2021

UNIFIED LOCAL MITIGATION STRATEGY

Updated: May 2021

St. Lucie County

Department of Public Safety

Division of Emergency Management

Table of Contents

PROMULGATION STATEMENT

Submitted herein is the St. Lucie County Unified Local Mitigation Strategy (LMS), which serves as a roadmap for St. Lucie County partners to mitigate all hazards that may impact the county. The LMS supports the St. Lucie County Comprehensive Emergency Management Plan (CEMP) and supersedes any previous plan promulgated for this purpose. This plan establishes the framework defining the implementation and coordination of mitigation goals, objectives, and projects that will reduce the impact of hazards to the public, property, and the environment.

The LMS has been developed in support of the CEMP, following the guidance of the State of Florida Comprehensive Emergency Management Plan, the National Response Framework, the National Incident Management System, and FEMA's Comprehensive Preparedness Guide (CPG) 101 (v. 2.0) – Developing and Maintaining Emergency Operations Plans. The efficient and effective implementation of this plan is the responsibility of the Emergency Management Division, which is under the direction of the Public Safety Department. The Emergency Operations Manager and/or their designee reviews and revises the LMS per guidance from the LMS Working Group. A program of review and evaluation of this plan is essential to its overall effectiveness.

This plan is hereby promulgated as of the date signed below.

Ron Parrish, MPA, EFO, Director,
Department of Public Safety

8-30-2021
Date

EXECUTIVE SUMMARY

St. Lucie County is susceptible to a number of hazards including flooding, hurricanes, tornados, wildland fire, and severe thunderstorms – these being an abbreviated list. Florida is one of the most hazard prone states in the nation. In Florida, the goals of the Mitigation program are being achieved through the Unified Local Mitigation Strategy (LMS) and a comprehensive planning process that is the same across the board for all jurisdictions, special districts, and agencies from the private and public sectors that are members of the LMS Working Group. The LMS is a pre-disaster mitigation planning initiative of the Florida Division of Emergency Management (FDEM) and is intended to reduce disruption effects of natural, human caused, and technological disasters on the economic and social fabric of the community. As part of FEMA's National Mitigation Framework, pre-disaster mitigation is defined as "sustained action that reduces or eliminates long-term risk to people and property from hazards and their effects". This definition generally distinguishes between actions that have long-term and sustainable effects from those that are more closely associated with preparedness for, immediate response to, and short-term recovery from a specific hazard event.

The intent of the LMS is to focus on practices that have cumulative benefits over time and ensure that fewer of the state's citizens and communities are victims of disasters. One of the most important elements is the idea that the resulting mitigation practices are instituted prior to the disaster occurring.

The purpose of a unified comprehensive mitigation planning process is to update the St. Lucie County LMS to develop and continue an engaged approach and mitigate hazard risk to better protect the residents, visitors and businesses within St. Lucie County Whole Community from the effects of natural, technological, and human caused hazards. This plan serves as an ongoing process of existing LMS efforts, updates the previous plan to reflect current conditions, identifies and outlines strategies the County and participating jurisdictions will use to decrease vulnerability to all types of hazards.

As such, the Unified Local LMS is defined as a document with a comprehensive description of mitigation planning strategies, programs and projects that institute an engaged multi-jurisdictional multi-agency approach across horizontal and vertical levels of government, as well as other Public and Private sectors to hazard mitigation planning.

The LMS clearly defines mitigation strategies and implementation of mitigation projects identified by way of a Prioritized Project List (PPL), hazards and vulnerabilities risk assessment and outreach and education for the public. The planning effort has been conducted through coordinated, cooperative efforts of the local governments within St. Lucie County. Participation is defined by jurisdictional adoption and Working Group agency membership:

Status of Jurisdictions in St. Lucie County LMS	
Jurisdiction	**Status**
St. Lucie County	Adoption 2005, 2010, 2016
City of Port St. Lucie	Adoption 2005, 2010, 2016
City of Fort Pierce	Adoption 2005, 2010, 2016
Town of St. Lucie Village	Adoption 2010, 2016

This plan will be distributed to the jurisdictions and special districts within the County and all agency members of the LMS Working Group for consideration of adoption. Jurisdictions have one (1) year to adopt the LMS, as this occurs, copies of the adopted resolutions will be entered into Appendix F.
Jurisdictions and Special Districts includes the following:

1. City of Fort Pierce,
2. City of Port St. Lucie,
3. Fort Pierce Farms Water Control District,
4. Ft. Pierce Utility Authority,
5. North St. Lucie Water Control District,
6. Office of Congressman Brian Mast,
7. School Board of St. Lucie County,
8. SLC Property Appraiser,
9. SLC Sheriff's Office,
10. South Florida Water Management District,
11. St. Lucie County,
12. St. Lucie County Chamber of Commerce,
13. St. Lucie County Fire District,
14. St. Lucie Transportation Organization,
15. St. Lucie West Services District,
16. Town of St. Lucie Village,
17. Treasure Coast Regional Planning Council,

Adoption of this strategy will provide the following benefits to both County and municipal governmental entities:

- Compliance with Florida Administrative Code (F.A.C.), Administrative Rules Chapter 27P-6, requirements for the local Comprehensive Emergency Management Plans (CEMP) to identify problem areas and planning deficiencies relative to severe and repetitive weather hazards, and to identify pre- and post-disaster strategies for correcting and/or managing problems;
- Compliance with - FEMA's Disaster Mitigation Act of 2000 (DMA2K) and all updated planning guidance thus, sustaining eligibility for pre- and post-disaster State and federal funding programs such as the Pre-Disaster Mitigation (PDM) grant and the Hazard Mitigation Grant Program (HMGP);
- Credit from the National Flood Insurance Program's Community Rating System (CRS) Program for developing a Floodplain Management Program, which will help further reduce flood insurance premium rates for property owners;
- Access to FEMA's Flood Mitigation Assistance (FMA) Grant Program, which provides funding

for pre-disaster mitigation projects and activities;

- Identification and prioritization of projects for funding under the State of Florida's Residential Construction Mitigation Program (RCMP) to help reduce losses under from properties subject to repetitive flooding damages; and
- Eligibility for local government public safety offices to receive funding from the Emergency Management Preparedness and Assistance (EMPA) Grant Program.

Mitigation practices can be applied to strengthen homes so people and their belongings are better protected from hurricanes, tropical storms, and inland floods promoting faster return to normalcy after a disaster. Pre-disaster mitigation planning is used to identify and protect at-risk critical facilities such as hospitals, fire and police stations, water and wastewater treatment facilities, and other essential services facilities increasing operational recovery in the wake of a disaster. Mitigation planning allows communities to consider current and future land use and vulnerabilities of developed and undeveloped land as well as the risk to people and property with existing developments. The ultimate goal is consideration of potential damage to property in vulnerable areas and implementation of actions to reduce impacts thereby eliminating disruptions that disaster occurrences create in communities.

In the year 2000, the Federal Emergency Management Agency's (FEMA's) recognition of growing costs of response and recovery from disasters materialized in the DMA2K. DMA2K created a new Pre-Disaster Mitigation (PDM) program aimed at reducing the cost of disasters as well as risk through comprehensive planning before disasters occur.

DMA2K requires that all communities, tribes, and states have a FEMA approved hazard mitigation plan consistent with the DMA2K requirements in place to retain eligibility for PDM project funds and post-disaster Hazard Mitigation Grant Program (HMGP) funds.

The planning process for preparing the St. Lucie County LMS was based on DMA planning requirements and FEMA's associated guidance. The LMS describes an in-depth process in the following chapters, annexes and appendices:

1. Planning Process
2. Risk Assessment
3. Mitigation Strategy
4. Plan Maintenance

1.0 COMMUNITY OVERVIEW

St. Lucie County, the municipalities within it, districts, and public and private entities have engaged in mitigation planning since 1998 to make the population, neighborhoods, businesses and institutions of the community more resilient to the impacts of future disasters. The Working Group and LMS Coordinator have conducted a comprehensive and detailed evaluation of hazards and vulnerabilities that may impact the community. This is an all hazards approach from natural events to technological and human caused hazards to identify ways to make the communities of the planning area more resilient to their impacts.

St. Lucie County is located on Florida's east coast in south central Florida bordered by 21 miles of Atlantic coastline with two inhabited barrier islands. St. Lucie County's population in 2020 was estimated at 322,265, an increase of 12% from 287,749 in 2015.[1] Population is estimated to increase to 367,500 in 2030.[2] Respectively, the Bureau of Economic Business and Regulation reported 2020 population estimates for the City of Fort Pierce as 44,476 persons (2015; 42,119), the City of Port St. Lucie as 202,914 persons (2015; 174,132), and the Town of St. Lucie Village at 661 persons (2015; 597).

Table 1.1 illustrates municipal population growth from 2000 to 2020 with projections for the year-2030. The 2020 population estimates show a 12% increase from 2015 to 2020 countywide.

Table 1.1

St. Lucie County Population					
	2000	**2010**	**2015**	**2020**	**2030 projection**
Fort Pierce	37,516	41,590	42,119	44,476	N/A
Port St. Lucie	88,769	164,603	174,132	202,914	N/A
St. Lucie Village	647	590	597	661	N/A
Unincorporated (County	71,596	71,006	70,901	72,194	N/A
Total County Populatio	**198,528**	**277,789**	**287,749**	**320,245**	**367,500**

Source: Bureau of Economic Business and Regulation, April 1, 2020

St. Lucie County is located on the Atlantic along the south-central coast of Florida in the upper reaches of the South Florida geographic region. It is nearly rectangular in shape. At its widest points, the County measures 24 miles, north/south and 29 miles east/west. The County occupies a total of 572 square miles (358,460 acres) of which approximately 60 square miles (38,400 acres) are water and 515 square miles (330,020 acres) are land. The County comprises approximately 572 square miles, 480 square miles of which are unincorporated, the balance of the land area is located within the three (3) incorporated municipalities; Fort Pierce (14.7 square miles), Port St. Lucie (120 square miles), and St. Lucie Village (approximately 1 square mile).

St. Lucie County has an ocean access inlet, Fort Pierce Inlet. The Inlet is a manmade federal inlet that is St. Lucie County's only point of access to the Atlantic Ocean-- it separates the barrier islands of North and South Hutchinson Island. The inlet connects the Atlantic Ocean to the Indian River Lagoon.

Table 1.2: Community Characteristics - St. Lucie County.

City	Location	Urban/Rural	Community Character (Residential/Working/ Retirement)	Economic Base (Industrial/Agricultural/ Retirement/Business)
St. Lucie Village	Coastal	Semi-Urban	Residential/Retirement	Residential/Retirement
Fort Pierce	Coastal	Urban	Residential/Working	Residential/Industrial/ Business
Port St. Lucie	Inland	Urban	Residential/Working/ Retirement	Residential/Business
Unincorporated St. Lucie County	Coastal/Island	Urban/Rural	Residential/Working/ Retirement	Industrial/Agricultural/ Business

Source: St. Lucie County Grants / Disaster Recovery

Other significant population characteristics include age, race, income, and special needs. The median age of St. Lucie County residents is 45.1. Twenty-five percent of the County is over the age of 65. This is important to know as the senior populations may require additional or special assistance during a hazard event.

Cultural differences can influence an individual's response to an event, it is important to define the County's population in terms of ethnicity. Twenty percent of St. Lucie County's residents are Hispanic or Latino, while 21.4% are Black or African American.

Languages

Nearly 23.4% of residents speak a language other than English at home, a 3% increase from the 2015 census data of 20.3%. Language is an important consideration when developing preparedness materials and communicating evacuation and safety information for residents.

Income

The median household income in St. Lucie County is $52,322 with per capita income at $27,121 in 2019, which is below the State of Florida average of $31,619. In the County, 10.5% of all ages reported are considered to live below the poverty level.

Employment

The Chambers of Commerce serves businesses in St. Lucie County from a central location in St. Lucie West. In 2018, the top three industries in St. Lucie County were the following:

- Education and health services
- Trade, transportation and utilities
- Government

Table 1.3

Major Industry Areas of Employment in St. Lucie County								
	2016		2017		2018			
Industry	**Labor Force**	**Percent**	**Labor Force**	**Percent**	**Labor Force**	**Percent**	**Change**	**Percent**
Agriculture, natural resources & mining	3,002	2.7	3,038	2.6	2,910	2.4	-92	-3.1
Construction	6,936	6.2	7,572	6.5	8,241	6.7	1,305	18.8
Education and health services	16,771	14.9	17,266	14.9	17,892	14.5	1,121	6.7
Financial activities	10,555	9.4	11,279	9.7	10,010	9.7	1,455	13.8
Government	13,802	12.3	14,169	12.2	14,428	11.7	626	4.5
Information	942	0.8	913	0.8	1,019	0.8	77	8.2
Leisure and hospitality	10,584	9.4	11,172	9.6	12,163	9.9	1,579	14.9
Maufacturing	3,777	3.4	4,008	3.5	4,217	3.4	440	11.7
Other Services	9,633	8.6	9,489	8.2	10,121	8.2	488	5.1
Professional and business services	6,825	6.1	6,990	6.0	7,145	5.8	320	5
Retail Trade	13,686	12.2	13,740	11.8	14,216	11.5	530	3.9
Trade, transportation, and utilities	12,269	10.9	13,037	11.2	15,645	12.7	3,376	27.5
Whole Sale	3,716	3.3	3,392	2.9	3,395	2.8	-321	-8.64

Source: US Department of Commerce- Bureau of Economic Analysis

2.0 PLANNING PROCESS

In 1998, St. Lucie County, along with all the municipalities, the local business community, and non-profit organizations such as the American Red Cross, joined together to develop a Unified Local Mitigation Strategy (LMS) that would benefit the St. Lucie County Whole Community through a consistent planning process across the board for jurisdictions, special districts, and private and public sector agencies. The St. Lucie County LMS Working Group, the policy body for this program, and the St. Lucie County Emergency Operations Manager have had the responsibility for developing the LMS. This group focused on achieving two key results:

- creation of a long-term LMS planning process; and
- development of the LMS document to coincide with a prioritized mitigation projects list (PPL).

The original St. Lucie County LMS was developed, approved and adopted in 1998 through stakeholder group engagement and community participation. The 2004 comprehensive update also utilized the stakeholders groups to build on Hazards and Vulnerability sections of the Plan and was approved and adopted. The 2010 update was completed and distributed for public comment to jurisdictional city halls, then reviewed and approved by the St. Lucie County LMS Working Group. The St. Lucie County Department of Public Safety, Division of Emergency Management, completed the comprehensive 2016 update in partnership with the Treasure Coast Regional Planning Council, Emergency Management staff. The updated draft plan will be distributed to jurisdictional city halls, libraries and County Administration offices to ensure access for a public review and comment period.

From 2016 through 2021, the LMS Working Group developed its membership and programs to align the planning process for efficient and effective management of flood awareness programs, project evaluation and prioritization, and alignment of hazard assessment and strategies to reduce risk to the St. Lucie Whole Community. In 2016, the LMS Working Group through its Steering Committee drafted a set of By-Laws to govern the Working Group's directions in setting up meeting dates, what constitutes a member agency's good standing, and how member agencies could vote for project prioritization during times of updating the Project Prioritized List (PPL). In 2017, the Working Group decided to leave the concept of a Steering Committee, as the Working Group realized that it did not have a large enough body to have a standing Steering Committee. The By-Laws were modified to reflect that the LMS Working Group would govern itself through a set of By-Laws, a Chair, a Vice-Chair, and the LMS Coordinator. No Steering Committee was needed to guide the LMS Working Group in developing its programs and plans.

In 2018 through 2019, the By-Laws were developed during Working Group meetings to better define what constitutes a member agency's good standing to vote for project evaluation, scoring, and ranking in the PPL. Membership of the LMS Working Group also increased from 25 to 44 member agencies from 2016 through 2021. In conformance with FEMA's Comprehensive Planning Guide (CPG) 101 and Florida Administrative Code (FAC) 27P-22, the LMS Working Group's By-Laws reflected directions for Working Group meetings to conduct the following:

1. Elect a Chair and Vice Chair at least once a year
2. Set up meetings at least on a quarterly basis
3. All meetings are properly announced to the public via a Press Release

4. Public Comments are listed in every meeting agenda and the Public is invited to attend meetings
5. The Working Group evaluates new and existing projects at least once a year

With a simple majority establishing quorum in Working Group meetings, the LMS Working Group created flexibility in setting up directions and guidance in the development of the PPL, support of projects submitted to State and FEMA for Hazard Mitigation Grant Program (HMGP) through letters of support, and setting up priority of projects to be considered for funding.

The LMS Working Group enhanced its membership and working components with the inclusion of several flooding awareness programs. In 2018, under the auspices of the St. Lucie County Emergency Management Division, St. Lucie County Community Rating System (CRS) program updates were included in Working Group meetings to inform members of development and progress made by the CRS program, as well as include Working Group members in these programs, if needed. An outcome of the endeavor was the formation of the St. Lucie CRS User Group, an independent group from the LMS Working Group composed of the St. Lucie County CRS Coordinator and CRS coordinators from the cities of Port St. Lucie and Fort Pierce. All three (3) coordinators are members of the LMS Working Group but decided to not become a sub-committee of the LMS Working Group. The setup was intentional to allow the CRS User Group to form new ideas and strategies that would benefit all three (3) jurisdictions under the CRS guidelines, align flood awareness strategies with that of the LMS, and reduce duplication of efforts in bringing flood awareness to the Whole Community. The CRS Coordinator would liaise with the LMS Working Group to report new developments and strategies established by the three (3) jurisdictions and request further support from the LMS Working Group, if needed.

In 2019, the Chair of the LMS Working Group requested the formation of the Program for Public Information (PPI) Sub-Committee to work on a PPI Plan that would align the marketing strategies of the CRS programs for St. Lucie County, Fort Pierce and Port St. Lucie. The PPI plan would assist the three (3) jurisdictions in avoiding the duplication of efforts and plans, as well as resources. The PPI Sub-Committee is chaired by the CRS Coordinator from Fort Pierce. Other members of the Sub-Committee include representatives from private insurance companies, as well as real estate agencies. The Sub-Committee met several times to develop and review the DRAFT PPI plan. The plan was completed and submitted to the LMS Working Group for adoption in the 2021 Local Mitigation Strategy.

In addition to the PPI Plan, the Floods Hazard Specific plan and the Tsunami plan were incorporated to the 2021 LMS. The unity of these plans would gain points for the three (3) jurisdictions in the CRS program, as well as show a unified planning effort in Mitigation for all member agencies of the LMS Working Group. According to the CRS Coordinators Manual (2017), the components listed previously along with the LMS would constitute as a Floodplain Management Plan for the jurisdictions.

In 2018 through 2019, the Chair of the LMS Working Group requested the formation of the Scoring Review Sub-Committee to review and revise the scoring process of new projects that would be ranked in the Project Priority List (PPL). The Sub-Committee reviewed the scoring sheet and discussed the merits of adding weight points to areas in projects to best reflect the intent and logic behind the prioritization of projects for the St. Lucie Whole Community. The Sub-Committee was headed by the representative from the St. Lucie School District, who is also a member of the LMS Working Group. The Sub-Committee completed its work and a new scoring sheet was adopted by the LMS Working Group. The application of

the projects was also reviewed and adjustments were made that reflect a consistent intent of project to goals and objectives of the LMS, strategies and plans, and how the plans are incorporated in the jurisdiction's capital improvement plans.

In its development and preparation for the 5-year State review, the Chair of the LMS Working Group requested the formation of sub-committees to review and revise the 2016 LMS. As such, the formation of the Hazard-Vulnerability and Review Sub-Committees were made in 2020. In addition, the Emergency Management Division hired a planning consultant to assist in the development of the new edition of the LMS. Members of the Division coordinated access of the DRAFT LMS to members of the LMS Working Group for review through the Emergency Operations Center's File Transfer Protocol (FTP) site. The Hazard Vulnerability Sub-Committee reviewed the Chapter of the LMS on Hazard Identification, Vulnerability, and Risk, and the Review Sub-Committee reviewed the rest of the LMS, specifically areas on planning process, community profile, and scoring process. Hazard Vulnerability Sub-Committee also reviewed and developed a Threat Assessment, showing the outcomes of the hazards that impact St. Lucie and which ones are considered the highest threats due to risk and historical basis.

Through the enhanced measures aforementioned, the St. Lucie Whole Community is expected to have reduced impacts to the identified hazards presented in the LMS and greatly minimize its community vulnerabilities.

Due to the COVID-19 pandemic in 2020, the planning process of the review and revision of the LMS was stalled. The process was immediately picked up in 2021 and review timelines were shortened to obtain a comprehensive process that included the public. The DRAFT LMS was made available on the www.stlucieco.org/eoc site for public comment. The 2021 DRAFT LMS was presented to the LMS Working Group, and a Public Comment meeting segment was included in every meeting made by the Working Group and Sub-Committees. Modifications of the LMS were made as well as updates of information relevant to the St. Lucie Whole Community.

The planning process used to develop and update the St. Lucie County LMS has been consistent across jurisdictions, special districts, and private and public sector agencies, since the promulgation and adoption of the 2016 LMS. The cities of Fort Pierce and Port St. Lucie, as well as all other member agencies of the Working Group have implemented the goals, objectives, and strategies developed in the LMS and Working Group meetings within their internal program and planning processes to obtain results. The following is a description of such process:

- The 2016 LMS has been presented in the St. Lucie County website to obtain public comment: https://www.stlucieco.gov/departments-services/a-z/public-safety/disaster-preparedness/local-mitigation-strategy
- The LMS Coordinator has convened members of the LMS Working Group to oversee the LMS update process and update the PPL.
- The Working Group has met at least on a Quarterly basis to discuss mitigation initiatives, modifications to the Working Group composition, update on projects in the PPL that received funding, announcements of new funding, and developments in mitigation measures (e.g., CRS updates, resiliency program initiatives, and changes in development of project and program implementation).

- The LMS Working Group included a *Public Comment* section in the agenda of every Working Group meeting since 2017 to include the public in all discussions. This is a consistent process with meetings of the St. Lucie County Board of County Commission (BOCC).
- All LMS Working Group meetings have been publicly announced. The public has been invited to all LMS Working Group general meetings and Sub-Committee meetings to insure engagement of new developments and changes to the LMS and mitigation strategies, projects, and updates.
- The LMS Working Group Chair under recommendation from the LMS Coordinator has convened the following subcommittees from the Working Group to oversee the review and update of the LMS :
  1. Scoring Review Sub-Committee
  2. Hazards Vulnerability Review Sub-Committee
  3. Review Sub-Committee
  4. Program for Public Information (PPI) Sub-Committee

- Working Group members have implemented projects from the PPL in their jurisdictions' and agencies' planning and project processes; thus, ensuring that LMS goals, objectives, plans and program strategies are incorporated in plans, programs, project management within their jurisdictions, special districts and private and public sector agencies. This process has guaranteed that the St. Lucie Whole Community benefits from the mitigation efforts to reduce risks against all hazards and threats.
- The Working Group has reviewed the PPL at least annually and updated the status of all projects.
- The Emergency Operations Manager through the Division of Emergency Management and the Public Safety Department has maintained the PPL and created a historical "completed and deleted" list separate from the active 2020 PPL to keep track of progress made to the St. Lucie County Whole Community through the implementation or completion of projects. Projects that no longer apply to the mission of the LMS or that no longer can benefit communities have been removed or incorporated into other projects.
- A period to join the LMS Working Group has been implemented every year and solicitations to agencies, jurisdictions, special districts, and private and public sector agencies have been made. A major result has been the increase of Working Group membership since 2016.
- A development of the Working Group By-Laws was made to ensure efficiency and effectiveness in the Working Group's process of updating the LMS and to ensure flexibility in being able to meet during emergencies and as needed to include new projects should funding become available.
- Working Group members have submitted new and existing projects for evaluation, scoring and ranking in the PPL.
- Working Group members have evaluated projects at least once a year. Projects can be submitted at any time but within a 30-day period, the Working Group's Scoring Sub-Committee has met as needed to complete the evaluation of all projects. As such the Working Group has adopted a new PPL at least once a year.
- To reduce duplication of efforts, funding, and time, Working Group members have met

independent from Working Group meetings to work on goals, objectives, and strategies, such as the creation of CRS User Group, which has worked on developing the CRS programs through joint efforts in tasks for the jurisdictions of St. Lucie County, City of Port St. Lucie, City of Fort Pierce who participate in such program.

- The following documents were reviewed as the comprehensive updated is conducted:

- St. Lucie County Comprehensive Plan (Future Land Use, Transportation, Infrastructure, Conservation, Coastal Management, Intergovernmental Coordination, Housing, Historical and Cultural, and Capital Improvements);
- Fort Pierce Comprehensive Growth Management Plan (Coastal Management, Conservation, Capital Improvements, Future Land Use, Housing, Infrastructure, Intergovernmental Coordination, Port, and Recreation and Open Space);
- Port St. Lucie Comprehensive Plan (Coastal Management, Conservation, Capital Improvements, Future Land Use, Housing, Infrastructure, Intergovernmental Coordination, Port, and Recreation and Open Space);
- St. Lucie County Land Development Code;
- St. Lucie County CEMP;
- St. Lucie County CRS current jurisdictional ratings;
- St. Lucie County Continuity of Operations Plan (COOP);
- 2020 LMS Project Prioritized List.
  - The DRAFT 2021 LMS was presented at the June, 2021 LMS Working Group meeting and once the Florida Division of Emergency Management (FDEM) provides a Letter of Compliance, all Working Group members who represent jurisdictions, special districts, as well as private and public sector agencies, will be requested to adopt the LMS as their Plan for mitigation goals, objectives, strategies and projects.

For further information on the unified planning process of the LMS see Chapter 4 – Mitigation Strategy, Appendix D – Stakeholder Participation and Appendix G – Tables and Figures.

2.1 OVERVIEW OF THE LMS WORKING GROUP

The LMS Working Group must have broad representation to be effective. It embraces all stakeholder groups in the County from both the public and private sectors. When the St. Lucie County LMS Working Group was created, representatives were chosen so that all affected groups would have representation in the St. Lucie Whole Community planning process and in the ongoing implementation of the LMS strategies within their jurisdiction's project and program processes. The Working Group interacts directly with the Board of County Commissioners, other respective Boards and Councils from other jurisdictions, private and public sectors, and the public.

Members of the LMS Working Group serve as liaisons to their respective divisions, departments, and organizations that implement and promote mitigation programs and projects. The LMS serves as the unified mitigation document that sets strategies, goals, and objectives for all jurisdictions, agencies, and organizations who adopt the LMS in resolutions, letters of support, and other organizational systems used to adopt the LMS as an authoritative document. As such, the LMS is cited as a supportive document in major plans and policies used for the growth and planning development of the St. Lucie Whole Community, which include but are not limited to:

1. Comprehensive Plans
2. Capital Improvement Plans
3. Growth Management Plans
4. Comprehensive Emergency Management Plans (CEMP)
5. Continuity of Operations Plans (COOP)
6. Floods Hazards Specific Plans

Each of the representatives in the LMS Working Group serves an important position within their jurisdictions or private sector organization they serve. Many are department directors and administrators understand how to implement the LMS strategies, goals and objectives within their organization's plans and program administration. Working Group members use the LMS to support and enhance mitigation programs like the Community Rating System (CRS), project works, and resiliency projects. Jurisdictions like the City of Port St. Lucie and Fort Pierce often partner with St. Lucie County departments and divisions to work on mitigation projects that benefit the entire community. Using similar planning processes within jurisdictions, Working Group members reference the LMS as the unified mitigation strategy for the St. Lucie Whole Community, as it meets local, State, and Federal criteria in funding sources and project management.

The St. Lucie County Department of Public Safety, Director provides direct staff support from the Division of Emergency Management to the working group and its Chairperson. The Emergency Operations Manager serves as the designated LMS Coordinator and is the liaison to the Florida Division of Emergency Management (FDEM), and the Federal Emergency Management Agency (FEMA).

For resolutions and policies on the LMS see Appendix F – Resolutions. Page six of the Resolutions attachment offers more information relating to the County's jurisdictions.

2.2 ADMINISTRATIVE - LEAD RESPONSIBILITY

The Department of Public Safety, Division of Emergency Management is the lead agency responsible for ensuring the implementation of the LMS program. The individual having lead responsibility is the Emergency Operations Coordinator who serves as the LMS Coordinator to the Chair of the LMS Working Group, Stakeholder Groups, communities and the local governments this LMS serves.

Responsibilities of the LMS Coordinator will:

- Serve as the hazard mitigation advocate at staff level;
- Keep current with all changes in LMS/DMA2K programs and communicates those changes to the LMS Working Group;
- Interact frequently with the Florida Division of Emergency Management;
- Serve as the LMS County Liaison;
- Work closely with the LMS Chairperson;
- Organize meetings of the LMS Working Group;
- Coordinate with and contact all members of the Working Group on a regular basis;
- Maintain avenues of communication with the general public;
- Set up and maintain files documenting progress of LMS program;

- Update the PPL as needed; and
- Conduct the comprehensive 5-year LMS update.

2.3 ADMINISTRATIVE - SUPPORT RESPONSIBILITY

Successfully implementing the LMS is not the sole responsibility of the Department of Public Safety, Division of Emergency Management; it is the responsibility of all participating organizations from both the public and private sectors to fulfill the administrative responsibilities in a number of ways including:

- Promote and educate others about the significance of local hazard mitigation;
- Interact and coordinate frequently with the LMS Coordinator;
- Manage mitigation projects or activities;
- Provide assistance to other organizations so they can implement their mitigation projects or activities;
- Disseminate hazard mitigation-related information to constituents;
- Document the progress of one's organization's hazard mitigation activities; and
- Make available to LMS Coordinator new data and information relevant to the LMS process.

An example of providing support to other organizations could involve assisting in an all-hazard public awareness/education program. Other participating public organizations and even homeowner associations should serve in a support role to publicize and disseminate the program information generated to improve public awareness and program education and attend educational workshops, seminars and Working Group meetings.

2.4 LMS COMPOSITION

The St. Lucie County LMS Working Group oversees the development and implementation of the St. Lucie LMS process. This group is comprised of county and municipal partners that prepare and promote local mitigation strategies and projects to reduce long-term risk to like and property from natural, technological and human caused disasters. The Working Group is broad to more equitably represent the stakeholder groups present in St. Lucie County. Occasionally a seat will become vacant. In this case, the LMS Coordinator shall coordinate with the organization to invite representation.

The Working Group serves as the policy development body for the LMS program. The role of the Working Group is to advise and assist in the formulation, implementation, and administration. The Working Group shall represent the diverse interests found in St. Lucie County. Below is the list of current working group members.

Table 2.1: LMS Working Group Roster

Agency	Department/Division	Work Title	Primary, Secondary or Tertiary
LMS Officers:			
St. Lucie County	**Public Works**	**Chair / Assistant Director**	**Primary**

Agency	Department/Division	Work Title	Primary, Secondary or Tertiary
School Board of St. Lucie County		**Vice Chair / Executive Director of Growth Management**	**Primary**
St. Lucie County	**Public Safety Department**	**LMS Coordinator / Emergency Operations Manager**	**Primary**
American Red Cross		Disaster Program Manager	Primary
Cleveland Clinic-Martin Health (CCMH)		Senior Manager, Emergency Management	Primary
		Director, Protective Services	Secondary
City of Fort Pierce			
	Stormwater Division	Stormwater Engineer Manager	Primary
		Stormwater Assistant	Secondary
	Building Department	CRS Coordinator	Primary
		Deputy Building Official	Secondary
	Engineering Department	City Engineer	Secondary
		Assistant City Engineer	Primary
	Planning Department	Planner	Primary
		Planning Director	Secondary
City of Port St. Lucie			
	Public Works Department	Deputy Director	Primary
	Utilities Systems	Professional Engineer-Capital Improvement	Primary
		Safety and Training Coordinator	Secondary
		Manager-Electrical-Maintenance & Safety	Primary
	Emergency Management	Emergency Management Administrator	Primary
		Emergency Operations and Project Assistant	Secondary
Council on Aging of St. Lucie Inc. Community Transit		Transit Vehicle Mnt. and Security Director	Primary
Florida Atlantic University		Director of Emergency Management	Primary
		Emergency Management Coordinator	Secondary
		Emergency Management Technical Paraprofessional	Tertiary
Florida Department of Health-St. Lucie County		Emergency Preparedness Coordinator	Primary
		Environmental Health Manager	Secondary
Florida Forest Service		Mitigation Specialist	Primary
		Supervisor	Secondary

Agency	Department/Division	Work Title	Primary, Secondary or Tertiary
		District Manager	Tertiary
Florida Highway Patrol		District Commander Troop L-Fort Pierce	Primary
		FHP Patrol Operations Lieutenant	Secondary
Florida Power and Light		Environmental Services Director	Primary
Fort Pierce Farms Water Control District		Assistant District Engineer	Primary
Fort Pierce Housing Authority		Interim Executive Director	Primary
Fort Pierce Police Department		Acting Deputy Chief	Primary
		Deputy Chief	Secondary
		Grant Coordinator	Tertiary
Fort Pierce Utilities Authority		Director of Electric and Gas Systems	Primary
		EOC Liaison	Secondary
Indian River State College		Assistant Dean of Facilities & Sustainability	Primary
		Physical Plant Supervisor	Secondary
North St. Lucie County Water Control District		Assistant District Engineer	Primary
Office of Congressman Brian Mast		Constituent Service Representative	Primary
		Outreach Coordinator	Secondary
Port St. Lucie Public Works Department		Manager – Surveying and Mapping	Primary
SAFER St. Lucie		CEO/President	Primary
School Board of St. Lucie County		Sr. Project Manager	Secondary
South Florida Water Management District		Regional Representative	Primary
St. Lucie County	Administration	Deputy County Administrator	Primary
		Deputy County Administrator	Secondary
		County Administrator	Tertiary
	Community Services Department	Housing Manager	Primary
	Environmental Resources Department	Environmental Resources Director	Primary
		Environmental Resources Assistant Director	Secondary
	Legislative Affairs	Grants Coordinator - Legislative Affairs	Primary
		Legislative Affairs Director	Secondary
		Executive Aide to the County Administrator	Tertiary

Agency	Department/Division	Work Title	Primary, Secondary or Tertiary
	Mosquito Control	Impoundment Supervisor	Primary
		Mosquito Control Manager	Secondary
		Interim Director	Tertiary
	Parks and Recreation Department	Parks & Special Facilities Manager	Primary
	Planning and Development Services	Planning And Dev. Svcs. Dir.	Primary
		Senior Planner	Secondary
	Public Safety Department	Emergency Management Safety Planner	Secondary
		Public Safety Assistant Director	Tertiary
	Public Works	Public Works Director	Primary
		County Engineer	Secondary
	Transportation Planning Organization	Executive Director	Primary
		Transportation Systems Manager	Secondary
		Transit Program Manager	Tertiary
	Utilities Department	Director	Primary
	Water Quality Division	Division Director	Primary
		Stormwater Water Program Coordinator	Secondary
		Engineer Intern	Tertiary
St. Lucie County Fire District		Chief	Primary
St. Lucie County Sheriff's Office		Fleet and Maintenance Facilitator	Primary
		Captain-Patrol Operations Division	Secondary
St. Lucie West Services District		District Manager	Primary
		Public Works Director/Assistant District Manager	Secondary
The Inner Truth Project		Executive Director	Primary
Town of St. Lucie Village		Mayor	Primary
Treasure Coast Food Bank		Chief Operations Officer	Primary
		Community/Disaster Coordinator	Secondary
Treasure Coast Regional Planning Council		Emergency Programs Director	Primary
		Executive Director	Secondary

One primary representative and one alternate or secondary point of contact, along with an optional tertiary point of contact, are represented by the stakeholder groups above. The representative

membership will be re-affirmed annually during a designated Working Group meeting through a self-selection/voluntary basis. The annual re-affirmation of the membership is submitted to the FDEM with the January annual LMS report. The Working Group follows its approved By-Laws which is provided in Appendix D. Participating municipalities, agencies, and districts Working Group members are required to attend Working Group meetings, provide input and technical information to the planning process (if available), and disseminate information to others within the represented sector.

The Working Group Chair is authorized to establish ad-hoc subcommittees as needed to further the goals and objectives of the LMS. These subcommittees can be formed to address special issues and can be disbanded once an issue has been properly addressed. Subcommittee members may not be Working Group members but may be any individual able to provide special expertise and knowledge about specific concerns addressed in the LMS.

The LMS has two standing sub-committees, but has convened sub-committees for the purposes of assessing the LMS, scoring project process, and to review the 2021 LMS:

- Hazard Vulnerability Review Sub-Committee
- Review Sub-Committee

In the event of restructuring that duly adds, deletes, or merges jurisdictions within the County, the LMS will appropriately adjust its voting member rolls and other pertinent data in reference to the altered jurisdiction(s).

2.5 PUBLIC PARTICIPATION PROCESS

St. Lucie County seeks to involve a diverse group of individuals and organizations in planning mitigation activities within the County for natural, technological, and human caused hazards. This LMS intends to maintain a broad decision-making body (Working Group) to develop mitigation projects and update the Plan continuously. The St. Lucie County LMS employs multiple methods of involving the jurisdictions, organizations, businesses, and citizens of St. Lucie County to ensure that full participation in the decision-making process. The Working Group strongly encourages public participation in the review and comment periods when updates to the Plan are released. For each quarterly meeting press releases are issued and the information is posted on St. Lucie County website for public participation. The LMS Coordinator also aids in education and outreach to the public by information dissemination through the County calendar and website that has electronic form for submission of public comment which will be monitored by the LMS Coordinator and all comments received will be delivered to the Working Group. The Working Group seeks to enhance and expand opportunities for public involvement.

2.6 COMMUNITY ORGANIZATIONS

St. Lucie has a wide range of Community organizations including faith-based, Chambers of Commerce, the local historical society and youth organizations. These groups represent diverse interests within the community and provide vital services as well. Many services provided by St. Lucie County's community organizations can help to achieve the goals of hazard mitigation identified in this mitigation strategy. The following lists provide information on services provided by organizations that work within St. Lucie

County to reduce the risks posed by disasters.

- **University of Florida/St. Lucie County Cooperative Extension -** The St. Lucie County Cooperative Extension actively promotes hazard mitigation in St. Lucie County through more than a dozen programs.

- **Florida Power & Light Co. (FPL) -** Each year, FPL produces a booklet on the emergency plan for the St. Lucie Nuclear Power Plant on Hutchinson Island. The booklet includes evacuation maps and information for residents in St. Lucie and Martin counties. FPL mails the booklet to households who would be affected by a plant emergency.

- **United Way of St. Lucie County** - The United Way of St. Lucie County has developed and implemented volunteer reception center. Following disasters, the County can open volunteer reception centers where volunteers are registered.

2.7 COMMUNITY STAKEHOLDER GROUPS

Community stakeholder groups are any community group or organization with an interest in reducing the risks posed by natural hazards in St. Lucie County. The LMS Working Group, by reviewing 17 Emergency Support Functions identified key community stakeholder groups and invited each to attend LMS Working Group meetings. The LMS Coordinator also made a presentation regarding the LMS to the Property Homeowners Association Committee, a committee comprised of the directors of homeowner associations throughout the County. Invitations to attend LMS Working Group meetings were extended at the Homeowners Association Committee meeting. In an effort to develop a mitigation planning process that is community based and focused on creating disaster-resilient communities in St. Lucie County, community stakeholder groups are invited to participate. All meetings of the LMS Working Group are publicly noticed.

2. 8 DOCUMENTATION

Following each meeting, a summary is prepared detailing how solicitation was completed for that meeting along with any comments and suggestions made by the public and/or community stakeholder groups. As per local, state and federal records retention requirements, for each meeting, the LMS Coordinator maintains copies of meeting summaries, attendance rosters, public invitations, public comments and input, and all other documents associated with Working Group meetings and workshops at the St. Lucie County Division of Emergency Management. Public comments are located in Appendix D.

In order to invite and promote the opportunity for broad participation, meeting notices and agendas are posted through some combination of the following: newspaper ads or public service announcements, postings on County and municipal websites, announcements on the County's TV station (Channel 20), postings in County and municipal newsletters and calendars, and emails to previous participants. The procedures for invitations are documented, along with comments in the meeting summaries located in Appendix D. The various invitation notices are to ensure the continuation of public participation in the LMS update process and other activities in the future.

2.9 EXISTING PLANNING DOCUMENTS

During the planning process, the LMS Working Group examined relevant planning documents that could significantly inform the revision of the LMS. They include:

- **St. Lucie County Comprehensive Plan -** The Comprehensive Plan serves not only as a blueprint for St. Lucie County's future, but also as the County's policy document. It defines County positions as they relate to development and redevelopment. The Comprehensive Plan contains the nine required plan elements, as set out in Section 163.3161, F.S. They include Conservation, Coastal Management, Infrastructure (i.e., potable water, sanitary sewer, storm-water management, solid waste, and natural aquifer recharge), Future Land Use, Housing, Recreation and Open Space, Transportation, Intergovernmental Coordination, and Capital Improvement. The issue of hazards is dealt with in five of the nine plan elements. Natural hazards, primarily flooding, hurricanes, drought, and beach erosion, are the focus of the Comprehensive Plan. Technological-type hazards such as aquifer contamination, wellfield contamination, and hazardous materials/waste accidents are addressed in several elements.
    - St. Lucie County Land Development Code;
    - St. Lucie County CEMP;
    - St. Lucie County CRS current jurisdictional ratings;
    - St. Lucie County Continuity of Operations Plan (COOP);
    - 2016 LMS Project Prioritized List

- **St. Lucie County Comprehensive Emergency Management Plan (CEMP) -** The Board of County Commissioners has an adopted CEMP. It is an operations-oriented document that establishes the framework for effective management by the County during emergencies and disasters. The CEMP is administered by the DPS and is updated and maintained by the Emergency Operations Manager. The CEMP addresses evacuation in terms of local and regional evacuation, public shelter, post-disaster response and recovery, rapid deployment of resources, communications and warning systems, training exercises, and agency responsibilities.

- **Fort Pierce Comprehensive Plan**
  (Coastal Management, Conservation, Capital Improvements, Future Land Use, Housing, Infrastructure, Intergovernmental Coordination, Port, and Recreation and Open Space);

- **Port St. Lucie Comprehensive Plan**
  (Coastal Management, Conservation, Capital Improvements, Future Land Use, Housing, Infrastructure, Intergovernmental Coordination, Port, and Recreation and Open Space);

2.10 HISTORIC AND CULTURAL RESOURCES

According to the National Register of Historic Places, there are sixteen (16) designated places within St. Lucie County. Designated places include:

- Arcade Building, Fort Pierce
- Captain Hammond House, White City

- Casa Caprona, Fort Pierce
- Cresthaven, Fort Pierce
- Fort Pierce Old Post Office, Fort Pierce
- Fort Pierce Site, Fort Pierce,
- Immokolee, Fort Pierce
- Jules Frere House, Fort Pierce
- Moore's Creek Bridge, Fort Pierce
- Old Fort Pierce City Hall, Fort Pierce
- Old St. Anastasia Catholic School, Fort Pierce
- St. Lucie High School, Fort Pierce
- Sunrise Theater, Fort Pierce
- Urca de Lima Shipwreck, Fort Pierce
- St. Lucie Village Historic District, St. Lucie Village
- Zora Neale Hurston House, Fort Pierce

Cultural events and festivals in St. Lucie County include the Fort Pierce Friday Fest, the Rainbow Festival, Seafood and Fishing Frenzy, the St. Lucie County Fair and St. Lucie Water Fest, Fort Pierce Farmers Market and others. The City of Fort Pierce currently participates in the Main Street program through two events: Fort Pierce Main Street and Lincoln Park Main Street.

2.11 CRITICAL FACILITIES

The LMS Working Group developed and adopted a formal definition for the term "critical facility." According to the adopted definition, "critical facilities comprise all public and private facilities deemed by a community to be mission critical and essential for delivery of vital services, protection of special populations and the provision of other services of importance for that community." Critical facilities include: hospitals, Assisted Living Facilities (ALF), nursing homes and medical facilities, emergency operation centers (EOCs), key grocery stores, fuel dispensing stations, newspaper facilities, radio broadcasting facilities, Florida Division of Forestry offices, fire stations, law enforcement offices, schools, shelters, government offices, funeral homes, power generating plants, water treatment plants, waste water treatment plants, major water, storm-water, flood, and water control structures, airports, railways, port facilities, roadways classified as evacuation routes significant intersections and others as identified by the LMS Working Group.

The LMS Working Group differentiates between primary and secondary critical facilities for purposes of prioritization of proposed mitigation projects. Primary critical facilities are defined as, "facilities that are critical to the immediate support of life and public safety." Examples of primary critical facilities include EOCs, emergency shelters, fire and police facilities, hospitals, and major utilities facilities (power generation plants, water and wastewater treatment plants, etc.).

Secondary critical facilities are defined as, "facilities that will be critical for community recovery and the restoration of services." Some examples of secondary critical facilities include government offices, key grocery stores, newspaper facilities, and non-shelter schools. Appendix B – Critical Facilities open during a hazard or disaster includes a table that shows St. Lucie County public facilities and their vulnerabilities to selected hazards developed for the Treasure Coast Regional Evacuation Study.

St. Lucie County is home to three major hospitals: Lawnwood Regional Medical Center in Fort Pierce, the St. Lucie County Medical Center and Martin Health in Port St. Lucie. Other major medical facilities within St. Lucie County include Lawnwood Pavilion, Savannas Hospital and New Horizons of the Treasure Coast.

Lines of communication are critical in providing information to the public before, during and after a disaster. The FCC (Federal Communications Commission) lists three (3) AM and twelve (12) FM radio stations broadcasting in St. Lucie County AM stations include: WJNX AM 1330, WIRA AM 1400, and WPSL AM 1590. FM stations include: WQCS 88.9, WSCF 91.9, WAVW FM 92.7, WGYL 93.7, WLDI 95.5, WKGR 98.7, WEHR 100.7, WHLG 101.3, WPBZ 103.1, WQOL 103.7, WFLM 104.5 and WIRK 107.9.

Television stations locally include WPTV (NBC), WPEC (CBS), WPBF (ABC) and WFLX (FOX). Locally printed newspapers include; The St. Lucie News Tribune (TCPalm), Hometown News, the Treasure Coast Business Journal, and The Miami Herald.

3.0 HAZARD IDENTIFICATION, VULNERABILITY, AND RISK ASSESSMENT

St. Lucie County is vulnerable to a wide range of natural and human caused hazards that threaten life and property. The Disaster Mitigation Act of 2000 (DMA2K) requires, at a minimum, an assessment of a full range of natural hazards, and technological or human-caused hazards. The initial identification of hazards for inclusion in the risk assessment is based on earlier versions of the St. Lucie County LMS, a review of the State of Florida Hazard Mitigation Plan and FEMA mitigation planning guidelines and hazards identified by the LMS Working Group which the County considered to be vulnerable. St. Lucie County and County municipalities use an all-hazards approach to mitigate disaster.

The purpose of this Section is to identify and assess the hazards and risks facing St. Lucie County in terms of potential impacts and loss to assets, infrastructure and community populations that may be vulnerable. The information provided by the assessment is the foundation on which decisions about future mitigation initiatives are based. Natural Hazards refer to those elements of the physical environment, (including atmospheric, hydrologic, geologic and wildfire phenomena) that because of their location, severity, and frequency, have the potential to adversely affect humans. Human-caused Hazards are those where human alterations or activities play a large role in triggering, exacerbating, or even creating a natural hazard where none existed before. Technological & Social Hazards are the result of human intent, error, or because of failed systems. They can be caused by accidents in human built infrastructures or technologies, or intentional human actions that cause destruction or loss of life.

Natural hazards include flooding, hurricanes/tropical storms, tornadoes, severe thunderstorms, wildfires, erosion and landslides, extreme temperatures, drought, earthquakes, sinkholes, tsunamis, sea level rise, agricultural pests and diseases and dam or levee failure. Natural hazards can affect a part of the specific area's county or the whole of the entire county unless otherwise detailed in the following profiles. Technological hazards include epidemics and pandemics, radiological accidents, power failure, hazardous material release, transportation system disruption, wellfield contamination, and communication failures. Human-caused hazards include terrorism (physical and cyber) and sabotage, civil disturbances, and mass migration.

The Hazard Identification Section describes each hazard above and provides historical data on impacts where available. Maps are provided to illustrate the location and extent of hazards and disasters are classified by the magnitude of their effects.

The vulnerability assessment for each hazard describes the community assets and potential impacts for each hazard. A community's vulnerability depends on the extent of the hazard exposure and the value of potentially vulnerable assets. Higher risk areas with higher potential damage warrant mitigation practices that are more extensive. Communities in this situation may rely on land use and site design rather than on relatively simple measures such as building codes and hardening existing structures. Other factors that influence vulnerability and are important for communities to consider when selecting mitigation practices

are pre-disaster mitigation, the amount of undeveloped and underdeveloped land, and in the case of post-disaster mitigation, the amount of developed land within the community. For the purposes of the LMS, vulnerability is classified as individual, social, and biophysical. Individual vulnerability describes the susceptibility of a person or a structure to potential harm from hazards. Social vulnerability describes demographic characteristics of social groups that make them more or less susceptible to the adverse impacts of hazards. Biophysical vulnerability examines the distribution of hazardous conditions arising from a variety of initiating events such as natural hazards, chemical contaminants, or industrial accidents (MDC, 2009).

Factors influencing vulnerability include but are not necessarily limited to a community's geographic location, type of construction, demographics, and cultural characteristics. The general hazards to which St. Lucie County is vulnerable and the projected potential impacts across the community exposure and services are discussed below under the vulnerability subsections for each hazard.

The hazards identified and discussed here are organized based on the maximum projected impact potential, (i.e., hazards capable of producing the maximum community-wide impact, such as hurricanes and floods, are discussed first, followed by hazards having lower community wide impacts).

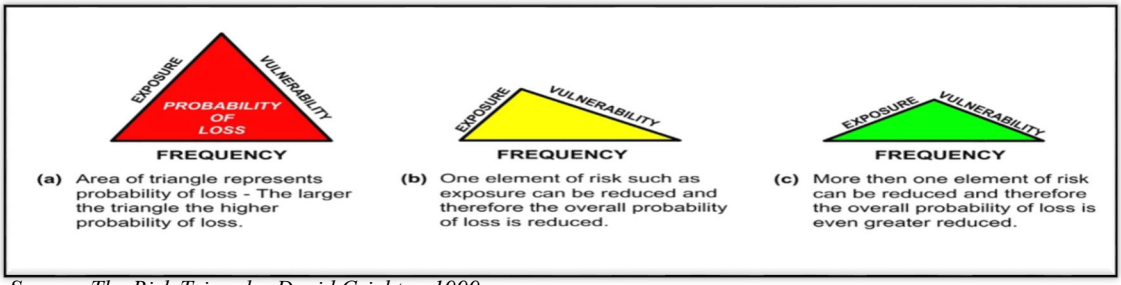
To effectively plan hazard mitigation projects and allocate scarce financial resources, a community's vulnerability to a specific hazard must be coupled with other critical factors to perform a risk assessment. Risk, or the probability of loss, depends on three elements:

- Frequency - how frequently does a known hazard produce an impact within the community?
- Vulnerability - how vulnerable is a community to the impacts produced by a known hazard?
- Exposure - what is the community's exposure in terms of life and property to the impacts produced by a specific hazard?

Once these three factors are established, the risk level faced by a community with regard to any specific hazard can be calculated using the "Risk Triangle" approach.[3]

In this approach, these three factors become the sides of a triangle, and the risk or probability of loss is represented by the triangle's area depicted below in **Figure 3.1**. The larger the triangle, the higher the community's risk with respect to a given hazard. If a community reduces any of these three factors, they reduce their risk or potential for loss.

Figure 3.1 – Risk Triangle



Source: The Risk Triangle; David Crichton 1999

[3] Crichton, 1999

In St. Lucie County, the overall exposure to tropical storms, hurricanes, floods, and earthquakes was determined by a risk assessment model software application called HAZUS-MH developed by FEMA. HAZUS-MH is a nationally applicable standardized methodology that contains models for estimating potential losses from the above hazards. HAZUS-MH uses Geographic Information Systems (GIS) technology to estimate physical, economic, and social impacts of disasters. It graphically illustrates the limits of identified high-risk locations due to earthquake, hurricane, and floods. HAZUS-MH is used for mitigation and recovery, as well as preparedness and response. Government planners, GIS specialists and emergency managers use HAZUS-MH to determine losses and the most beneficial mitigation approaches to take to minimize them. HAZUS-MH can be used in the assessment step in the mitigation planning process, which is the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. In terms of natural hazards, there is very little if anything that can be done to change the frequency with which they produce impacts in a community. Mitigation planning relative to those hazards must therefore focus on reducing the community's vulnerability or exposure. In terms of technological and human caused hazards, the most cost-effective type of mitigation is to limit or reduce the frequency with which such hazards occur.

The technical planning process began with hazard identification. In this process, the LMS planning team and representatives of individual jurisdictions identified the natural, technological, and human-caused hazards that could threaten St. Lucie County. The following hazards were selected by the LMS planning team for the 2021 LMS. The list of profiled hazards for St. Lucie County are contained in **Table 3.1**

Table 3.1- Hazard Identification

	POTENTIAL IMPACT POINTS																		
	WIND Excessive wind	**WATER** Excessive water	**HAIL** Damaging hail	**EROSION** Soil/beach erosion	**ENERGY** Electric power outage	**TRANSPORTATION** Surface and air transportation disruption	**WATERWAY TRANSPORTATION** Navigable waterway impairment	**POTABLE WATER** Potable water system loss or disruption, saltwater intrusion	**WASTEWATER** Sewer system outage	**COMMUNICATIONS** Telecommunications system outage	**HUMAN HEALTH** Disease/Physical & Mental health	**HUMAN SAFETY** Design/Planning, risk reduction	**ECONOMY & AGRICULTURE** Economic disruption; Agricultural/fisheries damages;	**SERVICES & SOCIAL NETWORKS** Disruption of community services & social networks	**BUILDINGS & INFRASTRUCTURE** Damage or loss of buildings or infrastructure	**ENVIRONMENT** Damage to critical environmental resources	**HISTORICAL RESOURCES** Damage	**FIRE** Fire and Wildfire	**TOXINS /HAZARDOUS** Toxic / Hazardous material releases	**STORMWATER** Stormwater drainage impairment
NATURAL HAZARDS																			
Flooding*		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hurricanes/Tropical Storms*	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tornadoes*	X				X	X				X	X	X	X						
Severe Thunderstorms & Lightning*	X	X	X		X	X				X	X	X	X					X	X
Wildfire*					X	X				X	X	X	X	X	X	X		X	X
Erosion*		X		X			X						X			X			X
Extreme Temperatures*					X						X	X			X	X			
Drought													X		X	X		X	
Seismic Hazards eg: earthquakes, sinkholes						X													X
Tsunami		X		X		X	X				X		X			X			X
Sea Level Rise			X	X		X	X	X	X		X	X	X	X	X	X	X	X	X
Dam/Levee Failure		X				X	X				X		X		X				X
Agricultural Pests & Diseases	X										X	X	X		X	X			
TECHNOLOGICAL HAZARDS																			
Power Systems Failures					X	X		X	X	X	X	X	X	X					
Wellfield Contaminations								X	X		X	X	X	X					

	POTENTIAL IMPACT POINTS																			
	WIND Excessive wind	**WATER** Excessive water	**HAIL** Damaging hail	**EROSION** Soil/beach erosion	**ENERGY** Electric power outage	**TRANSPORTATION** Surface and air transportation disruption	**WATERWAY TRANSPORTATION** Navigable waterway impairment	**POTABLE WATER** Potable water system loss or disruption, saltwater intrusion	**WASTEWATER** Sewer system outage	**COMMUNICATIONS** Telecommunications system outage	**HUMAN HEALTH** Disease/Physical & Mental health	**HUMAN SAFETY** Design/Planning, risk reduction	**ECONOMY & AGRICULTURE** Economic disruption; Agricultural/fisheries damages;	**SERVICES & SOCIAL NETWORKS** Disruption of community services & social networks	**BUILDINGS & INFRASTRUCTURE** Damage or loss of buildings or infrastructure	**ENVIRONMENT** Damage to critical environmental resources	**HISTORICAL RESOURCES** Damage	**FIRE** Fire and Wildfire	**TOXINS /HAZARDOUS** Toxic / Hazardous material releases	**STORMWATER** Stormwater drainage impairment
Epidemics/Pandemics											X	X	X	X						
Radiological Accidents					X	X				X	X	X	X	X					X	
Hazardous Materials Accidents						X					X	X	X	X				X	X	
Transportation Systems Accidents						X	X				X		X	X	X			X		
Communication Systems Failures										X	X		X	X						
HUMAN CAUSED HAZARDS																				
Terrorism and Sabotage					X	X		X		X	X	X	X			X	X	X	X	
Civil Disturbances						X					X	X	X	X			X			
Mass Migration											X	X	X	X						

** Sea Level Rise & Climate Change Impacts*

3.1 NATURAL HAZARDS

St. Lucie County is susceptible to several natural hazards with the potential to cause extensive damage within the community. The cost of responding to and recovering from these disasters has proven to be significant. Hurricanes, tropical storms, and wind related disasters were responsible for the most property damaged during this time. Planning for these events before they occur can significantly reduce future costs.

3.1.1 Flooding

3.1.1.1 Hazard Identification

A flood is defined by the National Weather Service as any high flow, overflow, or inundation by water, which causes or threatens damage. Flooding can occur because of heavy precipitation, overflowing rivers, community development and hydrological alterations, or breached or broken dams or levees. Existing flood-prone areas and flooding patterns may shift because of changing climate conditions.

Flooding can affect the health, safety, security, and livelihoods of residents. It can damage buildings property, roads, and utilities, and disrupt services such as public transportation. Heavy precipitation and flooding can also exacerbate erosion and landslides.

There are several flood types, such as:

River Flood – Occurs when water levels rise over the top of riverbanks due to excessive rain from tropical systems making landfall, persistent thunderstorms over the same area for extended periods of time, combined rainfall and snowmelt, or an ice jam.

Coastal Flood – The inundation of land areas along the coast causes by higher-than-average high tide and worsened by heavy rainfall and onshore winds (i.e., wind blowing landward from the ocean).

Storm Surge – An abnormal rise in water level in coastal areas, over and above the regular astronomical tide, caused by forces generated from a severe storm's wind, waves, and low atmospheric pressure. Storm surge is extremely dangerous because it is capable of flooding large coastal areas.

Inland Flooding – Inland flooding is the partial or complete inundation of normally dry land with freshwater, that may be extensive or limited to a few properties. It occurs when moderate precipitation accumulates over several days, intense precipitation falls over a short period, or a river overflows because of an ice or debris jam, or dam or levee fails, or with additional rainfall when the water table is high, and soils are saturated.

Flash Flood – Caused by heavy or excessive rainfall in a short period of time, generally less than six hours. Flash floods are usually characterized by raging torrents after heavy rains that rip through riverbeds, urban streets, or mountain canyons sweeping everything before them.

Several variations of flood hazards occur in St. Lucie County because of severe thunderstorms, hurricanes, tropical storms, and seasonal rains. For the majority land area in the County, the primary causes of flooding are thunderstorms, tropical storms, and hurricanes. However, the County's low-lying topography,

combined with the subtropical climate, make it vulnerable to riverine and estuarine associated flooding.

Flooding in St. Lucie County results from one or a combination of both meteorological events:

1) Tidal surge associated with thunderstorms, tropical storms, and hurricanes; and
2) Overflow from streams and swamps associated with rain runoff and pooling of standing water areas that do not drain well.

For additional information, see Annex A – Flood Hazard Specific Plan.

3.1.1.2 Flood Hazard Locations

In response to mounting losses from flooding nationwide, the United States Congress initiated the National Flood Insurance Program (NFIP) in 1968. This program is administered through the St. Lucie County Water Quality Manager (WCM). Under this program, The WCM produces Flood Insurance Rate Maps (FIRMs), which show areas subject to various levels of flooding under different conditions. This Flood risk information is based on historic, meteorological, hydrologic, and hydraulic data, as well as open-space conditions, Flood control works, and development. The FIRM maps for St. Lucie County were updated in June 2014. Floodplains designated on the FIRM are based on the 1% annual Flood chance or the 100-year Flood event. The 500-year Flood event with a 0.2% annual chance of occurrence is used to designate other areas of the community, which may have some vulnerability to flooding. Any official Flood zone determination must be completed using the official paper FIRMs. **Figure 3.2** depicts the St. Lucie County Flood Zone map follows zone definitions and map legend with abbreviation definitions.

St. Lucie County participates in the Community Rating System (CRS) which is a program designed to reduce insurance costs to residential homeowners that implement flood mitigation practices. The County maintains and updates the CRS plan periodically to increase information available to real estate agencies and homeowners to encourage preparedness and reduce costs of potential flood damage.

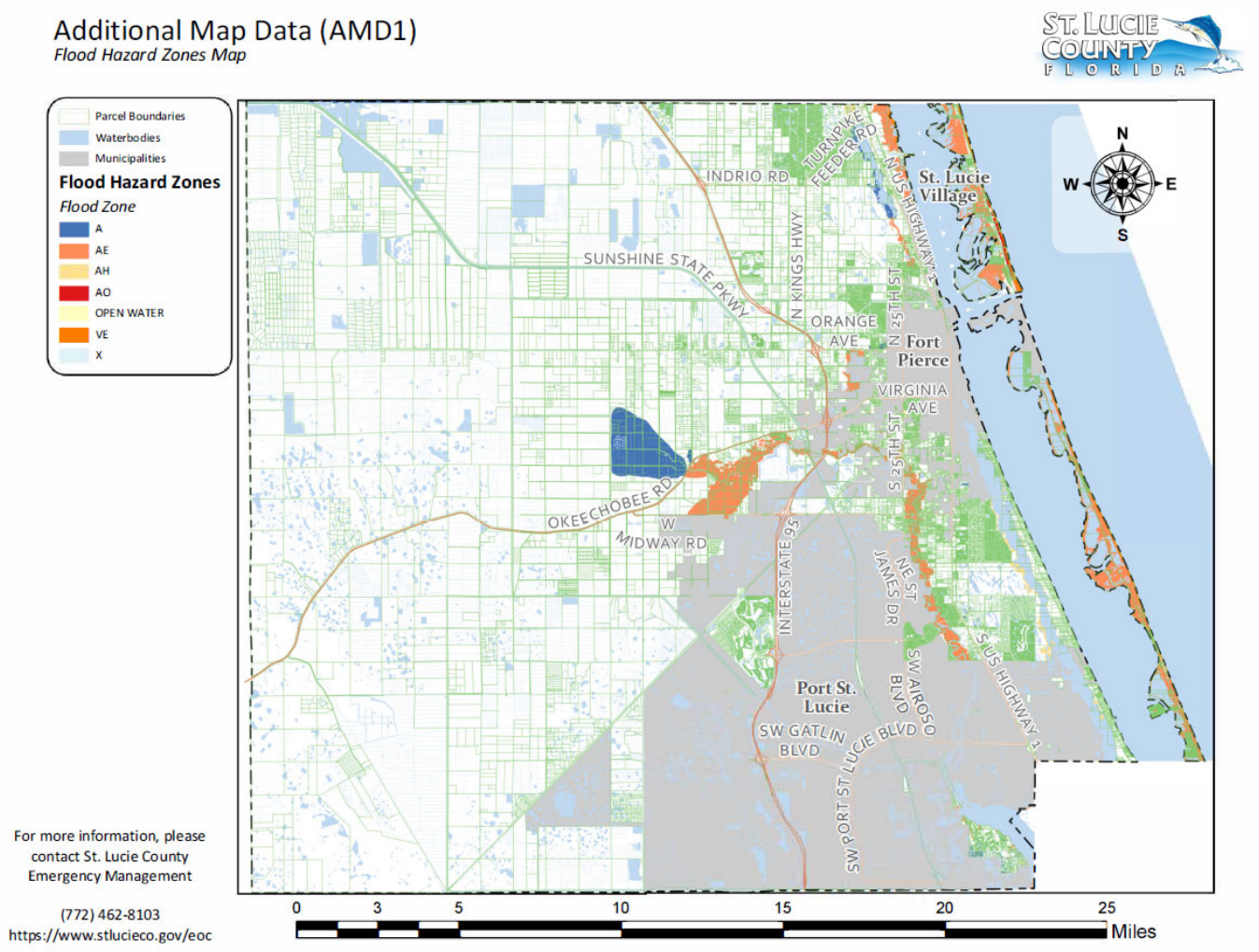
Undetermined Risk Areas: Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

ZONE	DESCRIPTION
A	Areas subject to inundation by the 1-percent-annual-chance flood event. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown.
AE, A1-A30	Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. BFEs are shown within these zones. (Zone AE is used on new and revised maps in place of Zones A1–A30.)
AH	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are 1–3 feet. BFEs derived from detailed hydraulic analyses are shown in this zone.
AO	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are 1–3 feet. Average flood depths derived from detailed hydraulic analyses are shown within this zone.

AR	Areas that result from the decertification of a previously accredited flood protection system that is determined to be in the process of being restored to provide base flood protection.
A99	Areas subject to inundation by the 1-percent-annual-chance flood event, but which will ultimately be protected upon completion of an under-construction Federal flood protection system. These are areas of special flood hazard where enough progress has been made on the construction of a protection system, such as dikes, dams, and levees, to consider it complete for insurance rating purposes. Zone A99 may be used only when the flood protection system has reached specified statutory progress toward completion. No BFEs or flood depths are shown.
V	Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards associated with storm-induced waves. Because detailed coastal analyses have not been performed, no BFEs or flood depths are shown.
VE, V1-V30	Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action. BFEs derived from detailed hydraulic coastal analyses are shown within these zones. (Zone VE is used on new and revised maps in place of Zones V1–V30.)
B, X	Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1- percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones. (Zone X (shaded) is used on new and revised maps in place of Zone B.)
C, X	Minimal risk areas outside the 1-percent and .2 percent-annual-chance floodplains. No BFEs or base flood depths are shown within these zones. (Zone X (unshaded) is used on new and revised maps in place of Zone C.)
D	Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

Source: FEMA and NFIP

Figure 3.2– Flood Zone Map



Source: St. Lucie County, 2020

3.1.1.3 Historic Events

Hurricane of September 1928. This hurricane made Florida landfall near the City of Palm Beach as a strong Category 4 hurricane with one of the lowest barometric pressures ever recorded in this area (928.9 millibars [27.43 inches]). It reached Lake Okeechobee with very little decrease in intensity. In all, 1,836 people were killed and another 1,870 injured during this storm's passage. Nearly all the loss of life was in the Okeechobee area and was caused by overflowing of the lake along its southwestern shore.

Hurricane of September 1933. The 1933 Treasure Coast Hurricane formed east-northeast of the Leeward Islands on August 31 and attained maximum sustained winds of at least 140 miles per hour, making landfall near the border of Palm Beach and Martin Counties as a strong Category 3 hurricane. Buildings were blown off their foundations, and citrus groves were devastated. Stuart, Jupiter, and Fort Pierce were heavily damaged.

Flood of 1947. This Flood is generally considered the most severe Flood recorded in southern Florida.

Heavy rainfall, including the rains from two hurricanes, occurred over a period of 5 months. Certain areas of St. Lucie County were flooded for months, and there was extensive damage to agriculture in general. Such a flooding event would be much more significant today because of the increase in land development along the eastern side of the County.

Hurricane of August 1949. This Category 3/Category 4 hurricane made landfall in Florida between Delray and Palm Beach with winds of 130 mph and a barometric pressure of 954.0 millibars (28.17 inches). As it moved inland, its center passed over the northern part of Lake Okeechobee, but the levees in that area held. No major flooding occurred. Damages in Florida were estimated at $45 million. Tides of 11.3 feet at Fort Pierce, 8.5 feet at Stuart, and 6.9 feet at Lake Worth were reported. Stuart sustained severe damages in this storm. Statewide, over 500 people lost their homes as a result of this storm.

Flood of 1953. As occurred in 1947, this Flood was preceded by 5 months of heavier than normal rainfall, which included a tropical storm in October. June through October rainfall was approximately 48 inches. Damage was heaviest in the beef cattle industry, with extensive losses of improved pastureland, which required supplemental feeding of cattle. Vegetable growers and dairy farmers also suffered significant losses as a result of this flood.

Flood of September 20-22, 1985. This incident affected large areas of St. Lucie County. Over a four-day period, 14 inches of rain were recorded in the City of Fort Pierce, with about half falling during a seven-hour period over the night of September 20, 1985. Flooding of streets and houses was widespread, especially in the central area around Five-mile and Ten-mile Creeks, where large numbers of residents were evacuated from their homes.

Left Blank Intentionally

Table 3.2 - Historical Flood Events Impacting St. Lucie County

Date	Time	Location	Deaths/ Injuries	Estimated Property Damage	Brief Description
10/17/1995	1400 - 2000	Port St. Lucie	None	4,000,000	An estimated 13 inches of rain fell in the county, flooding 12 homes and most roadways in the southern part of the County.
01/09/2004	1600-2300	Port St. Lucie	None	220,000	A cluster of showers and isolated thunderstorms moved very slowly down the coast of St. Lucie and Martin counties during the afternoon and early evening. 24-hour rainfall totals reached 8-12 inches across much of the coastal portion of the counties, with the majority of the rain falling in a period of 6-hours or less. Flooding of many roadways occurred, stranding vehicles. Drainage canals and creeks overflowed. While high water surrounded many subdivisions, businesses and homes, water only entered one building, a St. Lucie County High School, causing an estimated $220,000 in damage.
08/19/2008	1400-2200	St. Lucie County	None	67,000,000	On August 19th Tropical Storm Fay came on shore in south west Florida moving north northeast toward Lake Okeechobee. By the early morning of August 20th Fay had moved to southern Brevard County producing rainfall amounts ranging from 10 to 15 inches in Martin, St. Lucie, Okeechobee, and Indian River counties.
12/17/2009	2000-0000	St. Lucie County	0	0	A large area of 5 to 13 inches of rain fell from near the Florida Turnpike, impacting western portions of Port St. Lucie, and inland to the rural portions of central and western St. Lucie County. A rainfall spotter located 4 miles west of Port St. Lucie recorded over 12 inches of rain in less than 24 hours and 6 inches in 90 minutes during the evening. Standing water levels reached up to 3-feet on some roadways and yards in and near the Traditions Community, causing many homes and schools to briefly become cut-off from surrounding areas. While temporary roadway, lowland and urban flooding was extensive, no homes or businesses were damaged.

Source: National Climatic Data Center

Table 3.2 - Historical Flood Events Impacting St. Lucie County, (continued)

Date	Time	Location	Deaths/ Injuries	Estimated Property Damage	Brief Description
08/27/12	0500-1700	St. Lucie County	None	1,130,000	Persistent heavy rain bands from Tropical Storm Isaac produced widespread urban and lowland flooding across much of the county. Rainfall from the morning of August 26 until the evening of August 27 averaged 5 to 10 inches, with isolated totals of 12 to 14 inches, most of which fell during the morning and afternoon of August 27. The most significant impacts occurred near the coast, and included Lakewood Park to Fort Pierce, White City, and Port St. Lucie As a result, several roads in the county were temporarily impassable. Significant beach erosion occurred on the south end of the county with parts of Highway A1A flooded and washed out. .
01/09/14	1400-2200	St. Lucie County	None	20,000	Radar-based rainfall estimates were between 6 and 12 inches across eastern-most St. Lucie County, with most of the rain falling in a 6-hour or less period. The 24- hour rain gage total at Ft. Pierce was 10.64 inches, but with most of the rain falling in less than 6 hours. Flooding closed many roadways, stranding vehicles. Drainage canals and creeks overflowed. While high water surrounded many subdivisions, businesses and homes, water was only reported to have entered one apartment complex in Fort Pierce (three separate buildings).
09/10/2017	2100-0200	St. Lucie County	None	0	Rain bands associated with Hurricane Irma produced rainfall totals between 8 and 12 inches, resulting in areas of urban and poor drainage flooding. Many roadways were impacted by significant levels of standing water and many retention ponds reached capacity or overflowed. More significant (flash) flooding occurred farther north across the county, including Ft. Pierce.

Source: National Climatic Data Center

3.1.1.4 Vulnerability Assessment

Flooding in St. Lucie County results from one or a combination of both of the following meteorological events:

1. Tidal surge associated with thunderstorms, tropical storms, and hurricanes; and
2. Overflow from streams and swamps associated with rain runoff and pooling of standing water areas that do not drain well.

When intense rainfall events occur, streams and drainage ditches can reach peak Flood flow

concurrently with tidal water conditions associated with coastal storm surge or high tide. This greatly increases the probability of flooding in the low-lying areas known as the Coastal High Hazard Area (CHHA). This coastal flooding will be further exacerbated due to Sea Level Rise.

Areas along the North and South Forks of the Indian River Lagoon and estuary are particularly susceptible to flooding under these conditions. The most Flood prone areas in the eastern portion of the County feature poorly drained soils, a high-water table, and relatively flat terrain, all of which contribute to their flooding problems. In some areas, the flat terrain and heavily wooded conditions intensify flood problems by preventing rapid drainage.
Riverine flooding occurs when the flow of rainwater runoff exceeds the carrying capacities of the natural drainage systems. During extended periods of heavy rainfall, certain low-lying neighborhoods within the County are subject to considerable flood damage caused by the inability of natural and mechanical drainage systems to effectively remove the water. Heavy rainfalls can cause considerable damage to County infrastructure including roadbeds, bridges, drainage systems, and the water supply. The buildup of uncontrolled sediment contributes to the problem of inadequate drainage in natural and mechanical drainage systems. When a storm produces an overwhelming amount of stormwater runoff, the accumulation of loose sediment materials (sand and soil) clogging the drainage systems impedes the flow of water, thereby increasing the risk of flooding. Natural percolation and drainage is further inhibited in these saturated areas.

In comparison to riverine flooding, coastal flooding is usually the result of a severe weather system such as a tropical storm or hurricane and is known as inundation and storm surge. The damaging effects of coastal floods are caused by a combination of storm surge, wind, rain, erosion, and battering by debris. All coastal property and inhabitants are subject to severe damage and loss of life resulting from floods caused by hurricane-associated storm surge. Some coastal property, roads, and bridge approaches are also subject to severe flooding caused by astronomical high tides such as King Tides which occur in our area during the late fall and early winter.

Frequencies of flooding associated with rain events other than tropical storms and hurricanes are more difficult to estimate. Eastern Florida shows an annual dry cycle stretching from early November through mid-May. During this part of the year, monthly rainfall rarely exceeds 3.5 to 4.0 inches per month. The wet season, beginning approximately mid-May and running through October, shows monthly rainfall levels in the area to be between 6.0 and 8.5 inches with the heaviest rainfall usually occurring in August and September. In St. Lucie County, the eastern or coastal section of the County receives more rain than the western section. This annual rainfall pattern coupled with hurricane season (June through November) makes St. Lucie County particularly vulnerable to flooding associated with tropical storms and hurricanes since they typically occur when the water table is high, and the ground is saturated.

3.1.1.5 Probability Assessment - HIGH

As for future occurrences, the probability for flooding in St. Lucie County is high. Moreover, while the probability of flooding is higher in specific areas, and all jurisdictions of the County are at risk, flooding along the coastal areas occurs in late winter and early spring due to rough seas and high surf.

Table 3.3 - St. Lucie County Average Monthly Rain Totals

Month	JAN	FEB	MARCH	APRIL	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	Yearly Average
Average	2.36	3.07	3.66	2.87	3.78	5.71	6.02	7.48	7.68	5.43	3.58	2.16	53.77

Source: National Climatic Data Center

Identified Problem Areas. Flood prone areas within St. Lucie County experience some level of "nuisance" flooding anywhere from once to twice a year during the rainy season. For the purposes of this document, "nuisance" flooding is defined as several inches of standing water that remains in streets and along swales, from 3 to 8 hours after 3 to 5 inches of rainfall in less than 24 hours. While this type of flooding takes a toll on County or municipality infrastructure and services, it does not reach a level where individual citizens report property damage through claims to the NFIP.

The St. Lucie County Division Emergency Management and the Road and Bridge Department provide for community outreach and public education on flooding hazards, prevention, precautions, and mitigation. This is done through information on the website, in brochures and handouts, and in public workshops and presentations. The mass notification system, Everbridge (EVBG), is used to warn the public when flooding hazards are present. The City of Fort Pierce, City of Port St. Lucie and St. Lucie Village also provide for multiple flood prevention programs and public education.

Flooding events can have the following potential impacts within a community:

- Excessive water;
- Soil/beach erosion;
- Electric power outage;
- Surface and air transportation disruption;
- Navigable waterway impairment;
- Potable water system loss or disruption;
- Sewer system outage;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Disruption of local government and community services;
- Agricultural/fisheries damage;
- Damage to critical environmental resources;
- Damage to identified historical resources;
- Fire;
- Toxic releases; and
- Stormwater drainage impairment.

St. Lucie County experiences nuisance flooding that causes roadways to become dangerous and impassable, road closures or damage as a result of the flooding. Damage or closures can cause delays in emergency responses. In 2008 during Tropical Storm Fay, residents were unable to get to their homes in Port St. Lucie, and police assisted with transportation.

3.1.1.6 Documented Repetitive Losses

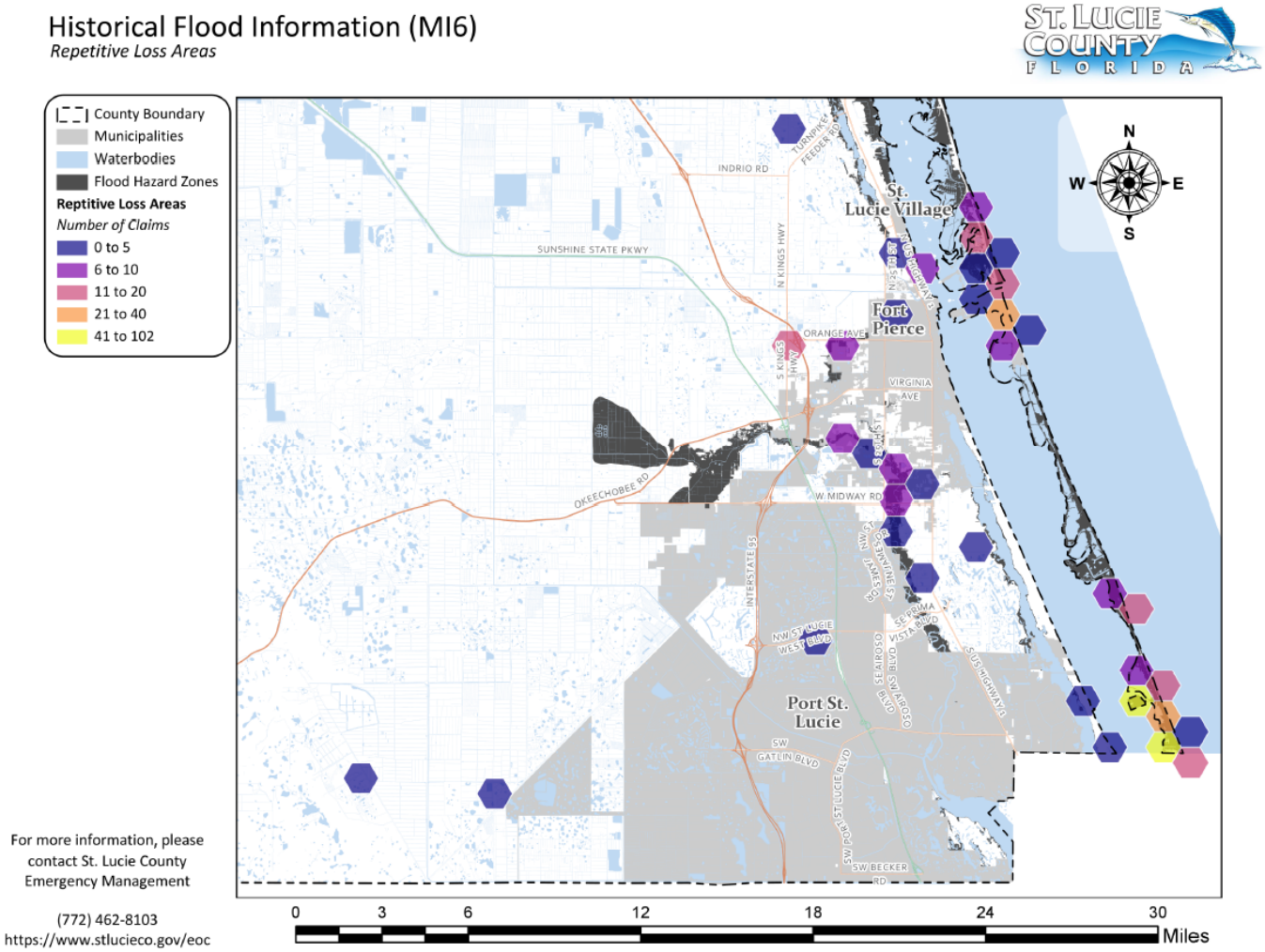
Reducing the losses associated with repetitive flood loss properties is a high priority nationally. This is reflected by the priority placed on repetitive loss properties in federal grant applications. For this analysis, documented repetitive losses are restricted to the narrow FEMA definition and represent only those properties for which two or more claims of more than $1,000 have been paid by the National Flood Insurance Program (NFIP) within any 10-year period since 1978 (e.g., two claims during the periods 1978–1987, 1979–1988, etc.). As of December 2018, the total repetitive loss properties in both unincorporated St. Lucie County and the respective jurisdictions were 345 properties. The following table documents the number of repetitive flood loss properties by jurisdiction and type. For the purposes of privacy, these addresses will not be incorporated into this document.

Table 3.4 - Repetitive Loss Properties for St. Lucie County and Associated Jurisdictions

Community	St. Lucie County	City of Fort Pierce	City of Port St. Lucie	Town of St. Lucie Village	Total
Community No.	120285	120286	120287	120288	
No. of Residential Repetitive Loss Properties	181	130	13	4	328
No. of Commercial Repetitive Loss Properties	4	12	1	0	17

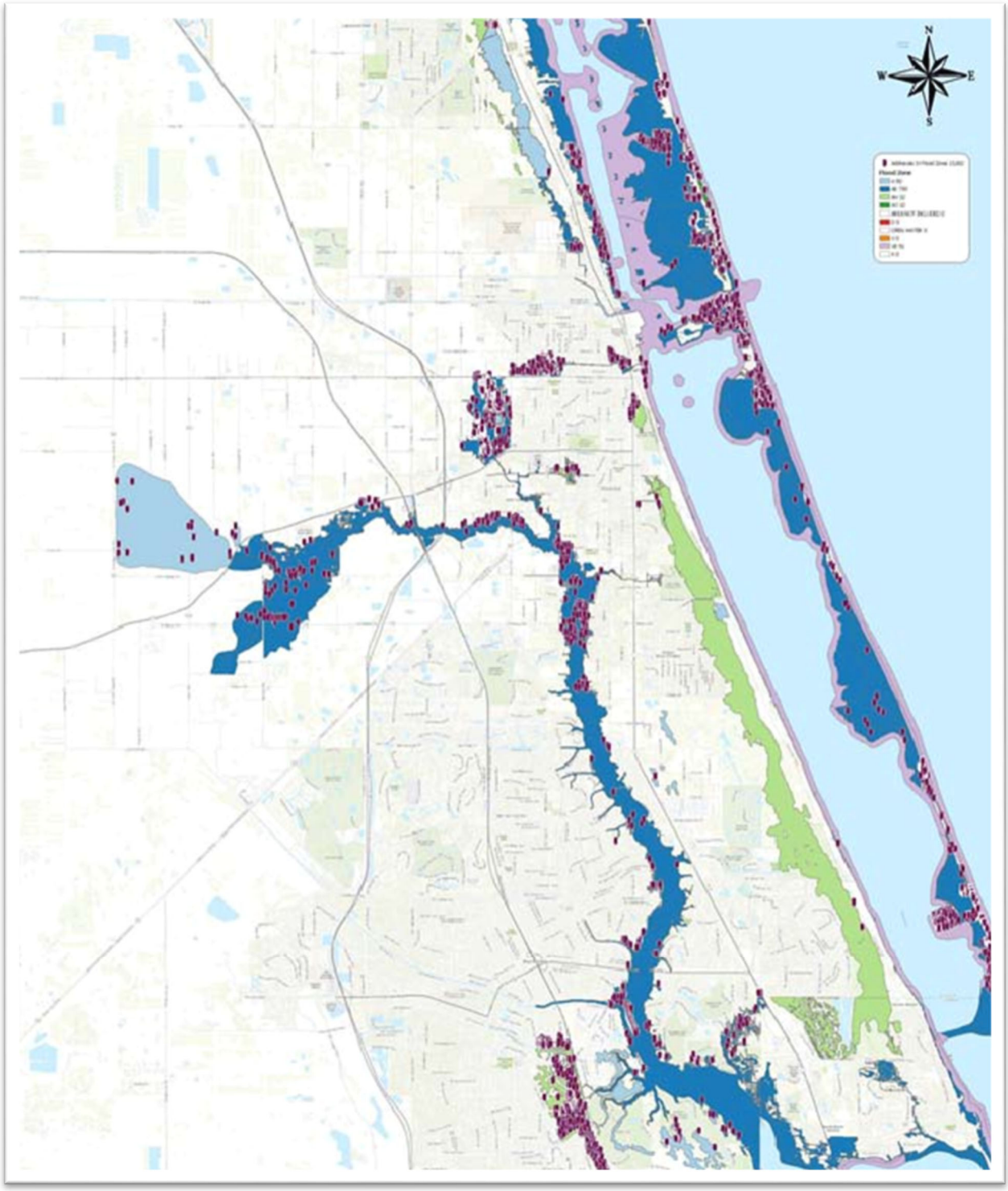
Source: FEMA NFIP, 2018

Figure 3.3 - St. Lucie County Repetitive Loss Areas



Source: St. Lucie County, 2020

Figure 3.4 – Homes Located in the Special Flood Hazard Area (SFHA)



Source: St. Lucie County PPI 2020

Figure 3.5 - Repetitive Loss Properties in St. Lucie County

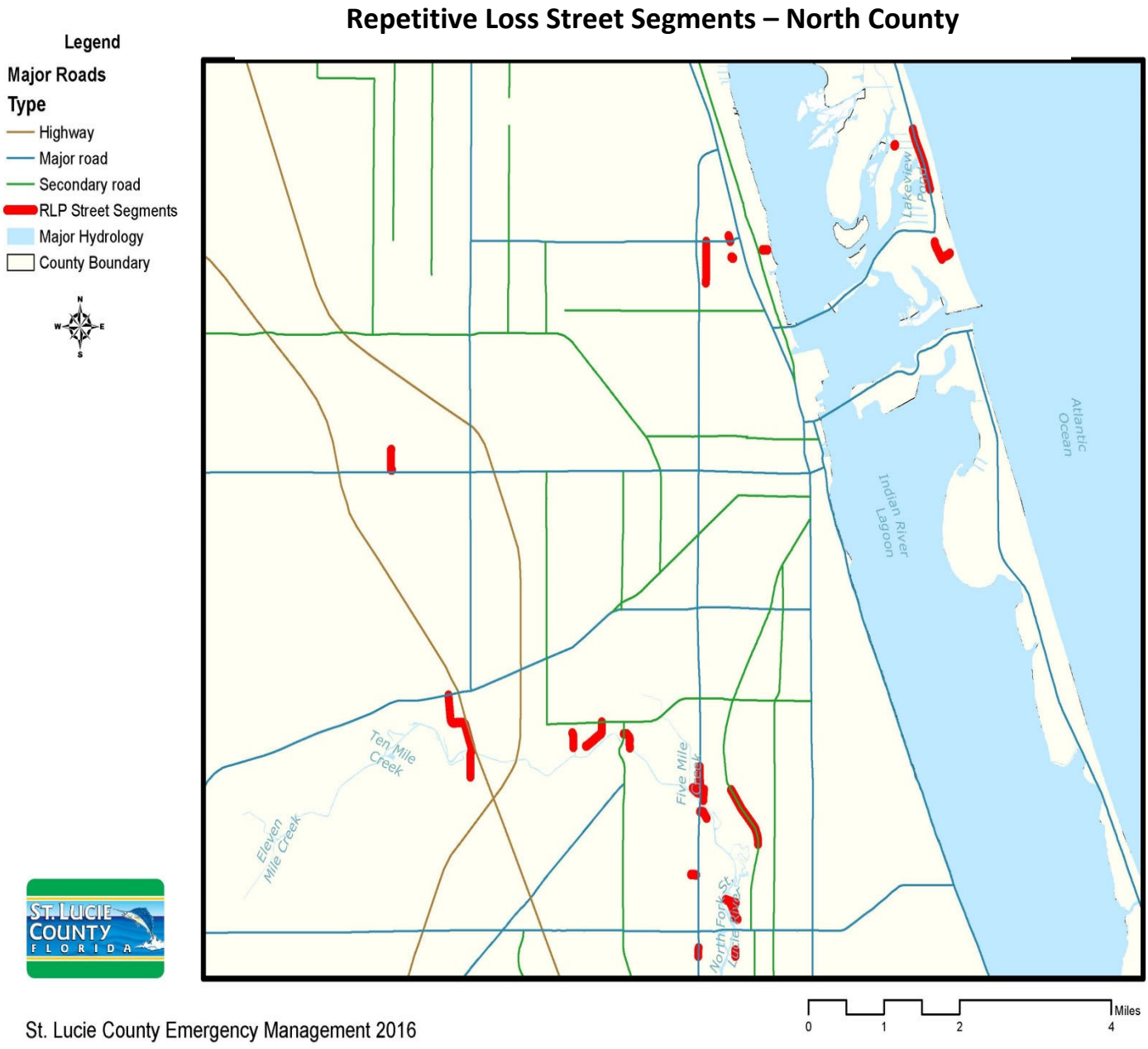
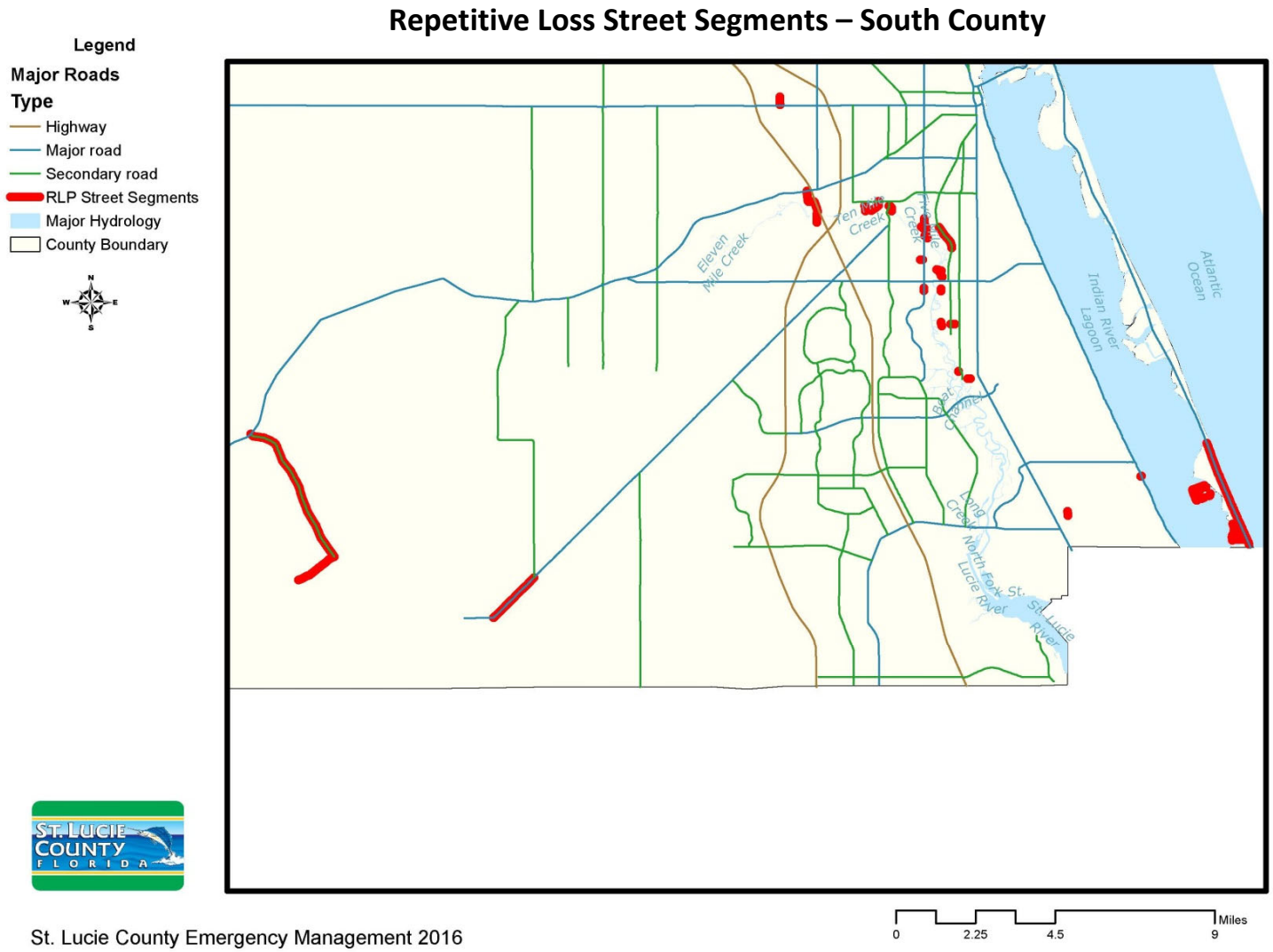
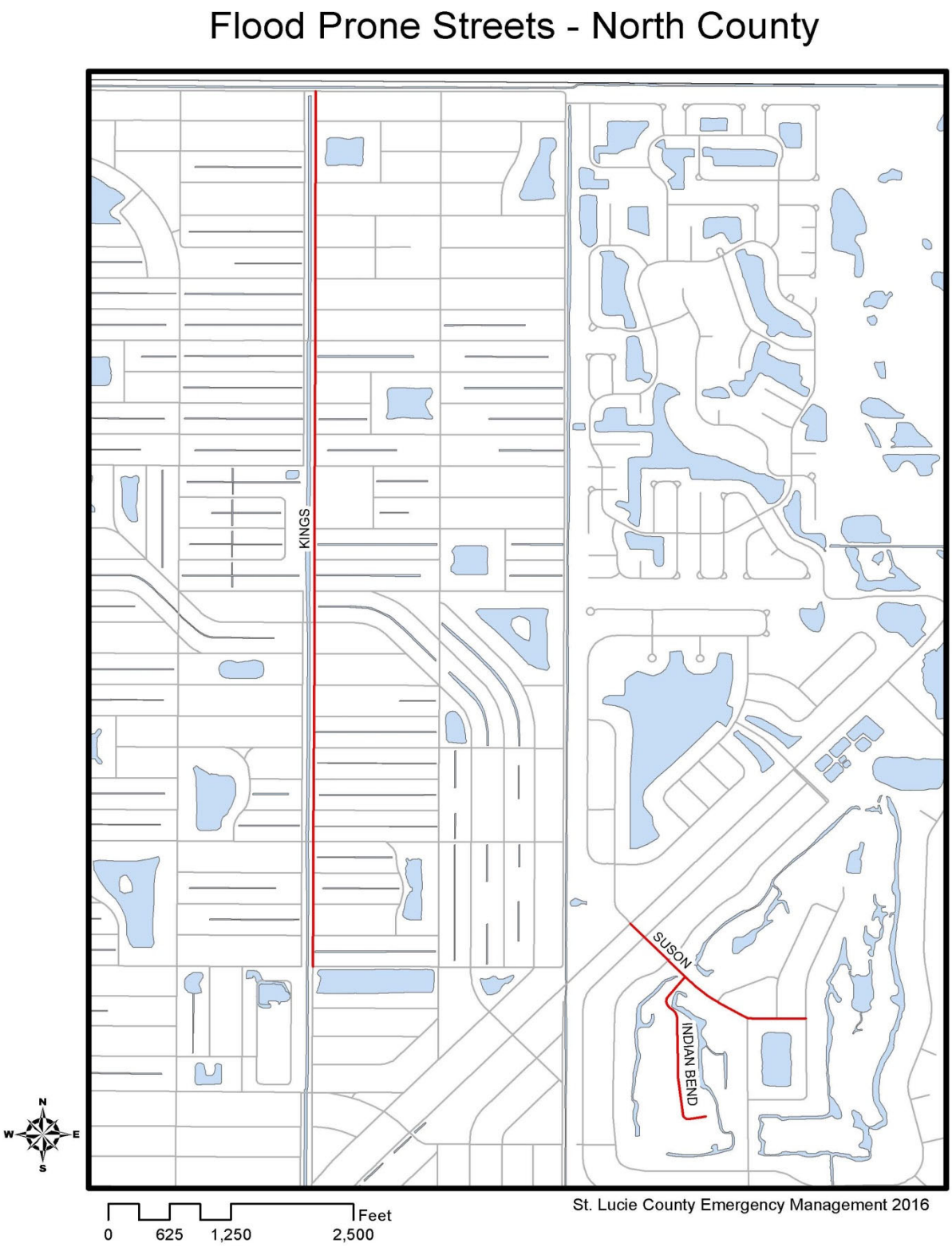


Figure 3.5 - Repetitive Loss Properties in St. Lucie County (continued)



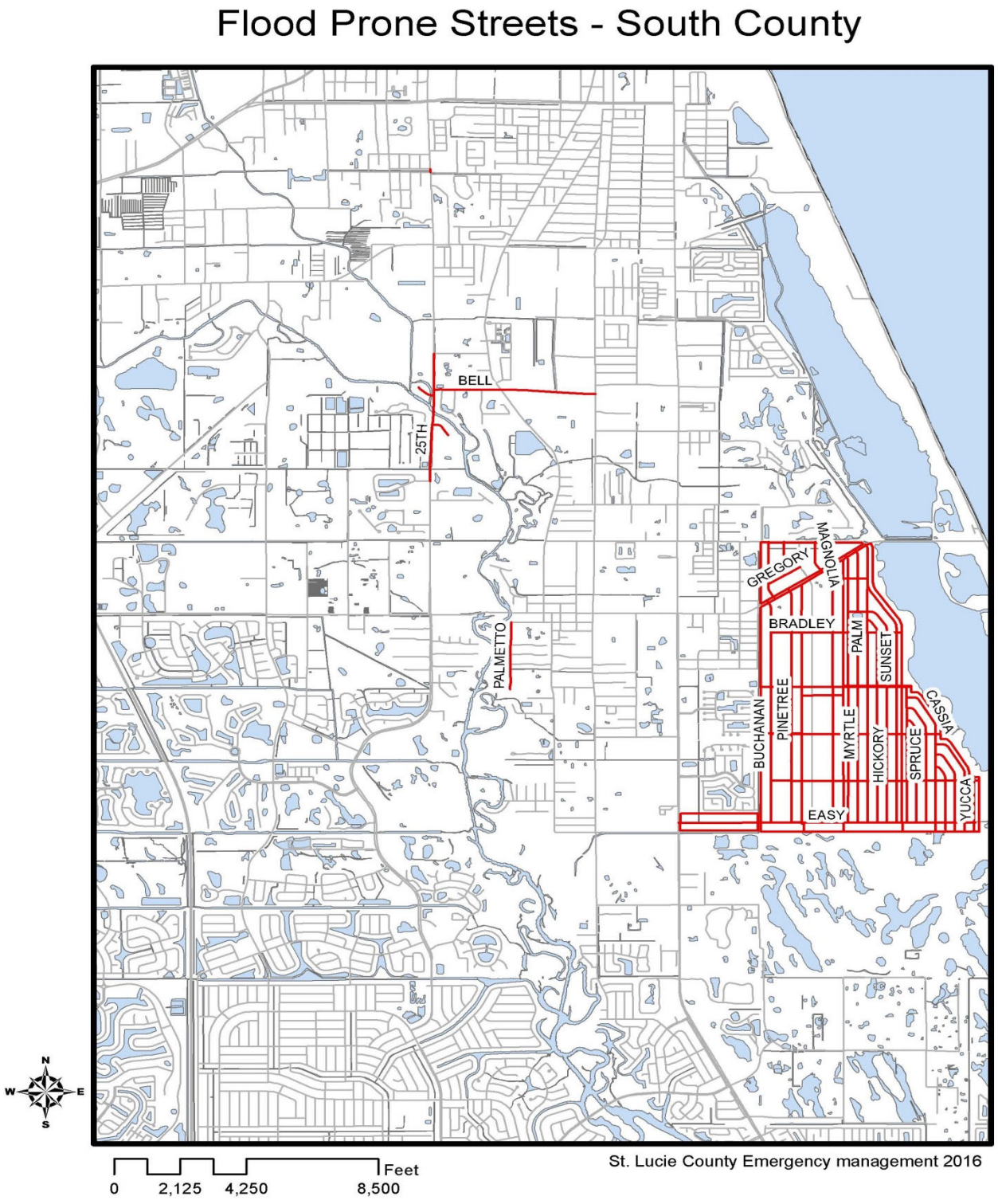
St. Lucie County Emergency Management 2016

Figure 3.6 - Flood Prone Streets in St. Lucie County



Source: St. Lucie County, 2016

Figure 3.6 - Flood Prone Streets in St. Lucie County (continued)



Source: St. Lucie County, 2016

[Refer to Appendix G for additional Tables and Figures.]

Table 3.5 - Flooding Exposure, St. Lucie County

Flood Zone	Total Number of Structures	Total Value of Structures	Total Population in Flood Zone
A	192	$23,521,300	1,503
AE	4,115	$695,487,340	16,740
AH	593	$107,500,400	10,134
AO	2,841	$796,031,800	510
X500	3,001	$1,011,851,442	10,878
X	120,318	$19,711,999,692	275,555
VE	111	$59,741,100	441
UNDES	369	$64,909,278	3,435
OFF FIRM	27	$1,778,594	1,702

Source: St. Lucie County Planning Department & GIS 2021

Property damage along the coast of St. Lucie County occurs most often in the late winter or early spring and is associated with winter storms and northeasters. Flooding in the inland portions of the County occurs most often in the fall and is often associated with tropical depressions and storms. Incidences of flooding in specific areas of St. Lucie County seem to be increasing. **Table 3.6** displays NFIP policy information for each participating jurisdiction. Jurisdiction listed are represented within the St. Lucie County LMS.

Table 3.6 - NFIP Policy Data by Jurisdiction

Community Name	Policies In-Force	Insurance In-Force	Number of Paid Losses	Total Losses Paid
St. Lucie County	4,675	$2,198,291,600	1,566	$44,301,884.00
City of Fort Pierce	4,089	$893,427,500	1,156	$32,498,572.26
City of Port St. Lucie	6,019	$1,786,644,500	486	$1,915,017.28
Town of St. Lucie Village	138	$37,244,500	68	$2,349,744.23

Source: Federal Emergency Management Agency, 2020a

NFIP and Community Rating System (CRS)

The Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed minimum NFIP requirements. Communities that participate in the NFIP may elect to participate in the CRS. The goals of the CRS include reducing flood losses, facilitating accurate insurance ratings, and promoting the awareness of flood insurance (FEMA, 2009). Incentives take the form of reductions on insurance premiums in 5% increments. A community's CRS class rating ranges from 10 (0% premium reduction) to 1 (45% premium reduction). **Table 3.7** displays CRS classes and activities for St. Lucie County and the associated jurisdictions. Three of the four jurisdictions represented by

this LMS currently participate in the CRS. The Town of St. Lucie Village is currently in the process of applying for a CRS class rating.

Table 3. 7- CRS Classes and Activities for St. Lucie County and Associated Jurisdictions

Community Name	St. Lucie County	City of Fort Pierce	City of Port St. Lucie
Community ID Number	120285	120286	120287
CRS Entry Date	10/01/94	10/01/92	10/01/91
Current Effective Date	05/01/09	05/01/12	10/01/96
Current Class	6	6	8
% Discount for SFHA	20	20	10
% Discount for Non-SFHA	10	10	5
Status	C	C	C
Activities Attempted	310, 320, 330, 340, 420, 430, 440,450, 510, 540, 610, 630	310, 320, 330, 340, 350, 360, 410, 420, 430, 440, 450, 502 510, 540, 630	310, 320, 350, 420, 430, 440, 450, 540 and 630

Source: FEMA NFIP, 2020 Community Rating System Eligible Communities

To ensure continued compliance with the NFIP, each jurisdiction will:

- Continue to enforce their adopted Floodplain Management Ordinance requirements, which include regulating all new development and substantial improvements located in the Special Flood Hazard Areas (SFHA)
- Ensure that each jurisdiction has an office and staff person designated as the Floodplain Administrator
- Continue to update the floodplain ordinance upon receiving new data from FEMA
- Continue to educate the public about the importance of flood hazards and the availability of flood insurance
- Continue to maintain or enhance their CRS scores

In an additional effort to ensure continued compliance with the NFIP, the City of Port St. Lucie has included a six (6) inch freeboard above base flood elevation (BFE) for all new residential structures within their current Floodplain Ordinance. This ordinance is significant considering that a majority of recent population growth and new construction has occurred within the City of Port St. Lucie.

As part of the NFIP CRS programs, FEMA documents repetitive flood losses. For this analysis, documented repetitive losses are restricted to the narrow FEMA definition and represent those properties for which two or more claims of more than $1,000 have been paid by the National Flood Insurance Program (NFIP) within any 10-year period since 1978 (e.g., two claims during the periods 1978–1987, 1979–1988, etc.).

Based on recent rain events and potential climate change impacts, the likelihood of this threat will continue to increase. During Hurricane season from June to November, damage tropical systems and hurricanes are the largest threat. Flooding in inland areas of the county is from tropical storms and depressions in the summer and fall, during the rainy season, and in the dry season during periods when El Nino is present in the Pacific Ocean regions.

3.1.1.7 Risk Assessment - HIGH

Flooding is the hazard which produces the most recurrent impacts in St. Lucie County. All communities within St. Lucie County are vulnerable to both hurricanes and flooding, but they are not all vulnerable for the same reasons. The barrier island communities such as the Fort Pierce beach area and the unincorporated areas of Hutchinson Island obviously are highly vulnerable to both wind and storm surge damage from hurricanes. Due to the presence of the Fort Pierce Inlet, mainland Fort Pierce also is highly vulnerable to flooding associated with hurricane winds and storm surge. Central Port St. Lucie and the White City area are vulnerable to storm surge related flooding along the North Fork of the St. Lucie River and the canals in those areas. Wind driven water combined with storm surge within the Indian River Lagoon may also produce substantial flooding along low-lying river front property away from the inlet. Communities away from the water such as St. Lucie West, Lakewood Park, and the unincorporated areas north of Fort Pierce along U.S. Highway 1, are more vulnerable to wind damage from hurricanes and flooding associated with rain rather than storm surge.

Flooding other than that associated with storm surge usually results from heavy rainfall events occurring in association with stalled fronts, tropical storms, and occasionally hurricanes and may be resultant from poor drainage and pooling of rainfall in low lying areas. Not all areas within any given jurisdiction are equally vulnerable to flooding, but all jurisdictions have specific areas where flooding is a recurring problem.

Table 3.5 illustrates the total number and value of structures and population expected to be impacted by each of the FEMA-identified flood zones. The zone with the highest number of structures and structure value is the X zone, which is known as the 500-year flood zone.

3.1.2 Hurricanes/Tropical Storms

3.1.2.1 Hazard Identification

Coastal areas are sensitive to sea level rise and other impacts of climate change. This may include the frequency and intensity of tropical storms, hurricanes, high winds, storm surge, and thunderstorms.

Tropical Storms or Tropical Cyclone

A tropical cyclone is a rotating low-pressure weather system that has organized thunderstorms but no fronts (a boundary separating two air masses of different densities). Tropical cyclones with maximum sustained surface winds of less than 39 miles per hour (mph) are called tropical depressions. A tropical storm is a tropical cyclone with maximum sustained winds of at least 39

mph. Tropical storms are given official names once they reach these wind speeds. Above 74 mph, a tropical storm is categorized a hurricane, typhoon, or cyclone based on the storm's geographic location.

A ***Tropical Storm Watch*** is issued by the National Hurricane Center (NHC) when tropical-storm conditions (sustained winds of 39 to 73 mph) are possible within the specified area within 48 hours. A ***Tropical Storm Warning*** is issued by the NHC when tropical-storm conditions (sustained winds of 39 to 73 mph) are expected within your area within 36 hours.

Hurricanes

Hurricanes, known generally as tropical cyclones are low-pressure systems with organized thunderstorm activity that form over tropical or subtropical waters. They gain their energy from warm ocean waters and have winds exceeding 74 mph that rotate counterclockwise about their centers in the Northern Hemisphere. Hurricanes are formed from thunderstorms that form over tropical oceans with surface temperatures warmer than 81°F (26.5°C). The ambient heat in the sea's surface and moisture in the rising air column set up a low-pressure center and convective conditions that allow formation of self-sustaining circular wind patterns. Under the right conditions, these winds may continue to intensify until they reach hurricane strength. This heat and moisture from the warm ocean water is the energy source of a hurricane. Hurricanes weaken rapidly when deprived of their energy source by traveling over land or entering cooler waters.

When a hurricane threatens the coast, advisories are issued by the NHC. In addition to advisories, the National Hurricane Center may issue a hurricane watch or warning. A hurricane watch indicates that hurricane conditions are possible and may threaten the area within 48 hours. A hurricane warning is issued when winds of at least 74 mph are to be expected in the area within 36 hours. Advisories and hurricane watches and warnings will frequently refer to the category of the storm. Hurricanes are classified using the Saffir-Simpson scale as follows:

The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes due to their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous and require preventative measures.

Table 3.8 - Saffir-Simpson Hurricane Wind Scale

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 mph	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156 mph	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 mph or higher	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Center, 2013.

While experts sometimes disagree on the annual cost, all sources agree that Hurricane Andrew was one of the costliest hurricane events ever to affect the U.S. Insured losses from Hurricane Andrew topped $17 billion, and most sources agree that the total cost of Hurricane Andrew exceeded $25 billion. Since Hurricane Andrew, several named storms have had similar devastating and costly effects on the United States including Wilma (2005) Katrina (2005), Ike (2008), Sandy (2012), Irma (2017), Maria (2017), Harvey (2017), and Sally (2020).

An average of 1.75 hurricanes strikes the U.S. every year. Florida is the most hurricane-prone state, and St. Lucie County has a history of major storms, which have impacted the area with severe property damage. The County's rapid growth, mainly during inactive hurricane period in the 1970s, 1980s, and 1990s, has resulted in increased potential for property damage and human suffering. Most of this new development occurred along the Atlantic shoreline as well as the Indian and St.

Lucie Rivers. The proximity of so many people living so close to the Atlantic Ocean, as well as the low coastal elevations, significantly increases the County's vulnerability. The barrier island towns of Port St. Lucie and Jupiter Island are vulnerable to storm surge and high wind damage, as are the communities fronting on the estuaries and rivers, while the inland area is more vulnerable to wind damage and freshwater flooding from rainfall.

Historically, Hurricanes Floyd and Irene impacted the County striking the area in September and October 1999, respectively. More recently, Hurricanes Frances and Jeanne (2004), both directly hit St. Lucie County. Hurricane Wilma (2005) crossed the southern half of Florida and exited the State just north of the County leaving considerable damage within the County. Tropical Storm Fay (2008) and Hurricanes Isaac and Sandy (2012) impacted the area with flooding and severe beach erosion.

Florida is noted as having the most people at risk and the most coastal property exposed to hurricanes. Between 1970 and 2010, Florida's population increased by 195.7%. Since 2019 the County population has increased in the inland areas of Port St. Lucie. Hurricane impacts occur through storm surge and high winds.

Storm Surge

Though hurricanes are well known for strong and destructive winds, hurricane storm surge is the greatest threat. Storm surge is water that is pushed toward the shore by winds swirling around the storm and is a large dome of water often 50 to 100 miles wide and rising anywhere from 4 to 5 feet in a Category 1 hurricane, and up to 20 feet during a Category 5 storm. Storm surge is a large dome of water often 50 to 100 miles wide and rising anywhere from 4 to 5 feet in a Category 1 hurricane, and up to 20 feet during a Category 5 storm. Storm surge is a wave that has outrun its generating source and become a long period swell and generally arrives ahead of the storm's actual landfall. The more intense the hurricane, the sooner the surge arrives ashore. Rising waters can be very rapid posing a serious threat to those who remain in flood prone areas.

Storm surge is always highest in the right-front quadrant of the direction the hurricane is moving in. As the storm approaches shore, the greatest storm surge will be to the north of the hurricane's eye. A surge of high water topped by waves driven by hurricane force winds can be devastating to coastal regions causing coastal erosion of natural and man-made buffers that include, sand, seagrasses, coastal forests, and seawalls. Storm tide is the combination of the storm surge and the normal astronomical tide. The stronger the hurricane and the shallower the offshore water, the higher the surge will be. In addition, if storm surge arrives during high or King tides, the water height will be even greater.

The effects of storm surge from hurricanes or tropical storms pose the greatest threats to St. Lucie County, are, especially along the shoreline of Hutchinson Island the barrier island that separates the Atlantic Ocean and the interior periphery of the Indian River Lagoon. The combination of high tides and wind can create coastal, riverine, and estuarine flooding as seawater is pushed into the Lagoon. The threat of saltwater inundation may also threaten water quality for marine life as it floods the estuarine lagoon system. As reported in the Treasure Coast Regional Evacuation Study 2010, potential storm tide heights for St. Lucie County range from up to 4.5' in a Category 1 storm to up to 16.5' in a Category 5 storm. The figure below is based upon the category of storm on the

Saffir-Simpson Hurricane Wind Scale and surge heights represent the maximum values from Sea, Lake and Overland Surges from Hurricanes (SLOSH) model data (2016, Treasure Coast Statewide Regional Evacuation Study). Similar values are set for adjacent county shorelines for Indian River and Martin County.

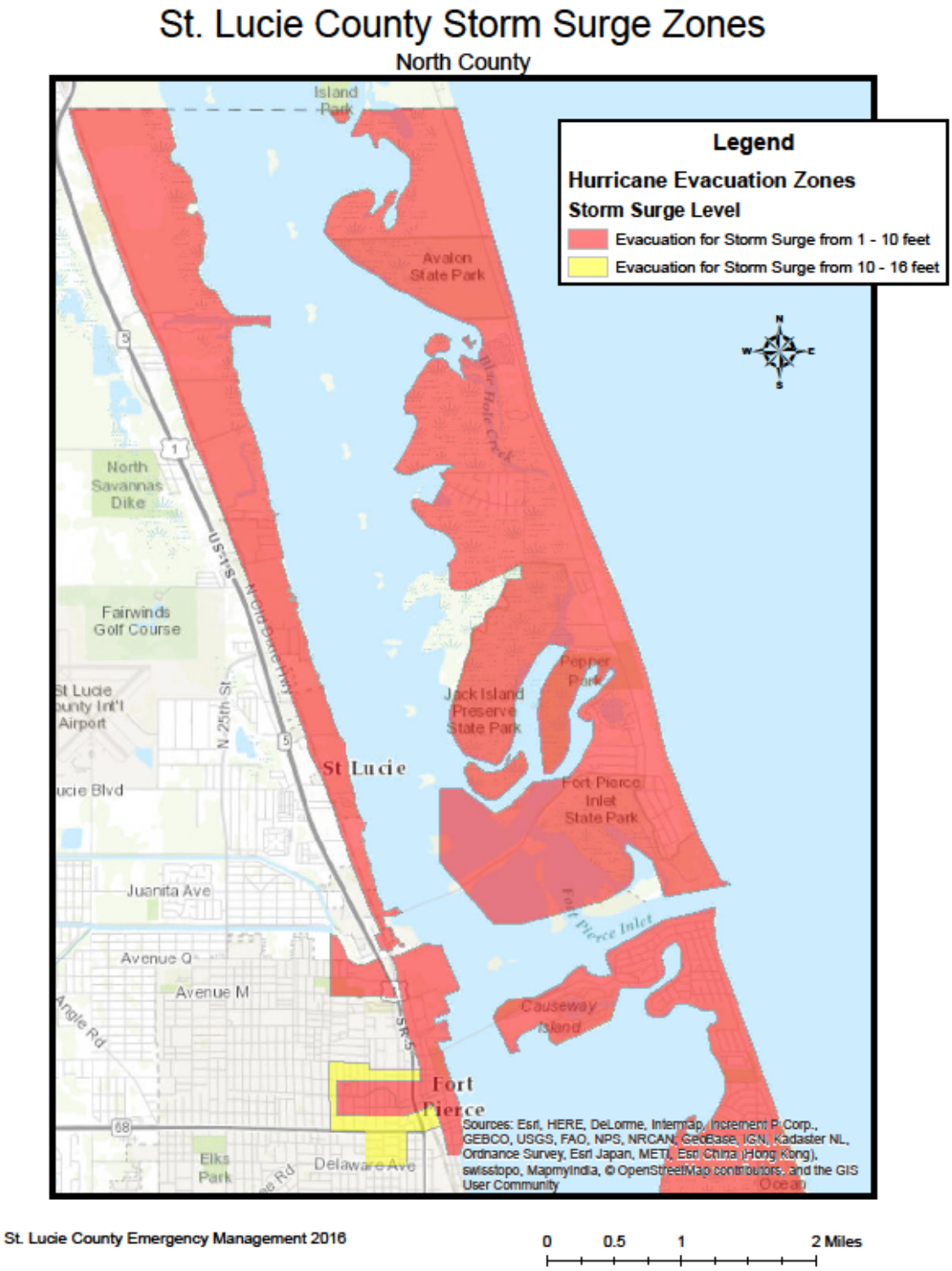
Figure 3.7 - Potential Tide Height(s) St. Lucie County

(In Feet above NAVD88)

*Storm Strength	St. Lucie
Category 1	Up to 6.8′
Category 2	Up to 12.2′
Category 3	Up to 16.7′
Category 4	Up to 21.2′
Category 5	Up to 27.7′

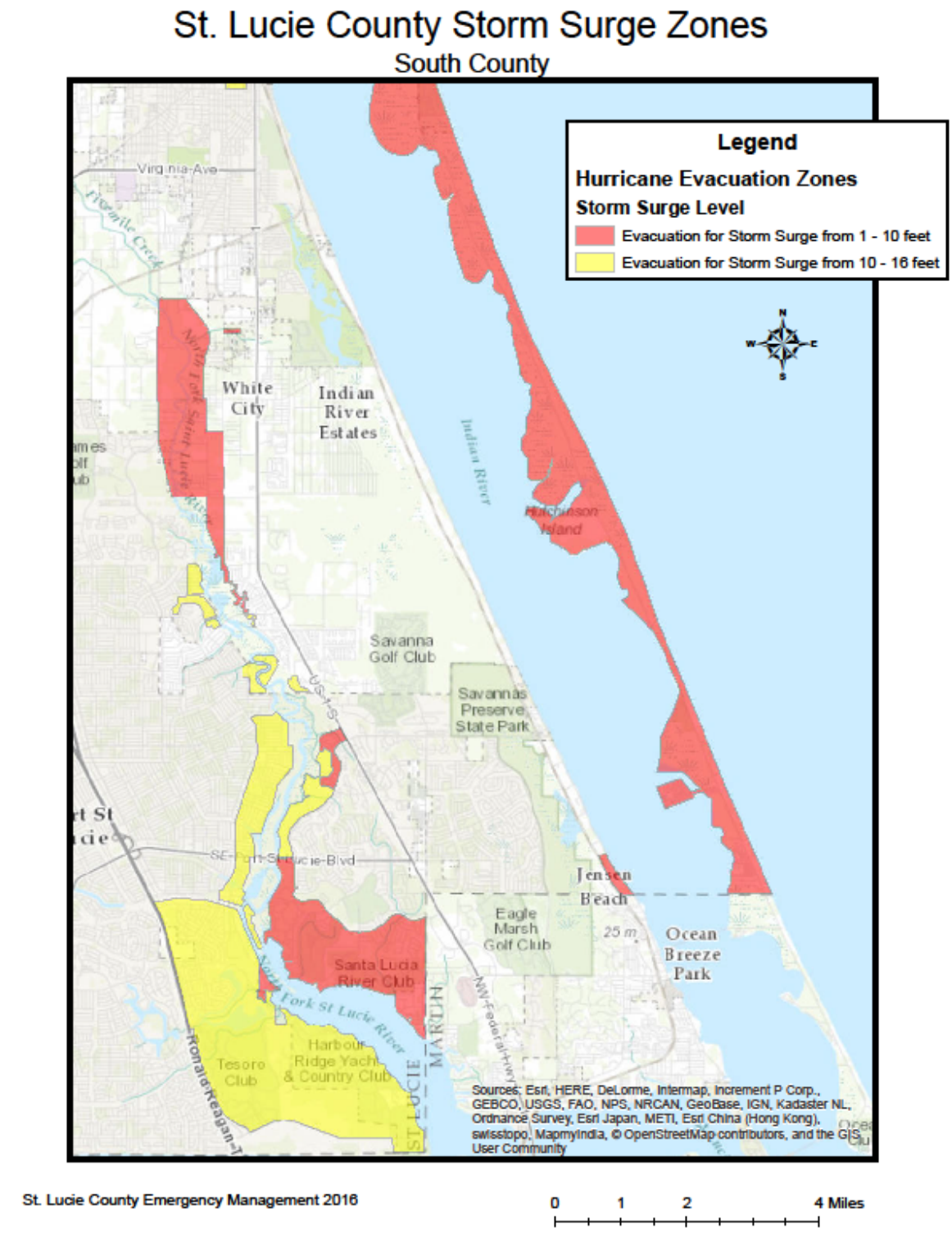
Left Blank Intentionally

Figure 3.8 - Storm Surge Maps for St. Lucie County



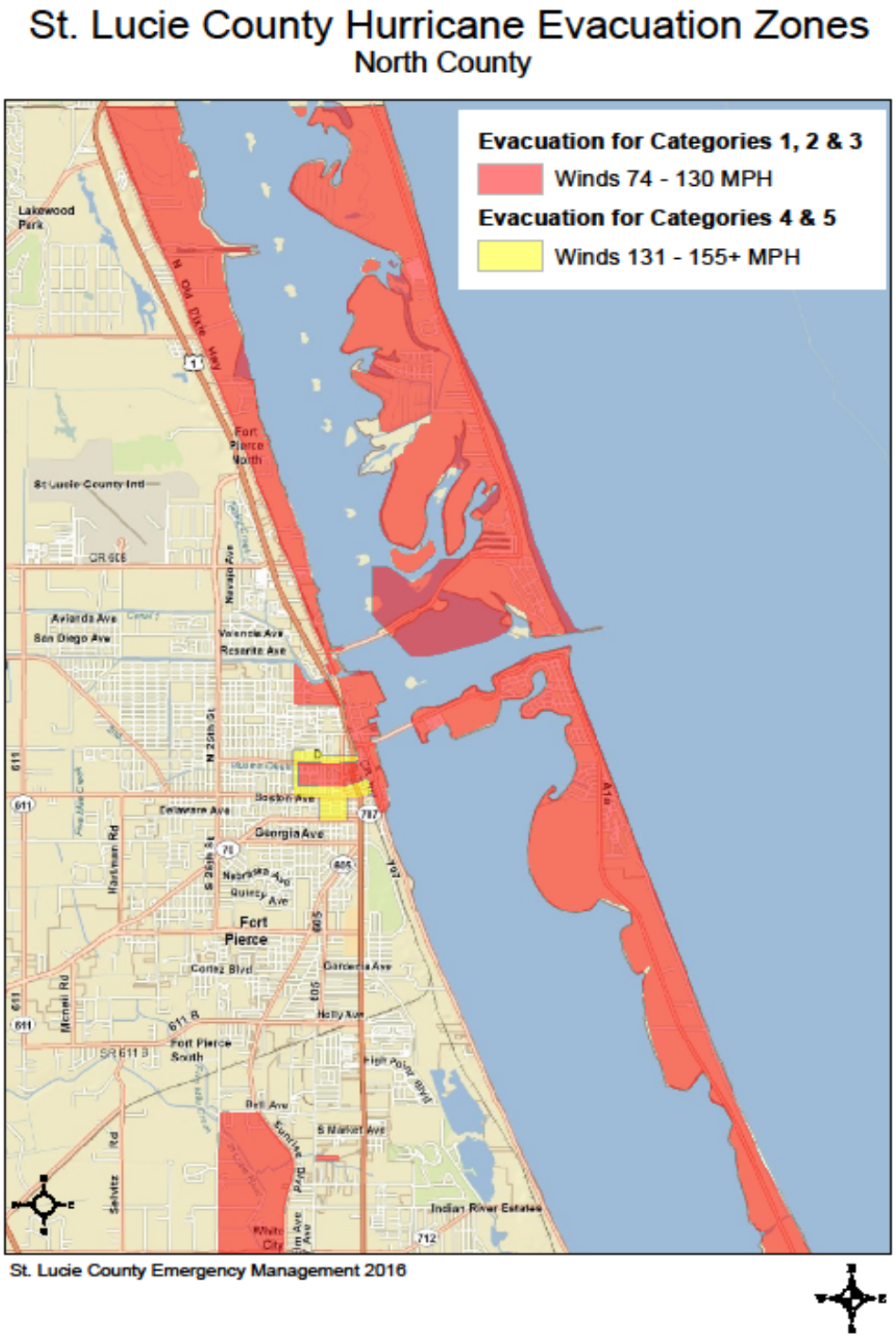
Source: St. Lucie County Division of Emergency Management

Figure 3.8 - Storm Surge Maps for St. Lucie County (continued)



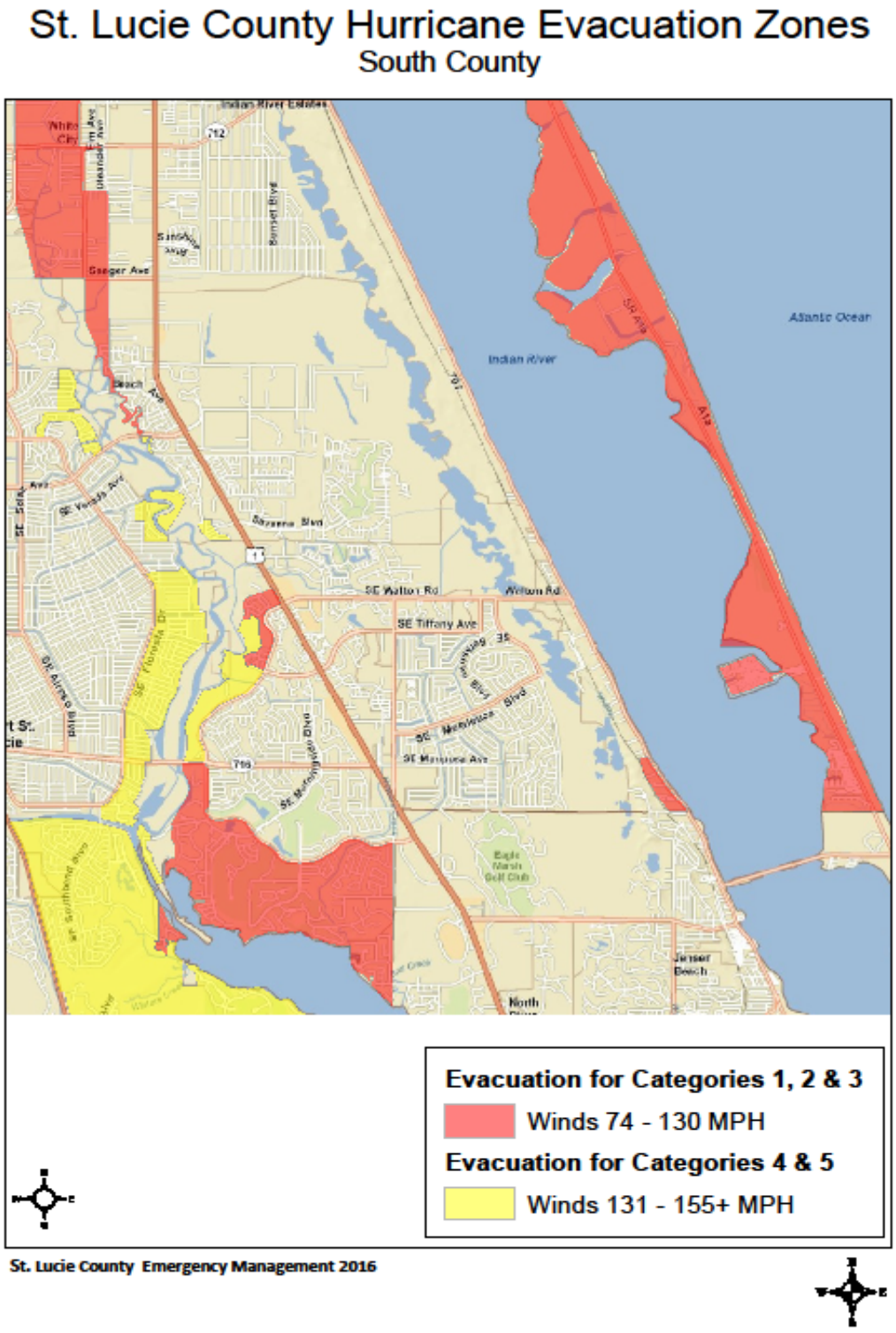
Source: St. Lucie County Division of Emergency Management

Figure 3.9 - Hurricane Evacuation Zone Maps for St. Lucie County



Source: St. Lucie County Division of Emergency Management

Figure 3.9 - Hurricane Evacuation Zone Maps for St. Lucie County, (continued)



Source: St. Lucie County Division of Emergency Management

[Refer to Appendix G for additional Tables and Figures.]

High Winds

Generally, it is the wind that produces most of the property damage associated with hurricanes, while the greatest threat to life is from flooding and storm surge. Although hurricane winds can exert tremendous pressure against a structure, a large percentage of hurricane damage is caused not from the wind itself, but from flying debris. Tree limbs, signs and signposts, roof tiles, metal siding, and other lose objects can become airborne missiles that penetrate the outer shells of buildings, destroying their structural integrity and allowing the hurricane winds to act against interior walls not designed to withstand such forces. Once a structure's integrity is breached, the driving rains associated with hurricanes can enter the structure and destroy its contents.

Hurricane winds are unique in several ways:

- They are more turbulent than winds in most other types of storms;
- They are sustained for a longer period of time (several hours) than any other type of atmospheric disturbance;
- They change slowly in direction, thus they are able to seek out the most critical angle of attack on a given structure; and
- They generate large quantities of flying debris as the built environment is progressively damaged, thus amplifying their destructive power.
- In hurricanes, gusts of wind can be expected to exceed the sustained wind velocity by 25% to 50%. This means a hurricane with sustained winds of 150 mph will have wind gusts exceeding 200 mph. The wind's pressure against a fixed structure increases with the square of the velocity. For example, a 100 mph wind will exert a pressure of approximately 40 pounds per square foot on a flat surface, while a 190 mph wind will exert a force of 122 pounds per square foot on that same structure. In terms of a 4 by 8foot sheet of plywood nailed over a window, there would be 1,280 pounds of pressure against this sheet in a 100 mph wind, and 3,904 pounds or 1.95 tons of pressure against this sheet in a 190 mph wind.

The external and internal pressures generated against a structure vary greatly with increases in elevation, shapes of buildings, openings in the structures, and the surrounding buildings and terrain. Buildings at ground level experience some reductions in wind forces simply because of the drag exerted by the ground against the lowest levels of the air column. High-rise buildings, particularly those located along the beachfront will receive the full strength of a hurricane's winds on their upper stories. Recent studies estimate that wind speed increases by approximately 37% just 15 feet above ground level.

Single-family residential construction is particularly vulnerable because less engineering oversight is applied to its design and construction. As opposed to hospitals and public buildings, which are considered "fully engineered," and office and industrial buildings, which are considered "marginally engineered," residential construction is considered "non-engineered." Historically, the bulk of wind damage experienced nationwide has occurred to residential construction. Fully engineered construction usually performs well in high winds due to the attention given to connections and load paths.

Hurricane winds generate massive quantities of debris that can easily exceed a community's entire solid waste capacity by three times or more. Debris removal is an integral first step toward recovery, and as

such, must be a critical concern of all those tasked with emergency management and the restoration of community services.

Table 3.9 - Debris Probability Based on a 10-Year Storm Event

Debris - 10 Year Event	Brick, Wood and Other	Reinforced. Concrete/ Steel	Eligible Tree Debris	Other Tree Debris	Total
St. Lucie	11,128	0	11,280	24,190	46,598
Total	11,128	0	11,280	24,190	46,598
Study Region Total	11,128	0	11,280	24,190	46,598

Source: Hazus Software (2016)

Other Impacts

Damage during hurricanes also may result from possible spawned tornadoes, and inland flooding associated with heavy rainfall that usually accompanies these storms. Hurricane Mitch which devastated Central America in 1998 and was later downgraded to Tropical Storm Mitch dropped as much as 10 inches of rain in some south Florida areas, which resulted in approximately $20 million in crop damage in Palm Beach County alone (Associated Press, 1998). According to the 2014 St. Lucie County CEMP, of St. Lucie County's 337,040 total land acreage, 195,155 are farmland. St. Lucie County is particularly vulnerable to crop damage resulting from the wind and rain from hurricanes and tropical storms.

3.1.2.2 Historic Events

From 1930 through 1959, a total of 58 hurricanes struck the U.S. mainland; 25 of which were Category 3 or higher (major storms). Between 1960 and 1989, 43 hurricanes struck the U.S., of which only 16 were Category 3 or stronger. Most hurricane experts feel we are entering a period of increased hurricane formation like the levels seen in the 1930's and 1940's. Current hurricane risk calculations are complicated by climatic factors suggesting the potential for even greater hurricane frequency and severity worldwide. Since 1995, there have been 110 Atlantic hurricanes, with 15 in 2005, 12 in 2010, and 10 in 2012 respectively. The Treasure Coast region, St. Lucie specifically was not impacted with any substantial impacts until 2017 when Hurricane Irma produced impacts of a statewide rainfall peak of 21.66 in recorded in the City of Fort Pierce (Weather Underground, 2021).

Global warming and climate change may augment storm frequency and precipitation rates associated with storms. The National Oceanic and Atmospheric Administration (NOAA) notes that a modest 0.9°F (0.5°C) increase in the mean global temperature will add 20 days to the annual hurricane season and increase the chances of a storm making landfall on the U.S. mainland by 33%. The warmer ocean surface also will allow storms to increase in intensity, survive in higher latitudes, developing storm tracts that

could shift farther north, producing more U.S. landfalls. Currently, an average of 1.75 hurricanes strikes the U.S. every year. Severe (Category 4 or 5 on the Saffir-Simpson scale) hurricanes strike the U.S. on the average of 3 every 5 years. Annually, hurricanes are estimated to cause approximately $1.2 billion in damages. The densely populated coastal areas on the Atlantic coastline and the Indian River Lagoon coupled with, generally low coastal elevations, increases vulnerability, introducing a strong case for mitigation and preparedness activities for populations, infrastructure, and environmental assets. The potential for property damage and human casualties in St. Lucie County has increased over the last several decades due to rapid growth since 1970, particularly in coastal and waterfront areas.

Since 1851, there have been 290 hurricanes that have struck the United States from Texas to Maine. Of those 39.3%, or 114, have made landfall in Florida. There have been 39 major hurricane strikes to Florida. This represents an average of one hurricane every year, and in 2004, St. Lucie County experienced two back-to-back landfalls within three weeks (NOAA, 2021).

Table 3.10 - Tropical Depressions, Tropical Storms, and Hurricanes for Past 5 Years

Year	Tropical Depressions	Tropical Storms	Hurricanes
2020	31	30	6
2019	20	18	6
2018	16	15	8
2017	18	17	10
2016	16	15	7

Source, National Hurricane Center, 2021

Table 3.11 - St. Lucie County Tropical Storm and Hurricane History

Date	Time	Name	Deaths or injuries	Estimated Property Damage $	Brief Description
10/15/1999	2000-1200	Irene	None	8,000,000	Minimal Hurricane Irene moved northeast from the Florida Keys across south Florida and emerged over the Atlantic near Ft. Pierce. In Martin and St. Lucie counties the greatest impact from the storm was flooding. From 5 to 9 inches of rain fell over the area flooding 300 homes. About 50 homes had major wind damage and thousands of trees were blown down.
9/4/2004	1949	Frances	None	4.8 Billion	The center of category 2 Hurricane Frances reached the Florida east coast near Port St. Lucie in Martin County early on September 5th. Frances was moving to the west northwest at 7 mph and maintained hurricane strength as it crossed the east half of the Florida Peninsula. Frances was downgraded to a tropical storm in the afternoon on the 5th when it was about 50 miles east of Tampa Bay. In Martin, St. Lucie and Indian River counties, the slow-moving storm produced wind gusts to hurricane strength for about 19 hours, producing an estimated 4.5 billion dollars in damage. Wind gusts well over 100 mph destroyed coastal structures, marinas, and vessels. Farther inland, hundreds of homes, mobile homes, and businesses were destroyed, and thousands were damaged. Highest recorded winds for St. Lucie County were 91 knots (105 mph) at St. Lucie Inlet.
9/25/2004	1400-0500	Jeanne	None	1.2 Billion	The center of category 3 Hurricane Jeanne reached the Florida east coast near Port St. Lucie in St. Lucie County shortly after midnight on September 26th, this is in the same location where Hurricane Frances came ashore on September 5th. Jeanne was moving to the west northwest at 12 mph and maintained hurricane strength as it crossed most of the Florida Peninsula. Jeanne was downgraded to a tropical storm in the afternoon of September 26th when it was about 40 miles northeast of Tampa Bay. The eye of Hurricane Jeanne passed over the community of Sewell' Point in Martin County. Over 180 residences were destroyed with about 4000 residences either damaged or destroyed. The highest wind speed recorded was 91 kts (105 mph) in Jensen Beach. No pressure data was recorded for St. Lucie County. Severe beach erosion occurred compounding the damage from Hurricane Frances just 3 weeks earlier.

Source: National Weather Service 2020

Table 3.11 - St. Lucie County Tropical Storm and Hurricane History (continued)

Date	Time	Name	Deaths or injuries	Estimated Property Damage $	Brief Description
10/14/2005	0500-1500	Wilma	None	8,000,000	Hurricane Wilma crossed the southern Florida Peninsula from the southwest exiting the state and moving over the Atlantic Ocean over the Martin/Palm Beach county line. The northern half of the eyewall of Hurricane Wilma moved over coastal St. Lucie County as Wilma moved offshore. The strongest winds in St. Lucie County occurred as the winds backed to the north with the large eye of Wilma over the coast of St. Lucie County. Estimated wind gust over 100 mph occurred along the beaches. Wilma produced widespread wind damage across the county. Forty-eight residences were destroyed and 120 suffered major damage. Most of these were mobile homes. More than 90 percent of St. Lucie County was without electricity. The county's main hospital, Martin Memorial, sustained enough damage to stop taking new patients. As much as 3 to 5 inches of rain fell across the county. Total crop loss including vegetables, citrus, and sugar equals $48 million. The highest reported wind gust was 108 mph (94 knots) at the St. Lucie County EOC at Hobe Sound. Lowest recorded surface pressure was 992.0 millibars from a vessel in the St. Lucie River. Actual surface pressure was likely lower.
8/19/2008	1200-2200	Fay	None	70,000,000	On the morning of August 19th, Tropical Storm Fay came onshore in southwest Florida, moving north-northeast toward Lake Okeechobee. Fay was well formed and intensified over land, exhibiting a classical tropical cyclone eye as it reached peak intensity over the western shore of Lake Okeechobee. Wind gusts of 58 mph were reported in the town of Okeechobee. By the early morning of August 20th, Tropical Storm Fay had moved to southern Brevard County, producing widespread wind gusts over 50 mph. Patrick AFB reported a gust to 62 mph. Fay produced torrential rain along the Space and Treasure coasts on the 20th as the circulation center moved up the Brevard County coast and into the near shore Atlantic waters near Edgewater. Rainfall amounts on the 20th were near 8 to 9 inches in St. Lucie County. In St. Lucie County, rainfall amounts of 10 to 15 inches fell over most of the coastal region, flooding over 55 homes. Damage estimates were over $70 million. Wind gusts in the western part of the county near Lake Okeechobee were estimated to be near 50 mph.
8/27/2012	0500-1700	Isaac	None	1,106,891	Persistent heavy rain bands from Tropical Storm Isaac produced widespread flooding across the county. Rainfall totals from the morning of August 26 through late on August 27 averaged 5 to 10 inches, with isolated totals of 12 to 14 inches. Peak wind gusts reached 35-45 mph along the coast and shore of Lake Okeechobee.
10/26/2012	0000-1600	Sandy	None	3,188,227	Hurricane Sandy moved slowly northwest, parallel to the Florida coast, 200-250 miles offshore. Due to the very expansive wind fields associated with the hurricane, sustained tropical storm winds reached the east-central Florida beaches and adjacent portions of the barrier islands. Large and pounding surf affected the beaches for six or more high tide cycles, during a period of high astronomical tides. Significant beach erosion occurred in south end of South Hutchison Island. Sections of South Highway A1A flooded, and a small section washed out. Damage estimates for the east-central Florida beaches totaled $46 million dollars. St. Lucie County sustained $3,188,277 in damages, $1,095,677 to mosquito impoundments and $2,122,600 to beaches on South Hutchison Island.

Date	Time	Name	Deaths or injuries	Estimated Property Damage $	Brief Description
10/03/2016	0800-1700	Matthew	None	3,973,954.19	Hurricane Matthew was a powerful, long-lived and deadly tropical cyclone which became the first Category 5 Atlantic hurricane since 2007. Preparations began in Florida on October 3 as Matthew approached, with the State Emergency Operations Center (State EOC/SEOC) activating and Governor Scott issuing an Executive Order (EO 16-230) declaring a state of emergency for the entire state. Hurricane Matthew paralleled the Florida coast of the southeastern United States over the next 36 hours, gradually weakening while remaining just offshore before making its fourth and final landfall in South Carolina as a Category 1 hurricane on the morning of October 8. In Florida, over 1 million lost power as the storm passed to the east. Sustained tropical storm force winds were observed in St. Lucie County.
9/05/2017	0800-1800	Irma	None	13,741,421.33	St. Lucie County, Florida declared a local State of Emergency on September 7, 2017, due to the National Weather Service's forecast that Hurricane Irma would make landfall in South Florida and that its path northward would create severe impacts to its residents in the form of storm surge, high winds, large rain amounts, flooding, tornadic activity, and flying debris. Hurricane Irma impacts within St. Lucie County post-landfall included the following: Over 115,000 properties without power. Heavy flooding near the tributaries of the Five Mile and Ten Mile creeks that caused extensive damage to numerous residential, commercial and governmental properties. Displacement of local populace (50+) that required short-term sheltering at the Percy Peek auditorium. Flooding hazards along numerous roadways that required upstream staging. Closure of the school district due to heavy flooding at its administrative offices and other areas around some schools (9/8-16/17).
8/26/2019	0800-1200	Dorian	None	1,996,050.00	Hurricane and storm surge warnings went into effect on September 1, 2019, due to the following meteorological expectations from storm data impacting the County: hurricane force winds are expected as close as 15 miles off of the Florida coast, with the potential for a storm surge of six (6) feet. Hurricane Dorian impacts within St. Lucie County post-landfall included the following: Erosion of Beaches. Damage to Mosquito Impoundments. Minor Localized Road damage. Displacement of local populace that required short-term sheltering at the Havert L. Fenn Center, Westwood Shelter, Fort Pierce Central High School, Treasure Coast High School, and Lakewood Park Elementary.
8/01/2020	0800-08004	Isaias	None	N/A	Isaias' path was difficult to accurately monitor as its sporadic spurts between land and water challenged its ability to significantly strengthen and intensify. Despite its adverse encounters, Isaias was able to develop from a potential tropical cyclone into a category 1 hurricane with its path forecasted to travel through the Caribbean and hit Florida. On August 1, 2020, Isaias inched up the coast of Florida just 5 – 10 miles off the shore of St Lucie County bringing heavy rains and powerful winds. Ultimately for St. Lucie County, Isaias brought peak winds of 45 – 55 mph, 2 – 3 inches in precipitation, and a storm surge of 1 – 2 feet which caused significant beach erosion.

Source: National Weather Service 2020

3.1.2.3 Vulnerability Assessment

St. Lucie County is vulnerable to or may be impacted by Tropical Depressions, Storms, and hurricanes

up to Category 5 strength. Potentially, hurricane events may impact communities in several ways, the list below is not mutually exclusive. Many impacts involve several combined effects on homes, infrastructure, and the environment:

- Excessive wind;
- Excessive water;
- Soil/beach erosion;
- Electric power outage;
- Surface and air transportation disruption;
- Navigable waterway impairment;
- Potable water system loss or disruption;
- Sewer system outage;
- Telecommunications system outage;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Agricultural/fisheries damage;
- Damage to critical environmental resources;
- Damage to identified historical resources;
- Fire;
- Toxic releases; and
- Storm water drainage impairment.

Recent hurricane impacts to the County were Floyd and Irene, which struck Florida in September and October 1999, respectively. More recently, Hurricanes Frances and Jeanne (2004), both directly hit St. Lucie County. Hurricane Wilma (2005) crossed the southern half of Florida and exited the state just north of the County. Hurricane Ernesto threatened the area in 2006 but was not a direct hit. Tropical Storm Fay (2008) and Hurricanes Isaac and Sandy in 2012 impacted the area with flooding and severe beach erosion. Hurricane Matthew (2016) brought powerful winds to St. Lucie County, while Hurricane Irma (2017) produced significant flooding in St. Lucie County. Lastly, Hurricane Dorian (2019) brought beach erosion to the County.

3.1.2.4 Probability Assessment – MEDIUM

St. Lucie County's exposure to hurricanes is high, while the County's hazard history indicates that the probability of future occurrence is medium depending based off of historical data.

3.1.2.4 Risk Assessment - HIGH

All communities within St. Lucie County are highly vulnerable to hurricanes, but they are not all vulnerable for the same reasons. The barrier islands, North and South Hutchinson, City of Fort Pierce, St. Lucie Village, and areas along the intercoastal waterway and St. Lucie River are highly vulnerable to both wind and storm surge damage from hurricanes. Inland communities may have less hurricane vulnerability from flooding but have hurricane vulnerability from wind damage due to their older or less substantial type of construction.

Other than flooding, impacts from tropical storms and hurricanes is the greatest consideration in

mitigation efforts countywide. Public facilities and infrastructure are being hardened or built to updated code to withstand greater winds. Though building/shelter destruction may be avoided, power loss or interruption can be demoralizing and impede quick recovery. The need and expectation for backup power (generators) is a priority for St. Lucie County shelters, hospitals, and other essential services and should be considered for public critical facilities.

3.1.3 Tornados

3.1.3.1 Hazard Identification

Tornados are characterized as violent windstorms with twisting, funnel-shaped clouds forming from sky to ground, spinning at high speed and destroying anything in their paths. A tornado's wind speed normally ranges from 40 to more than 300 mph. Waterspouts are weak tornadoes that form over warm water and are most common along the Gulf Coast and the southeastern states. Waterspouts occasionally move inland and become tornadoes causing damage and injury.

The most common type of tornado, the relatively weak and short- lived type, occurs in the warm season with June being the peak month. They most commonly precede the storm on the leading edge. The strongest, most deadly tornadoes occur in the cool season, from December through April. Occasional windstorms are accompanied by tornadoes and are also widespread and destructive. Damages from tornados are a result of the high wind velocity and wind-blown debris.

When a tornado threatens, only a short amount of time is available to make life or death decisions. The National Weather Service (NWS) issues two types of alerts:

- A Tornado Watch means that conditions are favorable for tornadoes to develop; and
- A Tornado Warning means that a tornado has been sighted or the Weather Field Office has detected rotation on the radar.

Table 3.12 - Enhanced Fujita Tornado Intensity Scale

EF-Scale:	Typical Damage:
EF-0 65-85mph	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF-1 86-110mph	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF-2 111-135mph	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF-3 136-165 mph	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF-4 166-200 mph	Devastating damage. Whole frame houses Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF-5 >200 mph	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd.); high-rise buildings have significant structural deformation; incredible phenomena will occur.
EF No rating	Inconceivable damage. Should a tornado with the maximum wind speed in excess of EF-5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. will create serious secondary damage on structures.

Source: National Weather Service 2021

3.1.3.2 Historic Events

Florida ranks third in the United States in the number of tornado strikes, and the first in the number of tornadoes per square mile. During the period 1950-1994, 82 Floridians were killed; 1998 was the deadliest with 42 deaths in 4 counties; and the 2007 Central Florida tornadoes left 21 dead. In 2012, the state of Florida had 48 tornados touch-down. The National Climatic Data Center (NCDC) indicates that there has been a total of 107 touchdowns in St. Lucie County since 1950 including funnel clouds and waterspouts. St. Lucie County has had four confirmed tornado touchdowns since 2011, the one in 2015. There has been one confirmed tornado as of the 2021 update; the tornado occurred in 2017.

Most of the events have been EFO and EF1; however, two EF2 and two EF3 tornados have impacted the County. NCDC data also indicate that there have been 27 tornado-related injuries, 2 fatalities and $4,378,560 in property damage associated with tornado events in the County.

Table 3.13 - Recent History of Tornados in St. Lucie County

Date	Time	Location	Deaths or Injuries	Property Damage Estimate $	Fujita Scale	Brief Description
8/02/2001	10:30	Western St. Lucie County	None	10,000	EF0	An EF0 tornado touched down briefly in a rural area west of Ft. Pierce. The tornado damaged a mobile home, overturned a farm tractor and blew down about 25 citrus trees.
5/14/2002	1600	Western St. Lucie County	None	10,000	EF0	A small F0 tornado touched down briefly in a truck repair facility, damaging the roof of one structure and destroying large awnings attached to the truck garage.
7/27/2002	1500	Fort Pierce	None	100,000	EF1	An F1 tornado touched down in Ft. Pierce and remained nearly stationary for about one minute. It destroyed the service bay roof of a car dealership, and damaged 70 cars.
8/4/2004	1525	Fort Pierce	None	Unknown	EF0	An F0 tornado touched down near Interstate 95 northwest of Ft. Pierce ripping the porch off a house. Funnel clouds were reported with this storm.
5/25/2005	1415	Port St. Lucie	None	Unknown	EFO	A tornado touched down in a residential area near Port St. Lucie, damaging shingles, pool screens and awnings.
7/23/2007	1730	Port St. Lucie	None	Unknown	EF0	Brief touchdown near Florida Turnpike knocking trees down with no structural damage
8/19/2008	1135	White City	None	Unknown	EF0	Rain bands moving on shore from Tropical Storm Fay produced a brief EF0 tornado in Ft. Pierce. The tornado slightly damaged the roof and interior ceiling of a warehouse.
4/26/2011	1805	Western St. Lucie County	None	None	EF0	A citizen in Port St. Lucie observed a funnel cloud which briefly touched down as a landspout tornado in a rural agricultural area west of the city. Several other reports were received of a funnel cloud, including two pilot reports. No damage occurred. Photos and video were obtained of the event

Source: National Climatic Data Center

Table 3.13 – Recent History of Tornadoes in St. Lucie County, (continued)

Date	Time	Location	Deaths or Injuries	Property Damage Estimate	Fujita Scale	Brief Description
5/8/2012	1408	White City	None	None	EF0	A thunderstorm intensified along the east coast sea breeze and produced a weak brief EF0 tornado (land spout) in a produce field off Glades Cut Off Road west of Port St. Lucie. The tornado quickly crossed the road before lifting.
5/28/2012	1358	Port St. Lucie	None	Unknown	EF0	A line of thunderstorms formed along the sea breeze boundary within the far outer circulation of Tropical Storm Beryl. One of the storms produced a brief tornado in Lyngate Park and near the St. Lucie Medical Center near Port St. Lucie. Estimated sustained winds were around 65 mph, consistent with low-end EF0 damage. Minor damage was sustained to the roofs of two homes, several fences were knocked over, and a few small trees were downed.
7/17/2012	1422	Lakewood Park	None	Unknown	EF0	The very brief EF0 tornado impacted one condominium building within the Indian Pines Village. The tornado stripped several sections of plywood from one roof of a condo and another unit sustained a small hole in the roof and the front entrance awning was peeled back.
8/15/2015	1256	Indrio	None	None	EF0	A motorist near the intersection of Highway US-1 and Indrio Road in Fort Pierce observed a brief touchdown of a weak land spout/tornado that crossed US-1. No damage was reported, and an examination of video relayed via social media suggests maximum winds were below 50 mph.
3/23/2017	1240	Ft Pierce Nelson ARP	None	2000	EF1	Florida Power and Light reported a power pole snapped in a rural area of St. Lucie County between Interstate 95 and the Florida Turnpike. The damage occurred as a severe thunderstorm traveled southwest from the Vero Beach area and acquired strong low-level rotation, resulting in a brief tornado touchdown. Photos of the damage suggest EF-1 damage (90-100 mph).

Source: National Climatic Data Center

3.1.3.3 Vulnerability Assessment

Tornado events can have the following potential impacts within a community:

- Excessive wind;
- Electric power outage;
- Surface and air transportation disruption;
- Telecommunications system outage;
- Human health and safety;
- Psychological hardship; and
- Economic disruption.

Tornadoes and severe thunderstorms can occur anywhere in the County. As the number of structures and the population increases, the probability that a tornado will cause property damage or human casualties also increases. When compared with other states, Florida ranks third in the average number of tornado events per year. These rankings are based upon data collected for all states and territories for tornado events between the years 1991 and 2010 (State of Florida Enhanced Hazard Mitigation Plan).

St. Lucie County's vulnerability to tornadoes is compounded by the high concentration of mobile home residents in large mobile home communities in both incorporated areas, and unincorporated County. There are 8,921 mobile home spaces and 1,184 RV spaces throughout the County (St. Lucie County Planning & Development Services, 2021*)*. Mobile homes are an affordable form of housing in St. Lucie County, and they are distributed throughout the County, in rural as well as urban areas. Although the number of mobile homes within the County has been reduced over the last 5 years, they remain the most vulnerable to tornadic activity.

The majority of Florida tornadoes are weak. There has never been an EF5 tornado documented in Florida – and only 4 EF4 tornados (National Weather Service Melbourne, Florida).

Historically, St. Lucie County has mainly had occurrences of a magnitude of an EF-0 or EF-1 tornado and the impacts have been widespread throughout the county.

> Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
>
> Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.

3.1.3.4 Probability Assessment - LOW

Because tornado hazards are not linked to geography or geology, it is difficult to determine the probability of future occurrence. However, based on historical data for the State of Florida and St. Lucie County, St. Lucie County could expect an EF-0 or EF-1 magnitude tornado, however stronger magnitude tornados cannot be ruled out. Overall, the probability of a tornado striking any specific point in southeastern Florida is 0.04, or once per 250 years, therefore the chances for a future occurrence is low.

3.1.3.5 Risk Assessment - LOW

Historical data indicate the overall hazard ranking of St. Lucie County to tornadoes is low, (State of Florida Enhanced Hazard Mitigation Plan) but some specific communities have a moderate to high vulnerability to this hazard due to the type of construction or numbers of mobile homes (manufactured

housing units) within their boundaries.

3.1.4 Severe Thunderstorms/Lightning

3.1.4.1 Hazard Identification

The National Weather Service (NWS) defines a severe thunderstorm as a thunderstorm containing one or more of the following phenomena: hail U.S. quarter size or greater, winds gusting in excess of 58 mph, and/or a tornado. Severe weather can include lightning, tornadoes, damaging straight-line winds, and large hail. Most individual thunderstorms only last several minutes; however, some can last several hours. Long-lived thunderstorms are called super cell thunderstorms. A super cell is a thunderstorm that has a persistent rotating updraft. This rotation maintains the energy release of the thunderstorm over a much longer time than typical, pulse-type thunderstorms, which occur in the summer months. Super cell thunderstorms are responsible for producing the majority of severe weather, such as large hail and tornadoes.

Downbursts also are occasionally associated with severe thunderstorms. A downburst is a strong downdraft resulting in an outward burst of damaging winds on or near the ground. Downburst winds can produce damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder. Strong squall lines also can produce widespread severe weather, primarily very strong winds and/or microbursts. A squall is a sudden violent gust of wind often with rain or snow.

When a severe thunderstorm approaches, the NWS will issue one of the two advisories below:

- Severe Thunderstorm Watch: Conditions are favorable for the development of severe thunderstorms.
- Severe Thunderstorm Warning: Severe weather is imminent or occurring in the area.

Hail: Hail is a showery precipitation in the form of irregular pellets or balls of ice more than 5mm in diameter, falling from a cumulonimbus cloud. Hailstones are formed when updrafts carry raindrops up into the highest parts of the cloud and the super-cooled liquid droplets collide. Hail drops back down into the warmer part of the cloud and carried back up, until the internal up and downdrafts can no longer support the size of the hailstone, then it falls to the ground.

The potential damage and hailstorm intensity is described H0 to H10 according to the TORRO Hailstorm Intensity Scale. St. Lucie County could reasonably expect hail up to a size code 5 during a severe thunderstorm, as has occurred.

Table 3.14 - Combined NOAA/TORRO Hailstorm Intensity Scale

Size Code	Intensity Category	Typical Hail Diameter (inches)	Approximate Size	Typical Damage Impacts
H0	Hard Hail	up to 0.33	Pea	No damage
H1	Potentially Damaging	0.33-0.60	Marble or Mothball	Slight damage to plants, crops
H2	Potentially Damaging	0.60-0.80	Dime or grape	Significant damage to fruit, crops, vegetation
H3	Severe	0.80-1.20	Nickel to Quarter	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	1.2-1.6	Half Dollar to Ping Pong Ball	Widespread glass damage, vehicle bodywork damage
H5	Destructive	1.6-2.0	Silver dollar to Golf Ball	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	2.0-2.4	Lime or Egg	Aircraft bodywork dented, brick walls pitted
H7	Very destructive	2.4-3.0	Tennis ball	Severe roof damage, risk of serious injuries
H8	Very destructive	3.0-3.5	Baseball to Orange	Severe damage to aircraft bodywork
H9	Super Hailstorms	3.5-4.0	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	4+	Softball and up	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: National Weather Service

Wind: Damaging winds are more likely to be associated with thunderstorms than tornadoes. In fact, many confuse damage produced by "straight-line" winds and often erroneously attribute it to tornadoes. This occurred in St. Lucie County in March 2015 in the White City area. Several mobile homes were damaged. St. Lucie County could expect to receive up to Force 11 winds during a severe thunderstorm.

Table 3.15 - Beaufort Wind Scale

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects	
			On the Water	On Land
0	Less than 1	Calm	Sea surface smooth and mirror like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted; small tree branches move
5	17-21	Fresh Breeze	Moderate waves 4-8 ft. taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger waves 8-13 ft., whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Sea heaps up, waves 13-20 ft., white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Moderately high (13-20 ft.) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Whole trees in motion, resistance felt walking against wind
9	41-47	Strong Gale	High waves (20 ft.), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Very high waves (20-3o ft.) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, “considerable structural damage”
11*	56-63	Violent Storm	Exceptionally high (30-45 ft.) waves, foam patches cover sea, visibility more reduced	
12	64+	Hurricane	Air filled with foam, waves over 45 ft., sea completely white with driving spray, visibility greatly reduced	

Source: National Weather Service

Lightning: Florida is the lightning capital of the country, mainly due to our geography. The very elements that make our state a great place for outdoor activities, warm temperatures, and plenty of water also make the environment primed to produce thunderstorms, which generate lightning.

Lightning is the most lethal component of thunderstorms. As a thunderstorm grows, electrical charges build up within the cloud, and oppositely charged particles gather at the ground below. The attraction between positive and negative charges quickly grows strong enough to overcome the air's resistance to electrical flow. The opposite charges connect and complete the electrical circuit. Charge then surges upward from the ground at nearly one-third the speed of light and produces a bright flash of light (Cappella, 1997).

While the conditions needed to produce lightning are understood, how lightning forms has never been verified. Forecasters may never be able to forecast when and where a lightning strike will take place, however, consistent historical and current technology is fairly certain that lightening accompanies thunderstorms, before, during, and after.

3.1.4.2 Historic Events

In 1997, thunderstorms spawned 103 tornadoes, injured 121 people, and produced over 38 million dollars in property damage statewide. St. Lucie County averages more than 70 days with thunderstorms per year, with the most frequent occurrences being between the months of July and September.

According to the National Climatic Data Center (NCDC), there have been 40 thunderstorm wind incidents in the County since 1975. These incidents caused a total of $288,000 in property damage.

On average, lightning kills more people than any other weather event. Florida leads in the nation in lightning-related deaths and injuries. Most lightning strike fatalities occur in June, July, and August. Between 1990 and 2003, there were 126 lightning-related deaths in Florida (National Lightning Safety Institute, 2015). Florida also has the most strikes, about 12 strikes per square kilometer per year in some places (National Lightning Safety Institute, 2015). Lightning occurs with every thunderstorm and, on average, Florida sees around 70-100 days a year with at least one thunderstorm in the state. Florida averages about 10 deaths and 40 injuries directly due to lightning each year.

Between 1950 and 2016, St. Lucie County recorded 8 lightning-related deaths and 13 injuries (National Climatic Data Center, NWS Melbourne). 35% of brush fires in St. Lucie County from 2011 to 2015 were caused by lightning strikes resulting in nearly 1,000 acres being burned.

Between 2017 and 2020, there were six reported cases of hail, three major thunderstorm events that produced strong winds, and one severe thunderstorm that heavily involved lightning.

3.1.4.3 Vulnerability Assessment

Thunderstorm events can have the following potential impacts within a community:

- Excessive wind;
- Excessive water;
- Damaging hail;
- Electric power outage;
- Surface and air transportation disruption;
- Telecommunications system outage;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Fire; and
- Storm water drainage impairment.

Vulnerability to severe thunderstorms and lightning is high countywide in St. Lucie County. Community protective measures include, but are not limited to, construction practices and lightning sirens at public gathering locations.

Lightning strikes can cause intense localized damage, as well as loss of life. In contrast to other hazards such as tornadoes and floods; an estimated 5% of all homeowners' insurance claims are related to lightning damage. Farmers face these same threats plus the threat to livestock. In stormy weather, livestock frequently gather under trees to seek shelter or are trapped in barns where a lightning strike can destroy an entire herd, therefore making the western portion of the County that is inherently agricultural even more vulnerable than other regions to severe thunderstorm/lightning.

3.1.4.4 Probability Assessment - HIGH

The probability of future thunderstorms with winds, hail, and lightning occurrence based on hazard history is high. According to the Florida Climate Center, Florida has 100 days of thunderstorms annually.

3.1.4.5 - Risk Assessment - HIGH

The National Lightning Detection Network's Vaisala map indicated that St. Lucie County lightning strike density is greater in the western two thirds (20-28 per square mile or between 4571 & 7619 strikes per year) of the county than the eastern one third (12-20 per square mile, between 3810 & 5134 strikes per year). This would indicate that the County, with 572 square miles over all could average 8,008 lightning strikes per year, if the 70-100 days a year of severe thunderstorms in the State impact St. Lucie County.

Since 1953, there have been 41 thunderstorm high wind events and 39 hail events totaling approximately $308,500 in damages. That amount may be conservative due to inconsistent damage reporting.

Working communities have a higher vulnerability to economic impacts by lightning than residential or retirement communities, all other factors being equal, while residential and retirement communities have a historically higher vulnerability in terms of lightning damages.

The County can expect losses similar to what it experienced in the past. The most vulnerable areas for citizens in the County are open areas such as the beaches and shoreline, golf courses, open fields, and parks. Risk of multiple injuries or deaths are more prevalent where large populations congregate in these open spaces.

3.1.5 Wildfires

3.1.5.1 Hazard Identification

Wildfire is defined as an undesirable fire occurring in the natural environment. Each year, thousands of acres and many homes are destroyed by fires that can erupt at any time of the year from a variety of causes, including arson, lightning, and debris burning. However, much of Florida's habitat is dependent upon wildfires to support the ecosystem. Many Florida habitats only exist due to the presence of wildfires. Some habitats are caused by frequent fires, while other habitats need only a few large fires over a period of years. Florida's wildfire season occurs from mid-April through July. Most of these fires are set by lightning. Lightning initiated fires were frequent until suppression measures were

implemented.

Several factors influence wildfire frequency and severity, including local weather and climate conditions (e.g., prevalence of storms, lightning, hot temperatures, and drought); forest health characteristics (e.g., brush conditions, tree mortality and density, changes in storms, drought, disease, or pests); human activities (e.g., camping, debris burning, and construction); and existing wildfire prevention measures and forest management practices.

Wildfires are expected to increase in size, frequency, and severity as a result of climate change, especially at the wildland-urban interface. Wildfires can increase risk to people, buildings, property, and infrastructure. They can impact physical and mental health, safety, and security of individuals, and result in electricity outages, water utility disruption, and transportation issues. Wildfires can have cascading effects on communities, such as exacerbating flooding and creating erosion risks, threatening drinking water sources, and altering a community's aesthetics.

The U.S. Census reports Florida's population has nearly tripled in the last century. Local, regional, and state government work to balance these development pressures through the acquisition, conservation, restoration and/or management of preserves and the ecological services provided by natural resource systems.

Virtually all of Florida's habitats need periodic fire to maintain ecosystem health. In natural settings, lightning-induced fire moves through the understory of a forest relatively quickly, avoiding the height and intensity that would kill trees or endanger wildlife. This natural process maintains habitats, returns nutrients to the soil, and creates conditions for rapid growth and renewal.

With urban development, this natural cycle is interrupted to protect human life and property. Today's land managers use a variety of strategies to mimic the natural cycle and maintain healthy natural spaces for the health, safety, and welfare of our community.

Large preserves and forested areas owned by federal, state, and local government implement management plans that include fuel reduction strategies, such as prescribed fire and mechanical removal of underbrush. Reducing the fuel load within a preserve is the first line of defense in avoiding catastrophic fires that endanger not only human life and property. This work becomes more challenging in or near urban areas due to ensuring the proper weather and wind conditions and ensuring fire breaks that delineate extent of the prescribed fire.

St. Lucie County has wildfires throughout the year. The most active part the year is typically December through the beginning of June. Generally, St. Lucie County experiences the greatest number of wildfires during April, May, and June. On average, St. Lucie County has 28 wildfires a year depending on weather conditions. Refer to the following tables for details by cause and year.

3.1.5.2 Historic Events

On April 15, 1999, the worst fire in St. Lucie County started as a small brush fire in western Port St. Lucie burning nearly 2,400 acres, destroying nearly 50 homes, and damaging 30 others with an estimated at $7.3 million in losses. This disaster received a Federal Disaster Declaration.

Table 3.16 highlights St. Lucie County's recent history involving wildfires. Table 3.17 identifies the

number of wildfires experienced within 2011-2015 along with the total amount of acres burned. As such, there have been no significant wildfires since 2015.

Table 3.16 - Historically Significant Wildfires in St. Lucie County

Wildfire Name	Date	Homes threatened	Location	Acres	Cause
Russakis	6/18/2015	4	5501 Emerson	42	powerlines
Savannas	6/11/2014	2 pavilions	Savannas preserve State Park	57.5	Escaped Prescribed Fire
Slash Pine	5/28/2014	10	Tree top trail off Indio in Ft Pierce	10 acres	Debris Burn
Canal Road	02/18/2014	3 pump houses damaged	Bluefield and Germany Canal Rd	211	Incendiary
Heather	3/24/2013	244	Indrio & US1	390	Lightning
Oleander Command	4/3/2012	1	Oleander	1.5	Campfire
Orange	2/17/2011	0	Carlton Road	240	Debris Burning
Midway Command	3/24/2011	5	Midway & US1	40	
Lewis	6/14/2011	0	Edwards & Lewis	23	Lightning
Del Mundo	5/9/2010	3	240 Del Mundo St	300	Children

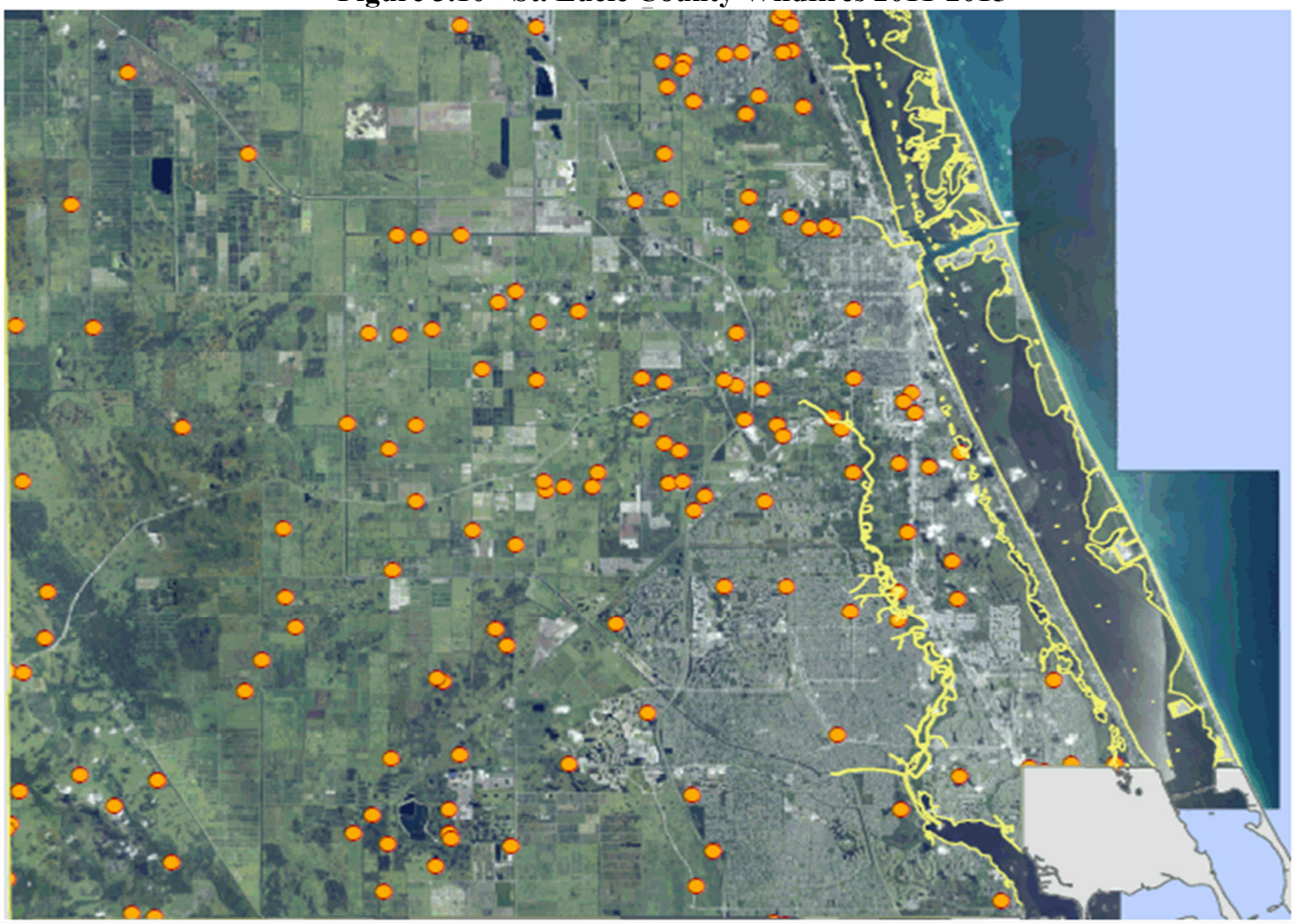
Source: Florida Forest Service

Table 3.17 – St. Lucie County's Five-Year Wildfire History

Year	Number of Wildfires	Acres Burned
2015	49	801
2014	19	250.3
2013	25	402.2
2012	22	376.4
2011	26	172.3

Source: Florida Forest Service

Figure 3.10 - St. Lucie County Wildfires 2011-2015



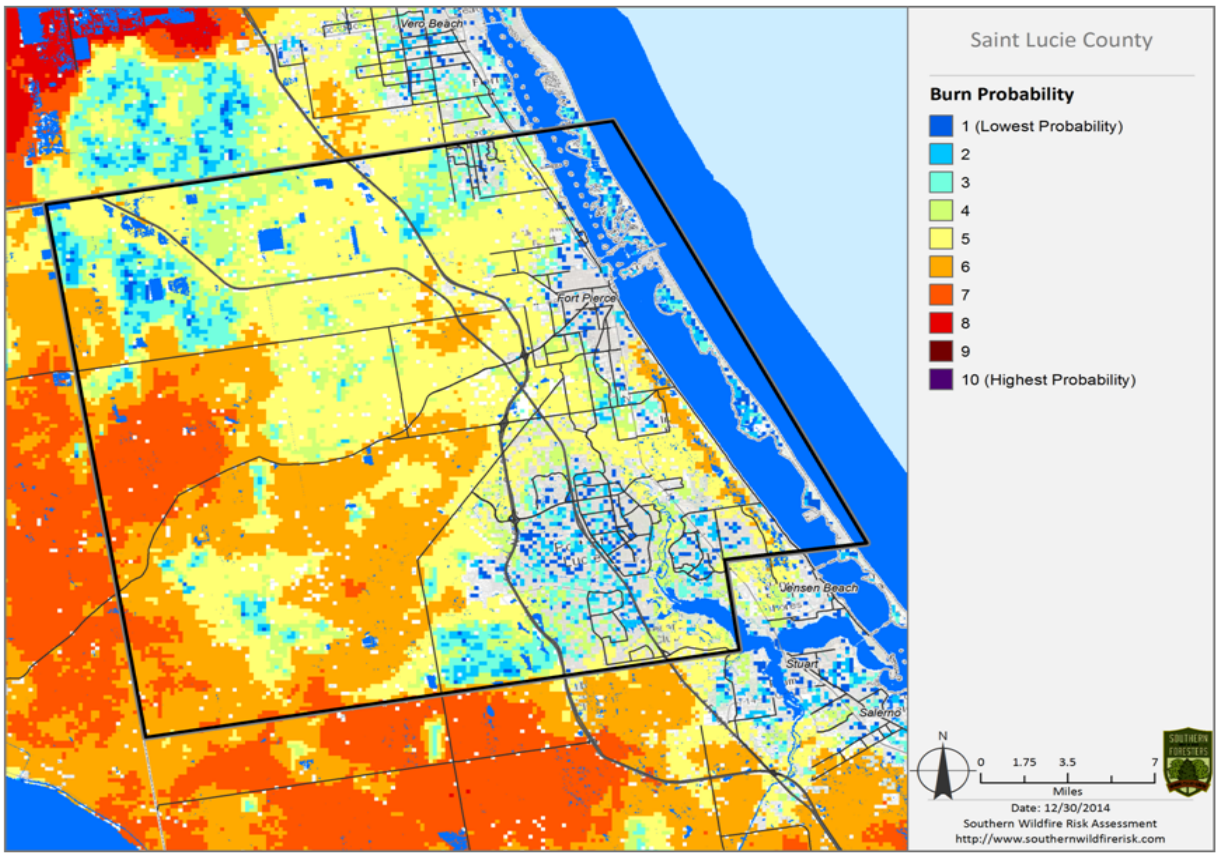
Source: Florida Forest Service

3.1.5.3 Vulnerability Assessment

Wildfires and Urban Interface fires have the potential for the following impacts within communities:

- Lives and property loss
- Electric power outage;
- Surface and air transportation disruption;
- Telecommunications system outage;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Agricultural/fisheries damage;
- Loss of livestock;
- Damage to critical environmental resources;
- Damage to identified historical resources

Figure 3.11 - St. Lucie County Burn Probability Map



Source: Florida Forest Service

3.1.5.4 Probability Assessment – MEDIUM

Based on the historic events of wildfires within St. Lucie County coupled with the environmental landscape and weather season, the probability for a future wildfire occurrence for the County is medium. The ecological composition of the County is diverse, therefore, the threat of a wildfire is concentrated in certain areas within the County. Likewise, the threat of a wildfire is amplified during the dry season versus during the wet or rainy season. Overall, due to the range of two extremes, the probability is rated at medium.

3.1.5.5 Risk Assessment - MEDIUM

Low Wildfire Hazard - Homes are built with concrete and appropriate non-flammable roofing materials. Short grass, low shrubs and light duff are present. The forest and heavy vegetation are not continuous throughout the community. Wildfires that do occur in these areas are less intense and easier to suppress because of the lower volume of fuel to feed and sustain the fire. (City of Fort Pierce, Ankona, Eden, Eldred)

Medium Wildfire Hazard - Wildland vegetation is continuous throughout the community. Tall grass,

medium shrubs, thick duff, and ladder fuels are prominent in the area. Vegetation is less than 30 feet from homes. Homes are built with vinyl, plastic, or other types of less fire-resistant materials. Access is limited and the concentration of fuel to feed fires causes more intense fire behavior. Fire suppression becomes more difficult and costly. (City of Port St. Lucie, Village of St. Lucie, River Park, Fort Pierce North & South, Hutchinson Island North & South, Lakewood Park, River Park)

High Wildfire Hazard

Wildfire hazards include the following:

- Dense, highly flammable vegetation surrounds the neighborhood and is within a few feet of homes.
- A thick layer of vegetation is present on the forest floor.
- Access to the neighborhood is limited to one entrance and/or on poorly maintained roads.
- Continuous, overgrown vegetation limits access and creates intense wildfire conditions.
- Fire suppression is challenging and requires more resources (engines, dozers, and aircraft) and firefighters than normal.

There are four Firewise Communities in St. Lucie County (Savanna Club, PGA Village, Indian River Estates & Walden Woods). These communities are aware of their wildfire risk and take action to reduce their risk.

The Wildland Urban Interface (WUI) Risk Index layer is a rating of the potential impact of a wildfire on people and their homes. The key input, WUI, reflects housing density (houses per acre) consistent with Federal Register National standards. The range of values is from -1 to -9, with -1 representing the least negative impact and -9 representing the most negative impact. For example, areas with high housing density and high flame lengths are rated -9 while areas with low housing density and low flame lengths are rated -1.

Table 3.18 - Fires by Causes (Okeechobee District) 2019

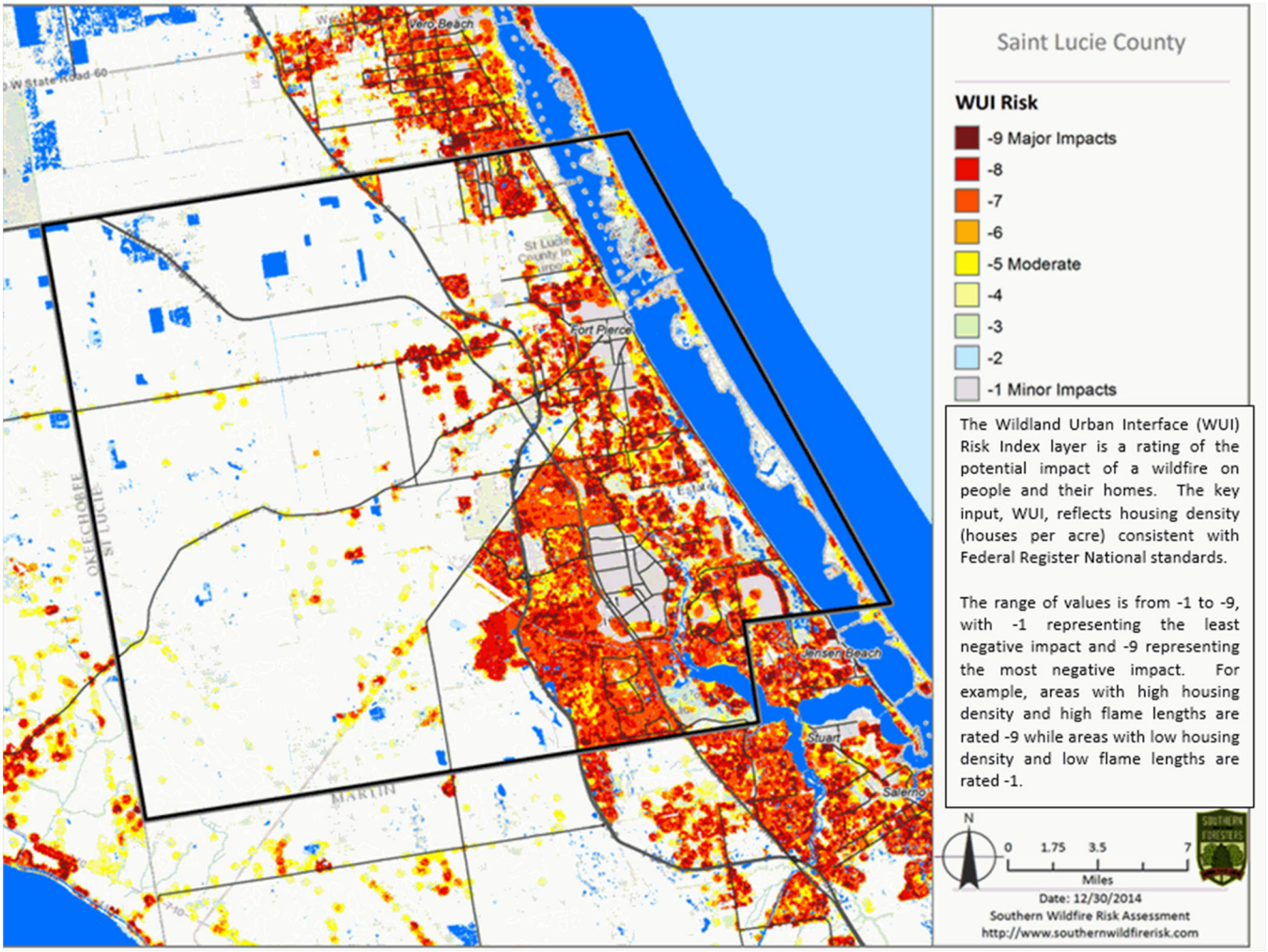
St. Lucie

Cause	Fires	Percent	Acres	Percent
Campfire	1	5.56	27.7	26.23
Children	0	0	0.0	0
Debris Burn*	0	0	0.0	0
Debris Burn--Auth--Broadcast/Acreage	1	5.56	0.5	0.47
Debris Burn--Auth--Piles	0	0	0.0	0
Debris Burn--Auth--Yard Trash	0	0	0.0	0
Debris Burn--Nonauth--Broadcast/Acreage	0	0	0.0	0
Debris Burn--Nonauth--Piles	1	5.56	0.5	0.47
Debris Burn--Nonauth--Yard Trash	0	0	0.0	0
Equipment use*	0	0	0.0	0
Equipment--Agriculture	0	0	0.0	0
Equipment--Logging	0	0	0.0	0
Equipment--Recreation	1	5.56	3.0	2.84
Equipment--Transportation	0	0	0.0	0
Incendiary	1	5.56	0.5	0.47
Lightning	7	38.89	38.7	36.65
Miscellaneous --Breakout	0	0	0.0	0
Miscellaneous --Electric Fence	0	0	0.0	0
Miscellaneous --Fireworks	1	5.56	1.5	1.42
Miscellaneous --Power Lines	3	16.67	1.2	1.14
Miscellaneous --Structure	0	0	0.0	0
Miscellaneous--Other	0	0	0.0	0
Railroad	0	0	0.0	0
Smoking	0	0	0.0	0
Unknown	2	11.11	32.0	30.30
Total	18		105.6	

* Fire cause no longer used

Source: Florida Forest Service 2019

Figure 3.12 - St. Lucie County WUI Risk Index Map



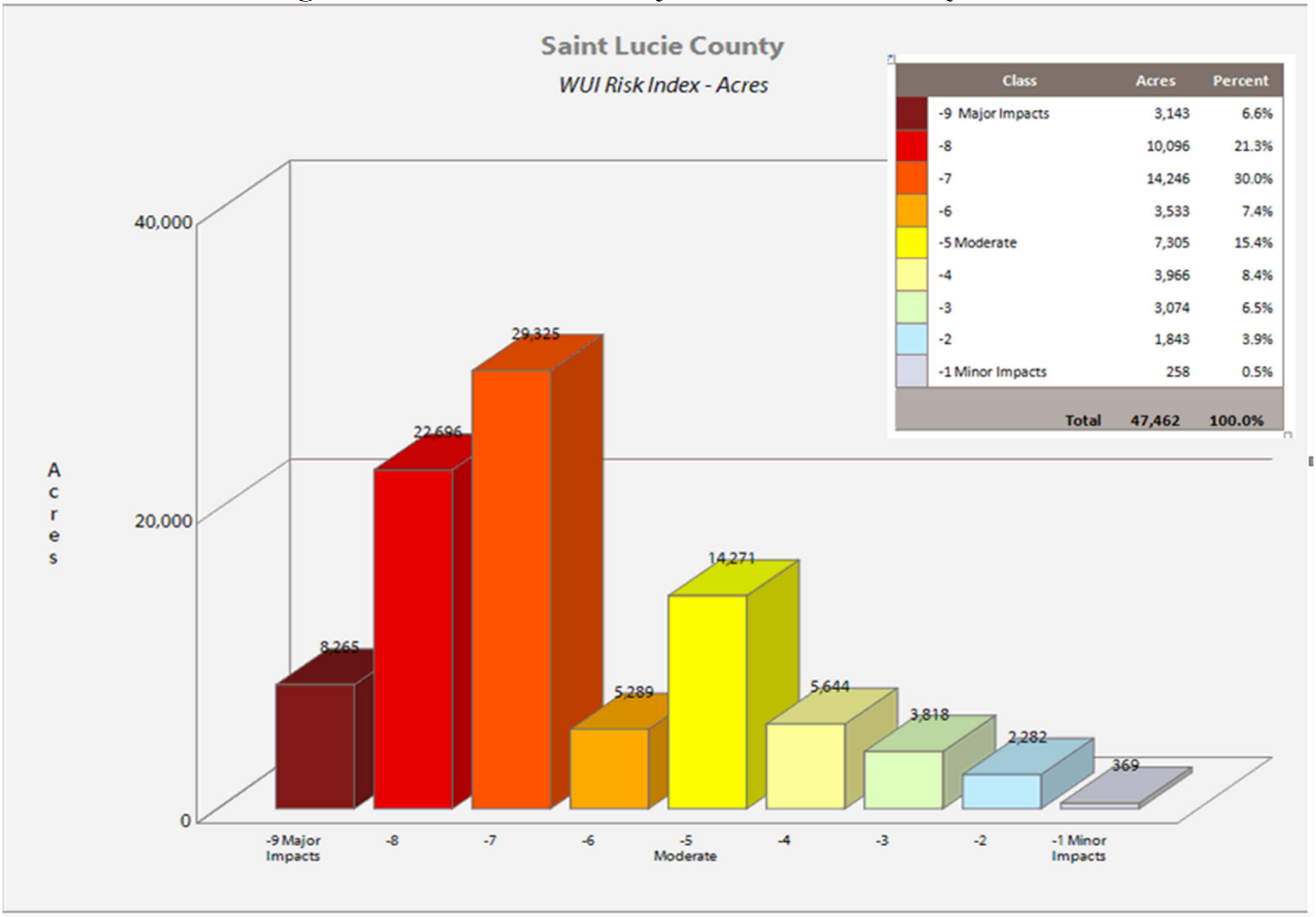
Source: Florida Forest Service 2014

Table 3.19 – Wildfire Call Volume (2016 – 2020)

Year	No. of Calls
2020	283
2019	333
2018	471
2017	520
2016	505

Source: St. Lucie County Fire District (2021)

Figure 3.13 - St. Lucie County WUI Risk Index – by Acres



Source: Florida Forest Service

According to the US Forest Service, burn probability is determined by modeling is based on components of fire regimes (spatial ignition, and fire weather conditions) on landscape of known fuels and topography. Burn probability varies considerably throughout the County and is susceptible to change due to weather conditions.

3.1.6 Erosion and Landslides

3.1.6.1 Hazard Identification

Erosion and Landslides

Erosion is the wearing away and loss of areas such as riverbanks, hillslopes, beaches, shorelines, or dunes by wind or water. It results from periodic natural hazard events such as extreme rain, rapid snow melt, hurricanes, storm surge, wildfires, and windstorms, but may be intensified by human related activities such as vegetation removal or urbanization. Changes in the frequency or severity of storms, wildfires, or storm surge may increase the potential for erosion. Even when gradual, erosion can harm or destroy buildings and infrastructure.

Landslides are the rapid or sudden movement of a mass of earth, debris or rock, down a slope. Landslides

may be spurred by inland and coastal storms or earthquakes, and can become more likely due to severe wildfire, intense precipitation and/or human induced activities.

Although conditions that trigger landslides vary, they occur only on relatively steep (typically greater than 15–20 degrees) and tall slopes. Landslides are also more likely to happen where vegetation does not exist, has been removed, or where the soil moisture level is high. Potential impacts from landslides include environmental disturbance, property and infrastructure damage, and injuries or fatalities.

Beach erosion is a primary concern in St. Lucie County. The wearing away of sand, grasslands, coastal forests, or other natural land material such as dune sediments by wave action, tidal currents, wave currents, drainage or high winds. The wave climate impacting St. Lucie County's shoreline has contributed to the long-term erosion of the barrier island, Hutchinson Island. As a result, the Florida Department of Environmental Protection (FDEP) has concluded that 18 miles of shoreline is "critically eroded." A critically eroded area is defined by FDEP as a segment of the shoreline where natural processes or human activity has caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost. To assist with its coastal management strategies and long-term sustainability of its shoreline, the County has developed and adopted a Beach Preservation Plan (BPP), updated 2014. The BPP identifies the current shoreline conditions and provides cost effective strategies for future beach management along the County's shoreline in particular the FDEP classified critically eroded areas.

Wind, waves, and longshore currents are the driving forces behind coastal erosion. This removal and deposition of sand permanently changes beach shape and structure. Most beaches, if left to natural processes, experience natural shoreline retreat. As houses, highways, seawalls, and other structures are constructed on or close to the beach, the natural shoreline retreat processes are interrupted. The beach jams up against these humans caused obstacles and narrows considerably as the structures prevent the beach from moving naturally inland. When buildings are constructed close to the shoreline, coastal property soon becomes threatened by erosion. The need for shore protection often results in "hardening" the coast, with a structure such as a seawall or revetment.

A seawall is a large concrete wall designed to protect buildings or other manmade structures from beach erosion. A revetment is a less expensive option constructed with "rip rap" such as large boulders or concrete rubble. Although these structures may serve to protect beachfront property for a certain period of time, the resulting disruption of the natural coastal processes has serious consequences for all beaches in the area. Seawalls inhibit the natural ability of the beach to adjust its slope to the ever-changing ocean wave conditions. Large waves wash up against the seawall and rebound out to sea carrying large quantities of sand with them. With each storm, the beach narrows, sand is lost to deeper water, and the long shore current scours the base of the wall. Eventually, large waves impact the seawall with such force that a bigger structure becomes necessary to continue to resist the forces of the ocean.

FDEP has identified St. Lucie County as a medium-high risk to erosion. The beaches of Florida will continue to shift and change over time, especially when faced with current levels of development and future impacts from climate change.

3.1.6.2 Historic Events

St. Lucie County has developed, instituted, and/or participated in several beach restoration projects in spanning 30 years. Between 2004 and 2015; Hurricanes Frances and Jeanne (2004), Tropical Storm Wilma (2005), and Hurricanes Isaac and Sandy (2012) caused considerable beach erosion. Hurricane Sandy destroyed the County re-nourishment project in-progress in the south end of South Hutchinson Island in 2012.

3.1.6.3 Vulnerability Assessment

Erosion can have the following potential impacts within a community:

- Soil/beach erosion;
- Navigable waterway impairment;
- Damage to infrastructure;
- Economic disruption;
- Damage to critical environmental resources; and
- Stormwater drainage impairment.

St. Lucie County's vulnerability to soil collapse and beach erosion is moderate along its entire coastline. The most significant area of beach erosion in the County is along South Beach and north at the Fort Pierce Inlet. This area has just been the subject of a major beach re-nourishment project sponsored jointly by the County and U.S. Army Corps of Engineers (ACOE). Other beachfront communities report low to moderate erosion problems. Erosion also is a potential vulnerability for the communities, wildlife habitat and environments located on both estuarine and riverine area such as the Indian River Lagoon and the North Fork of the St. Lucie River.

3.1.6.4 Probability Assessment - HIGH

The probability of beach erosion in St. Lucie County is high. Coastal erosion is continual and cyclical. Erosion is exacerbated by tropical storms, winter storms, and hurricanes. It is anticipated there will be at least one storm event on an annual basis that will contribute to erosion.

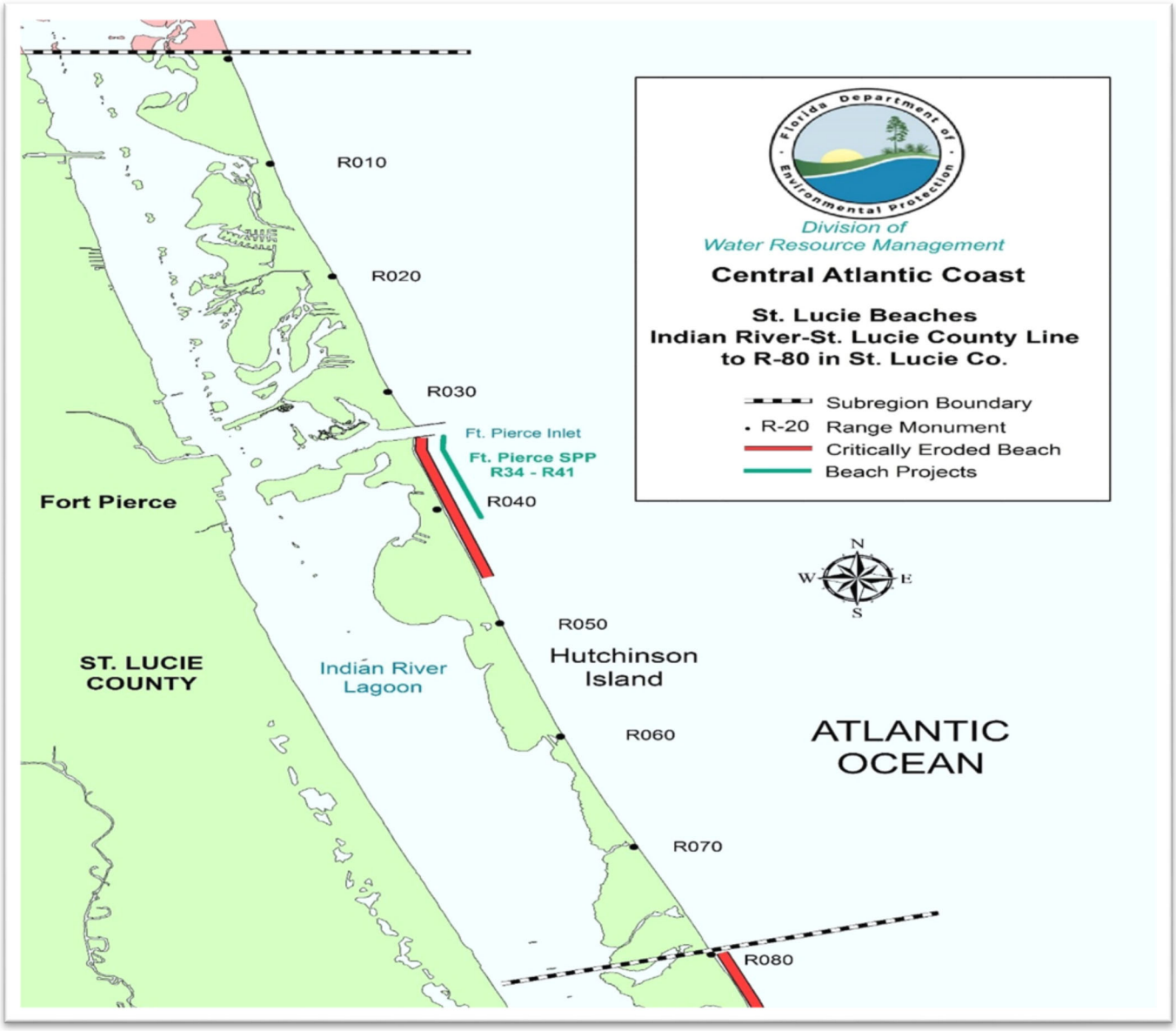
3.1.6.5 Risk Assessment - HIGH

FDEP's Strategic Beach Management Plan for the Central Atlantic Coast region updated a statewide assessment of beach erosion in June 2009. In that assessment, FDEP defined the "critical erosion area" as a segment of shoreline where natural processes or human activity have caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreation interests, wildlife habitat, or important cultural resources are threatened or lost. Critically eroded areas may also include peripheral segments or gaps between identified critically eroded areas which, although they may be stable or slightly erosional now, their inclusion is necessary for continuity of management of the coastal system or for the design integrity of adjacent beach management projects (FDEP, 2009).

Figure 3.13 shows the only critical erosion area (R040) in St. Lucie County as of 2015. R040 extends south from the Fort Pierce Inlet 1.3 miles, threatening recreation, and development interests. This area is currently undergoing re-nourishment in a joint project between the County, City of Fort Pierce, Florida Inland Navigation District, and the US Army Corps of Engineers. The budget for this project is $5.2

million dollars. The southern 3.4 miles of the County shoreline (R070) was under a re-nourishment project when Hurricane Sandy eroded the work that had been done. This project cost 2.96 million.

Figure 3.14 - Critically Eroded Beaches in St. Lucie County



Source: Florida Department of Environmental Protection

[Refer to Appendix G for additional Tables and Figures.]

3.2 OTHER NATURAL HAZARDS

3.2.1 Extreme Temperatures (Heat and Cold)

3.2.1.1 Freezing Temperatures Hazard Identification

A freeze is defined by the National Weather Service (NWS) as when the surface air temperature is expected to be 32 degrees or below over a widespread area for a climatologically significant period of time. The NWS issues a freeze warning when surface temperatures are expected to drop below freezing over a large area for an extended period of time, regardless of whether or not frost develops. According to the Department of Agriculture and Consumer Services, a moderate freeze may be expected every 1 to 2 years. Severe freezes may be expected on an average of once every 15 to 20 years.

Agricultural lands represent nearly one-half of all land in St. Lucie County. Freezes pose a major hazard to the St. Lucie County agriculture industry on a recurring basis and are a significant threat to the economic vitality of the State's agriculture industry (University of Florida, 2001). The Florida Agricultural Statistics Service (FASS) released the 2017 Florida Agriculture by the Numbers statistical report. Working with the Florida Department of Agriculture and Consumer Service (FDACS), a comprehensive report of Florida's agricultural economy shows the importance of citrus farming for Florida and St. Lucie County, and though the County has not been affected by a freeze in several years, the importance of protecting crops is evident. Florida has 47,000 commercial farms and ranches, using a total of 9.45 million acres. Florida ranks first in the U.S. in value of production of cucumbers, grapefruit, oranges, squash, sugarcane, fresh market snap beans, and fresh market tomatoes. Florida ranks second in value of production of bell peppers, strawberries, watermelons, fresh market cabbage and fresh market sweet corn. In 2016, St. Lucie County commercial citrus trees number 3.6 million grown on 26,744 acres. St. Lucie ranked sixth in crop production in the State of Florida with 6,693 boxes of citrus for Crop Year 2015-2016. Citrus harvesting for the most popular eating and juicing oranges and grapefruit begins in September, finishing by late October. Avocados crops are harvested nearly year-round. A freeze would affect the St. Lucie citrus economy severely (FASS, 2016).

3.2.1.2 Historic Events

Florida has experienced several severe or disastrous freezes, where most of the winter crops were lost. The lowest temperature ever recorded in the state of Florida is -2°F in Tallahassee on February 13, 1899 (Florida Department of Emergency Management, 2012). At the same time, snow up to three inches deep was reported by several cities in the Panhandle. Since December 1889, there have been at least 22 recorded severe freezes; the most recent being in 1996, when a Presidential Disaster Declaration was issued for crop losses exceeding $90 billion. During this event, there was extensive loss of citrus trees, and the majority have not been replanted. Freezes in January of 1977 had severe impacts on agriculture around the state. A U.S. Department of Agriculture report indicated the following crop loss: citrus - 35%, vegetables - 95-100%, commercial flowers - 50-75%, permanent pastureland - 50%, and sugar cane - 40%. In addition, there was a severe loss to the tropical fish industry. It is estimated that the freeze cost the Florida economy $2 billion in 1977 dollars (National Weather Service, 1999). St. Lucie County has experienced seven significant freezes since 1970, but none since 2010.

3.2.1.3 Extreme Heat Hazard Identification

Historical records indicate that temperatures are increasing worldwide, and scientists project that temperatures will continue to rise in the future. This means increases in average temperatures as well as more frequent or longer-lasting extreme heat events.

Hotter temperatures can affect public health, buildings and infrastructure, and the natural environment.

Exposure to extreme or prolonged heat can result in heat exhaustion, heat stroke, respiratory problems, and even death. Some individuals, including older adults, young children, people with chronic diseases, or those experiencing homelessness are more vulnerable to extreme heat because they may have underlying health conditions or less access to indoor, climate-controlled spaces.

Heat disorders generally have to do with a reduction or collapse of the body's ability to cool itself by circulatory changes and sweating, or a chemical (salt) imbalance caused by too much sweating. When the body cannot cool itself, or when it cannot compensate for fluids and salt lost through perspiration, the temperature of the body's inner core begins to rise, and heat-related illness may develop. Studies indicate that, other things being equal, the severity of heat disorders tend to increase with age.

In addition, extreme temperatures impact outdoor workers, and the businesses and economies that rely on them. Risks are particularly increased for those in dense urban areas that typically have higher temperatures because of the urban heat island effect.

Extreme heat can put additional strain on building materials and mechanical equipment, making them more susceptible to failure.

Rising average temperatures and longer summers can also cause changes in habitats and growing seasons, increased vector-borne disease patterns, and increased stress on native plant and animal species. In addition, hotter temperatures can increase the risk of other hazards, such as wildfire and drought.

Temperatures that are 10° or more above the average high temperature for a region and last for several weeks are defined as extreme heat (FEMA, 2003). Humid conditions, which add to the discomfort of high temperatures, occur when an area of high atmospheric pressure traps hazy, damp air near the ground.

A heat wave is an extended period of extreme heat and is often accompanied by high humidity (FEMA Ready, 2015). Humid conditions, which add to the discomfort of high temperatures, occur when an area of high atmospheric pressure traps hazy, damp air near the ground.

When the temperature gets extremely high, the NWS has increased its efforts to alert the public as well as the appropriate authorities by issuing Special Weather Statements. Residents should heed these warnings to prevent heat-related medical complications:

- Excessive Heat Watch - Conditions are favorable for an excessive heat event to meet or exceed local Excessive Heat Warning criteria in the next 24 to 72 hours.

- Excessive Heat Warning - Heat Index values are forecast to meet or exceed locally defined warning criteria for at least 2 days (daytime highs = 105-110° Fahrenheit).

- Heat Advisory - Heat Index values are forecast to meet locally defined advisory criteria for 1 to 2 days (daytime highs = 100-105° Fahrenheit).

As a result of the latest research findings, the NWS has devised the "Heat Index" (HI). The HI, given in degrees Fahrenheit, is an accurate measure of how hot it really feels when relative humidity is added to the actual air temperature. The NWS will initiate alert procedures when the HI is expected to exceed 105°F for at least two consecutive days. Possible heat disorders related to the corresponding HI are listed below.

- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Agricultural/fisheries damage;
- Damage or failure of building materials and mechanical equipment, and
- Damage to critical environmental resources.

Table 3.20 - Heat Index Chart

Classification	Heat Index	Effects on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

Source: NOAA, 2014

3.2.1.4 Historic Events

The hottest temperature ever recorded in Florida was 109˚F on June 29, 1931, in Monticello, Florida (Florida Department of Emergency Management, 2012). In a normal year, approximately 175 Americans die from extreme heat. However, in 2013, the death toll was 92 (National Weather Service, 2014).

Temperature extremes, both freezes and periods of excessive heat impact communities with a larger population of older people to a greater extent than those with younger populations. According to the 2013 Census, 28.8% of residents in St. Lucie County are over the age of 65. Freezing conditions primarily affect agriculture and homeless indigents. When conditions are predicted to be below freezing, shelters are opened.

According to the National Weather Service, between 1979 and 1999, there have been 249 extreme temperature-related deaths in the state. This number is greater than the number of deaths caused by

hurricanes, tornadoes, and lightning combined. As such, the hazard is felt county-wide.

In recent history (2000-2021), there has been one incident of extreme heat in 2017 which lead to three residents being hospitalized.

Regarding vulnerability, the whole county is moderately vulnerable to extreme heat and cold incidents.

3.2.1.5 Probability Assessment – MEDIUM

Due to a moderate history of extreme temperatures in conjunction with climate change, St. Lucie County's probability of a future extreme temperature occurrence is medium.

3.2.1.6 Risk Assessment - MEDIUM

At the time of Local Mitigation Strategy (LMS) publication, no model was available to determine potential loss in St. Lucie County due to extreme temperatures. The best datum available to estimate potential loss for freezing temperatures is the market value of production in St. Lucie County, which in 2007 totaled $165,000,000.

3.2.2 Drought

3.2.2.1 Hazard Identification

Drought is a normal, recurrent feature of climate, with severe or extreme drought impacting some part of the U.S. each year. Although drought has many definitions, it originates from a deficiency of precipitation over an extended period of time, usually a season or more. Drought produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the area producing physical drought. This complexity exists because water is essential to our ability to produce goods and services (National Drought Mitigation Center, 2015).

Droughts are induced or exacerbated by several factors, including the amount of average precipitation, the length of time between precipitation events, temperature, and water demand. Climate risks are likely to affect all these factors, increasing the likelihood of water shortages.

Droughts may result in reduced surface and groundwater availability. Water demand (particularly in industry sectors such as agriculture or hydropower), precipitation and runoff, groundwater withdrawals, and aquifer recharge may all be affected.

Droughts pose a threat to community water availability, water quality, the environment, and key economic and employment sectors such as agriculture, tourism, and outdoor recreation. Drought also increases the risk of wildfires and erosion.

A few examples of direct impacts of drought are reduced crop, rangeland, and forest productivity; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat. Social impacts include public safety, health, conflicts between water users, reduced quality of life, and inequities in the distribution of impacts and disaster relief. Income loss is another indicator used in assessing the impacts of drought. For example, reduced income for farmers has a ripple effect throughout the region's economy (National Drought Mitigation Center, 2015).

In St. Lucie County, excess water from an interconnected series of lakes, rivers, canals, and marshes flows either north to the St. Johns River or east to the Indian River Lagoon and Atlantic Ocean. The primary sources of water are watershed areas, Lake Okeechobee, and the County's well fields. Excess water from an interconnected series of lakes, rivers, canals, and marshes flows either north to the St. Johns River or east to the Indian River Lagoon.

Rainfall patterns vary greatly both seasonally and annually in Florida. Therefore, periods of low rainfall are a common occurrence but still may have significant impacts. This especially can be the case if there are several periods of low rainfall in the same year or series of years. Based on daily rainfall records from the Indian River Research and Education Center at Fort Pierce from 1953-2002, periods of 3 weeks or more with cumulative rainfall of less than 0.25, 0.50, and 1.0 inches were identified by researchers from the University of Florida. There have been seven occurrences since 1953 where there were periods of 6 or more weeks with less than 0.25 inch of cumulative rainfall and 33 periods of 4 or more weeks with less than 0.25 inch. There also have been 34 periods of 4 or more weeks with less than 0.50 inch of rain and 52 periods with less than 1.0 inch. Any of these periods could potentially occur again. These periods of drought frequently coincided with the season of late March to mid-October when citrus crops require intense irrigation.

Reducing water demand conserves available water supplies in aquifers, rivers, and lakes. Additional water conservation, capture, and recharge methods extend the use of limited water supplies. For these and other reasons, water suppliers typically advocate for water conservation measures, even in non-drought conditions.

In addition to obvious losses in yields in both crop and livestock production, drought in St. Lucie County is associated with increases in insect infestations, plant disease, and wind erosion. The incidence of forest fires increases substantially during extended droughts, which in turn places both human and wildlife populations at higher levels of risk.

The South Florida Water Management District and County staff manage the County's water resources. Complementing the District's water management efforts during periods of critical water shortage, a countywide, uniform, forceful, contingency plan is in place to effectively restrict the use of water.

3.2.2.2 Historic Events

Utilizing the Palmer Drought Severity index, St. Lucie County has experienced 27 droughts ranging from mild to extreme since 2000. The worst drought (Extreme) occurred from May 1, 2011 until October 2011. The longest drought period was 19 months from August 1, 2006 through February 28, 2008. This drought ranged in severity from Mild to Severe. The last drought was from March 1, 2012 to May 1, 2012 and was classified as Mild. According to the National Integrated Drought Information System, St. Lucie County experienced one severe drought in 2017, and another severe drought in 2019.

3.2.2.3 Vulnerability Assessment

While St. Lucie County is moderately vulnerable to impacts from drought due to the County's large agricultural land tax base, other communities are less vulnerable due to their location and non- agricultural economic base. When the normal climatic cycle is disrupted by periods of drought, one of the potentially most damaging effects is substantial crop loss in the western agricultural areas of the County as this area

is heavily populated with agricultural operations, thus making it extremely vulnerable to incidents of droughts. Overall, the vulnerability and location to droughts is felt county-wide, as the whole county and its industries can be impacted directly or indirectly by a disruption of agriculture practices and water supply changes; all industries are dependent on a constant medium of climatic elements.

Drought can have the following potential impacts within a community:

- Economic disruption;
- Agricultural/fisheries damage;
- Damage to critical environmental resources; and
- Fire hazards.

3.2.2.4 Probability Assessment – HIGH

Based on past occurrences and the cyclical nature of drought, conditions suggests that the probability of future drought incidents in the County is high.

3.2.2.5 Risk Assessment - HIGH

The Palmer Drought Index has become the semi-official drought index. It is most effective in determining long term drought—a matter of several months—and is not as good with short-term forecasts (a matter of weeks). It uses a 0 as normal, and drought is shown in terms of minus numbers; for example, minus 2 is moderate drought, minus 3 is severe drought, and minus 4 is extreme drought. The Palmer Index can also reflect excess rain using a corresponding level reflected by plus figures, i.e., 0 is normal, plus 2 is moderate rainfall, etc.

Another reference tool is the Keetch-Byram drought index (KBDI), which is a continuous reference scale for estimating the dryness of the soil and duff layers. The index increases for each day without rain (the amount of increase depends on the daily high temperature) and decreases when it rains. The scale ranges from 0 (no moisture deficit) to 800 (prime drought condition). The range of the index is determined by assuming that there is 8 inches of moisture in a saturated soil that is readily available to the vegetation.

At the time of LMS publication, no model was available to determine the potential loss associated with drought in St. Lucie County. The best datum available to determine potential loss is the market value of agricultural products in St. Lucie County, which in 2012 totaled $165 million.

3.2.3 Seismic Hazards

3.2.3.1 Hazard Identification

Earthquakes

An earthquake is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, flash floods, fires, and tsunamis.

Florida is situated on the trailing (or passive) margin of the North American Plate while California is located on its active margin. The active margin is bounded by faults that generate earthquakes when there

is movement along them. This is the fundamental reason that Florida has an extremely low incidence of earthquakes while California experiences many (mostly small) earthquakes.

All 50 states and five U.S. territories are at some risk for earthquakes. Earthquakes can happen at any time of the year (FEMA Ready, 2015).

Sinkholes

Sinkholes are common features of Florida's landscape where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that can naturally be dissolved by ground water circulating through them. As the rock dissolves, spaces and caverns develop underground. Sinkholes are dramatic because the land usually stays intact for a while until the underground spaces get too big. If there is not enough support for the land above the spaces, then a sudden collapse of the land surface can occur. These collapses can be small, or they can be large, and they can occur under a house or road.

A significant number of sinkholes tend to occur in the years that follow a drought. When an area has a long-term lack of rain and water levels decrease, there is usually a correlated link to an increase in incidences of sinkholes being reported. Historically, years where dry weather has been followed by wet weather have resulted in some of the greatest increases in sinkhole occurrences.

They are only one of many kinds of karst landforms, which include caves, disappearing streams, springs, and underground drainage systems, all of which occur in Florida. Karst is a generic term that refers to the characteristic terrain produced by erosional processes associated with the chemical weathering and dissolution of limestone or dolomite, the two most common carbonate rocks in Florida. Dissolution of carbonate rocks begins when they are exposed to acidic water.

Most rainwater is slightly acidic and usually becomes more acidic as it moves through decaying plant debris. Limestones in Florida are porous, allowing the acidic water to percolate through them, dissolving some limestone and carrying it away in solution. Over time, this persistent erosion process has created extensive underground voids and drainage systems in much of the carbonate rocks throughout the state. Collapse of overlying sediments into the underground cavities produces sinkholes (Florida Department of Environmental Protection, 2012).

When groundwater discharges from an underground drainage system, it is a spring, such as Wakulla Springs, Silver Springs, or Rainbow Springs. Sinkholes can occur in the beds of streams, sometimes taking all of the stream's flow, creating a disappearing stream. Dry caves are parts of karst drainage systems that are above the water table, such as Marianna Caverns.

Other subterranean events can cause holes, depressions or subsidence of the land surface that may mimic sinkhole activity. These include subsurface expansive clay or organic layers which compress as water is removed, collapsed or broken sewer and drainpipes or broken septic tanks, improperly compacted soil after excavation work, and even buried trash, logs and other debris. Often a depression is not verified by a licensed professional geologist or engineer to be a true sinkhole and the cause of subsidence is not known. Such events are called subsidence incidents (Florida Department of Environmental Protection, 2012).

3.2.3.2 Historic Events

Earthquakes: In January 1879, a shock wave occurred near St. Augustine that is reported to have knocked plaster from walls and articles from shelves. Similar effects were reported in Daytona Beach. The shock was felt in Tampa, throughout central Florida, and in Savannah, Georgia as well (USDOI, USGS, 2015).

In January 1880, another earthquake occurred, this time with Cuba as the focal point. Shock waves were felt as far north as the town of Key West (US DOl, USGS, 2015).

In June 1893, Jacksonville experienced a minor shock wave that lasted about 10 seconds. Another earthquake occurred in October 1893, which also did not cause any damage (USDOI, USGS, 2015).

In November 1948, doors and windows rattled in Captiva Island, west of Ft. Myers. It was reportedly accompanied by sounds like distant heavy explosions (USDOI, USGS, 2015).

Sinkholes: The most damage from sinkholes tends to occur in Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania; however, Florida has more sinkholes than any other state in the nation. Florida's average sinkhole size is 3 to 4 feet across and 4 to 5 feet deep. For this reason, and because they are one of the predominant landform features of the State, sinkholes are of particular interest to Florida. Their development may be sudden and has the potential to result in property damage or loss of life.

There are as many as 150 sinkholes reported each year in Florida because the Florida landmass is formed by limestone with a thin layer of sediment covering it, usually consisting of very loose sediment. However, the covering on the porous limestone below is often only temporary. Limestone is very soluble, and as water moves through it, small holes develop and grow into larger holes. Overburdened sediments can cover the hole for a certain amount of time, but once the hole gets larger the ability to bridge across it is compromised and sediments collapse into it.

The following table illustrates the Modified Mercalli Intensity Scale of 1931 and is the basis for the U.S. evaluation of seismic intensity. Unlike earthquake magnitude, which indicates the energy a quake expends, Mercalli intensity denotes how strongly an earthquake affects a specific place. The scale has 12 divisions and given that the best available data do not indicate that there have ever been any earthquakes in St. Lucie County or the municipalities, we could reasonably expect to experience Level I on the intensity scale.

Table 3.21 - The Modified Mercalli Intensity Scale

I. Not felt except by a very few under especially favorable circumstances.
II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing truck. Duration estimated.
IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, and doors disturbed; walls make creaking sound. Sensation like heavy truck striking building. Standing motorcars rock noticeably.
V. Felt by nearly everyone; many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbance of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
VI. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures. Some chimneys broken. Noticed by persons driving motor cars.
VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.
IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed over banks.
XI. Few, if any (masonry), structures are left standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

3.2.3.3 Vulnerability Assessment

Although Florida is not usually considered to be a state subject to earthquakes, several minor shocks have occurred over time, but only one caused any damage (US DOl, USGS, 2015). One of the most frightening and destructive phenomena of nature is an earthquake and its aftereffects. As such, if a seismic event was to occur, the vulnerability lies county-wide across nearly 600 square miles. Our municipalities will be more susceptible to infrastructure impacts due to the concentration of population.

Seismic events can have the following potential impacts within a community:

- Electric power outage;
- Surface and air transportation disruption;
- Potable water system loss or disruption;
- Sewer system outage;
- Telecommunications system outage;

- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Disruption of municipal and community services;
- Damage to identified historical resources;
- Fire;
- Flooding;
- Toxic releases; and
- Stormwater drainage impairment.

3.2.3.4 Probability Assessment - LOW

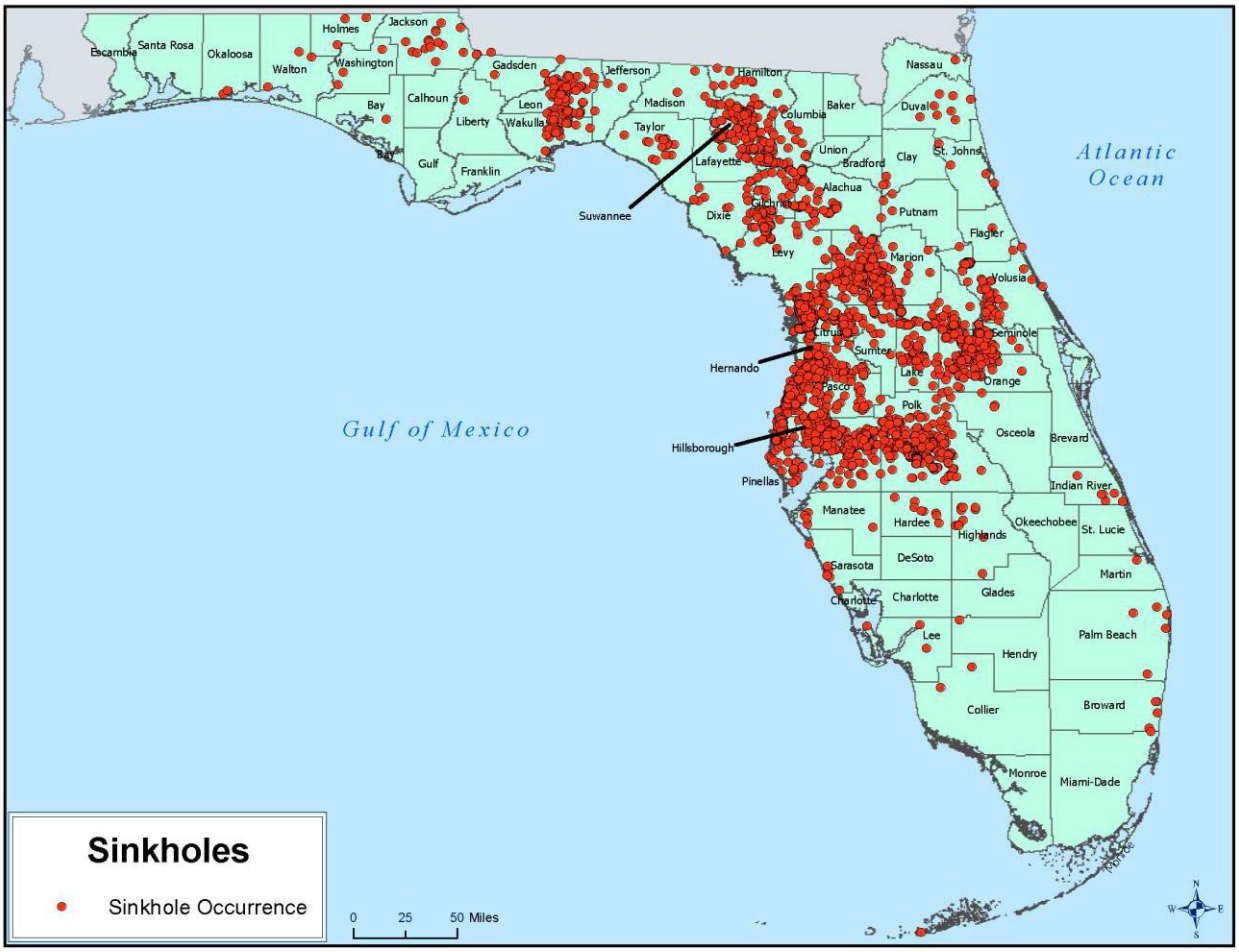
There have never been any soil failures or seismic or sinkhole activity in St. Lucie County. While these hazards exist, the probability of future occurrence at this time must be considered low. Due to the lack of occurrence and extremely low probability of this hazard, impact due to an occurrence in St. Lucie County cannot be accurately identified.

3.2.3.5 Risk Assessment -LOW

The USDOI, USGS and the Florida Department of Natural Resources Bureau of Geology have created a map illustrating sinkhole type, development, and distribution for the state of Florida. Sinkhole risk is categorized using four categories. According to this map, St. Lucie County lies in Area II, which is classified as having coverage between 20 and 200 feet thick, consisting of in cohesive and permeable sand.

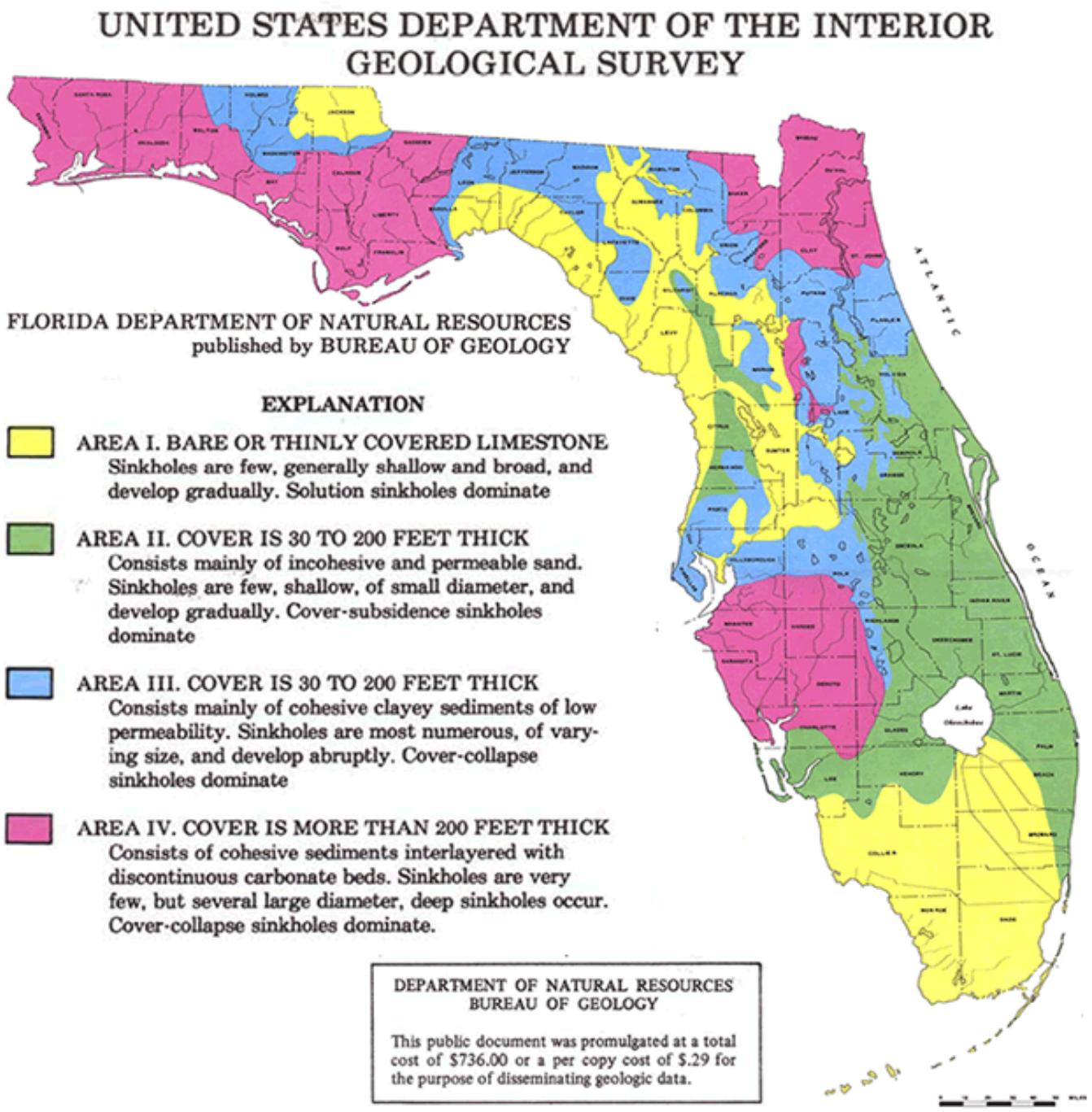
Sinkholes are common wherever there is limestone terrain but are rare in the southern part of the State. The State of Florida Enhanced Hazard Mitigation Plan 2013 reports that Central Florida and the Big Bend region have the largest incidence of sinkholes.

Figure 3.15 - Sinkhole Occurrences in Florida



Source: Florida Division of Emergency Management: State of Florida Enhanced Hazard Mitigation Plan 2019

Figure 3.16 - Sinkhole Areas in Florida



Source USGS

3.2.4 Tsunami

3.2.4.1 Hazard Identification

A tsunami is a series of waves created when a large body of water is rapidly displaced. A tsunami has a much smaller amplitude (wave height) offshore, and a very long wavelength (often hundreds of kilometers long), which is why they generally pass unnoticed at sea, forming only a passing "hump" in the ocean. Tsunamis have been historically referred to as tidal waves because as they approach land, they take on the characteristics of a violent onrushing tide rather than the sort of cresting waves that are formed by wind action upon the ocean. Since they are not actually related to tides, the term is considered misleading, and its usage is discouraged by oceanographers.

Tsunami waves are unlike typical ocean waves generated by wind and storms. When a tsunami approaches the shore, they behave like a very fast-moving tide that extends far inland. Tsunamis are not like the typical wind-generated waves popular with surfers. Even "small" tsunamis are associated with extremely strong currents, capable of knocking someone off their feet. Because of complex interactions with the coast, tsunami waves can persist for many hours. As with many natural phenomena, they can range in size from micro-tsunamis detectable only by sensitive instruments on the ocean floor to mega- tsunamis that can affect the coastlines of entire oceans, as with the Indian Ocean tsunami of 2004 (United States Geological Survey).

If a tsunami-type event were to occur, the hazard would be measured using Deep-ocean Assessment and Reporting of Tsunami (DART) systems which detect unusual variations of waves as they travel towards U.S. coastal communities and therefore, enhances detection, prediction, and measurement capabilities along with real-time tsunami reporting.

Rogue Waves

Rogue Waves are a phenomenon often confused with tsunamis. There is debate as to whether these waves are related to tsunamis, however they are dangerous and cause immense damage as do tsunamis. They are included in this section as the mitigation plans address the threat in the same relative manner. Characteristics of rogue waves include:

- Unpredictable nature;
- Little is known about the formation; and
- May be caused by regularly-spaced ocean swells that are magnified by currents or the atmosphere

3.2.4.2 Historic Events.

The history of big waves hitting Florida is short:

- A powerful earthquake in Portugal in 1755 killed thousands there and launched a tsunami that hit much of the U.S. coast. Scientists do not know if that caused many deaths in Florida, which was sparsely populated at the time;
- An earthquake in Charleston, S.C., in 1886 triggered a wave that surged up the St. Johns River to Jacksonville, causing few if any deaths;
- An 18-foot rogue wave flooded the parked cars of sunbathers on Daytona Beach without warning

in 1992. This event, called a meteorological tsunami (or meteotsunami), was a tsunami- like wave phenomenon of meteorological origin. Tsunamis and meteotsunamis propagate in the water in the same way and have the same coastal dynamics. For an observer on the coast where it strikes, the two types would look the same and have the same impacts. Research is currently underway to better understand these events, with the goal of developing a protocol for issuing meteotsunami warnings along the U.S. coast.

3.2.4.3 Vulnerability Assessment

Tsunami events occur most often in the Pacific Ocean, but they are a global phenomenon, and all are potentially dangerous, though they may not damage every coastline they strike. Analyzing the past 150 years of tsunami records shows that the most frequent and destructive tsunamis to affect the U.S. have occurred along the coasts of California, Oregon, Washington, Alaska, and Hawaii.

The State of Florida is located within the Caribbean area, and over the past 156 years, the Caribbean has experienced more total tsunami events, which have ultimately resulted in over 2,500 deaths. Modeling results from a tsunami triggered by a large Portugal earthquake suggest more significant tsunami impacts locally. Overall, Florida has experienced few destructive tsunami or rogue wave events, but there were several small events. Modeling has indicated that a wave generated in a tsunami threatening St. Lucie County would be 6-8 feet in height. Impact to the County would be comparable to impact because of significant storm surge due to a hurricane.

Computer modeling for a large tsunami originating from the Puerto Rico trench could inundate the St. Lucie County beaches on the barrier islands, including in the City of Fort Pierce to the dune line with 6 to 8-foot waves. In this case, ocean water may breach the dune line in some locations and reach as far as Highway A1A. Therefore, St. Lucie County Emergency Management, in conjunction with the Melbourne Office of the National Weather Service, has developed a St. Lucie County-specific Tsunami Warning and Evacuation Plan. The goal of this plan is to properly prepare and respond to the residents of St. Lucie County in the unlikely event of a tsunami impacting our area. Mitigation efforts for a tsunami include preparation, planning and exercising, providing for immediate evacuations of the beaches through multiple means (mass notification system, sirens, Ocean Rescue personnel, Sheriff's Office personnel, Fire District, and public education). Please refer to the St. Lucie County Tsunami Response Plan – 2018, in Annex C.

3.2.4.4 Probability Assessment - LOW

As there has never been a recorded impact from tsunamis and rogue waves, the probability of future events in St. Lucie County is low.

St. Lucie County Tsunami Hazard Zone

National Weather Service guidelines indicate that the (Florida Atlantic Coast) Tsunami Hazard Zone extends 300 feet inland beyond the high tide location, which is up to the dune line in most of the areas and vertically upward to 15 feet within the zone. To describe the Tsunami Hazard Zone more comprehensively, while also allowing for a greater safety zone for the protection of life and property, St. Lucie County Emergency Management has defined the Tsunami Hazard Zone as the region from east of Highway A1A to the Atlantic. Within this hazard zone there are five facilities considered Critical

Infrastructure - on South Hutchinson Island, Fire Station 2 is on Seaway Drive, Fire Station 8 and a St. Lucie County Water Treatment facility are both located in the 8000 block of South Highway A1A. On North Hutchinson Island, Fire Station 9 and a St. Lucie County Utilities water treatment plant are in the 4600 Bloch North Highway A1A. The St. Lucie Nuclear Power Plant's elevation is above a worst-case scenario tsunami.

St. Lucie County Tsunami Safe Zone

St. Lucie County Emergency Management has defined the Tsunami Safe Zone as the area west of North Old Dixie Highway (U.S. Highway 1), North of Seaway Drive, and West of 2nd St. in Fort Pierce South of Seaway Drive to Florida Avenue.

3.2.4.5 Risk Assessment - LOW

Florida has directly experienced few destructive tsunami and rogue wave events since 1900, with only five small, recorded occurrences. As such, very limited tsunami modeling exists for the Florida east coast, but the threat and risk does exist.

3.2.5 Sea Level Rise

3.2.5.1 Hazard Identification

One of the major impacts of climate change is sea level rise. Sea levels rise due to increased atmospheric temperatures warming ocean waters and melting glaciers and ice sheets. Sea level has risen in Florida about 9 inches over the past century according to the South Florida Water Management District and is projected to accelerate in the coming decades.

The barrier islands of St. Lucie County are North Hutchinson Island south of Vero Beach in Indian River County, and South Hutchinson Island, north of Jensen Beach in Martin County. North Hutchinson and South Hutchinson Islands are separated by the Fort Pierce Inlet. Developed areas are predominately residential. The Indian River Lagoon lies between the western shore of the barrier islands in St. Lucie County and the mainland. This estuary is designated as an Estuary of National Significance. The Lagoon contains highly productive natural communities and ecosystem, including sea grass beds, algal beds, and oyster beds, mud flats, tidal marshes, and mangrove swamps. The Lagoon is heavily used by recreational boaters and is important to the marine business communities as prime locations for boat facilities and waterfront development. Impacts include storm-water drainage systems, saltwater intrusion into public water supplies and sources, and ecological impacts of inundation and saltwater intrusion into estuaries and freshwater systems.

3.2.5.2 Historic Events

June 2012 a regional vulnerability study that included sea level rise, was completed for the Treasure Coast (Martin, St. Lucie, Indian River and Palm Beach counties) by the Treasure Coast Regional Planning Council. In early 2021, St. Lucie County, Port St. Lucie, Fort Pierce, and St. Lucie Village formed a Resilience Steering Committee. Currently, this Committee is in the process of updating sea level rise impact analyses using NOAA 2017 Intermediate High Sea Level projections, with anticipated completion in summer 2021.

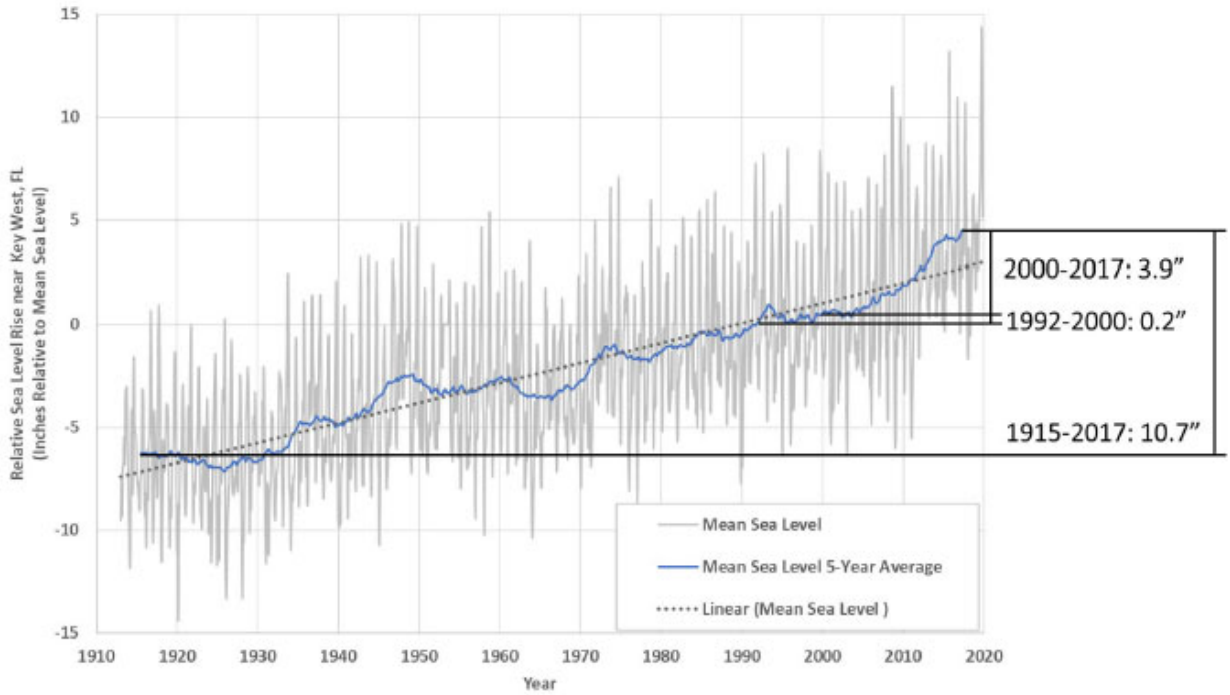
Sea level rise in St. Lucie County is measured using the Key West Tidal Station, which has captured continuous data since 1915. This tide gauge was chosen due to its geographic proximity, long historical record, and to increase capacity to aggregate and coordinate Southeast Florida regional assessments and

resilience plans.

Global mean sea level has risen about 8–9 inches since 1880, with about a third of that coming in just the last two and a half decades. As opposed to global sea level, "relative sea level" in specific locations or regions, has high variability, with more or less rise than the global average due to local factors: ground settling, upstream flood control, erosion, regional ocean currents, and whether the land is still rebounding from the compressive weight of Ice Age glaciers.

Based on the 5-year average of mean sea level at the Key West tide gauge[1], sea level has risen approximately 3.9 inches from 2000 to 2017. In addition, the rate of rise has accelerated over the last 10 years. Recent analyses of tide gauge records acquired along the United States Atlantic coast indicate year-to-year acceleration in the rate of sea level rise (NOAA report, Sweet et al., 2017). During 2010-2015, accelerated sea level rise at rates five times the global average was observed between Key West and Cape Hatteras (Valle-Levinson, 2017), and is attributed to the warming of the Florida Current (Domingues et al., 2018).

Wdowinski et al. (2016) analyzed the Virginia Key tide gauge[2] record (near Miami) and found a significant acceleration in the rate of sea level rise since 2006. The average rate of regional sea level rise since 2006 was 0.35 inches per year (+/- 0.16 inches), significantly higher than the global average rate, which has been estimated to be in the range of 0.16 to 0.2 inches per year for the post-2006 period (WMO, 2019).



Relative Sea Level Rise in Key West, Florida (NOAA Station ID 8724580) presented as monthly mean sea level, 5-year average of monthly mean sea level and linear trend of monthly mean sea level.

Annotated measurements on right of figure are computed by subtracting the 5-year average mean sea levels for the years listed. Sea level rise computed based on the linear trend will differ from the 5-year mean sea level trend shown.

Sea Level Rise proves to be a serious threat to St. Lucie County and the world thereof, however there seems to be no significant, single previous occurrence. Instead, the information referenced above demonstrates a gradual increase throughout recent years that will undoubtedly continue to be monitored and mitigated in the future.

3.2.5.3 Vulnerability Assessment

Sea level rise magnifies the impacts of coastal storms by raising elevation at high tides and the base of storm surge. Coastal areas are sensitive to sea level rise and changes in the frequency and intensity of storm events. Rising sea levels and intensified coastal storms can impact low-lying inland areas, damage coastal ecosystems, intensify coastal erosion and flooding, and introduce saltwater and nonpoint source pollution into many coastal resources such as estuaries.

Low- and moderate-income areas along the coast are generally less able to prepare for, respond to, or recover from impacts of sea level rise and coastal storms. They are also likely to be disproportionately affected by workplace closures, lost business revenue, and loss of public services.

Southeast Florida is vulnerable to sea level rise due to its peninsular geomorphology and low topography. Mapping different sea level rise inundation scenarios helps to identify areas at potential risk and aids in planning for a resilient community. Inundation maps, identifying land at elevations below sea level, highlight areas located near St. Lucie County's coastline and tidal waterways. Inland areas identified as vulnerable are low-lying areas, which may be of future concern for storm water management but are not directly hydrologically connected to tidal waters.

Adaptation of current structures, mitigation and/or managed withdrawal of structures in redevelopment activities can lessen economic and social impacts to County businesses, government, and residents (St. Lucie County CEMP, 2014).

3.2.5.4 Probability Assessment - LOW

At this time, Sea Level Rise is not an additional impact to hurricanes or rough surf that may impact St. Lucie County, therefore the probability is considered low.

3.2.5.5 Methodology

The Sea Level Rise Vulnerability Analysis includes a small area data utilizing parcel-level data identifying structures within the Sea Level Rise Inundation Zone created under the 2-foot scenario, and then added the potential impacts of Cat. 3 and 5 hurricanes, respectively. This identified structures threatened by additional storm surge. In addition, an analysis of roadways within the 2-foot Inundation Zone were analyzed for impacts due to increased storm surge using different scenarios.

The 2-foot Inundation Zone was developed consistent with the methodology used by the Southeast Florida Regional Climate Compact, and the mapping process used by the NOAA Coastal Services Center. The Analysis used a digital elevation model (DEM) derived from the latest available Light Detection and Ranging (LiDAR) data in addition to NOAA's VDatum Tool to create a tidal surface. The 2-foot rise in sea level was mapped on top of Mean Higher High Water (MHHW). Inundation Zones for Category 3 and Category 5 Storm Surge under the Sea Level Rise (2ft) Scenario were generated using the Statewide Regional Evacuation Study Surge Model Tool Version 2.9i6, created by Marshall Flynn with the Tampa Bay Regional Planning Council and used previously to produce the County level Storm Atlases of the Statewide Regional Evacuation Study Program.

The created scenario Inundation Zones were used with county Property Appraiser parcel data and Florida Department of Transportation major roads data to identify parcels with structures and roads that could potentially be impacted by the sea level rise scenario.

Table 3.22- Vulnerability to Sea Level Rise and Storm Surge

St. Lucie County

Countywide Estimated Vulnerability to Sea Level Rise and Storm Surge as Increased by Sea Level Rise

Structure Use	Sea Level Rise (2ft) Scenario		Increased Category 3 Storm Surge under Sea Level Rise (2ft)		Increased Category 5 Storm Surge under Sea Level Rise (2ft) Scenario	
	# of Units	Value ($) in	# of Units	Value ($) in	# of Units	Value ($) in thousands
Single Family Residential	1,847	270,561.5	2,018	216,138.2	3,661	287,605.4
Multi-Family Residential	7,347	1,458,039.1	248	165,276.5	770	312,540.1
Mobile Home Residential	2,258	56,894.5	208	4,504.4	146	1,448.5
Institutional/Governmental	140	290,046.6	29	41,190.5	67	166,000.0
Commercial	105	562,849.3	55	16,657.9	93	28,009.2
Industrial	14	5,464.2	36	12,432.7	28	32,447.1
Agricultural	15	1,514.2	5	2,872.3	18	1,455.6
Miscellaneous/Undefined	6	302.2	1	10.7	3	40.5
Total	**11,732**	**2,645,671.6**	**2,600**	**459,083.2**	**4,786**	**829,546.4**

Table 3.23 - Vulnerability to Roadways from Sea Level Rise and Storm Surge

Indian River, Martin, and St. Lucie Counties

Estimated Vulnerability of Treasure Coast Roads to Strom Surge as Increased by Sea Level Rise

Road Functional Classification	Increased Category 3 Storm Surge under Sea Level Rise (2ft) Scenario	Increased Category 5 Storm Surge under Sea Level Rise (2ft)
	Length Inundated (m)	Length Inundated (m)
Rural: Minor Arterial	5,320.52	5,385.94
Urban Collector	53,719.94	121,467.01
Urban: Local	23,041.83	27,253.44
Urban: Minor Arterial	94,017.61	150,691.82
Urban: Principal Arterial - Other	18,175.86	70,000.46
Urban: Principal Arterial - Other Freeways and Expressways	-	1,063.37
Total	**194,275.75**	**375,862.04**

Table 3.24 - Vulnerability to Critical Facilities from Sea Level Rise

St. Lucie County Critical Facilities Estimated Vulnerability to Flooding and								
Category of	Total # of	# of Facilities located in SFHA	# of Facilities Located in Surge Zone					
			Category 1	Category 2	Category 3	Category 4	Category 5	Surge Total
Public Safety	36	6	0	4	1	0	0	5
Healthcare	16	0	0	0	0	0	3	3
Education	91	4	0	0	0	2	1	3
Government	28	2	0	0	0	1	5	6
Infrastructure	41	10	0	3	5	3	0	11
Community Resources	36	6	0	2	5	2	0	9
Recovery Operations	12	0	0	0	0	0	0	0
Shelters	13	0	0	0	0	0	0	0
Group Homes	1	0	0	0	0	0	0	0
Transportation	4	0	0	0	0	0	0	0
Communication	3	1	0	0	0	0	0	0
Banks	0	0	0	0	0	0	0	0
Businesses	0	0	0	0	0	0	0	0
Oil and Gas	4	0	0	0	0	0	0	0
Total	**285**	**29**	**0**	**9**	**11**	**8**	**9**	**37**

Note: See also Section 3.5 – Critical Facilities

3.2.5.6 Risk Assessment – LOW

It is understood that Sea Level Rise is very likely to become more problematic in the future, therefore it is a consideration identified within the 2015 Countywide Post Disaster Redevelopment Plan developed for St. Lucie County by the Treasure Coast Regional Planning Council. St. Lucie LMS will continue to monitor the changes in sea level rise to further assess vulnerability, risk, and impact.

3.2.6 Agricultural Pests and Diseases

3.2.6.1 Hazard Identification

Climate is one of the factors that influence the distribution of diseases borne by vectors (such as fleas, ticks, and mosquitoes, which spread pathogens that cause illness). The geographic and seasonal distribution of vector populations, and the diseases they can carry, depends not only on climate but also on land use, socioeconomic and cultural factors, pest control, access to health care, and human responses to disease risk, among other factors. Daily, seasonal, or year-to-year climate variability can sometimes result in vector/pathogen adaptation and shifts or expansions in their geographic ranges. Such shifts can alter disease incidence depending on vector-host interaction, host immunity, and pathogen evolution (Centers for Disease Control and Prevention).

Florida is among the top three agriculture-producing states in the nation. Agriculture generates farm cash receipts of nearly $6 billion annually, of which, citrus and vegetable crops contribute more than 40%. The industry is susceptible to many hazards including freezes, droughts, and exotic pests or diseases. Agricultural crops are grown throughout the state, and every region is vulnerable

to the effects of an exotic pests or disease infestation. As a result, Florida uses the second highest volume of pesticides in the nation.

Agriculture and citrus production play key role in the St. Lucie County economy; 56.8% of the County is agricultural farmland. The main threats to the St. Lucie County agriculture industry are (1) Citrus canker and greening, (2) Mediterranean fruit fly (Medfly), (3) Tomato Yellow Leaf Curl Virus (TYLCV), and (4) Africanized honeybees.

Citrus Canker and Citrus Greening

Unlike most citrus diseases, which are predominantly fungi (plant-like), citrus canker is a serious bacterial disease. It is microscopic (unseen by the human eye), and can be spread by wind, rain, humans (contact), landscaping (trimming, chipping, cutting, or pruning citrus trees), and fruit removal (peeling, buying, selling, transporting, picking, etc.). Remember that the disease is bacterial in nature and the only remedies existing for its control are decontamination (chemical antibacterial), or sanitation (fire).

The best choice for control is decontamination by antibacterial instead of the latter. The latter choice (firing) involves the eradication of 900 feet of citrus trees within the radius of an infected tree. In a neighborhood or subdivision, this would mean a substantial removal, of neighboring citrus trees for blocks, or in the case of citrus growers the removal of more than 200 acres per infected tree site in contiguous groves.

Since 1995, Citrus Canker has been detected in 24 Florida counties including St. Lucie prior to the 2004 hurricane season, Citrus Canker was confined primarily to South Florida. Florida is currently under a Statewide quarantine by the USDA allowing no citrus to leave the State unless the USDA has issued a limited permit. No Florida grown citrus may enter any other citrus producing states or territories and no citrus plants or parts may enter or exit Florida (Florida Department of Agriculture and Consumer Services, 2012).

Citrus Greening

Huanglongbing (HLB; citrus greening) was discovered in July 2004 in Brazil.is thought to be caused by the bacterium, *Candidatus Liberibacter asiaticus*. HLB has seriously affected citrus production in a number of countries in Asia, Africa, the Indian subcontinent and the Arabian Peninsula. Wherever the disease has appeared, citrus production has been compromised with the loss of millions of trees. In August 2005, the disease was found in the south Florida region of Homestead and Florida City. Since that time, HLB has been found in commercial and residential sites in all counties with commercial citrus (UF-IFAS Citrus Extension, 2013).

Mediterranean Fruit Fly (Medfly)

Another threat to St. Lucie County's agriculture industry is the Medfly. It is one of the world's most destructive pests and infests more than 260 different plants that are important for U.S. food producers, homeowners, and wildlife. It is considered the greatest pest threat to Florida's $1.5 billion citrus crop, as well as endangering many other economically significant crops (Florida Department of Agriculture and Consumer Services, 2020). For example, a Medfly outbreak in 1997 cost an estimated $32 million to eradicate in Manatee, Marion, Orange, Polk, and Sarasota counties (U.S. Department of Agriculture, 1999). Consequences of a long-term or widespread

Medfly infestation in Florida would halt Florida growers from export shipping of fruit and vegetable crops to many foreign and domestic markets. The movement of fruits and vegetables, even within the State, would be disrupted leading to higher prices. Costly post-harvest treatment of fruits and vegetables to meet quarantine restrictions of domestic and foreign markets would also be required and ongoing pesticide treatments by homeowners and commercial growers would be necessary the Medfly is not eradicated in Florida,

Adult Medflies are up to 1/4" long, black with yellow abdomens, and have yellow marks on their thoraxes. Their wings are banded with yellow. The Medfly damages produce by laying eggs in the host fruit or vegetable. The resulting larvae feed on the pulp, rendering the produce unfit for human consumption. In addition to citrus, med flies will feed on hundreds of other commercial and backyard fruit and vegetable crops.

Because medflies are not strong fliers, the pest is spread by the transport of larval-infested fruit. The major threats come from travelers, the U.S. mail, and commercial fruit smugglers. Several steps have been taken to prevent new infestations. State and Federal officials are working with postal authorities to develop ways to inspect packages suspected of carrying infested fruit. In addition, public education efforts carrying the message, "Don't Spread Med" are being expanded (Florida Department of Agriculture and Consumer Services, 1998).

Tomato Yellow Leaf Curl Virus (TYLCV)

The Tomato Yellow Leaf Curl Virus is believed to have entered the state in Dade County sometime in early 1997 (UF, IFAS, 2007). Symptoms vary among tomato types, but in general, leaves produced shortly after infection are reduced in size, distorted, cupped inward or downward, and have a yellow mottle. Less than one in ten flowers will produce fruit after TYLCV infection, severely reducing yields.

The virus is transmitted by adult silver leaf whiteflies. Although frequent applications of pesticides help to decrease whitefly populations and suppress the spread of TYLCV, virus management through whitefly control is not possible in years where whitefly populations are high. Fortunately, the virus is not transmitted through seed or casual contact with infected plants.

Africanized Honeybees

Africanized Honeybees (AHBs) were brought to Brazil in the 1950s for testing as possible alternative pollinators and honey producers because of their reputation of being hardy in tropical environments. At the time, their defensive nature and ability to reproduce in greater numbers were not well understood. Some were accidentally released and have spread throughout South and Central America, Mexico and the southern U.S.

The FDACS reports that Africanized bees have been a threat in the nation’s southwest and southern states since the 1990’s with 17 human deaths reported to present. Florida incurred the first human death from an attack of Africanized bees in April 2008; however, livestock and pets have been the majority of reported deaths. The population has grown and will continue to grow in Florida due to its numerous pathways into the State and the lack of effective eradication products or techniques.

The department monitors 500 bait hives placed throughout the State, primarily in port areas, along Interstate 10 and on the Florida-Alabama border. The bait hives are checked on a three-week cycle based on the reproduction habits of the AHB. St. Lucie County Fire District and Animal Control are equipped to make rescues in the event of an AHB attack. Removal of AHB should be done by private contractors.

NOTE: All honeybees are not Africanized and are a vital part of maintaining a healthy pollination process for habitat retention of several other species and critical to plant, flower, and tree heath and propagation. If there is question on a hive found or bees that cannot be identified, please notify FDEP, the FDACS, and or your local fire rescue or district.

3.2.6.2 Vulnerability Assessment

Agricultural pests and diseases can have the following potential impacts within a community:

- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Agricultural/fisheries damage; and
- Damage to critical environmental resources.

Agricultural pests and diseases are a more significant hazard in those areas of the County where agriculture is a more significant element in the economic base. In 2015-2016, St. Lucie County citrus crops yielded 6.6 million boxes of citrus (FDACS). The State of Florida is ranked fourth in crop acreage production and area harvested for fresh market vegetables and has the second highest tomato sales, bringing in $342 million in 2015-2016 (FDACS 2017 Agricultural Statistics).

3.2.6.3 Probability Assessment - LOW

Given the small number of past events, the probability of future occurrence for agricultural pests and disease is low.

3.2.6.4 Risk Assessment - LOW

At the time of the 2016 LMS, no model was available to determine the potential loss associated due to agricultural pests and disease. Since St. Lucie County has a large agricultural market, damage to the local economy could be significant. Because of the lack of a model, this hazard is not fully profiled.

3.2.7 Dam/Levee Failure

3.2.7.1 Hazard Identification

Ten Mile Creek is an above-ground reservoir of approximately 526 acres surrounded by a 12-to-15-foot-tall embankment. The reservoir was originally designed to store up to 6,000-acre feet of water at an average depth of 10 feet. The project also includes the following components: a natural preserve area, a pump station for filling the reservoir from Ten Mile Creek, a gated water level

control structure for the moderated release of water back to the creek, and a 132-acre STA with associated pumps and structures for water treatment and release. The intent of the WPA is to filter and clean agricultural run-off water before it enters the North Fork of the St Lucie River.

The project was initiated in 2005 by the US Army Corps of Engineers (USACE) with the intent of turning it over to the South Florida Water Management District (SFWMD). Due to construction and legal issues, the project is not complete and has not been turned over to the SFWMD.

3.2.7.2 Historical Occurrences

There are no dam/levee failures that have occurred in the County.

3.2.7.3 Probability Assessment - LOW

Due to this hazard's complexities and its lack of past events, the probability of a future dam/levee failure for St. Lucie County is low.

3.2.7.4 Risk Assessment - MEDIUM

In 2006, the USACE completed a risk and vulnerability assessment based on the original design. Due to re-engineering and construction, this assessment cannot be considered valid. A comprehensive assessment will be done once the legal issues are resolved and the project is completed. As of the 2021 update, there are still no legal resolutions, therefore there is no data available to measure.

3.3 TECHNOLOGICAL HAZARDS

3.3.1 Epidemics and Pandemics

3.3.1.1 Hazard Identification

An epidemic is any rise in cases beyond the baseline for that geographic area.
Epidemics can occur:

- When an infectious agent (such as a virus) suddenly becomes much more prevalent in an area where it already existed
- When an outbreak spreads throughout an area where the disease was not previously known.
- When people who were not previously susceptible to an infectious agent suddenly start getting sick from it.

Infectious diseases emerging throughout history have included some of the most feared plagues of the past. New infections continue to emerge today with the most recent COVID-19 virus becoming a worldwide pandemic that has been affecting the U.S. including Florida and St. Lucie County in February 2020. While many of the old plagues are still with us, new or mutated viruses are emerging regularly. As demonstrated by influenza epidemics and COVID-19, a new infection first appearing anywhere in the world could travel across entire continents within days or weeks. The U.S. and world populations have learned quickly how easily viruses can be carried and spread. Due to the potential of complex health and medical conditions that

can threaten the general population, Florida's vulnerability to an epidemic is continually being monitored. With millions of tourists arriving and departing the State daily, disease and disease exposure (airborne and ingestion) are constantly evaluated and analyzed by the U.S. Center for Disease Control (CDC). Health officials closely monitor this potential threat to the public health. The emphasis upon preventive medical measures such as school inoculation, pet licensing, rodent/insect eradication, water purification, sanitary waste disposal, health inspections, and public health education are mitigation measures taken to thwart potential disasters.

3.3.1.2 Historic Events

During the 2013-2014 season, influenza A (H3N2), 2009 influenza A (H1N1), and influenza B viruses circulated in the United States. 2009 H1N1 viruses predominated overall during the 2013-14 flu season, though influenza B viruses became the predominant virus nationally later in the season causing increases in flu-like symptoms and illness. After several recent influenza A (H3N2)–predominant seasons, 2013-14 was the first H1N1–predominant season since the 2009 H1N1 pandemic (CDC, 2015).

In 2014, the West African Ebola epidemic is the largest in history at that time, affecting four countries. Two imported cases, including one death, and two locally acquired cases in healthcare workers have been reported in the U.S.. The U.S. CDC and partners are taking precautions to prevent additional cases of Ebola in the United States (CDC, 2015). Florida Department of Health - St. Lucie County, St. Lucie County Fire District, Cleveland Clinic (Formerly Martin Health Systems), and the St. Lucie County Sheriff's Office developed a response plan and trained and equipped responders to respond to such an incident should it occur in the County.

Food Contamination

Another potential threat to south Florida's population is food contamination. Frequent news stories document that *E. coli* and botulism breakouts throughout the country are not that uncommon. Most recently, millions of pounds of possibly contaminated beef from the Hudson packing plant were seized by the Department of Agriculture and destroyed.

3.3.1.3 Vulnerability Assessment

Epidemics and pandemics can have the following potential impacts within a community:

- Population Isolation
- Human Health & Safety;
- Psychological Hardship;
- Economic Disruption;
- Widespread unemployment;
- Disruption of Government and Community Services;
- Impact on emergency services; and
- Agricultural/Fisheries Damages.

High-density, low-income communities or neighborhoods that have antiquated well and septic systems in older neighborhoods tend to be at higher risk for illnesses associated with epidemics.

Advances in community health programs have reduced the potential for future occurrence of epidemics, therefore making communities as a whole less vulnerable.

3.3.1.4 Probability Assessment – MEDIUM

At the time, the 2016 LMS was written, the potential for future pandemic occurrence was expected to be low. In February of 2020 and as of this update (2021), there is a significant concern that mutation and the slow movement toward mass vaccination, will allow for continued response to the current pandemic impacts and the impacts of the future. Due to these factors, the probability of a future occurrence for St. Lucie County is medium.

3.3.1.5 Risk Assessment - MEDIUM

Modeling was not conducted to determine potential losses associated with an epidemic or pandemic in St. Lucie County. However, since February 2020 and the onset of COVID-19, there has been significant data generated to illustrate losses in every job sector, jurisdictional, national, and foreign trade, health, hospital, human services, and community wellbeing of residents, and all levels of government policy making. An update to future risk assessment, will rely heavily on the experiences and outcome of the current pandemic affecting St. Lucie County, and the nation.

3.3.2 Radiological Accidents

3.3.2.1 Hazard Identification

While the probability of an actual release of radioactive material is extremely unlikely and the immediate threat to life extremely low, vulnerability to a nuclear plant disaster could consist of long-range health effects with temporary and permanent displacement of population from affected areas. The potential danger from an accident at a nuclear power plant is exposure to radiation. This exposure could come from release of radioactive material from the plant into the environment, usually characterized by a plume (cloudlike) formation. The area the radioactive release may affect is determined by the amount released from the plant, wind direction and speed, and weather conditions (e.g., rain) that would quickly drive radioactive material into the ground, hence causing increased deposition of radionuclides.

Twenty eight of the 67 counties in the State of Florida are involved in preparedness planning for a commercial nuclear power plant emergency. Emergency Planning Zones (EPZs) have been designated for each power plant to enhance planning efforts for an emergency. An EPZ is comprised of two zones, the 10- mile plume exposure zone and the 50-mile ingestion exposure zone. Specific coordinating procedures for response at a nuclear power plant has been prepared in the form of Standard Operating Procedures, including Emergency Classification Levels (ECLs) which are listed below. They assist in public notification and are defined by four categories by the Nuclear Regulatory Commission (NRC).

- **Notification of Unusual Event** - Events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response

or monitoring are expected unless further degradation of safety systems occurs.

- **Alert** - Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life-threatening risk to site personnel or damage to site equipment because of Hostile Action. Any releases are expected to be limited to small fractions of the Environmental Protection Agency (EPA) protective action guides (PAGs).

- **Site Area Emergency** - Events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or hostile action that results in intentional damage or malicious acts; 1) toward site personnel or equipment that could lead to the likely failure of or 2) that prevent effective access to, equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA PAG exposure levels beyond the site boundary.

- **General Emergency** - Events are in progress or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity or hostile action that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area.

3.3.2.2 Vulnerability Assessment

The St. Lucie Nuclear Power Plant (SLNPP) is located on North Hutchinson Island in St. Lucie County. The facility contains two reactors and is owned and operated by the Florida Power & Light Corporation (FP&L). This places the northeast quadrant of St. Lucie County, the City of Fort Pierce, St. Lucie Village, and Port St. Lucie (Zone 7) within the 10-mile EPZ, and places the entire County within the 50-mile IPZ. St. Lucie County Division of Emergency Management has a radiological coordinator on staff.

Emergency response plans written and maintained by the County exceed FEMA's criteria to protect the health and safety of the residents of the County. FEMA reviews the plans annually. Radiological accidents can have the following potential impacts on a community:

- Electrical power outage;
- Surface and air transportation disruption;
- Telecommunications system outage;
- Human and health safety;
- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Damage to critical environmental resources; and
- Toxic releases.

Nuclear power plant emergency drills are held annually, and FEMA conducts evaluated exercises biennially. Evacuation, notification, and emergency response plans are reviewed by FEMA, incorporated within exercises and evaluation and then incorporated into Florida's Annual Letter

of Certification to FEMA to provide reasonable assurance to the NRC that St. Lucie County's plan and procedures are more than adequate to respond to an emergency at the nuclear power plant.

3.3.2.3 Probability Assessment – LOW

Based on the absence of previous radiological emergencies at the SLNPP and the enhanced safety protocols used at the location, the probability of a future occurrence is low.

3.3.2.3 Risk Assessment - HIGH

Chernobyl, Ukraine in 1986 and Fukushima Japan in 2011 nuclear incidents were due to inadequate design and emergency redundancies. Nuclear power plants in the United States are required to have more redundant systems in place to ensure they will not experience the same failures. There have not been any emergencies requiring response to an incident at the SLNPP to date. Since 2011, the NRC has re-evaluated geological conditions and tsunami probability in this region and have re-confirmed the original evaluation that the SLNPP is not at risk from either hazard. The SLNPP is built 28' above sea level and will not suffer damage from storm surge inundation, or freshwater flooding that could jeopardize the plant's integrity.

3.3.3 Power Failures

3.3.3.1 Hazard Identification

Power failure can result from a variety of related natural and man-made causes such as hurricanes and associated debris, sagging lines due to hot weather, flashovers from transmission lines to close to trees, and incorrect relay settings. Widespread hurricane damage in Florida in 2004 and 2005 resulted in lengthy sustained electric service interruptions for millions of utility customers. No portion of the state is immune to widespread and lengthy electric service interruptions associated with powerful storms that may strike the State during hurricane season.

Nationwide, electric utilities plan their bulk power systems to comply with reliability standards set by the North American Electric Reliability Council (NERC). NERC is comprised of eight regional electric reliability councils. NERC and the regional reliability councils ensure that the bulk electric system in North America is reliable, adequate, and secure. The Florida Reliability Coordinating Council (FRCC) is responsible for ensuring that Peninsular Florida's electric utilities meet federal reliability standards. The FRCC has contracted with Florida Power & Light Company (FPL) to act as the Security Coordinator for Peninsular Florida. The Security Coordinator monitors system conditions in real-time using remote telemetry units at substations and other points in the electric system. The Security Coordinator gathers data on power flows, voltages, and the status of various switching and relaying equipment in the FRCC region.

The Florida Electrical Emergency Contingency Plan was developed to address generating capacity issues, equipment capacity, and consumer demand. Due to State or local emergencies, the Florida Electrical Emergency Contingency Plan was developed. The Contingency Plan has four stages (Florida Reliability Coordinating Council, 2004).
The plan: (1) provides for early identification of situations that could lead to electricity shortages; (2) coordinates actions among utilities, regulators, and state and local emergency

agencies, (3) establishes a communication network to assist consumers during an electricity shortage; and (4) issues appeals for voluntary conservation. Alerts have been created to give early warning of potential electricity shortfalls and bring utilities, emergency management officials, and the public to a state of preparedness.

Generating Capacity Advisory

A Generating Capacity Advisory is primarily for information purposes. It starts utility tracking activities, and it initiates inter-utility and inter-agency communication. No action by the public is required. General information may be distributed to consumers to forewarn them of conditions if necessary.

Generating Capacity Alert

A Generating Capacity Alert starts actions to increase reserves. Available emergency supply options will be explored. When reserves fall below the size of the largest generating unit in the state, loss of that size unit to an unexpected mechanical failure could lead to blackouts somewhere since insufficient backup is available.

Generating Capacity Emergency

A Generating Capacity Emergency occurs when blackouts are inevitable somewhere in Florida. Every available means of balancing supply and demand will be exhausted. Rolling blackouts, manually activated by utilities, are a last resort to avoid system overload and possible equipment damage. Frequent status reports are provided to agencies and the media. The Division of Emergency Management will consider using the Emergency Broadcast System to inform citizens of events and to direct them to available shelters if conditions warranted. Recognizing the consequences of a loss of electricity, individual utility emergency plans include provisions for special facilities critical to the safety and welfare of citizens.

System Load Restoration

System Load Restoration is instituted when rolling blackouts have been terminated and power supply is adequate. It is the recovery stage, and efforts are made to provide frequent system status reports.

3.3.3.2 Historic Events

In the U.S., from July 2nd to August 10th, 1996, the Western States Utility Power Grid reported widespread power outages that affected millions of customers in several western states and adjacent areas of Canada and Mexico.

A massive power outage struck the northeast on August 14th, 2003. Areas affected by the outage included New York City and Albany, New York; Cleveland and Toledo, Ohio; Detroit and Lansing, Michigan; parts of New Jersey and Connecticut; as well as Toronto and Ontario, Canada. The most extensive power failure in history, it shut down 10 major airports, 9 power plants, affected 50 million people, and led to a declared State of Emergency in New York City. The Ford Motor Company lost production capability at 21 of its facilities. Two deaths and 71 fires

were attributed to the outage in New York City alone (Gellman and Milbank, 2003). The preliminary economic impacts of this event are large. It is estimated that the power failure cost approximately $1 billion including $800 million in unsold goods and services and $250 million in spoiled food.

3.3.3.3 Vulnerability Assessment

The vulnerabilities of all communities to power failures are considered moderate. The power grid throughout St. Lucie County is diversified, and there are no single choke points or distribution nodes whose failure would disrupt power distribution to the entire community.

Power failure can have the following potential impacts on a community:

- Electric power outage;
- Surface and air transportation distribution;
- Potable water system loss or disruption;
- Sewer system outage;
- Telecommunications system outage;
- Human and health safety;
- Psychological hardship;
- Economic disruption; and
- Disruption of community and essential services

3.3.3.4 Probability Assessment – HIGH / LOW

The probability of future occurrence of small-scale power outages in St. Lucie County is high, due to the frequency of thunderstorms and lightning as well as extremely minor transportation system accidents. The probability of future occurrence of large-scale power outages in St. Lucie County is low.

3.3.3.5 Risk Assessment - MEDIUM

At the time of publication, no model was available to determine the potential loss associated with power failure in St. Lucie County.

3.3.4 Hazardous Materials Accidents

3.3.4.1 Hazard Identification

Hazardous materials accidents, spills, and/or releases can occur on roadways, rail, or fixed facility storing or transporting hazardous materials. The entire State is at risk to an unpredictable accident of some type. Most accidents are small spills and leaks that can be contained onsite. However, but some incidents result in large scale releases of hundreds or thousands of gallons/pounds of materials that causes minor or major injuries, property damage, environmental contamination, or other consequence. Hazardous materials can be poisonous, corrosive, flammable, radioactive, and/or toxic and pose dangers to humans, wildlife, and environments. Hazardous materials are regulated by the U.S. Department of Transportation, the Environmental Protection Agency (EPA),

and the Departmental of Environmental Protection (DEP).

Emergencies involving hazardous materials can be expected to range from a minor accident with no off- site effects to a major accident that may result in an off-site release of hazardous or toxic materials. The overall objective of chemical emergency response planning and preparedness is to minimize exposure for a wide range of accidents that could produce off-site levels of contamination in excess of Levels of Concern established by the EPA. Minimizing this exposure will reduce the consequences of an emergency to people in the area near to facilities that manufacture, store, or process hazardous materials (TCRPC, 1998).

A large volume of hazardous materials is transported to and through the County by railroad and highway, air, water, and pipeline daily. Within St. Lucie County, there are several both public and private fixed facilities that produce or use hazardous materials. Coordinating procedures for hazardous material response are found within the County's Emergency Plan for Hazardous Materials. U.S. Highway 1 is the main urban north-south route connecting the adjacent counties and serving the coastal area. The Florida Turnpike, a north-south toll route, and Interstate 95 bisect the County, running parallel to each other. Two railroads pass through St. Lucie County, running north and south. The eastern railroad is serviced by Florida East Coast Railway, and the western railroad by the CSX Corporation. In addition to the County's Emergency Plan for Hazardous Materials, Local Emergency Planning Committee officials have prepared a plan for use in responding to and recovering from a release of hazardous or toxic materials. This plan addresses the range of potential emergency situations and the appropriate measures to be implemented to minimize exposure through inhalation, ingestion, or direct exposure (TCRPC, 1998). Within the County there are numerous public and private facilities that store hazardous materials and Extremely Hazardous Substances (EHS's). The frequency of fixed facility hazardous materials releases is 3-5 per year with the majority of these having been small-scale incidents. The severity of impact of such an event depends on the proximity to population, chemical character, wind direction, response capability and situational awareness. Under SARA Title III reporting there are fifty- two sites storing EHS's in the County. The number of facilities varies from year to year as new facilities come online and others permanently remove chemicals.

The Florida Gas Transmission Company (GSTC) owns and operates a line that transports natural gas through St. Lucie County. GSTC has a pressure booster facility on Orange Avenue Extension. Several other companies have buried distribution and feeder pipes throughout the County.

Mishandling and improper disposal or storage of medical wastes and low-level radioactive products from medical use are also a hazard to St. Lucie County. For example, a few years ago an incident occurred in New Jersey when improper disposal of medical wastes resulted in some of the used products ending up on Atlantic Ocean beaches.

3.3.4.2 Vulnerability Assessment

The Emergency Planning and Community Right-to Know Act (EPCRA) Section 304 (Emergency Notification) requires facilities to notify the State Emergency Response Commission (SERC) housed under Florida Department of Emergency Management (FDEM) and the Local Emergency Planning Commission (LEPC) if there is a release into the environment of an Extremely Hazardous Substances (EHSs) or CERCLA hazardous substance (HS) equal to or exceeding minimum

reportable quantities. The EPA issues a List of EHSs and the reportable and release threshold quantities that trigger chemical and business registration and inventory reporting to enhance response to accidental releases to protect people and environment.

There are several factors that determine a community's vulnerability to a chemical release. The State of Florida State Emergency Response Commission (SERC), and the Treasure Coast Local Emergency Planning Committee (LEPC) work to minimize threat and risk though public education, but the others include:

- The major road and railway transportation routes that pass through a community
- Facilities that store, manufacture, and/or transport hazardous materials generators located in or near the community; and
- Response resources (trained personnel and equipment) able to respond to an area of possible impact from a hazardous materials release.

Hazardous materials events can have the following potential impacts within a community:

- Surface and air transportation disruption;
- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Fire; and Toxic releases.

Overall, St. Lucie County has a moderate vulnerability to impacts from hazardous materials releases. There are relatively few major generators within the County, and those that do exist are generally not situated in urban or major population centers. Areas of high vulnerability for these hazardous materials accidents are the Cities of Fort Pierce and Port St. Lucie, due to the transportation networks (both highway and rail) that pass through these areas.

Because of its location relative to the St. Lucie NPP, all of St. Lucie County has a high vulnerability to a nuclear power plant accident or nuclear materials release and this is discussed under the Nuclear Hazards section of this Plan.

3.3.4.3 Probability Assessment – MEDIUM

The probability of future occurrence of hazardous materials accidents in the County remains medium due to major transportation routes in the County and the low chance of new facilities. The frequency of fixed facility hazardous materials releases in the county is 1-3 per year with the majority of these having been small-scale incidents and transportation related accidents (Florida Division of Emergency Management, State Watch Office 2019).

3.3.4.4 Risk Assessment - MEDIUM

HAZUS software is available to determine scenario driven potential losses associated with hazardous materials accidents in St. Lucie County. St. Lucie County has 56 EPCRA Section 302

facilities that store, manufacture, and or transport EHSs. These facilities file annual chemical inventory reports with the State of Florida SERC and TCLEPC to maximize knowledge to hazardous materials response teams and minimize risk for release through preparedness. The County also participates in the Small Quantity Waste Generator (SQG) program in partnership with Florida Department of Environmental Protection (FDEP). This program monitors facilities and amounts of chemical waste generated by each facility. Chemicals range from used oil and antifreeze, recyclable metals such as aluminum, paint solvents, and spent halogen and fluorescent lamps.

3.3.5 Transportation System Accidents

3.3.5.1 Hazard Identification (Highway, Rail, Air and Sea)

Florida has a large transportation network consisting of major highways, airports, marine ports, and passenger railroads. The heavily populated areas of St. Lucie County are particularly vulnerable to serious accidents, which are capable of producing mass casualties. With the linear configuration of several major highways in St. Lucie County, such as interstate highways and the Florida Turnpike, major transportation accidents could occur in a relatively rural area, severely stressing the capabilities of local resources to respond effectively. A major transportation accident could also involve a large number of tourists and visitors from other countries, given Florida's popularity as a vacation destination, further complicating the emergency response to such an event.

As a major industrial nation, the U.S. produces, distributes, and consumes large quantities of oil. Petroleum-based oil is used as a major power source to fuel factories and various modes of transportation, and in many everyday products, such as plastics, nylon, paints, tires, cosmetics, and detergents. With billions of gallons of oil being stored throughout the country, the potential for an oil spill is significant, and the effects of spilled oil can pose serious threats to the environment.

3.3.5.2 Historic Events

A notorious example is the crash in the Everglades of ValuJet Flight 597 on May 11, 1996, which resulted in 109 fatalities and cost millions of dollars, severely taxing the financial and public safety resources of Dade County. In 2010, an oil-drilling platform in the Gulf of Mexico had exploded. The Deepwater Horizon explosion resulted in an estimated 4.9 million barrels of oil being discharged into the Gulf of Mexico. Coastal communities had cleaned up 4.6 million pounds of oily material in 2013. St. Lucie County was not impacted by the oil spill (Encyclopedia Britannica, 2014).

3.3.5.3 Vulnerability Assessment

St. Lucie County has about 22 miles of Atlantic Ocean coastline that is subject to contamination caused by an oil spill. There are two active oil field regions in Florida: in Escambia and Santa Rosa counties in the Panhandle, and Collier, Dade, Hendry, and Lee counties in southwest Florida. Oil spills may occur from various activities including pipeline ruptures; well blowouts; leaking oil storage containers; and activities associated with offshore oil exploration, production, and transportation.

The probability of coastal oil spills in St. Lucie County is currently in the medium to low range, with low frequency and a potential for high severity of impacts to beaches, wildlife, community populations and tourism. St. Lucie County has an extremely limited history of minor oil spills. Florida prohibits oil drilling in its waters within 125 miles of its shoreline, yet St. Lucie County is vulnerable to coastal oil spills resulting from in-shore activities as well as from the aftereffects of hurricanes on offshore tanker transport ships. Regardless of cause, a large coastal oil spill could directly affect the value of the properties involved and, in the case of a long-term incident, could damage the overall coastal recreational and commercial activities of the area. St. Lucie County Emergency Management and the Engineering Department, including coastal engineering, actively participates with the U.S. Coast Guard in the planning and maintenance of the Area Contingency Plan (ACP) for St. Lucie County in planning for an oil spill impacting the County. The ACP was significantly updated after Deep Water Horizon.

Transportation system accidents can have the following potential impacts within a community:

- Surface and air transportation disruption;
- Navigable waterway impairment;
- Human health and safety;
- Economic disruption;
- Disruption of community services;
- Environment;
- Wildlife and Habitat;
- Fire; and
- Toxic releases.

3.3.5.4 Probability Assessment – LOW

Due to the minor history of the various transportation systems accidents and the geographical location of St. Lucie County, the probability of a future occurrence for a significant transportation systems accident is deemed low.

3.3.5.5 Risk Assessment - MEDIUM

The St. Lucie County International Airport (SLCIA), referred to as "The Gateway to the Bahamas," is a busy general aviation airport owned and operated by the St. Lucie County Board of County Commissioners. The Treasure Coast International Airport and Business Park Master Plan was updated in 2011. Aviation is an important element of the economy in St. Lucie County, and this activity raises the County's vulnerability to aviation associated accidents. The airport is home to more than 200 privately owned aircraft. There are nine (9) flight schools, several commercial aircraft construction and maintenance operations. The airport is located directly to the north of the City of Fort Pierce, and the runway approach passes directly over the Town of St. Lucie Village.

Vulnerability to transportation system accidents is also associated with the highway and rail systems that run through the County. Individual community and population center vulnerabilities to this hazard are entirely dependent upon location. The City of Fort Pierce is the County's major transportation hub, with rail yards, trucking centers, and a port. Transportation accidents have

created blockages of highways within the City. Due to their locations along the rail line, both St. Lucie Village and unincorporated South Indian River Drive have higher vulnerabilities to rail system accidents. St. Lucie Village also is more vulnerable to plane crashes due to its location relative to the St. Lucie airport. The western, unincorporated portion of the County and City of Port St. Lucie has higher vulnerability to major highway accidents due to the presence of I-95 and the Florida Turnpike.

The Port of Fort Pierce is located within the Indian River Lagoon, a designated National Estuary under the EPA's National Estuary Program (Section 320 - 33 USC 1330) of the Clean Water Act. As such, this Port is located within an environmentally sensitive area. Spills of any type in such areas are of more significance due to the sensitive nature of the environmental resources seen there.

At the time of publication, data were not available to determine the potential loss in St. Lucie County due to transportation system accidents.

Figure 3.17 – Forecast of Aviation Activity

FAA APPROVED FORECAST SUMMARY				
	2008 *(Base Year)*	**2013**	**2018**	**2028**
AIRCRAFT OPERATIONS				
Air Taxi	953	1,088	1,244	1,623
Military	357	357	357	357
Itinerant General Aviation	85,566	92,650	101,009	123,625
Local General Aviation	73,400	82,014	92,261	117,993
TOTAL OPERATIONS	**160,277**	**176,111**	**194,871**	**243,599**
PEAK OPERATIONS				
Peak Month	16,704	18,354	20,309	25,387
Average Day	691	759	840	1,050
Peak Hour	104	114	126	158
BASED AIRCRAFT				
Single-Engine Piston	122	137	155	199
Multi-Engine Piston	59	59	59	59
Turboprop	12	13	14	17
Jet	14	20	26	46
Helicopter	4	5	6	8
TOTAL BASED AIRCRAFT	**211**	**233**	**260**	**327**
ANNUAL INSTRUMENT APPROACHES				
Instrument Operations	24,261	26,918	29,865	36,764

Source: St. Lucie County International Airport Master Plan (2011)

3.3.6 Wellfield Contaminations

3.3.6.1 Hazard Identification

The development of wellfield protection programs is a major preventative approach for the protection of community drinking water supplies. Wellfield protection is a means of safeguarding public water supply wells by preventing contaminants from entering the area that contributes water to the well or wellfield over a period of time. Management plans are developed for the wellfield protection area that include inventorying potential sources of ground water contamination, monitoring for the presence of specific contaminants, and managing existing and proposed land and water uses that pose a threat to ground water quality.

Ground water is an essential natural resource. It is a source of drinking water for more than half of the U.S. population and more than 95% of the rural population. In addition, ground water is a

support system for sensitive ecosystems, such as wetlands or wildlife habitats.

3.3.6.2 Historic Events

Between 1971 and 1985, there were 245 ground water-related outbreaks of disease, resulting in more than 52,000 individuals being affected by associated illnesses. While most of these diseases were short- term digestive disorders caused by bacteria and viruses, hazardous chemicals found in wells nationwide also pose risks to public health.

The 1986 Amendments to the Federal Safe Drinking Water Act require states to implement wellfield protection programs for public water wells. Prevention strategies include maintaining isolation distances from potential contamination sources, reporting to the state violations of isolation distance, and asking a local governmental unit to regulate these sources.

3.3.6.3 Vulnerability Assessment

St. Lucie County's Conservation Element of the Comprehensive Plan contains a policy regarding wellfield protection. The policy (8.1.5.1) outlines the following standards for wellfield protection within the County:

1. Assure adequate and safe water supplies to present and future citizens of the County;
2. Comply with Federal and State regulations in the best interests of the County and its future growth and development;
3. Avoid crisis water supply situations through careful groundwater resources planning and conservation;
4. Identify and protect the functions of public wellfield areas, including recharge of those areas, and provide incentives to keep the present and future public well fields compatible with the needs expressed in 1) above;
5. Ensure that new development is compatible with existing local and regional water supply capabilities; and
6. Protect present and future public well fields against depletion and contamination through appropriate regulation, incentives, and cooperative agreements.

Cleaning up contaminated ground water can be technically difficult, extremely expensive, and sometimes simply cannot be done. Contaminated ground water also affects the community by discouraging new businesses or residents from locating in that community. Wellfield contamination may have the following potential impacts within a community:

- Potable water system loss or disruption;
- Sewer system outage;
- Human health and safety;
- Psychological hardship;
- Economic disruption; and
- Disruption of community services.

Section 6.03.00 of the St. Lucie County Land Development Code also outlines requirements for

protecting wellfields within the County. Wellfield contamination has not been a major problem for most of St. Lucie County. There is some potential exposure to this hazard in the eastern portion of the County, but overall, the County vulnerability to this hazard is considered low.

3.3.6.4 Probability Assessment – LOW

As there have been no significant instances of wellfield contaminations within St. Lucie County, the probability of a future occurrence is low.

3.3.6.5 Risk Assessment - LOW

At the time of publication, no data were available to determine the potential loss associated with wellfield contamination in St. Lucie County. However, wellfield contamination has not been a major problem for most of St. Lucie County. There is some potential exposure to this hazard in the eastern portion of the County, but overall, the County's risk to this hazard is considered low.

3.3.7 Communications Failures

3.3.7.1 Hazard Identification

As society emerges from industrial production into the age of information, we are seeing new kinds of technological accidents/disasters. Recently, a communications failure occurred that was the worst in 37 years of satellite service. Some major problems with the telecommunications satellite Galaxy IV drastically affected 120 companies in the paging industry. Radio and other forms of news broadcasts also were affected. The pager failure not only affected personal and business communications, but emergency managers and medical personnel as well.

3.3.7.2 Vulnerability Assessment

Communications failure can have the following potential impacts within a community:

- Telecommunications system outage;
- Economic disruption; and
- Disruption of community services.

Communications failures have a greater potential to produce adverse economic impacts in business- based rather than retirement or residential communities. On the other hand, communications system failures in residential and retirement communities may put more human lives at risk. St. Lucie County's vulnerability to communications systems failures is generally considered moderate. The Cities of Fort Pierce and Port St. Lucie have a higher vulnerability to this hazard because they are centers of government and business within the County. St. Lucie County's vulnerability to this hazard is no greater or less than most other Florida coastal counties. The County and all jurisdictions maintain a robust system of redundancy in the communications structure. St. Lucie County has two redundant data centers, one at the Information Technology Data Center and one at the Emergency Operations Center. These data centers provide

redundancy for much of the County's IT infrastructure.

3.3.7.3 Probability Assessment – LOW

Based off the lack of significant past events and the operation of important back-up measures put into place, the probability of future occurrence of communications failure in St. Lucie County is low.

3.3.7.3 Risk Assessment - LOW

At the time of publication, no data were available to determine the potential losses in St. Lucie County due to communications failure, however, human and health services, law enforcement and fire rescue would certainly be compromised with downed communications.

3.4 HUMAN CAUSED HAZARDS

This subsection will now identify those hazards in St. Lucie County identified as being human caused hazards.

3.4.1 Terrorism and Sabotage

3.4.1.1 Terrorism

Terrorist attacks both foreign and domestic may pose a threat to our community at any time. These attacks may take the form of chemical releases, biological, mass shootings, or improvised explosives, commonly referred to by the Region 5 Central Florida Regional Domestic Security Task Force (RDSTF) as CBRNE (Chemical, Biological, Radiological, Nuclear and Explosive Incendiary). In 2001, several letters containing anthrax were delivered to various locations in the United States. One of them was sent to a tabloid media center in Boca Raton, Florida resulting in one person dying from the exposure and a second employee being hospitalized, and five others exposed without effect.

The building was closed and required federal assistance to decontaminate the facility. Public hysteria from the event impacted emergency services across the United States with concern that biological agents could have been released to the public at other venues as well. Public governmental/political, transportation, commercial, infrastructure, cultural, academic, research, military, athletic, and other activities, and facilities constitute opportunistic targets for attacks causing catastrophic levels of property and environmental damage, injury, and loss of life. Acts of terrorism also can create disasters, which threaten the safety of a large number of citizens.

3.4.1.2 Historic Events

On September 11, 2001, terrorists attacked the World Trade Center in New York City and the Pentagon in Washington, DC, crashing hijacked commercial airplanes into the structures. Approximately 3,000 civilians and emergency response personnel perished in the attack. The long-term economic and psychological impacts of this event are astounding. New York City

alone experienced capital losses totaling 34 million dollars. The World Trade Center bombing attack resulted in a loss of 12.5 million square feet of office space and damaged 7.7 million more. The insured losses associated with the event totaled 52 million dollars to date. The City estimates that 125,300 jobs were lost because of the attack (National Conference of State Legislatures, 2003).

3.4.1.3 Cyber Attacks - Computer and Sabotage

The President's Commission on Critical Infrastructure Protection (PCCIP) recently reported that there is increasing threat that the U.S. could suffer something like an "Electronic Pearl Harbor." Networked information systems present new security challenges in addition to the benefits they offer. Long-term power outages could cause massive computer outages, with severe economic impacts such as loss of sales, credit checking, banking transactions, and ability to communicate and exchange information and data. "Today, the right command sent over a network to a power generating station's control computer could be just as effective as a backpack full of explosives, and the perpetrator would be harder to identify and apprehend," states the PCCIP report.

With the growth of a computer-literate population, increasing numbers of people possess the skills necessary to attempt such an attack. The resources to conduct a cyber-attack are now easily accessible everywhere. A personal computer and an Internet service provider anywhere in the world are enough to cause a great deal of harm. Threats include:

- Human error;
- Insider use of authorized access for unauthorized disruptive purposes;
- Recreational hackers - with or without hostile intent;
- Criminal activity - for financial gain, to steal information or services, or organized crime;
- Industrial espionage;
- Terrorism - including various disruptive operations; and
- National intelligence - information warfare, intended disruption of military operations.

The effects of such activities may take the form of disruption of air traffic controls, train switches, banking transfers, police investigations, commercial transactions, defense plans, power line controls, and other essential functions. The loss of computer access, and IT capabilities and services are a hardship for businesses, citizens, and safety. Computer failures could affect emergency communications as well as routine civilian applications, such as telephone service, banking and brokerage transactions, credit card payments, Social Security payments, pharmacy transactions, airline schedules, etc.

3.4.1.4 Vulnerability Assessment

Terrorism and sabotage events can have the following potential impacts within a community:

- Electric power outage;
- Surface and air transportation disruption;
- Potable water system loss or disruption;
- Sewer system outage;
- Telecommunications system outage;
- Human health and safety;

- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Damage to critical environmental resources;
- Damage to identified historical resources;
- Fire; and Toxic releases.

A decade ago, the possibilities for terrorism and sabotage in St. Lucie County was extremely limited, and the County's vulnerability to this hazard very low. However, local governments and agencies data are being held captive through computer viruses. The data is released upon payment of a ransom to the hijacker(s). Local governments are investing in protection software to protect electronic assets costing governments and taxpayers thousands. The City of Fort Pierce has a slightly higher vulnerability to terrorism as the center of government including the federal courthouse, but this vulnerability is still considered low. Port St. Lucie has a slightly higher risk of what may be described as "Celebrity Terrorism" due to the national prominence of some of their citizens, New York Mets Spring Training, but the overall community vulnerability remains low. St. Lucie County would be vulnerable to terrorist acts targeting (a) the nuclear power facility; (b) food production facilities; (c) water and wastewater treatment facilities; (d) public/crowded events; and (e) residents with considerable wealth.

3.4.1.5 Probability Assessment - LOW

Although terrorism has come to the forefront recently, in St. Lucie County, the probability of future occurrence is low due to the County's history in regard to this hazard.

3.4.1.6 Risk Assessment – LOW/MEDIUM

At the time of publication, no data were available to determine the potential loss in St. Lucie County due to terrorism.

3.4.2 Civil Disturbances

3.4.2.1 Hazard Identification

As in any other area, St. Lucie County is subject to civil disturbances in the form of riots, mob violence, and a breakdown of law and order in a focalized area. Communities with racial mixtures, gang violence, and drug trafficking are increasingly aware of the need to plan for civil disturbance emergencies. Although they can occur at any time, civil disturbances are often preceded by periods of increased tension caused by questionable social and/or political events such as controversial jury trials or law enforcement actions. Police services are responsible for the restoration of law and order in any area of the County.

3.4.2.2 Vulnerability Assessment

Civil disturbance can have the following potential impacts within a community:

- Surface and air transportation disruption;

- Human health and safety;
- Psychological hardship;
- Economic disruption;
- Disruption of community services;
- Damage to identified historical resources; and
- Fire.

The City of Fort Pierce has a moderate vulnerability in this area, and the Indiantown area has a low vulnerability. In general, civil disturbance is not a significant hazard faced by St. Lucie County.

3.4.2.3 Probability Assessment - LOW

The probability of future occurrence of civil disturbances in St. Lucie County is considered very low as there has been no significant events to date.

3.4.2.4 Risk Assessment - LOW

At the time of publication, no data were available to determine the potential loss in St. Lucie County due to civil disturbance.

3.4.3 Mass Migration

3.4.3.1 Hazard Identification

Florida's location as the nearest U.S. landmass bordering the Caribbean basin makes it a chosen point of entry for many migrants attempting to enter the country illegally. A major consequence of a mass arrival of illegal immigrants could be a disruption of the routine functioning of the impacted community, resulting in significant expenditures related to the situation. Enforcement of immigration laws is a Federal government responsibility. However, it is anticipated that joint jurisdictional support of any operation will be required from the State and local governments.

3.4.3.2 Historic Events

An example of this threat occurred in 1994, when the state responded to two mass migration incidents. In May 1994, there was an unexpected migration of approximately 100 Haitian refugees; while in August 1994, there was an influx of 700 Cubans. These events are typically preceded by periods of increasing tension abroad, which can be detected and monitored.

3.4.3.3 Vulnerability Assessment

The Atlantic shore of St. Lucie County is the sporadic scene of the arrival of undocumented immigrants. The County has both the history and the potential for the unannounced arrival of a large number of immigrants.

Until relieved of the responsibility by the State and Federal governments, St. Lucie County must be capable of providing mass refugee care to include shelter, food, water, transportation, medical, police protection, and other social services. St. Lucie County is growing in population. However, a sudden mass exodus or migration to the area could strain or overwhelm local resources

and infrastructure. During a mass migration, community populations can increase significantly when large numbers of families are displaced from other communities fleeing disaster impacts. Temporary mass migration into the County may require shelter services in a host capacity. Additional reliance on community members, hotels, churches and state and federal programs may be necessary to house dislocated families.

Mass migration can have the following potential impacts within a community:

- Human health and safety;
- Psychological hardship;
- Economic disruption; and
- Disruption of community services.

Reviewing the data on past mass population movements such as the Haitian influx and Cuban raft incidents of the 1980's indicates that mass migration has never reached a crisis state for the local authorities in St. Lucie County. Overall, the County vulnerability to this hazard is very low. Due to demographic features, the City of Fort Pierce has a slightly higher, but still low vulnerability to illegal migration impacts.

3.4.3.4 Probability Assessment – LOW

There is a low probability for experiencing a heightened mass migration event in St. Lucie County; there have been no reported incidents at this point in time.

3.4.3.5 Risk Assessment - LOW

At the time of publication, no data were available to determine the potential loss in St. Lucie County due to mass migration.

3.5 CRITICAL FACILITIES

St. Lucie County has conducted an inventory of critical facilities located within the hazard areas boundaries. For purpose of this LMS these include emergency service facilities, medical facilities, government facilities, schools, emergency/evacuation shelters, fire and police stations, emergency operation center, facilities used by special needs populations, and any other facilities identified by the Division of Emergency Management. Those critical facilities that are highlighted [Facility Name] remain open during a hazard event. Please refer to **Appendix B** for a list of additional critical facilities in St. Lucie County and its jurisdictions that remain open during a hazard event.

Table 3.25 – Critical Facilities in Flood Prone Areas

Facility Name	Facility Type	Address	Municipality	County	State	Flood Zone	Zone Subtype	SHFA	Risk Level	FHZ Label	Description
Orange Blossom Mall Site	Education Facility	4204 Okeechobee Rd	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
City of Ft Pierce EOC	Emergency Response Facility	920 S US Highway 1	FP	St. Lucie County	FL	AH		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
FPUA substation	Energy Distribution Control Facility	205 AE Backus Ave	FP	St. Lucie County	FL	X	0.2 Pct Annual Chance Flood Hazard	F	Moderate Risk Areas	0.2% Annual Chance Flood Hazard	Outside Special Flood Hazard Area
Station #11 Shinn Rd	Fire Station / EMS Station	3501 Shinn Rd	FP	St. Lucie County	FL	A		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
Station #2 South Beach	Fire Station / EMS Station	880 Seaway Dr	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
Station #8 S Hutchinson Island	Fire Station / EMS Station	7583 S Ocean Dr	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area

Table 3.25 – Critical Facilities in Flood Prone Areas (continued)

Facility Name	Facility Type	Address	Municipality	County	State	Flood Zone	Zone Subtype	SHFA	Risk Level	FHZ Label	Description
US Coast Guard Station	Government or Military Facility	900 Seaway Dr	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
SLC Health Office\Clinic	Hospital / Medical Center	412 Browns Ct	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
SLC Health Office\Clinic	Hospital / Medical Center	408 Browns Ct	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
Ft Pierce Police Department	Law Enforcement	920 S US Highway 1	FP	St. Lucie County	FL	AH		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
SLC Sheriffs Nettles Island Substation	Law Enforcement	9801 S Ocean Dr	JB	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
Ft Pierce Branch Library	Library	101 Melody Ln	FP	St. Lucie County	FL	X	0.2 Pct Annual Chance Flood Hazard	F	Moderate Risk Areas	0.2% Annual Chance Flood Hazard	Outside Special Flood Hazard Area
SLC Historical Museum Complex	Museum	414 Seaway Dr	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
SLC Smithsonian Marine Center	Museum	701 Seaway Dr	FP	St. Lucie County	FL	X	0.2 Pct Annual Chance Flood Hazard	F	Moderate Risk Areas	0.2% Annual Chance Flood Hazard	Outside Special Flood Hazard Area
Florida Power & Light Nuclear Power Plant	Nuclear Facility	6501 S Ocean Dr	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area

Table 3.25 – Critical Facilities in Flood Prone Areas (continued)

Facility Name	Facility Type	Address	Municipality	County	State	Flood Zone	Zone Subtype	SHFA	Risk Level	FHZ Label	Description
Florida Power & Light Nuclear Power Plant	Nuclear Facility	6501 S Ocean Dr	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
Fredrick Douglas Memorial Park	Park	3600 S Ocean Dr	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
Ft Pierce State Recreation Area	Park	905 Shorewinds Dr	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
Savannas Recreation Complex	Park	1400 Midway Rd	FP	St. Lucie County	FL	AH		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
Waveland Beach Complex	Park	10350 S Ocean Dr	JB	St. Lucie County	FL	VE		T	High Risk - Coastal Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
White City Park Complex	Park	1801 W Midway Rd	FP	St. Lucie County	FL	AE	Floodway	T	High Risk Areas	Regulatory Floodway	Inside Special Flood Hazard Area
Indian River Terminal Co	Port Facility: Commercial Port	100 Terminal Dr	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
JES Seventh Day Adventist School	School	3201 Memory Ln	FP	St. Lucie County	FL	X	0.2 Pct Annual Chance Flood Hazard	F	Moderate Risk Areas	0.2% Annual Chance Flood Hazard	Outside Special Flood Hazard Area
St Andrews Episcopal School	School	210 S Indian River Dr	FP	St. Lucie County	FL	X	0.2 Pct Annual Chance Flood Hazard	F	Moderate Risk Areas	0.2% Annual Chance Flood Hazard	Outside Special Flood Hazard Area

Table 3.25 – Critical Facilities in Flood Prone Areas (continued)

Facility Name	Facility Type	Address	Municipality	County	State	Flood Zone	Zone Subtype	SHFA	Risk Level	FHZ Label	Description
St James Christian Academy K-12	School	4300 Okeechobee Rd	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
Forest Grove Middle School	School: Middle School	3201 S 25th St	FP	St. Lucie County	FL	X	0.2 Pct Annual Chance Flood Hazard	F	Moderate Risk Areas	0.2% Annual Chance Flood Hazard	Outside Special Flood Hazard Area
State Government Bldg.	State Government Facility	337 N US Highway 1	FP	St. Lucie County	FL	X	0.2 Pct Annual Chance Flood Hazard	F	Moderate Risk Areas	0.2% Annual Chance Flood Hazard	Outside Special Flood Hazard Area
Ft Pierce Wastewater Treatment Plant	Wastewater Treatment Plant	403 Seaway Dr	FP	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
North Hutchinson Island WWTP Complex	Wastewater Treatment Plant	3251 N SR Highway A1A	FP	St. Lucie County	FL	X	0.2 Pct Annual Chance Flood Hazard	F	Moderate Risk Areas	0.2% Annual Chance Flood Hazard	Outside Special Flood Hazard Area
South Hutchinson Island WWTP	Wastewater Treatment Plant	7601 S Ocean Dr	JB	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
Back Pump No 4	Water Pumping Station	13510 Okeechobee Rd	FP	St. Lucie County	FL	A		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special Flood Hazard Area
Bryn Mawr Utility Site	Water Supply or Treatment Facility	N SR Highway A1A	FP	St. Lucie County	FL	X	0.2 Pct Annual Chance Flood Hazard	F	Moderate Risk Areas	0.2% Annual Chance Flood Hazard	Outside Special Flood Hazard Area

FPUA Water Storage	Water Tank	7581 S Ocean Dr	JB	St. Lucie County	FL	AE		T	High Risk Areas	1% Annual Chance Flood Hazard	Inside Special lood Hazard Area

Table 3.25 – Critical Facilities in Flood Prone Areas (continued)

Facility Name	Facility Type	Address	Municipality	County	State	Flood Zone	Zone Subtype	SHFA	Risk Level	FHZ Label	Description
FPUA Water Storage	Water Tank	S Ocean Dr	FP	St. Lucie County	FL	X	0.2 Pct Annual Chance Flood Hazard	F	Moderate Risk Areas	0.2% Annual Chance Flood Hazard	Outside Special Flood Hazard Area

Source: St, Lucie County Division of Emergency Management (2021)

3.6 THREAT ASSESSMENT

The Local Mitigation Strategy (LMS) Hazards Vulnerability Sub-Committee determined and prioritized the level of threat posed by the following hazards according to the risk and exposure caused by the hazard to the St. Lucie County Whole Community. Information presented in the LMS on the vulnerability and risk posed by the hazard to the St. Lucie County Whole Community assisted the LMS Hazards Vulnerability Review Sub-Committee in determining a score to then rank the level of threat that the hazard poses to St. Lucie County's population, properties, and environment / community. Twenty-five (25) hazards were identified for the 2021 LMS after assessing all the existing hazards presented in the 2016 LMS, as well as identifying any new hazard that was not previously mentioned in the Plan.

3.6.1 Hazards Vulnerability Sub-Committee

Upon request from the LMS Working Group Chair, a Hazards Vulnerability Sub-Committee was created to assess the hazards presented in the 2016 LMS. The five-member group consisted of members from the following jurisdictions / LMS Working Group agencies.

Table 3.26 - Members of the Hazards Vulnerability Sub-Committee

Jurisdiction / LMS Working Group Member Agency	Work Title
St. Lucie School District	Executive Director of Growth Management, Land Acquisition, Inter-Government Relations Facilities & Maintenance
Port St. Lucie Public Works	Deputy Director
St. Lucie County Public Works	Assistant Road & Bridge Manager
Fort Pierce Utilities Authority	Director of Electric and Gas Systems
Fort Pierce Engineering Department	Assistant City Engineer

3.6.2 Threat Level Definitions

The level of threat posed by each hazard described in this section is ranked by the following calculation:

Risk + Exposure = Threat

Scale and level: Each threat was given a score from 0 – 5 in the Risk and Exposure factors. Both scores were added to determine a total that it is defined as a threat score caused by the hazard to the St. Lucie County Whole Community. A determination of how scores correlate to the level of threat is as follow:

Low = 0-1	Medium = 2 - 3	High = 4 - 5

After each Sub-Committee member added their scores, a simple average was taken from the Sub-Committee's totals (i.e., threat score) on each hazard to determine a list of scores from highest to lowest – see **Table 3.27.**

The list of scores was then organized showing the hazard's level of threat arranged from the highest score ranked as #1 followed by the next highest score ranked #2 and so on. See **Table 3.29** for the results showing a ranked list of threats posed by hazards to the St. Lucie County Whole Community.

3.6.3 Risk

The level of risk is determined by the hazard's likelihood of occurrence which means how often one would expect this hazard to impact the County. For each hazard, the following scale was used to determine the level of risk:

0-1 = not likely to occur = **Low;**

2-3 = might occur = **Medium**; and

4-5 = very likely to occur = **High.**

As hazards were determined as having a risk factor of low, medium, and high in the Risk Assessment, Sub-Committee members placed a score for the hazard using the definitions and scale previously mentioned.

Guidance on the risk factor - based on historical data, the following scale can be used as a guide to further determine the likelihood that St. Lucie County will be impacted by the hazard within a given period of time:

- **Low (0-1)** - Although the hazard is noted, no previous occurrence has been recorded and the hazard is considered no threat to the jurisdiction or there is some potential for the hazard to exist once every 10 years or more.
- **Medium (2-3)** - Potential for the hazard to exist once every 6-9 years.
- **High (4-5)** - Potential for the hazard to exist once every 0-5 years.

3.6.3.1 Probability

Probability is determined by incorporating the historical data of previous occurrences into the hazard analysis. By doing this, the probability of a future occurrence can be gauged and placed into three categories – low, medium, and high. The metric is defined below:

- **Low (0-1)** - No previous occurrence has been recorded and/or the occurrence happens less frequently than 10 years.
- **Medium (2-3)** - Occurs once every 6-9 years.
- **High (4-5)** - Occurs once every 0-5 years.

3.6.4 Exposure

Exposure means how severe the hazard is likely to negatively impact the number of people and structures, the value of structures, and the environment (including communities).

For each hazard, the following scale was used to determine the level of exposure:

0-1 = **low** possibility of death, injury and destruction in properties and the environment / community;

2-3 = **some** potential for death, injury and destruction in properties and the environment / community; and

4-5 = **strong** potential of death, injury and destruction in properties and the environment / community.

Guidance on the exposure factor - The following scales can be used as a guide to further determine the level of exposure caused by the hazards that impact the St. Lucie County Whole Community:

3.6.4.1 Magnitude

Human Impact (Possibility of death or injury)

- Low = No possibility of death or injury to some potential for death or injury
- Moderate = Potential for death or injury
- High = Strong potential for death or injury

Property Impact (Physical losses and damages)

- Low = No possibility of physical loss and/or damage to some potential for physical loss and/or damage
- Moderate = Potential for physical loss and/or damage
- High = Strong potential for physical loss and/or damage

Spatial Impact (Amount of geographic area affected)

- Low = No geographic area affected up to 25% of total land mass affected
- Moderate = 25%-50% of total land mass affected
- High = 50% or more of total land mass affected
-

Economic Impact (Interruption of business services)

- Low = No interruption of business services to some potential for business service interruption
- Moderate = Potential for business service interruption
- High = Strong potential for business service interruption

3.6.6 Threat Assessment Calculation

Each hazard described below was given a score from 0 – 5 to determine a threat score which was used to determine a ranking level posed by the hazard. The following calculation was used:

Risk + Exposure = Threat

Each factor was given a range of scores to further determine the overall score using the following scale to determine a threat level. Each hazard was given a level of risk from the Risk Assessment previously presented in this LMS:

Low = 0-1	Medium = 2 - 3	High = 4 - 5

Hazard Vulnerability Sub-Committee members used the following to calculate the threat score for each hazard:

HAZARD	RISK	EXPOSURE	THREAT
Agricultural Pests and Diseases **Risk – Low**			
Civil Disturbances **Risk – Low**			
Communication Failures **Risk – Low**			
Cyber Attacks (Cyber Security) **Risk - Medium**			
Dam/Levee Failures (10-Mile Creek) **Risk – Medium**			
Droughts **Risk – High**			
Epidemics/Pandemics **Risk – Medium**			

HAZARD	RISK	EXPOSURE	THREAT
Erosions **Risk - High**			
Extreme Temperatures **Risk - Medium**			
Flooding **Risk – High**			
Hazardous Materials Accidents **Risk – Medium**			
Hurricanes / Tropical storms (storm surge) **Risk - High**			
Mass Migration **Risk - Low**			
Power Failures **Risk - Medium**			
Radiological Incidents **Risk - High**			
Sea Level Rise **Risk - Low**			
Seismic Hazards (e.g., Earthquakes, Sinkholes) **Risk - Low**			
Severe Thunderstorms / Lightning **Risk - High**			
Terrorism (Sabotage, CBRN) **Risk - Low**			
Tornados **Risk – Low**			
Transportation System Accidents **Risk - Medium**			
Tsunami			

HAZARD	RISK	EXPOSURE	THREAT
Risk - Low			
Wellfield Contamination **Risk - Low**			
Wildfires **Risk - Medium**			

3.6.5.1 Hazards Vulnerability Sub-Committee Threat Assessment Calculations

St. Lucie County Emergency Management Division staff used the chart referenced below to calculate the threat score for each hazard. Totals from the five-member Hazards Vulnerability Sub-Committee were listed and a simple average was calculated to show an overall total representing the "Threat" score for each hazard impacting the St. Lucie County Whole Community.

Table 3.27 - Sub-Committee Hazard Vulnerability Threat Scores

Hazard	St. Lucie School District GV	SLC Public Works SS	PSL Public Works	Fort Pierce Utilities Authority	Fort Pierce Engineering Department	Total Threat Score (Average)
Agricultural Pests and Diseases Risk – **Low**	3	4	2	5	2	3.2
Civil Disturbances Risk – **Low**	3	4	2	3	0	2.4
Communication Failures Risk – **Low**	3	5	2	3	0	2.6
Cyber Attacks (Cyber Security) Risk – **Medium**	6	7	6	8	4	6.2

Table 3.27 - Sub-Committee Hazard Vulnerability Threat Scores (continued)

Hazard	St. Lucie School District GV	SLC Public Works SS	PSL Public Works	Fort Pierce Utilities Authority	Fort Pierce Engineering Department	Total Threat Score (Average)
Dam/Levee Failures (10-Mile Creek, Blackwell Reservoir) Risk – **Medium**	1	5	5	4	3	3.6
Droughts Risk - **High**	8	9	9	9	5	8
Epidemics/Pandemics Risk - **Medium**	6	8	5	6	7	6.4
Erosions Risk - **High**	9	8	9	8	5	7.8
Extreme Temperatures Risk - **Medium**	7	8	6	7	4	6.4
Flooding Risk – **High**	10	10	9	9	7	9
Hazardous Materials Accidents Risk – **Medium**	5	8	5	6	2	5.2
Hurricanes / Tropical storms (storm surge) Risk - **High**	9	10	8	9	10	9.2
Mass Migration Risk - **Low**	2	2	2	3	0	1.8
Power Failures Risk - **Medium**	5	6	6	8	6	6.2
Radiological Incidents Risk - **High**	5	9	8	9	10	8.2
Sea Level Rise Risk - **Low**	4	4	2	3	4	3.4
Seismic Hazards (e.g., Earthquakes, Sinkholes) Risk - **Low**	3	5	1	1	0	2
Severe Thunderstorms/Lightning Risk - **High**	7	9	10	9	6	8.2
Terrorism (Sabotage, CBRN) Risk - **Low**	4	5	2	3	0	2.8
Tornados Risk - **Low**	4	5	1	4	2	3.2
Transportation System Accidents Risk - **Medium**	5	4	6	6	4	5
Tsunami Risk - **Low**	3	4	1	1	0	1.8
Wellfield Contamination Risk - **Low**	3	4	1	4	2	2.8

Wildfires Risk - **Medium**	7	8	4	6	8	6.6

Table 3.28 - Threat Score by Hazard for St. Lucie County & Jurisdictions

Hazard	Sub-Committee Members Total Threat Scores (Average)	Rank
Hurricanes / Tropical storms (storm surge) Risk - High	9.2	**1**
Flooding Risk – High	9	**2**
Severe Thunderstorms/Lightning Risk - High	8.2	**3**
Radiological Incidents Risk - High	8.2	**4**
Droughts Risk - High	8	**5**
Erosions Risk - High	7.8	**6**
Wildfires Risk - Medium	6.6	**7**
Extreme Temperatures Risk - Medium	6.4	**8**
Epidemics/Pandemics Risk - Medium	6.4	**9**
Cyber Attacks (Cyber Security) Risk – Medium	6.2	**10**
Power Failures Risk - Medium	6.2	**11**
Hazardous Materials Accidents Risk – Medium	5.2	**12**
Transportation System Accidents Risk – Medium	5	**13**

Table 3.28 - Threat Score by Hazard for St. Lucie County & Jurisdictions (continued)

Hazard	Sub-Committee Members Total Threat Scores (Average)	Rank
Dam/Levee Failures (10-Mile Creek) Risk – Medium Blackwell Reservoir	3.6	**14**
Sea Level Rise Risk - Low	3.4	**15**
Tornados Risk - Low	3.2	**16**
Agricultural Pests and Diseases Risk – Low	3.2	**17**
Terrorism (Sabotage, CBRN) Risk - Low	2.8	**18**
Wellfield Contamination Risk - Low	2.8	**19**
Communication Failures Risk – Low	2.6	**20**
Civil Disturbances Risk – Low	2.4	**21**
Seismic Hazards (e.g., Earthquakes, Sinkholes) Risk - Low	2	**22**
Mass Migration Risk - Low	1.8	**23**
Tsunami Risk - Low	1.8	**24**

Table 3.29 - Hazards Ranked by Impact to St. Lucie County & Jurisdictions

Hazard	Rank
Hurricanes / Tropical storms (storm surge) Risk – High	**1**
Flooding Risk – High	**2**
Severe Thunderstorms/Lightning Risk - High	**3**
Radiological Incidents Risk - High	**4**
Droughts Risk - High	**5**
Erosions Risk - High	**6**
Wildfires Risk - Medium	**7**
Extreme Temperatures Risk - Medium	**8**
Epidemics/Pandemics Risk - Medium	**9**
Cyber Attacks (Cyber Security) Risk – Medium	**10**
Power Failures Risk - Medium	**11**
Hazardous Materials Accidents Risk – Medium	**12**
Transportation System Accidents Risk - Medium	**13**
Dam/Levee Failures (10-Mile Creek) Risk – Medium Blackwell Reservoir	**14**
Sea Level Rise Risk - Low	**15**
Tornados Risk - Low	**16**
Agricultural Pests and Diseases Risk – Low	**17**
Terrorism (Sabotage, CBRN) Risk - Low	**18**
Wellfield Contamination Risk - Low	**19**
Communication Failures Risk – Low	**20**

Table 3.29 - Hazards Ranked by Impact to St. Lucie County & Jurisdictions (continued)

Hazard	Rank
Civil Disturbances Risk – Low	**21**
Seismic Hazards (e.g., Earthquakes, Sinkholes) Risk - Low	**22**
Mass Migration Risk - Low	**23**
Tsunami Risk - Low	**24**

END OF SECTION

4.0 MITIGATION STRATEGY

Due to key findings from LMS Working Group meetings, assessment of hazards impacting the St. Lucie County Whole Community, development of a threat assessment, and implementation of mitigation initiatives in community and public sectors the following has driven the development of goals, objectives, and strategies of the Unified Local Mitigation Strategy (LMS):

- Flooding and hurricanes occur the most frequently; place the most people at risk, and produce the greatest amount of damage of all the natural hazards faced by the County. There has been an increase in severe weather, tropical storms and hurricanes impacting St. Lucie County since 2016.

- The Hazards Vulnerability Sub-Committee ranked Tropical Storms / Hurricanes as the #1 threat for St. Lucie County. This is a change from the 2016 LMS which ranked Flooding as the most impacting hazard to the St. Lucie County Whole Community.

- Wildland fires occur more frequently than flooding and hurricanes, but historically have had a lower impact on the community. Exposure to the impacts of wildland fire continues to increase as urban interface areas are developed next to wildland areas.

- Agriculture is an important component of the local economy; therefore, drought and agricultural pests and diseases can be as damaging to the agricultural community as beach erosion and flooding are to the coastal and intra-coastal communities.

- While a major focus of mitigation is retrofitting, the most effective time to mitigate is before development orders are approved. Adding hazard mitigation requirements may add to the cost of development, but this cost is relatively small. Following a disaster, the cost of recovery and redevelopment can be enormous. Recovery cost tends to become public costs that local governments must assume.

- While all jurisdictions in St. Lucie County are in the National Flood Insurance Program (NFIP), St. Lucie County, City of Fort Pierce and the City of Port St. Lucie participate in the Community Rating System (CRS) Program or the NFIP to the maximum extent possible. Having a strong CRS Program reduces the cost of flood insurance premiums to St. Lucie County residents, and the FMA Program is a major source of funding to assist in retrofitting flooding problems.

- Properties on the barrier islands are susceptible to both flooding and wind-related storm damage. There are a number of important public facilities in those areas. By hardening these facilities, the chance of their being impacted by storm events can be significantly reduced.

- Transportation commercial and private on Interstate 95 and the Florida Turnpike has continually increased in volume, the probability of truck rollovers spilling of toxic contaminants and/or hazardous materials also continues to increase. The St. Lucie County Fire District hazardous materials teams have increased response training activities in efforts to become proactive in planning for releases.

- Florida East Coast Railway (FEC) and CSX Railroad traverse several densely populated areas of coastal urban population, putting an ever-increasing number of people at risk from train derailment and potentially significant toxic and hazardous material spills. The addition of passenger rail will present additional planning concerns for derailments.

- Through Hazard Mitigation Grant Program (HMGP) funding from Hurricanes Irma, Hurricane Dorian, Community Development Block Grant (CDBG) – Mitigation (MIT), and Cares Act, projects have increased development of retrofitting roads, supplying critical facilities with generators, hardening critical facilities, implementation of a county-wide Threats, Hazards, Identification, Risk Assessment (THIRA), as well as the implementation of a fiber optic connection among the Port St. Lucie EOC, County EOC, Sheriff's Office, and other first responder agencies.

- Funding from CDBG has allowed the development of a Resiliency Plan and program which is addressing the long term impacts of global warming and sea level rise to St. Lucie County.

- Since 2016, St. Lucie County's population has grown substantially, increasing the need to expand and improve hazard mitigation techniques. Population growth has been accommodated largely through the construction on infill single family home lots, however we have also experienced growth moving towards western St. Lucie County and east along the coastal barrier island.

- The County has taken initiative and implemented several actions to reduce the likelihood of natural disasters within flood prone areas.

- The Federal Emergency Management Agency (FEMA) has identified special flood hazard areas within the boundaries of St. Lucie County. These areas may be subject to periodic inundation by floodwater, which could result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare

- 2018, the St. Lucie County Board of County Commissioners (BOCC) adopted Ordinance 18-001, to amend section 6.05.00 – Floodplain Management. This ordinance is now consistent with Florida's model ordinance. The ordinance meets NFIP requirements and explicitly coordinates with the Florida Building Code. Specific descriptions St. Lucie County's requirements in its Building Code are as follow:

R322.2.1 Elevation requirements.

1. Buildings and structures in flood hazard areas including flood hazard areas designated as Coastal A Zones, shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.
2. In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated to a height above the highest adjacent grade of not less than the depth number specified in feet (mm) on the FIRM plus 1 foot (305 mm), or not less than 3 feet (915 mm) if a depth number is not specified.
3. Basement floors that are below grade on all sides shall be elevated to or above base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.

Exception: Enclosed areas below the design flood elevation, including basements with floors that are not below grade on all sides, shall meet the requirements of Section 322.2.2.

R322.3.2 Elevation requirements.

1. Buildings and structures erected within coastal high-hazard areas and Coastal A Zones, shall be elevated so that the bottom of the lowest horizontal structure members supporting the lowest floor, with the exception of pilings, pile caps, columns, grade beams and bracing, is elevated to or above the base flood elevation plus 1 foot (305 mm) or the design flood elevation, whichever is higher.
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.
5. Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R322.3.4 and R322.3.5.

- 2019, St. Lucie County amended its Land Development Code and Comprehensive Plan to reflect FEMA's revised Flood Rate Maps (FIRM), which resulted from their Flood Insurance Study. Through these floodplain management practices, the County has improved the protections for human health, minimize property damage, encourage appropriate construction practices, and safeguard individuals from unwittingly purchasing land subject to flood hazards and reduce economic losses caused by floods.

- In the 2019 update of the St. Lucie County Comprehensive Plan,

    - Objective 1.1.4 (c)(d)(e)(g) were included to address the protection of areas designated for conservation of environmental habitats, potable water wellfields and aquifer recharge areas and to regulate areas subject to seasonal and periodic flooding an provide for drainage and Stormwater management. In addition, the Plan sets guide to the protection of native and drought tolerant species in lieu of exotic and water consumptive plants.
    - Policy 1.1.4.1 - The Land Development Code shall maintain the specific and detailed provisions necessary to implement the adopted Comprehensive Plan, and which at as a minimum include the following:
        - (c) Protect those areas designated for conservation purposes or that contain other special environmental habitat as identified in the Future Land Use and other elements of the St. Lucie County Comprehensive Plan;
        - (d) Regulate areas subject to seasonal and periodic flooding and provide for drainage and stormwater management;
        - (e) Protect potable water wellfields and aquifer recharge areas;
        - (f) Regulate signage;
        - (g) Provide minimum landscaping standards for all development that encourages the use and protection of native and drought tolerant species in lieu of exotic and water consumptive plants;

    - Objective 2.1.2, Policy 2.1.2.5 – addresses the intergovernmental coordination among County, Transportation Planning Organization (TPO), the municipalities, and the Florida Department of Transportation (FDOT) to retrofit the US-1 Corridor to meet future capacity needs.

    - Objective 8.1.7: The County shall strive to increase community resiliency through continued coordination and cooperation.

- Policy 8.1.7.1 – St. Lucie County shall coordinate with municipalities, neighboring counties, regional, State, and federal government agencies, universities, not-for-profit organizations, non-governmental organizations and private organizations to coordinate the updating and analyzing data regarding vulnerability and storm impacts, and to exchange data and develop coordinated strategies to address energy conservation and mitigation and adaptation strategies.
- Policy 8.1.7.2 – St. Lucie County shall continue to support public education and outreach programs addressing issues including but not limited to: energy efficiency; water conservation; solid waste reduction and recycling; native landscaping; air quality; greenhouse gas reduction; and adaptation and response planning.
- Policy 8.1.7.3 – The County shall coordinate with regional agencies in the identification of modeling resources and development of adaptation strategies.
- Policy 8.1.7.4 – The County shall encourage partnerships between local government agencies, universities, professionals and practitioners to foster an environment for connecting scientific research and education with practical applications that will contribute to the resiliency and adaptation within the built and natural environments.

To see details of how LMS initiatives have been incorporated into the St. Lucie County Comprehensive Plan go to **Appendix H – LMS Plan Integration (new).**

Reference: St. Lucie County Comprehensive Plan :
https://www.stlucieco.gov/departments-services/a-z/planning-and-development-services/planning/comprehensive-planning

4.1 MITIGATION GOALS AND OBJECTIVES

The LMS Working Group developed four (4) goals and numerous objectives to guide its work in the development of this plan, program and strategies in the St. Lucie Whole Community. The goals and objectives help focus the efforts and resources to reduce hazard related losses and damages in the future, as well as avoiding duplication of efforts, funding, and implementation.

After examining development in planning, project management, mitigation programs, progress in building codes and initiatives, the LMS Working Group decided to keep the same goals and objectives from the 2016 LMS. As such, the goals and objectives used as a guide for the development of the 2021 LMS, as well as mitigation plans, programs, and incentives implemented across the board for the St. Lucie Whole Community are as follow:

Goal 1: Reduce the loss of life and property

- Objective 1.1 Reduce flooding and/or wind damage.
- Objective 1.2 Eliminate or retrofit repetitive loss properties.
- Objective 1.3 Retrofit and/or construct new critical facilities.
- Objective 1.4 Protect and restore areas susceptible to erosion.
- Objective 1.5 Improve local roadways to ensure safe, efficient, evacuation.
- Objective 1.6 Reduce the potential threat of fires, wildland and structural.
- Objective 1.7 Increase public awareness of hazards and their impacts.
- Objective 1.8 Evaluate codes, policies, ordinances, and regulations for natural hazards.
- Objective 1.9 Reduce exposure to potential environmental hazards.

Goal 2: Achieve safe and fiscally sound, sustainable communities.

- Objective 2.1 Integrate hazard reduction into local planning and development processes.
- Objective 2.2 Enhance environmental quality and/or function of natural resource.
- Objective 2.3 Prepare informational materials explaining the positive relationship between sustainable communities and disaster-resistant and resilient communities.
- Objective 2.4 Create and maintain current an all-hazards database.
- Objective 2.5 Promote implementation of cost-effective mitigation projects.
- Objective 2.6 Enhance geographic information system (GIS) capabilities for use in hazard analysis.

Goal 3. Facilitate orderly recovery during post-disaster redevelopment.

- Objective 3.1 Create more resilient disaster-resistant businesses.
- Objective 3.2 Ensure economic viability of the local business community following disaster events.

Goal 4. Optimize the effective use of all available resources.

- Objective 4.1 Establish public/private partnerships.
- Objective 4.2 Establish procedures strengthening intergovernmental coordination and cooperation.

4.2 MITIGATION INITIATIVES

The LMS Working Group is responsible for discussing new ideas / concepts, identifying projects and activities that will impact the St. Lucie Whole Community, such as jurisdictions, special districts, and public and private sector partners of the Working Group, to implement the LMS goals, objectives.

Several mitigations initiatives were developed and implemented in jurisdictions' planning processes and mechanisms to serve the LMS Working Group's goal of mitigating the St. Lucie Whole Community:

1. Community Rating System (CRS) User Group. Although not a formal Sub-Committee of the LMS Working Group, the CRS User Group was created by the CRS Coordinators of St. Lucie County and the Cities of Fort Pierce and Port St. Lucie to work as a collaborative strategic group. The group meets at least twice a year to discuss strategies and tasks that will benefit all three (3) jurisdictions in meeting CRS program guidelines without duplicating efforts. The CRS User Group also seeks new trainings and ideas from other CRS User Groups throughout the state of Florida to enhance the capabilities of the CRS programs in St. Lucie County and the Cities of Fort Pierce and Port St. Lucie.

   An

2. Program on Public Information (PPI) Sub-Committee. Under the auspices of the LMS Working Group, the PPI Sub-Committee was created to ensure marketing strategies in promoting the CRS programs and flood awareness for St. Lucie County and the Cities of Fort Pierce and Port St. Lucie are not duplicated and as strategies are put in order, results would benefit all three (3) jurisdictions which participate in the CRS program. The PPI Sub-Committee was created in 2020 to identify, assess, and implement various marketing opportunities found in community events, trainings, exercises provided countywide that can benefit St. Lucie County and the Cities of Fort Pierce and Port St. Lucie in meeting criteria and points found in the CRS Coordinators' Manual. The Sub-Committee developed and approved a PPI Plan (Annex B).

3. Project Prioritized List (PPL) Scoring Review Sub-Committee. The LMS Working Group discussed ways to improve the evaluation and scoring process of new and re-submitted mitigation projects from LMS Working Group member agencies. The Working Group

formed the PPL Scoring Review Sub-Committee to review the current process at length and evaluate the current scoring system. The PPL Scoring Review Sub-Committee met several times to review the current evaluation and scoring process found in the LMS and revised it to ensure a fair process to successfully rank projects based on adherence to the LMS goals.

4. Review Sub-Committee – The LMS Working Group created a Review Sub-Committee that assessed the information held in the 2016 LMS and updated its format, content and provided recommendations to ensure that the new version would be inclusive and consistent of hazards, as well as the progress and development achieved by the Working Group.

5. Hazards Review Sub-Committee – The LMS Working Group created a Hazards Review Sub-Committee to address changes in vulnerability and exposure from hazards impacting the St. Lucie Whole Community. The Sub-Committee assessed the current information of the 2016 LMS and made recommendations to ensure that recorded impacts from hazards to the St. Lucie Whole Community are consistent throughout the LMS, as well as inputting new information from 2016 through 2020.

6. Resiliency Program – St. Lucie County and its municipalities have committed to working collaboratively on a community-wide resilience plan. A multi-jurisdictional St. Lucie Community Resilience Steering Committee has been established, made up of directors from all jurisdictions, as well as regional agencies such as the Health Department, Regional Planning Council, School Board, etc.

   The goal is to take a systems-thinking approach to resilience planning -- with the health, safety and welfare of people being the overarching system we are focused on and upon which we evaluate our success. The County received two grants to assist in creating a community-wide resilience plan. The County is currently in the final stretch of a DEP-Florida Resilient Coastlines Program grant that funded vulnerability assessments. In addition, we have been awarded a Community Development Block Grant Mitigation (CDBG-MIT) grant to perform additional vulnerability assessments, develop a capacity assessment, adaptation strategies, and action plan, involve community and sector stakeholders, and begin fostering a Treasure Coast Regional Collaborative.

7. Threats, Hazards, Identification Risk Assessment (THIRA). Through the CDBG-MIT funds, the City of Port. St. Lucie will be conducting a countywide THIRA in collaboration with the LMS Working Group and the Resiliency Group. The THIRA will replace the assessment process of the LMS, as the THIRA will provide a more comprehensive approach in assessing the impacts of hazards in the St. Lucie Community.

4.2.1 National Flood Insurance (NFIP) Compliance

St. Lucie County, the City of Fort Pierce, the Town of St. Lucie Village, and the City of Port St. Lucie are participating communities in the NFIP Program. Each jurisdiction within the county is an active participant in the NFIP. In an effort to ensure continued compliance with the NFIP, each participating community will:

1. Continue to enforce their adopted floodplain management ordinance requirements, which include regulating all new development and substantial improvements in Special Flood Hazard Areas (SFHA).
2. Continue to maintain all records pertaining to floodplain development, which shall be available for public inspection.
3. Continue to notify the public with proposed changes to the floodplain ordinance or Flood Insurance Rate Maps (FIRM).
4. Maintain the FIRM map and Letter of FIRM Map Change repositories.
5. Continue to promote flood insurance for all properties.
6. Continue their CRS public outreach programs, as applicable.

Table 4.1 National Flood Insurance Program Summary per jurisdiction, below shows effective dates for the initial identification, the initial Flood Insurance Rate Map areas identified and the current effective map date for each jurisdiction within St. Lucie County.

Table 4.1 National Flood Insurance Program Summary per Jurisdiction

CID #	Community	Initial Identification	Initial FIRM	Current Effective Map Date
120286	Fort Pierce	05/24/74	12/01/77	02/19/20
120287	Port St. Lucie	12/13/74	03/15/82	02/19/20
120288	St. Lucie Village	11/29/74	04/01/80	02/19/20
120285	County Unincorporated	01/24/75	08/17/81	02/19/20

Source: FEMA; Federal Emergency Management Agency Community Status Book Report, Florida; May 2021

4.2.2 Community Rating System (CRS)

The CRS is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the NFIP. In CRS communities, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community's efforts that address the three goals of the program:

1. Reduce and avoid flood damage to insurable property.
2. Strengthen and support the insurance aspects of the National Flood Insurance Program.
3. Foster comprehensive floodplain management.

Participation in the CRS program can reduce Flood insurance premiums up to 45 percent for residents within St. Lucie County. The number of mitigation actions that reduce the impacts of flooding is directly related to lower insurance premiums. The goals of the CRS are to reduce flood losses, to facilitate accurate insurance ratings, and to promote the awareness.

Table 4.2 CRS per Jurisdiction

CID #	Community Name	CRS Entry Date	Current Effective Date	Current Class	% Discount for SFHA	% Discount for Non-SFHA	Status

120286	Fort Pierce	10/1/1992	5/1/2012	6	20	10	C
120287	Port St. Lucie	10/1/1991	10/1/1996	8	10	5	C
120285	County Unincorporated	10/1/1994	5/1/2009	6	20	10	C

4.3 MITIGATION PROGRAMS

4.3.1 HUD CDBG and CDBG-DRI Programs

HUD sponsors a number of programs that can be used to further the goals of hazard mitigation within a community. The Community Development Block Grant (CDBG) Small Cities Program provides funding to improve local housing, streets, utilities, and public facilities in small cities. Disaster Recovery Initiative (DRI) funds are provided for disaster relief, long-term recovery, and mitigation activities in areas affected by a presidential disaster declaration.

4.3.2 Florida Inland Navigation District (FIND)

FIND provides assistance on certain waterway-related projects including navigation channel dredging, channel markers, navigation signs or buoys, boat ramps, docking facilities, fishing and viewing piers, waterfront boardwalks, inlet management, environmental education, law enforcement equipment, boating safety programs, beach re-nourishment, dredge material management, environment mitigation, and shoreline stabilization.

4.4 UPDATING THE PLAN AND PROJECT LIST

There are two updating processes connected to the LMS. One describes how the Prioritized Project List (PPL) is updated annually. A detailed description of the PPL updating procedure is provided below. The second updating process, involves the 5-year update of the Plan sections of the LMS.

At the heart of the LMS is the PPL. The PPL is a rank order of priority projects that if implemented will result in a more disaster-resistant and resilient community.

When current projects are completed, new needs surface, new funding opportunities arise, and events occur that affect priorities, it is important that the PPL be a dynamic document. For this reason, the window to submit projects to the PPL is always open. All applicants desiring to have their project on the PPL must submit their proposed project utilizing the Mitigation Measure (Project or Initiative) Proposal Form (Appendix C). The following sections identify the multi-step prioritization methodology.

4.4.1 Project Prioritization List (PPL)

The County, municipalities, and districts have already implemented numerous mitigation projects, such as:

- installation of storm shutters on public buildings; and

- retrofitted storm-water drainage systems; and
- raised finished floor elevation to 18 inches above base flood elevation; and
- distribution of informative publications on hurricanes to local residents; and
- installation of emergency generators at key critical facilities.

The objective of developing a countywide PPL for mitigation projects is to allow City and County governments to better focus mitigation efforts and resources while maintaining a historical database. The existence of this list will speed local receipt of federal disaster mitigation funds and will place St. Lucie County in a more competitive position when competing for other, non-disaster-related mitigation grant funds.

To develop the PPL, each local government was invited to submit a list of mitigation projects for inclusion in the unified, countywide list. A project prioritization methodology was to enable the working group to score and rank a list of projects. Projects are ranked according to the stakeholders' priorities. Should funding become available during the year, the Committee will review top projects to determine what projects should be submitted for funding. The St. Lucie County LMS Working Group last updated the PPL August 3, 2020.

The development of the PPL is not a one-time process. To be effective, the list must be dynamic, a living document designed to track project status; completed and deleted projects as well as phased projects and will be revised as progress is made on projects and new hazards or increased vulnerabilities are identified. The PPL process will be updated and implemented as far as possible on an ongoing quarterly basis. The current PPL is located in Appendix E.

For tracking purposes, there is an Eliminated Projects List which contains projects that were removed from the PPL for a variety of reasons including completion, deferral, and deletion. The current list can be found in Appendix E with the PPL.

4.4.2 Prioritization Process

The Working Group determined proposed LMS mitigation projects and activities are to be evaluated and prioritized based on the following scoring system and procedures:

1. Projects will be scored only on the basis of documents submitted by the individual or agency proposing the mitigation project.
2. Projects may be submitted to the LMS Working Group at any time. Organizations are encouraged to do so as soon as the need is identified. However, projects of a time-sensitive nature, such as HMGP projects requiring LMS Working Group- ranking, shall be submitted to the LMS Coordinator no later than one month in advance of when the LMS Working Group ranking is due.
3. Each project will be scored on the eleven Scoring Factors listed in Table 4.3.
4. Each Scoring Factor is assigned point criteria ranging from 0 to 3.
5. Each Scoring Factor is assigned a weight. The weight indicates the relative importance of each Scoring Factor.
6. To determine a project's score on each scoring factor, the number of points is multiplied by the weight.
7. A project's total score is the sum of the scores of the eleven Scoring Factors. The highest

possible score is 120.

Table 4.3 PPL Scoring Factors and Weights

SCORING FACTOR		POINT CRITERIA	WEIGHT	POINTS	SCORE
1	Consistency with LMS Goals		4		
		3- Addresses the highest LMS goal (reduce the loss of human life through provision of sheltering, evacuation, disaster preparedness, emergency response, hazard mitigation, or other services.)			
		2- Addresses the second highest LMS goal (To ensure orderly, effective, short-term Recovery and redevelopment by establishing a program that provides adequate shelters, community health services, food and water, debris removal and promotes rapid economic recovery following a disaster.)			
		1 – Addresses at least one of the three lowest LMS goals A. (To minimize public and private exposure to loss of property and economic disruption in the event of natural, technological, and human caused hazards.) B. (To achieve safe and financially sound, sustainable communities through thoughtful long range planning of natural and human caused environment) C. (To optimize the effective use of all available resources by establishing public/private partnerships and by promoting intergovernmental coordination and cooperation.)			

		0- Fails to address any of the listed LMS goals.			
2	Consistency with Hazard Impact		4		
		· Addresses at least one of the three highest hazards A. Wind Event (Hurricane, Tornado, Tropical Storm) B. Flooding C. Epidemic			
		· Addresses at least one of the three second highest hazards: A. Terrorism/Sabotage B. Hazardous Materials Accident, Wellfield /Surface Water Contamination C. Wildfire			
		1 – Addresses at least one of the remaining hazards: A. Radiological Hazard B. Power/Communication Failure C. Transportation System Accident D. Drought E. Erosion F. Agricultural Pest/Disease G. Civil Disturbance			
		H. Extreme Temperature I. Mass Migration J. Seismic (Sinkholes, Earthquakes) K. Thunderstorm/Lightning			
		0- Fails to address any LMS listed disasters			
3	Consistency with Laws and/or Policies		2		
		3- Consistent with existing laws/policies			
		2- New legislation or policy changes needed, but no conflicts identified			

		1- New legislation or policy changes needed, but may conflict with existing laws, regulations, and/or policies			
		0- Inconsistent with laws and/or policies			
4	Consistency with Local Plans		4		
		3- Supported in both the Comprehensive Emergency Management Plan and a jurisdiction's Comprehensive Plan			
		2- Supported in either the Comprehensive Emergency Management Plan or a jurisdiction's Comprehensive Plan			
		1- Supported in other government plan			
		0- Not supported in any government plan			
5	Scope of Benefits – Jurisdictions		4		
		3- Benefits the health and safety of all Municipalities and the unincorporated county			
		2- Benefits the health and safety of 2 to 3 jurisdictions (municipality or the unincorporated county			
		1- Benefits the health and safety of 1 jurisdiction (municipality or the unincorporated county			
		0- Provides no significant benefits to any jurisdiction			
6	Scope of Benefits – County		4		
	Population				
		3- Benefits 67% to 100% of the County population			
		2- Benefits 33% to 66% of the County population			
		1- Benefits 1% to 32% of the County population			
		0- Provides no significant benefit			
7	Importance of Benefits – Essential Services		4		
		3- Needed for essential services: Medical, Shelter, Custodial Care, Educational, Emergency, Utility, Police, Food			
		0- Not needed for essential services			

8	Importance of Benefits – Critical Facilities		4		
		3- The project facility is a designated primary critical facility			
		2- The project facility is a designated secondary critical facility			
		0- The project facility is not a designated critical facility			
9	Benefit/Cost Ratio		2		
		3- 4.0 or higher			
		2- Between 2.0 to 3.9			
		1- Between 1.0 to 1.9			
		0- Less than 1 or a formal analysis has not been completed			
10	Financing		4		
		3- Eligible for more than one grant and is scheduled for future funding in jurisdiction's approved budget or capital plan			
		2- Eligible for grant funding from at least two grant sources			
		1- Eligible for grant funding			
		0- Not scheduled for funding in jurisdiction's approved budget or capital plan and is not			
		eligible for grant funding			
11	Time Necessary for Implementing		4		
		3- Less than 2 years			
		2- 2 to 3 years			
		1- 3 to 4 years			
		0- Greater than 4 years			

4.4.3 Cost Benefit Review

The cost benefit review is included in Scoring Factor 9. The cost benefit criterion is analyzed by comparing mitigation effects each project will create versus the monetary value of the elements of the project. As it is difficult to monetize these mitigation and community benefits, they do often outweigh the cost that comes with each project, and for that, the scoring factor is taken into

consideration during the evaluation and prioritization of projects. Specifically during the cost benefit analysis, a global view is utilized to weigh the factors of multi-jurisdiction and population impacts into the scoring matrix to best execute the proposed mitigation practices and plans to effectively achieve the LMS goals and objectives.

4.4.4 Tie Break Methodology

This project prioritization methodology may result in tie scores for projects that address the same hazards. For instance, most stormwater management projects will address the same goals and hazards, perhaps resulting in tie ranking scores. Because of this, it is important to develop a tie-break methodology.

1. For projects with identical ranking scores that address different LMS Goals, the project that addresses the highest LMS Goal shall be ranked higher.
2. For instance, if a tornado project and a hazardous materials accident project received identical ranking scores, the tornado project would be ranked higher because overall hazard priority is higher than hazardous materials accidents. For projects with identical ranking scores that address identical LMS Goals, the project that addresses the highest ranked hazard shall be ranked higher.
3. For projects with identical ranking scores that address the same LMS Goals and the same hazards, the project that serves the greatest percent of the County's population shall be ranked the highest.
4. For projects with identical ranking scores that address the same LMS Goals, the same hazards and the same percent of the County's population; the project that has the highest benefit cost analysis shall be ranked the highest.

4.4.5 Project Evaluation Worksheet

The Hazard Mitigation project evaluation criteria worksheet is used as a consistent approach, to assign a numeric value to each project. It allows the St. Lucie County Local Mitigation Strategy Work Group to prioritize projects relative to one another based on several factors outlined in Appendix E.

4.5 IMPLEMENTATION PROGRAM

The LMS program relies on plan implementation as the cornerstone of success, plan update, project update and prioritization are cyclical and reinforce the goals and objectives of the local government's comprehensive planning, hazard mitigation and the creation of resiliency in the wake of disaster. Without an implementation program, either the Plan "gathers dust on the shelf" or lags along implementing projects incrementally, based more on agencies or individuals' interest than on a prioritized need basis. Discussed below are issues related to the organizational arrangement and administrative responsibility, the role of the Working Group, plan monitoring, plan funding, and plan update processes.

4.6 FUNDING

Whether projects are implemented in many instances is dependent on whether or not funding is available, match requirements are met or whether grant applications were awarded. Programs are unpredictable (funded some years, cutback other years, or completely eliminated). The County and its municipalities maintain contact with their FDEM liaison and the FDEM Hazard Mitigation Grant Program Coordinator and the Treasure Coast Regional Planning Council (TCRPC) for available grants opportunities. In addition, the Region IV FEMA - PDM Senior Coordinator for Florida is an excellent resource as well.

4.7 INSTITUTIONAL ARRANGEMENT

Effective implementation requires the strong support of the locally elected body, dedicated staff to maintain documentation and understanding within the stakeholder groups and the public. The creation of a disaster-resistant community is achieved once the concept becomes part of the mindset and fabric of the private and public sectors of a community. It requires an advocate, someone or a group who believes the issue to be essential to the long-term sustainability of the community. This individual or group of individuals is represented by the LMS Coordinator, the Working Group, the stakeholder groups, and the public. The LMS Coordinator and the Working Group continually reassess the vulnerabilities of the community and identifying potential strategies and partners to address the vulnerabilities and means to affecting change whether it is a brick and mortar project or implementing a new programmatic initiative or modification to existing codes or plans.

4.8 IMPLEMENTATION STRATEGY

The implementation strategy is based on information gathered from the Working Group as well as key community stakeholders and citizens. The hazards and community issues identified as well as the community's institutional analysis are used to determine the best means to implement mitigation strategies in St. Lucie County. The implementation strategy includes the goals and objectives identified by the Working Group as well as a list of prioritized mitigation activities.

4.9 INTEGRATION INTO LOCAL PLANS

Hazards are pervasive throughout our local communities. While it is understood that the issue of hazard mitigation is a central focus of the LMS, there are other planning mechanisms where this important issue should be addressed. Issues of land use, infrastructure, and environment have been addressed in local comprehensive plans; however, few plans properly address the impact disasters may have on existing and future development. Disasters have enormous physical and social impacts on the community. Other types of planning mechanisms where hazards should be addressed include county and city CEMPs, Continuity of Operations Plans (COOP), Flood mitigation plans, State Housing Initiative Partnership Program (SHIP), and Local Development Review (LDR). Disaster planning is relevant to historic resources, waterfront development, community redevelopment, and low income neighborhoods where substandard housing is typically found has resulted due to use of poor construction methods and materials, and/or lack of adequate maintenance by the homeowner.

From a regulatory standpoint, local government comprehensive plans administered under the provisions of Section 163.3161, Florida Statutes are the cornerstone of growth management in Florida. Being supported by force of law, local comprehensive plans are extremely important vehicles to implement hazard mitigation. Local governments under Section 163.3161, Florida Statutes, are required to update their capital improvement plans (CIPs) annually. The projects included on the LMS PPL also should be incorporated into the local comprehensive plan CIPs. This should be accomplished annually in keeping with the annual update of the jurisdiction's list of projects. As a unified LMS Working Group, all jurisdictions follow the same integration process.

During LMS Working Group quarterly meetings, Working Group members comment on the update on projects that have been submitted for funding and project management, and how the project contributes to the St. Lucie Whole Community. Updates on projects are recorded in meeting minutes as well as the Project Prioritized List (PPL) and Eliminated Projects List.

As mentioned in Chapter 2.1, members of the LMS Working Group serve as liaisons to their respective divisions, departments, and organizations that implement and promote mitigation programs and projects. The LMS serves as the unified mitigation document that sets strategies, goals, and objectives for all jurisdictions, agencies, and organizations who adopt the LMS in resolutions, letters of support, and other organizational systems used to adopt the LMS as an authoritative document. As such, the LMS is cited as the guiding document in major plans and policies used for the growth and planning development of the St. Lucie Whole Community, which include but are not limited to:

1. Comprehensive Plans
2. Capital Improvement Plans
3. Growth Management Plans
4. Comprehensive Emergency Management Plans (CEMP)
5. Continuity of Operations Plans (COOP)
6. Floods Hazards Specific Plans

Each of the representatives in the LMS Working Group serves an important position within their jurisdictions or private sector organization they serve. Many are department directors and administrators understand how to implement the LMS strategies, goals and objectives within their organization’s plans and program administration. Working Group members use the LMS to support and enhance mitigation programs like the Community Rating System (CRS), project works, and resiliency projects. Jurisdictions like the City of Port St. Lucie and Fort Pierce often partner with St. Lucie County departments and divisions to work on mitigation projects that benefit the entire community. Using similar planning processes within jurisdictions, Working Group members reference the LMS as the unified mitigation strategy for the St. Lucie Whole Community, as it meets local, State, and Federal criteria in funding sources and project management.

For example, the LMS is cited in the St. Lucie County Comprehensive Plan’s goals, which delineates a comprehensive approach in the development of infrastructure, programs, projects and resources to St. Lucie County.

Goal 5.2: Reducing vulnerability to hazards. St. Lucie County shall strive to protect the people and property in St. Lucie County from the effects of hurricane storm damage and other hazards. St. Lucie County shall weigh future development as to the impact it would have on the County's ability to protect the people and property in St. Lucie County from the effects of hurricanes, storm surges, wildfires, sinkholes or other potential hazards.

Objective 5.2.1: *Coastal High Hazard Area.* The County shall address development and redevelopment in the coastal area consistent with the County's Comprehensive Emergency Management Plan, Local Mitigation Strategy, and the National Flood Insurance Program.

To see specific further LMS plan integration as well as mitigation program integration in local and community programs see Appendix D – Stakeholder Participation, Appendix E – Project Prioritized List (PPL) and Eliminated Projects List, and Appendix F – Resolutions.

4.10 INTEGRATION PROCESS

The following process is followed to ensure widespread integration of hazard mitigation into local planning mechanisms in St. Lucie County.

1. An invitation from the LMS Chair, along with a letter of support from the chair of the Working Group is transmitted to local organization and planning heads and directors, inviting each to attend an LMS Working Group meeting to discuss ways in which hazard mitigation can be best integrated into planning matters.

2. Meeting of the LMS Working Group is held. This phase could be said to be the institutionalization of hazard mitigation into the local planning and development.

3. Each director is asked to work with their planning staff to develop a strategy to integrate hazard mitigation into their planning programs and to evaluate whether their regulations address hazard mitigation, identify gaps, then seek possible alternatives.

4. At the next meeting of the LMS, directors will report their situation to the LMS Working Group

5. Identified changes will be made through the plan amendment process. Refer to Section 163.3187, Florida Statutes, and Chapter 27P-6; F.A.C. Local governments can seek plan amendments twice each year.

This is the preferred approach because the formal, legally mandated Evaluation and Appraisal Report process in which local comprehensive plans undergo extensive review and scrutiny and modification occurs every seven years.

*The County itself and the jurisdictions alike utilizes the LMS as a planning and development tool as a basis or supplement to governmental plans. Thus, the LMS is often integrated into other plans. These plans include but are not limited to County and City Compressive Emergency Management Plans (CEMPs), County and City Community Rating Systems (CRSs), County and City Capital Improvement Plans (CIPs), and Flood and Stormwater Management plans. The LMS is

incorporated in different ways within each document. For instance, certain plans use the LMS as a reference, while others use it as a management instrument. Under both uses, the LMS is an essential resource in local planning mechanisms at all levels.*

For example, the City of Port St Lucie notes: "The City of Port St Lucie uses the Local Mitigation Strategy as a planning tool as well as a project development tool. The LMS was used to develop the City's Comprehensive Emergency Management Plan (CEMP) and is referred to throughout the document. When planning and ranking mitigation projects throughout the City the LMS is used as a reference. The LMS also has helped drive steps the City has taken to increase our Flood Mitigation posture including, dedicating a 0.5 Full Time Employee (FTE) to managing the City's Community Rating System (CRS) and completing and the City Council has adopting a Storm Water Management Master Plan.

4.11 PLAN MONITORING

Once the participants adopt the LMS, monitoring the progress of plan implementation is extremely important. It is through the monitoring process the Working Group determines whether implementation is occurring as originally envisioned. Determining whether the implementation timeframes are being met is critical. The monitoring process is also important to identify why actions/initiatives are not occurring. The identification of obstacles to implementation also is important, for example, funding cutbacks, unsuccessful grant applications, and staff changes (e.g., key individual resigns or reassigned to new job, unexpected design problems, unexpected complexity in securing permits, lose commitment of partner agencies/organizations). Having an understanding of the timing and flow of projects as well as the availability of funding sources and community support also is key to successfully implementing the identified strategies. Certain events or circumstances can alter the traditional means of operation and implementation.

Step 1 Each quarter, the designated point-of-contact for each individual mitigation project or initiative identified on the PPL will report progress to the St. Lucie County LMS Coordinator. For the first and third quarters, the point-of-contact will complete an Individual Project Progress Report (Appendix C) for each project and submit it to the St. Lucie County LMS Coordinator. For the second and fourth quarters, an informal progress check-in will take place between the point-of-contact and the St. Lucie County LMS Coordinator. The point-of-contacts also will be responsible for submitting any supporting documentation such as newspaper articles or other relevant media.

Step 2 Based on the submitted progress report forms and progress check-ins, the St. Lucie County LMS Coordinator will complete quarterly progress reports for the overall LMS program and submit them to the elected boards of the County and municipalities.

Step 3 At the end of each year, the St. Lucie County LMS Coordinator will prepare an LMS Annual Report. The Annual Report will be submitted to the elected boards of the County and municipalities.

Step 4 Besides reporting to local governments, the St. Lucie County LMS Coordinator and/or

Chair of the LMS Working Group will be available to make similar presentations to private sector organizations, non-profit organizations (e.g., Council on Aging, Chambers of Commerce) and community organizations.

4.12 COMPREHENSIVE UPDATE

The LMS planning process is dynamic and results in the development of a set of prioritized projects and initiatives with the aim of mitigating hazard impacts. To ensure this Local Mitigation Strategy is consistent with current community issues and characteristics, it is important that it be periodically reviewed and updated. During preparation for LMS meetings and agenda preparation, The LMS Coordinator, the Chairman of the Working Group, and the Co-Chairman will solicit requests for changes to each jurisdiction's mitigation projects and/or strategies from participating jurisdictions as part of the Working Group meeting process. At each meeting the LMS is evaluated for any needs for changes. The LMS Coordinator evaluates the plan prior to meetings, in order to recommend any changes needed. All jurisdictions and participating parties are able to submit projects for consideration at any time.

In developing this updating process, three key sources were consulted to shape the process and procedures developed herein:

- Section 163.3191, Florida Statutes,
- the evaluation and appraisal process of local government comprehensive plans; and
- FEMA Local Mitigation Planning Handbook.

A key objective in the development of the process was to keep it from being excessively bureaucratic and cumbersome.

The LMS update process will occur on a 5-year cycle as is recommended by FEMA's DMA2K. The Working Group indicated that there needed to be some abbreviated reassessment of the Strategy following a Disaster Declaration. The LMS update procedures will be initiated and carried out by the Director of St. Lucie County's Department of Public Safety. The Director's responsibility is to ensure that the following update procedures are implemented in a timely manner. Both the regular, 5-year, Strategy update processes, as well as the abbreviated review process applicable following a Disaster Declaration, are depicted in Figure 6.2.

4.12.1 Comprehensive Update Procedures

The regular updating process will occur every 5 years. The administrative steps, as described below, constitute the procedures that will be followed.

Step 1 The LMS Coordinator of the Division of Emergency Management will activate the update process in January of the fourth year of the update cycle by notifying each member of the Working Group of an initial organizational meeting. At that time, the LMS Coordinator will request information updates on those serving on the Working Group (name of person, address, telephone number, and e-mail address, if available).

Step 2 The LMS Coordinator prepares meeting agenda in coordination with the Chairman of the

Working Group to be distributed in advance of the meeting to members of the Working Group.

Step 3 Working Group meeting is held. A brief review of the updating process is discussed. There will be a discussion of whether the evaluation criteria are still appropriate or whether modifications or additions are needed due to change of conditions over the period since the last update process occurred. The data needs will be reviewed, data sources identified, and responsibility for collecting information will be assigned to members.

Step 4 A draft report will be prepared. Evaluation criteria to be addressed.

Step 5 The LMS Coordinator determines best method to solicit public input. The LMS Coordinator is responsible for public noticing/advertising requirements. All Working Group members are informed and invited to attend public meeting.

Step 6 A public meeting is held. The LMS Coordinator or a representative of the Working Group presents findings, conclusions, and recommendations of the effort. Public comments are recorded.

Step 7 The LMS Coordinator of the Division of Emergency Management distills and synthesizes public comments in memorandum.

Step 8 The LMS Coordinator coordinates and organizes second meeting of Working Group. The draft report is distributed to the Working Group seven days prior to the meeting. The Working Group meeting is held. Consensus is reached on changes to the draft. If certain local governments cannot reach agreement on certain issue(s) and/or project prioritization(s), the conflict resolution process may be triggered for those specific items parties cannot agree upon. A vote is taken securing approval of the draft report, contingent upon integrating Working Group comments into the report.

Step 9 The LMS Coordinator incorporates modifications/additions resulting from Working Group meeting.

Step 10 The LMS Coordinator finalizes the report. Copies are distributed to Working Group members.

Step 11 Each jurisdictional representative presents the updated report to their respective governing body and other interested parties. If there are new or modified recommendations that their local government could implement to further the countywide Strategy, member seeks direction from governing body to implement appropriate strategies.

Step 12 The final updated LMS is formally adopted by all of the participating jurisdictions.

Step 13 The final updated LMS is forwarded on to the State Hazard Mitigation Officer at the

Florida Division of Emergency Management.

4.12.2 Methodology

Potential LMS mitigation projects and activities will be evaluated based on the following four criteria:

1. Which goal(s) the project addresses;
2. Which hazard(s) the project addresses;
3. Whether or not the project is supported in a plan or policy of the jurisdiction (i.e., Comprehensive Emergency Management Plan, Stormwater Management Plan, etc.);
4. Population benefiting from the mitigation project;
5. Does the project address an immediate threat to public health, safety, and welfare; and
6. What is the project's benefit cost ratio?

In order to evaluate the projects, the Working Group must first establish the priority goals and hazards using the following methodology. The process listed below will be followed during each update of the LMS.

The Working Group members were provided a survey of all submitted projects. Each stakeholder will complete a Project Scoring Sheet for each project. After scoring each project, a list of each stakeholder's projects is prioritized. If any projects received the same ranking, the stakeholder determines the final ranking order. A summary of those rankings were conducted and a final list was composed by stakeholder from those scores. A summary of the rankings were provided to all LMS Committee members and those rankings were submitted to the FDEM on January 30, 2015.

4.13 CONTINUING PUBLIC INVOLVEMENT

The St. Lucie County LMS Working Group recognizes the importance of public involvement in the LMS planning process. The Committee is committed to providing opportunities for the public to become and engaged in the LMS process. The Committee will ensure continued public involvement through the following methods:

- Advertising quarterly meetings of the LMS Working Group in local newspapers via press release and posting meeting dates to County website and calendar to ensure opportunities for the public to attend;
- Post updated LMS information and data on County and municipal websites when available;
- Engaging in public hazard awareness events and programs to make residents more aware of the hazards that St. Lucie County faces; and
- Providing copies of the final LMS at local library branches, city halls, and County Administrator and Mayoral offices for the public to view.

The LMS Coordinator shall have the responsibility of ensuring that these activities are being implemented.

4.14 CONFLICT OF RESOLUTION

With multiple local governments involved in the development of the St. Lucie County LMS, differences of opinions may arise over the course of the program with regard to goals, objectives, policies, and projects. Governments often have different interests, priorities, and needs as well as distinct constituents. In cases where an impasse occurs, there needs to be a procedure that can be activated to resolve such conflicts. This section describes the procedure that will be used to resolve conflicts arising among the participating entities in the development of the St. Lucie County LMS. The Conflict Resolution Process is depicted in Figure 6.3. The specific steps are described in detail below.

Prior to developing the process, other dispute resolution processes were investigated. They included the Treasure Coast Regional Planning Council (TCRPC) Dispute Resolution Process, the Palm Beach County Multi-jurisdictional Issues Coordination Forum, the South Florida Growth Management Conflict Resolution Consortium, the Volusia County Coastal Management Element Conflict Resolution Program, and the Monroe County procedures for resolving disputes during the planning, design, construction, and operation of wastewater collection/treatment and effluent disposal facilities.

The two types of conflicts that may arise are issues and disputes. Issues are technical problems that are susceptible to informal solution by emergency management or planning office staff. Disputes are problems that escalate to levels requiring formal resolution by neutral third parties. In either case, resolution or settlement will not be binding, but a mutual, agreed to understanding among the disputing parties.

Developing an LMS is a cooperative, collaborative process, and local governments should be able to reach consensus on most issues and problems that arise during the development period. When occasions arise where local governments cannot reach agreement on a particular issue or project, they will be able to petition a hearing of the issues before the Working Group.

Section 6.8.2 provides a detailed, step-by-step procedure that would be followed should a dispute arise during the study. The LMS Coordinator will serve as staff support to the Working Group.

4.14.1 Conflict Resolution Procedure

Objective: To institute a fair, effective, and efficient process to resolve conflicts among local governments during the development of the single, countywide LMS.

During the development of the LMS, local governments may reach an impasse on a particular issue or position. The local government has an opportunity to elect to exercise the following LMS Conflict Resolution Process.

Step 1 The local government would submit a Letter of Dispute (LOD) to the LMS Coordinator explaining in as much detail as possible, their concern and position along with documentation to support their position. In addition, they would outline potential alternative solutions.

Step 2 The LMS Coordinator would review the LOD making sure that it clearly outlined the position of the local government(s) and provided sufficient information supporting their position so the dispute at question could be easily understood by the members of the Working Group. If necessary, the LMS Coordinator would contact the disputing party and ask for additional information/data necessary to clarify the position.

Step 3 The LMS Coordinator will schedule a meeting of the LMS Working Group. In an effort to continue to try to resolve the impasse expeditiously, the LMS Coordinator will make every attempt to schedule the meeting within two calendar weeks from the date once the LMS Coordinator determines that there is sufficient information available to proceed to the Working Group. Each member will be sent a copy of the LOD and any supportive materials provided by the disputing party. The disputing party will be notified of the meeting date and time.

Step 4 A meeting of the Working Group will be held. The representative of the disputing party will present their positions to the Working Group. Based on the ensuing discussion, hopefully resolution will be achieved. At the end of the meeting, if no mutually acceptable compromise is achieved, the position of the Working Group will be final. Whatever the outcome of the meeting, a memorandum of understanding will be prepared by the LMS Coordinator. To be official, the memorandum must have the concurrence of the LMS Working Group Chair and a representative of the disputing party.

ANNEX A - FLOOD HAZARD SPECIFIC PLAN

ANNEX B - PPI PLAN

ANNEX C - TSUNAMI PLAN

ANNEX D – FDEM CROSSWALK

APPENDIX A - DEFINITIONS

APPENDIX B - CRITICAL FACILITIES OPEN DURING A HAZARD OR DISASTER

APPENDIX C - FORMS

APPENDIX D - STAKEHOLDER PARTICIPATION

APPENDIX E - PROJECT PRIORITIZED LIST (PPL) AND ELIMINATED PROJECTS LIST

APPENDIX F - ADOPTED RESOLUTIONS

APPENDIX G - TABLE AND FIGURES

APPENDIX H – LMS PLAN INTEGRATION

APPENDIX I – RECORD OF CHANGES