

Floodplain Management Plan

for

Seminole County

And its

Municipalities



SEMINOLE COUNTY

FLORIDA'S NATURAL CHOICE

2020-2025

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1 Introduction

The Problem: Seminole County, Florida, is subject to natural hazards that threaten life and health and that have caused extensive property damage. Floods inundated the County following Hurricane Irma in 2017, Tropical Storm Fay in 2008, following Hurricane Frances in 2004, and Tropical Storm Gabrielle in 2001. Extensive flooding occurred in 1960 after Hurricane Donna brought heavy rainfall. During the summer of 1953, rainfall over the St. Johns River basin was above normal, and when a tropical storm passed nearby, bringing additional heavy rainfall, Lake Monroe flooded lakefront areas. To better understand these hazards and their impacts on people and property, and to identify ways to reduce those impacts, the County’s Office of Emergency Management undertook this Floodplain Management Plan as an appendix to the County’s Local Mitigation Strategy (LMS).



“Hazard mitigation” does not mean that all hazards are stopped or prevented. It does not suggest complete elimination of the damage or the disruption caused by such incidents. Natural forces are powerful and most natural hazards are well beyond our ability to control. Mitigation does not mean quick fixes. It is a long-term approach to reducing hazard vulnerability. As defined by the Federal Emergency Management Agency (FEMA), “hazard mitigation” means any sustained action taken to reduce or eliminate the long-term risk to life and property from a hazard event.

Why Plan: Every community faces different hazards and every community has different resources to draw upon in combating problems and different interests that influence the solutions to those problems. Because there are many ways to deal with flood hazards and many agencies that can help, there is no one solution for managing or mitigating their effects. Planning is one of the best ways to develop a customized program that will mitigate the impacts of hazards while taking into account the unique character of a community. The plan provides a framework for all interested parties to work together and reach consensus on how to move forward. A well-prepared flood mitigation plan will ensure that all possible activities are reviewed and implemented so that the problem is addressed by the most appropriate and efficient solutions. It can also ensure that activities are coordinated with each other and with other goals and activities, preventing conflicts and reducing the costs of implementing each individual activity.

This Floodplain Management Plan was developed under the guidance of a Floodplain Management Planning Committee (FMPC). The Committee’s representatives included representatives of Seminole County departments, interested municipalities, federal and state agencies, citizens, and other stakeholders. All municipalities in the County were also invited to attend and participate in the planning process.

Mitigation activities require funding. A mitigation plan is now a requirement for Federal mitigation funds. Section 104 of the Disaster Mitigation Act of 2000 (42 U.S.C. 5164) states that as of November 1, 2003, local governments applying for pre-disaster mitigation funds must have an approved local mitigation plan. Similarly, as of November 1, 2004, a plan is also needed for

post-disaster mitigation funds under the Hazard Mitigation Grant Program. These requirements are detailed in 44 Code of Federal Regulations Part 201.

Thus a mitigation plan will both guide the best use of mitigation funding and meet the prerequisite for obtaining such funds from FEMA. FEMA also recognizes plans through its Community Rating System (CRS), a program that reduces flood insurance premiums in participating communities.

This Plan: This Floodplain Management Plan identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage caused by floods. The Plan fulfills the federal mitigation planning requirements, qualifies for CRS credit, and provides the County with a blueprint for reducing the impacts of these flood hazards on people, property, and the environment.

1.1 Planning Approach

This Floodplain Management Plan is the product of a rational thought process that reviews alternatives and selects and designs those that will work best for the situation. This process is an attempt to avoid the need to make quick decisions based on inadequate information. It provides carefully considered directions to the County government by studying the overall damage potential and ensuring that public funds are well spent.

1.1.1 Planning Committee

This Floodplain Management Plan was developed under the guidance of the FMPC with oversight from the Office of Emergency Management. The Committee includes representatives from the County and other local, state and federal agencies that serve Seminole County and private citizens and other stakeholders. The member organizations and participants who were members of this FMPC are shown in Table 4 in section 2.1.1 of this plan. The FMPC met and developed the plan starting in March 2020, and then from July 2020 to October 2020. Meetings were paused from March to July due to response to the COVID-19 virus, and resumed in July with a virtual format. Sign-in sheets from these meetings are kept for records by the Office of Emergency Management. The plan development included identifying the unique flood risks that affect the County, assessing these flood risks, identifying mitigation actions for these risks, and involving the public in the development of the plan.

Technical support for the development and implementation of the Floodplain Management Plan is provided by the Seminole County Office of Emergency Management and Development Services.

1.1.2 Planning Process

The Floodplain Management Planning Committee followed the CRS 10-Step Planning Process, based on the guidance and requirements of FEMA and the 2017 *CRS Coordinator's Manual*. The process is explained in further detail in Chapter 2 – Planning Process.

1.1.3 Public Involvement

Step 2 of the planning process was to obtain input from the public, particularly residents and businesses that have been affected by natural hazards. The public was invited to participate in the process through the following ways:

- Attending and participating in meetings of the FMPC. Five meetings were held in total.
- Contact with committee members.
- A public meeting at the end of the planning process to gain comments on the draft plan.

1.1.4 Coordination

Existing plans and programs were reviewed during the planning process. During the planning process, contacts were made with a variety of regional, state and federal agencies and organizations. Many of these agencies were members of the FMPC and provided review of and support for this planning effort.

Seminole County also coordinated with representatives from the municipalities in the County, who were invited to participate and attend the FMPC meetings. Citizens representing various areas of the County were members of the FMPC and provided valuable support. At the end of the planning process, these same agencies and organizations reviewed the draft plan and provided feedback.

1.1.5 Hazard Assessment and Problem Evaluation

The Committee addressed Steps 4 and 5 of the planning process (Assess the Hazard and Evaluate the Problem) during meetings of the Committee. The Committee's assessment and evaluation of the flood hazard are covered in Chapter 3 of this plan. The FMPC evaluated flooding data, including localized drainage, repetitive loss, hurricanes and tropical storms.

1.1.6 Goals

The Committee conducted goal setting exercises at one of its meetings. During the meeting, the previous plan's goals were reviewed and then the Committee agreed upon a final list of goals and objectives. These goals and objectives are discussed in Chapter 4 of this plan.

1.1.7 Mitigation Strategies

The FMPC considered everything that could impact the flood hazards and reviewed a wide range of possible alternatives. They are organized under six general strategies for reaching the goals. These strategies are the subject of Chapters 5 – 10 of this plan.

- Preventive Measures: zoning, building codes and other development regulations
- Property Protection Measures: relocation out of harm's way, retrofitting buildings, etc.
- Natural and Beneficial Functions: preserving natural areas to protect species and habitats or developing in ways that are more protective of species and habitats
- Emergency Services: warning, response, evacuation
- Structural Projects: levees, reservoirs, channel improvements
- Public Information: outreach projects, technical assistance to property owners, and other

measures.

1.1.8 Action Plan

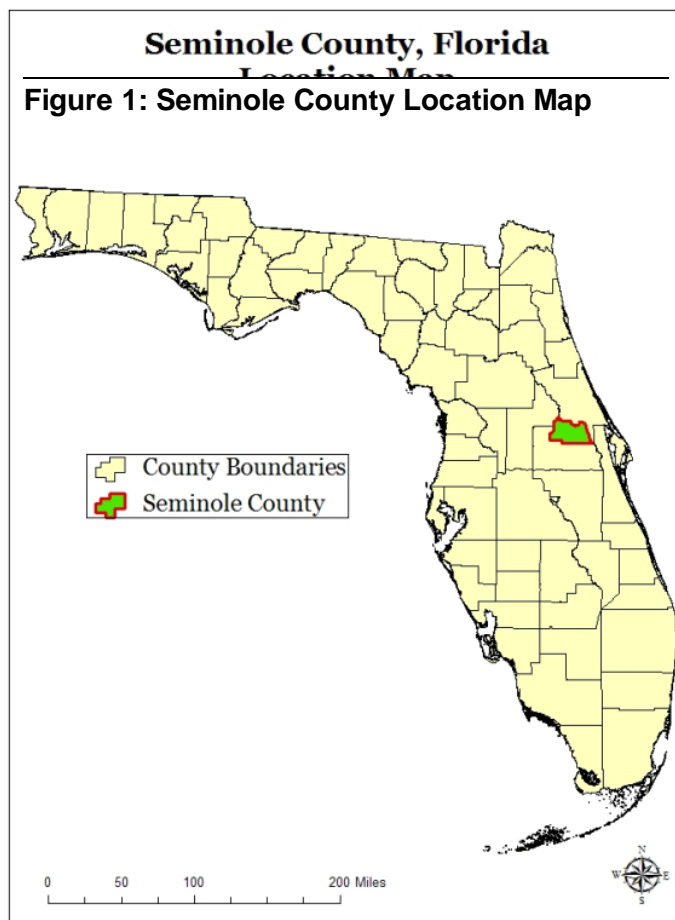
After reviewing the various alternatives, the Committee drafted an action plan to identify recommended projects, parties responsible for each of the projects, and a schedule for project completion. The action plan is included as an appendix to this plan.

It should be noted that this Plan only serves to recommend mitigation measures. Implementation of these recommendations depends on the adoption of this Plan by the Seminole County Board of County Commissioners.

1.2 Topography and Land Use

Seminole County is located in the central part of Florida and is part of the Orlando-Kissimmee-Sanford Metropolitan Statistical Area. The City of Sanford is the county seat. Seminole County covers 345 square miles, 37 square miles of which is water. The floodplains of Seminole County consist of lowlands adjacent to streams and lakes. The topography of the County is relatively flat, with some gently rolling hills. Ground elevations in Seminole County range from less than five (5) feet North American Vertical Datum of 1988 (NAVD) to 130 feet NAVD.

The City of Sanford, the county seat, is located on the southern shore of Lake Monroe in the northern part of the County. In the southwestern part of the County are the Cities of Longwood,



Winter Springs, Casselberry and Altamonte Springs. The City of Oviedo is in the south central portion of the County. The City of Lake Mary borders Sanford, in the western part of the County.

Seminole County's climate is characterized by long, warm summers and mild, dry winters. The average annual rainfall is about 53 inches. The majority of the rain falls from June through September and is associated with tropical storms or depressions which means that precipitation for any given month can vary greatly from year to year.

Seminole County is bordered on the north and east by the St. Johns River and on the west primarily by the Wekiva River. The St. Johns River is brackish. There are many lakes in Seminole County, and more than 120 of these are larger than five acres. Most occur in karst areas on the sand ridges. In addition to Lake Monroe which straddles the northern

border of the County, Lake Jesup bisects much of the northern half of the County and Lake Harney sits along the County's eastern border.

Seminole County's physiography consists of alternating ridges and valleys with abundant lakes. According to the USDA's Soil Survey of Seminole County, Florida,

"The Osceola Plain is a broad, flat area of low, local relief and is generally between 60 and 70 feet in elevation. Most of the western part of the county is made up of this plain. The Orlando Ridge is an area of higher elevation that is generally parallel to the other surrounding ridges outside of Seminole County, such as the Mount Dora Ridge to the west. It is possible that the Orlando Ridge once was part of a relic, 'Cape Orlando,' which resulted from progressive progradation that formed Cape Canaveral and False Cape in Brevard County from marine processes. The northern tip of the Orlando Ridge extends a few miles into Seminole County in the area of Altamonte Springs.

The Eastern Valley is generally 20 to 25 feet in elevation and is characterized by a broad, flat area through which the St. Johns River flows. Most of the eastern part of Seminole County is composed of this valley. The Wekiva Plain is a flat area in western Seminole County dominated by the Wekiva River. In eastern Seminole County, the Geneva Hill is a high area in the Eastern Valley in the vicinity of Geneva."

In terms of geology, Seminole County is underlain by a thick sequence of limestone and dolomite rock upon which a relatively thin section of sand, silt, shell material and clay was deposited.

According to the USDA's Soil Survey of Seminole County, Florida, there are 10 soil map units in Seminole County, described below.

Mineral soils on the uplands:

1. *Urban Land-Pomello-Paola*. This unit is about 4% of Seminole County and consists of moderately well drained and excessively drained soils that are sandy.
2. *Urban Land-Astatula-Apopka*. This unit is about 22% of Seminole County, and is more than half urban land. The rest is excessively drained soils that are sandy and well drained sand soils that have a loamy subsoil.
3. *Urban Land-Tavares-Millhopper*. The soils in this unit are moderately well drained and sandy or have a loamy subsoil. This unit covers 23% of the County.

Mineral soils on the flatwoods and in sloughs and depressions between the upland ridges and the floodplains, depressions and swamps:

4. *Myakka-EauGalle-Urban Land*. These are poorly drained soils that are sandy or have a loamy subsoil. This unit covers 24% of the County.
5. *St. Johns-Malabar-Wabasso*. This unit makes up 8% of Seminole County. These soils in the central part of the County are poorly drained and sandy or have a loamy subsoil.
6. *Basinger-Smyrna-Delray*. These soils, covering about 7% of the County, are poorly drained and very poorly drained soils that are sandy throughout or have a loamy subsoil.

Mineral and organic soils on the floodplains and in depressions and swamps:

7. *Nittaw-Felda-Floridana*. These are very poorly drained and poorly drained mineral soils; some with a clayey subsoil and some sandy with a loamy subsoil. They exist on floodplains and in depressions and make up about 4% of the County.
8. *Nittaw-Okeelanta-Terra Cela*. The soils in this unit, which covers about 4% of the County, are on the floodplains adjacent to Lake Monroe and Lake Jesup and subject to frequent flooding. They are very poorly drained mineral and organic soils, some are mucky with a clayey subsoil, some are mucky with a sandy layer, and some are mucky throughout.
9. *Brighton-Samsula-Sanibel*. These soils are south of Lake Jesup and are ponded. They are very poorly drained organic and mineral soils. They make up about 1% of the County. Some are mucky throughout, some are mucky and have a sandy layer beneath, and some are sandy throughout. They exist in depressions and swamps.
10. *Pompano-Nittaw-Basinger*. The soils in this map unit are in floodplains adjacent to the Wekiva, St. Johns and Econlockhatchee Rivers and Lake Jesup. They make up about 3% of the county, and are poorly drained and very poorly drained mineral soils, some are sandy throughout and some are mucky with a clayey subsoil.

The Floridan Aquifer underlies all of Seminole County and supplies at least 95 percent of the County's freshwater. Most of the County's soils are sandy and low in natural fertility, but they support forests and wildlife. In addition, ornamental plants, vegetables and other plant products are grown in the County.

1.3 Development, Redevelopment and Population Trends

Seminole County's convenient location between Volusia and Orange Counties has made it one of the fastest growing counties in Florida. The Seminole County 2018 Comprehensive Plan has certain goals for future development. The goals and objectives outlined in the Future Land Use Section are:

- Protection and preservation of the environment, including water resources, air quality, regionally significant natural areas, open space and recreational areas;
- Creation and support of diverse, globally competitive economic conditions favorable to higher wage jobs;
- Provision of a range of affordable housing opportunities and choices;
- Provision of adequate services and facilities, including a variety of transportation choices;
- Maintenance of established residential neighborhoods, revitalization of declining neighborhoods and creation of new energy-efficient communities with educational, health care and cultural amenities;
- Protection of rural and agricultural areas; and
- Protection of private property rights.

Chapter 3 provides information on the number and location of building permits issued in Seminole County between January of 2015 and August of 2020. During this time period more than 3,300 building permits were issued for single-family, multi-family, commercial and government buildings. The table to the right from the Seminole County Comprehensive Plan indicates the various land use categories and the acreage for each. The map in Figure 2 below identifies future land use proposed for Seminole County.

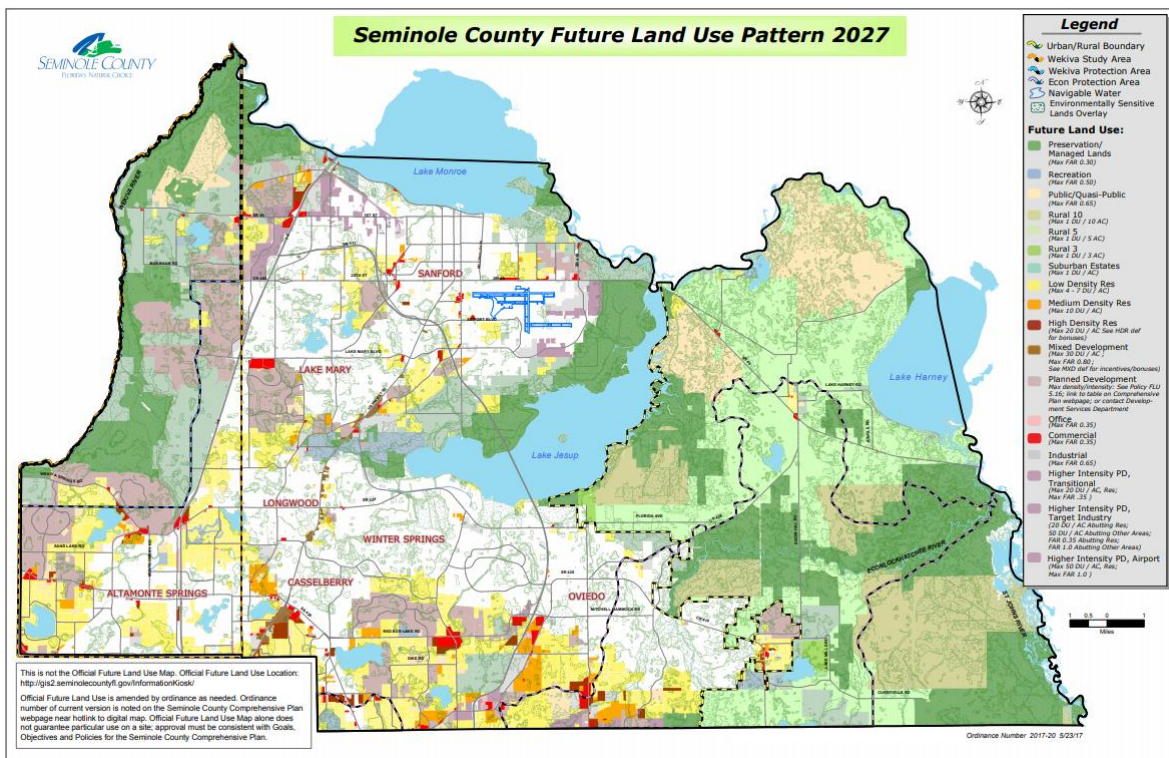
Table 1: Acres of Land by Land Use Category

Existing Land Use Categories	Acres	Percent
Residential Single Family	54,059	29%
Agriculture	30,117	16%
Managed Environmental Land	27,170	14%
Dedicated Common Open Space	13,902	7%
Vacant Other	12,877	7%
Public	11,026	6%
Public Other	4,499	2%
Residential Multifamily	4,462	2%
Residential Mobile Home	3,966	2%
Commercial	3,832	2%
Vacant Residential	3,659	2%
Vacant Commercial	2,942	2%
Transportation	2,669	1%
Industrial	2,538	1%
Institutional	2,531	1%
Recreation	2,295	1%
Education	1,906	1%
Office	1,801	1%
Vacant Industrial	1,172	1%
Hotel/Motel	143	0%
Vacant Institutional	91	0%
TOTAL (includes city acres)	187,657	100%

Source: Seminole County Comprehensive Plan

There has not been a significant amount of re-development within Seminole County. All development must follow the guidance of the Comprehensive Plan and must comply with all current floodplain management regulations.

Figure 2: Seminole County Land Use Pattern



Source: Seminole County Comprehensive Plan – Future Land Use

1.3.1 Population Trends

In 2019, the estimated population of Seminole County was 471,826 people, an 11.6% increase from the 2010 population. According to the University of Florida Bureau of Economic and Business Research Florida Population Studies, the population of Seminole County is expected to increase to 510,710 people by 2025, an 8.2% increase in the next five years. By 2030, the

population is expected to increase another 4.9%, to 535,588 people. These figures include both the incorporated and unincorporated areas of the County.

1.4 The Community Rating System

FEMA's National Flood Insurance Program (NFIP) administers the CRS. Under the CRS, flood insurance premiums for properties in participating communities are reduced to reflect the flood protection activities that these communities are implementing. This program can have a major influence on the design and implementation of flood mitigation activities, so a brief summary is provided here.



A community receives a CRS classification based on the credit points it receives for activities. It can undertake any mix of activities that reduce flood losses, such as enhanced mapping, regulatory changes, public information programs, flood damage reduction, or flood warning and preparedness programs. There are 10 CRS classes: class 1 requires the most credit points and gives the largest premium reduction; class 10 receives no premium reduction (see Table 2). A community that does not apply for the CRS or that does not obtain the minimum number of credit points is a class 10 community. On May 1, 2011, the County was rated a Class 6 and policy holders within the SFHA enjoy a 20 percent reduction on the cost of flood insurance. This CRS rating was reaffirmed in 2017 cycle verification.

Table 2: Community Rating System Premium Reductions

Class	Points	Premium in Floodplain	Reduction Outside Floodplain
1	4500+	45%	10%
2	4,000-4,499	40%	10%
3	3,500-3,999	35%	10%
4	3,000-3,499	30%	10%
5	2,500-2,999	25%	10%
6	2,000-2,499	20%	10%
7	1,500-1,999	15%	5%
8	1,000-1,499	10%	5%
9	500-999	5%	5%
10	0-499	0%	0%

1.4.1 Program Incentive

The CRS provides an incentive not just to start new mitigation programs, but to keep them going. There are two requirements that encourage a community to implement flood mitigation activities. First, the County will receive CRS credit for this plan, once it is adopted. To retain that credit, the County must submit an evaluation report on progress made towards implementing this plan to FEMA by October 1st of each year. That report must be made available to the media and to the public. Second, the County must annually recertify to FEMA that it is continuing to implement its CRS credited activities. Failure to maintain the same level of involvement in flood

protection can result in a loss of CRS credit points and a resulting increase in flood insurance rates to residents.

It is expected that this undesirable impact of loss of CRS credit for failure to report on the plan's progress or for failure to implement flood loss reduction projects will be a strong incentive for the County to continue implementing this plan in dry years when there is less interest in flooding.

1.4.2 Benefits of CRS Participation

Table 3 below shows the direct dollar benefit to Seminole County and the County's policy holders for participation in the CRS. The savings per policy are for properties in the FEMA mapped 100-year floodplain ("Special Flood Hazard Area"). The savings are lower for policies outside the mapped floodplain. CRS discounts do not apply to Preferred Risk Policies (PRP), as shown in Table 3 below. The Preferred Risk Policy (PRP) is a Standard Flood Insurance Policy (SFIP) that offers low-cost coverage to owners and tenants of eligible buildings located in the moderate-risk B, C, and X Zones in the National Flood Insurance Program (NFIP) Regular Program communities.

Table 3: Seminole County Policy Savings for CRS Participation

	Total Policies	Policies in SFHA	X-STD/AR/A99	PRP
Number of Policies	4,109	1,259	50	2,800
Total Premiums	\$2,105,881	\$936,511	\$66,489	\$1,102,881
Average individual annual premium	\$512	\$744	\$1,330	\$394
Class 9 savings per floodplain policy	\$15	\$46	\$74	\$0
Class 9 savings for community	\$62,226	\$58,532	\$3,694	\$0
Class 8 savings per floodplain policy	\$29	\$93	\$74	\$0
Class 8 savings for community	\$120,757	\$117,063	\$3,694	\$0
Class 7 savings per floodplain policy	\$44	\$139	\$74	\$0
Class 7 savings for community	\$179,289	\$175,595	\$3,694	\$0
Class 6 savings per floodplain policy	\$59	\$186	\$148	\$0
Class 6 savings for community	\$241,515	\$234,127	\$7,388	\$0

Source: Insurance Services Office (ISO)

In addition to the direct financial reward for participation in the CRS, there are many other reasons to participate. The other benefits that are more difficult to measure in dollars include:

1. The activities credited by the CRS provide direct benefits to residents, including:
 - Enhanced public safety,
 - A reduction in damage to property and public infrastructure,
 - Avoidance of economic disruption and losses,
 - Reduction of human suffering, and
 - Protection of the environment.

2. A community's flood programs will be better organized and more formal. Ad hoc activities, such as responding to drainage complaints rather than an inspection program, will be conducted on a sounder, more equitable basis.
3. A community can evaluate the effectiveness of its flood program against a nationally recognized benchmark.
4. Technical assistance in designing and implementing a number of activities is available at no charge from the Insurance Services Office.
5. The public information activities will build a knowledgeable constituency interested in supporting and improving flood protection measures.
6. A community will have an added incentive to maintain its flood programs over the coming years. The fact that the community's CRS status could be affected by the elimination of a flood-related activity or a weakening of the regulatory requirements for new developments will be taken into account by the governing board when considering such actions.
7. Every time residents pay their insurance premiums, they are reminded that the community is working to protect them from flood losses, even during dry years.

More information on the Community Rating System can be found at <https://www.fema.gov/national-flood-insurance-program-community-rating-system>.

1.5 References

1. *Community Rating System Coordinator's Manual*, FEMA, 2017.
2. *Example Plans*, FEMA/Community Rating System, 2006.
3. *Getting Started – Building Support for Mitigation Planning*, FEMA, FEMA-386-1, 2002.
4. *Local Multi-Hazard Mitigation Planning Guidance*, FEMA, 2008.
5. *Soil Survey of Seminole County, Florida*, USDA Soil Conservation Service, 1990.
6. *State and Local Plan Interim Criteria under the Disaster Mitigation Act of 2000*, FEMA, 2002.
7. *Florida Population Studies*, College of Liberal Arts and Sciences Bureau of Economic and Business Research, 2020
https://www.bebr.ufl.edu/sites/default/files/Research%20Reports/projections_2020_asrh.pdf
8. *Seminole County Comprehensive Plan*, Seminole County Planning and Development Department, 2018.

2 Planning Process

2.1 Planning Approach

This Floodplain Management Plan is the product of a rational thought process that reviews alternatives and selects and designs those that will work best for the situation. This process is an attempt to avoid the need to make quick decisions based on inadequate information during an emergency. It provides carefully considered direction to the County government by studying the overall damage potential and ensuring that public funds are well spent. The development of this plan also followed FEMA's CRS 10-Step Planning Process.

2.1.1 Planning Committee

This Floodplain Management Plan was developed under the guidance of a Floodplain Management Planning Committee (FMPC) with oversight from the Seminole County Office of Emergency Management. The Committee included representatives from various County departments, other local, state and federal agencies that serve the County, and citizens from throughout the County. Some of these citizen members of the FMPC had been flooded in the past. The County department representatives, citizens and stakeholders who make up the FMPC are shown in Table 4 below.

Table 4: FMPC – Floodplain Management Planning Committee

Name	Agency
Daniel O'Keefe	Citizen
Karen Heriot	Citizen
Michelle Bernstein	Citizen
Pam Sanders	Citizen
Shannon Webster	Citizen
Victoria Colangelo	Citizen
April Davis	City of Altamonte Springs
Danielle Marshall	City of Altamonte Springs
Jane Dai	City of Casselberry
Kelly Brock	City of Casselberry
Danielle Koury	City of Lake Mary
Dave Dovan	City of Lake Mary
Shad Smith	City of Longwood
Tom Smith	City of Longwood
Amanda Kortus	City of Oviedo
Jeff Buchanan	City of Oviedo
Mike Cash	City of Sanford
Russel Sheibenberger	City of Sanford
Christopher Schmidt	City of Winter Springs
Rachel Gironella	City of Winter Springs
Lucius Cushman	Seminole County Resiliency Committee – Citizen Representative
Rob Wolf	Seminole County Resiliency Committee – Citizen Representative
Tony Coleman	Seminole County Building Division
Bill White	Seminole County Development Review Engineering Division
Alan Harris	Seminole County Emergency Management
Kathryn Valentine	Seminole County Emergency Management
Jeff Sloman	Seminole County Engineering Division
Tuan Huynh	Seminole County Engineering Division
Mary Robinson	Seminole County Planning and Development
Owen Reagan	Seminole County Roads and Stormwater
Marie Lackey	Seminole County Watershed Management

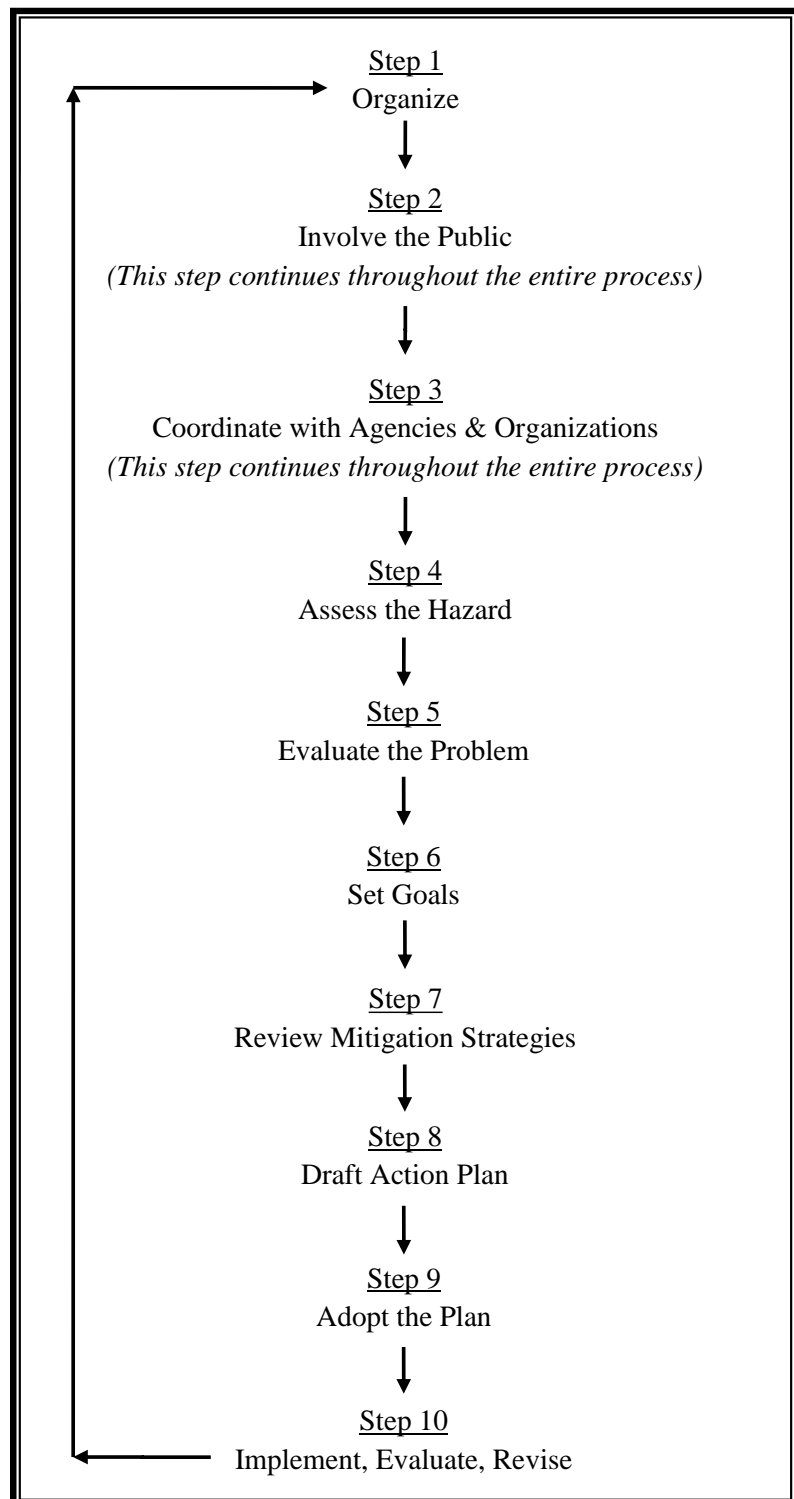
The plan development included identifying the unique flood risks that affect the County, identifying mitigation actions for these risks, and discussing how to involve the public in the development of the Plan.

The Seminole County Board of County Commissioners passed a Resolution amending Administrative Code Section 4.12, which established the planning process and created the FMPC.

2.1.2 Planning Process

The FMPC followed a standard 10-step process, based on the guidance and requirements of FEMA. The process is summarized in the flow chart in the figure on the right. The Committee assessed the flood hazards affecting the County, set goals, and reviewed a wide range of activities that can mitigate the adverse effects of the hazards. The FMPC met five times over the course of the planning process in development of this plan. Agendas and sign-in sheets for each of the meetings are documented and saved by the Office of Emergency Management.

Figure 3: Mitigation Planning Process



2.1.3 Public Involvement

Step 2 of the planning process was to obtain input from the public, particularly residents and businesses that had been affected by flooding. The public was invited to participate through:

- Attending and participating in meetings of the Floodplain Management Planning Committee. Five meetings were held in total.
- Contacting committee members.
- Attending a public meeting held on May 18, 2021 to receive comments on the draft plan.

2.1.3.1 Public Meetings

A public meeting was held at the end of the planning process to solicit comments on the draft plan. This meeting was held on May 18, 2021 in a virtual format, due to the current conditions of the COVID-19 pandemic. The meeting was advertised through the local newspaper, in a County public building, on the Seminole County website, and on multiple social media platforms. Background on the plan and its findings and recommendations were explained, and attendees were given an opportunity to ask questions and submit comments for review, consideration, and potential modification of the plan.

2.1.3.2 Other Public Involvement Methods

Seminole County promoted the floodplain management plan through its established Local Mitigation Strategy Committee, which includes members from a cross-section of the community and who represent a variety of local organizations.

2.1.4 Coordination

Existing plans and programs were reviewed during the planning process. In order to effectively update all parts of the plan, a review was done of the Seminole County and municipal Comprehensive Plans, the Local Mitigation Strategy, the Seminole County Future Land Use plan, National Inventory of Dams, Area Basin Studies, and Geographic Information Systems map data. In addition, contacts were made with regional, state and federal agencies and organizations during the planning process. Requests for updated information were made of a variety of stakeholder agencies, including the National Weather Service, the Florida Division of Emergency Management, and the Insurance Services Office to obtain technical information needed for review and inclusion in the plan.

2.1.4.1 Solicitation of Comments

Members of the FMPC included representatives from different areas of the community, including citizen representatives from all five (5) commission districts. These stakeholders provided valuable comments throughout the planning process.

2.1.4.2 Neighboring Communities

All incorporated municipalities within Seminole County were made aware of the planning process via e-mail and calendar invitation. Each incorporated municipality was invited to attend

the FMPC meetings. Participating municipal agencies were involved through the planning process and community profiles are included as appendices to this plan for each of the six participating communities.

2.1.4.3 *Contacting Other Agencies and Meetings with Agencies*

Because Seminole County is not a coastal county, the Florida Department of Environmental Protection's Coastal Management Program was not contacted for this planning effort.

2.1.5 Hazard Assessment and Problem Evaluation

The Committee addressed Steps 4 and 5 of the planning process (Assess the Hazard and Evaluate the Problem) during the March and July meetings of the FMPC. The flood hazard data and vulnerability to critical facilities, buildings and infrastructure and the impact of the flood hazard on life, health and safety is covered in Chapter 3 of this document. The LMS also provided data and support for Hazard Assessment and Problem Evaluation sections of the plan.

2.1.6 Goals

The Committee reviewed the Floodplain Management Plan Goals at the August FMPC meeting. During this meeting, the list of current goals was reviewed and discussed, and then the Committee agreed upon a final list of goals and objectives. These goals are discussed in Chapter 4 of this document.

2.1.7 Mitigation Strategies

During the September meeting of the FMPC, the Committee reviewed and discussed various mitigation measures which could help to reduce or eliminate the flood hazards. The Committee went through a comprehensive list of potential mitigation options based on the following six general categories:

- Preventive Measures
- Property Protection Measures
- Natural Resource Protection Measures
- Emergency Services Measures
- Structural Measures
- Public Information Measures

2.1.8 Action Plan

After reviewing the various alternatives, the Committee drafted an action plan to identify recommended projects, parties responsible for implementation, a schedule for project completion, and identification of funding sources. The action plan is included as an appendix to this document.

This Floodplain Management Plan serves only to recommend mitigation measures. Implementation of these recommendations depends on adoption of this plan by the Seminole County Board of County Commissioners.

3 Flood Risk Assessment

Flooding is the deadliest and most costly storm-related natural hazard in the United States. Many deaths due to flooding can be avoided by not driving through flooded roads and paying attention to evacuation warnings.

Types of Flooding: The most common and most damaging floods occur along rivers and streams. This type of flooding is called overbank flooding. Overbank flooding of rivers and streams can be caused for any of the following reasons:

1. There is more precipitation in the watershed than the waterways and the storm system can convey;
2. There are obstructions in a channel, such as a beaver dam,
3. There is a large release of water when a dam or other obstruction fails; or
4. A combination of these factors.

Most floods are caused because of the first factor, a larger amount of precipitation than the watershed can manage. Another contributor to flooding is storm water runoff. This problem has recently become more critical because of development in areas subject to urban flooding.

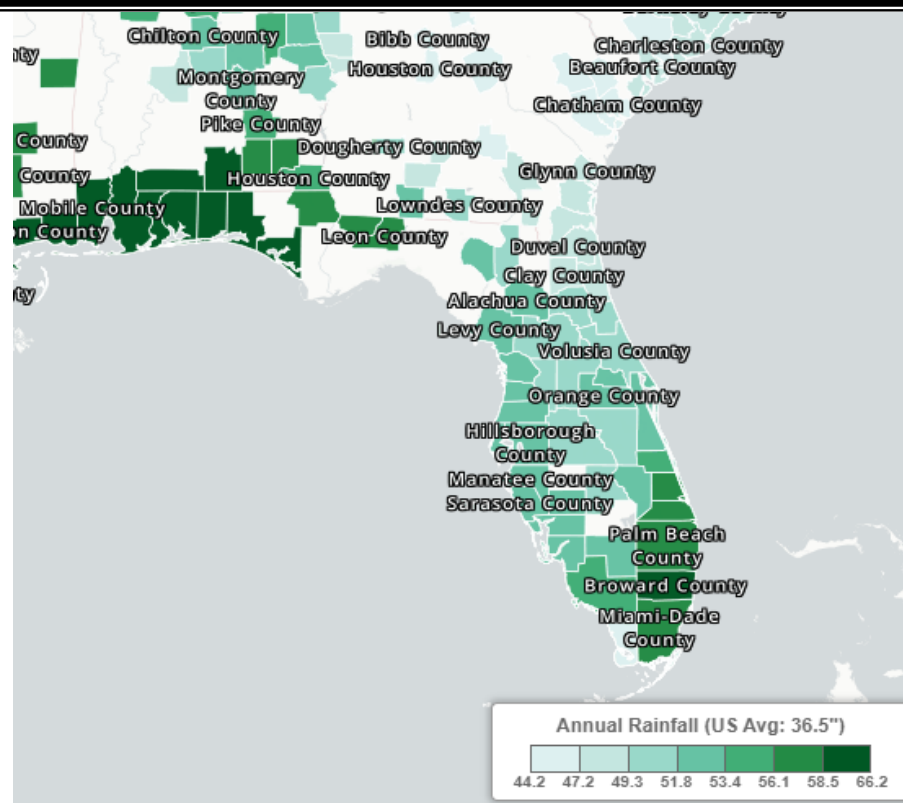
Causes of Flooding: For most of Seminole County, the primary causes of flooding are tropical systems and afternoon thunderstorms. These storms generally occur during the rainy season, from June through November. The rain associated with hurricanes and tropical storms can produce extreme amounts of rainfall in short periods of time, which can overwhelm the capacity of streams, channels, or drainage infrastructure. In addition, certain areas of Seminole County are low-lying, which makes them subject to flooding from rising water.

Historical Floods: Since 1994, Seminole County has experienced eight major floods. These floods have disrupted life for community members by closing streets and causing property damage to homes and businesses, and one of these floods even caused the death of a Seminole County resident. To address flood control and protection issues, Seminole County continues to update and implement this floodplain management plan.

3.1 Precipitation in Seminole County

Seminole County receives an average of 53 inches of rain each year. However, this rainfall is not spread out evenly from month to month or across all parts of the County. Most precipitation occurs during the rainy season, from June to October.

Figure 4: Rainfall Distribution across Florida



Source: <https://www.bestplaces.net/climate/county/florida/seminole>, 2020

The above map shows average annual rainfall across the state of Florida, showing Seminole County to be within the 51.8-53.4 inch range, with the national average being 36.5 inches.

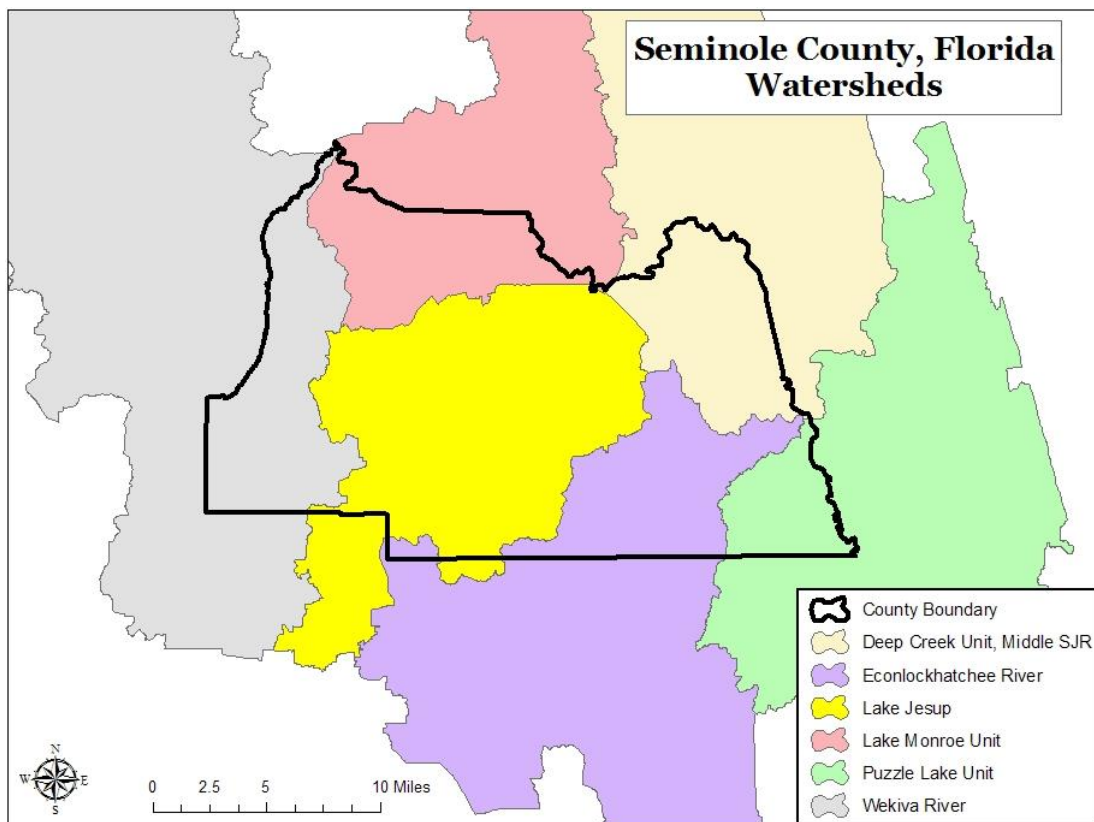
3.2 Seminole County Water Resources and Watersheds

Seminole County has an abundance of surface water resources. The St. Johns River and Econlockhatchee River as well as three large lakes – Lake Monroe, Lake Jesup and Lake Harney – fall at least partly within the County boundaries.

There are also six watersheds that fall partly within Seminole County, as shown in Figure 5. Within these six major watersheds are smaller subwatersheds that drain into the tributaries. Each of these streams has adjacent floodplains that are inundated during a flood.

The condition of the land in the watershed affects what happens when precipitation falls. For example, more rain will run off the land and into streams if the terrain is steep, if the ground is already saturated from previous rains, if the watershed is significantly covered with impervious pavement and parking lots, or if depressional storage areas (like swamps) have been filled in. Thus, urban development in the watershed can contribute to flooding. Each of the watersheds in Seminole County contains urban as well as rural areas, except for Deep Creek, which is mostly rural. Watersheds that are more urbanized tend to flood more quickly than rural watersheds.

Figure 5: Watersheds within Seminole County



Source: Seminole County GIS Division

3.3 Flood Risks

3.3.1 Tropical Cyclones

Flooding in Seminole County is often the result of hurricanes, tropical storms, or tropical depressions, all of which are tropical cyclones. These storms bring heavy rainfalls and high winds to Seminole County, which can cause significant damage. These storms can last for several days, and therefore they have the potential to cause sustained flooding. Rain combined with high winds can also create wave action on the three lakes and can damage properties adjacent to these bodies of water.

Historically, many hurricanes and tropical storms have passed near or through Seminole County, as shown in Table 7.

Table 7: Major Storms near Seminole County, Florida (1990 to 2020)

Date	Storm Name	Deaths(FL)	Injuries (FL)	Property Damage
9/11/2017	Hurricane Irma	7	Hundreds (direct & indirect)	\$50,000,000,000 (US)
10/7/2016	Hurricane Matthew	2	0	\$10,000,000,000 (US)
8/24/2008	Tropical Storm Fay	5	0	\$390,000,000 (FL)
2/3/2007	Severe Storms and Tornadoes	0	0	\$43,000,000 (FL)
8/24/2006	Hurricane Ernesto	0	0	\$500,000,000 (US)
10/5/2005	Tropical Storm Tammy	0	0	<\$25,000,000 (US)
9/24/2004	Hurricane Jeanne	3	0	\$6,900,000,000 (US)
9/16/2004	Hurricane Ivan	14	0	\$8,300,000,000 (FL)
9/4/2004	Hurricane Frances	5	0	\$8,000,000,000 (FL)
8/13/2004	Hurricane Charley and TS Bonnie	9	0	\$14,000,000,000 (FL)
9/3/2003	Tropical Storm Henri	0	2	“minor”
9/2/2002	Tropical Storm Edouard	0	0	“minor” (roadway flooding in Seminole County)
9/13/2001	Tropical Storm Gabrielle	2 (1 in Seminole)	0	\$230,000,000 (FL)
10/4/2000	Tropical Storm Leslie	3	0	\$700,000,000 (FL)
10/20/1999	Hurricane Irene	8	3	\$8,000,000 (FL)
10/22/1998	Hurricane Mitch	2	65	\$20,000,000 (FL)
9/15/1998	Hurricane Georges	0	0	\$20,000,000 (FL)
8/22/1995	Tropical Storm Jerry	0	0	\$30,000,000 (FL)
7/31/1995	Hurricane Erin	0	0	\$700,000,000 (FL)
11/8/1994	Tropical Storm Gordon	8	0	\$400,000,000 (FL)

Sources: National Oceanic and Atmospheric Administration’s National Hurricane Center and the Federal Emergency Management Agency

Of particular importance to communities susceptible to hurricane damage is the track of an approaching storm. Proximity and direction of an approaching storm are important when determining impacts and subsequent damage from the storm. Figure 6 on the next page shows the historical tracks of storms that have passed through or near Seminole County.

Figure 6: Historical Storm Tracks near Seminole County (1852 to 2019)

Source: NOAA Historical Hurricane Tracks

3.3.2 Flash Floods

A second source of flooding in Seminole County is flash flooding. Flash floods are generated by severe storms that drop a large amount of rainfall in a short period of time. Flash floods strike quickly and end quickly, with very little warning time. Areas with steep slopes and narrow stream valleys are particularly vulnerable to flash flooding, as are the banks of small tributary streams. In hilly areas, the high velocity flows and short warning times make flash floods hazardous and destructive.

In urban areas, flash flooding can be triggered by increased stormwater runoff due to land development. When buildings are constructed on open spaces, hard surfaces like parking lots and rooftops replace forests, swamps, fields, and other natural land covers. When rainfall hits these impervious surfaces, it runs off of them rather than infiltrating into the soil that was once there. Along the way, stormwater runoff picks up sediment, debris and pollutants on the hard surfaces and carries them to streams or rivers. Thus, developed land absorbs less rainfall than

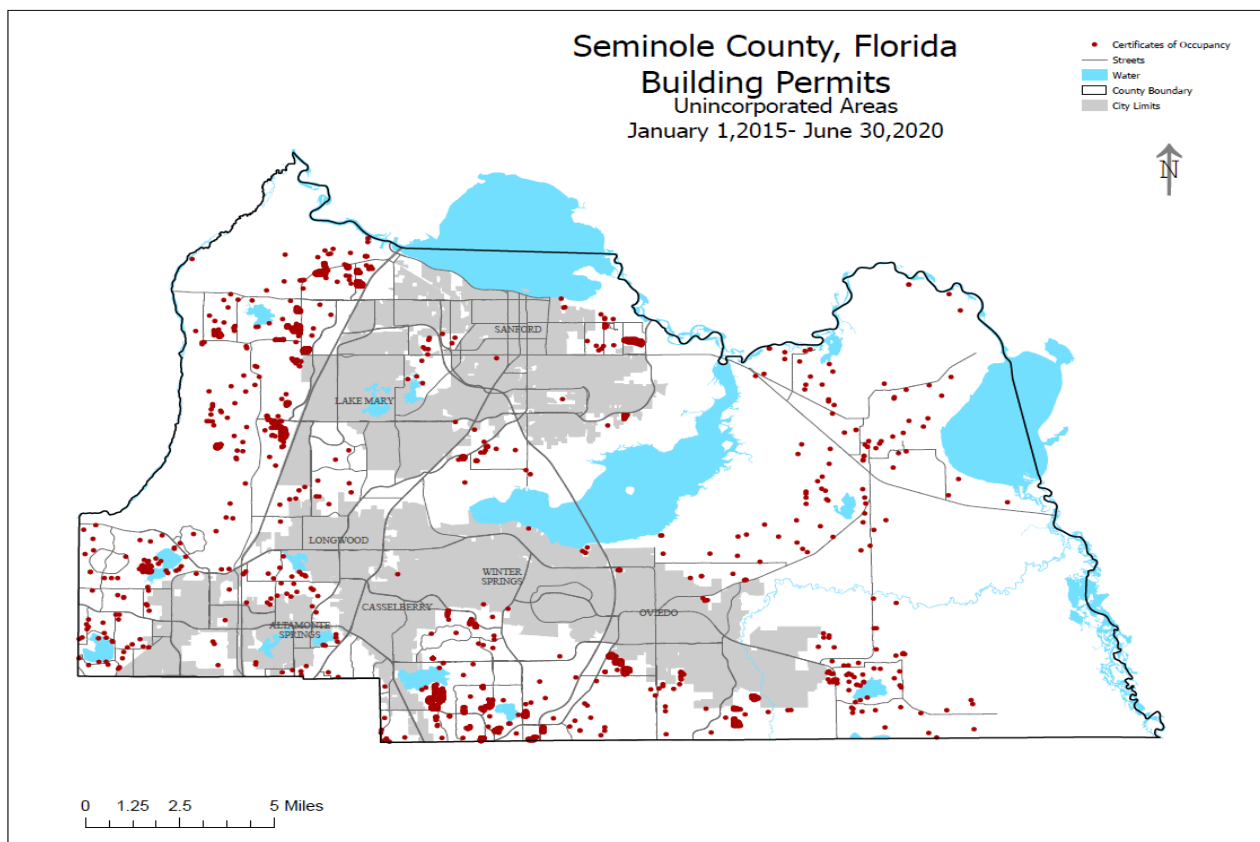
undeveloped land, and also increases pollution in local waterways. As we develop land, the amount and speed of storm water runoff increases. As a result, flash floods often occur in urban areas where much of the watershed is covered in impervious surfaces. Development in the floodplain and watersheds of Seminole County could lead to increased flooding problems in the future, if not mitigated.

Figure 7 shows the distribution of building permits issued from 2015 to mid-2020. New development such as this can trigger more flash floods. This data comes from the Seminole County Building Division.

Table 5: Number of Permits for New Construction per Year in Seminole County

	January 2015- August 2020						
	2015	2016	2017	2018	2019	2020	Total
Commercial	24	19	24	21	14	2	104
Single Family Res	454	298	381	466	675	506	2780
Multi-Family Res	48	85	90	171	69	0	463
Government	0	2	4	0	4	0	10
Total	526	404	499	658	762	508	3357

Figure 7: Location of Permits for New Construction from January 1, 2015- June 30, 2020



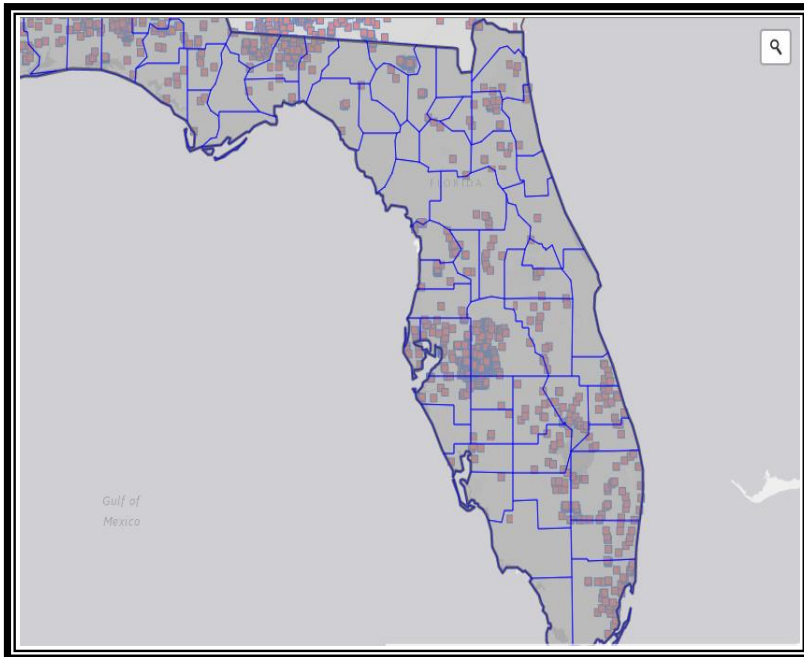
Source: Seminole County GIS

3.3.3 Dam Failure

Dams are designed to hold back large amounts of water. If they fail or are overtopped, they can produce a dangerous flood situation because of high velocities and large volumes of water released. A break in a dam can occur with little or no warning on clear days when people are not expecting rain or a flood. Breaching often occurs within hours after the first visible signs of dam failure, leaving little time for evacuation.

Dam failures are usually caused either by structural problems with the dam or by hydrologic

Figure 8: Dams in Florida, based on the 2018 National Inventory of Dams



problems. Structural problems include seepage, erosion, cracking, sliding and overturning resulting from the age of the dam or a lack of maintenance. Hydrologic problems typically occur when there is excessive runoff due to heavy precipitation. For example, a dam failure can occur if the dam has to impound more water than it was designed to, or if the spillway capacity is inadequate for the amount of water that needs to pass downstream.

A dam can suffer a partial failure or a complete failure, but the potential energy of the water stored behind even a small dam can cause loss of life and great

property damage downstream. There are currently no dams located within Seminole County, but there are dams located to the north, west and south of the County.

3.3.4 Obstructions

Obstructions can affect a channel, such as small bridge openings or log jams, or they can affect an entire floodplain, such as road embankments, fill and buildings. Channel obstructions will cause smaller, more frequent floods, while floodplain obstructions impact the larger, less frequent floods where most of the flow is overbank, outside the channel. Obstructions can be either natural or manmade, and will vary in depth based on the size and type of obstruction. Natural obstructions like log jams can be washed away during larger floods. Manmade obstructions pose a more serious problem, because they tend to be more permanent.

3.4 Historical Flooding

Seminole County has experienced several flooding events in the past, caused by heavy rainfall or tropical events.

In 1994, two storms brought heavy rain to most of the Florida peninsula during the last half of September. Rivers and streams overflowed, flooding streets and some urban areas. A flash flood

on July 21, 2001 produced by heavy rain inundated the Tuskawilla area of Winter Springs, flooding three homes and causing \$15,000 worth of property damage. There has been one recorded death caused by flooding which took place on September 15, 2001. This occurred in the City of Winter Springs during the aftermath of Tropical Storm Gabrielle, which brought wind gusts to around 45 miles per hour, causing minor damage across much of east central Florida. Following the storm, a 15-year-old boy drowned while playing with friends in Gee Creek near Winter Springs after he was pulled underwater by branches and other debris in the fast-moving water. Raising awareness about the danger of currents following heavy rains, as well as the potential for debris in floodwaters, can help prevent similar accidents in the future.

On August 19, 2002, three inches of rapidly falling rain flooded streets and six homes in Sanford. This led to \$60,000 of property damage. A thunderstorm brought rainfall and widespread flooding of major roadways in Seminole County on August 29, 2002. The roadway flooding occurred about three miles south of Oviedo. On September 5, 2004, Hurricane Frances brought eight to ten inches of rain across much of Seminole County, flooding homes and streets. Four days later, the rain from Hurricane Frances had caused water levels to reach flood stage in the middle St. Johns River Basin. Levels continued to rise and then fell slightly until Hurricane Jeanne followed the same track across Florida as Hurricane Frances. Significant flooding followed, and the Lake Harney gauge reached a record crest of 10.1 feet. Near Geneva, roads, nurseries and homes along Lake Harney were flooded. Water came over the seawall in Sanford and flooded numerous structures along the south shore of Lake Monroe. The total amount of property damages due to these events was \$4.8 million.



Flooding in Seminole County following Tropical Storm Fay in 2008 (photos courtesy Gary Exner, Advantage Consulting LLC).

In 2008, Tropical Storm Fay made four landfalls in Florida. While crossing central Florida, Fay unexpectedly strengthened over land to just under hurricane intensity with 70 mph winds. The storm caused extensive flooding in east central Florida, including historic flooding on the St. Johns River. The rainfall during this period, from August 18th to August 23rd, at its highest reached 17.59 inches with the highest single day being 9.81 inches on August 21st.

Approximately 500 homes and many roadways were damaged as the river's water level continued to climb after the storm had passed. Seminole County schools were closed due to impassable roads. The pictures in the box above show floods from Tropical Storm Fay in Seminole County.

In October of 2016, Hurricane Matthew brought minor flooding to the Little Wekiva River and Altamonte Springs area. Although the storm only brought tropical storm force winds to Seminole County, \$15,000,000 worth of damage occurred as a result. In September of 2017, Hurricane Irma brought major, near record flooding to the Little Wekiva River and St. John's River at Lake Harney. Moderate flooding also occurred in Sanford along Lake Monroe. Although Seminole

County only experienced tropical storm force winds from Hurricane Irma, the flooding that resulted due to heavy rainfall and already saturated lakes and rivers was severe. Overall, property damages from Irma were approximately \$543,200,000.

Table 6: Historical occurrences of floods in the County

Location	Date	Time	Type	Deaths	Injuries	Property Damages
Florida	9/15/1994	NA	Flooding	0	0	\$500,000
Winter Springs	7/21/2001	5:00 PM	Flash Flood	0	0	\$15,000
Winter springs	9/15/2001	1:00 PM	Urban/Small Stream Flood	1	0	\$0
Sanford	8/19/2002	4:45 PM	Flash Flood	0	0	\$60,000
Oviedo	8/29/2002	4:38 PM	Flash Flood	0	0	\$0
Seminole County	9/5/2004	1:30 AM	Flash Flood	0	0	\$0
Geneva and Sanford	9/9/2004	7:00 AM	Flooding	0	0	\$4,800,000
Seminole County	9/23/2014	5:00 PM	Heavy Rain	0	0	\$0
Altamonte Springs	6/30/2016	5:30PM	Flooding	0	0	\$10,000
Seminole County	10/7/2016	3:00AM	Flooding	1	0	\$15,000,000
Seminole County	9/10/2017	9:00PM	Flooding	0	0	\$543,200,000

Source: National Oceanic and Atmospheric Administration's National Environmental Satellite, Data, and Information Service

3.5 Locally Identified Flood Areas

While many floodplain boundaries are mapped by NFIP, floods sometimes go beyond the mapped floodplains or change courses due to natural processes, such as erosion and sedimentation, or human development, such as filling in floodplains to build houses, increased imperviousness within the watershed from new development, or debris.

The County has approximately 8,400 single family residences and 150 commercial buildings that could be affected by flooding during a 100-year flood. These businesses and homeowners have been identified by address and GIS mapping. In many flood prone areas, the terrain is heavily wooded with vast areas of marshlands, which receive the overflows from Lake Monroe, Lake Harney, Lake Jesup and the St. Johns River.

3.6 The National Flood Insurance Program

In 1968, Congress created the National Flood Insurance Program (NFIP), which enables property owners in participating communities to purchase insurance from the federal government against losses due to flooding. The program is designed as an alternative to disaster assistance.

Participation in the NFIP is based on an agreement between local governments and the NFIP that the local government will adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas, while the federal government will make flood insurance available within the community.

More properties are insured for flood damages under NFIP in Florida than in any other state. Seminole County participates in the NFIP, which means that NFIP flood insurance is available to residents living anywhere in the unincorporated area. According to the NFIP, in Seminole County there were 4,109 NFIP flood insurance policies in effect, for a total of \$1,218,941,100 in insurance, as of October 2, 2020.

3.7 Future Flood Risk

Flooding can occur along all waterways in Seminole County, including the St. Johns River, Lake Monroe, Lake Harney, and Lake Jesup. Because there are numerous surface water bodies throughout the County, many locations in the County may be subject to flooding. Areas identified as vulnerable to flooding are depicted on FEMA’s Flood Insurance Rate Maps (FIRMs), which are developed through the NFIP and are the official floodplain maps for Seminole County. Many of the County’s floodplain management regulations are based on the floodplain limits shown in these maps. It is important to realize that on an annual basis more than 30 percent of all flood losses occur outside any mapped floodplain.

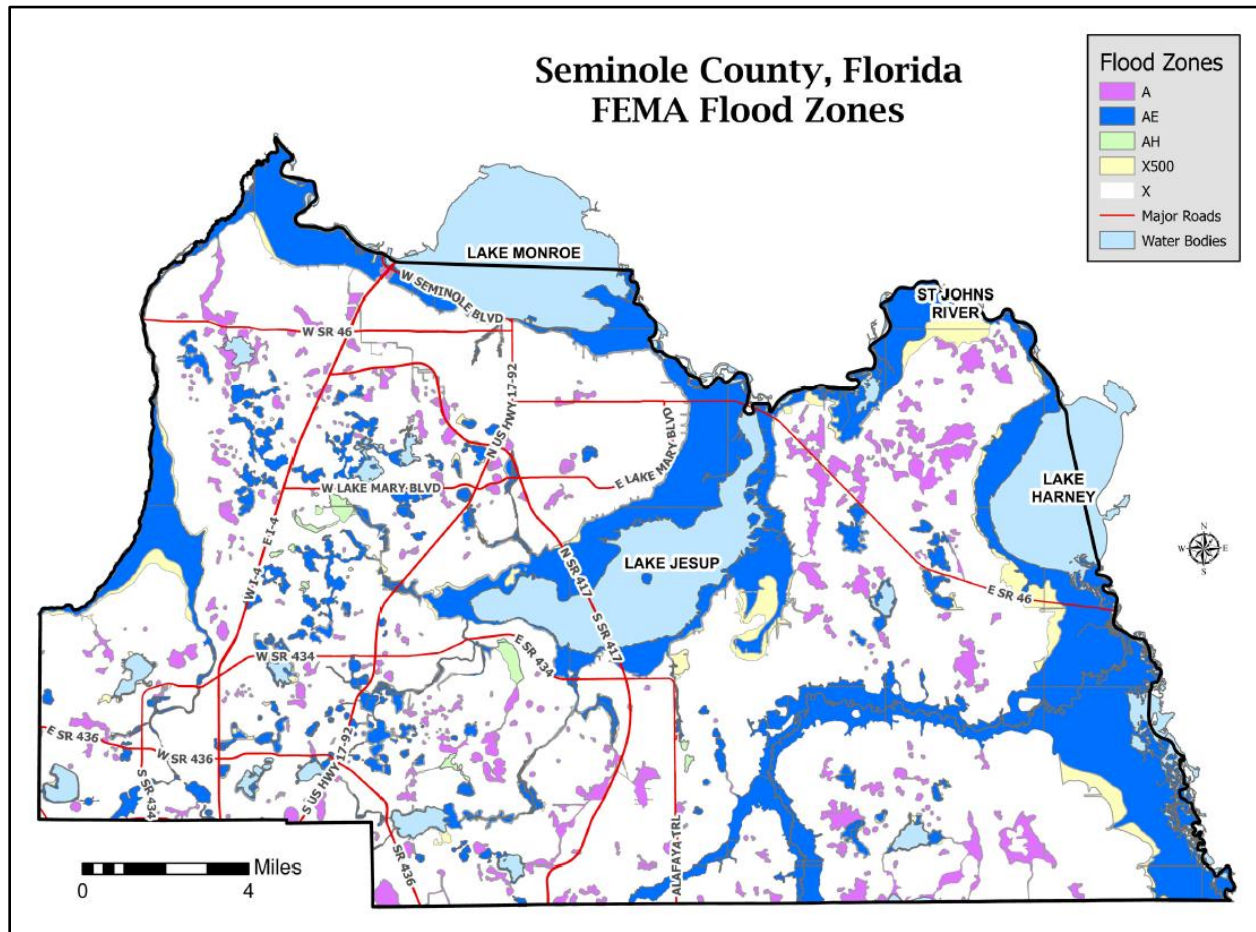
FEMA’s flood zones represent the areas of risk for flooding. These zones are based on the statistical risk of future flooding, which is extrapolated from historical records to determine the statistical potential that storms and floods of a certain magnitude will recur. Such events are measured by their “recurrence interval,” i.e., a 10-year storm or a 50-year flood. A 10-year storm means that there is a 1 in 10 chance, or 10% chance, of that storm occurring in any given year. A 50-year flood has a 1 in 50 chance, or 2% chance, of occurring in any given year. Because these identifiers are based on statistics, such a flood could occur twice in one year, or could not occur at all over the course of 100 years.

Table 7: Flood Recurrence Intervals

Time Period	Chance of Flooding over a Period of Years			
	Flood Size			
1 Year	10%	4%	2%	1%
10 Years	65%	34%	18%	10%
20 Years	88%	56%	33%	18%
30 Years	96%	71%	45%	26%
50 Years	99%	87%	64%	39%

The map below shows flood zone areas within Seminole County. Areas marked as Zone A have a 1% annual chance of flooding, which translates to a 26% chance of flooding over the life of a 30-year mortgage. This area is the base flood for Seminole County. Detailed analyses are not performed for Zone A, thus flooding depths and base flood elevations are not shown for Zone A areas. Zone AE areas have a 1% annual chance of flooding. These have been determined using detailed methods, thus base flood elevations – the level to which flood waters are expected to rise – are available in these areas. Zone AH are areas subject to 1% annual chance flooding, usually as ponding, with average depths between one and three feet.

Areas in yellow have a moderate flood hazard. These are places susceptible to a 0.2% annual chance of flooding. Zone X shows areas where flood hazards are minimal, and have a less than 0.2% annual chance of flooding.

Figure 10: FEMA Flood Zones in Seminole County

Source: Seminole County GIS

3.8 Flood Impacts

The impacts of floods affect people, buildings, and the economy. These impacts are discussed in this section.

3.8.1 Safety

Floods can be extremely dangerous, and even six inches of moving water can knock over a person given a strong current. A car will float in less than two feet of moving water and can be swept downstream into deeper waters. This is one reason floods kill more people trapped in vehicles than anywhere else. During a flood, people can also suffer heart attacks or electrocution due to electrical equipment short outs.

3.8.2 Health

While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and

industrial chemicals. Pastures and areas where cattle and hogs are kept or their wastes are stored can contribute polluted waters to the receiving streams.

Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when it is diluted by flood waters, raw sewage can be a breeding ground for bacteria such as E.coli and other disease causing agents. If a water system loses pressure, a boil water order may be issued to protect people and animals from contaminated water.

The second type of health problem arises after most of the water has gone. Stagnant pools can become breeding grounds for mosquitoes, and wet areas of a building that have not been properly cleaned breed mold and mildew. A building that is not thoroughly cleaned becomes a health hazard, especially for small children and elderly individuals.

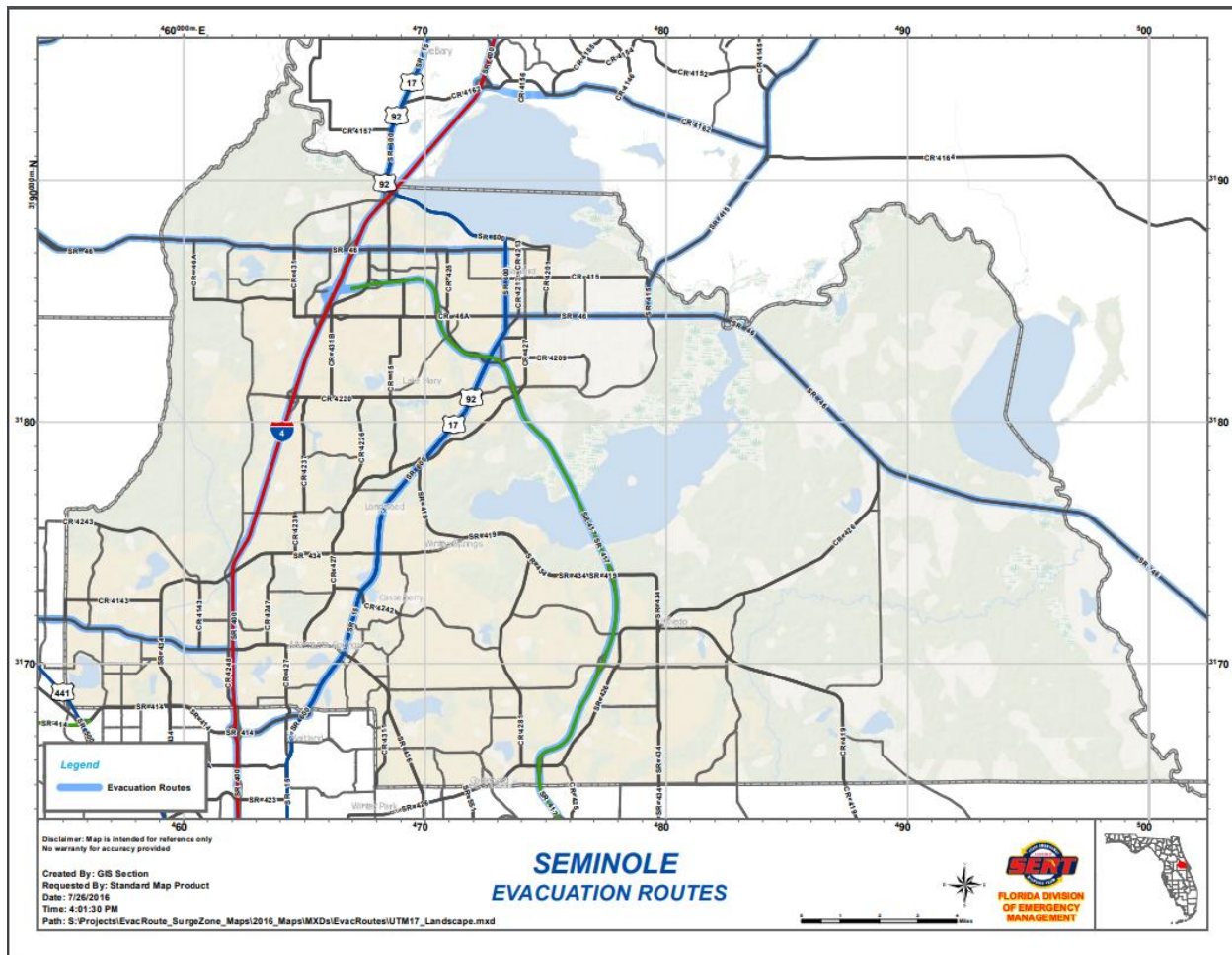
Another health hazard occurs when heating ducts in a forced air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants.

The third problem is the long-term psychological impact of having been through a flood and seeing one's home damaged and irreplaceable keepsakes destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

3.8.3 Evacuation of Residents and Visitors

A key evacuation and safety concern is when roads and bridges go under water. Generally, the larger the road, the less likely it is to flood, but this is not always the case. In addition, a bridge does not have to be under water to be damaged or to cut off an evacuation route. In some cases the bridge is high, but the access road may be flooded. In other cases, the bridge or culvert can be washed out. This is especially dangerous if a person drives on a flooded road and assumes that the bridge is still there.

Residents and visitors within Seminole County should be made aware of evacuation routes. It is important that the County work with both public and private entities to ensure that everyone knows which roads and thoroughfares are designated for evacuation. The Office of Emergency Management may use the Integrated Public Alert and Warning System (IPAWS) to alert residents and visitors to voluntary and mandatory evacuations. For local flood concerns, the opt-in Alert Seminole system will be used to notify residents who are at risk of flooding. Below is a map from the Florida Division of Emergency Management which indicates the designated evacuation routes for Seminole County.

Figure 11: Evacuation Routes for Seminole County

Source: floridadisaster.org/knowyourzone

3.8.4 Critical Facilities

Seminole County's FMPC identifies several types of critical facilities including some roads and bridges. The Seminole County Office of Emergency Management maintains a list of critical facilities within Seminole County. This critical infrastructure list is updated on an annual basis and is organized using the Department of Homeland Security's (DHS) Critical Infrastructure Sectors.

3.8.5 Building Damage

Floods can cause severe damage to buildings, which can be costly to repair. Although flood insurance can help pay for repairs to buildings damaged by floods, not all property owners obtain insurance. Moreover, preventing damage to buildings is less costly, less disruptive, and less dangerous than sustaining damage.

In a few situations, deep or fast moving waters will push a building off its foundation, but this is rare. More frequently, structural damage is caused by the weight of standing water, known as

“hydrostatic pressure.” Basement walls and floors are particularly susceptible to damage by hydrostatic pressure. Not only is the water acting on basement walls deeper, but a basement is also subject to the combined weight of water and saturated earth. In addition, water in the ground underneath a flooded building will seek its own level, resulting in uplift forces that can break a concrete basement floor.

The most common type of property damage inflicted by a flood is soaking. When soaked, many materials change their composition or shape. Wet wood will swell and, if dried too quickly, will crack, split or warp. Plywood can fall apart. Drywall will fall apart if it is bumped before it dries. The longer these materials remain wet, the more moisture, sediment and pollutants they will absorb.

Soaking can cause extensive damage to household goods. Wooden furniture may become so badly warped that it cannot be used. Other furnishings, such as upholstery, carpeting, mattresses, and books, are usually not worth drying out and restoring. Electrical appliances and gasoline engines will not work safely until they are professionally cleaned and dried. While a building may appear sound and unharmed after a flood, the water may have caused a lot of damage. To properly clean a flooded building, the walls and floors should be stripped, cleaned and allowed to dry before being recovered. This can take weeks and is a costly process.

Flood insurance claims figures do not include those items that are not covered by a flood insurance policy, like cars and landscaping, or the value of family heirlooms. They also do not include damages to uninsured or underinsured properties.

Table 8 below shows the appraised value of all buildings in unincorporated Seminole County by FEMA flood zone. All of the buildings in these zones are at risk of flood damage.

Table 8: Appraised Value of Buildings in Unincorporated Seminole County by Flood Zone

Row Labels	A		AE		AH		X/ X500	
	Bldg Value	Bldg Count	Bldg Value	Bldg Count	Bldg Value	Bldg Count	Bldg Value	Bldg Count
Agriculture	\$403,141	7	\$1,645,014	32			\$18,639,783	277
Commercial	\$43,523,655	48	\$40,122,134	105			\$1,478,215,969	2,582
Government	\$883,135	2	\$11,708,347	14			\$115,598,910	258
Industrial	\$15,884,882	48	\$18,260,407	126	\$11,061,826	3	\$941,423,779	2,313
Institutional	\$9,342,120	29	\$74,242,683	48	\$833,629	2	\$797,744,168	1,303
Multi Family Residential	\$143,554,658	712	\$297,041,819	1,392	\$42,150,009	61	\$6,344,964,245	32,387
Misc Residential	\$32,055	4	\$383,017	16			\$3,321,492	111
Open Space	\$0	6	\$0	23			\$0	188
Single Family Residential	\$632,784,946	2,826	\$1,218,018,411	5,373	\$40,334,385	203	\$20,342,152,825	109,150
Grand Total	\$846,408,592	3,682	\$1,661,421,832	7,129	\$94,379,849	269	\$30,042,061,171	148,569

Source: Seminole County GIS

3.8.6 Economic Impacts

Although repairing structural flood damages can be costly, they can also have economic impacts beyond building repairs. Floods can close down businesses for days, weeks, or longer.

Businesses can lose their inventories, customers are unable to reach them, and employees are often unable to work. Below is a table which indicates the largest employers in Seminole County which make up much of the tax base.

Table 9: Seminole County Major Employers

Employer	Number Employed
Seminole County Public Schools	7,868
Central Florida Regional Hospital	2,865
Concentrix Cvg Corporation (Convergys)	1,900
JP Morgan Chase / Chase Bankcard Services	1,900
Deloitte Consulting LLP	1,850
Seminole State College	1,588
Seminole County Government	1,340
Verizon Corporate Resources Group (VCRG)	1,300
Seminole County Sheriff's Office	1,250
Paylocity Holding Corporation	1,100
Liberty Mutual	1,070
Veritas Technologies, LLC (Formerly Symantec)	932
South Seminole Hospital	900
AAA	873
Waste Pro USA Inc.	820
Adventhealth System	800
Elite Technical Svc Inc	600
Tri-City Electrical Contractors Inc.	570
Adventhealth Information Svc	500
Centralsquare Technologies (Superion LLC)	500
Collis Roofing Inc	500
Del-Air Inc	500
Fiserv	500
Mid FI Procuring & Distribution	500
D & A Window Cleaning Svc Inc	450
Fortress Insurance Partners	450
D&A Building Services Inc.	418
Insurance Office of America Inc.	409
JEUNESSE LLC	407
ABB Inc	400
Irby Construction Co	400
Ethnos (New Tribes Mission USA)	368
A. Duda & Sons Inc.	367
Aerosim Flight Academy-Sanford	350
David Maus Toyota	350
Hartford	350
Maronda Homes	350
Mercedes-Benz Club Of America	350

Source: Seminole County Economic Development

According to the 2018 American Community Survey, there are approximately 245,000 workers in the labor force in Seminole County. The most common job groups, by number of people living in Seminole County are Office & Administrative Support Occupations (31,813 people), Management Occupations (29,466 people), and Sales & Related Occupations (28,857 people). Other notable job groups after these include Business and Financial Operations Occupations, Education Instruction & Library Occupations, and Food Preparation & Serving Related Occupations.

The table below indicates the taxation value in Unincorporated Seminole County from 2015 through 2019 according to the County Property Appraiser.

Table 10: Seminole County Taxable Value

Year	Value	% Change
2015	\$13,978,137,571	5.32%
2016	\$14,752,369,807	5.54%
2017	\$15,661,722,908	6.16%
2018	\$16,646,459,602	6.29%

2019	\$17,892,470,376	7.49%
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Source: <https://www.scpafl.org/Portals/0/LinkFile/2020TaxRoll/ValueHistory.pdf?ver=2020-06-30-081233-733>

3.8.7 Repetitive Loss Properties

A repetitive loss property is a property that has experienced repeated flooding that caused financial losses. The National Flood Insurance Program (NFIP) is continually faced with the challenge of balancing the financial soundness of the program with the competing expectations of keeping premiums affordable. Repetitive loss properties are one of the largest obstacles to achieving financial soundness.

A repetitive loss property is defined as any insurable building for which two or more claims of more than \$1,000 were paid by the NFIP within any rolling 10-year period since 1978. Two of the claims paid must be more than 10 days apart but, within 10 years of each other. A repetitive loss property may or may not be currently insured by the NFIP.

Severe Repetitive Loss properties consist of any NFIP-insured residential properties that have met at least 1 of the following paid flood loss criteria since 1978, regardless of ownership: four or more separate claim payments of more than \$5,000 each, or two or more separate claim payments where the total of the payments exceeds the current value of the property.

Repetitive loss properties are the biggest draw on the National Flood Insurance Fund. Repetitive loss properties are not only costly; they also disrupt and threaten residents' lives. These properties may be sponsored by state or local government programs that mitigate the flood losses or provide information on how to mitigate flood losses through such measures as elevating buildings above the level of the base flood, demolishing buildings, removing buildings from the Special Flood Hazard Area, or local drainage improvement projects.

In unincorporated Seminole County, there are forty (40) repetitive loss properties. Three (3) properties were previously designated as repetitive losses, but have been removed from the list after being mitigated. \$3,189,486 of building and contents damage has been incurred in total at these repetitive loss properties, with \$3,134,014.11 of the damage having occurred on the unmitigated properties. A detailed analyses of each repetitive loss area is recommended to further assess the problem within each specific area of concern, and provide recommendations for solutions.

The repetitive loss areas in Seminole County are shown in Figure 11 below. The repetitive loss areas may contain multiple repetitive loss properties, or a single repetitive loss property. Due to privacy restrictions, the individual properties that received the losses are not identified on the maps. Detailed areas of repetitive loss are shown in the following figures.

Figure 12: Seminole County Repetitive Loss Property Areas

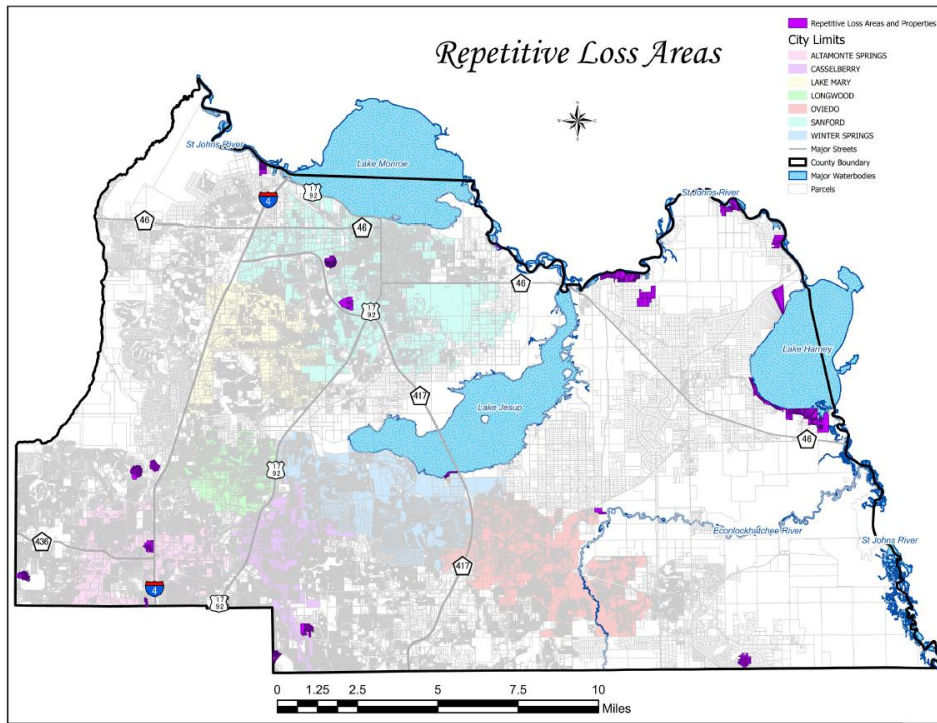


Figure 13: Repetitive Loss Area 1

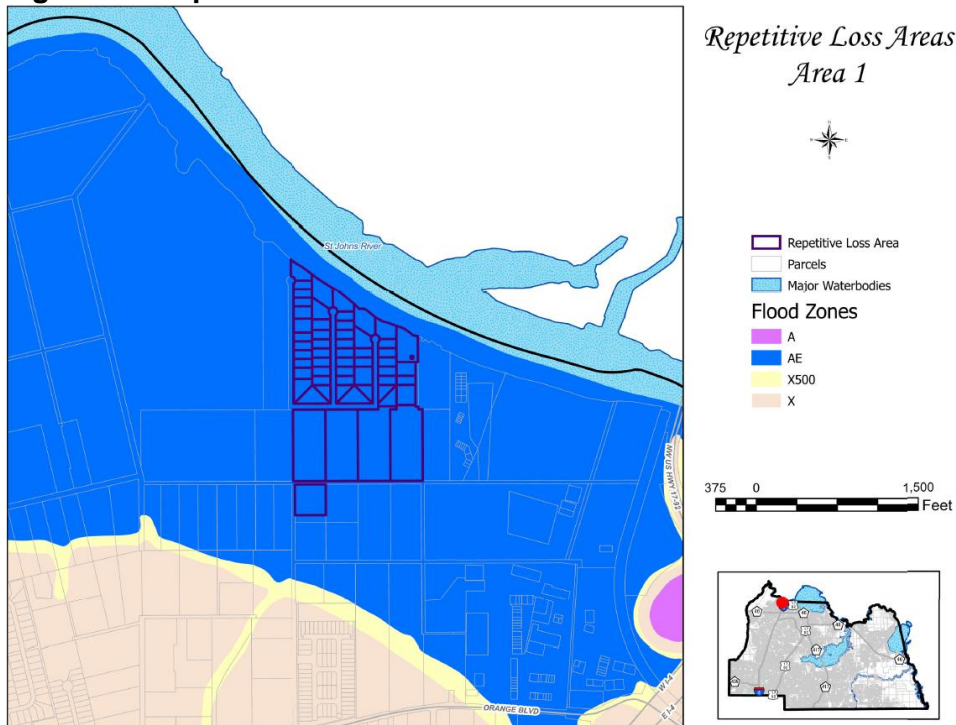


Figure 14: Repetitive Loss Areas 2 & 3

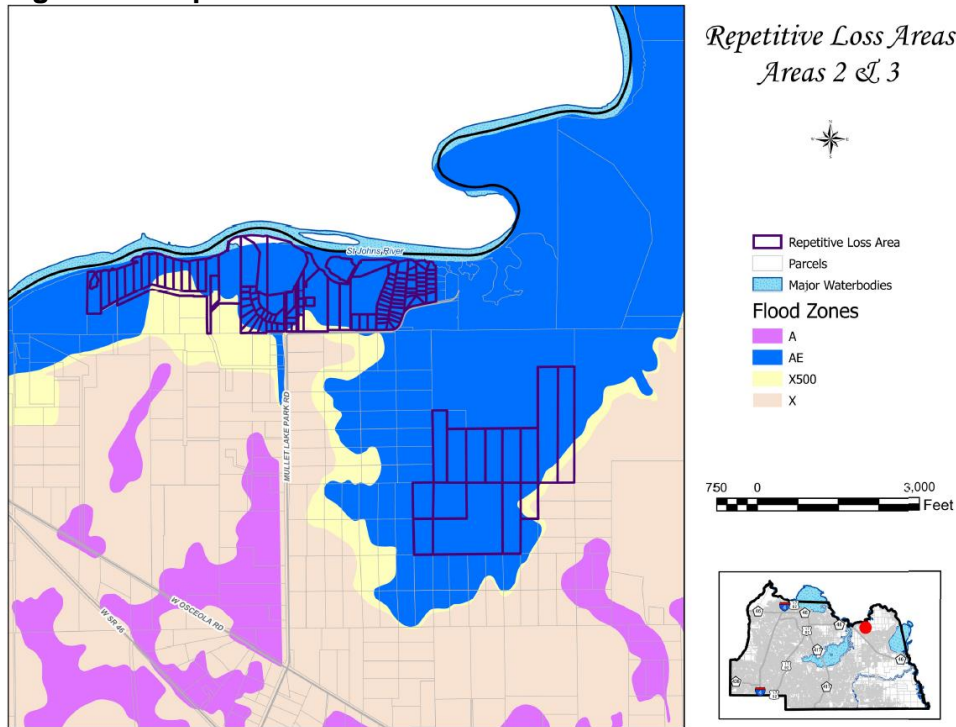


Figure 15: Repetitive Loss Areas 4, 5, & 6

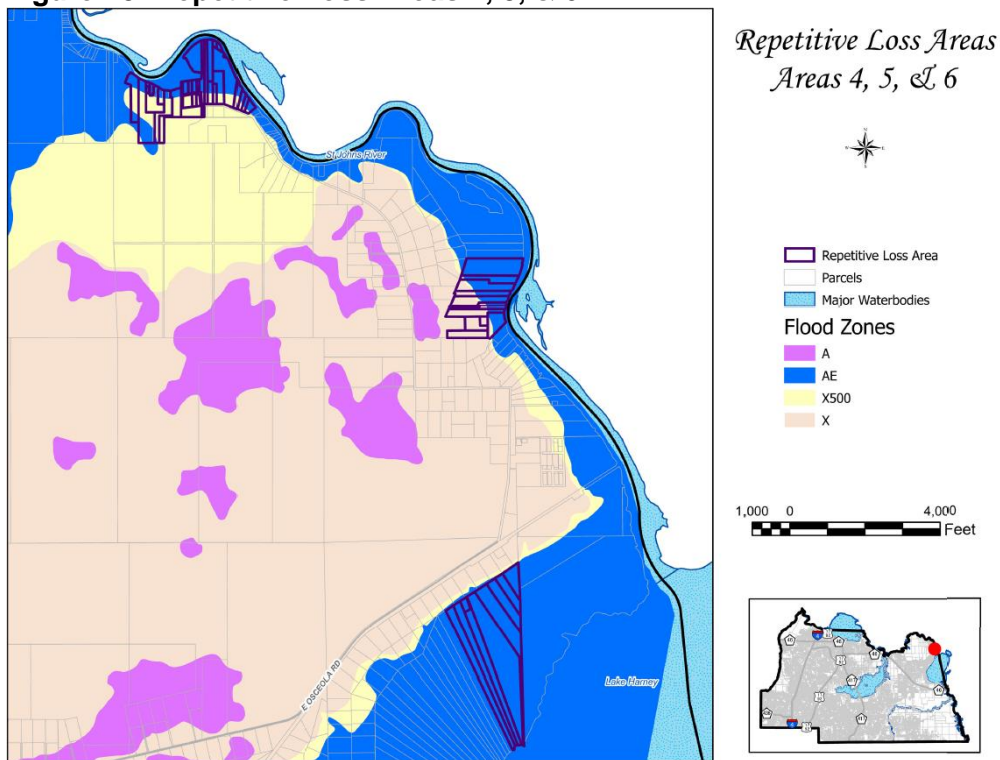
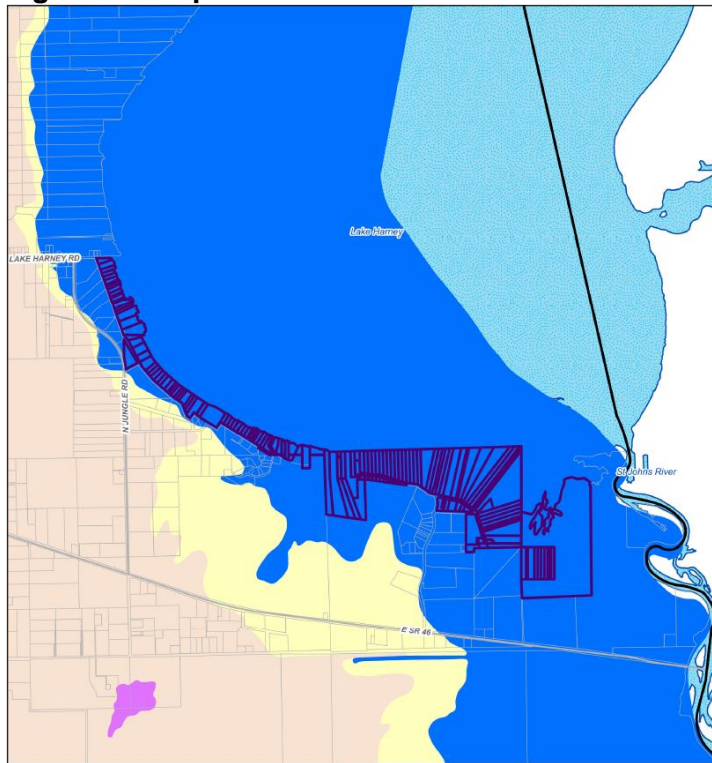


Figure 16: Repetitive Loss Area 7



*Repetitive Loss Areas
Area 7*

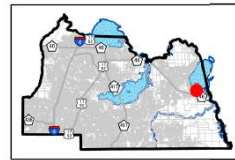
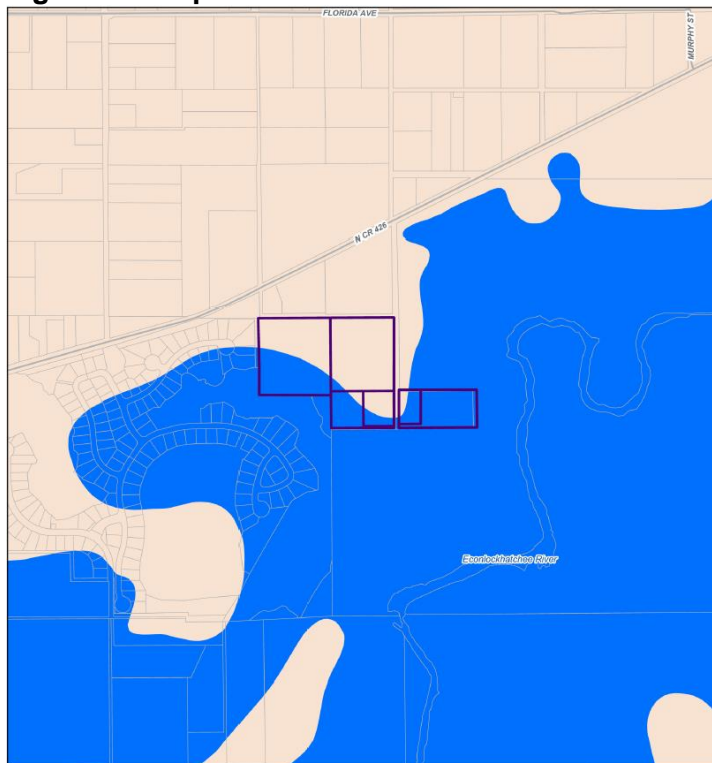


Figure 17: Repetitive Loss Area 8



*Repetitive Loss Areas
Area 8*

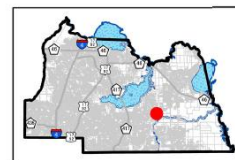


Figure 18: Repetitive Loss Area 9

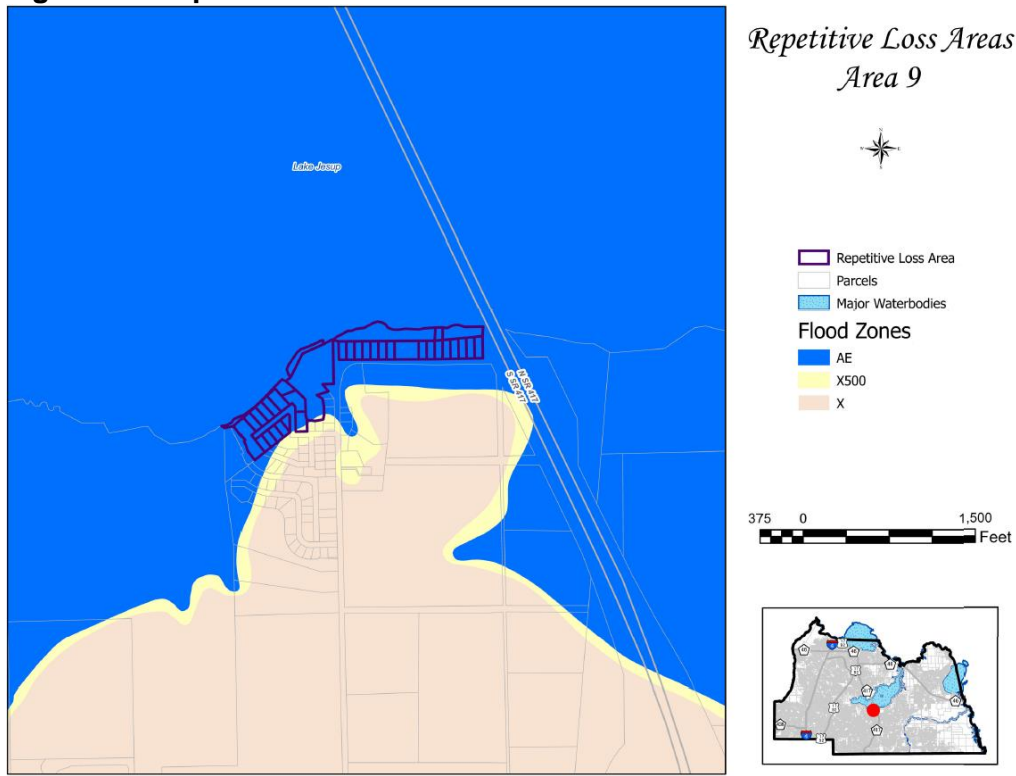


Figure 19: Repetitive Loss Area 10

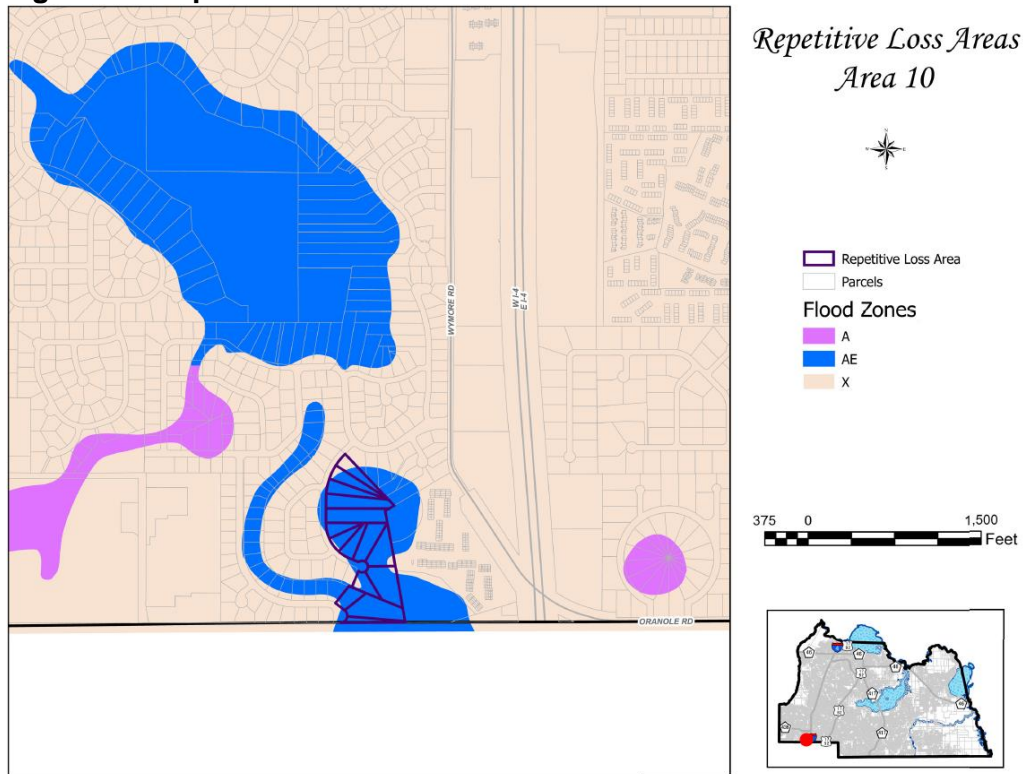


Figure 20: Repetitive Loss Area 11

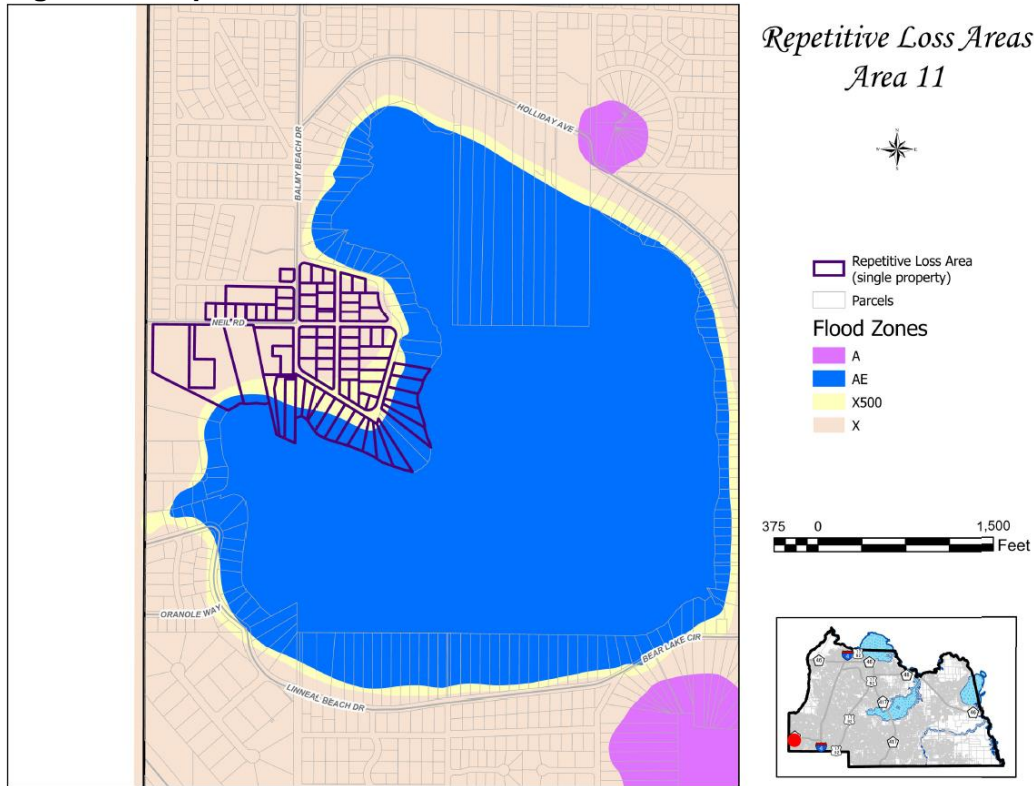


Figure 21: Repetitive Loss Areas 12, 13, & 14

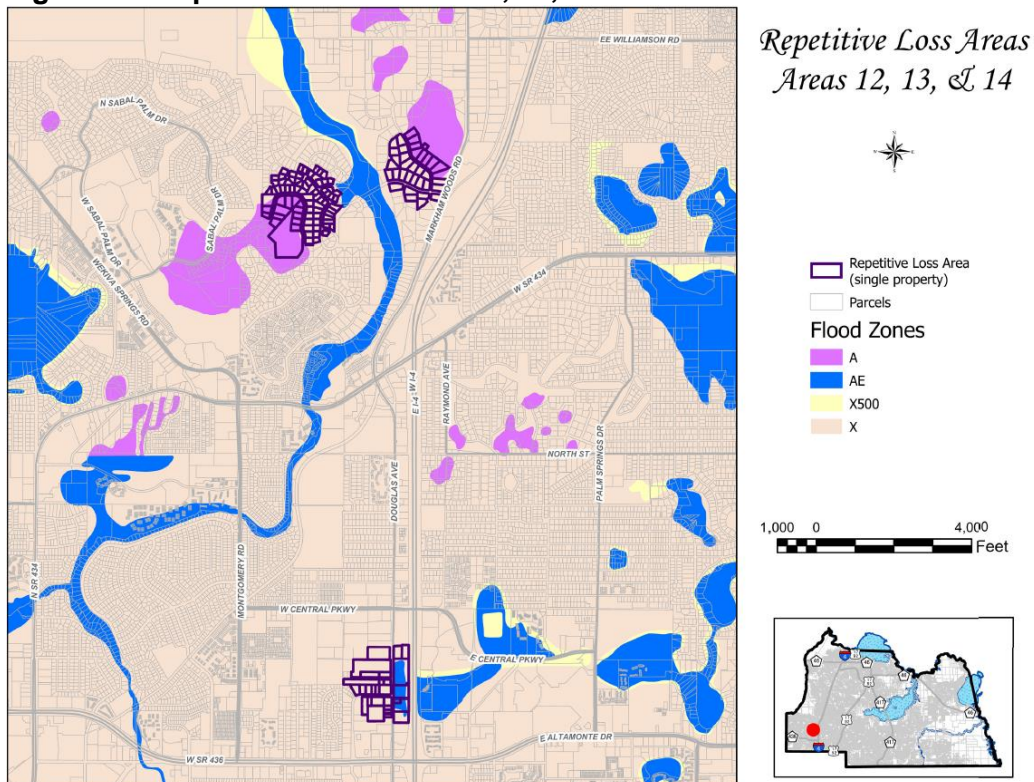


Figure 22: Repetitive Loss Areas 15 & 16

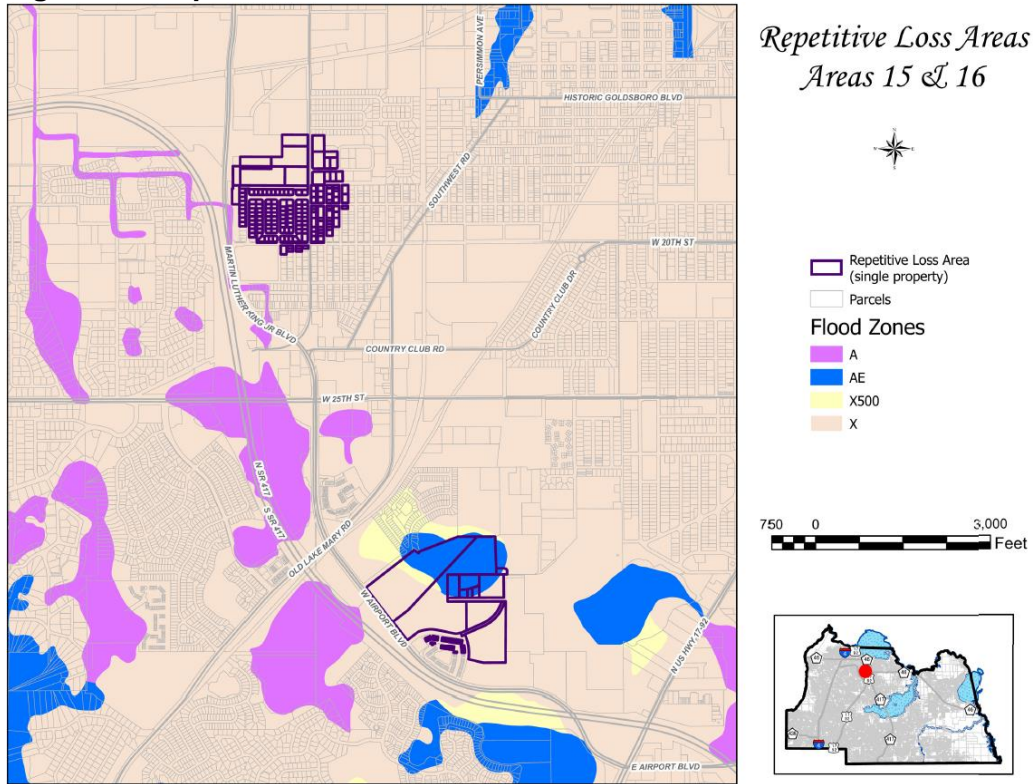


Figure 23: Repetitive Loss Areas 17 & 18

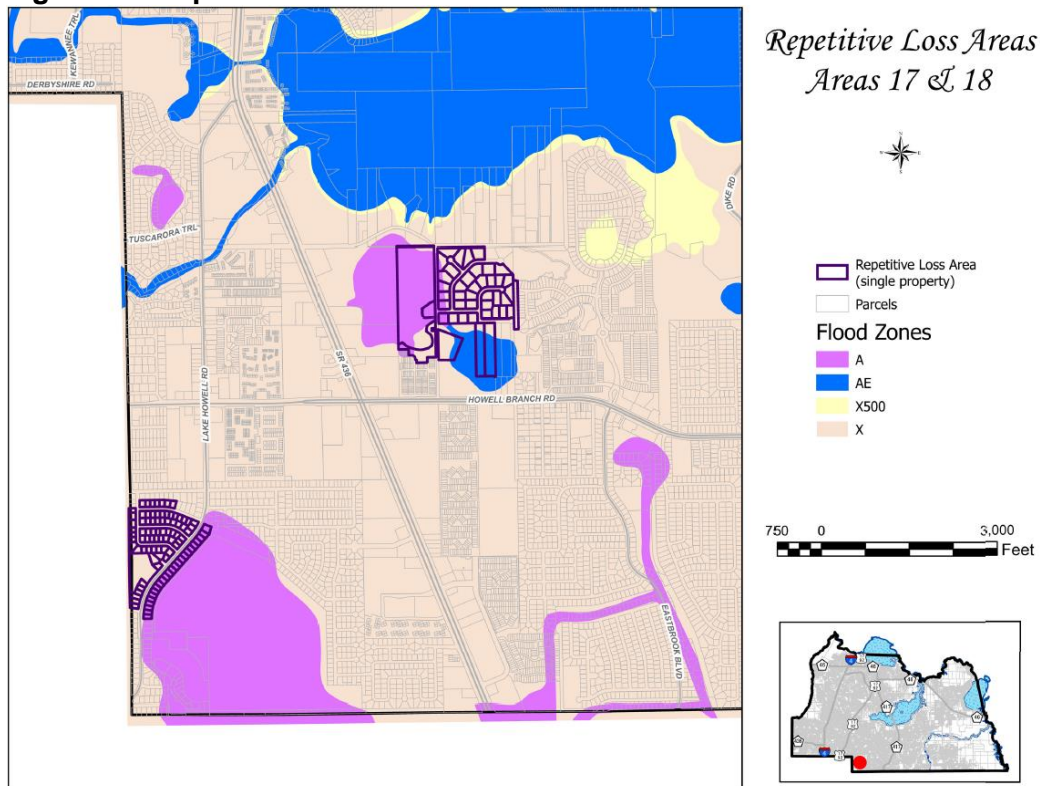
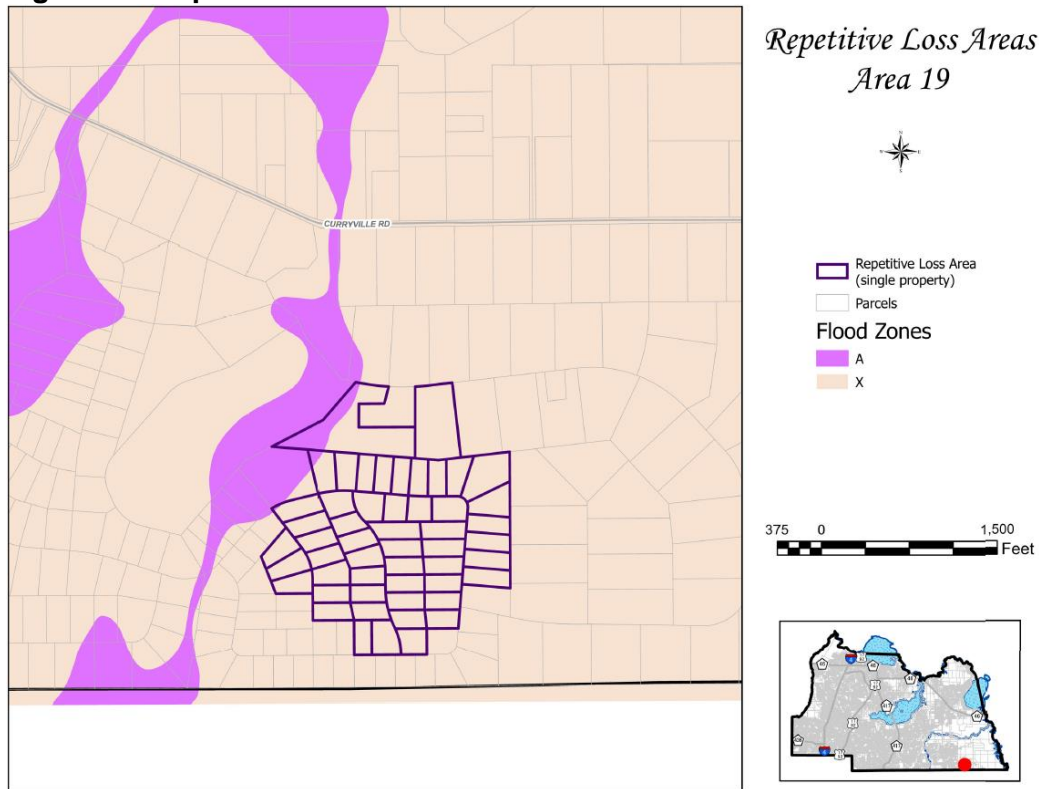


Figure 24: Repetitive Loss Area 19

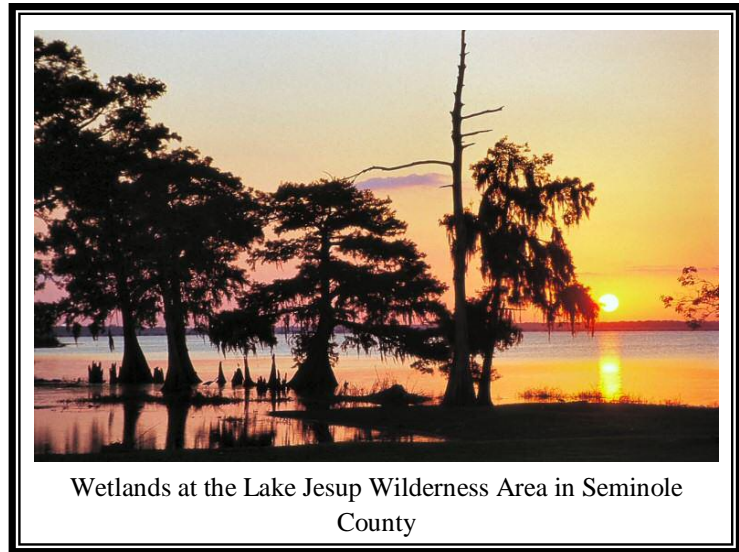


3.9 Flood Warning Systems

Seminole County residents can sign up for the Alert Seminole Emergency Notification System, which will contact those registered in the event of an emergency that may require evacuation. Residents can register for this emergency notification system by visiting the County’s preparedness website at www.prepareseminole.org or by calling the Seminole County Office of Emergency Management at 407-665-5102. Residents can also stay prepared by listening to a NOAA weather radio, particularly during hurricane season, or by calling the citizen’s information hotline at (407) 665-0000.

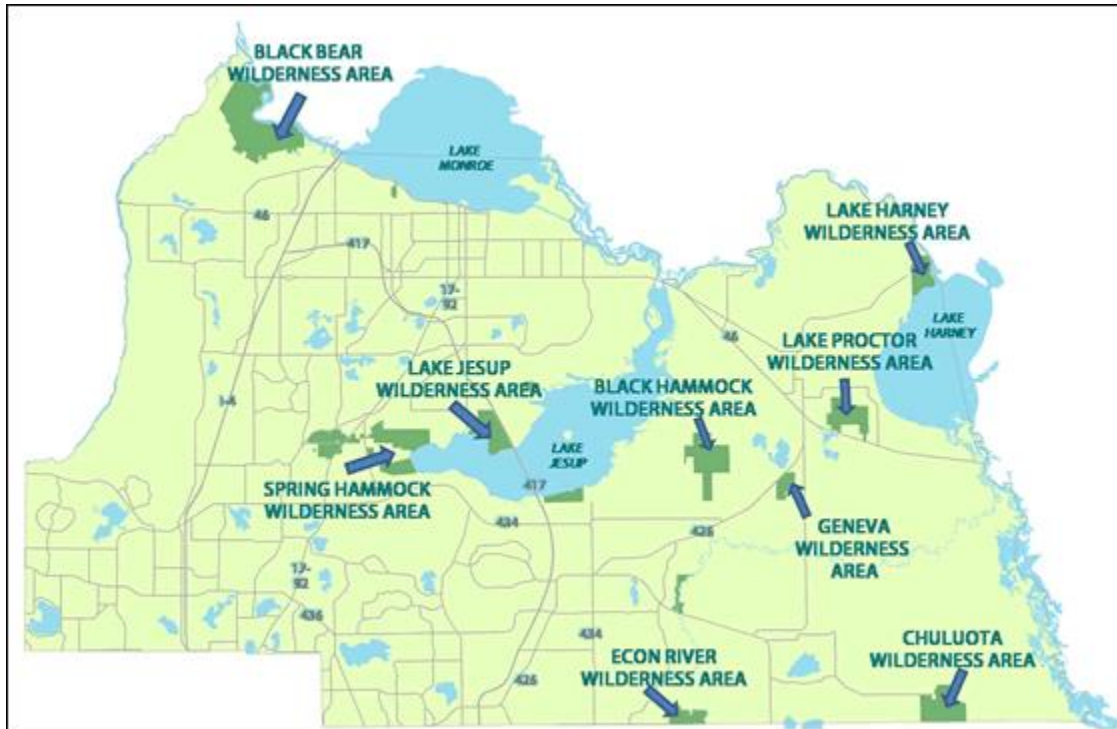
3.10 Natural and Beneficial Areas

In their natural, undeveloped state, floodplains play an important role in flooding. They allow flood waters to spread over a large area, reducing flood velocities and providing flood storage to reduce peak flows downstream. Natural floodplains reduce wind and wave impacts and their vegetation stabilizes soils. Natural cover acts as a filter for runoff and overbank flows, improving water quality and minimizing the amount of sediment transported downstream and the impurities in that sediment. Floodplains can be recharge areas for groundwater and reduce the frequency and duration of low flows of surface water. They provide habitat for diverse species of plants and animals, some of which cannot live in other habitats. Floodplains are particularly important as breeding and feeding grounds. Natural floodplains also moderate water temperature, reducing potential harm to aquatic plants and animals.



Wetlands at the Lake Jesup Wilderness Area in Seminole County

Seminole County preserves and manages several wilderness areas to protect biodiversity of species, wildlife corridors, and water resources while offering passive recreation areas for Seminole County residents. Through a voter approved referendum in 1990, a \$20 million bond was established, creating the Seminole County Natural Lands Program. The primary purpose of this program is to systematically assess, rank and purchase environmentally significant lands throughout the County. These lands are purchased to preserve or restore their important ecological functions as well as to provide sites for passive, resource-based recreational activities. Since the program's inception, Seminole County has purchased just over 6,600 acres. Many of the natural land areas are located within the Special Flood Hazard Area (SFHA), and provide natural and beneficial functions of a natural floodplain. Several of these sites have been opened for public access, as shown in Figure 24 on the next page.

Figure 25: Wilderness Area Open to the Public in Seminole County


3.11 References

1. *Local Mitigation Strategy for Seminole County and its Municipalities, 2020-2025*
2. *Seminole County Comprehensive Plan*, Seminole County, 2018.
3. *American Community Survey 2018*
4. floridadisaster.org/knowyourzone
5. *Seminole County Property Appraiser's Office 2020 Tax Roll*
6. Flood insurance claims records for Seminole County, FEMA.
7. National Oceanic and Atmospheric Administration's National Environmental Satellite, Data, and Information Service
8. National Oceanic and Atmospheric Administration's National Hurricane Center

4 Goals and Objectives

Chapter 3 documents the flood risk that threatens the unincorporated areas of Seminole County, the vulnerability of structures, infrastructure, and critical facilities to floods, and the capacity the County has to reduce the flood hazard. The intent of Goal Setting is to identify areas where the County's existing capabilities (in terms of policies and programs) can be enhanced so that the community's overall vulnerability to flood hazards is reduced. Goals are also necessary to guide the review of possible mitigation measures. At the same time, this plan needs to ensure that recommended actions are consistent with what is appropriate for Seminole County. Mitigation goals need to reflect community priorities and be consistent with other plans for the County.

4.1 Background

4.1.1 Seminole County Local Mitigation Strategy

The goals of this plan need to be consistent with and complement the goals of other planning efforts. The primary planning document that this Floodplain Management Plan must complement and be consistent with is the Seminole County Local Mitigation Strategy. This plan will be adopted as an appendix to Seminole County Local Mitigation Strategy; therefore the goals in both planning documents should align and not conflict. The six goals of the Seminole County Local Mitigation Strategy are:

- **Goal 1:** Local government shall make every reasonable effort to identify, develop, implement, and reduce hazard vulnerability through effective mitigation programs.
- **Goal 2:** All sectors of the community will work together to create a disaster resistant community.
- **Goal 3:** Reduce the vulnerability of critical infrastructures and public facilities from the effects of all hazards.
- **Goal 4:** Strengthen continuity planning for local government, businesses and community partners to avoid significant disruptions of services.
- **Goal 5:** Develop policies and regulation to support effective hazard mitigation programming throughout the community.
- **Goal 6:** Encourage economic vitality of the community by providing business continuity education, disaster planning, and diversifying employment opportunities.

4.2 Goals

Following the exercises, the FMPC agreed upon five general goals for this planning effort. The goals were refined and objectives in support of the goals were also added.

Goal 1: Reduce vulnerability and exposure to flood hazards in order to protect the lives, health, safety and welfare of Seminole County citizens and guests.

- Objective 1.1:** Focus mitigation efforts on flooding resulting from heavy rainfall which causes runoff, overbank, backwater, and stormwater issues to keep the problem from getting worse
- Objective 1.2:** Implement regulatory measures to discourage new development in areas that are more likely to be exposed to the effects of flood damage
- Objective 1.3:** Preserve open space in hazardous areas, especially where there are sensitive natural areas and agricultural lands
- Objective 1.4:** Protect the environmental integrity of the natural water systems in Seminole County by focusing on water quality and best management practices
- Objectives 1.5:** Continue to protect aquifers and environmentally sensitive lands from encroachment of development by requiring buffers and other setbacks mechanisms
- Objective 1.6:** Reduce stormwater runoff through adequate stormwater management, flood control, on-site retention and best management practices to mitigate impacts associated with incremental construction and redevelopment projects

Goal 2: Promote emergency management and warning system measures to provide better protection to the citizens and guests of Seminole County.

- Objective 2.1:** Leverage state and federal emergency management funding for planning, training and equipment
- Objective 2.2:** Seek funding for the installation of stream and river gages to help provide increased flood warning capability
- Objective 2.3:** Monitor technological advancements and implement new technologies where applicable to ensure reliable communications with residents and guests

Goal 3: Encourage property owners through education and outreach measures to protect their homes and businesses from flood damage.

- Objective 3.1:** Encourage residents to assume an appropriate level of responsibility for their own protection
- Objective 3.2:** Promote flood insurance as a property protection measure against flood damage through multiple methods, including enhancements to the county website to provide information on comprehensive flood preparedness/protection and flood insurance
- Objective 3.3:** Educate property owners, including repetitive loss properties, on FEMA grant programs and other methods in order to mitigate possible flood damage

Goal 4: Protect critical and cultural facilities, public infrastructure, and businesses from the effects of flood hazards and reduce the vulnerability of flood damage to these facilities.

- Objective 4.1:** Seek County, State and Federal support for projects
- Objective 4.2:** Identify and implement flood mitigation measures or strategies as necessary to protect critical infrastructure and facilities from flood damage

Goal 5: Identify properties susceptible to flood damage and implement cost-effective and affordable improvements, including those which reduce the number of repetitively damaged structures.

- Objective 5.1:** Leverage state and federal grant funding to facilitate buyouts, elevations and other mitigation efforts
- Objective 5.2:** Target repetitive loss properties for implementation of mitigation projects
- Objective 5.3:** Allow continued opportunities for members of the public to be part of the planning process, including identifying areas susceptible to flooding

5 Preventive Measures

Preventive measures are designed to keep a problem such as flooding from occurring or from getting worse. The objective of preventive measures is to ensure that future development is not exposed to damage and does not cause an increase in damages to other properties. Building, zoning, planning and code enforcement offices usually administer preventive measures. Some examples of types of preventive measures include:

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

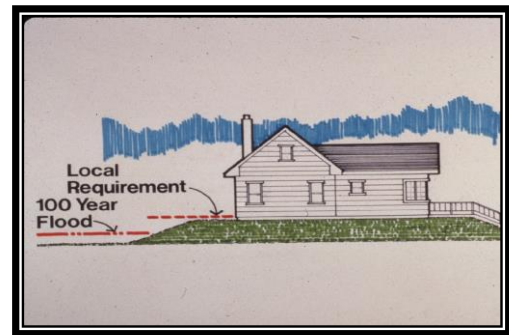
5.1 Building Codes

Building codes provide one of the best methods of addressing flood hazards. When properly designed and constructed according to code, the average building can withstand many of the impacts of natural hazards. Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Building codes can ensure that the first floors of new buildings are constructed to be higher than the elevation of the 100-year flood (the flood that is expected to have a one percent chance of occurring in any given year). Building codes in Seminole County also require that driveways are sloped so as to prevent flood waters from draining into a building.

Just as important as having code standards is the enforcement of the code. Adequate inspections are needed during the course of construction to ensure the builder understands the requirements and is following them. Making sure a structure is properly anchored requires site inspections at each step.

Seminole County's Code of Ordinances adopts the Florida Building Code by reference, and the State of Florida has some of the most stringent building codes in the nation. Nonetheless, during planning meetings where the mitigation strategies were evaluated, the FMPC discussed possible ways to strengthen Seminole County's building codes. There is relatively no cost involved in strengthening codes, but since the County adopts the Florida Building Code, the possibility of exceeding current code requirements is extremely slim. Another possibility discussed was to increase the freeboard requirement for buildings to be built higher than the current 1 ft. above the base flood elevation.

Figure 26: Elevated Home



5.1.1 Manufactured Homes

Manufactured or mobile homes are usually not regulated by local building codes. They are built in a factory and out of state, and they are shipped to a site. They do have to meet construction standards set by the U.S. Department of Housing and Urban Development. All mobile homes constructed after 1976 must comply with HUD's National Manufactured Home Construction and Safety Standards. These standards apply uniformly across the country and it is illegal for a local unit of government to require additional construction requirements. Local jurisdictions may regulate the location of these structures and their on-site installation.



The NFIP allows communities to exempt mobile homes in existing mobile home parks from some of the flood protection requirements. The CRS provides up to 50 points if the community does not use this exemption. Seminole County does not use this exemption.

5.1.2 Local Implementation

Seminole County uses the 2017 Florida Building Code. The County's floodplain management ordinance requires development in areas of special flood hazard to be reasonably safe from flooding. This means that new construction and substantial improvements shall be designed or modified and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from flooding. New construction and substantial improvements must also be constructed using methods that minimize flood damage. New construction or substantial improvement of any residential structure, including manufactured homes, must have the lowest floor, including the basement, elevated to no lower than one foot above the base flood elevation. In addition, manufactured homes must be anchored to prevent flotation, collapse, or lateral movement. For commercial properties, the first floor must be elevated to one foot above the base flood or they must be flood-proofed in lieu of being elevated.

5.1.3 CRS Credit

The CRS encourages strong building codes. It provides credit in two ways: points are awarded based on the community's BCEGS (Building Code Effectiveness Grading Schedule) classification and points are awarded for adopting the International Code series. Seminole County's BCEGS rating is a Class 4 for residential and Class 3 for commercial. Seminole County uses the 2017 Florida Building Code, and will be adopting the 2020 FBC on 12/31/2020.

The CRS also has a prerequisite for a community to attain a CRS Class 8 or better: the community must have a BCEGS class of 6 or better. To attain a CRS Class 4 or better, the community must have a BCEGS class of 5 or better.

5.2 Planning and Zoning

Building codes provide guidance on how to build in hazardous areas. Planning and zoning activities direct development away from these areas, especially floodplains and wetlands. They do this by designating land uses that are compatible with the natural conditions of lands prone to flooding, such as open space or recreation. Planning and zoning activities can also provide benefits simply by allowing developers more flexibility in arranging improvements on a parcel of land through the planned development approach.

5.2.1 Comprehensive Plans

These plans are the primary tools used by communities to address future development. They can reduce future flood-related damages by indicating open space or low density development within floodplains and other hazardous areas. Unfortunately, natural hazards are not always emphasized or considered in the specific land use recommendations.

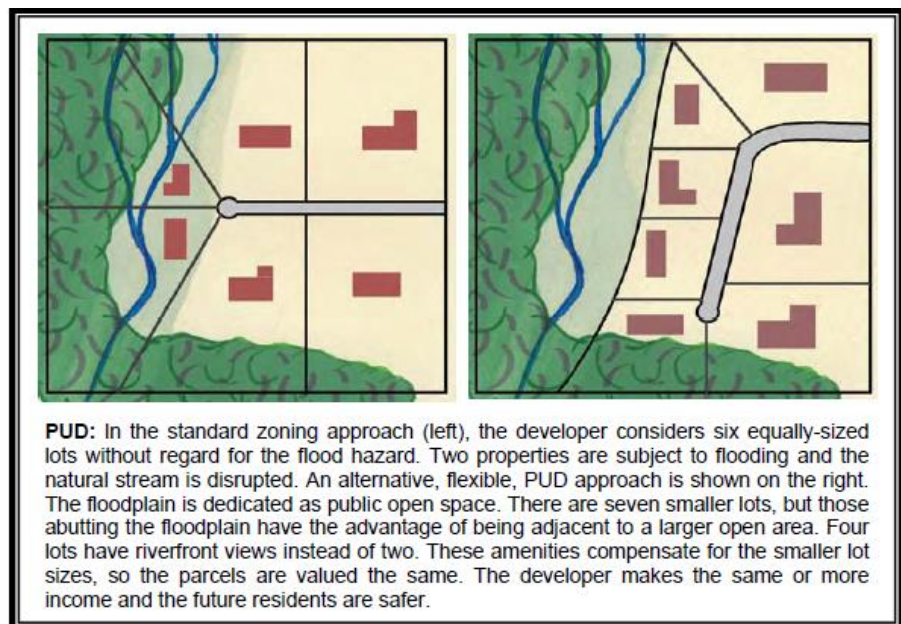
Generally, a plan has limited authority. It reflects what the community would like to see happen. Its utility is that it guides other local measures, such as capital improvement programs, zoning ordinances, and subdivision regulations.

5.2.2 Zoning Regulations

A zoning ordinance regulates development by dividing a community into zones and setting development criteria for each zone. Zoning codes are considered the primary tool to implement a comprehensive plan's guidelines for how land should be developed. Zoning ordinances can limit development in hazardous areas, such as reserving floodplain zones for agricultural uses. Often, developers will produce a standard grid layout. The ordinance and the community can allow flexibility in lot sizes and location so developers can avoid hazardous areas.

One way to encourage such flexibility is to use a planned unit development (PUD) approach. This approach allows developers to incorporate flood hazard mitigation measures into projects. Open space or floodplain preservation can be facilitated as site design standards and land use densities can be adjusted to fit the property's specific characteristics, as shown in Figure 26.

Figure 27: Planned Unit Developments



5.2.3 Capital Improvement Plans

A capital improvement plan will guide a community's major public expenditures for a five- to 20-year period. Capital expenditures may include acquisition of open space within the hazardous areas, extension of public services into hazardous areas, or retrofitting existing public structures to withstand a hazard.

5.2.4 Local Implementation

The *Seminole County Comprehensive Plan* includes conservation goals to address the long-range implementation of programs aimed at meeting environmental regulations and preserving the County's natural amenities. Seminole County uses a multi-faceted system to direct incompatible land uses away from wetlands. To date, this system has managed to preserve most of the wetland acreage in the urban area. There are three primary methods by which the County directs incompatible land uses away from wetlands, and several secondary methods. The primary methods are:

1. **Identification of environmentally sensitive lands.** These lands are to be preserved during the development process.
2. **Land acquisition.** Seminole County also protects wetlands through land acquisition via the County's Natural Lands Program. In combination with the efforts of the U.S. Army Corps of Engineers, the Florida Department of Environmental Protection and the St. Johns River Water Management District, over 18,000 acres of the County's 41,000 acres of wetlands are in public ownership. This is roughly 44% of County lands.
3. **Special areas.** The County and the State have designated areas for special consideration to protect wetlands, including the Wekiva River Protection Area, the Econlockhatchee River Protection Zone, and the East Rural Area. These three areas make up roughly 75 percent of the County's unincorporated area. Development within these areas is managed and regulated to protect natural resources and maintain their rural character.

The secondary methods of directing incompatible uses away from wetlands are through the implementation and execution of the *Comprehensive Plan's* Future Land Use designations and Seminole County's Land Development Code.

1. **Special Techniques.** For example, allowing clustering of development, or planned development, in exchange for preserving open areas which protects natural resources from development.
2. **Environmentally Sensitive Land Overlay.** Seminole County maintains an Environmentally Sensitive Lands Overlay Area, as defined in the *Comprehensive Plan*. The Environmentally Sensitive Lands Overlay Area includes any areas flooded during a 100-year flood event or identified by NFIP as Zone A or Zone V, as well as wetlands as defined by the St. Johns River Water Management District. This designation is used to limit permitted uses on wetland properties and direct development away from environmentally sensitive lands.
3. **The Urban/Rural Boundary.** This boundary forms the foundation for both wetland regulation and for the land uses that are assigned throughout the County. Having established that the East Rural Area contains a high quality mosaic of valuable wetland and upland systems, the County has adopted a limited number of land use designations of

very low density in the Rural Area to protect these resources.

5.2.5 CRS Credit

The CRS provides flood insurance discounts to those communities that implement various floodplain management activities that meet certain criteria. Comparing local activities to those national criteria helps determine if local activities should be improved.

Up to 100 points are provided for regulations that encourage developers to preserve floodplains or other hazardous areas from development. There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan. Up to 600 points are provided for setting aside floodplains for low density zoning, such as five acre lots or conservation.

5.3 Open Space Preservation

Keeping the floodplain and other hazardous areas open and free from development is the best approach to preventing damage to new developments. Open space can be maintained in agricultural use or can serve as parks, greenway corridors and golf courses.

Comprehensive and capital improvement plans should identify areas to be preserved by acquisition and other means, such as purchasing an easement. With an easement, the owner is free to develop and use private property, but property taxes are reduced or a payment is made to the owner if the owner agrees to not build on the part set aside in the easement.

Although there are some federal programs that can help acquire or preserve open lands, open space lands and easements do not always have to be purchased. Developers can be encouraged to dedicate park land and required to dedicate easements for drainage and maintenance purposes. These are usually linear areas along property lines or channels. Maintenance easements also can be donated by streamside property owners in return for a community maintenance program.

5.3.1 Local Implementation

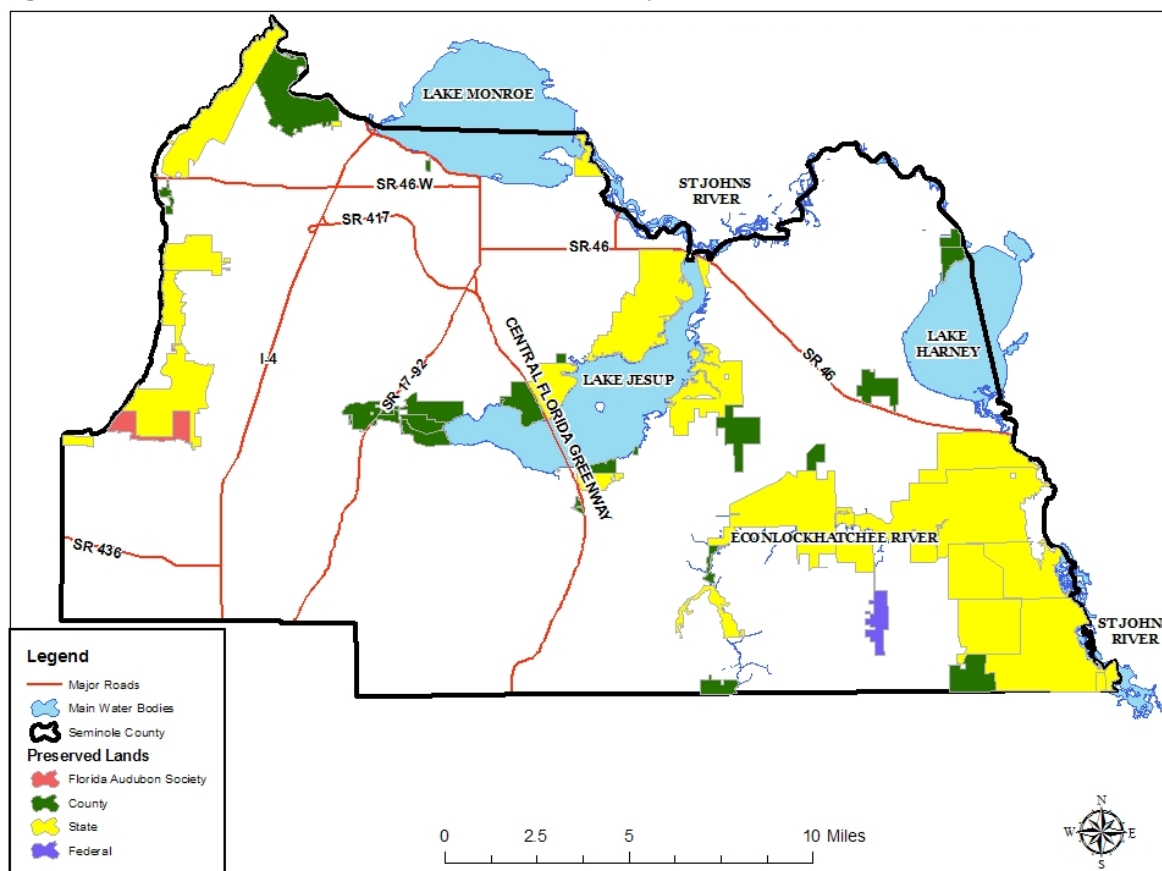
In 1990, the voters of Seminole County approved a \$20 million bond which created the Seminole County Natural Lands Program (NLP). The NLP established a system to access, rank and purchase environmentally significant lands throughout the County. In 2000, a voter-approved referendum provided for \$25 million dollars with \$20 million dollars of support of the County trails program and \$5 million dollars for natural lands. The County used these funds to purchase land to preserve or restore their important ecological functions, as well as provide sites for passive resource-based recreational activities. Since the inception of the program, Seminole County has purchased and currently manages just over 6,600 acres of land through the NLP.

The County's adoption of flood prone and wetland ordinances were critical steps in providing countywide protection of wetlands. The County's wetlands protection program has established an extensive network of wetlands under conservation easements. Conservation easements are used to protect post-development flood prone and wetland areas. Conservation easements are blanket easements over the area of concern and are granted to Seminole County, state or Federal

agencies or some combination thereof. Conservation easements act to limit any future encroachment or development and thus provide protection of flood prone and wetland areas. Conservation easements are required of all developments except for single family residences that contain post-development flood prone or wetland areas within their site boundaries and may be granted as specified in [Section 35.101\(a\)–\(c\)](#) of the Land Development Code.

Land acquisition efforts by Seminole County and the State of Florida have led to the conservation of major wetland systems in the Econlockhatchee, Wekiva, St. Johns, and Lake Jesup Basins. An ongoing focus on the conservation of intact wetland systems in the rural portion of the County supplements these acquisition programs. Preserved lands in Seminole County are shown in the figure below.

Figure 28: Preserved Lands in Seminole County



Wilderness areas and trails created from these referendums include the Black Bear, Black Hammock, Geneva, Chuluota, Lake Proctor, Econ River, Lake Jesup, and Spring Hammock Preserve. These environmental assets are open to the public for environmental education and passive recreation. The County designated these lands as “Preservation/Managed Lands” on the Future Land Use Plan Map in 2008. The County will continue to manage the more than 6,600 acres of Natural Lands acquired through these bond referendum for the preservation of significant natural habitats, open space areas and greenways.

In addition, the Comprehensive Plan states that the County shall include in its Land Development Code neighborhood performance standards for “common, liked and usable open space for active and/or passive recreation, including interconnected walkways, bikeways, trails and greenways” as well as “Preservation of onsite natural lands.” The County’s Land Development Code requires that all new development, unless otherwise specified within the Code, include a minimum amount of urban, suburban or rural open space and that open space areas within a development be connected to each other. The amount and type of required open space varies with the character of the proposed development and surrounding land uses. For commercial developments, the open space ratio is a minimum of 25% of the parcel.

5.3.2 CRS Credit

Preserving flood prone areas as open space is one of the highest priorities of the Community Rating System. Up to 1,450 points can be given for keeping land vacant through ownership or regulations (Activity 420 – Open Space Preservation).

5.4 Subdivision Regulations

Subdivision regulations govern how land will be subdivided and set construction standards. These standards generally address roads, sidewalks, utilities, storm sewers, and drainageways. They can include the following flood protection standards:

- Requiring that the final plat show all hazardous areas
- Requiring that each lot be provided with a building site above the flood level
- Requiring that all roadways be no more than one foot below the flood elevation

5.4.1 Local Implementation

Seminole County’s subdivision regulations require:

- Final subdivision plats require the 100-year floodplain boundary to be identified.

5.5 Floodplain Regulations

Most communities with a flood problem participate in the National Flood Insurance Program (NFIP). The NFIP sets minimum requirements for the participating communities’ standards for development, subdivision of land, construction of buildings, installation of mobile homes, and improvements and repairs to buildings. These are usually spelled out in a separate ordinance.

The NFIP minimum requirements are summarized on the next page. It should be stressed that these are minimum requirements. To gain credit in the CRS, communities must adopt and implement floodplain regulations that go above and beyond the minimum requirements of the NFIP.

5.5.1 Enforcement

To ensure that communities are meeting the NFIP standards, FEMA periodically conducts a Community Assessment Visit. During this visit, the maps and ordinances are reviewed, permits

are checked, and issues are discussed with staff. Failure to meet all of the requirements can result in one or more consequences:

- Reclassification under the Community Rating System to a higher class
- Probation, which entails a \$50 surcharge on every flood insurance policy in the community, or
- Suspension from the NFIP. If a community is suspended, the following sanctions are imposed:
 - Flood insurance will not be available. No resident will be able to purchase a flood insurance policy.
 - Existing flood insurance policies will not be renewed.
 - No direct federal grants or loans for development may be made in identified flood hazard areas under programs administered by federal agencies, such as HUD, EPA, and the Small Business Administration.
 - Federal disaster assistance will not be provided to repair insurable buildings located in identified flood hazard areas for damage caused by a flood.
 - No federal mortgage insurance or loan guarantees may be provided in identified flood hazard areas. This includes policies written by FHA (Federal Housing Administration), VA (Veterans Affairs), and others.
 - Federally insured or regulated lending institutions, such as banks and credit unions, must notify applicants seeking loans for insurable buildings in flood hazard areas that there is a flood hazard and the property is not eligible for federal disaster relief.

These sanctions can be severe for any community with a substantial number of buildings in the floodplain. Most communities with a flood problem have joined the NFIP and are in full compliance with their regulatory obligations.

One way to assure good administration and enforcement is to have Certified Floodplain Managers on staff. The Association of State Floodplain Managers administers the national Certified Floodplain Manager (CFM[®]) program. Certification involves a three hour exam and a requirement for continuing education each year. The exam covers the regulatory standards of the National Flood Insurance Program as well as mapping, administration, enforcement and flood hazard mitigation.

5.5.2 Minimum NFIP Regulatory Requirements

The NFIP is administered by FEMA. As a condition of making flood insurance available for their residents, communities that participate in the NFIP agree to regulate new construction in the area subject to inundation by the 100-year (base) flood. The floodplain subject to these requirements is shown as an A or V Zone on the Flood Insurance Rate Map (FIRM).

There are five major floodplain regulatory requirements. Additional floodplain regulatory requirements may be set by state and local laws.

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 when there are proposed changes to the floodplain ordinance or Flood Insurance Rate Maps.
4. Maintain the map and Letter of Map Change repositories.
5. Continue to promote Flood Insurance for all properties.

Communities are encouraged to adopt local ordinances that are more comprehensive or provide more protection than the federal criteria. The NFIP's Community Rating System provides insurance premium credits to recognize the additional flood protection benefit of higher regulatory standards.

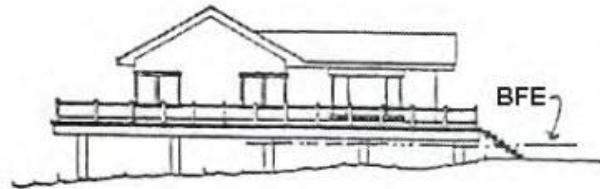
5.5.3 Local Implementation

Seminole County's Floodplain Ordinance meets all of the NFIP's floodplain regulatory requirements. The County's Floodplain Ordinance exceeds minimum NFIP standards for a number of elements that are credited in the CRS.

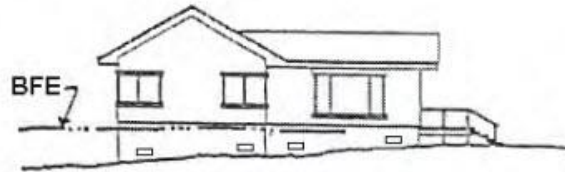


5.5.4 CRS Credit

There are many higher regulatory standards that warrant CRS credit. These standards include:



- Delineating a floodway, the area of higher hazard near the channel. This would allow development outside the floodway (called the "floodplain fringe") without engineering studies to determine their impact on others.
- Requiring all new construction to be elevated one or two feet above the base flood elevation to provide an extra level of protection from waves and higher floods. This extra protection is reflected in a distinct reduction in flood insurance rates.
- Having all developers (not just the larger ones) provide flood data where none are available.
- Specifications to protect foundations from erosion, scour and settling.
- Prohibiting critical facilities from all or parts of the floodplain.
- Prohibiting hazardous materials.
- Requiring buffers adjacent to streams or natural areas.
- Restrictions on use of enclosures below elevated buildings.
- Flood storage lost due to filling and construction must be compensated for by removal of an equal volume of storage.
- The CRS also provides credit for having trained staff and a higher credit if the staff members are Certified Floodplain Managers.



It should be noted that one of the prerequisites for participation in the CRS is that the community be in full compliance with the minimum requirements of the NFIP. A community with a number of “potential violations” risks being removed from the CRS entirely.

Seminole County’s Floodplain Ordinance requires that residential construction is built with the lowest floor no lower than one foot above the base flood elevation, which is an extra requirement beyond NFIP’s minimum requirements. An additional requirement beyond the minimum for Seminole County is that the ordinance sets specific restrictions on the use of enclosures below elevated buildings.

The County has a total of seven Certified Floodplain Managers on staff, three of whom are in the Development Services Department.

Buffers are required within wetlands to protect the natural and beneficial functions of the floodplain.

Seminole County has a floodplain storage capacity requirement that requires that if fill is brought into a development, an equal amount of fill must be removed somewhere in the floodplain to maintain the floodplain storage capacity.

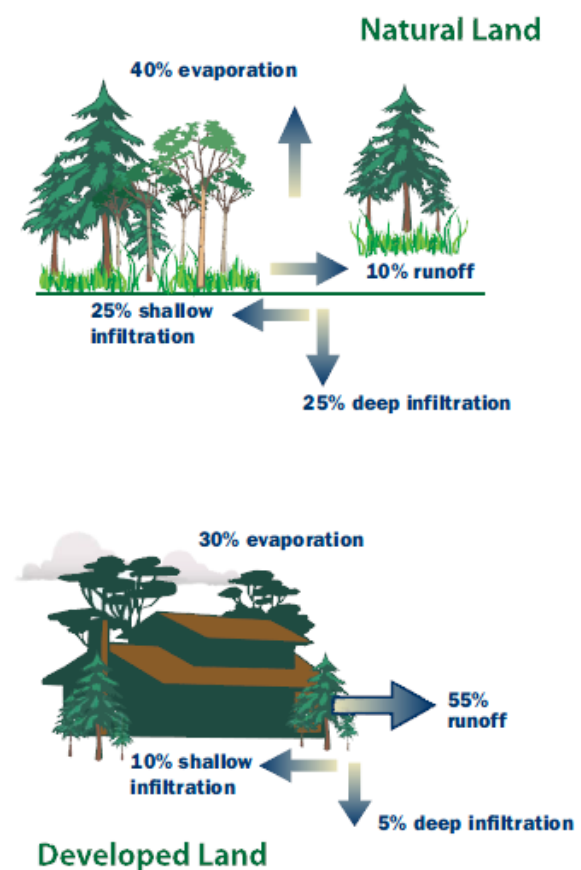
5.6 Stormwater Management

Development in floodplains is development in harm’s way. New construction in the floodplain increases the amount of development exposed to damage and can aggravate flooding on neighboring properties. Development outside a floodplain can also contribute to flooding problems. Stormwater runoff is increased when natural ground cover is replaced by urban development (see graphic). Development in the watershed that drains to a river can aggravate downstream flooding, overload the community’s drainage system, cause erosion, and impair water quality.

There are three ways to prevent flooding problems caused by stormwater runoff:

1. Regulating development in the floodplain to ensure that it will be protected from flooding and that it won’t divert floodwaters onto other properties.
2. Regulating all development to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions.
3. Set construction standards so buildings are protected from shallow water.

Figure 30: Effect of Development on Stormwater



Many communities participate in the NFIP, which sets minimum requirements for regulating development in the floodplain. The State of Florida has more stringent requirements than the NFIP, including a requirement that all new buildings must be elevated to no lower than one foot above the base flood elevation.

Stormwater runoff regulations require developers to build retention or detention basins to minimize the increases in the runoff rate caused by impervious surfaces and new drainage systems. Generally, each development must not let stormwater leave at a rate higher than what existed under pre-development conditions.

Standards for drainage requirements are typical in subdivision regulations. Standards for storm sewers, ditches, culverts, etc., are best set when an area is laid out and developed. Traditionally, the national standard is to require that the local drainage system carry the 10-year storm. Recently, communities are finding that older estimates of the 10-year storm understated the true hazard, so they are addressing larger storms.

One problem with requiring the drainage system to carry water away is that runoff increases with urban development. The runoff equivalent of a 10-year storm occurs more frequently, and from smaller storms. The problem is just sent downstream onto someone else's property.

Accordingly, modern subdivision regulations require new developments to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions. This is usually done by constructing retention or detention basins to hold the runoff for a few hours or days, until flows in the system have subsided and the downstream channels can accept the water without flooding.

If the storm sewers or roadside ditches cannot handle a heavy rain, the standard subdivision design uses the streets to carry excess runoff. If the flows exceed the streets' capacity, adjacent properties will flood. Therefore, the third approach to protecting from stormwater flooding is to make sure new buildings are elevated one or two feet above the street or above adjacent grade.

5.6.1 Local Implementation

The County's surface water management standards, within the Public Works Engineering Manual, set requirements for managing runoff from new developments. The standards require the storage and controlled release or retention on-site and infiltration into the ground of excess stormwater runoff from any commercial, industrial, and residential developments such that runoff from the site and peak attenuation rates will not be greater post-development than they were prior to development.

The procedure for disposing of excess stormwater runoff varies depending on the Hydrologic Soil Classification of the soils within the proposed development. For pervious soils (types A and B), the required overall stormwater management strategy is on-site retention and infiltration into the ground. For impervious soils (types C and D) or high ground water table areas (types A/D, B/D and C/D) the required overall stormwater management system is providing detention basins to attenuate the peak from the contributory drainage area and to settle solids washed off or eroded. The Public Works Engineering Manual also encourages the use of natural vegetative cover in controlling erosion.

The Seminole County Land Development Code provides for two overlay districts that protect the Wekiva River and the Econlockhatchee River by requiring design standards that establish high

quality development that is rural, maintains existing vegetation, protects wetlands, and minimizes disturbance to certain species and their habitats. Within the Wekiva River zoning overlay, development activity and the placement or depositing of fill is prohibited within wetlands and the 100-year floodplain. Within the Econlockhatchee zoning overlay, native plants must be used and removal of vegetation minimized in landscaping to the greatest extent practical and peak discharge rates for stormwater BMPs shall not exceed the pre-development rate for the mean annual storm event (24 hour, 2.3 year return period) and the 25-year storm. In some parts of the Econlockhatchee zoning overlay, development is prohibited within 550 feet of the stream's edge of channels of the Big Econlockhatchee River and the Little Econlockhatchee River except for the creation of wetlands and passive recreational uses.

5.6.2 CRS Credit

CRS credit is provided for both higher regulatory standards in the floodplain and stormwater management standards for new developments. Credit is based on how those standards exceed the minimum NFIP requirements.

The Public Works Engineering Manual has the following provisions that would be recognized by the CRS (in addition to provisions discussed in previous sections):

- Standards for retention and detention basis
- Requirements for erosion and sedimentation control

5.7 Conclusions

1. Installation of new mobile homes appears to be adequately administered to ensure proper tie downs and flood protection.
2. The majority of the comprehensive and land use plans address floodplains and the need to preserve these hazardous areas from intensive development. However, most zoning ordinances do not designate floodprone areas for any special type of land use.
3. Standards in subdivision regulations for public facilities should account for the hazards present at the site. New building sites, streets, and water systems should facilitate access and use by fire and emergency equipment.
4. A percentage of the county's floodplain is open space in public ownership. Because some of the floodplain is still undeveloped and not preserved as open space preventive measures can have a great impact on future flood damages. There are more opportunities to preserve more open space, especially when new developments are proposed.
5. The County's floodplain development and stormwater management regulations exceed minimum national and state standards in many areas and will be helpful in preventing flood problems from increasing.

5.8 Recommendations

1. The County planning and engineering staff should develop example subdivision ordinance language that requires new infrastructure to have hazard mitigation provisions, such as:
 - a. Buried utility lines and

- b. Storm shelters in new mobile home parks.
2. The County should use every opportunity to preserve floodplain areas as open space or other uses compatible with the flooding hazard.
3. The County should consider increasing the freeboard requirement by six (6) inches, from one (1) foot above the base flood elevation (BFE) to 1.5 ft. above BFE.
4. The County should continue to enforce its existing regulations for development and mobile homes and consider other higher standards to further protect the residents of Seminole County.

5.9 References

1. *CRS Coordinator's Manual*, FEMA, 2017.
2. *Design and Construction Guidance for Community Shelters*, FEMA, 2000.
3. *Manufactured Home Installation in Flood Hazard Areas*, FEMA, 1985.
4. *Multi-Hazard Identification and Risk Assessment*, FEMA, 1997.
5. Seminole County Code of Ordinances and Land Development Code, Seminole County.
6. *Subdivision Design in Flood Hazard Areas*, American Planning Association and FEMA, PAS Report 473, 1997.
7. *Floodplain Management in Florida Quick Guide*, FDEM Bureau of Mitigation, 2017.

6 Property Protection Measures

Property protection measures are used to modify buildings or property subject to damage. Property protection measures fall under three approaches:

- Modify the site to keep the hazard from reaching the building,
- Modify the building so it can withstand the impacts of the hazard, and
- Insure the property to provide financial relief after the damage occurs.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can be provided by a government agency. These are discussed later in this chapter.

6.1 Keeping the Hazard Away

Generally, natural hazards do not damage vacant areas. As noted earlier, the major impact of hazards is to people and improved property. In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. For example, a berm can be built to prevent floodwaters from reaching a house.

6.1.1 Flooding

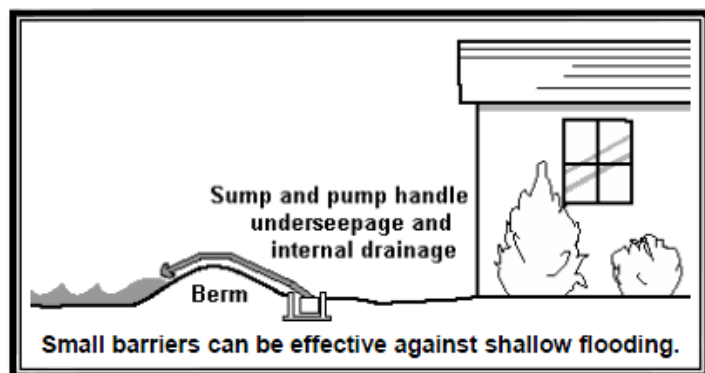
There are five common methods to keep a flood from reaching and damaging a building:

1. Erect a barrier between the building and the source of the flooding.
2. Move the building out of the floodprone area.
3. Elevate the building above the flood level.
4. Demolish the building.
5. Replace the building with a new one that is elevated above the flood level.

6.1.2 Barriers

A flood protection barrier can be built of dirt or soil (a “berm”) or concrete or steel (a “floodwall”). Careful design is needed so as not to create flooding or drainage problems on neighboring properties. Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, the design needs to account for leaks, seepage of water underneath, and rainwater that will fall inside the perimeter. This is usually done with a sump or drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier.

Figure 31: Flood Protection Barrier



Barriers can only be built so high. They can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and properly maintained. A berm can also settle over time, lowering its protection level. A floodwall can crack, weaken, and lose its watertight seal. Therefore, barriers need careful design and maintenance (and insurance on the building, in case of failure).

6.1.3 Relocation

Moving a building to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost increases for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. However, experienced building movers can handle any job.

In areas subject to flash flooding, deep waters, or other high hazard, relocation is often the only safe approach. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where the owner has a new flood-free lot (or portion of the existing lot) available.

6.1.4 Building Elevation

Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents.

Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.



One concern with elevation is that it may expose the structure to greater impacts from other hazards. If not braced and anchored properly, an elevated building may have less resistance to the shaking of an earthquake and the pressures of high winds.

6.1.5 Demolition

Some buildings, especially heavily damaged or repetitively flooded ones, are not worth the expense to protect them from future damages. It is cheaper to demolish them and either replace them with new, flood protected structures, or relocate the occupants to a safer site. Demolition is also appropriate for buildings that are difficult to move – such as larger, slab foundation or masonry structures – and for dilapidated structures that are not worth protecting. Generally, demolition projects are undertaken by a government agency, so the cost is not borne by the property owner, and the land is converted to public open space use, like a park.

One problem that sometimes results from an acquisition and demolition project is a “checkerboard” pattern in which nonadjacent properties are acquired. This can occur when some owners, especially those who have and prefer a waterfront location, are reluctant to leave their homes. Creating such an acquisition pattern in a community simply adds to the maintenance costs that taxpayers must support.



6.1.6 Pilot Reconstruction

If a building is not in good shape, elevating it may not be worthwhile or it may even be dangerous. An alternative is to demolish the structure and build a new one on the site that meets or exceeds all flood and wind protection codes. This was formerly known as “demo/rebuild.” FEMA funding programs refer to this approach as “pilot reconstruction.” It is still a pilot program, and is not always funded.

Certain rules must be followed to qualify for federal funds for pilot reconstruction:

- Pilot reconstruction is only possible after it has been shown that acquisition or elevation are not feasible, based on the program’s criteria.
- Funds are only available to people who owned the property at the time of the event for which funding is authorized.
- It must be demonstrated that the benefits exceed the costs.
- The new building must be elevated to the advisory base flood elevation.
- The new building must not exceed more than 10% of the old building’s square footage.
- The new building must meet all flood and wind protection codes.
- There must be a deed restriction that states the owner will buy and keep a flood insurance policy.
- The maximum federal grant is 75% of the cost, up to \$150,000. FEMA is developing a detailed list of eligible costs to ensure that disaster funds are not used to upgrade homes.

6.1.7 Local Implementation

Seminole County has had experience with acquisition, demolition, or elevation to protect buildings from flooding. The County has received grants from FEMA to manage these programs. The County is currently in the process of removing structures from the floodplain.

6.1.8 CRS Credit

The CRS provides the most credit points for acquisition and relocation, because this measure permanently removes insurable buildings from the floodplain.

The CRS credits barriers and elevating existing buildings (Activity 530 – Flood Protection). Elevating a building above the flood level will also reduce the flood insurance premiums on that individual building. Because barriers are less secure than elevation, not as many points are provided.

Higher scores are possible, but they are based on the number of buildings removed compared to the number remaining in the floodplain.

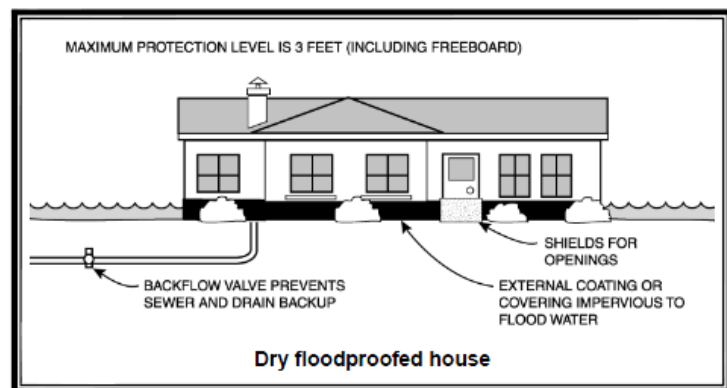
6.2 Retrofitting

An alternative to keeping the hazard away from a building is to modify or retrofit the site or building to minimize or prevent damage. There are a variety of techniques to do this, as described below.

6.2.1 Dry Floodproofing

Dry floodproofing entails making all areas below the flood protection level watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows and vents, are closed, either permanently, with removable shields, or with sandbags. Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under state, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques.

Figure 32: Dry Floodproofing



Dry floodproofing is only effective for shallow flooding, such as repetitive drainage problems. It does not protect from the deep flooding along lakes and larger rivers caused by hurricanes or other storms.

6.2.2 Wet Floodproofing

The alternative to dry floodproofing is wet floodproofing: water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. This is the approach used for the first floor of the elevated homes described in the previous section.

For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms. This practice is not generally used in central and southern Florida where most structures are slab on grade.

6.2.3 Local Implementation

It is likely that some properties in Seminole County have been retrofitted to protect them from flooding. However, because these projects are often so small, they generally do not require a building permit and there are no records of them.

6.2.4 CRS Credit

Credit for dry and wet floodproofing is provided under Activity 530 – Retrofitting. Because these property protection measures are less secure than barriers and elevation, not as many points are provided.

6.3 Insurance

Technically, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild, and hopefully afford to incorporate some of the other property protection measures in the process. Insurance offers the advantage of protecting the property, as long as the policy is in force, without human intervention for the measure to work.

6.3.1 Private Property

Although most homeowner’s insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the NFIP. Flood insurance coverage is provided for buildings and their contents damaged by a “general condition of surface flooding” in the area.

Most people purchase flood insurance because it is required by the bank when they get a mortgage or home improvement loan. Usually these policies just cover the building’s structure and not the contents. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building. The 2018 Insurance Information Institute *Pulse* survey found

Figure 33: Example Flood Insurance Premiums

Building Exposure	Premium
In the Special Flood Hazard Area (AE Zone)	\$1,689
Pre-FIRM ("subsidized") rate	
Post-FIRM (actuarial) rates	
2 feet above the base flood elevation	\$440
1 foot above the base flood elevation	\$643
At the base flood elevation	\$1,167
1 foot below the base flood elevation	\$4,379
Outside the Special Flood Hazard Area	\$1,029
Premiums are for \$150,000 in building coverage and \$75,000 in contents coverage for a one-story house with no basement and a \$500 deductible, using the October 2008 Flood Insurance Manual. Premiums include the 5% Community Rating System discount. Premiums are higher for local governments that do not participate in the CRS.	

that 15 percent of American homeowners had a flood insurance policy, up from 12 percent who had the coverage in 2016.

6.3.2 Public Property

Governments can purchase commercial insurance policies. Larger local governments often self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-insurance can drain the government's budget. Communities cannot expect federal disaster assistance to make up the difference after a flood.

Under Section 406(d) of the Stafford Act:

“If an eligible insurable facility damaged by flooding is located in a [mapped floodplain] ... and the facility is not covered (or is underinsured) by flood insurance on the date of such flooding, FEMA is required to reduce Federal disaster assistance by the *maximum* amount of insurance proceeds that would have been received had the buildings and contents been fully covered under a National Flood Insurance Program (NFIP) standard flood insurance policy. [Generally, the maximum amount of proceeds for a non-residential property is \$500,000.]

[Communities] Need to:

- Identify all insurable facilities, and the type and amount of coverage (including deductibles and policy limits) for each. The anticipated insurance proceeds will be deducted from the total eligible damages to the facilities.
- Identify all facilities that have previously received Federal disaster assistance for which insurance was required. Determine if insurance has been maintained. *A failure to maintain the required insurance for the hazard that caused the disaster will render ineligible for Public Assistance funding...*
- [Communities] *must* obtain and maintain insurance to cover [their] facility – buildings, equipment, contents and vehicles – for the hazard that caused the damage in order to receive Public Assistance funding. Such coverage must, at a minimum, be in the amount of the eligible project costs. FEMA will not provide assistance for that facility in future disasters if the requirement to purchase insurance is not met. – FEMA Response and Recovery Directorate Policy No. 9580.3, August 23, 2000

In other words, the law expects public agencies to be fully insured as a condition of receiving federal disaster assistance.

6.3.3 Local Implementation

NFIP flood insurance is available in Seminole County. As of October 2, 2020, there were 4,109 flood insurance policies in Seminole County. These policies are shown in Table 11 on the next page and shown by occupancy of building in Table 12.

Table 11: Flood Insurance Policies in Seminole County

	Total
Number of Policies	4,109
Total Premiums	\$2,105,881
Insurance in Force	\$1,218,941,100
Number of Closed Paid Losses	520
\$ Value of Closed Paid Losses	\$7,827,333.10

Table 12: Flood Insurance Policies by Occupancy in Seminole County

Occupancy	Policies in Force	Insurance in Force	Number of Closed Paid Losses	Value of Closed Paid Losses
Single Family	3,820	\$1,811,705	491	\$7,235,605.06
2-4 Family	32	\$7,962	2	\$0
All Other Residential	147	\$47,516	5	\$0
Non-Residential	110	\$238,698	22	\$591,728.04
Total	4,109	\$2,105,881	520	\$7,827,333.10

The number of flood insurance policies by FEMA flood zone is also available, as shown in Tables Table 13: Flood Insurance Policies by Flood Zone and 14, below.

Table 13: Flood Insurance Policies by Flood Zone

Zone	Pre-FIRM		Post-FIRM		Total	
	Policies in Force	Insurance in Force	Policies in Force	Insurance in Force	Policies in Force	Insurance in Force
A Zones	438	\$109,565,700	758	\$200,711,500	1,196	\$310,277,200
V Zones	0	\$0	0	\$0	0	\$0
X Zones	635	\$187,758,900	2,215	\$704,865,000	2,850	\$892,623,900

Table 14: Number and Value of Losses by Flood Zone

Zone	Pre-FIRM		Post-FIRM		Total	
	Number of Closed Paid Losses	Value of Closed Paid Losses	Number of Closed Paid Losses	Value of Closed Paid Losses	Number of Closed Paid Losses	Value of Closed Paid Losses
A Zones	142	\$3,259,941.30	168	\$2,386,105.72	310	\$5,646,047.02
V Zones	0	\$0	0	\$0	0	\$0
X Zones	91	\$1,392,710.91	109	\$774,486.10	200	\$2,167,197.01

6.3.4 CRS Credit

There is no credit for purchasing flood insurance, but the CRS does provide credit for local public information programs that explain flood insurance to property owners. The CRS also reduces the premiums for those people who do buy NFIP coverage.

6.4 The Government's Role

Property protection measures are usually considered the responsibility of the property owner. However, local governments should be involved in all strategies that can reduce flood losses, especially acquisition and conversion of a site to public open space. There are various roles a county or municipality can play in encouraging and supporting implementation of these measures.

6.4.1 Government Facilities

One of the first duties of a local government is to protect its own facilities. Fire stations, water treatment plants and other critical facilities should be a high priority for retrofitting projects and insurance coverage. Often public agencies discover after the disaster that their "all-hazard" insurance policies do not cover the property for the type of damage incurred. Flood insurance is even more important as a mitigation measure because of the Stafford Act provisions discussed above.

6.4.2 Public Information

Providing basic information to property owners is the first step in supporting property protection measures. Owners need general information on what can be done. They need to see examples, preferably from nearby. Public information activities that can promote and support property protection are covered in Chapter 10.

6.4.3 Financial Assistance

Communities can help owners by helping to pay for a retrofitting project. Financial assistance can range from full funding of a project to helping residents find money from other programs. Some communities assume responsibility for sewer backups, street flooding, and other problems that arise from an inadequate public sewer or public drainage system. Less expensive community programs include low interest loans, forgivable low interest loans and rebates. A forgivable loan is one that does not need to be repaid if the owner does not sell the house for a specified period, such as five years. These approaches don't fully fund the project, but they cost the community less and they increase the owner's commitment to the flood protection project. Often, small amounts of money act as a catalyst to pique the owner's interest to get a self-protection project moving.

The more common outside funding sources are listed below. Unfortunately, the last three are only available after a disaster, not before, when damage could be prevented. Following past disaster declarations, FEMA and the Florida Division of Emergency Management have provided advice on how to qualify and apply for these funds.

Pre-disaster funding sources:

- FEMA’s Building Resilient Infrastructure and Communities (BRIC) (administered by the Florida Division of Emergency Management)
- FEMA’s Flood Mitigation Assistance (FMA) grants (administered by the Florida Division of Emergency Management)
- Community Development Block Grants (administered by the Florida Division of Housing and Community Development)
- The Florida Department of Environmental Protection grant programs
- Conservation organizations, although generally these organizations prefer to purchase vacant land in natural areas, not properties with buildings on them.

Post-disaster funding sources:

- Insurance claims
- The NFIP’s Increased Cost of Compliance (ICC). This provision increases a flood insurance claim payment to help pay for a flood protection project required by code as a condition to rebuild the flooded building. It can also be used to help pay the non-federal cost-share of an elevation project.

Property Protection Rebates

The Village of South Holland, Illinois received national recognition for its rebate program to help property owners fund retrofitting projects that protect against surface and subsurface flooding. If a project is approved, installed and inspected, the Village will reimburse the owner 25% of the cost up to \$2,500. Over 450 floodproofing and sewer backup protection projects have been completed under this program. Perhaps not surprisingly, contractors have become some of the best agents to publicize this program.

Post-disaster funding sources, federal disaster declaration needed

- FEMA’s disaster assistance (for public properties). However, the amount of assistance will be reduced by the amount of flood insurance that the public agency should be carrying on the property. (administered by the Florida Division of Emergency Management)
- Small Business Administration disaster loans (for non-governmental properties)
- FEMA’s Hazard Mitigation Grant Program (HMGP) (administered by the Florida Division of Emergency Management)

6.4.4 Acquisition Agent

The community can be the focal point in an acquisition project. Most funding programs require a local public agency to sponsor the project. The local government could process the funding application, work with the owners, and provide some, or all, of the local share. In some cases, the local government would be the ultimate owner of the property, but in other cases another public agency, such as Florida State Parks, could assume ownership and the attendant maintenance responsibilities.

6.4.5 Mandates

Mandates are considered a last resort if information and incentives are insufficient to convince a property owner to take protective actions. An example of a retrofitting mandate is the requirement that communities have to disconnect downspouts from the sanitary sewer line.

There is a mandate for improvements or repairs made to a building in the mapped floodplain. If the project equals or exceeds 50% of the value of the original building, it is considered a “substantial improvement.” The building must then be elevated or otherwise brought up to current flood protection codes.

Another possible mandate is to require less expensive hazard protection steps as a condition of a building permit. For example, many communities require upgraded electrical service as a condition of a home improvement project. If a person were to apply for a permit for electrical work, the community could require that the service box be moved above the base flood elevation or the installation of a separate ground fault interrupter circuits in the basement.

6.4.6 Local Implementation

As discussed in Chapter 1, there are many critical facilities, most of which are not subject to flooding and have no requirement for protection from flooding.

There have most likely been some flood protection measures implemented by homeowners in the County. In the past there has been one demolition/rebuild project and currently Seminole County is in the process of acquiring one residential property through FEMA’s Flood Mitigation Assistance Program.

6.4.7 CRS Credit

Except for public information programs, the CRS does not provide credit for efforts to fund, provide incentives, or mandate property protection measures. CRS credits are provided for the actual projects after they are completed. However, to participate in CRS, a community must certify that it has adequate flood insurance on all properties that have been *required* to be insured. The minimum requirement is to insure those properties in the mapped floodplain that have received federal aid, as specified by the Flood Disaster Protection Act of 1973.

6.5 Repetitive Loss Properties and Analysis

Chapter 2 explains the criteria for designation of the County’s repetitive loss areas. These properties deserve special attention because they are more prone to damage by natural hazards than any other properties in the County. Further, protecting repetitive loss buildings is a priority with FEMA and Florida Division of Emergency Management mitigation funding programs.

Flood insurance policies and paid amounts for repetitive loss properties in Seminole County are shown in Table 15 on the next page.

Table 15: Flood Insurance for Repetitive Loss Properties

	A Zones	V Zones	X Zones	Total
RL Buildings	32	0	8	40
RL Losses	74	0	19	93
RL Total Payments	\$2,805,061.07	\$0	\$328,953.04	\$3,134,014.11
Building Payments	\$2,433,122.49	\$0	\$248,446.62	\$2,681,569.11
Contents Payments	\$371,938.58	\$0	\$80,506.42	\$452,445.00

6.6 Conclusions

1. There are several ways to protect individual properties from damage by natural hazards. The advantages and disadvantages of each should be examined for each situation.
2. Property owners can implement some property protection measures at little cost, especially for sites in areas of low hazards (e.g., shallow flooding, sewer backup, and thunderstorms). For other measures, such as relocation and elevation, the owners may need financial assistance.
3. Local government agencies can promote and support property protection measures through several activities, ranging from public information to financial incentives to full funding.
4. It is unlikely that most government properties, including critical facilities, have any special measures to protect them from flooding.
5. Property protection measures can protect the most damage-prone buildings in the County: repetitive loss properties.

6.7 Recommendations

1. Public education materials should be distributed to homeowners, explaining property protection measures that can help owners reduce their exposure to damage by floods and the various types of insurance that are available.
2. Because properties in floodplains will be damaged at some point, a special effort should be made to provide information and advice to floodplain property owners. Special attention should be given to repetitive loss and high hazard areas.
3. All property protection projects should be voluntary. Other than state and federally mandated regulations, local incentives should be positive as much as possible, such as providing financial assistance.
4. Seminole County should evaluate its own properties' vulnerability. A priority should be placed on determining critical facilities' vulnerability to damage and whether public properties are adequately insured.
5. Seminole County should protect its own publicly owned facilities with appropriate mitigation measures.

6. Seminole County should establish cost sharing programs, such as rebates, to encourage low cost (under \$10,000) property protection measures on private property, for example:
 - Surface and subsurface drainage improvements,
 - Berms and regrading for shallow surface flooding, and
 - Relocating heating and air conditioning units above the base flood elevation.
7. The County should seek state and federal funding support for higher cost measures, such as elevation, relocation and acquisition of high priority properties. High priority properties are:
 - Those properties in repetitive loss areas.
 - Critical facilities in the floodway or subject to flood depths of more than two feet.

6.8 References

1. *Engineering Principles and Practices for Retrofitting Flood Prone Residential Structures*, FEMA, FEMA-259, 2012.
2. *Flood Insurance Agent's Manual*, FEMA, 2000.
3. *National Flood Insurance Policies in Force in Florida by County*, Insurance Information Institute, 2017
4. *Flood Proofing Techniques, Programs and References*, U.S. Army Corps of Engineers National Flood Proofing Committee, 1991.
5. *Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding*. FEMA, FEMA-312, 3rd Edition 2014.
6. *Local Flood Proofing Programs*, U.S. Army Corps of Engineers, 1994.

7 Natural Resource Protection

Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. These activities enable the naturally beneficial functions of fields, floodplains, wetlands, and other natural lands to operate more effectively. Natural and beneficial functions of watersheds, floodplains and wetlands include:

- Reduction in runoff from rainwater in pervious areas
- Infiltration that absorbs overland flood flow
- Removal and filtering of excess nutrients, pollutants and sediments
- Storage of floodwaters
- Absorption of flood energy and reduction in flood scour
- Water quality improvement
- Groundwater recharge
- Habitat for flora and fauna
- Recreational and aesthetic opportunities

As development occurs, many of the above benefits can be achieved through regulatory steps for protecting natural areas or natural functions. The regulatory programs are discussed in Chapter 5 – Preventive Measures. This chapter covers the resource protection programs and standards that can help mitigate the impact of natural hazards, while they improve the overall environment. Seven areas are reviewed:

- Wetland protection
- Erosion and sedimentation control
- River restoration
- Best management practices
- Dumping regulations
- Urban forestry
- Farmland protection

7.1 Wetland Protection

Wetlands are often found in floodplains and depressional areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flows. They also serve as a natural filter, which helps to improve water quality, and they provide habitat for many species of fish, wildlife and plants.

Wetlands that are determined to be part of the waters of the United States are regulated by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency (US EPA) under Section 404 of the Clean Water Act. Before a “404” permit is issued, the plans are reviewed by

several agencies, including the Corps and the U.S. Fish and Wildlife Service. Each of these agencies must sign off on individual permits.

There are also nationwide permits that allow small projects that meet certain criteria to proceed without individual permits. Wetlands not included in the Corps' jurisdiction or that are addressed by a nationwide permit may be regulated against by local authorities.

If a permit is issued by the Corps or the County, the impact of the development is typically required to be mitigated. Wetland mitigation can include creation, restoration, enhancement or preservation of wetlands elsewhere. Wetland mitigation is often accomplished within the development site, however, mitigation is allowed off-site and sometimes in another watershed. The appropriate type of mitigation is addressed in each permit.

Some developers and government agencies have accomplished the required mitigation by buying into a wetland bank. Wetland banks are large wetlands created for the purpose of mitigation. The banks accept money to reimburse the owner for setting the land aside from development.

When a wetland is mitigated at a separate site there are

drawbacks to consider. First, it takes many years for a new wetland to approach the same quality as an existing one. Second, a new wetland in a different location (especially if it is in a different watershed) will not have the same flood damage reduction benefits as the original one did.



Wetlands in the Lake Jesup Wilderness Area in Seminole County, Florida

7.1.1 Local Implementation

Seminole County's Land Development Code includes a "Wetlands Overlay Zoning Classification" in which all property containing a wetland of a half-acre or larger, any wetlands with a direct hydrologic connection a half-acre or larger, and their adjacent areas are included. The zoning classification strives to protect wetland functions by minimizing disruption of wetlands by development activities, regulating development activities on wetlands according to wetland significance, and providing for mitigation measures for wetlands development on a site-specific basis. Wetlands less than a half-acre may not require such mitigation, unless they are located in the Econlockhatchee River Basin Zone or the Wekiva River Protection Area. No loss of wetlands is permitted in these areas.

Wetland and surface water impacts require a state permit from the Florida Department of Environment Protection or, if the parcel is within the Wekiva River Protection Area, it is

permitted through the St. Johns River Water Management District. County permits are also required.

In addition, Seminole County's Natural Lands Program preserves and manages natural areas within Seminole County, including wetlands, to enhance or promote biodiversity, wildlife corridors, water resources, and passive resource-based recreation. Since the program began in 1990, Seminole County has purchased over 6,600 acres of natural land.

The County's *Comprehensive Plan* adopts a policy to regulate wetlands to protect and sustain their functions and values, and states that in conjunction with the Land Development Code, the County "will evaluate the need to provide additional criteria which will allow for mitigation of impacts to wetlands caused by the development actions." The *Comprehensive Plan* calls for the establishment of a County-run comprehensive wetland mitigation program partly funded by fees in lieu of performing mitigation.

7.1.2 CRS Credit

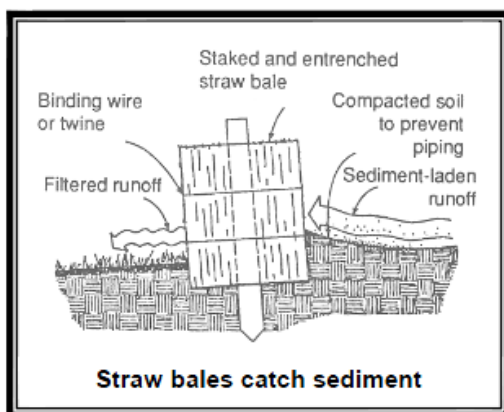
CRS focuses on activities that directly affect flood damage to insurable buildings. While there is no credit for relying on the Corps of Engineers' 404 regulations, there is credit for preserving open space in its natural condition or restored to a state approximating its natural condition. The credit is based on the percentage of the floodplain that can be documented as wetlands protected from development by ownership or local regulations.

7.2 Erosion and Sedimentation Control

Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along streambanks and shorelines as the volume and velocity of flow or wave action destabilize and wash away the soil.

Sediment suspended in the water tends to settle out where flowing water slows down. This can clog storm drains, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands. When channels are constricted and

Figure 35: Straw Bales



flooding cannot deposit sediment in the bottomlands, even more sediment is left in the channels. The result can be clogged streams and increased dredging costs.

Not only are the drainage channels less able to perform their job, but the sediment in the water reduces light, oxygen and water quality, and often carries chemicals, heavy metals and other pollutants. Sediment has been identified by the US EPA as the nation's number one nonpoint source pollutant for aquatic life.

There are two principal strategies to address these problems: minimize erosion and control sedimentation. Techniques to minimize erosion include phased construction, minimal land clearing, and stabilizing

bare ground as soon as possible with vegetation and other soil stabilizing practices. Best management practices for agriculture activities can also be implemented.

If erosion occurs, other measures are used to capture sediment before it leaves the site. Silt fences, sediment traps and vegetated filter strips are commonly used to control sediment transport. Runoff from the site can be slowed down by terraces, contour strip farming, no-till farm practices, hay or straw bales, constructed wetlands, and impoundments (e.g., sediment basins and farm ponds). Slowing surface water runoff on the way to a drainage channel increases infiltration into the soil and reduces the volume of topsoil eroded from the site.

Erosion and sedimentation control regulations mandate that these types of practices be incorporated into construction plans. They are usually oriented toward construction sites rather than farms. The most common approach is to require applicants for permits to submit an erosion and sediment control plan for the construction project. This allows the applicant to determine the best practices for the site.

7.2.1 Local Implementation

Erosion and sediment control requirements and Best Management Practices (BMPs) are referenced in the Seminole County Public Works Engineering Manual. Erosion control measures are to be designed so that local, state and federal water quality standards are achieved prior to discharge from a site. Best management practices are to be incorporated during construction in accordance with Rule 62-25.025, Florida Administrative Code, and other applicable statutes or codes. All surface water discharge from a site, including dewatering discharge, must meet state water quality criteria (Rule 62-302, Florida Administrative Code) unless temporarily exempted by specific permit conditions.

7.2.2 CRS Credit

Seminole County's Surface Water Management Standards include erosion and sedimentation control provisions and should qualify for 40 points, the maximum credit available.

7.3 Lake and Stream Restoration

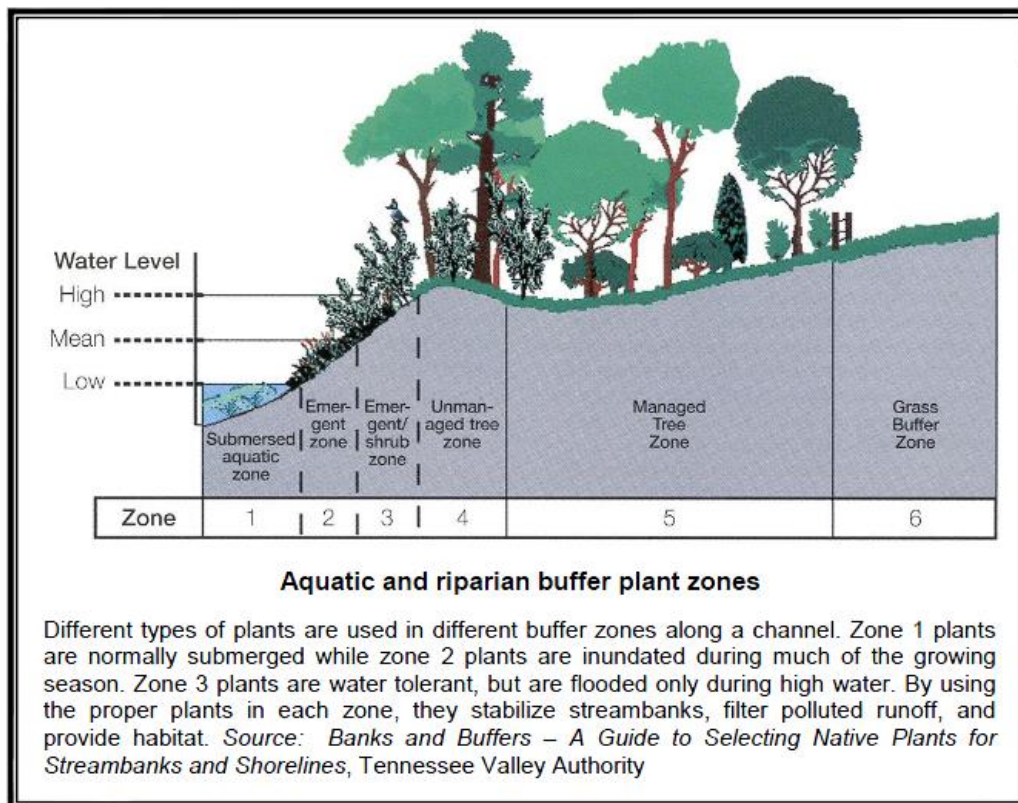
Stream conservation, riparian corridor restoration, lake management, and lake shoreline restoration are all objectives to returning lakes and streams, including adjacent lands, to a more natural condition. Another term is "ecological restoration," which restores native beneficial plants and animals to an area. A key components of these efforts is to use appropriate native plantings along the shoreline of lakes or banks of streams for erosion prevention. This may involve retrofitting the lake shoreline or stream bank with native plantings, installing rolls of landscape material covered with a natural fabric that decomposes after the banks are stabilized with plant roots, or armoring areas with underground structures (such as geofabrics) to conserve sediment and vegetation loss due to erosion. In addition, restoring natural meanders of a streams are integral to reduce water velocity and flow and allow for natural deposition of sediment to occur where decomposition of organics is promoted. These efforts follow the purpose of The Plan to reduce safety hazards, health hazards, and property damage caused by floods.

The Plan fulfills the federal mitigation planning requirements, qualifies for CRS credit, and provides the County with a blueprint for reducing the impacts of these flood hazards on people, property, and public health. In all, restoration to lakes and streams has the following advantages:

- Reduces the amount of sediment and pollutants entering the water
- Reduces harmful algae blooms potential by mitigation nutrients
- Enhances aquatic habitat
- Provides food and shelter for both aquatic and terrestrial wildlife
- Can reduce flood damage by slowing the velocity of water
- Increases the beauty of the land and its property value
- Prevents property loss due to erosion
- Provides recreational opportunities, such as hunting, fishing and bird watching
- Reduces long-term maintenance costs

Studies have shown that after establishing the right vegetation, long-term maintenance costs are lower than if the banks were concrete or a monoculture of grass. The Natural Resources Conservation Service estimates that over a ten-year period, the combined costs of installation and maintenance of a natural landscape may be one-fifth of the cost for conventional landscape maintenance, e.g., mowing turf grass.

Figure 37: Aquatic and Riparian Buffer Plant Zones



7.3.1 Local Implementation

Seminole County has been active in pursuing and completing lake and stream restoration projects. Seminole County Lake Management Program (SCLMP) offers options that are understandable, and responsive to undesirable lake conditions affecting water quality and biological habitats for insects, fish, birds, etc. This program conducts detailed lake assessment and restoration studies, prepares reports analyzing the condition of county lakes, provides public education and technical assistance to lake groups and lakeside residents, and provides actions to control invasive aquatic plants via technical aquatic plant management plans.

Basic Components of SCLMP include:

- Provide Biological and Water Quality Diagnosis – To assess the extent of eutrophication and evaluate trends in water quality conditions.
- Conduct Watershed Assessment – A detailed evaluation of important watershed features, such as land uses and soil types, is conducted to identify active or potential sources of pollution that need to be addressed to protect and improve lake water quality.
- Develop Lake Management Plan – The results of the water quality diagnosis and watershed assessment are used to evaluate methods to remediate undesirable lake conditions and to manage pollution sources in the lake watershed. The plan identifies the most cost effective ways to achieve water quality objectives.
- Provide Plan Implementation – The lake management plan may involve one or more of a variety of technologies including sediment dredging, weed harvesting, artificial aeration, grass carp fish, and aquatic herbicide treatments. Watershed management invariably involves the implementation of BMPs for non-point sources of pollution. (Examples are improved shoreline vegetation, routine catch basin cleanouts, and installation of stormwater treatment technology).

Volunteers have contributed an average of 1,787 hours per year restoring shorelines. These volunteer efforts have installed an average of 31,836 native plants per year and removed an average of 14.84 cubic yards of invasive plants. Community participation is an integral component of the Lake Restoration Program.

The development of a successful lake management program is dependent on active community participation. SCLMP is very active in meeting with property owners, lake associations, and professional officials to promote and assist in various lake management projects.

7.3.2 CRS Credit

The Community Rating System focuses on activities that directly affect flood damage to insurable buildings. However, there are credits for preserving open space in its natural condition or restored to a state approximating its natural condition. There are also credits for channel setbacks, buffers and protecting shorelines.

7.4 Stormwater Best Management Practices

Point source pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the US EPA and the Florida Department of Environmental Protection. Nonpoint source pollutants come from non-specific locations and are harder to

regulate. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, grass clippings, other chemicals, animal wastes, oils from street surfaces and industrial areas, and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches, streams, and lakes.

The term “best management practices” (BMPs) refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff through these management techniques. By mitigating rate/volume of runoff through various recognized BMPs, erosion prevention, natural resource protection, and capturing nonpoint source pollutants (including sediment) can be achieved. BMPs can prevent increases in downstream flooding by attenuating runoff and enhancing infiltration of stormwater. They also minimize water quality degradation causing hazardous algal blooms, preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, improve ecological diversity, and provide multiple usages of drainage and storage facilities.

7.4.1 Local Implementation

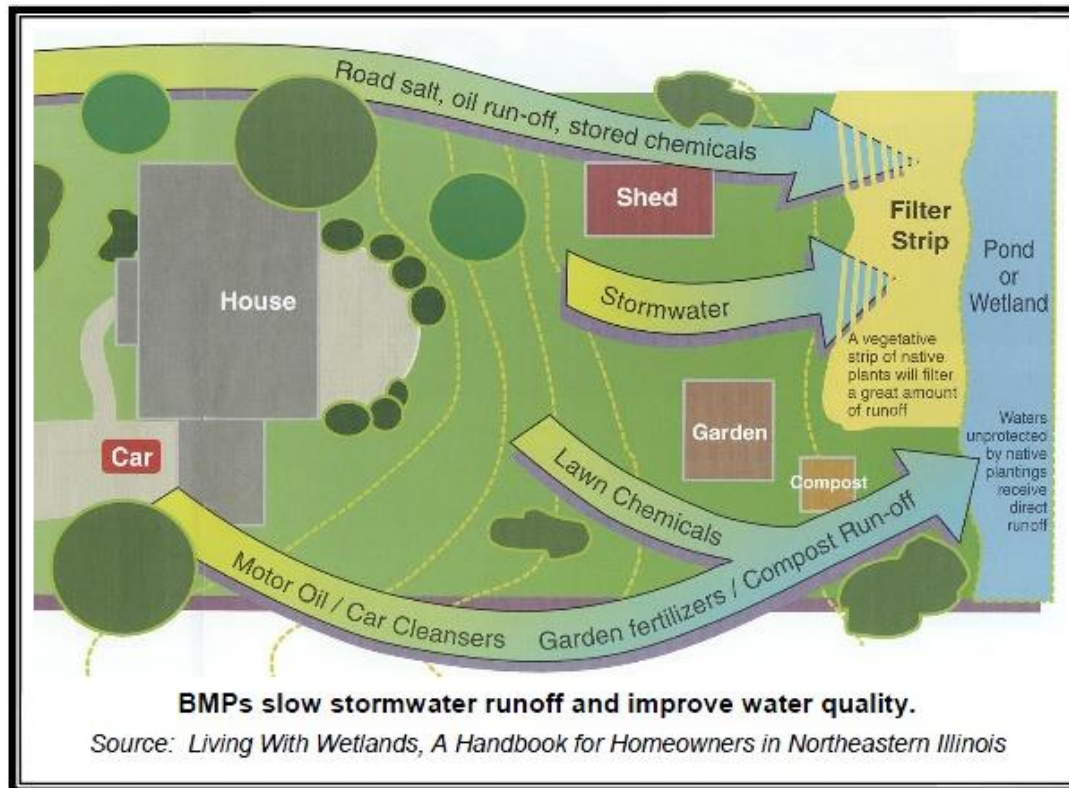
Surface water management standards for Seminole County are stipulated in Chapter 2 of the Seminole County Public Works Engineering Manual. These Standards establish the minimum criteria for the design, construction and maintenance for all Land Development projects within Seminole County. All design, construction and maintenance for public and private Surface Water Management Systems used for the conveyance of storm water must conform to requirements of the St. Johns River Water Management District (SJRWMD), the Florida Department of Environmental Protection (FDEP), and the Florida Department of Transportation (FDOT).

The Surface Water Management Standards must be consistent with Florida law. Consequently, all standards must be consistent with the latest rules of the SJRWMD set forth in Rules 40C-4, 40C-40, 40C-41, 40C-42, 40C-44, and 40C-400, Florida Administrative Code, FDOT's rules set forth in Rule 14-86, Florida Administrative Code (if FDOT Drainage Permit required), and FDEP's rules set forth in Rule 62-25, Florida Administrative Code. Chapter 373, Florida Statutes, must be met as applicable. These State standards are set as minimum requirements and do not supersede Seminole County requirements if these State standards are less stringent. If not covered in these standards all Federal, State and local regulations are applicable. Any reduction in the minimum criteria of the Seminole County Surface Water Management Standards must be reviewed and approved by the County Engineer or his or her designee.

The County is also the permittee of a National Pollutant Discharge Elimination System (NPDES) Phase I Municipal Separate Storm Sewer System (MS4) permit (FLS000038). This permit regulates discharges of stormwater runoff from the publicly-owned stormwater system. Seminole County has implemented a Stormwater Management Program that includes pollution prevention measures, stormwater treatment BMPs, monitoring, education and other appropriate means to control the quality of stormwater discharged from the MS4.

7.4.2 CRS Credit

Under Activity 450 – Stormwater Management, credit is given for both water quality and water quantity. Water quality credit under activity is given to a community who implements best management practices.

Figure 38: BMPs and Stormwater

7.5 Pollution Regulations

BMPs usually address pollutants that are liquids or are suspended in water that are washed into a lake or stream. Dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Such materials may not pollute the water, but they can obstruct even low flows and reduce the channels' and wetlands' abilities to convey or clean stormwater.

Many cities have nuisance ordinances that prohibit dumping garbage or other “objectionable waste” on public or private property. Waterway dumping regulations need to also apply to “nonobjectionable” materials, such as grass clippings or tree branches, which can kill ground cover or cause obstructions in channels. Regular inspections to catch violations should be scheduled.

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard without realizing that is needed to drain street runoff. They may not understand how regrading their yard, filling a wetland, or discarding leaves or branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement program should include public information materials that explain the reasons for the rules as well as the penalties.

7.5.1 Local Implementation

Seminole County has several ordinances that prohibit the pollution of air and water resources and prevent dumping or illicit discharges.

Chapter 205 – Pollution Control. This ordinance adopted the pollution control requirements of the Florida Air and Water Pollution Control Act as amended (Chapter 403, F.S.). Part 2 of the ordinance references pollution of drainage ditches, prohibiting the dumping of any refuse matter or effluent into County drainage ditches.

Chapter 270, Part 9 – Storm Sewer System Discharges. This ordinance regulates the non-stormwater discharges to the storm drainage system to the maximum extent practicable as required by federal and state law and establishes methods for controlling the introduction of pollutants into the County's municipal separate storm sewer system (MS4) in order to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process. Section 270.402 specifically prohibits illicit discharges and illicit connections to the County's drainage system. Certain discharges are exempt from discharge prohibitions, such as water line flushing, landscape irrigation and air conditioning condensation (Sec. 270.397(a)(1)).

Chapter 235 – Solid Waste. This ordinance stipulates that solid waste shall be disposed of only at County designated disposal facilities.

Chapter 95 – Health and Sanitation. Objectionable, unsightly or unsanitary accumulations of garbage, refuse, rubbish, junk or debris are considered nuisances when existing upon lands or premises in the unincorporated area of Seminole County.

Seminole County has implemented educational outreach activities and public information materials to educate citizens and business owners about proper disposal of waste and prevent illicit discharges. Seminole County has also established customer service call in numbers and reporting mechanisms through the Seminole Water Atlas (www.seminole.wateratlas.org) to report any pollution or dumping concerns.

7.5.2 CRS Credit

The CRS provides up to 30 points for enforcing and publicizing a regulation that prohibits dumping in the drainage system. Seminole County should be eligible for this credit.

7.6 Farmland Protection

Farmland protection is quickly becoming an important piece of comprehensive planning and zoning throughout the United States. The purpose of farmland protection is to provide mechanisms for prime, unique, or important agricultural land to remain as such, and to be protected from conversion to nonagricultural uses.

Frequently, farm owners sell their land to residential or commercial developers and the property is converted to non-agricultural land uses. With development comes more buildings, roads and other infrastructure. Urban sprawl occurs, which can create additional stormwater runoff and emergency management difficulties.

Farms on the edge of cities are often appraised based on the price they could be sold for to urban developers. This may drive farmers to sell to developers because their marginal farm operations cannot afford to be taxed as urban land. The Farmland Protection Program in the United States

Department of Agriculture’s 2002 Farm Bill (Part 519) allows for funds to go to state, tribal, and local governments as well as nonprofit organizations to help purchase easements on agricultural land to protect against the development of the land. Eligible land includes cropland, rangeland, grassland, pastureland, or forest land that is part of an agricultural operation. Certain lands within historical or archaeological resources are also included.

The hazard mitigation benefits of farmland protection are similar to those of open space preservation, as discussed in Chapter 5 – Preventive Measures:

- Farmland is preserved for future generations,
- Farmland in the floodplain keeps damageable structures out of harm’s way,
- Farmland keeps more stormwater on site and lets less stormwater runoff downstream,
- Rural economic stability and development is sustained,
- Ecosystems are maintain, restored or enhanced, and
- The rural character and scenic beauty of the area is maintained.

7.6.1 Local Implementation

The policies of the “Future Land Use” element of the County’s *Comprehensive Plan* include “Protection and preservation of the environment and farmlands.” The “Conservation” element of the plan also emphasizes the protection and preservation of farmlands. In addition, the East Seminole County Scenic Corridor Overlay District Ordinance recognizes that “agricultural activities in East Seminole County are an important historical, cultural and economic resource.” Limited development activities are allowable in this zone, such as agricultural uses and commercial uses designated on the future land use map. Landscaping must be done using native species.

7.6.2 CRS Credit

Credit is given for preserving open space in the floodplain, regardless of why it is being preserved. Credit is also provided for low density zoning of floodprone areas. Agricultural zones that require minimum 10- or 20-acre lots would qualify.

7.7 Conclusions

1. A hazard mitigation program can use resource protection programs to support protecting areas and natural features that can mitigate the impacts of natural hazards.
2. The current regulations on wetland protection, erosion and sediment control, and best management practices have effective standards.
3. There are excellent examples of wetland protection and river and shoreline restoration projects managed by Seminole County that demonstrate the benefits of these measures.
4. The County’s Code of Ordinances prohibits illicit discharges into waters of the state and into the County’s Municipal Separate Storm Sewer System (MS4).
5. Preserving farmland in the floodplain will prevent damage to homes, businesses, and other development.

7.8 Recommendations

1. Seminole County should continue to enforce the wetland protection, erosion and sediment control and BMP provisions of the Surface Water Management Standards.
2. The public and decision makers should be informed about the hazard mitigation benefits of restoring rivers, wetlands and other natural areas. Restoration and protection techniques should be explained.
3. Seminole County should publicize its illicit discharge rules more widely.
4. The public should be informed about the need to protect streams, wetlands, and lakes from dumping and inappropriate development along with the relevant codes and regulations.

7.9 References

1. *Banks and Buffers – A Guide to Selecting Native Plants for Streambanks and Shorelines*, Tennessee Valley Authority, 1997.
2. *CRS Coordinator’s Manual*, Community Rating System, FEMA, 2017.
3. *Stream Corridor Restoration Principles, Processes and Practices*, Federal Interagency Stream Restoration Working Group, 1998.

8 Emergency Services Measures

Emergency services measures protect people during and after a disaster. A good emergency management program addresses all hazards, and it involves all local government departments. At the state level, emergency services programs are coordinated by the Florida Division of Emergency Management. Seminole County emergency services are coordinated through the Seminole County Office of Emergency Management.

This chapter reviews emergency services measures following a chronological order of responding to an emergency. It starts with identifying an impending problem (threat recognition) and continues through post-disaster activities.

**Seminole County Office of
Emergency Management Mission:**

Planning, training, exercising, and coordinating resources to ready our community for any emergency, while promoting a culture of preparedness that will ensure Seminole County is a safe place to work, live, and play.

8.1.1 Threat Recognition

The first step in responding to a flood, storm or other natural hazard is knowing when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

Tropical Storms and Hurricanes. The National Weather Service' National Hurricane Center monitors all tropical storm and hurricane activity. It uses computer models to estimate where the storm will make landfall, the predicted wind speeds, and the likely storm surge levels. These predictions are updated periodically and disseminated to the media and through emergency management channels.

The Hurricane Center runs the predicted storm through a computer model called SLOSH (Sea, Lake, and Overland Surges from Hurricanes). This provides information on how deep and how far inland storm surges are expected to be.

Floods. A flood recognition system predicts the time and height of the flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On larger rivers, this measuring and calculating is performed by the National Weather Service, a part of the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Support for NOAA's efforts is provided by cooperating partners from state and local agencies.

Forecasts of expected river stages are made through the Advanced Hydrologic Prediction Service (AHPS) of the National Weather Service. Flood threat predictions are disseminated on the NOAA Weather Radio (NWR). NWR is an "All Hazards" radio network, making it a single source for comprehensive weather and emergency information.

On smaller rivers, locally established rainfall and river gauges are needed to establish a flood threat recognition system. The National Weather Service may issue a "flash flood watch." This is

issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain nor imminent. These events are so localized and so rapid that a “flash flood warning” may not be issued, especially if no remote threat recognition equipment is available. In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

Severe Weather. The National Weather Service is the primary agency for detecting meteorological threats, such as tornadoes, thunderstorms and winter storms. Severe weather warnings are transmitted through NOAA’s Weather Radio System. As with floods, federal agencies can only look at the large scale, e.g., whether conditions are appropriate for the formation of a thunderstorm. Local emergency managers can provide more site-specific and timely recognition by sending out National Weather Service trained spotters to watch the skies when the Weather Service issues a watch or a warning.

Dam Failure. A key part of a dam safety program is for the emergency management office to be in touch with the operators of upstream dams. There should be periodic communication checks and clear criteria for when a dam appears threatened and when the community should notify downstream properties.

8.1.2 Local Implementation

The Seminole County Office of Emergency Management is responsible for performing technical work in the development, implementation, and management of countywide disaster response, recovery, mitigation, risk reduction, prevention, and preparedness for the County. Emergency Management provides countywide planning, training and exercise programs in order to be prepared for natural and human-caused emergencies.

Severe Weather: Seminole County recognizes impending thunderstorms through radar and reports from the National Weather Service.

Floods: The National Weather Service monitors six stream gages in Seminole County. It issues periodic updates of current river levels. For the gages it monitors, the National Weather Service

USGS Stream & Rainfall Gages in Seminole County

Little Econlockhatchee River at SR434 near Oviedo – Level & Flow

Econlockhatchee River near Oviedo – Level & Flow

Econlockhatchee River near Chuluota – Level & Flow

St. Johns River above Lark Harney near Geneva (CS Lee Park) – Level, Flow & Rainfall

Howell Creek near Altamonte Springs – Level & Flow

Howell Creek near Slavia – Level & Flow

Howell Creek at SR434 near Oviedo – Level & Flow

Soldier Creek near Longwood – Level & Flow

Gee Creek near Longwood – Level & Flow

Lake Jesup Outlet near Sanford – Level & Flow

St. Johns River near Sanford – Level & Flow

Little Wekiva River at SR434/ Woodbridge near Altamonte Springs – Level & Flow

Wekiva River near Sanford – Level & Flow

Lake Sylvan Park near Paola – Rainfall

can issue a specific prediction of when and how high a river will crest. Forecasts for the St. Johns River near Sanford are issued as needed during times of high water, but are not routinely available. River gage information is disseminated on the NOAA Weather Radio and is available to the public at <https://water.weather.gov/ahps/>.

On larger streams, the United States Geological Survey (USGS) operates stream and rain gages in cooperation with Seminole County and the St. Johns River Water Management District. The USGS provides stream stage and stream flow information for the thirteen (13) sites along with two (2) precipitation sites listed in the box above. Real-time stream gage readings for these sites can be accessed on the Internet at <http://waterdata.usgs.gov/fl/nwis/rt>. This site provides the current stream conditions.

The National Weather Service is able to issue a specific prediction of when and how high a river will crest.

Dam Failure. There are no dams in Seminole County, and dam failure is not considered a likely threat.

8.1.3 CRS Credit.

Credit can be received for using National Hurricane Center warnings and river flood stage predictions for the National Weather Service's gages. The actual score is based on how much of the community's floodplain is affected by these systems. A total of 75 points is possible under Activity 610 – Flood Warning Program.

8.2 Warning

After the threat recognition system tells the emergency management office that a flood, tornado, thunderstorm, hurricane or other hazard is coming, the next step is to notify the public, internal and external staff, and critical facilities. The earlier and the more specific the warning, the greater the number of people that can implement protective measures. The Emergency Alert/Warning Systems Operations Annex to the Comprehensive Emergency Management Plan (CEMP) outlines how the Office of Emergency Management will coordinate alerts and warnings to stakeholders and members of the public.

The National Weather Service issues notices to the public using two levels of notification:

Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms.

Warning: a flood, tornado, etc., has started or been observed.

A more specific warning may be disseminated to the public by the community in a variety of ways. The following are the more common methods:

- Email notifications
- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- NOAA Weather Radio

- Outdoor warning sirens
- Sirens on public safety vehicles
- Door-to-door contact

Multiple or redundant systems are most effective – if people do not hear one warning, they may still get the message from another part of the system. Each has advantages and disadvantages:

- Radio and television provide a lot of information, but people have to know when to turn them on. They are most appropriate for hazards that develop over more than a day, such as a tropical storm, hurricane, or winter storm.
- NOAA Weather Radio can provide short messages of any impending weather hazard or emergency and advise people to turn on their televisions for more information, but not everyone has a Weather Radio.
- Outdoor warning sirens can reach many people quickly as long as they are outdoors. They do not reach people in tightly-insulated buildings or those around loud noise, such as at a factory, during a thunderstorm, or in air conditioned homes. They do not explain what hazard is coming, but people should know to turn on a radio or television when they hear the siren.
- Where a threat has a longer lead time, going door-to-door and manual telephone trees can be effective.

NOAA Weather Radios

NOAA Weather Radio is a nationwide network of radio stations that broadcasts warnings, watches, forecasts and other hazard information 24 hours a day. For Seminole County, information comes from transmitters in Melbourne, Florida.

NOAA weather radios can be very effective for notifying people, businesses, schools, care facilities, etc. of weather threats. They have a monitoring feature that issues an alarm when activated by the Weather Service.

To program a new weather radio, the FIPS code for Seminole County is 012117. The channels that broadcast information for Seminole County are 162.4 Mhz (Channel 1) and 162.475 Mhz (Channel 4). You can also listen online, by visiting <https://www.weatherusa.net/radio>.

Just as important as issuing a warning is telling people what to do in case of an emergency. A warning program should have a public information aspect. Citizens should know the difference between a tornado warning (when they should seek shelter in a low spot), a flood warning (when they should stay out of low areas), and other appropriate warnings and responses.

8.2.1 StormReady

The National Weather Service established the StormReady program to help local governments improve the timeliness and effectiveness of hazardous weather related warnings for the public.



To be officially StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center,
- Have more than one way to receive severe weather warnings and forecasts and to alert the public,

- Create a system that monitors weather conditions locally,
- Promote the importance of public readiness through community seminars, and
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

Being designated a StormReady community by the National Weather Service is a good measure of a community's emergency warning program for weather hazards. It is also credited by the CRS.

8.2.2 Local Implementation

The Office of Emergency Management (OEM) coordinates emergency warning and notifications through a multimodal approach including, but not limited to, NOAA weather radios, Civil Emergency Messages, Emergency Broadcast System, Emergency Alert System, electronic text/media notification, cable interrupt, and reverse calling systems. The Florida Division of Emergency Management also funds a reverse calling system that can be used to send voice, text, and email notifications to residents based on geographic area. In Seminole County, this system is called Alert Seminole.

Alert Seminole is a way for Seminole County residents to sign up for emergency notifications from the Seminole County Emergency Management Agency. Notifications can be sent to a cell phone, pager, or email address.

Officials with the National Weather Service in Melbourne, Florida awarded Seminole County the designation of "StormReady." This nationwide program assesses the capability of a community to receive and disseminate severe weather information. The designation is only granted to those communities that have established a high degree of readiness for natural disasters such as hurricanes, tornadoes and floods.

8.2.3 CRS Credit

Community Rating System points are based on the number and types of warning media that can reach the community's floodprone population. Depending on the location, communities can receive up to 25 points for the telephone calling system and more points if there are additional measures, like telephone trees. Being designated as a StormReady community can provide 25 additional points. These credits are in Activity 610 – Flood Warning Program.

8.3 Response

The protection of life and property is the most important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

- Activating the emergency operations center (emergency management),
- Closing streets or bridges (sheriff's office or public works),
- Shutting off power to threatened areas (utility company),
- Passing out sandbags (public works),

- Holding children at school/releasing children from school (school superintendent),
- Opening evacuation shelters (emergency management/ School Board),
- Monitoring water levels (engineering), and
- Establishing security and other protection measures (police/sheriff).

An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given the various responsibilities.

Planning is best done with adequate data. One of the best tools is a map that shows which areas would be affected under different conditions. Even though Seminole County is not a coastal County, it may be beneficial to consider developing a map which directs residents to evacuate based on the different hurricane categories.

A flood stage forecast map shows areas that will be under water at various flood stages. Different flood levels are shown as color coded areas, so the emergency management agency can quickly see what will be affected. Emergency management staff can identify the number of properties flooded, which roads will be under water, which critical facilities will be affected, who to warn, etc. With this information, an advance plan can be prepared that shows problem sites and determines what resources will be needed to respond to the predicted flood level.

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to ensure that needed supplies and equipment are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and of changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner possible.

8.3.1 Local Implementation

The Seminole County Emergency Operations Center (EOC) is the central coordination point for disaster preparedness, training, response, and recovery efforts for the County. The purpose of the EOC is to provide a centralized and specialized location to communicate, organize and manage natural or human-caused disasters and make strategic decisions necessary to protect the residents and property of Seminole County.

The EOC is staffed with personnel and equipment necessary to properly manage significant events. The 3,525 square foot main room has two attached breakout rooms for amateur radio operations and Seminole Government Television (SGTV) communication. In addition, there are multiple EOC support rooms.

Seminole County's EOC is organized using the National Incident Management System (NIMS) guidelines, and is separated into Command and General Staff, 18 Emergency Support Functions (ESF), and the Municipal Branch. Each ESF, municipality, and partner organization, provide staffing to improve communication and coordination during emergencies.

To ensure all of the available information is transmitted into the EOC, the main room is equipped with audio-visual equipment, GIS mapping software, interoperable communications, traffic monitoring, satellite technology for redundant communications, and video cameras for live EOC

streaming during activations. The EOC is also equipped with a resource tracking system, known as WebEOC.

The integration of these data and communications systems provides an essential on-site decision-making platform plus an excellent training room. In the event of a large-scale disaster, the EOC is equipped with two backup generators, potable water, shower facilities, and dormitories.

8.3.2 CRS Credit

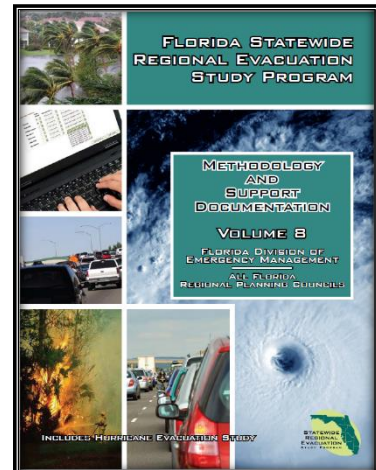
Up to 255 points of credit is available for a fully credited flood warning system. Credit is based on a variety of factors and is cumulative, which includes the previous credits mentioned.

8.4 Evacuation and Shelter

In an area subject to the tremendous forces that accompany hurricanes, evacuation is a prime life safety concern. Given the one to two days of lead time provided by the National Hurricane Center, evacuation on a large scale is a realistic lifesaving task. In other situations, such as a tornado, it is safer to keep people where they are rather than expose them to danger from an event that gives little warning.

According to *Emergency Management: Principles and Practice*, “The principle of evacuation is to move citizens from a place of relative danger to a place of relative safety, via a route that does not pose significant danger.” There are six key ingredients to a successful evacuation:

- Adequate warning
- Adequate routes
- Proper timing to ensure the routes are clear
- Traffic control
- Knowledgeable travelers
- Care for special populations (e.g., handicapped, prisoners, hospital patients, and schoolchildren)

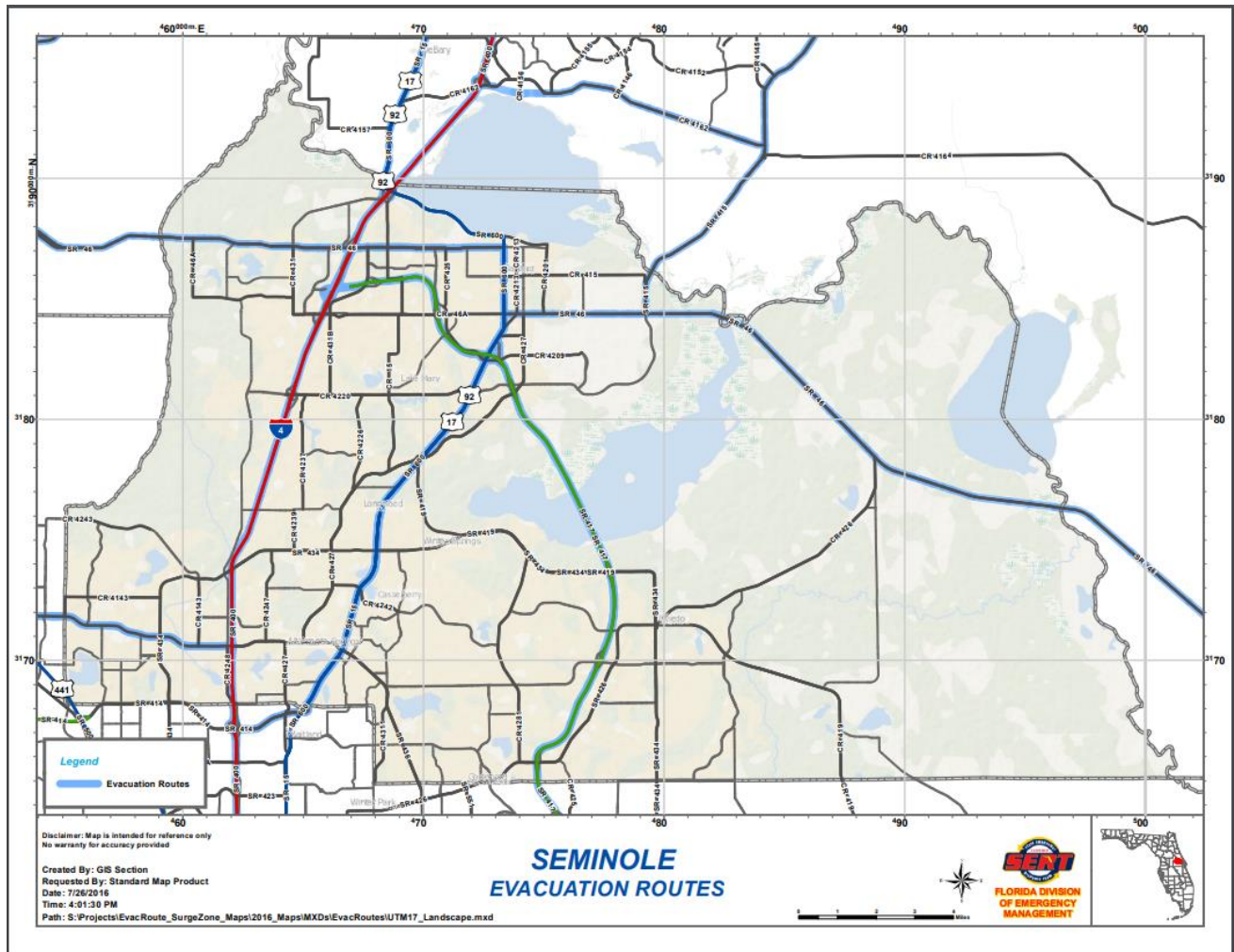


Those who cannot get out of harm’s way need shelter. For tropical storms, a stick-built house (not a mobile home) often suffices, but for hurricanes, something sturdier is required. That is why schools so often serve as shelters during a storm as well as a place for those who have lost their homes after the storm.

Seminole County and the School Board of Seminole County will staff a shelter and ensure that there is adequate food, bedding, and wash facilities. Shelter management is a specialized skill. Managers must deal with problems like scared children, families that want to bring their pets in, and the potential for an overcrowded facility.

8.4.1 Local Implementation

Evacuation routes for Seminole County are shown in the map below.

Figure 39: Seminole County Evacuation Routes

8.4.2 CRS Credit

Because it is primarily concerned with protecting insurable buildings, the CRS does not provide any special credit for evacuation or sheltering of people. It is assumed that the emergency response plan would include all necessary actions in response to a flood.

8.5 Post-Disaster Recovery and Mitigation

After a disaster, communities should undertake activities to protect public health and safety and facilitate recovery. Appropriate measures include:

- Patrolling evacuated areas to prevent looting,
- Providing safe drinking water,
- Monitoring for diseases,
- Vaccinating residents for tetanus and other diseases,

- Clearing streets, and
- Cleaning up debris and garbage.

Throughout the recovery phase, everyone wants to get “back to normal.” The problem is that “normal” means the way they were before the disaster, exposed to repeated damage from future disasters. There should be an effort to help prepare people and property for the next disaster. Such an effort would include:

- Public information activities to advise residents about mitigation measures they can incorporate into their reconstruction work,
- Evaluating damaged public facilities to identify mitigation measures that can be included during repairs,
- Identifying other mitigation measures that can lessen the impact of the next disaster,
- Acquiring substantially or repeatedly damaged properties from willing sellers,
- Planning for long-term mitigation activities, and
- Applying for post-disaster mitigation funds.

8.5.1 Regulating Reconstruction

Requiring permits for building repairs and conducting inspections are vital activities to ensure that damaged structures are safe for people to reenter and repair. There is a special requirement to do this in floodplains, regardless of the type of disaster or the cause of damage. The NFIP requires that local officials enforce the substantial damage regulations. These rules require that if the cost to repair a building in the mapped floodplain equals or exceeds 50% of the building’s market value, the building must be retrofitted to meet the standards of a new building in the floodplain. In most cases, this means that a substantially damaged building must be elevated above the base flood elevation.

This requirement can be very difficult for understaffed and overworked offices following a disaster. However, if these activities are not carried out properly, not only does the community miss a tremendous opportunity to redevelop or clear out a hazardous area, it may be violating its obligations under the NFIP. The sanctions for failure to properly enforce the floodplain reconstruction regulations are spelled out in Chapter 5 – Preventive Measures. In some areas, mutual aid agreements have been established so building inspectors from a community not affected by the disaster can work in the communities that were hit the hardest.

8.5.2 Local Implementation

The County’s Floodplain Management Ordinance includes the NFIP requirements for determining if a building is substantially damaged. The County’s practice is to wait until reconstruction applicants come to the County to request a permit. Repairs that are cosmetic only (for example, replacing flooring, cabinets and painting) do not need permits.

There are no special public information activities to tell people to apply for a permit. Residents interested in a mitigation project funded by the NFIP’s Increased Cost of Compliance do apply and request a substantial damage determination.

These practices could potentially permit substantially damaged properties to be repaired without inspection. These practices also mean that the County misses opportunities to inform disaster victims about property protection measures that they can incorporate during repairs.

8.5.3 CRS Credit

Seminole County should formally establish post-disaster mitigation polices outlined in this Plan in the section above.

8.6 Conclusions

1. There are several threat recognitions systems that can provide the County with advance notice of an impending emergency.
2. Additional stream and river gauges can help protect more residents in the County.
3. The *Seminole County Comprehensive Emergency Management Plan (CEMP) and Location Mitigation Strategy (LMS)* contain general guidance on responding to many different kinds of hazards. The CEMP also contains the Flood Response Annex. Such guidance could be very helpful when things happen quickly and for hazards that have predictable impacts, such as tropical storms and flooding.
4. The plans and guidance documents on post-disaster inspections and capitalizing on post-disaster mitigation opportunities are lacking. They also mean that the County could miss opportunities to advise people on property protection measures they can implement during repairs and reconstruction.

8.7 Recommendations

1. The *Seminole County CEMP and LMS* should be reviewed in detail to determine where improvements can be made and how to maximize credit under CRS. These plans should then be submitted for credit under CRS, and CRS will provide a critique of the plan to show what further improvements are needed.
2. The County should consider all possible local, state and federal funding options for installation of additional stream and river gauges to provide a higher level of protection to its residents.
3. The County should ensure that all steps are being taken to alleviate traffic jams during an evacuation of the county.
4. The County's emergency preparedness, public information, and permits staffs should work together to evaluate and revise post-disaster procedures for public information, reconstruction regulation and mitigation project identification.

8.8 References

1. *CRS Coordinator's Manual*, FEMA, 2017.
2. *CRS Credit for Flood Warning Programs*, FEMA, 2006.

3. *Emergency Management: Principles and Practice for Local Government*, International City/County Management Association, 1991.
4. *Flood Fight Operations*, FEMA, 1995.
5. *Guide for All-Hazard Emergency Operations Planning*, FEMA SLG-101, 1996.
6. https://www.weather.gov/nwr&ln_desc=NOAA+Weather+Radio/

9 Structural Project Measures

Flood control projects have traditionally been used by communities to control or manage floodwaters. They are also known as “structural” projects that keep flood waters away from an area as opposed to “non-structural” projects, like retrofitting, that do not rely on structures to control flows.

9.1 Flood Control Measures

Four general types of flood control projects are reviewed here: levees, weirs, reservoirs, diversions, and dredging. These projects have three advantages not provided by other mitigation measures:

- They can stop most flooding, protecting streets and landscaping in addition to buildings,
- Many projects can be built without disrupting citizens’ homes and businesses, and
- They are constructed and maintained by a government agency, a more dependable long-term management arrangement than depending on many individual private property owners.

However, as shown below, structural measures also have shortcomings. The appropriateness of using flood control depends on individual project area circumstances.

Pros and Cons of Structural Flood Control Projects

Advantages

They may provide the greatest amount of protection for land area used.

Because of land limitations, they may be the only practical solution in some circumstances.

They can incorporate other benefits into structural project design, such as water supply and recreational uses.

Regional detention may be more cost-efficient and effective than requiring numerous small detention basins.

Disadvantages

They can disturb the land and disrupt the natural water flows, often destroying wildlife habitat.

They require regular maintenance, which if neglected can have disastrous consequences.

They are built to a certain flood protection level that can be exceeded by larger floods, causing extensive damage.

They can create a false sense of security, as people protected by a project often believe no flood can ever reach them.

Although it may be unintended, in many circumstances they promote more intensive land use and development in the floodplain.

9.1.1 Levees, Weirs, and Floodwalls

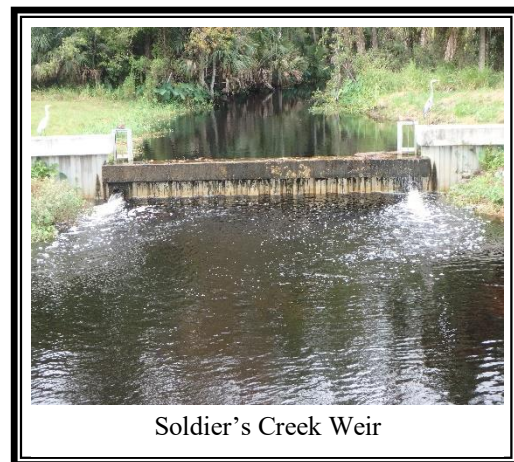
Probably the best known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected. Weirs are small dams built across a river to control the upstream water level. Weirs have been used for ages to

control the flow of water in streams, rivers, and other water bodies. Unlike large dams which create reservoirs, the goal of building a weir across a river isn't to create storage, but only to gain some control over the water level. Levees and floodwalls confine water to the stream channel by raising its banks. They must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour. Key considerations when evaluating the use of a levee include:

- Design and permitting costs,
- Right of way acquisition,
- Removal of fill to compensate for the floodwater storage that will be displaced by the levee,
- Internal drainage of surface flows from the area inside the levee,
- Cost of construction,
- Cost of maintenance,
- Mitigation of adverse impacts to wetlands and other habitats,
- Loss of river access and views, and
- Creating a false sense of security, because while levees may reduce flood damage for smaller more frequent rain events, they may also overtop or breach in extreme flood events and subsequently create more flood damage than would have occurred without the levee.

Levees placed along the river or stream edge degrade the aquatic habitat and water quality of the stream. They also are more likely to push floodwater onto other properties upstream or downstream. To reduce environmental impacts and provide multiple use benefits, a setback levee is the best project design. The area inside a setback levee can provide open space for recreational purposes and provide access sites to the river or stream. There are no levees currently within Seminole County.

During a flood, a weir may back up the water badly enough to cause damage upstream. Barriers across rivers may affect the aquatic environment. Weirs should be used with caution on flows with floating trash, debris, or high solids contents as sedimentation will occur upstream of the weir (raising the weir pool depth) and debris may cling to the crest of the weir. Weirs are used on several bodies of water within Seminole County including Soldier's Creek, Howell Creek, and Lake Sylvan.



Soldier's Creek Weir

Floodwalls perform like levees except they are vertical-sided structures that require less surface area for construction. Floodwalls are constructed of steel sheet pile or reinforced concrete, which makes the expense of installation cost prohibitive in many circumstances. Floodwalls also degrade adjacent habitat and can displace erosive energy to unprotected areas of shoreline

downstream. The City of Sanford Riverwalk includes a floodwall along Lake Monroe which protects the roadway and surrounding areas from flooding.

Seawalls are barriers or retaining walls that are built facing a large lake, ocean or the Gulf of Mexico. They are intended to protect the land from erosion by wave action. However, they often have an adverse impact on the shore and on neighboring properties and the movement of sand. The natural forces that transport sand and replenish beaches are disrupted by the wall, often increasing shoreline erosion on adjacent properties. Therefore, they are not encouraged and are even prohibited in many areas.

9.1.2 Reservoirs and Detention

Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower flood heights by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flood has subsided, then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.



Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created. The lake may provide recreational benefits or water supply (which could also help mitigate a drought).

Flood control reservoirs are most commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs, or detention basins, are built to protect property from the stormwater runoff impacts of new development.

Regardless of size, reservoirs protect the development that is downstream from the reservoir site. Unlike levees and channel modifications, they do not have to be built close to or disrupt the area to be protected. Reservoirs are most efficient in deeper valleys where there is more room to store water, or on smaller rivers where there is less water to be stored.

In urban areas, some reservoirs are simply manmade holes, excavated to store floodwaters. Reservoirs in urban areas are typically constructed adjacent to streams (though usually outside of the floodplain). When built in the ground, there is no dam for these retention and detention basins and no dam failure hazard. Wet or dry basins can also serve multiple uses by doubling as parks or other open space uses.

There are several considerations when evaluating use of reservoirs and detention:

- There is the threat of flooding the protected area should the reservoir's dam fail,
- There is a constant expense for management and maintenance of the facility,
- They may fail to prevent floods that exceed their design levels,
- Sediment deposition may occur and reduce the storage capacity over time,

- They can impact water quality as they are known to affect temperature, dissolved oxygen and nitrogen, and nutrient levels, and
- If not designed correctly, in-stream reservoirs may cause backwater flooding problems upstream.

9.1.3 Diversion

A diversion is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During floods, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river.

Diversions are limited by topography; they will not work in some areas. Unless the receiving water body is relatively close to the floodprone stream and the land in between is low and vacant, the cost of creating a diversion can be prohibitive.

9.1.4 Dredging

Dredging is often viewed as a form of conveyance improvement. However, it has the following problems:

- Given the large volume of water that comes downstream during a flood, removing a foot or two from the bottom of the channel will have little effect on flood heights.
- Dredging is often cost prohibitive because the dredged material must be disposed of somewhere.
- Unless in-stream or tributary erosion are corrected upstream, the dredged areas usually fill back in within a few years, and the process and the expense have to be repeated.
- If the channel has not been disturbed for many years, dredging will destroy the habitat that has developed.



To protect the natural values of the stream, federal law requires a U.S. Army Corps of Engineers permit before dredging can proceed. This can be a lengthy process that requires a lot of advance planning and many safeguards to protect habitats, which adds to the cost of the project.

9.1.5 Channelization

Channelization has traditionally been the common method for dealing with local drainage or flooding problems. Channelization involves straightening, deepening and /or widening a stream or river channel. With this approach, there are several concerns to keep in mind:

- Channelized streams can create or worsen flood problems downstream as larger amounts of water are transported at a faster rate.
- Channelized streams rise and fall faster. During dry



periods the water level in the channel is lower than it should be which creates water quality problems and degrades habitat.

- Channelized waterways tend to be unstable and experience more erosion. The need for periodic reconstruction and silt removal becomes cyclic, which makes channel maintenance very expensive.

On the other hand, properly sloped and planted channels are more aesthetically and environmentally appealing and can be cheaper to maintain.

9.1.6 CRS Credit

Structural flood control projects that provide 100-year flood protection and that result in revisions to the Flood Insurance Rate Map are not credited by the CRS in order to avoid duplicating the larger premium reduction provided by removing properties from the mapped floodplain.

The CRS credits smaller flood control projects that meet the following criteria:

- They must provide protection to at least the 25-year flood,
- They must meet certain environmental protection criteria,
- They must meet federal, state and local regulations, such as the Corps of Engineers' 404 permit and Florida dam safety rules, and
- They must meet certain maintenance requirements.

These criteria ensure that credited projects are well-planned and permitted. Any of the measures reviewed in this section would be recognized under Activity 530 – Flood Protection, although it would be very hard to qualify a dredging project. Credit points are based on the type of project, how many buildings are protected, and the level of flood protection provided.

9.1.7 Local Implementation

The County initiated a project on the Mullet Lake Road Stormwater Improvement Project to help provide a solution to stormwater and localized flooding in the St. Johns and Lake Harney Basins. This project in eastern Seminole County involves a drainage area of approximately 2,890 acres or 4.5 square miles. Residents within the Mullet Lake Park Road Basin experience both yard and structure flooding during greater than average rainfall events. The study defined the primary cause of flooding to be an inadequate conveyance system and accumulation of runoff from upstream areas which overload the current system. The study was completed in 2006 but the project is still in the beginning phases due to grant funding eligibility.

9.2 Conclusions

1. Continue to require onsite retention and detention facilities to manage runoff from sites to avoid overloading drainage systems. There is a benefit to ensuring that post-development runoff does not exceed pre-development conditions.
2. Consider the benefits of regional upper watershed retention and detention to help mitigate the amount of conveyance of downstream flows.

3. Levees and floodwalls don't appear to be practical solutions for the County as the areas in need of protection would require these structures to be located on private property. The constant maintenance of these facilities can be quite expensive.
4. Improvement to channels should be considered in terms of the immediate benefit for increased conveyance and the long-term cost of maintaining them.

9.3 Recommendations

1. The County should continue to require developers to provide on-site detention and retention to lessen the runoff from developed sites.
2. The County should consider the benefits of upper watershed regional detention as a way to reduce downstream flow. This approach could be combined with the preservation of open space of sensitive lands.
3. Continue to recommend and implement projects as a result of drainage and other studies conducted.

9.4 References

1. *CRS Coordinator's Manual*, FEMA, 2017.
2. *CRS Credit for Drainage System Maintenance*, FEMA, 2006.
3. *Kane County, IL Natural Hazards Mitigation Plan*, January, 2009
4. *Mullet Lake Park Road Stormwater Improvement Project*, Inwood Consulting Engineers, 2006

10 Public Information Measures

A successful hazard mitigation program involves both the public and private sectors. Public information activities advise property owners, renters, and businesses about hazards and ways to protect people and property from these hazards. These activities can motivate people to take the steps necessary to protect themselves and others.

Information can bring about voluntary mitigation activities at little or no cost to the government. Property owners mitigated their flooding problems long before government funding programs existed. The typical approach to delivering information involves two levels of activity. The first is to broadcast a short and simple version of the message to everyone potentially affected. The second level provides more detailed information to those who respond and want to learn more.

This chapter starts with activities that reach out to people and tell them to be advised of the hazards and some of the things they can do. It then covers additional sources of information for those who want to learn more. It ends with an overall public information strategy.

10.1 Outreach Projects

Outreach projects are the first step in the process of orienting property owners to the hazards they face and the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Research has shown that outreach projects work. However, awareness of the hazard is not enough; people need to be told what they can do about the hazard, so projects should include information on safety, health and property protection measures. Research has also shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

Community newsletters/direct mailings: The most effective types of outreach projects are mailed or distributed to everyone in the community. In the case of floods, they can be sent only to floodplain property owners.

News media: Local newspapers can be strong allies in efforts to inform the public. Press releases and story ideas may be all that's needed to whet their interest. After a flood in another community, people and the media become interested in their flood hazard and how to protect themselves and their property. Local radio stations and cable TV channels can also help. These media offer interview formats and local television stations may be willing to broadcast videos on the hazards.

Other approaches: Examples of other outreach projects include:

- Presentations at meetings of neighborhood, civic or business groups,
- Displays in public buildings or shopping malls,
- Signs in parks, along trails and on waterfronts that explain the natural features (such as the river) and their relation to the hazards (such as floods),
- Brochures available in municipal buildings and libraries, and
- Special meetings, workshops and seminars.

10.1.1 Local Implementation

There are several types of outreach projects implemented in Seminole County. The County's website features a page describing flood facts and flood safety measures. The County also distributes a brochure titled "A Guide to Flood Safety" to residents who attend outreach events. There is also a hurricane and storm information page on the County's website, which contains emergency information when a storm is threatening the area. In addition, news releases are posted to the County's website, which contain safety information related to natural hazards when appropriate. The County holds a Hurricane Expo and Touch a Truck event to disseminate information about hurricane safety and give residents tools to add to their hurricane kits such as flashlights and can openers. The County also advertises safety information on local billboards.

Finally, various brochures are available in the community at various departments such as in the Building Division to provide residents with flood safety and property protection advice.

10.1.2 CRS Credit

The Community Rating System provides up to 350 points for outreach projects on flood topics. Extra points are given for having a Program for Public Information.

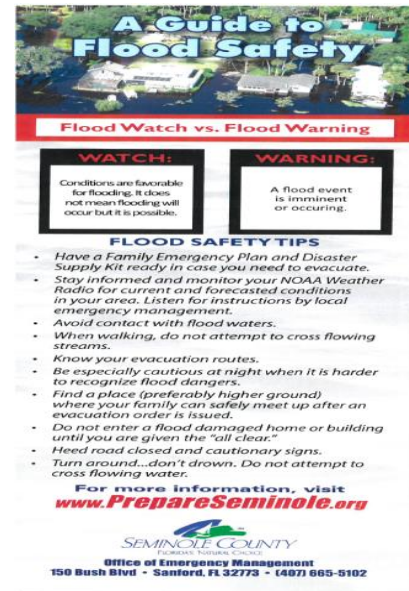
10.2 Real Estate Disclosure

Many times after a flood or other natural disaster, people say they would have taken steps to protect themselves if they had known they had purchased a property exposed to a hazard. There are some federal and state requirements about such disclosures, but they have their limits.

Federal law: Federally regulated lending institutions must advise applicants for a mortgage or other loan that is to be secured by an insurable building whether the property is in a floodplain as shown on the Flood Insurance Rate Map. If so, flood insurance is required for buildings located within the floodplain if the mortgage or loan is federally insured. However, because this requirement has to be met only 10 days before closing, the applicant is often already committed to purchasing the property when he or she first learns of the flood hazard.

State law: State laws set standards for real estate sales and licensing of agents and brokers. In addition, Florida has a natural hazards disclosure law, which requires the seller of real estate to give the buyer a document outlining whether the property is in an area prone to flooding, hurricanes or tornadoes. The shortcoming of such a law is that because of the sporadic nature of flooding, a property owner may legitimately not be aware of past or potential flooding problems.

Figure 45: Flood Safety Brochure Distributed to Residents during Outreach Events



10.2.1 Local Implementation

The County has one additional law related to natural hazard disclosure. The final plat for development plans must include the limits of the floodplain, indicating the flood elevation for the 100-year flood. This only provides information for developments that have been platted since the requirement went into effect and then only if the title search sees it and advises the buyer. The multiple listing service does not include a listing of whether a property is in a flood zone or wetland. Disclosure practices are left up to the individual broker or agent.

10.2.2 CRS Credit

Communities in Florida should be eligible for five points under the “Other disclosure requirements” for the state law requiring sellers to notify the buyer of natural hazards. Seminole County is eligible for 5 points for including the limits of the floodplain on all final plats.

10.3 Libraries and Websites

The two previous activities tell people that they are exposed to a hazard. The next step is to provide information to those who want to know more. The community library and local websites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources.

Books and pamphlets on hazard mitigation can be given to libraries, and many of these can be obtained for free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures and other projects, which can augment the activities of the local government. Today, websites are commonly used as research tools. They provide fast access to a wealth of public and private sites for information. Through links to other websites, there is almost no limit to the amount of up to date information that can be accessed online.

In addition to online floodplain maps, websites can link to information for homeowners on how to retrofit for tornadoes and floods or a website about floods for children. The “FEMA for Kids” website teaches children how to protect their home and what to have in a family disaster kit.

10.3.1 Local Implementation

A search of the Seminole County Library catalog on September 23, 2020 showed that the library has 36 publications about floods and 99 publications about hurricanes. The documents about floods represent a broad range of topics, from flood proofing construction guidance to a review of flood policies to a guide to reading flood maps.

The County’s website, www.prepareseminole.org, is kept updated with information on the County’s activities, including the mitigation planning process. FEMA’s floodplain maps for the County are available at <http://www.seminolecountyfl.gov/departments-services/development-services/building/flood-prone-areas/>.

10.3.2 CRS Credit

The Community Rating System provides up to 20 points for having a variety of flood references in the local public library and up to 77 more for similar material on municipal websites (Activity 350 – Flood Protection Information).

10.4 Technical Assistance

10.4.1 Hazard Information

Many benefits stem from providing map information to inquirers. Residents and business owners that are aware of the potential hazards can take steps to avoid problems or reduce their exposure to flooding. Real estate agents and house hunters can find out if a property is floodprone and whether flood insurance may be required.

Communities can easily provide map information from FEMA's Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is located outside the mapped floodplain.

Some communities supplement what is shown on the FIRM with information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never flood.

10.4.2 Property Protection Assistance

While general information provided by outreach projects or the library is beneficial, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track.

Building or public works department staffs can provide the following types of assistance:

- Visit properties and offer protection suggestions,
- Recommend or identify qualified or licensed contractors,
- Inspect homes for anchoring of roofing and the home to the foundation,
- Provide advice on protecting windows and garage doors from high winds, and
- Explain when building permits are needed for home improvements.

There is a concern that a local official might provide the wrong information and the community would be sued if a project failed. To counter this, there are guidelines for local programs and training on how to identify the right measures. FEMA conducts a free week-long course at its Emergency Management Institute on property protection measures for flooding. FEMA and the Corps of Engineers periodically conduct one- or two-day retrofitting workshops.

10.4.3 Local Implementation

FEMA floodplain maps are available on the County's website, as described above. The Building Division will also provide maps to anyone who requests them.

10.4.4 CRS Credit

The Community Rating System provides 140 points for providing map information to inquirers. Up to 71 points are available for providing one-on-one flood protection assistance to residents and businesses and for making site visits. Both services must be publicized.

10.5 Program for Public Information

The Program for Public Information is an ongoing public information effort to design and transmit the messages that the community determines are most important to its flood safety and the protection of its floodplains' natural functions. It is a review of local conditions, local public information needs, and a recommended plan of activities. A strategy should include the following elements:

- Assess the community's public information needs,
- Formulate messages,
- Identify outreach projects to convey the messages,
- Examine other public information initiatives,
- Prepare the Program for Public Information document and adopt the Program for Public Information,
- Implement, monitor, and evaluate the program.

10.5.1 Public Information Topics

At its 2020 meeting series, the FMPC reviewed the various public information activities currently underway with the goals of this Floodplain Management Plan in mind. The members of the FMPC discussed developing a formal Program for Public Information as a way to organize current outreach and information sharing activities. Partners such as faith-based organizations and homeowners' associations could be used to help spread information to as many residents as possible.

Flood Safety

Pay attention to evacuation orders. Listen to local radio or TV stations for forecasts and emergency warnings. Know about evacuation routes and nearby shelters and have plans for all family members on how to evacuate and where to meet if you're split up during an emergency.

Do not drive through a flooded area. During a flood, more people drown in their cars than anywhere else. Don't drive around road barriers; the road or bridge may be washed out.

Do not walk through flowing water. Flash flooding is the leading cause of weather-related deaths in the U.S. Currents can be deceptive; 6 inches of moving water can knock you off your feet in a strong current. If you walk in standing water, use a stick to help you locate the ground.

Stay away from power lines and electrical wires. Electrical currents can travel through water. Report downed power lines to the police or sheriff by calling 911.

Have the power company turn off your electricity. Some appliances, like TV sets, keep electrical charges even after they've been unplugged. Don't use appliances or motors that have gotten wet unless they have been taken apart, cleaned and dried.

Look before you step. After a flood, the ground and floors are covered with debris like broken bottles and nails. Floors and stairs that are covered with mud can also be slippery.

Be alert for gas leaks. Use a flashlight to inspect damage. Don't smoke or use candles, lanterns, or open flames unless you know the gas has been shut off and the area has been ventilated.

Look out for animals that may have been flooded out of their homes and who may seek shelter in yours. Use a pole or stick to turn things over and scare away small animals.

Carbon monoxide exhaust kills. Use a generator or other gasoline-powered machine outdoors. The same goes for camping stoves. Charcoal fumes are especially deadly – cook with charcoal outdoors.

Clean everything that got wet in the flood. Floodwaters have picked up sewage and chemicals from roads, farms, factories, and storage buildings. Spoiled food, and flooded cosmetics and medicines can be health hazards. When in doubt, throw it out.

Take care of yourself. Recovering from a flood is a big job. It is tough on both the body and the spirit and the effects a disaster has on you and your family may last a long time.

10.5.2 CRS Credit

The CRS provides 100 points for a public information program strategy. A mass mailing to all properties can earn up to 60 more points and can meet the publicity requirements to receive credit for several other activities.

10.6 Conclusions

1. There are many ways that public information can be used so that people and businesses will be more aware of the hazards they face and how they can protect themselves.
2. Many of the public information activities can be implemented by community staff. By creating and implementing a Program for Public Information, the County and its jurisdictions can earn additional credit points through the CRS.
3. Outreach projects, libraries, websites and the Hurricane Expo are currently being used as public information tools in Seminole County.
4. The most important topics to cover in public information activities are:
 - Safety precautions for all types of hazards, but especially storms, floods and fog.

Evacuation is recognized as the most important safety precaution for tropical storms and hurricanes.

- Flood protection measures, including rules for new construction and insurance.
- Keeping drainage ways clear and protection from local drainage problems.
- Family and emergency preparedness measures.
- County resources and programs.
- Protecting water quality and wetlands and the benefits of open space.

The most appropriate ways to spread this information are:

- Websites and social media
- Mailings to everyone, in utility bills or otherwise
- News releases or newspaper articles
- Newsletters
- Displays, particularly at special events such as the Hurricane Expo or Touch A Truck
- Handouts, flyers and other materials, which can be distributed at special events and presentations

10.7 Recommendations

1. The County should continue to increase its presence on social media, including Facebook and NextDoor, to maximize the number of people reached with flood hazard and safety information.
2. The County should continue to distribute brochures about hurricanes to those living in the mapped floodplain.
3. The County should continue to hold Hurricane Expo and Touch a Truck events.
4. Staff should reach out to homeowners' associations and faith-based organizations to help spread the word about flood hazards and safety measures.
5. The County should create and implement a multi-jurisdictional Program for Public Information (PPI) for credit under the CRS.

10.8 References

1. *Are You Ready? A Guide to Citizen Preparedness*, FEMA, 2002.
2. *CRS Coordinator's Manual*, Community Rating System, FEMA, 2017.
3. *CRS Credit for Outreach Projects*, FEMA, 2006.
4. "What is a Natural Hazard Disclosure?" from <http://www.wisegeek.com/what-is-a-natural-hazard-disclosure.htm>.

11 Revisions and Maintenance

The FMP will be housed in the in the Office of Emergency Management for Seminole County. The LMS Working Group meets on a quarterly basis at a minimum, as well as after times of natural disaster events, and any other time deemed appropriate by the Working Group Chairperson, to update and revise the FMP. The criteria used to evaluate the FMP document and activities should include, but not be limited to the following:

- Federal and/or State Requirements
- Changes in development trends and land use that could affect infrastructure
- Storms or other natural events that have altered Seminole County’s hazard areas
- Completion of existing mitigation projects and introduction of new goals
- Changes in policy, procedure or code
- Changes in building codes and practices
- Review of legislative actions that could affect funding of mitigation efforts
- Changes in Flood Insurance Rate Maps, National Flood Insurance Program, etc.

On an annual basis the Office of Emergency Management will generate a FMP progress report that will evaluate the successes or areas of improvement for the FMP. The report will be available to the public, as well as provided to all jurisdictional governing bodies. This annual report also satisfies the CRS program requirements for an annual report for the floodplain management plan. This will allow people to re-acquaint themselves with the FMP document and the processes that it identifies, so any recommendations, suggestions, and updates, can be properly reviewed and weighed for consistency with the direction of the FMP Committee.

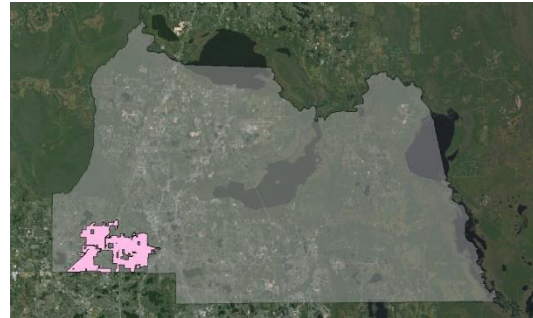
The plan is reviewed and adopted by the participating jurisdictions’ governing bodies every five years to ensure that the mitigation actions taken by their organizations are consistent with each community’s larger vision and goals, as well as their overall unique needs and circumstances. The adoption process includes instructing the jurisdictions’ agencies and organizations to continue to refine, expand and implement the plan.

Introduction

Overview

The City of Altamonte Springs was incorporated in 1920. It is located in the southern portion of Seminole County, bordered by Orange County to the south. The City of Winter Springs is to the east of Altamonte Springs, the City of Longwood is to the north, and unincorporated areas to the west of Altamonte Springs. Altamonte Springs currently covers 9.67 square miles. The current population is 45,304 people (Bureau of Economic and Business Research, 2020).

Figure 1. City of Altamonte Springs



Source: Seminole County GIS Dept

Involvement with the National Flood Insurance Program (NFIP)

Altamonte Springs became eligible for the National Flood Insurance Program's (NFIP) Community Rating System (CRS) on October 1, 1994. The CRS is a voluntary program for NFIP-participating communities. The goals of the CRS are to reduce flood losses, to facilitate accurate insurance rating, and to promote the awareness of flood insurance. The CRS was developed to encourage communities to go beyond the minimum NFIP requirements to further reduce flood losses. The incentives are in the form of premium discounts.

The City continues to participate in the CRS program and is currently ranked as a Class 7. With the Class 7 ranking, the discount percentage applied to insurance premiums for properties located in a Special Flood Hazard Area (SFHA) is 15%. The premium discount available to property owners not located in a SFHA is 5%.

Figure 2. Severe Weather



Risk Assessment

This section of the community profile assesses the potential of risk with respect to floodplain management in Altamonte Springs. Communities must address four components when assessing risk. They are identifying hazards, profiling hazard events, inventorying assets, and estimating losses. This process measures the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards by assessing the vulnerability of people, buildings, and infrastructure to natural hazards (FEMA). There are six categories that address the four components identified in risk assessment as defined through the Federal Emergency Management Agency (FEMA): identifying flood zones within the city, identifying surface water locations, identifying property value within each flood zone, identifying insurance statistics, identifying vulnerable populations, and identifying critical facilities.

FEMA Flood Zone

Figure 3. FEMA Flood Zone,
Percentage of Acreage for the City of Altamonte Springs, 2013,
Non-Submerged Acres

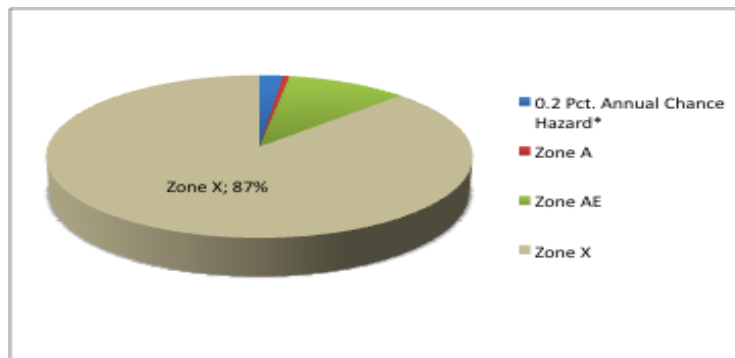


Figure 3 shows that the percentage of non-submerged acreage found in Altamonte Springs. Non-submerged acreage refers to land not inundated by surface water. Close to half of this category can be found in the northeast section of the city in the outlier sections of Cranes Roost Lake. The largest percentage of non-submerged acreage in Altamonte Spring is Flood Zone X accounting for 87.32%. The 0.2 percent Annual Chance Flood Hazard of the 100 Year Flood accounts for 1.95% of the total percentage of non-submerged acreage. Flood Zone A accounts for 0.46% of total percentage, the majority of this flood zone is located in the southern segment of Altamonte Springs. Flood Zone AE accounts for 10.26% of the total percentage of non-submerged acreage. This zone is found throughout the City.

Surface Water

Table 1. Percentage of Total Surface Water Within City Limits

<u>Surface Water Name</u>	<u>Percentage, %</u>
Lake Orienta	22.0
Prairie Lake	11.9
Spring Lake	3.3

SOURCE: Altamonte Springs GIS Dept.

There are 23 bodies of surface water located in Altamonte Springs. Surface water accounts for 6.0% of the total land make-up. Table 1 displays the three largest bodies of water and their percentage of total surface water in Altamonte Springs

All bodies of water are located in or within close proximity of the SFHA.

The vast majority of these lakes are closed basin lakes with no outlets. Rainfall causes closed basin lakes to rise faster than drain. The result is a variation in water elevation that can lead to flooding.

Lake Orienta is the City's largest surface water body accounting for 22.0% (81.55 acres within the City boundary). The lake is located in the southeast section of the City.

The second largest body of water is Prairie Lake at 11.9% of the total percentage of surface water. The location of this lake is on the City's eastern boundaries with the county.

The third largest lake is Spring Lake, the lake accounts for 3.3% of the total surface water in Altamonte Springs.

Figure 4. Lake Orienta, Aerial View



Figure 5. Prairie Lake



Source: Seminole County Water Atlas

Property Value

Table 2. Total Appraised Value by Flood Zone

Flood Zone	Total Appraised Value
0.2 % Chance	\$707,439,279.00
Zone A	\$147,944,633.00
Zone AE	\$486,338,721.00
Zone X	\$2,882,711,151.00
Total	\$4,224,433,784.00

SOURCE: Altamonte Springs GIS Dept.

Altamonte Springs has over \$4,224,433,784.00 in property and building value that could be at risk in the event of a flood hazard. The 0.2 Percent Annual Chance Flood Hazard of the 10-year flood contains 16.7% of the total appraised value. Flood Zone A contains 3.5% of the total appraised value. Flood Zone AE comprises 11.5% of the property value that could be exposed to risk. Flood Zone X accounts for 68.2% of the total property value.

Insurance Statistics

Table 3. Policy Statistics for the City of Altamonte Springs

Polices In-Force	Insurance In-Force Whole	Written Premium In-Force
525	\$127,187,000.00	\$273,571.00

Altamonte Springs has 525 insurance policies in force according to the Federal Emergency Management Agency. The total coverage amount for these insurance policies \$127,187,000.00 while the average premium paid for them was \$273,571.00.

Table 4. Loss Statistics for the City of Altamonte Springs

Total Number of Closed Losses	Total Payment for Closed Losses
85	\$1,102,251.00

Total property losses in Altamonte Springs are numbered at 85 properties since 1978. Total payments made to claimants since 1978 is \$1,102,251.00.

Vulnerable Population

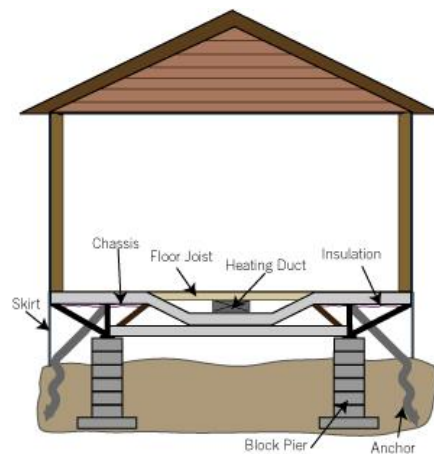
Vulnerable populations are those segments of the community considered to be most prone to risk in the time of a hazard. In Altamonte Springs, 14.4% of the population is over the age of 65 and 9% of the population has a disability. Most of the people who have a disability are over the age of 65.

Repetitive Loss Property

Repetitive Loss properties are defined as those properties that have been flooded on more than one occasion. Altamonte Springs has 3 repetitive loss property.

Manufactured Homes

Figure 6. Manufactured Home Foundations



Source: Livingwithmyhome.com

Chassis are the steel frames of manufactured homes. Block piers and anchors are building methods utilized to mitigate flood damage.

Altamonte Springs currently has no manufactured homes located within its boundaries. Manufactured homes located in the Special Flood Hazard Area (SFHA) would have to comply to mitigation regulations that reduce flood damage include elevating the foundation to one foot above the base flood elevation (BFE). Manufactured homes must also be anchored to a foundation system to prevent floatation or varying forms of movements.

Critical Facilities

Critical facilities are defined as those facilities that provide a critical function and should be protected from flood damage. Altamonte Springs has identified 21 critical facilities throughout its limits and the emergency function they provide in times of crisis. No facility is located in the SFHA.

Mitigation Measures

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters (FEMA). The policies adopted by Altamonte Springs work to achieve these objectives and prevent flood damage. This community profile analyzes mitigation policies including Future Land Use, Environmental Efforts, Stormwater Management, and Building Practices all identified through the City’s Comprehensive Plan and Land Development Code. Altamonte Springs is an active member of the Local Mitigation Strategy and works to make sure all plans are up to date.

Future Land Use

An analysis of the Future Land Use Map by Flood Zone for the City of Altamonte Springs is aggregated below by percentage of total acreage in the specified flood zone. This analysis reflects the potential hazards that come with planning for growth in flood prone areas.

Table 5. 0.2 Percent Annual Chance Flood Hazard by Future Land Use (FLU)

Altamonte Springs Future Land Use	Percentage, %
Conservation	0.55
Industrial	0.57
Institutional	2.51
Low Density Residential	26.37
Medium Density Residential	21.00
Office/Residential	0.78
RBC Core East	41.63
RBC Core West	3.04
Regional Business Center	2.76
West Town Center	0.79

SOURCE: Altamonte Springs GIS Dept.

In Altamonte Springs, 41.63% of the total percentage of acreage for the 0.2 Percent Annual Chance Hazard of the 100-year flood is planned for Regional Business Center Core East. Regional Business Centers and Town Centers are a variation of mixed-use districts. The second largest future land use for the zone is Low Density Residential at 26.37%. Medium Density Residential developments account for 21.00%. Institutional composes 2.51 of the total future land use for this flood zone.

Table 6. Flood Zone A by Future Land Use (FLU)

Altamonte Springs Future Land Use	Percentage, %
Gateway Center	94.66
Industrial	1.75
Medium Density Residential	3.58

SOURCE: Altamonte Springs GIS Dept.

In Flood Zone A 94.66% of all future land use is planned for the Gateway Activity Center. This future land use is a variation of a mixed-use district. The remaining future uses are Medium Density Residential Development at 3.58%. Industrial comprises 1.75% of the total.

Table 7. Flood Zone AE by Future Land Use (FLU)

Altamonte Springs Future Land Use	Percentage, %
Commercial/Office	3.08
Conservation	21.85
East Town Center	2.03
Gateway Center	10.85
Industrial	0.21
Institutional	5.46
Low Density Residential	25.20
Medium Density Residential	17.16
Office/Residential	0.56
RBC Core East	10.39
RBC Core West	1.52
Regional Business Center	0.80
West Town Center	0.88

SOURCE: Altamonte Springs GIS Dept.

In Altamonte Springs, 25.20% of the total future land use for Flood Zone AE is identified as Low Density Residential. Conservation comprises 21.85% of the total make-up. Medium Density Residential also has a notable percentage of the total acreage in this zone at 17.16%. The Regional Business Center Core East and Gateway Activity Center account for 10.39% and 10.85%, respectively. Institutional makes up 5.46% of the total percentage of acres. Commercial and Office is 3.08% and Regional Business Center Core West is 1.52% of the total percentage of acreage. East Town Center and Regional Business Center Activity Center are 2.03% and 0.80%, respectively, of the total

Altamonte Springs Floodplain Management Profile

percentage of acreage. Office and Residential and West Town Center complete the remaining future land use of this zone with 0.56% and 0.88%, respectively.

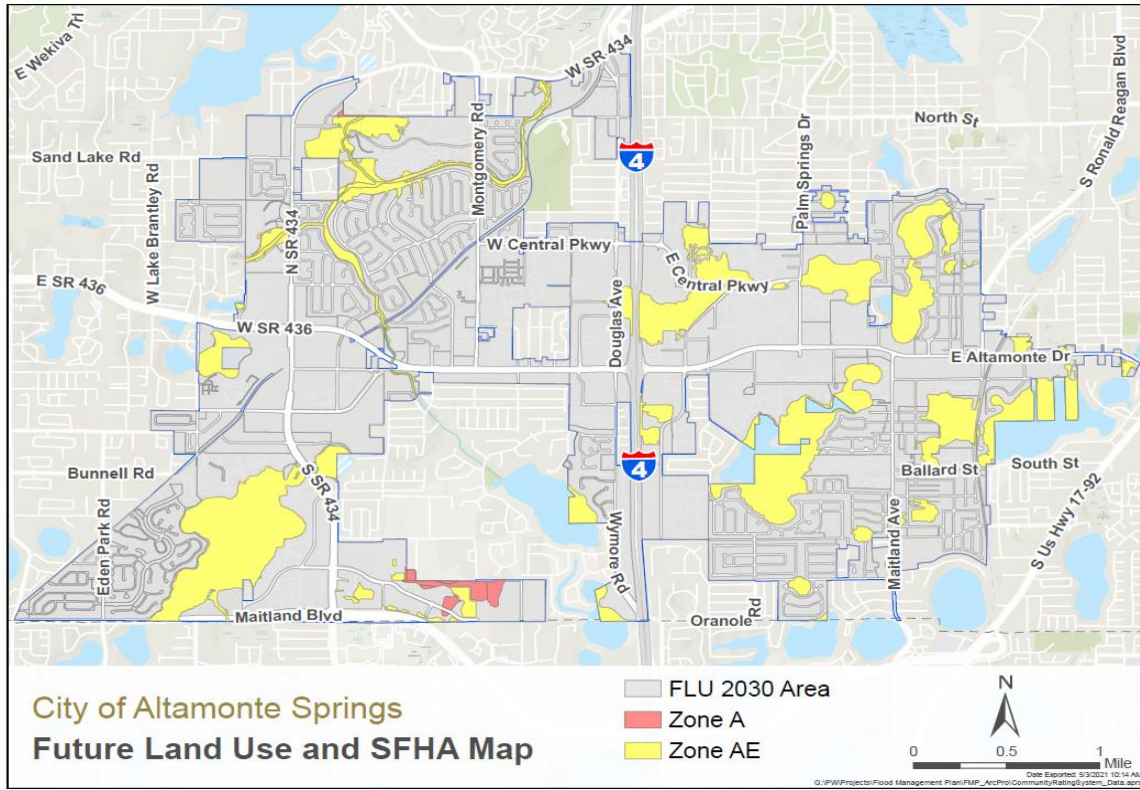
Table 8. Flood Zone X by Future Land Use (FLU)

Altamonte Springs Future Land Use	Percentage, %
Commercial/Office	4.49
Conservation	0.83
East Town Center	3.23
Gateway Center	7.92
Industrial	2.32
Institutional	3.11
Low Density Residential	31.30
Medium Density Residential	12.63
Office/Residential	1.85
RBC Core East	6.88
RBC Core West	4.64
Regional Business Center	10.49
Right of Way	1.75
Right of Way - Rail	0.26
West Town Center	8.30

SOURCE: Altamonte
Springs GIS Dept.

In Flood Zone X, 31.30% of the total percentage of acreage is classified as Low Density Residential. The second most planned use in this flood zone is Medium Density Residential at 12.63%. Regional Business Activity Center is 10.49%, and West Town Center and Gateway Activity Center at 8.30% and 7.92%, respectively, of the total percentage of acreage. Regional Business Center Core East and West make up 6.88% and 4.64% of the total acreage. Commercial and Office comprises 4.49% and East Town Center is 3.23%. Industrial, Office and Residential, and Conservation have future land uses for Flood Zone X with 2.32%, 1.85%, and 0.83%, respectively.

Figure 7. Future Land Use and Special Flood Hazard Areas (SFHA)



Environmental Efforts

Environmental policies are a means to which a municipality values its natural heritage. Best management practices in Floodplain Management mitigation include preserving natural areas located in floodplains or directing open space/ recreation uses towards them.

Altamonte Springs has committed itself to the protection of wetlands. The City enforces Flood Hazard Avoidance Regulations and conserves wetlands where habitats act as wildlife corridors. Wetlands act as a natural mitigation measure in mitigating flood damage.

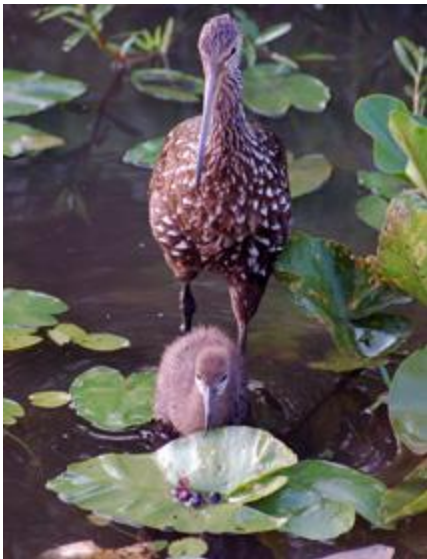
Erosion and Sedimentation Control

The City of Altamonte Springs is working on plans to improve the basin for the Little Wekiva River.

Along the Little Wekiva River, certain areas are prone to soil erosion. The City of Altamonte Springs in coordination with Seminole County, Orange County, and the SJRWMD implemented several erosion and sedimentation control project along the Little Wekiva River identified in the Little Wekiva River Master Plan.

After Hurricane Irma, Altamonte Springs applied for the Emergency Watershed Protection grant from the USDA Natural Resources Conservation Service to remove fallen trees and debris and to install erosion control countermeasures in 8 locations along the Little Wekiva River between S.R. 436 and S.R. 434.

Figure 8. Wetland Protection



Altamonte Springs protects wetlands because they act as a natural mitigation measure.

Figure 9. Wetland Protection



Area along the Little Wekiva River Basin where soil erosion is visible.

Stormwater Management

Stormwater management practices are an essential component in mitigating flood damage. Policies enacted at the municipal level are essential in controlling stormwater runoff and minimizing damage on property.

The City of Altamonte Springs has established regulations in the City's many LOS standards for stormwater quality and quantity.

There are currently 584 stormwater ponds (81 public and 503 private) as well as many other facilities such as pump stations, roadside drainage, and control structures.

The City protects wetlands so there is also a natural drainage system in the area. The City also adheres to best management practices that reduce run-off and improve water quality. Altamonte Springs is currently working to update its stormwater master plan, written in 1995 and last revised in 2002. This is because of the ongoing development and growth in the City as well as the changes that have occurred in last 20 years.

Figure 10. Stormwater Pond



Stormwater pond located in Altamonte Springs.

Building Practices

Building Practices are essential in mitigating flood damage to structures located in flood prone zones. There are different practices that help protect property and citizens. The City of Altamonte Springs is currently working to adopt a variation of the State Model Floodplain ordinance that incorporates recent changes to the Florida Building Code. This will be presented to the City Commission for adoption in June 2021. Altamonte Springs mandates

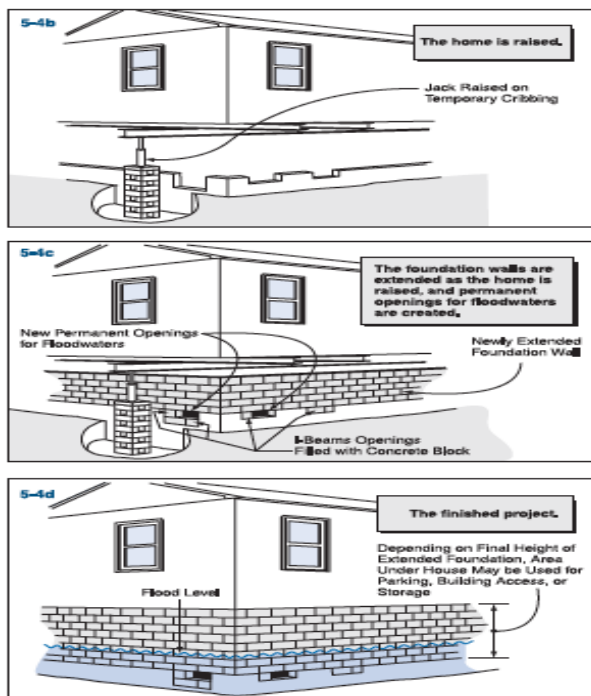
that new residential construction, new non-residential construction, and substantial improvement/damage to existing structures should have their lowest floor, including basement, elevated to at least one-foot above the base flood elevation (BFE).

Buildings where there is an enclosed area below the lowest floor elevation are required to be designed for the entry and exit of floodwater. Dry floodproofing techniques such as these reduce damage from flooding while allowing waters to enter the structure.

Most forms of development in the floodway are prohibited unless certification by a professional engineer is issued stating that the development will result in no increase in flood levels.

Standards for subdivisions are required to build utilities that minimize flood damage and must provide adequate drainage.

Figure 11. Home elevation



Home elevation is a dry floodproofing technique that reduces damage from flooding by allowing water to enter the structure.

Altamonte Springs Floodplain Management Profile

Responsible party Deadline

Altamonte Springs

Goal 1: Update the City's floodplain ordinance in accordance with Florida Department of Emergency Management requirements. (June 2021)

Objective 1.1 – Adopt revisions to City ordinance.

Objective 1.2 – Include higher standards in floodplain ordinance and conform to the State's Model Ordinance.

Goal 2: Maintain the condition of the City's MS4 to reduce flooding. (Continuously)

Objective 2.1 – Perform ongoing maintenance and repair of City's MS4.

Objective 2.2 – Repair MS4 facilities as necessary and in a timely manner.

Goal 3: Update the City's Stormwater Master Plan. (December 2023)

Objective 3.1 – Perform a thorough drainage inventory of public and private stormwater systems in the City, including refine basin delineations.

Objective 3.2 – Qualitatively assess historical flooding along the Little Wekiva River, lakes and other major water bodies within the City using best available information to include but not limited to: surveyed high water marks; lake level records; photographs of flooding; repetitive loss records; flood elevations predicted by drainage studies; new and more accurate topography; etc.

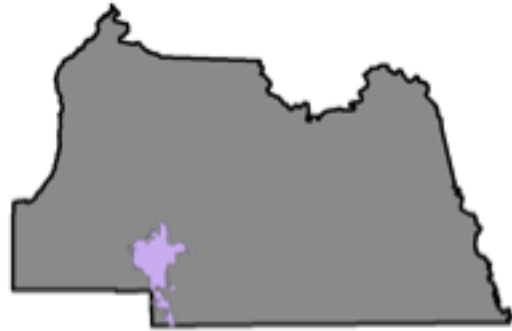
Objective 3.3 – Refine the limits of existing flood hazards based on more accurate topographic information, also convert several Zone "A" SFHAs to Zone "AE" SFHAs.

Introduction

Overview

The City of Casselberry was incorporated in 1940 in Seminole County. It is located in the southern portion of the county east of the Cities of Longwood and Altamonte Springs and to the west of Winter Spring. Casselberry covers 7.5 square miles. The city's population is 30,035.

Figure 1. City of Casselberry



Source: Seminole County GIS

Involvement with the National Flood Insurance Program (NFIP)

Casselberry has been participating in the Community Rating System (CRS) program since 2019 and awarded class 8 since. It also has a history with the National Flood Insurance Program's (NFIP).

Figure 2. National Flood Insurance Program

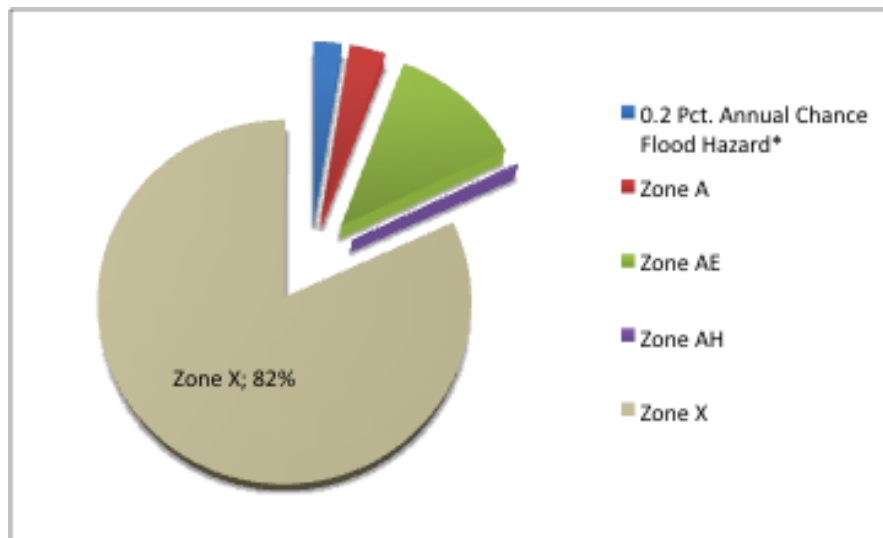


Risk Assessment

Communities must address four components when assessing risk. They are identifying hazards, profiling hazard events, inventorying assets, and estimating loss. This process measures the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards by assessing the vulnerability of people, buildings, and infrastructure to natural hazards (FEMA). This section of the community profile assesses the potential of risk with respect to floodplain management in Casselberry. There are six categories that address the four components identified in risk assessment as defined through the Federal Emergency Management Agency (FEMA): identifying flood zones within the city, surface water locations, property value within each flood zone, insurance statistics, vulnerable populations, and critical facilities.

FEMA Flood Zones

Figure 3. FEMA Flood Zone, Percentage of Acreage for the City of Casselberry, 2013, Non-Submerged Acres



*of the 100 Year Flood

Figure 3 shows that the percentage of non-submerged acreage found in the 0.2 percent Annual Chance Flood Hazard of the 100 Year Floodplain; 0.5%. Non-submerged acreage refers to land not inundated by surface water. The largest quantity of the acreage is found in the northern portion of the city by Lake Kathryn and along the flood way situated towards Gee Creek Flood Zone A accounts for 3.31% of the floodplain total. Flood Zone AE comprises 12.13% of the city's total non-submerged acreage, Zone AH accounts for 0.31% and Zone X covers 82%.

Surface Water

Table 1. Percentage of Total Surface Water

Surface Water Name	Percentage, %
Total Surface Water	15.9
Lake Howell	49.1
Lake Kathryn	9.1
Middle Lake Triplet	5.4

Source: Seminole County GIS Dept.

Figure 4. Lake Howell



Source: Seminole County Water Atlas

There are 39 bodies of surface water located in Casselberry. Surface water accounts for 15.9% of the total land make-up. Table 1 displays the three largest bodies of water and their percentage of total surface water in Casselberry.

All bodies of water are located in or within close proximity of the Special Flood Hazard Area (SFHA).

Lake Howell is the largest body of water, accounting for 49.1 % of the total percentage of surface water. It is located in the southeast section of the city and the boundaries are shared with Seminole County.

Figure 5. Lake Kathryn



Source: Seminole County Water Atlas

The second largest body of water is Lake Kathryn comprising 9.1% of the total percentage of surface water. The lake is located in the northern portion of the city.

Middle Lake Triplet is located the central section of the city and spans 5.4% of the total percentage of surface water.

Property Value

Table 2. Total Appraised Value by Flood Zone, 2021

Flood Zone	Total Appraised Value
0.2 Pct. Annual Chance Flood Hazard*	\$131,477,884
Zone A	\$100,548,561
Zone AE	\$348,423,613
Zone AH	\$1,494,766
Zone X	\$1,715,803,100
Grand Total	\$2,297,747,924

*of the 100 Year Flood

Source: City of Casselberry GIS

Casselberry has over two billion dollars of appraised property value that could be vulnerable to flood risk damage. The largest property value is found in Flood Zone X where 75% of the city's total property value is found. Flood Zone AE contains the second largest appraised value that could be vulnerable to flood risk damage at 15% of the total value of Casselberry. There is close to \$250 million dollars of property value at risk in the remaining flood zones.

Flood Insurance

Table 3. Policy Statistics for the City of Casselberry, as of 11/02/2020

Policies in-Force	Insurance in-Force Whole	Written Premiums in-Force
286	\$69,901,100	\$182,690

Source: FEMA

Casselberry has 286 insurance policies in force according to the Federal Emergency Management Agency. The total coverage amount for these insurance policies is \$69,901,100 while the premium paid for them is \$182,690

Table 4. Loss Statistics for the City of Casselberry, as of 11/02/2020

Closed Paid Losses	Total Payments
30	\$126,385.16

Source: FEMA

Total losses that had been paid in full in Casselberry accounted for 30 claims and total payments made to claimants since 1978 is numbered at \$126,385.16.

Vulnerable Population

Vulnerable populations are those segments of the community who are considered to be most prone to risk in the time of hazard. In Casselberry, 15.1% of the population is over the age of 65.

Repetitive Loss Property

Repetitive Loss properties are defined as those properties that have been flooded on more than one occasion. Casselberry does not have repetitive loss properties. In the event that properties do begin to meet that criteria then there are buy out programs that can be initiated to purchase the property. These measures protect residents from harm and remove development from the floodplain (Schwab, 2014).

Manufactured Homes

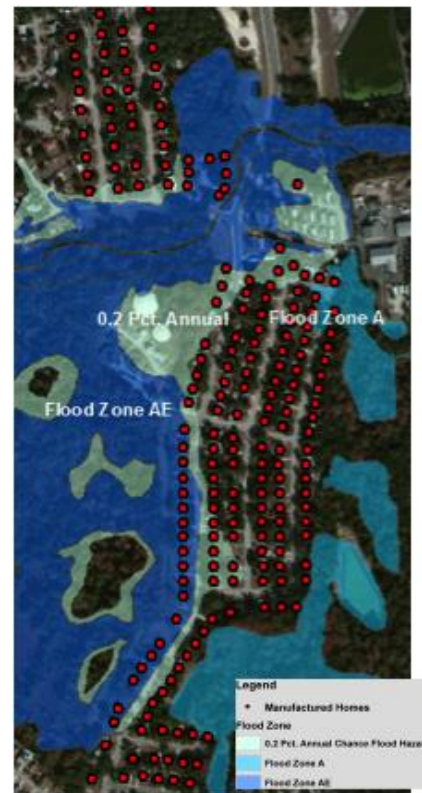
There are over one thousand manufactured homes located in Casselberry.

The two largest communities are Summerloch Green (formerly known as Lake Kathryn Park) and Seminole Speedway. While the vast majority of these manufactured homes are located in Flood Zone X, there are a considerable number of ones that are not.

Casselberry restricts manufactured home placement to existing manufactured parks homes or subdivisions. The city's land development code regulates standards for manufactured homes.

New or substantially improved manufactured homes in the Special Flood Hazard Area (SFHA) are required to elevate the lowest floor on a permanent foundation to no lower than one foot above the base flood elevation and must be properly anchored to resist flotation, collapse or any form of movement. Drainage paths around structures are also required to be designed to guide water away from manufactured homes.

Figure 6. Selected Manufactured Homes in Floodplain Hazard



Critical Facilities

Critical facilities are defined as those facilities that provide a critical function and should be protected from flood damage. Seminole County has identified four critical facilities throughout Casselberry and the emergency function they provide in times of crisis. No facility is located in the Special Flood Hazard Area (SFHA).

Mitigation Measures

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters (FEMA). The policies adopted by Casselberry work to achieve these objectives and prevent flood damage. This community profile analyzes mitigation policies including Future Land Use, Environmental Efforts, Stormwater Management, and Building Practices all identified through the city's Comprehensive Plan and Land Development Code. Casselberry is an active member of the Local Mitigation Strategy and works to make sure all plans are up to date.

Future Land Use

An analysis of the Future Land Use Map by Flood Zone for the City of Casselberry is aggregated below. This analysis reflects the hazards that come with developing in flood prone areas.

Table 5. 0.2 Percent Annual Chance Flood Hazard* by Future Land Use (FLU), 2021

Casselberry Future Land Use	Percentage of Acres, %
0.2 Pct. Annual Chance Flood Hazard*	2.47
LDR- Low Density Residential	44.27
MDR- Medium Density Residential	35.15
REC- Recreation/Open Space	8.28
COMM- Commercial	5.48
PUB- Public Service	3.87
IND- Industrial	2.72
HDR- High Density Residential	0.23

*of the 100 Year Flood

Source: City of Casselberry GIS

In Casselberry 44.27% of the total Future Land Use in the 0.2 Percent Annual Chance Flood Hazard is planned for Low Density Residential. Medium Density Residential accounts for 35.15% of the total future land use. Recreation and Open Space makes up 8.28%. The remaining uses account for about 12% of the total make-up.

Table 6. Flood Zone A by Future Land Use (FLU), 2021

Casselberry Future Land Use	Percentage of Acres, %
Flood Zone A	2.92
MDR- Medium Density Residential	37.97
LINR- Low Density Non-Res/Medium Density Res.	23.42
REC- Recreation/Open Space	17.26
LDR- Low Density Residential	10.81
PUB- Public Service	9.44
IND- Industrial	1.11

Source: City of Casselberry GIS

A third of Flood Zone A is planned for Medium Density Residential. The next largest future planned use is for Low- Density Non- Residential/ Medium Density Residential at 23.42%. Recreation and Open Space is the third largest future land use in the zone at 17.26%. Low- Density Residential future is also a notable make- up of the zone with 10.81%. The Future Land Use indicates that the city has planned residential units for over 70% of Flood Zone A. The remaining uses account for close to 30% of the total future make- up.

Table 7. Flood Zone AE by Future Land Use (FLU), 2021

Casselberry Future Land Use	Percentage of Acres, %
Flood Zone AE	14.34
LDR- Low Density Residential	52.91
REC- Recreation/Open Space	18.01
MDR- Medium Density Residential	15.75
COMM- Commercial	4.01
PUB- Public Service	3.26
LINR- Low Density Non-Res/Medium Density Res.	3.20
HDR- High Density Residential	2.13
IND- Industrial	0.47
HINR- High Density Non-Res/Medium Density Res.	0.27

Source: City of Casselberry GIS

The largest Future Land Use category in Flood Zone AE is Low Density Residential at 52.91%. Recreation and Open Space accounts for 18.01% of the total acreage followed by Medium Density Residential at 15.75%. The following most notable future uses include Commercial at 4.01%, Public Service at 3.26% and Low Density Non- Res/ Medium Density Residential at 3.20%. The remaining future uses account for close to 3% of the total of acreage.

Table 8. Flood Zone AH by Future Land Use (FLU), 2021

Casselberry Future Land Use	Percentage of Acres, %
Flood Zone AH	0.10
COMM- Commercial	58.45
LINR- Low Density Non-Res/Medium Density Res.	30.96
LDR- Low Density Residential	9.85
MDR- Medium Density Residential	0.73

Source: City of Casselberry GIS

The largest Future Land Use category in the Flood Zone AH is Commercial at 58.45%. The second largest future use is Low- Density Non- Residential/ Medium Density Residential at 30.96%. The remaining uses account for close to 10% of the total percentage of acres.

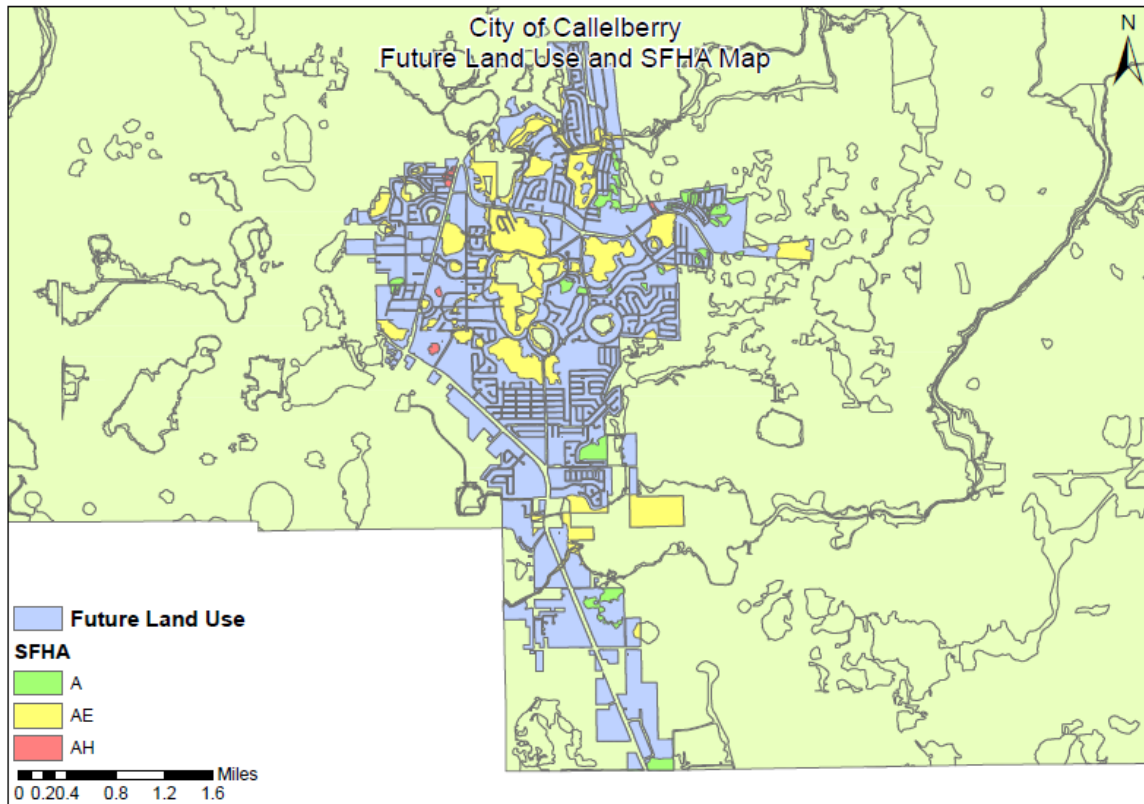
Table 9. Flood Zone X by Future Land Use (FLU), 2021

Casselberry Future Land Use	Percentage of Acres, %
Flood Zone X	63.20
LDR- Low Density Residential	46.30
MDR- Medium Density Residential	24.42
COMM- Commercial	8.43
LINR- Low Density Non-Res/Medium Density Res.	4.96
PUB- Public Service	4.89
REC- Recreation/Open Space	4.56
IND- Industrial	3.70
HDR- High Density Residential	2.25
HINR- High Density Non-Res/Medium Density Res.	0.50

Source: City of Casselberry GIS

Low Density Residential comprises 46.30% of Flood Zone X. The next largest future uses are Medium Density Residential 24.42% and Commercial future use accounts for 8.43%. Low Density Non- Residential/ Medium Density Residential future use accounts for 4.96% followed by Public Service at 4.89% and Recreation and Open Space at 4.56%. The remaining future uses account for about 6% of the total percentage of acres.

Figure 7. Land Use and Special Flood Hazard Areas (SFHA)



Environmental Efforts

Environmental policies are a means to which a municipality values its natural heritage. Best practices in Floodplain Management mitigation include preserving natural areas located in floodplains or directing open space/recreation uses towards them.

Casselberry's policies require that natural functions of wetlands and floodplains be protected. Land use restrictions have been implemented on the specific use of floodplains. These include, limits on natural vegetation removal, limitations on intensities and densities of development, and restrictions on fill placement in floodplains.

Erosion and Sedimentation Control

The city's comprehensive plan sets objectives to protect minerals, soils and vegetation. These policies protect bodies of water and wetlands from siltation.

Best management practices have been identified to control erosion and restrictions on clearing of sites prior to development.

Sediment controls include temporary and permanent sodding and seeding, sediment basins and rock dams, silt fences, and vegetative buffers.

These practices help reduce harmful pollutants in stormwater runoff from the construction site.

Figure 8. Wetland Protection



Casselberry has identified Wetland Protection as a policy in which to help mitigate against flood damage.

Figure 9. Sediment Basins



Sediment Basins are temporary ponds built on construction sites to capture eroded or disturbed soils. Casselberry requires this sedimentation practice.

Stormwater Management

Stormwater management practices are an essential component in mitigating flood damage. Policies enacted at the municipal level are essential in controlling stormwater run-off to create minimal damage impact on property.

In 2017, Casselberry adopted Stormwater and Lake Management master plan. This plan guides stormwater management for the city and identifies stormwater policies that are integral in maintaining a quality system.

Casselberry is committed to protecting water resources and maintaining the natural drainage systems and watercourses.

The city also adheres to best management practices that reduce run-off and improve water quality.

Casselberry's objectives are met by implementing policies such as dry retention/ detention facilities, wet detention/ retention facilities and promoting techniques such as low-impact development, which adheres to pre- development hydrologic conditions.



Dry Detention/ Detention facilities are used to drain between rainfall events.

Figure 11. Low Impact Development



Source: Lowimpactdevelopment.org.

Low Impact Development is a form of development that adheres to pre-development conditions. Examples include green roofs and permeable surfaces.

Building Practices

Building Practices are essential in mitigating flood damage to structures located in flood prone zones. There are different practices that help protect property and citizens.

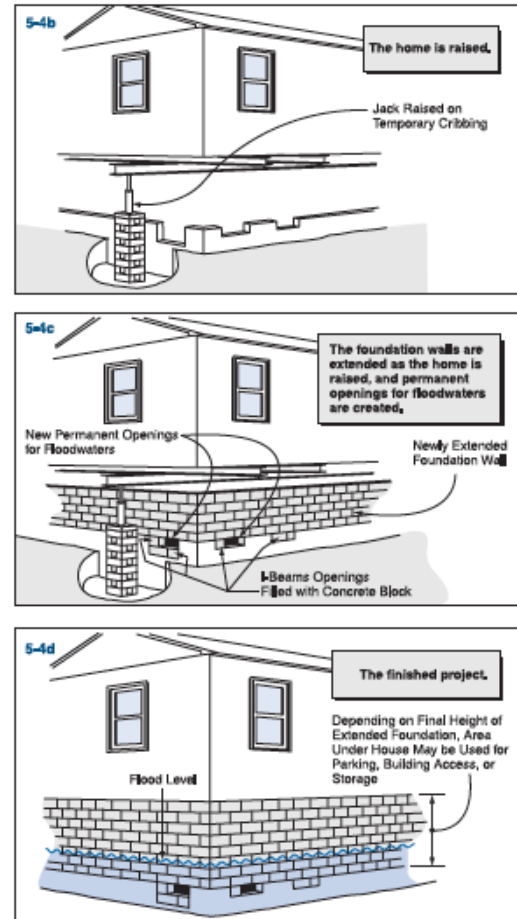
Casselberry mandates that new residential and non-residential construction or substantial improvements to existing ones should have their lowest floor including basement elevated to at a foot above the base flood elevation (BFE).

Buildings where there is an enclosed area below the lowest floor elevation are required to be designed for the entry and exit of floodwater. Dry floodproofing techniques such as these reduce damage from flooding while allowing waters to enter the structure.

Most forms of development in the floodway are prohibited unless certification is by a professional engineer is issued stating that the development will result in no increase in flood levels.

Standards for subdivisions are required to build utilities that minimize flood damage and must provide adequate drainage.

Figure 12. Home Elevation



Source: FEMA

Home elevation is a dry floodproofing technique that reduces damage from flooding by allowing water to enter the structure.

City of Casselberry Floodplain Management Goals, Objectives, & Action Items

Goal 1: Improve City's GIS web viewer and outreach programs.

Objective 1.1 Improve City's online maps to provide property owners easy access to flood related data.

Objective 1.2 Implement annual outreach public meetings and educational events to educate insurance agents and property owners the availability of flood related data from the City.

Action Item 1.1 *Pursuant to Objective 1.1, rebuild the GIS web viewer to provide floodplain zones, elevation certificates and other flood related information with regular updates.*

Responsible Party: City of Casselberry Public Works and IT Departments

Timeline: Continuously

Goal 2: Implement digital or paper system that improve access, quality, and/or ease of updating flood data within the community.

Objective 2.1 Maintain benchmark files and provide access of the data to surveyors.

Objective 2.2 Maintain building elevation database and update regularly using as-built or survey data.

Objective 2.3 Update the latest FEMA floodplain map to reflect approved LOMCs within the community.

Goal 3: Implement and improve flood protection to help mitigate flood risk.

Objective 3.1 Ensure that the peak flow and volume of stormwater runoff from each site will be no greater than the runoff from the site before it was developed or redeveloped.

Action Item 3.1 *Regulate development by implementing routine stormwater model check during the process of reviewing engineering permit.*

Responsible Party: City of Casselberry Public Works

Timeline: Continuously

Goal 4: Maintain and improve the City's drainage infrastructure to help mitigate flood risk, where feasible, sustainable, and appropriate in context.

Objective 2.1 Continue and, where feasible, improve routine maintenance of the City's key drainage infrastructure components, such as major pipes, ditches, and key control structures.

Objective 2.2 Strengthen the "no dumping" regulations

Objective 2.3 Identify, evaluation, and implement (where feasible) potential capital improvement projects to help mitigate flood risk.

Action Item 2.1 Pursuant to Objective 2.1, perform an inventory update for key components of the City's drainage infrastructure in the City's GIS (Geographic Information System).

Responsible Party: City of Casselberry Public Works Department

Timeline: Continuously

Action Item 2.2 Complete (through adoption) an Illicit Discharge Ordinance

Responsible Party: City of Casselberry Public Works Department

Timeline: Complete adoption by December 31, 2022

Action Item 2.3 Construct an emergency overflow for Lake Lotus to help reduce flood risk.

Responsible Party: City of Casselberry Public Works Department

Timeline: Complete construction by January 31, 2022

Introduction

Overview

The City of Lake Mary was incorporated in 1973 in Seminole County. It is located in the northern section of the county, with the city of Sanford located to the north and east, the city of Longwood to the south, and unincorporated areas to its west. Lake Mary covers 9.16 square miles. The city's population is 13,822.

Figure 1. City of Lake Mary



Source: Seminole County GIS

Involvement with the National Flood Insurance Program (NFIP)

Lake Mary became eligible for the National Flood Insurance Program's (NFIP) Community Rating System (CRS) on October 1, 2009. The municipality currently ranks as a class five, receiving 2,500-2,999 Credit Points (cT) during its classification.

The discount percentage for properties found in the Special Flood Hazard (SFHA) is twenty-five percent while the percent discount for non Special Flood Hazard Area (SFHA) properties is ten percent. The city's participation in the program is listed as current.

Figure 2. National Flood Insurance Program



Source: Seminole County GIS

Risk Assessment

Communities must address four components when assessing risk. They are identifying hazards, profiling hazard events, inventorying assets, and estimating loss. This process measures the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards by assessing the vulnerability of people, buildings, and infrastructure to natural hazards (FEMA). This section of the community profile assesses the potential of risk with respect to floodplain management in Lake Mary. There are six categories that address the four components identified in risk assessment as defined through the Federal Emergency Management Agency (FEMA): identifying flood zones within the city, surface water locations, property value within each flood zone, insurance statistics, vulnerable populations, and critical facilities.

Figure 3. FEMA Flood Zone, Percentage of Acreage for the City of Lake Mary, 2013, Non-Submerged Acres

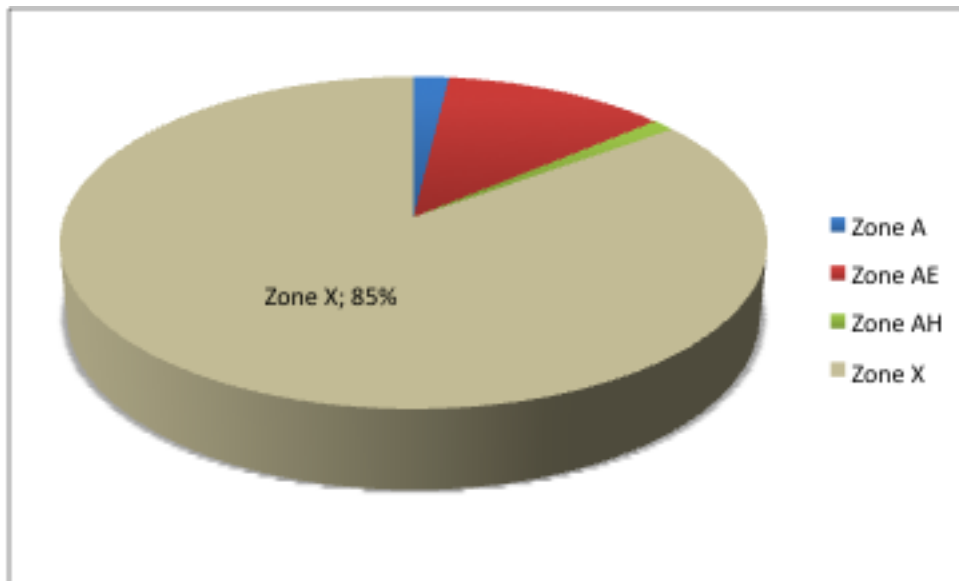


Figure 3 shows that the percentage of non-submerged acreage found in Lake Mary. Flood Zone A accounts for 1.65% of the total percentage of non-submerged acres. Non-submerged acreage refers to land not inundated by surface water. Flood Zone AE accounts for 12.16% of the total percentage of acres and AH accounts for 1.18%. Flood Zone X accounts 85.01% of the total percentage of non-submerged acres found in the Lake Mary.

Surface Water

Table 1. Percentage of Total Surface Water

<u>Surface Water Name</u>	<u>Percentage, %</u>
Total Surface Water	9.48%
West Crystal Lake	35.15%
Big Lake Mary	16.23%
East Crystal Lake	11.59%

Source: City of Lake Mary PW Dept.

There are 28 bodies of surface water located in Lake Mary. Surface water accounts for 9.48 % of the total land make- up. Table 1 displays the three largest bodies of water and their percentage of total surface water in the city boundaries.

All bodies of water are located in or within close proximity of the Special Flood Hazard Area (SFHA).

The vast majority of these lakes are closed basin lakes with no outlets. Rainfall causes closed basin lakes to rise faster than drain. The result is a variation in water elevation that can lead to flooding.

The largest body of surface water is West Crystal Lake accounting for 35.15% of the total surface water. The lake is located in the Special Flood Hazard Area (SFHA).

The second largest body of surface water is Big Lake Mary comprising 16.23% of the total surface water.

East Crystal Lake is 11.59% of the total surface water in Lake Mary.

Figure 4. West Crystal Lake



Source: Seminole County Water Atlas

Figure 5. East Crystal Lake, Aerial View



Source: Seminole County Water Atlas

Property Value

Table 2. Total Appraised Value by Flood Zone, 2020

FLOOD ZONE	TOTAL JUST VALUE
A	11,120,705
AE	100,246,545
AH	6,965,235
X (0.2 Pct. Annual Chance Flood Hazard)	1,609,836
X (Area of Minimal Flood Hazard)	3,317,689,026
	3,437,631,347

Lake Mary has \$3,437,631,347 dollars in property value that could be exposed to flood damage. 97% of the appraised value is found in Flood Zone X. Flood Zone AE has 2.9%, and Flood Zones A, AH, and X (0.2 percent annual chance flood hazard) each have under one percent of the total appraised value found in Lake Mary.

Insurance Statistics

Table 3. Policy Statistics for the City of Lake Mary, as of 8/21/2020

Policies in-Force	Insurance in-Force Whole	Written Premiums in-Force
244	\$75,652,400	\$111,396

Source: FEMA

Lake Mary has 290 policies in force according to the Federal Emergency Management Agency. The total amount coverage for these insurance policies \$81,821,200, while the premium paid for them was \$141,009.

Table 4. Loss Statistics for the City of Lake Mary, as of 8/21/2020

Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
13	2	0	11	\$3,016

Source: FEMA

Total property losses in Lake Mary are numbered at 13 properties since 1978. Losses that had been paid in full were accounted for 2 claims and losses that had been closed without payment (CWOP) was numbered at 11. There were no losses that had not been paid in full (Open Losses). Total payments made to claimants since 1978 is \$3,015.68.

Vulnerable Population

Vulnerable populations are those segments of the community who are Considered to be most prone to risk in the time of hazard. 21.0% of the population is over the age of 65.

Repetitive Loss Property

Repetitive Loss properties are defined as those properties that have been flooded on more than one occasion. Lake Mary does not have repetitive loss properties.

In the event that properties do begin to meet that criteria then there are buy out programs that can be initiated to purchase the property. These measures protect residents from harm and remove development from the floodplain (Schwab, 2014).

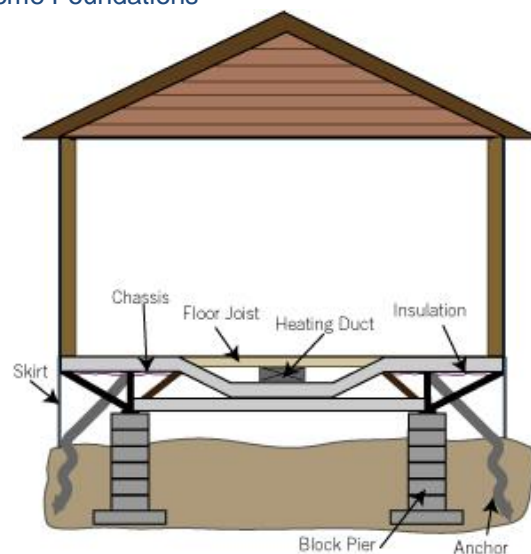
Manufactured Homes

Lake Mary is limited in the number of manufactured homes located throughout its boundaries.

For those manufactured homes located in the Special Flood Hazard (SFHA) mitigation policies that reduce flood damage include elevating the foundation to or at above the base flood elevation (BFE).

Manufactured homes must also be anchored to a foundation system to prevent floatation or varying forms of movements.

Figure 6. Manufactured Home Foundations



Chassis are the steel frames of manufactured homes. Block piers and anchors are building methods utilized to mitigate flood damage.

Critical Facilities

Critical facilities are defined as those facilities that provide a critical function and should be protected from flood damage. Seminole County has identified 16 critical facilities throughout Lake Mary and the emergency function they provide in times of crisis. No facility is located in the Special Flood Hazard Area (SFHA).

Mitigation Measures

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters (FEMA). The policies adopted by Lake Mary work to achieve these objectives and prevent flood damage. This community profile analyzes mitigation policies including Future Land Use, Environmental Efforts, Stormwater Management, and Building Practices all identified through the city’s Comprehensive Plan and Land Development Code. Lake Mary is an active member of the Local Mitigation Strategy and works to make sure all plans are up to date.

Future Land Use

An analysis of the Future Land Use Map by Flood Zone for the City of Lake Mary is aggregated below by percentage of total acreage in the flood zone. This analysis reflects the potential hazards that come with planning for growth in flood prone areas.

Table 5. Flood Zone A by Future Land Use (FLU), 2020

Lake Mary Future Land Use	Percentage of Acres, %
Flood Zone A	1.65
LDR- Low Density Residential	22.69
COM- Commercial	13.39
REC- Recreation	13.08
IND- Industrial	11.89
PUB- Public/ Semi- Public	9.18
HIPTI- High Intensity Planned Development	6.71
RCOM- Restricted Commercial	6.45
HTM- High Tech & Medical	6.23
HDR- High Density Residential	4.29
DDD- Downtown Development District	3.34
OFF- Office	1.62
MDR- Medium Density Residential	1.57
RR- Rural Residential	0.87
LMDR- Low/ Medium Density Residential	0.05

Source: City of Lake Mary PW Dept.

Low Density Residential is the largest future planned use for Flood Zone A with 22.69% of the total percentage of acreage. The second largest planned use is Commercial at 13.39%. Recreation comprises 13.08% and Industrial consists of 11.89% of the total percentage acreage. Public and Semi Public is 9.18% and High Intensity Planned Development is 6.71%. Restricted Commercial and High Tech & Medical are 6.45% and 6.23%. The remaining future uses account for 7.44% of the flood zone.

Table 5. Flood Zone AE by Future Land Use (FLU), 2020

Lake Mary Future Land Use	Percentage of Acres, %
Flood Zone AE	12.16
LDR- Low Density Residential	33.90
RR- Rural Residential	25.33
REC- Recreation	15.79
LMDR- Low/ Medium Density Residential	9.90
MDR- Medium Density Residential	5.85
COM- Commercial	3.65
PUB- Public/ Semi- Public	3.37
HTM- High Tech & Medical	0.85
DDD- Downtown Development District	0.66
IND- Industrial	0.44
OFF- Office	0.22
HDR- High Density Residential	0.06

Source: City of Lake Mary PW Dept.

Low Density Residential accounts for 33.90% of the total percentage of acreage in Flood Zone AE. Rural Residential comprises 25.33% of future land use. Recreation is planned for 15.79% of the flood zone. Low/ Medium Density Residential accounts for 9.90% of the planned future use in Lake Mary. Medium Residential use makes up 5.85%; Commercial is 3.65%. The remaining categories account for the last 5.59% of the future land use in Lake Mary.

Table 6. Flood Zone AH by Future Land Use (FLU), 2020

Lake Mary Future Land Use	Percentage of Acres, %
Flood Zone AH	1.18
LDR- Low Density Residential	75.16
IND- Industrial	18.44
MUMT- Mixed-Use Mid-Town	3.05
PUB- Public/ Semi- Public	2.30
COM- Commercial	0.99
RCOM- Restricted Commercial	0.06

Source: City of Lake Mary PW Dept.

Flood Zone AH is dominated by Low Density Residential future use at 75.16% of the total percentage of acreage. The next largest category is Industrial at 18.44%. Mixed-Use Mid-Town comprises of 3.05% of the planned future use. Public/ Semi- Public accounts for 2.30% of future land use. Commercial and Restricted Commercial compete the future make- up with 0.99% and 0.06%.

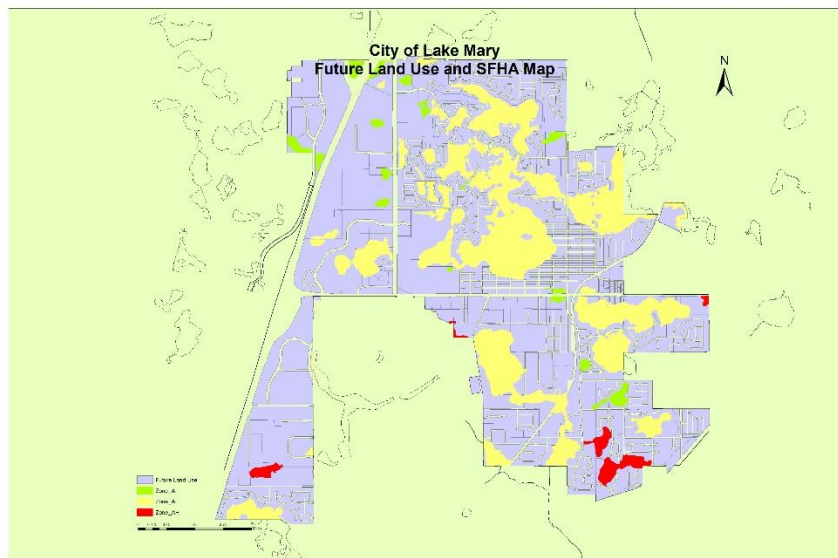
Table 6. Flood Zone X by Future Land Use (FLU), 2020

Lake Mary Future Land Use	Percentage of Acres, %
Flood Zone X	85.01
LDR- Low Density Residential	34.91
IND- Industrial	11.77
COM- Commercial	11.34
LMDR- Low/ Medium Density Residential	8.56
RR- Rural Residential	6.73
MDR- Medium Density Residential	6.30
REC- Recreation	4.43
PUB- Public/ Semi- Public	3.79
HTM- High Tech & Medical	3.11
HDR- High Density Residential	2.23
DDD- Downtown Development District	1.90
RCOM- Restricted Commercial	1.75
HIPTI- High Intensity Planned Development	1.65
OFF- Office	0.83
MUMT- Mixed-Use Mid-Town	0.71

Source: City of Lake Mary PW Dept.

In Lake Mary Low Density Residential accounts for 34.91% of the total percentage of acreage in Flood Zone X. The next largest future land use category is Industrial with 11.77%. Commercial accounts for 11.34% of the total future land use in Flood Zone X. Low/ Medium Density Residential accounts for 8.56% and Rural Residential is 6.73% of the total make- up. Medium Density Residential, Recreation and Public/Semi Public account for 6.30%, 4.43% and 3.79%. High Tech & Medical is 3.11% of the total percentage of acreage for Flood Zone X. The remaining future land uses account for 9.06% of the total make- up.

Figure 7. Future Land Use and Special Flood Hazard Areas (SFHA)



Environmental Efforts

Environmental policies are a means to which a municipality values its natural heritage. Best practices in Floodplain Management mitigation include preserving natural areas located in floodplains or directing open space/recreation uses towards them.

Lake Mary has multiple policies to protect the shorelines, flood hazard areas, watercourses, and natural wetlands to help create natural flood mitigation.

By doing this, Lake Mary believes they can minimize flood damage, keep a stable tax base, and minimize the amount of future projects needed to protect against floods. The city abides to the requirements set in the Tile 44 Code.

Erosion and Sedimentation

The city's comprehensive plan sets objectives to protect minerals, soils and vegetation. These policies protect bodies of water and wetlands from siltation.

The City of Lake Mary tries to manage dredging, mining, paving, grading, filling, and drilling to protect against erosion in the city.

Stormwater Management

Stormwater management practices are an essential component in mitigating flood damage. Policies enacted at the municipal level are essential in controlling stormwater run-off to create minimal damage impact on property.

Lake Mary has plenty of retention ponds and drainage facilities to manage run-off.

Figure 8. Wetlands in Lake Mary



Figure 9. Shore erosion in Lake Mary



Recently, Lake Mary raised stormwater fees to make sure the fund doesn't dry up and money is set aside to fix drains and other facilities.

Building Practices

Building Practices are essential in mitigating flood damage to structures located in flood prone zones. There are different practices that help protect property and citizens

Lake Mary mandates that new residential and non-residential construction or substantial improvements to existing ones should have their lowest finished floor including basement elevated to at a foot and a half above the base flood elevation (BFE).

In areas delineated on the FIRM and base flood elevation (BFE), Flood Plain Administrators must follow certain steps. They must try to find any flood data from state and federal governments. When information can't be found, the structure must be built three and a half feet above the tallest adjacent ground.

When a developer wants to build in a regulatory floodway, an analysis must take place in order to prove the base flood elevation (BFE) won't rise.

Structures must be built to minimize or eliminate flood damage. There must be enough drainage to reduce flooding.

Figure 10. House elevation



This house in Lake Mary that has been built above the base flood elevation (BFE). As you can see, the house has been built on stilts to keep it from flooding, a common technique of dry floodproofing.

Goal 1: Develop policies and regulation to support effective floodplain management.

Objective 1.1- Develop and enforce land use policies, plans and regulations to discourage or prohibit inappropriate location of structures or infrastructure components in areas of high risk to flooding

Objective 1.2- Participate fully in the National Flood Insurance Program and the associated Community Rating System.

Objective 1.3- Develop and enforce building and land development codes that are effective in addressing the flooding hazards threatening the community.

Objective 1.4- Establish and enforce regulations to ensure that public and private property maintenance is consistent with minimizing vulnerabilities to flooding.

Goal 2: Work in conjunction with the County and other local governments to create and support floodplain management throughout the county.

Objective 2.1- Participate fully in the countywide Floodplain Management Plan and associated Floodplain Management Team working group.

Objective 2.2- Coordinate with the County and other local government agencies to develop and administer outreach programs to gain participation in mitigation programs by business, industry, institutions and community groups.

Objective 2.3- Comply with interagency agreements and collaborate with the County and other local governments to improve multi-jurisdiction / multi-agency coordination

Introduction

Overview

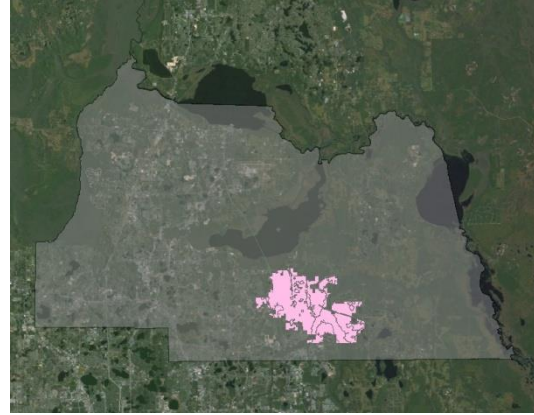
The City of Oviedo was incorporated in 1925 in Seminole County, FL. It is located in the southern portion of the county, bordered by Orange County to the south, the City of Winter Springs to the west and rural unincorporated Seminole County to the north and east. The city currently covers 16 square miles. The current population is 40,021 people.

Involvement with the National Flood Insurance Program (NFIP)

Oviedo became eligible for the National Flood Insurance Program's (NFIP) Community Rating System (CRS) on October 1, 2008.

The municipality is currently ranked in class six. Class six implies that Oviedo received 2,000- 2,499 Credit Points (cT) during its classification. The discount percentage for Special Flood Hazard Areas (SFHA) is 20% while the percent discount for non-Special Flood Hazard Area (SFHA) is 10%. This classification within the NFIP is held until May 1, 2024.

Figure 1. City of Oviedo



Source: Seminole County GIS Department

Figure 2. Flood Damage



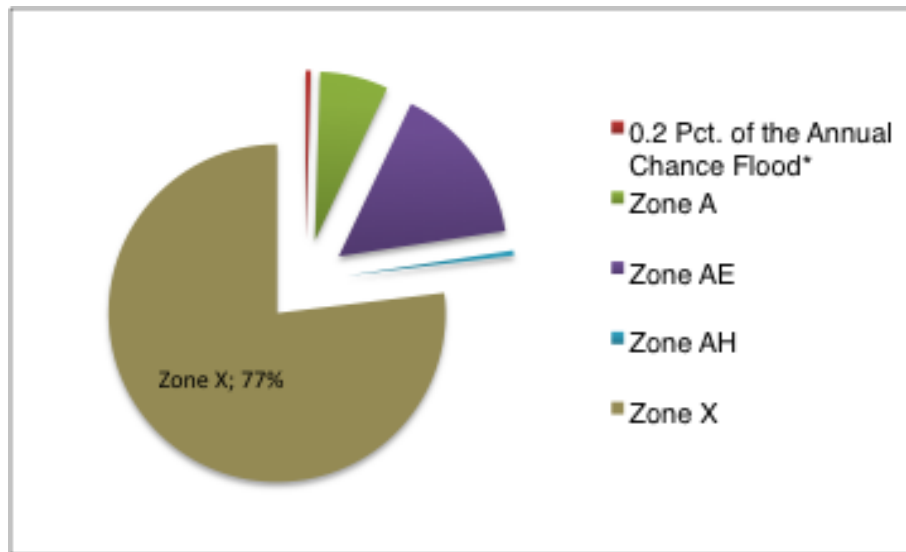
Source: City of Oviedo

Risk Assessment

Communities must address four components when assessing risk. They are identifying hazards, profiling hazard events, inventorying assets, and estimating loss. This process measures the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards by assessing the vulnerability of people, buildings, and infrastructure to natural hazards (FEMA). This section of the community profile assesses the potential of risk with respect to floodplain management in Oviedo. There are six categories that address the four components identified in risk assessment as defined through the Federal Emergency Management Agency (FEMA): identifying flood zones within the city, surface water locations, property value within each flood zone, insurance statistics, vulnerable populations, and critical facilities.

FEMA Flood Zones

Figure 3. FEMA Flood Zone, Percentage of Acreage for the City of Oviedo, 2013, Non-Submerged Acres



Source: Seminole County GIS Dept.

*of the 100 Year Flood

Figure 3 shows that the percentage of non-submerged acreage found in the 0.2 percent Annual Chance Flood of the 100 Year Floodplain; 0.06%. Non-submerged acreage refers to land not inundated by surface water. The largest quantity of that acreage is found in the southeast corner of the city on the edges of Horse Shoe Lake, with over five acres. Flood Zone A accounts for 6.52% acres of the municipality. Over 200 acres of this zone is located in the southwest corner and the second largest allocation of Flood Zone A accounts for over 190 acres located in the southeast portion in proximity to Horse Shoe Lake. Flood Zone AE accounts for over 15.57% of the total. Over 88% of Flood Zone AE is found in the floodway running in tandem with the Little Econlockhatchee and Econlockhatchee River. Flood Zone AH accounts for 0.49% of the total acreage. Flood Zone X has moderate to minimal risk of flooding and accounts for over 77% of the total acreage of Oviedo.

Surface Water

Table 1. Percentage of Total Surface Water

Surface Water Name	Percentage, %
Econlockhatchee River	44.8
Horseshoe North Lake	13.3
Little Econlockhatchee River	7.4

Source: Seminole County GIS Dept.

Figure 4. Econlockhatchee River



Source: Seminole County Water Atlas

There are 19 bodies of surface water that are located throughout Oviedo and they cover close to 5% of the total land use; all located within the Special Flood Hazard Area (SFHA). Table 1 displays the three largest bodies of water and their percentage of total surface water in Oviedo.

The vast majority of these lakes are closed basin lakes with no outlets. Rainfall causes closed basin lakes to rise faster than drain. The result is a variation in water elevation that can lead to flooding.

Figure 5. Horseshoe North Lake



Source: Seminole County Water Atlas

The largest surface water in Oviedo is the Econlockhatchee River, which is located in the eastern portion of the city. It consists of 44.8% of the total surface water.

Horseshoe North Lake accounts for 13.3% of the total surface water and is located in the southeast area of Oviedo.

The third largest body of surface water is the Little Econlockhatchee River, which covers 7.4%. This river is also found in the eastern area of the city.

Property Value

Table 2. Total Appraised Value by Flood Zone, 2014

Flood Zone	Total Appraised Value
0.2 Pct. Annual Chance Flood Hazard*	\$14,211,860.00
Zone A	\$196,289,664.00
Zone AE	\$208,256,476.00
Zone AH	\$6,614,284.00
Zone X	\$2,623,084,524.00
Grand Total	3,048,456,808.00

*of the 100 Year Flood

Source: Seminole County GIS Dept.

Oviedo has over three billion dollars in appraised property value that could be vulnerable to flood risk damage. While close to 86% of the appraised property value is found in Flood Zone X. It is important to note that over half a billion dollars in property value is found in the Special Flood Hazard Areas (SFHA).

Flood Insurance

Oviedo has 727 insurance policies in force according to the Federal Emergency Management Agency. Total property losses in Oviedo are numbered at 34 properties since 1978. The total coverage amount for these insurance policies is \$199,092,900.00, while the premium paid for them is \$297,653.00.

Table 4. Loss Statistics for the City of Oviedo, no changes since 2015 update

Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
34	17	0	17	\$125,372.67

Source: FEMA

Losses that had been paid in full accounted for 17 claims and losses that had been closed without payment (CWOP) were counted at 17 claims. There were no losses that had not been paid in full (Open Losses). Total payments made to claimants since 1978 is numbered at \$125,372.67.

Vulnerable Population

Vulnerable populations are those segments of the community who are considered to be most prone to risk in the time of hazard. 10.2% of the population is over the age of 65.

Repetitive Loss Property

Repetitive Loss properties are defined as those properties that have been flooded on more than one occasion. Oviedo does not have repetitive loss properties.

In the event that properties do begin to meet that criteria then there are buy out programs that can be initiated to purchase the property. These measures protect residents from harm and remove development from the floodplain (Schwab, 2014).

Manufactured Homes

Oviedo does not have land currently zoned for mobile home parks. At this time there are no manufactured homes within its boundaries. There is one manufactured home built on slab.

Critical Facilities

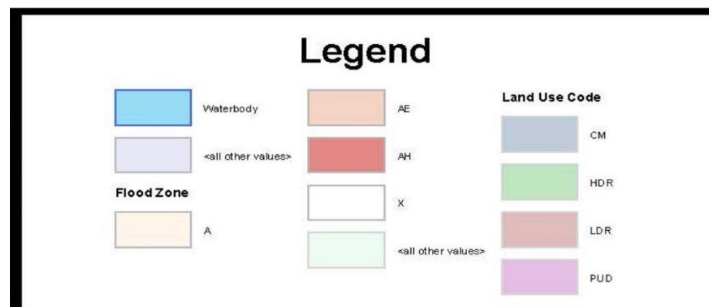
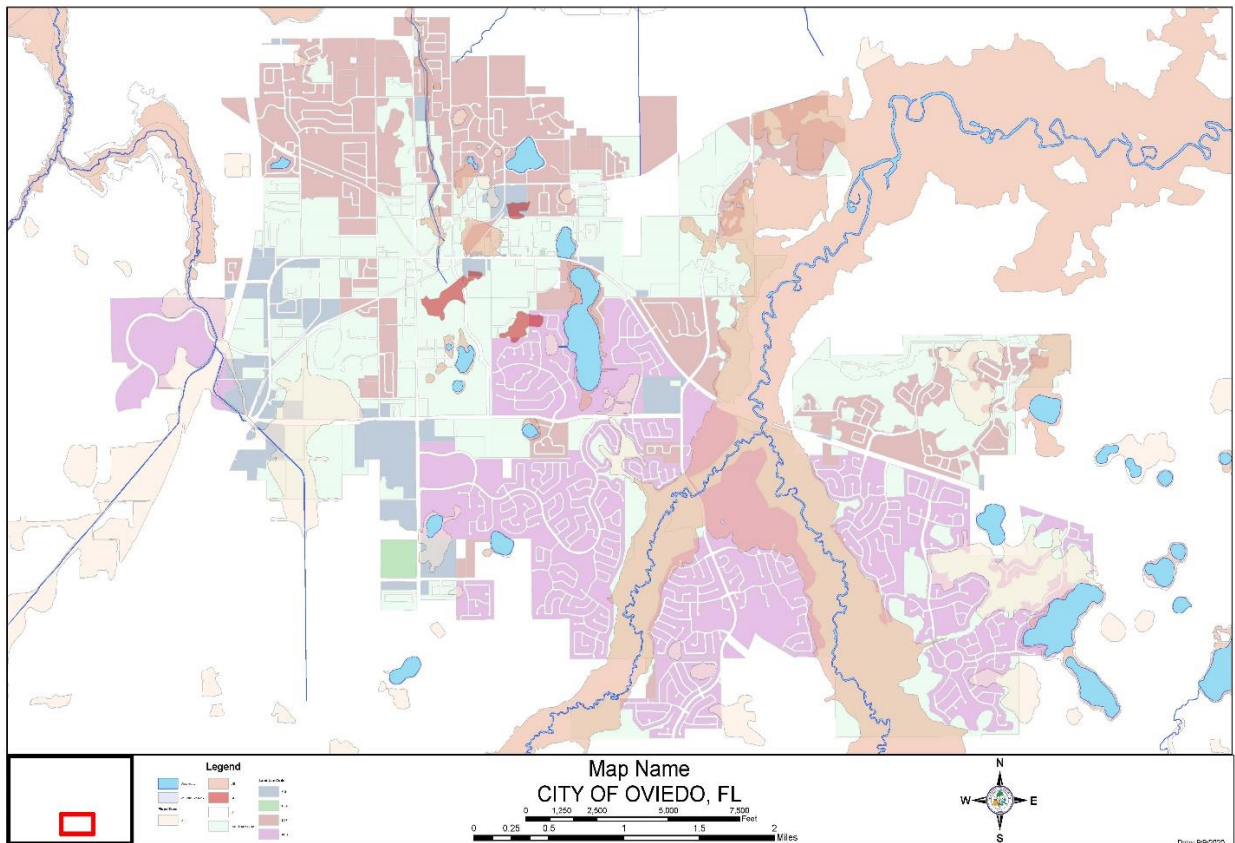
There are 17 critical facilities found in Oviedo. None of these facilities are located in the SFHA.

Mitigation Measures

Future Land Use

An analysis of the Future Land Use Map by Flood Zone (non- submerged acres) for the City of Oviedo is shown below. This reflects the hazards that come with developing in flood prone areas. The map shows the Future Land Use codes and flood zones, including where these areas overlaps. The Future Land Use codes used on this map include CM (Commercial), HDR (High Density Residential), LDR (Low Density Residential), and PUD (Planned Unit Development). The flood zones include A, AE, and AH which are all part of the Special Flood Hazard Area (SFHA), as well as X (minimal area of flooding), and all other values.

Figure 6. Future Land Use and Special Flood Hazard Areas (SFHA)



Environmental Efforts

Oviedo prohibits construction within the floodway that would diminish the functional floodway capacity.

An analysis of the Future Land Use Map found in Section 2.2 found that 37% of Future Use is designated for Conservation in Flood Zone A and over 62% in Flood Zone AE. There is no conservation found in the Future Land Use for Flood Zone AH. As mentioned, these zones are part of the Special Flood Hazard Area (SFHA).

Municipal policies intended towards minimizing potential flood damage is achieved through directing recreation, conservation and common open space to those areas within the Flood Zone.

This restricts development to occur outside the 100 Year Floodplain, which creates clusters of residential developments.

Figure 7. Econ Corridor Project



The Econ Corridor Project is a conservation effort to protect environmentally sensitive lands. These forms of mitigation policies prevent development in the flood prone area.

Erosion and Sediment Control

Oviedo's mitigation policies are intended to minimize erosion and control sedimentation. Construction projects associated with the development order application are required to submit an erosion and sediment control plan to ensure that certain measures are properly addressed. These measures are also required to follow through with state environmental standards.

Mitigation policies intended to support minimizing erosion and controlling sedimentation include leaving steep slopes and wetlands undisturbed and promoting natural vegetative cover.

The benefits included in these policies include but are not limited to reducing the velocity of run-off and increasing infiltration into the soil.¹ Other policies identified to control sedimentation from construction sites are practicing run-off control measures and sediment trapping measures.

Stormwater Management

Stormwater run-off is an essential component in helping to mitigate flood damage. Oviedo requires that development adhere to the natural drainage system. This policy promotes conservation efforts to protect wetlands throughout the city. The functions of these natural resources are to retain and filtrate water.

¹ Section 10.2 Drainage and Stormwater Management and Erosion Control, Article X. Floodways, Floodplains, Drainage, and Erosion of Oviedo's Land Development Code

Performance and design standards for stormwater management are found in Oviedo's Engineering Standards Manual. These standards are directed toward implementing effective policies that help circumvent extensive damage in the event of severe stormwater flooding. Performance standards include implementing best management practices requiring the retention/detention of stormwater, managing discharge levels and protecting water quality. Design standards include proper maintenance, having accessible entrance channels, and designing under drain systems for the purpose of removing stormwater.

Figure 8. Oviedo Drainage and Stormwater Management & Erosion Control



Building Practices

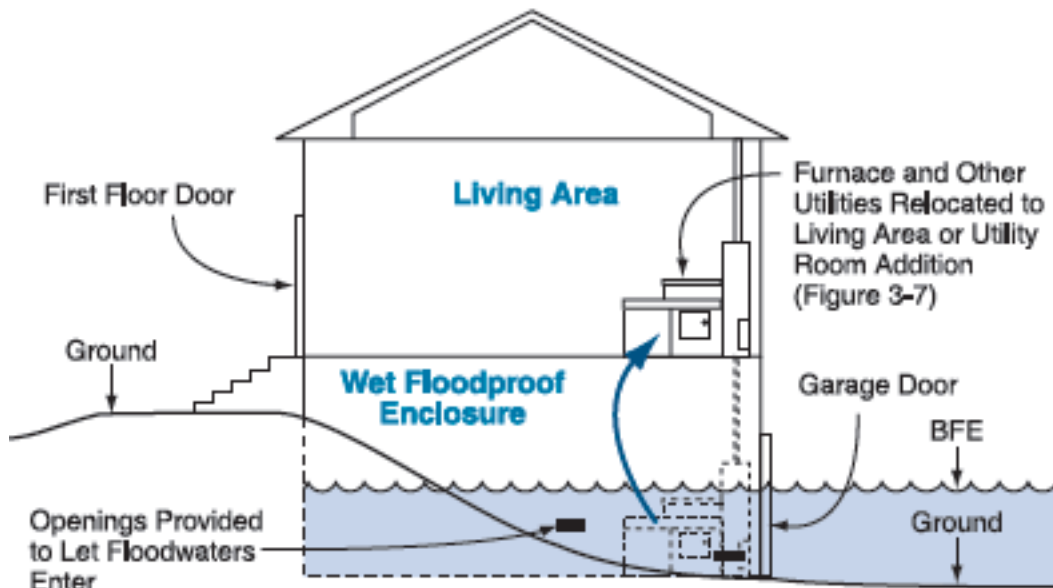
Oviedo building practices mandate that developments orders or permits cannot be issued within floodplains until development adheres to certain goals. These goals include all developments and public facilities are located and constructed to minimize or eliminate flood damage and that adequate drainage is provided.

As annotated earlier, no new construction is permitted in the floodway. Construction in the floodplain also mandates that no new construction or improvements take place unless the lowest floor is elevated to no lower than two foot above the base flood elevation (BFE).

For non- residential buildings, flood-proofing techniques can be used in lieu of elevation. These techniques are required to be certified by a professional engineer or architect. Floodproofing techniques identified by the city are intended to withstand flood depths, pressure, impact, and prevent the passage of water in buildings below the base flood. Figure 9 displays several FEMA floodproofing techniques including, situating the primary residence above the Base Flood Elevation (BFE) and elevating HVAC equipment to an upper floor.

In subdivision regulations, final plat approvals are not authorized unless the boundaries of the floodplain are identified on the plat. All new residential and commercial structures located within or near a Special Flood Hazard Area are required to submit an original Elevation Certificate to the Engineering Department prior to a Certificate of Occupancy being issued.

Figure 9. FEMA Floodproofing Techniques



Source: FEMA

Responsible party Deadline

City of Oviedo Annual

Goal 1: To maintain the condition of the stormwater ponds in Oviedo

Objective 1.1- Perform on-going maintenance of tributaries and canals.

Objective 1.2- Perform on-going maintenance of city wide storm water master system.

City of Oviedo Annual

Goal 2: To maintain the quality of the street drainage facilities in Oviedo

Objective 2.1- Perform on-going maintenance of street cleaning and storm drains.

Objective 2.2- Perform on-going maintenance of street culverts and storm water pond inlets and outfalls.

City of Oviedo Annual

Goal 3: To improve the quality of water in Oviedo

Objective 3.1- Perform measures to further reduce pollutants from the cities MS4 systems to surface water within the incorporated limits.

Objective 3.2- Perform measures to further identify and reduce localized flash flooding to roadways from heavy rainfall weather events and implement infrastructure improvements when financially feasible and appropriate.

Introduction

Overview

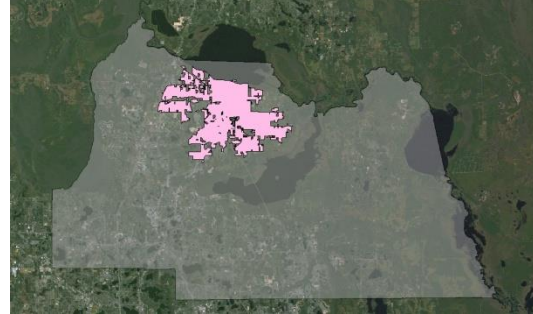
The City of Sanford was incorporated in 1877 in Seminole County. It is located in the northern section of the county, with the City of Lake Mary located to the south and Volusia County to the north. Unincorporated Seminole County borders Sanford on its west and east boundaries.

Sanford covers 23.69 square miles making it the largest municipality within Seminole County. The city's population is 61,448.

Involvement with the National Flood Insurance Program (NFIP)

Sanford was accepted into the National Flood Insurance Program's (NFIP) Community Rating System (CRS) on October 1, 2016 with an initial Rating of 7.

Figure 1. City of Sanford



Source: Seminole County GIS

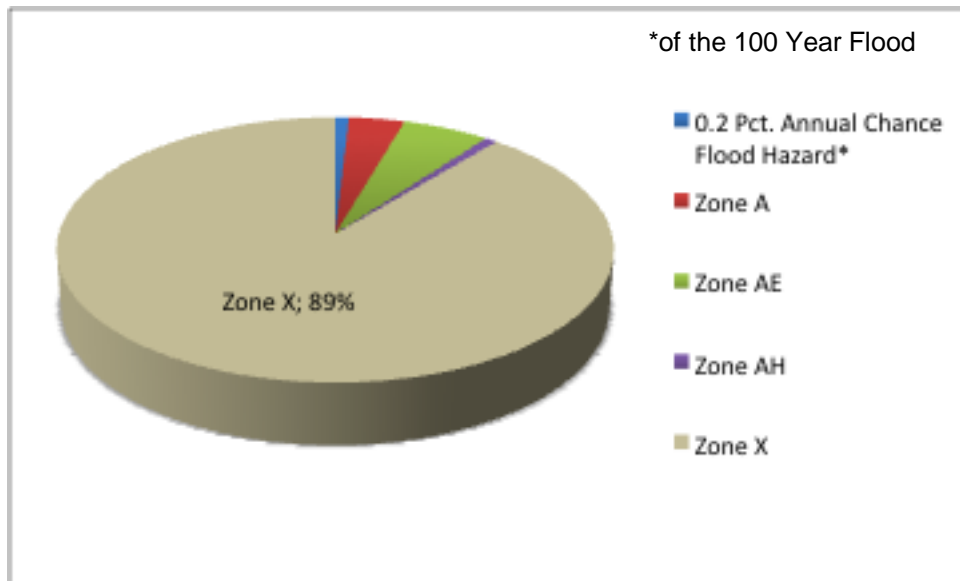
Figure 2. National Flood Insurance Program



Risk Assessment

Communities must address four components when assessing risk. They are identifying hazards, profiling hazard events, inventorying assets, and estimating loss. This process measures the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards by assessing the vulnerability of people, buildings, and infrastructure to natural hazards (FEMA). This section of the community profile assesses the potential of risk with respect to floodplain management in Sanford. There are six categories that address the four components identified in risk assessment as defined through the Federal Emergency Management Agency (FEMA): identifying flood zones within the city, surface water locations, property value within each flood zone, insurance statistics, vulnerable populations, and critical facilities.

Figure 3. FEMA Flood Zone, Percentage of Acreage for the City of Sanford, 2013, Non-Submerged Acres



Source: Seminole County GIS Dept

Figure 3 shows that the percentage of non- submerged acreage found in Sanford. The 0.2 percent Annual Chance Flood Hazard of the 100 Year Floodplain accounts for 0.9% of the total percentage of non- submerged acreage. Much of this zone is located near the banks of Lake Monroe. Non- submerged acreage refers to land not inundated by surface water. Flood Zone A accounts for 3.6% of the total percentage of non- submerged acres. Flood Zone AE comprises 5.7% and is predominately found in the surrounding areas of Lake Monroe. Flood Zone AH is 0.79% of the total make- up. Flood Zone X is 89% of the total percentage of non- submerged acres.

Surface Water

Table 1. Percentage of Total Surface Water

<u>Surface Water Name</u>	<u>Percentage, %</u>
Total Surface Water	6.2
Lake Monroe	53.8
Little Lake Mary	5.6
Lake Ada	5.4

Source: Seminole County GIS Dept.

There are 23 bodies of surface water located in Sanford. Surface water accounts for 6.2% of the total land make-up. Table 1 displays the three largest bodies of water and their percentage of total surface water in Sanford.

All bodies of water are located in or within close proximity of the Special Flood Hazard Area (SFHA).

The vast majority of these lakes are closed basin lakes with no outlets. Rainfall causes closed basin lakes to rise faster than drain. The result is a variation in water elevation that can lead to flooding. Lake Monroe is a notable exception connecting to the St. Johns River.

Lake Monroe is the largest lake in Sanford accounting for 53.8% of the total surface water make up of the city. The body of water is located to north of the city.

Little Lake Mary is the second largest body of water comprising 5.6% of the total surface water and is located in the southern section of this jurisdiction.

Lake Ada is also located in the southern portion of Sanford. This body of water makes up 5.4% of the total percentage of surface water.

Figure 4. Lake Monroe, Aerial View



Source: Seminole County Water Atlas

Figure 5. Little Lake Mary



Source: Seminole County Water Atlas

Sanford Floodplain Management Profile

Property Value

Table 2. Total Appraised Value by Flood Zone, 2020

FLOOD ZONE	TOTAL JUST VALUE
A	53,737,984
AE	152,995,083
AH	10,549,661
X (0.2 Pct. Annual Chance Flood Hazard)	60,633,699
X (Area of Minimal Flood Hazard)	5,488,000,314
	5,765,916,741

Sanford has over 5.7 billion dollars in appraised value that could be vulnerable to flood risk damage. The largest property value risk is found in Flood Zone X, with 95%. Flood Zone AE accounts for the second largest appraised value that could be vulnerable to risk at 2.7%. Those properties zone A, AH, and within the 0.2 Pct. Annual Chance Hazard of the 100-year flood have over 124 million dollars of property risk.

Insurance Policies

Table 3. Policy Statistics for the City of Sanford, as of 09/20/2020

Policies in Force	Insurance in Force Whole	Written Premiums in Force
589	\$154,118,200	\$329,283

Sanford has 618 insurance policies in force according to the Federal Emergency Management Agency. The total coverage amount for these insurance policies is \$152,232,400, while the premium paid for them averaged \$343,110.

Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
69	41	0	28	\$454,772.10

Source: FEMA

Table 4. Loss Statistics for the City of Sanford, as of 09/20/2020

Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
	79			\$609,850.70

Total property losses in Sanford are numbered at 79 properties since 1978. Losses that had been paid in full accounted for 41 claims and losses that had been closed without payment (CWOP) were totaled at 28 claims. There were no losses that had not been paid in full. Total payments made to claimants since 1978 is valued at \$609,850.70.

Vulnerable Population

Vulnerable populations are those segments of the community who are considered to be most prone to risk in the time of hazard. 9.3% of the population is over the age of 65.

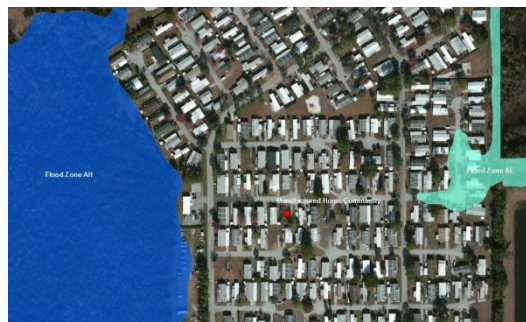
Repetitive Loss Property

Repetitive Loss Properties are defined as those properties that have been flooded on more than one occasion. Sanford eight repetitive loss properties.

In the event that properties do begin to meet that criteria then there are buy out programs that can be initiated to purchase the property. These measures protect residents from harm and remove development from the floodplain (Schwab, 2014).

Manufactured Homes

Figure 6. Manufactured Home Flood Hazard



Manufactured home communities, such as the one showed above in Sanford are vulnerable populations susceptible to flood hazard without proper mitigation measures.

Sanford has a large mobile home park located in its southern jurisdiction that could be vulnerable to flood inundation. Figure 6 illustrates the potential risk. The City's Land Development Code sets standards for these forms of residences. Mitigation policies that help protect flood damage to manufactured homes include setting the permanent foundation to no lower than two feet above the base flood elevation and must have an adequate anchored foundation system to circumvent flotation and other forms of movement.

Critical Facilities

Critical facilities are defined as those facilities that provide a critical function and should be protected from flood damage. Seminole County has identified 66 critical facilities throughout Sanford and the emergency function they provide in times of crisis. No facility is located in the Special Flood Hazard Area (SFHA).

Mitigation Measures

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters (FEMA). The policies adopted by Sanford work to achieve these objectives and prevent flood damage. This community profile analyzes mitigation policies including Future Land Use, Environmental Efforts, Stormwater Management, and Building Practices all identified through the city’s Comprehensive Plan and Land Development Code.

Future Land Use

An analysis of the Future Land Use Map by Flood Zone (non-submerged acres) for the City of Sanford is aggregated below. This analysis reflects the hazards that come with planning for growth in flood prone areas.

Table 5. 0.2 Percent Annual Chance Flood Hazard* by Future Land Use (FLU), 2020

0.2% Annual chance by FLU

FLU Designation	area	Percentage of total acres
AIC	68.79	6.38
GC	18.21	1.69
HDR	99.41	9.22
I	6.75	0.62
LDRSF	144.32	13.39
MDR15	52.73	4.89
NC	4.82	0.44
PRO	11.42	1.05
PSP	29.83	2.76
ROI	21.11	1.95
RP	234.02	21.72
SE	50.54	4.69
WDBD	335.48	31.13

In Sanford, 31.13% of the total percentage of acreage for the 0.2 Percent Annual Chance Hazard of the 100-year flood is planned for the Waterfront Downtown Business District, mixed use district. The next largest future land use Resource Protection District at 21.72%. Low Density Residential districts are the third largest future use in this flood hazard area at 13.39%. Airport Industry & Commerce, another variation of a mixed- use district accounts for 6.38%.

Sanford Floodplain Management Profile

Table 6. Flood Zone A by Future Land Use (FLU), 2020

Flood Zone A by FLU

FLU Designation	area	Percentage of total acres
AIC	1754.69	45.02
GC	162.76	4.17
HDR	104.82	2.68
HI	428.05	10.98
LDRMH	73.64	1.88
LDRSF	269.78	6.92
MDR10	162.79	4.17
MDR15	65.15	1.67
NC	28.61	0.73
PRO	69.87	1.79
ROI	3.12	0.08
RP	247.84	6.35
WIC	525.93	13.49

Airport Industry and Commerce accounts for 45.02% of the total future land use in Flood Zone A. West Side Industry and Commerce comprises 13.49% of the total future land use. The third largest planned future use in this flood hazard area is I-4 High Intensity, a variation of a mixed-use district accounts for 10.98% of the total make-up.

Table 7. Flood Zone AE by Future Land Use (FLU), 2020

Flood Zone AE by FLU

FLU Designation	area	Percentage of total acres
AIC	1850.67	39.45
GC	191.19	4.07
HDR	141.30	3.01
HI	62.71	1.33
I	36.37	0.77
LDRMH	73.64	1.56
LDRSF	390.71	8.32
MDR10	90.13	1.92
MDR15	218.91	4.66
NC	7.02	0.14
PRO	139.34	2.97
PSP	407.73	8.69
ROI	45.97	0.97
RP	698.17	14.88
SE	37.09	0.79
WDBD	299.89	6.39

Sanford Floodplain Management Profile

In Flood Zone AE Airport Industry and Commerce comprises 39.45% of the total future land use. The next largest future use is Resource Protection District with 14.48% of the total make-up. Low Density Residential Single Family is 8.32%.

Table 8. Flood Zone AH by Future Land Use (FLU), 2020

Flood Zone AH by FLU

FLU Designation	area	Percentage of total acres
GC	33.63	5.81
HDR	36.74	6.35
LDRMH	73.64	12.73
LDRSF	35.25	6.09
MDR15	8.66	1.49
PRO	2.03	0.35
PSP	293.77	50.80
ROI	3.08	0.53
RP	91.39	15.80

Sanford's Flood Zone AH is predominately planned for Public Semi-Public at 50.80% of the total future acreage. The next largest future use is Resource Protection District at 15.80%. Low Density Residential Mobile Home comprises 12.73%.

Table 9. Flood Zone X by Future Land Use (FLU), 2020

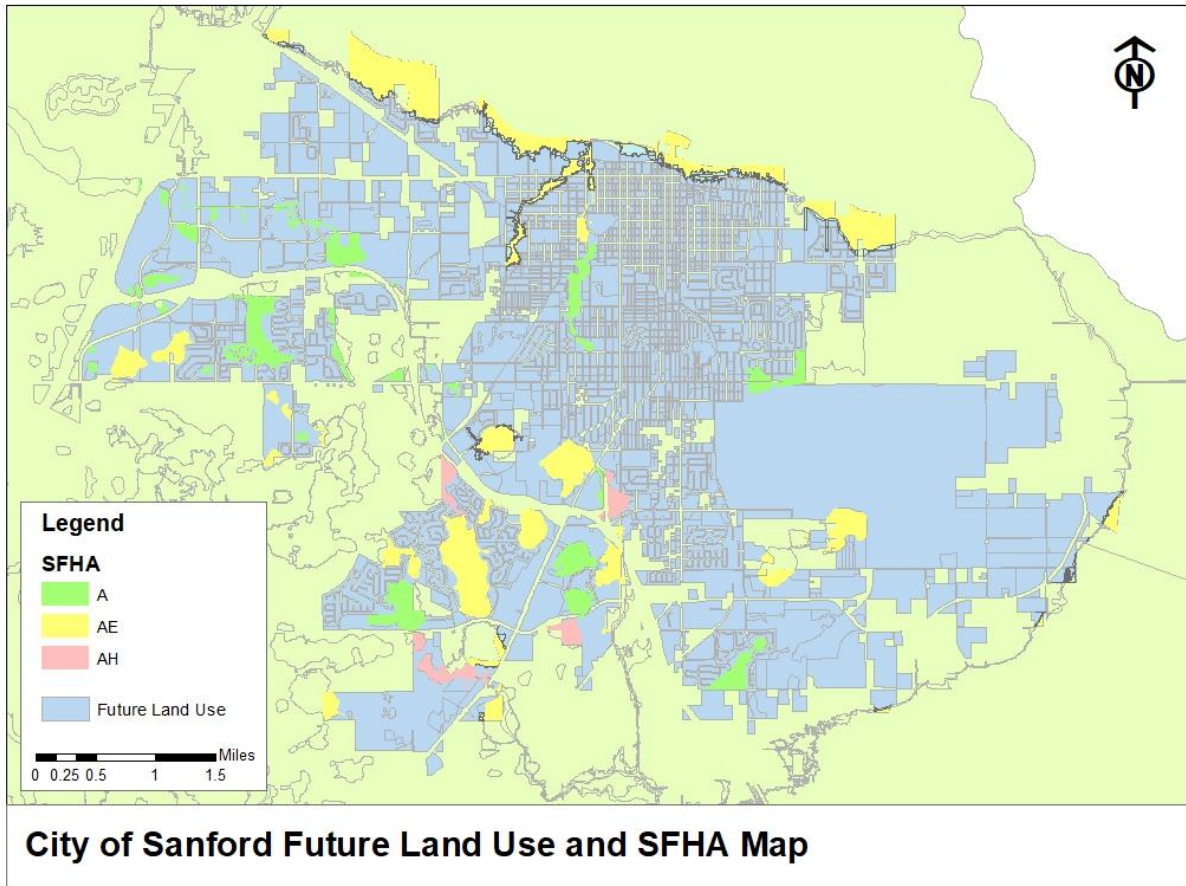
Flood Zone X by FLU

FLU Designation	area	Percentage of total acres
AIC	68.79	5.36
GC	29.38	2.28
HDR	99.41	7.74
I	6.75	0.52
LDRSF	144.32	11.24
MDR10	132.76	10.34
MDR15	52.73	4.10
NC	4.82	0.37
PRO	11.42	0.89
PSP	29.83	2.32
ROI	21.11	1.64
RP	295.68	23.04
SE	50.54	3.93
WDBD	335.48	26.14

Sanford Floodplain Management Profile

Waterfront Downtown Business District comprises 26.14% of the total future land use in Flood Zone X. The next highest district is Reource Protection at 23.04%. Low Density Residential- Single Family also makes up a significant percentage of this Flood Zone at 11.24%. Medium Density Residential comprises 10.34%

Figure 7. Future Land Use and Special Flood Hazard Areas (SFHA)



Environmental Efforts

Environmental policies are a means to which a municipality values its natural heritage. Best practices in Floodplain Management mitigation include preserving natural areas located in floodplains or directing open space/recreation uses towards them.

Sanford has committed itself to the protection of wetlands, aquatic habitats, floodways, and drainage ways. In only certain circumstances, minimal development is permitted if the reason is valid.

Under Section IV (Natural Resources) of the Comprehensive Plan the City of Sanford has laid out the Goals and Objectives to protect our environment for future generations. The City cooperates with the Florida Department of Environmental Protection and the City of Sanford is part of the St. Johns River Management District.

Erosion and Sedimentation Control

The city's comprehensive plan sets objectives to protect minerals, soils and vegetation. These policies protect bodies of water and wetlands from siltation.

Section IV of the plan is dedicated to Natural Resources. Objective CON-1.5, Combat Soil Erosion, intends to reduce the incidence of soil erosion caused by development, breaches in shorelines and lands exposed for agricultural purposes. Policy CON-1.5.1 covers the implementation of Erosion and Sedimentation Controls as stipulated within the Land Development Regulations.

Figure 8. Wetlands



Wetlands from the St. Johns River that are protected from development.

Figure 9. Development along the St. Johns River



Stormwater Management

Stormwater management practices are an essential component in mitigating flood damage. Policies enacted at the municipal level are essential in controlling stormwater run-off to create minimal damage impact on property.

The City of Sanford has many policies and objective to help with the management of stormwater. All of these provide guidelines on where and how many drainage systems are built.

Under Objective 4-5.1, there must be adequate stormwater management to allow for new development

Policy 4-5.1.2 states that stormwater drainage shall be addressed as watershed management and shall be coordinate plans and policies with the appropriate Public Agencies including local, State and Federal.

Policy 4-5.1.4 Addresses water quality and quantity concerns to protect the hydrological and ecological functions of water resources while permitting the most beneficial uses to occur.

Figure 10. Proper Stormwater Management



None of the stormwater has reached the property due to proper stormwater management practices.

Building Practices

Building Practices are essential in mitigating flood damage to structures located in flood prone zones. There are different practices that help protect property and citizens.

Sanford uses the current Florida Building Code, with some modifications and higher standards. One of the higher standards dictates that the lowest floor level of any new structure, including the basement, shall be a minimum of 2-feet above the base flood elevation.

Before development can begin, permits must be submitted about the nature, location, dimensions, and elevations of the area under consideration for development.

A structure must be certified after placement of the lowest floor and proper floodproofing has been constructed. If they aren't certified or meet standards, all construction must cease.

Figure 11. Proper Building Practices



The correct way to prepare a property for development.

Sanford Floodplain Management Profile

Responsible party Deadline

CITY OF SANFORD Annual

Goal 1: Engage in risk-based mitigation planning resulting in sustainable actions that reduce or eliminate risks to life and property from flooding.

Objective 1.1- Participate in Local Mitigation Strategy meetings and communicate concerns and issues.

Objective 1.2-Coordinate with the County and other local government agencies to develop and administer outreach programs to gain participation in mitigation programs by business, industry, institutions and community groups.

Goal 2: Enforce proper building and stormwater objectives and practices.

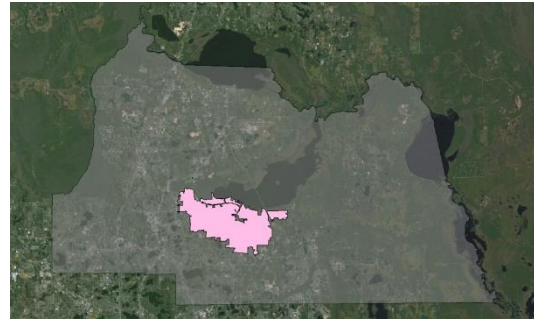
Objective 1.1- Continue training and review of building codes.

Objective 1.2- Perform ongoing maintenance of city streets, storm drains, street culverts, and storm water pond inlets and outfalls.

Introduction

Overview

The City of Winter Springs was incorporated in 1959 in Seminole County. It is located in the central section of the county, with the City of Longwood to its west and the City of Oviedo to its east. Unincorporated Seminole County borders Winter Springs to the south and Lake Jesup is the northern boundary. Winter Springs covers 15 square miles. The city's population is 37,312.



Source: Seminole County GIS

Involvement with the National Flood Insurance Program (NFIP)

Winter Springs became eligible for the National Flood Insurance Program's (NFIP) Community Rating System (CRS) on October 1, 1993. The municipality ranked a class six rating, receiving 2,000-2,499 Credit Points (cT) during its classification and continues to maintain this designation as of 2020.

The discount percentage for those properties in the Special Flood Hazard Area (SFHA) is twenty (20%) percent while the percent discount for non-Special Flood Hazard Area (SFHA) is ten (10%) percent. The city's participation in the program is listed as current.

Figure 2. National Flood Insurance Program



Figure 1. City of Winter Springs

Risk Assessment

Communities must address four components when assessing risk. They are identifying hazards, profiling hazard events, inventorying assets, and estimating loss. This process measures the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards by assessing the vulnerability of people, buildings, and infrastructure to natural hazards. This section of the community profile assesses the potential of risk with respect to floodplain management in Winter Springs. There are six categories that address the four components identified in risk assessment as defined through the Federal Emergency Management Agency (FEMA): identifying flood zones within the city, surface water locations, property value within each flood zone, insurance statistics, vulnerable populations, and critical facilities.

Figure 3. Flood Zone, Percentage of Acreage for the City of Winter Springs, 2021, Non-Submerged

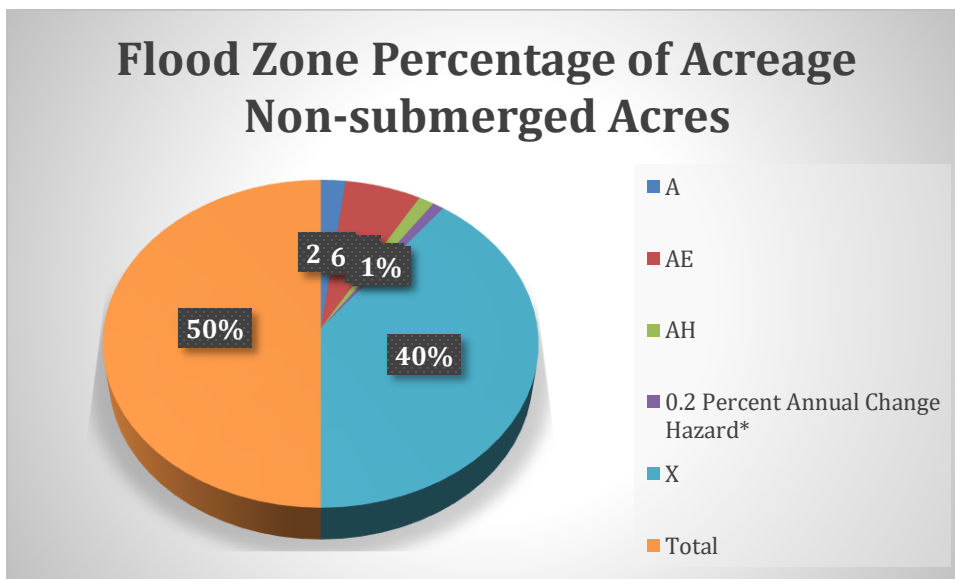
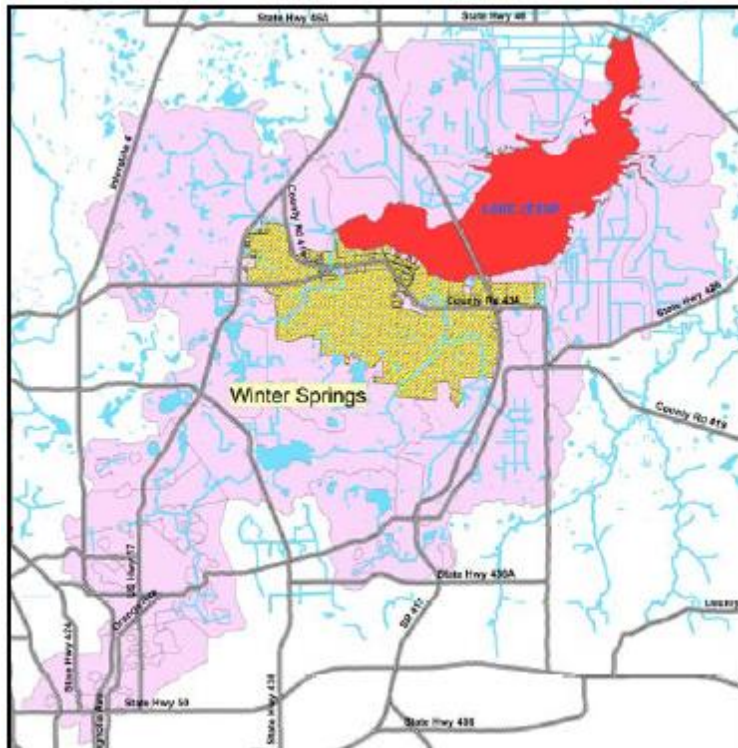


Figure 3 shows that the percentage of non-submerged acreage found in Winter Springs. 0.2 Percent Annual Change Hazard of the 100-year flood accounts for 1.84% of the total percentage of non-submerged acreage. Non-submerged acreage refers to land not inundated by surface water. Flood Zone A comprises 4.02% of the total make-up. Flood Zone AE is 12.39% and Flood Zone AH is 2.59%. Flood Zone X accounts for 79.24% of the total percentage of non-submerged acres.

Surface Water

Figure 4. Surface Water Runoff



The majority of the City's surface water runoff is into Lake Jesup and is conveyed by three of its main tributaries, Howell Creek, Gee Creek and Soldiers Creek.

Howell Creek runs through the central portion of the City and has an approximate 3750-acre tributary area, thirty eight percent (38%) in the City. Bear Creek, a tributary to Howell Creek, also runs through a portion of the City and converges with Howell Creek just north of Winter Springs Boulevard.

Gee Creek runs through the southwestern portion of the City and has an approximate 2,464-acre tributary in the area, twenty six (26%) percent of the City. No Name Creek is a tributary to Gee Creek and converges with Gee Creek just south of SR 434.

A very small portion of the City about nine (9%) percent is with the Soldiers Creek Basin, approximately 884 acres. The creek itself enters the City's limits near the SR 419 crossing before discharging into the western part of Lake Jesup.

The 100-year flood plains in the City are located along the creeks, along the shores of lakes and in some landlocked low spot areas.

Property Value

Table 2. Total Appraised Value by Flood Zone, 2014

Flood Zone	Total Appraised Value
0.2 Pct. Annual Chance Flood Hazard*	\$191,184,305.00
Zone A	\$85,792,173.00
Zone AE	\$368,088,713.00
Zone AH	\$1,609,778.00
Zone X	\$2,321,701,467.00
Grand Total	\$2,968,376,436.00

*of the 100 Year Flood

Source: Seminole County GIS Dept.

Winter Springs has over 2.9 billion dollars in appraised value that could be vulnerable to flood risk damage. The largest property value risk is found in Flood Zone X, 78%. Flood Zone AE accounts for the second largest appraised value that could be vulnerable to risk at 12%. The next most notable flood zone that has high-appraised value is A with over 85 million dollars in property. Those properties within the 0.2 Percent Annual Chance Hazard of the 100-year flood have over 191 million dollars of property risk.

Insurance Policies

Table 3. Policy Statistics for the City of Winter Springs, as of 12/31/2013

Policies in- Force	Insurance in-Force Whole	Written Premiums in- Force
724	\$193,875,900	\$294,912

Source: FEMA

Winter Springs has 724 insurance policies in force according to the Federal Emergency Management Agency. The total coverage amount for these insurance policies is \$193,875,900 while the premium paid for them averaged \$294,912.

Table 4. Loss Statistics for the City of Winter Springs, as of 12/31/2013

Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
19	10	0	9	\$154,179.38

Source: FEMA

Total property losses in Winter Springs are numbered at 35 properties since 1978. Losses that had been paid in full accounted for 22 claims and losses that had been closed without payment (CWOP) were totaled at 13 claims. There were no losses not paid in full. Total payments made to claimants since 1978 is valued at \$817,008.

Vulnerable Population

Vulnerable populations are those segments of the community who are considered to be most prone to risk in the time of hazard. Approximately eleven (11%) percent of the population is over the age of 65.

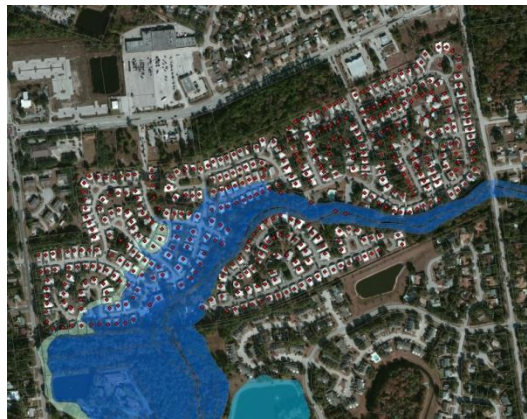
Repetitive Loss Property

Repetitive Loss (RL) properties are defined as those properties that have been flooded on more than one occasion. Winter Springs currently has four (4) repetitive loss properties and Community Rating System (CRS) Outreach Program letters of standard guidelines is sent annually to 22 properties in the RL areas.

In the event that properties do begin to meet that criteria, there are home buyout programs that can be initiated to purchase the property. These measures protect residents from harm and remove development from the floodplain (FEMA, 2019).

Manufactured Homes

Figure 5. Manufactured Home Flood Hazard



Manufactured home communities, such as the one showed above in Winter Springs are vulnerable populations susceptible to flood hazard without proper mitigation measures. Manufactured homes are symbolized as red points.

Winter Springs has one (1) manufactured home communities located in its jurisdiction that could be vulnerable to flood inundation. Figure 6 illustrates the potential risk. The City's Land Development Code set standards for these forms of residences. Mitigation policies that help protect flood damage to manufactured homes include setting the elevation above the base flood level and must be anchored. The foundation must be anchored in order to prevent flotation or any varying form of movement.

Critical Facilities

Critical facilities are defined as those locations that provide a critical function and should be protected from flood damage. Seminole County has identified eighteen (18) critical facilities throughout Winter Springs and the emergency services they provide in times of crisis. There is only one (1) facility located in the Special Flood Hazard Area (SFHA); the Winter Springs Utility East, a water pump station.

Figure 7. Location of Critical Facilities



Source: Seminole County GIS

Critical Facilities:

1. Winter Springs Water Treatment Plant (WTP) # 2 West at 700 Sheoah Boulevard
2. Winter Springs Wastewater Treatment Plant (WWTP) West at 1000 West State Road 434
3. Winter Springs Civic Center at 400 North Edgemon Avenue
4. Winter Springs Senior Center at 400 North Edgemon Avenue
5. Winter Springs Fire Department Station # 24 at 102 North Moss Road
Winter Springs Public Safety Complex at 300 North Moss Road
6. Winter Springs Water Treatment Plant (WTP) # 3 at 110 West Bahama Road
7. Seminole County Public Schools Transportation Service Station at 810 East State Road 434
8. Keeth Elementary School at 425 Tuskawilla Road
9. Winter Springs Fire Department Station # 26 at 850 Northern Way

10. Winter Springs Water Treatment Plant (WTP) # 1 East at 851 Northern Way
11. Winter Springs Wastewater Treatment Plant (WWTP) East at 1560 Winter Springs Boulevard
12. Winter Springs City Hall at 1126 East State Road 434
13. Highlands Elementary School at 1600 Shepard Road
14. Layer Elementary School at 4201 East State Road 419
15. Winter Springs Elementary School at 701 West State Road 434
16. Winter Springs High School at 130 Tuskawilla Road
17. Indian Trails Middle School at 415 Tuskawilla Road

Mitigation Measures

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. The policies adopted by Winter Springs work to achieve these objectives and prevent flood damage. This community profile analyzes mitigation policies including Future Land Use, Environmental Efforts, Stormwater Management, and Building Practices all identified through the city’s Comprehensive Plan and Land Development Code.

Future Land Use

An analysis of the Future Land Use Map by Flood Zone (non-submerged acres) for the City of Winter Springs is aggregated below. This analysis reflects the hazards that come with planning for growth in flood prone areas.

Table 6. 0.2 Percent Annual Chance Flood Hazard* by Future Land Use (FLU), 2021

Flood Zone by Future Land Use	Acres	Percentage
0.2 Pct Annual Chance Flood Hazard*		1.84%
Low Density Residential	66.15	45.85%
Conservation	21.42	14.85%
Rural Residential	11.96	8.29%
Medium Density Residential	9.91	6.87%
Recreation	8.74	6.06%
Town Center District	8.45	5.86%
Public / Semi-Public	6.78	4.70%
Greenway Interchange District	5.01	3.47%
Industrial	2.33	1.62%
High Density Residential	2.09	1.45%
Commercial	0.79	0.55%
Mixed-Use	0.64	0.44%
Total	144.27	100.00%

**of the 100 Year Flood*

In Winter Springs, 45.85% of the total percentage of acreage for the 0.2 Percent Annual Chance Hazard of the 100-year flood is planned for Low Density Residential. The second largest planned use is Conservation at 14.85%. The next largest future land use in this flood hazard area is Rural Residential at 8.29%. Medium Residential and Recreation comprise 6.87% and 6.06%. Town Center District, which is a variation of a mixed- use district, is 5.86% of the total make up.

Table 6. Flood Zone A by Future Land Use (FLU), 2021

Flood Zone by Future Land Use	Acres	Percentage
Flood Zone A		4.02%
Low Density Residential	101.62	32.35%
Rural Residential	76.42	24.33%
Recreation	70.47	22.44%
Conservation	52.36	16.67%
Medium Density Residential	6.57	2.09%
Public / Semi Publis	4.63	1.47%
High Density Residential	2.01	0.64%
Total	314.08	100.00%

Low Density Residential accounts for 32.35% of the total percentage of acreage in Flood Zone A. The next largest future planned use is Rural Residential at 24.33%. Recreation and Conservation account for 22.44% and 16.67%. Medium Density Residential comprises 2.09% and Public/Semi-Public is planned for 1.47% of the total percentage of acreage.

Table 7. Flood Zone AE by Future Land Use (FLU), 2021

Flood Zone by Future Land Use	Acres	Percentage
Flood Zone AE		12.39%
Conservation	534.58	55.17%
Low Density Residential	140.91	14.54%
Towne Center	86.9	8.97%
Greenway Interchange District	78.62	8.11%
Recreation	37.29	3.85%
Rural Residential	27.03	2.79%
Medium Density Residential	20.52	2.12%
High Density Residential	12.58	1.30%
Industrial	11.01	1.14%
Commercial	10.44	1.08%
Public / Semi-Public	4.96	0.51%
Mixed-Use	4.12	0.43%
Total	968.96	100.00%

In Flood Zone AE Conservation is designated for 55.17% of the total percentage of acres of future land use. The next largest future is Low Density Residential at 14.54%. Town Center District and Greenway Interchange District comprise 8.97% and 8.11%. Recreation accounts for 3.85% of the total future use in this flood prone area.

Table 8. Flood Zone AH by Future Land Use (FLU), 2021

Flood Zone by Future Land Use	Acres	Percentage
Flood Zone AH		2.51%
Conservation	192.34	97.96%
Medium Density Residential	3.08	1.57%
Low Density Residential	0.71	0.36%
Rural Residential	0.22	0.11%
Total	196.35	100.00%

Conservation accounts for 97.96% of the total future land use in Flood Zone AH. Medium Density comprises 1.57%.

Table 9. Flood Zone X by Future Land Use (FLU), 2021

Flood Zone by Future Land Use	Acres	Percentage
Flood Zone X		79.24%
Low Density Residential	2380.9	38.45%
Medium Density Residential	892.72	14.42%
Rural Residential	768.98	12.42%
Town Center District	373.56	6.03%
Commercial	317.38	5.13%
Recreation	323.53	5.23%
Greenway Interchange District	289.25	4.67%
Public / Semi-Public	269.54	4.35%
Conservation	243.38	3.93%
High Density Residential	177.34	2.86%
Industrial	35.96	0.58%
Mixed Use	119.2	1.93%
Total	6191.74	100.00%

The largest future planned use in Flood Zone X is Low Density Residential at 38.45% of the total make- up. Medium Density Residential accounts for 14.42% and Rural Residential is 12.42%. Public/ Semi Public comprises 4.35% of the total make- up. Recreation accounts for 5.23% of the future planned use in this flood zone.

Figure 6. Future Land Use and Special Flood Hazard Areas (SFHA)

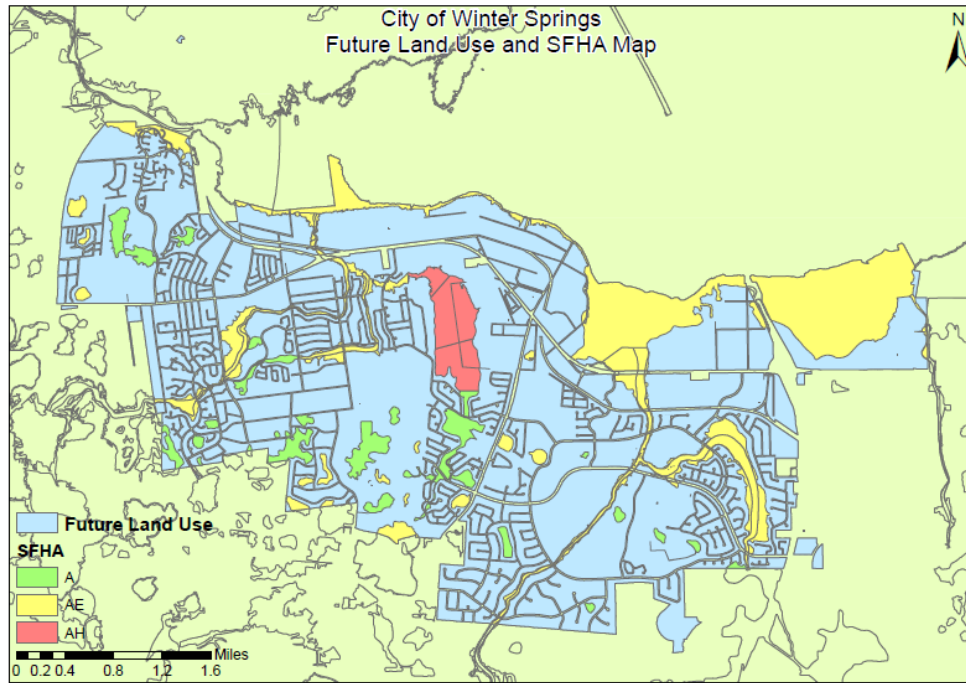


Figure 6a. Future Land Use

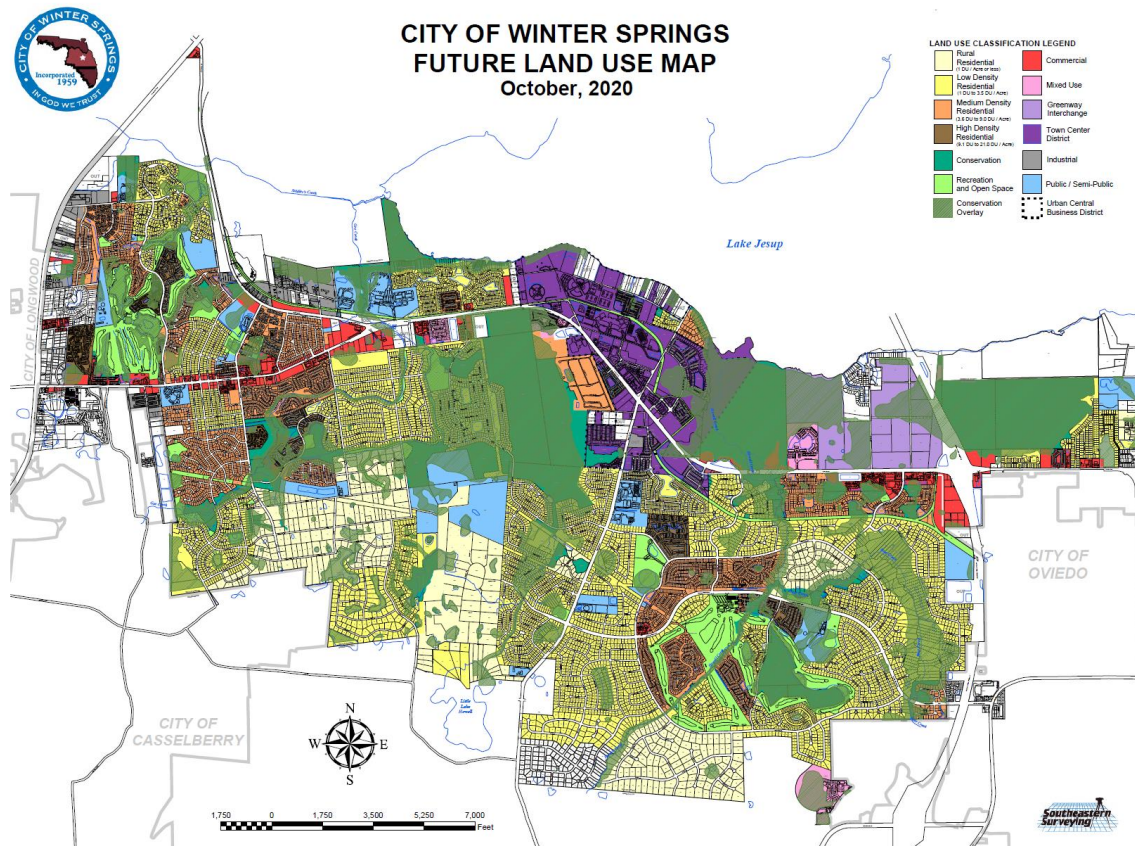
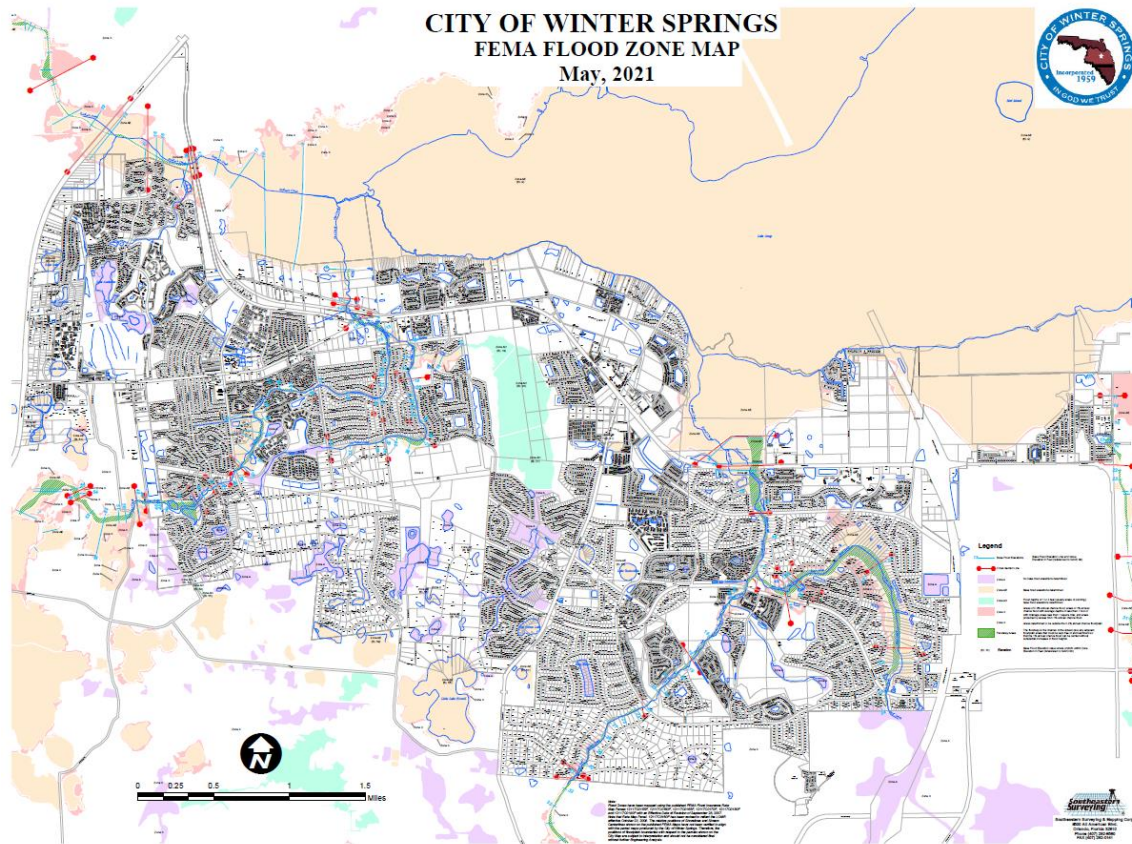


Figure 6b. FEMA Flood Zone Map - Special Flood Hazard Areas (SFHA)



areas are deemed not sensitive, development may be allowed.

Environmental Efforts

Environmental policies are a means to which a municipality values its natural heritage. Best practices in Floodplain Management mitigation include preserving natural areas located in floodplains or directing open space/recreation uses towards them.

In recent years, development in areas of Lake Jesup, wetlands, and the 100-year flood plain have become much stricter. Figure 8 shows where these areas that is in the Conservation Overlay. Conservation Overlay in regards to the Future Land Use Map- 2030. Even though this map exists, it does not prohibit development in these areas, rather point out sensitive areas. If these

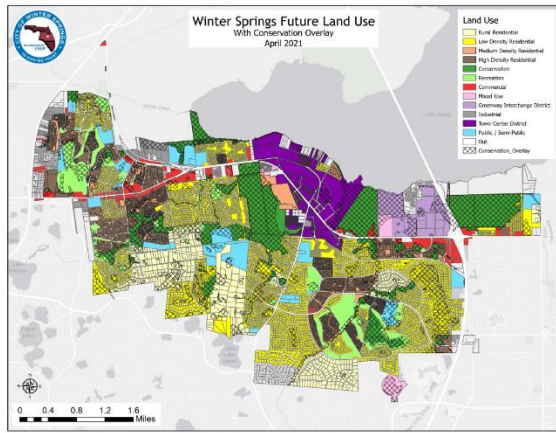
In Winter Springs, most of the wetlands are found near Lake Jesup. These wetlands are considered palustrine which consist of wet prairie, hydric hammocks and hardwood swamps, bayhead, and areas of cypress. These areas are being protected because they are in the floodzone and create a natural mitigation against floods.

Erosion and Sedimentation Control

The City's Comprehensive Plan sets objectives to protect minerals, soils and vegetation. These policies protect bodies of water and wetlands from siltation. The regulations for water quality, erosion and sedimentation control for both the city

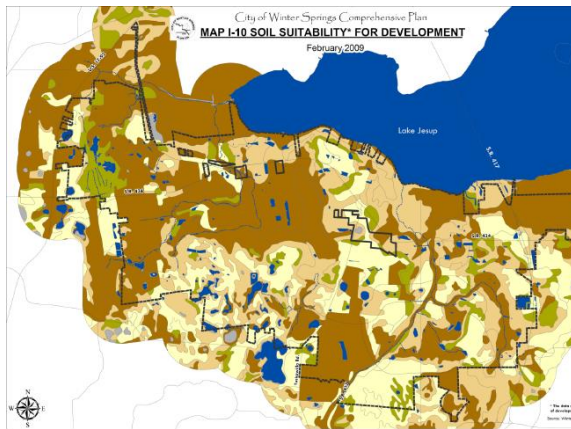
and state regulatory agencies are enforced during the development review process and the implementation of the capital improvements, private new developments and re-developments.

Figure 7. Conservation Overlay



Conservation Overlay in Winter Springs.

Figure 8. Soil Suitability



Areas where soil is most suitable for development.

In Winter Springs, development is impacted by the type of soil present. This is determined by how well they drain and how much load they can bear. Figure 9 shows the areas where soil is approved for development by the Soil Conservation Service.

The two main soil types in Winter Springs are Urban Land-Tavares-Millhopper and Urban Land-Astatula-Apopka. Both of these soils are known for being well drained.

Stormwater Management

Stormwater management practices are an essential component in mitigating flood damage. Policies enacted at the municipal level are essential in controlling stormwater run-off to create minimal damage impact on property.

There are 116 stormwater retention ponds in Winter Springs.

In Winter Springs, there are many policies that help with stormwater management.

Policy 1.2.8 states that stormwater management codes in the Code of Ordinances must set the standards for onsite stormwater systems and ways to lessen the amount of untreated run-off into the city's lakes.

Policy 1.2.9 is the Stormwater Master Plan. This policy states development is not allowed unless it abides to the Stormwater Master Plan.

Policy 1.10.1 is the Public Utility System Land Requirements. This policy states that proposed development in relation to the existing utility and land needs systems must be adequate. Stormwater management falls in this category.

Figure 9. The Soils



On the left is the Urban Land-Tavares-Millhopper Soil and the right is the Urban Land-Astatula-Apopka Soil.

Building Practices

Building Practices are essential in mitigating flood damage to structures located in flood prone zones. There are different practices that help protect property and citizens.

Policy 1.2.7 requires all new construction or substantial improvement and damage repair must fall into the standards of the National Flood Insurance Program (NFIP).

The lowest floor of a structure must be eighteen inches above the Base Flood Elevation (BFE) established in the 100-year plain. The Florida Building Code mandates the BFE plus one foot free board requirement.

The City Code of Ordinances states many codes that help prevent flood damage. If any structure is within a flood zone, the City's CFM representative conducts a thorough assessment of the property and location.

In December 2020, Winter Springs adopted the 2020 Florida Building Codes Chapter 16.

The City's Building Department maintained a BCEGS Class 4/4 as of the 2018 certification review.

Goal 1 – City’s Floodplain Management Implementation Activities (Annual Basis)

Objective 1.1 – Continue to maintain the City’s CRS Class 6

The City continues to implement the steps and procedures required to maintain the City’s Class 6 designation. This is an ongoing item that will continue throughout the duration of the certification. The only costs associated with this objective is staff time and resources. This will benefit City’s residents by continuing to spread awareness about Special Flood Hazard Areas and providing cost savings through insurance discounts.

Objective 1.2 – Continue to provide accessible flood protection information and public outreach

The City continues to provide flood protection information and resources to current and prospective residents and business owners. Information is available at City Hall, the City’s website, and by contacting the City’s CRS coordinator. This an ongoing item that will continue throughout the duration of the certification. The City will modify the availability of these items as current accessibility requirements adapt. The costs associated with this objective are minimal and only requires staff time and resources.

Objective 1.3 – Continue to preserve open space areas

The City of Winter Springs defines open space and conservation areas within the City’s Future Land Use Maps, Recreation and Open Space Element and Conservation Element of the City’s Comprehensive Plan. The City continues to preserve these areas to the greatest extent possible during planning and land development review. The City reviews these areas on a regular basis and the costs associated are minimal to the City.

Objective 1.4 – Continue to enforce flood management provisions

The City enforces flood management provisions through permit and land development review. The City’s flood management provisions are more restrictive than the current FEMA minimums, which has likely resulted in a lessen impact to structures within Special Flood Hazard Areas. The City will continue to enforce flood management provisions. The cost associated with this objective is minimal to the City and is part of standard permit review.

Objective 1.5 – Continue to provide the inspection and maintenance of the drainage infrastructure and system

The City performs routine inspections and maintenance activities on all publicly owned infrastructure as part of the City’s National Pollutant Discharge Elimination

System Municipal Separate Storm Sewer System permit. This includes the periodic inspections and maintenance on critical City outfalls, piping, inlets, weirs, etc. This is an ongoing item and the City typically exceeds the State minimums for inspections. Not including staff wages, the City typically spends about \$250,000 between maintenance and capital improvements on the drainage infrastructure and system.

Goal 2 – Work in conjunction with the county, the cities and other local governments to create and support floodplain management throughout the county

Objective 2.1 – Participate in the countywide Floodplain Management Plan and associated Floodplain Management Team working group

The City continues to work with both the county and surrounding cities in a collaborative effort to help support floodplain management in Seminole County and its associated cities. This is an ongoing item that has minimal costs to the City.

Objective 2.2 – Coordinate with the County and other local government agencies to develop and administer outreach programs by business, industry, institutions, and community groups

The City continues to work with the County and local agencies to participate in the various outreach programs led by the County. This is an ongoing item with minimal costs to the City.

2020-2025 Floodplain Management Plan Action Items

	Special Flood Hazard Ordinance	
1	The County staff should review all development ordinance language pertaining to development in the Special Flood Hazard Area (SFHA) that would require new/improved infrastructure to have hazard mitigation provisions.	
	Responsible Agency	Seminole County Development Services
	Deadline	October 1, 2025
	Cost	Staff Time
	Project Status	
	Notes	
	Open Space Preservation	
2	The County should use every opportunity to encourage preservation of floodplain areas as open space or other uses compatible with the flooding hazard to preserve floodplain storage capacity and reduce the potential for damage to structures.	
	Responsible Agency	Seminole County Development Services
	Deadline	October 1, 2025
	Cost	Staff Time
	Project Status	
	Notes	
3	Evaluate Increasing Higher Standards	
	The County should continue to enforce its existing regulations for development and mobile homes and explore the cost and benefits of other higher standards to further protect the residents of Seminole County, such as a higher freeboard requirements.	
	Responsible Agency	Seminole County Development Services
	Deadline	October 1, 2025
	Cost	Staff Time
	Project Status	
	Notes	
4	Promote and Distribute Homeowner Property Evaluation Checklist	
	Promote and distribute the Homeowners Property Evaluation Checklist. Vulnerable Populations, other languages, links on websites, during permit distribution, local media outlets, realtors, insurance agencies, banking institutions.	
	Responsible Agency	Seminole County Development Services and Office of Emergency Management
	Deadline	October 1, 2025
	Cost	Staff Time
	Project Status	

2020-2025 Floodplain Management Plan Action Items

	Notes	
5	Cost Sharing Programs	
	<p>Seminole County should evaluate potential cost sharing programs both public and private, such as grants, rebates, tax, insurance credits, to encourage low cost property protection measures on private property. For example:</p> <ul style="list-style-type: none"> • Surface and subsurface drainage improvements, • Berms and regrading for shallow surface flooding, and • Relocating heating and air conditioning units above the base flood elevation • May offer free permit to citizens for flood mitigation measures 	
	Responsible Agency	Seminole County Development Services
	Deadline	October 1, 2025
	Cost	Staff Time/ Grants
	Project Status	
	Notes	
6	Funding Options	
	<p>The County should seek state and federal funding support for higher cost measures, such as elevation, relocation and acquisition of high priority properties. The Hazard Mitigation Grant Program, Flood Mitigation Assistance Program, Building Resilient Infrastructure and Communities, should be investigated for all eligible properties. High priority properties are:</p> <ul style="list-style-type: none"> • Those properties in repetitive loss areas. • Critical facilities in the special flood hazard area or subject to flood depths of more than two feet. 	
	Responsible Agency	Seminole County Office of Emergency Management
	Deadline	October 1, 2025
	Cost	Grants
	Project Status	
	Notes	
7	Water Management Ordinance	
	<p>Seminole County should continue to enforce the floodplain management, wetland protection, erosion and sediment control and BMP provisions of all water management ordinances.</p>	
	Responsible Agency	Seminole County Development Services and Seminole County Public Works
	Deadline	October 1, 2025
	Cost	Staff Time
	Project Status	
	Notes	

2020-2025 Floodplain Management Plan Action Items

8	Emergency Operations Plan	
	The Seminole County Emergency Operations Plan should be reviewed in detail on an annual basis to determine where updates and improvements can be made and how to maximize credit under CRS. The Plan should then be submitted periodically for credit under CRS, and CRS will provide a critique of the plan to show what further improvements are needed.	
	Responsible Agency	Seminole County Emergency Management
	Deadline	October 1, 2025
	Cost	Staff Time
	Project Status	
	Notes	
9	Gauge Funding	
	The County should consider all possible local, state and federal funding options for installation of additional and/or improved lake, stream, river gauges to provide a higher level of protection to its residents. The investigation of additional gauging stations should be done in cooperation with the National Weather Service, St. Johns River Water Management District, the United States Geological Survey and FEMA.	
	Responsible Agency	Seminole County Public Works and Office of Emergency Management
	Deadline	October 1, 2025
	Cost	Grants/ General Funds
	Project Status	
	Notes	
10	Review and Update Regional Evacuation Plan	
	The County should ensure that all steps are being taken to alleviate traffic jams during an evacuation of the County. Hurricane warnings versus toxic fumes may require different routes to be used for evacuation. Based on current and future population projections, the County should ensure that there is adequate roadway to carry residents and evacuees to safety.	
	Responsible Agency	Seminole County Office of Emergency Management
	Deadline	October 1, 2025
	Cost	Staff Time
	Project Status	
	Notes	
11	Review and Update Post- Disaster Emergency Permitting	
	The County's emergency preparedness, public information, and permits staffs should work together to formalize the post-disaster procedures for public information, reconstruction regulation and mitigation project identification. Those ideas should be expanded, further developed and adopted as a clear set of policies and procedures.	

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	Responsible Agency	Seminole County Development Services
	Deadline	October 1, 2025
	Cost	Staff Time
	Project Status	
	Notes	
12	Continued On-Site Detention and Retention and Evaluation of County Maintenance of Facilities	
	The County should continue to require developers to provide on-site detention and retention to lessen the volume and/or rate of runoff from developed sites. The County should evaluate the inspection and maintenance of these facilities to ensure that the designed storage is maintained and outfalls and piping remain in good condition.	
	Responsible Agency	Seminole County Development Services and Seminole County Public Works
	Deadline	October 1, 2025
	Cost	Staff Time
	Project Status	
	Notes	
13	Regional Detention	
	The County should consider the benefits of upper watershed regional detention as a way to reduce downstream flow. This approach could be combined with the preservation of open space.	
	Responsible Agency	Seminole County Development Services
	Deadline	October 1, 2025
	Cost	Staff Time/ Grants
	Project Status	
	Notes	
14	Mullet Lake Park Road Stormwater Project	
	The County should continue work on the Mullet Lake Park Road Stormwater Improvement Project for implementation to reduce flooding and avoid future repetitive loss properties. This project is already started through Hazard Mitigation Grant Program funds.	
	Responsible Agency	Seminole County Public Works
	Deadline	October 1, 2025
	Cost	Grants
	Project Status	
	Notes	
15	Outreach Projects for Flood Hazard Mitigation Benefits	

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	The public and decision makers should be informed about the flood hazard mitigation benefits of restoring rivers, wetlands and other natural areas. Restoration and protection techniques should be explained. This should include publicizing the need to protect lakes, streams, rivers and wetlands from illegal dumping and/or filling and inappropriate development. This campaign can be conducted through direct mail, website development, and/or neighborhood meetings.	
	Responsible Agency	Seminole County Public Works
	Deadline	October 1, 2025
	Cost	Staff Time
	Project Status	
	Notes	
16	Outreach Projects for Property Protection	
	Public education materials should be developed to explain property protection measures that can help owners reduce their exposure to damage by floods and the various types of insurance that are available. Because properties in floodplains may be damaged at some point, a special effort should be made to provide information and advice to floodplain property owners. Special attention should be given to repetitive loss and high hazard areas. Explore local incentives for voluntary protection measures. This can be accomplished through the following techniques: <ul style="list-style-type: none"> • The County’s website should be improved to make navigation to flood hazard and safety information more intuitive. • The County should increase its presence on social media, such as Facebook and NextDoor, to maximize the number of people reached with flood hazard and safety information. • The County should continue to distribute brochures about hurricanes to those living in the mapped floodplain. • The County should continue to hold the Hurricane Expo and Touch a Truck events. • Staff should reach out to homeowners’ associations and faith-based organizations to help spread the word about flood hazards and protection and safety measures. 	
	Responsible Agency	Seminole County Development Services and Seminole County Office of Emergency Management
	Deadline	October 1, 2025
	Cost	Staff Time
	Project Status	
	Notes	
17	Public Information Strategy	
	The County should maintain a public information outreach program strategy for credit under the CRS and to prepare a program that evaluates the County’s current outreach program in terms of what is currently working and what is not working.	
	Responsible Agency	Seminole County Community Information Division and Office of Emergency Management
	Deadline	October 1, 2025
	Cost	Staff Time

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	Project Status	
	Notes	
18	Critical Facility Protection	
	Identify critical facilities whose functionality may be impacted by flood hazards and develop mitigation measures for protection.	
	Responsible Agency	Seminole County Office of Emergency Management and Seminole County Development Services
	Deadline	October 1, 2025
	Cost	Staff Time/ Grants
	Project Status	
	Notes	