1 yr	U

Table F.34: Volusia County (Unincorporated) Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0380 1007 Shockney DR Mitigation	4,5,7	10/13/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0381- elevate 997 Shockney Drive 3 feet above the base flood elevation		4/1/2005	2006	C
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0382 Demo/Rebuild 1021 Shockney Drive due to repetitive flood losses	4,5,7	4/14/2005	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	AH	PP	VOL-0396 Warning and Alert System		1/16/2008	2008	C
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	PP	VOL-0397 Purchase NOAA weather radios for distribution to mobile/manufactured home owners		1/16/2008	2009	C
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	P	VOL-0023 Develop and implement a Community Emergency Management Academy	2,5	8/1/1999	< 1 yr	D
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	P	VOL-0024- Identify and hire an individual to support the efforts of Volusia 2020		8/1/1999		C
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	P	VOL-0025 - Develop a Recovery and Redevelopment Plan template		8/1/1999		C
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	P	VOL-0060 Increase size of back-up emergency generator to 59 Keyton		8/1/1999	2002	C

Table F.34: Volusia County (Unincorporated) Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
H	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	S	VOL-0180 Conduct a causeway/bridge vulnerability assessment	5	8/1/2002	< 1 yr	D
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0201 Increase the base flood elevation requirement	5	11/1/2002	< 1 yr	D
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Wind	PP	VOL-0202 Prohibit the placement of new/replacement manufactured homes in the wind-born debris	5	11/1/2002	< 1 yr	D
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0203 Increase the design storm year event from 25 years to 100 years		3/1/2002	2006	C
M	Volusia County (Unincorporated)	Volusia County Emergency Management	All	ES	VOL-0204 Integrate and expand the existing CERT programs	2.5	11/1/2002	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0262 Ranchette RD Elevation		10/13/2004		T
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0267 Stone Island Flood Mitigation Project	4,5,7	10/13/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0268 Tomoka Estates Flood Mitigation Project	4,5,7	10/13/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0269 Repetitive Loss Property Mitigation	4,5,7	10/13/2004	< 1 yr	U

Table F.34: Volusia County (Unincorporated) Mitigation Action Plan

Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0318 Demo/Rebuild repetitive loss home at 248 Cherokee Dr Ormond Beach		2/14/2005	2006	C
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0319 LIDAR Mapping of Volusia County		12/7/2004	2006	C
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0338- Acquire repetitive loss property at 249 Cherokee Drive, Ormond Beach		1/12/2004		T
M	Volusia County (Unincorporated)	Volusia County Emergency Management	Flood	PP	VOL-0339- Acquire repetitive flood property at 224 Westchester, DeLand		1/12/2004	2005	C
	Volusia County (Unincorporated)	Volusia County Fire Services	All	All	VOL-0109 Hire a contractor GIS specialist		8/1/1999		T
	Volusia County (Unincorporated)	Volusia County Fire Services	Fire	PP	VOL-0110 Installation of six (6) horizontal wells, six (6) dry hydrants		8/1/1999	37591	C
	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0111 Appropriate the funds to train 100 Volusia County citizens		8/1/1999	40150	C
	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0112 Purchase four (4) mass casualty trailers with generators, lighting, tarps, back		8/1/1999		T
	Volusia County (Unincorporated)	Volusia County Fire Services	Fire	ES	VOL-0113 To hire a contractor as a Disaster/Wildfire Education Program Coordinator		8/1/1999		T
	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0114 Replace existing Fire Station 14		8/1/1999	2007	C
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0115 Replace existing Fire Station 23	2,5	8/1/1999	< 1 yr	

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Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0153 Construct a structural collapse training facility	2,5	12/1/2000	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0154 Purchase specialized rescue equipment	2,5	12/1/2000	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0155 Purchase brushcutter and atvs		12/1/2000	2004	C
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0270 Emergency Power for 4 County Fire Stations	5	10/13/2004	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0271 Training Facility Improvements	2,5	10/13/2004	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Fire Services	Wind	PP	VOL-0272 Hurricane Shutters for County Fire Stations		10/13/2004	40057	C
	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0273 Satellite Communications Phones		10/13/2004	2006	C
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0274 Weather Stations for 22 Fire Stations	2,5	10/13/2004	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0289 Replace Fire Station 33 in Debary		12/8/2004	< 1 yr	T
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0290 Replace Fire Station 43 in Seville	5	12/8/2004	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0291 Replace Fire Station 13 in Ormond Beach	5	12/8/2004	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0292 Replace Fire Station 15 in Daytona Beach	5	12/8/2004	< 1 yr	

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Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0293 Replace Fire Station 41 in DeLeon Springs	5	12/8/2004	< 1 yr	
H	Volusia County (Unincorporated)	Volusia County Fire Services	All	ES	VOL-0294 Replace Fire Station 32 in DeLand	5	12/8/2004	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department	All	ES	VOL-0031To provide emergency power to operate the medical clinics	2,5	8/1/1999	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department	All	ES	VOL-0175 Install a backup generator at the new Health Department building	5	1/1/2002	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department	All	PE	VOL-0252 VCHD Public Information Disaster Initiative	2,5	10/13/2004	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department	Wind	PP	VOL-0324 Harden roof on main Health Dept building	5		< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department - Daytona Clinic	All	ES	VOL-0249 Emergency Communications	2,5	10/13/2004	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department - Daytona Clinic	All	ES	VOL-0250 Emergency Backup Power	5	10/13/2004	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department - Daytona Clinic	All	ES	VOL-0251 Emergency Prime Mover Vehicle	5	10/13/2004	< 1 yr	

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Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Volusia County (Unincorporated)	Volusia County Health Department - Daytona Clinic	All	ES	VOL-0030 To provide emergency power to operate the medical clinics	5	8/1/1999	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department - DeLand Clinic	All	ES	VOL-0253 Emergency Response	2,5	10/13/2004	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Health Department - Env. Health Lab	All	ES	VOL-0029 Provide emergency generatorpower at Environmental Health Lab	5	8/1/1999	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Private Agencies	All	PP	VOL-0026 Develop a countywide contractor licensing program	5		< 1 yr	
	Volusia County (Unincorporated)	Volusia County Private Agencies	All	PP	VOL-0045 Protect United Way Headquarters with generator & window protection	5		< 1 yr	
	Volusia County (Unincorporated)	Volusia County Private Agencies	All	ES	VOL-0132 Fund CERV program	5		< 1 yr	
M	Volusia County (Unincorporated)	Volusia County Private Agencies	Flood	S	VOL-0181 Infrastructure placement in Tomoka Estates Subdivision	2,5	5/21/2004	< 1 yr	U
M	Volusia County (Unincorporated)	Volusia County Private Citizen	Flood	PP	VOL-0177 Replace the repetitive loss structure at 993 Shockney Drive		1/1/2002	37681	C
M	Volusia County (Unincorporated)	Volusia County Private Citizen	Flood	PP	VOL-0178 Replace the repetitive loss structure located at 967 Shockney Drive		1/1/2002	37681	C

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Priority	Jurisdiction	Responsible Organization	Hazard(s)	Mitigation Technique Category	Initiative	Funding	Approved by LMS Working Group	Completion Date	Status
	Volusia County (Unincorporated)	Volusia County Road & Bridge	Flood	S	VOL-0035 Replace Orange Avenue Bridge with Fixed High Level Bridge	5	8/1/1999	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Road & Bridge	Flood	S	VOL-0038 Replace Bridge #794010 (Taylor Road over B-19)	5	8/1/1999	< 1 yr	
	Volusia County (Unincorporated)	Volusia County Sheriff's Dept	All	ES	VOL-0172 Purchase a mobile EOC		1/1/2002		C
	Volusia County (Unincorporated)	Volusia County Sheriff's Dept	All	ES	VOL-0186 Purchase a weapons of mass destruction bomb disposal unit		11/7/2002		C
M	Volusia County (Unincorporated)	Volusia County Sheriff's Dept	All	ES	VOL-0198 Updated 09/10/08 Construct a hardened, centralized evidence storage facility	5	11/1/2002	< 1 yr	
	Volusia County (Unincorporated)	Water & Utility Services	Flood	S	VOL-0108 The creation of additional flood storage capacity and additional outfall capacity		8/1/1999		C
	Private Non-Profits	Evangelical Lutheran Good	Wind	PP	VOL-0362 Providing hurricane shutters for Samaritan Society nursing homes in Daytona Beach & Deland		4/8/2005		
H	DeLand	City of DeLand Public Services	Flood	ES	VOL-0053 Purchase/install emergency generator for Volusia County Fairgrounds	5	8/1/1999	< 1 yr	U