Orange County
Local Mitigation Strategy
2021

Adopted: January 11, 2022
Revised: August 17, 2022

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Record of Changes

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8/17/2022	Updated resolution dates	Page 3
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Executive Summary

Orange County is threatened by a variety of different types of natural, technological, and human-caused hazards. These hazards can endanger the overall well-being of residents, visitors, and other municipalities; threaten private business operations; and compromise the quality of life experienced in the County. Several years ago, a group of agencies in and around Orange County, joined together to establish a Local Mitigation Strategy Working Group (LMS Working Group) that addressed these hazards. They formulated potential solutions to them to reduce or eliminate the threats and the impacts. This planning process involved takes into account all of the hazards that may affect Orange County while developing effective mitigation measures to lessen the overall impact to the community.

The LMS Working Group is a multi-jurisdictional group and includes representatives from around Orange County in its hazard mitigation planning efforts. The planning process for the update of this plan was led by the Orange County Office of Emergency Management and brought together a core group, known as the LMS Planning Committee, whose members included: Orange County Public Works, Orange County Public School District, the City of Orlando, Reedy Creek Improvement District, Ranger Drainage District, the Greater Orlando Aviation Authority, the University of Central Florida, Orlando Health, and the American Red Cross. Other representatives to the LMS Working group include County agencies, municipalities, private sector, and non-profit groups. In addition to the unincorporated county, the Orange County LMS has been formally adopted via resolution or letter by eleven (11) municipalities, one (1) aviation authority, one (1) drainage district, , and one (1) university:

- Orange County (unincorporated)
- City of Apopka
- City of Belle Isle
- Town of Eatonville
- City of Edgewood
- City of Maitland
- Town of Oakland
- City of Ocoee
- City of Orlando
- Town of Windermere
- City of Winter Garden
- City of Winter Park
- Greater Orlando Aviation Authority
- Ranger Drainage District
- University of Central Florida

Following approval of this updated LMS, a new formal adoption resolution or letter must be obtained from each entity seeking to adopt the document.

The LMS Planning Committee has also conducted research on historical occurrences to identify a number of hazards that may threaten Orange County. In order to estimate the

risks, impacts, or vulnerabilities to the different affected areas of the County by each hazard, a series of outreach events was conducted in communities around the County. For each hazard, an historical impact survey was conducted that looked at the damages felt by members of the public, their property, the geographic and natural environment, the economy, and emergency preparedness efforts and operations. An analysis was completed to evaluate any potential consequences to members of the public, property, critical facilities or infrastructure, the natural environment, the economy, emergency responders, or public confidence in government operations. The information resulting from these analytical methods will be used by the LMS Working Group to help prioritize its actions prior to future disasters taking place. The LMS Working Group will also take into consideration the probability of occurrences, vulnerabilities, extent of damages, impacts, and overall risks to the populations, their property, and facilities and neighborhoods of the County in order to identify, validate, and rank specific projects from sponsoring agencies that will help to diminish or eliminate the negative impacts sustained during a disaster.

A listing of these prioritized projects or initiatives is included as part of the LMS document. As the initiatives are developed over time, both now and in the future, the LMS Working Group must continue to provide new information and research on hazard occurrences and brief the community on changes in probabilities, vulnerabilities, and risks. As development continues to occur, and as the tourism capital of the world, Orange County has a rich mixture of diverse historical neighborhoods, a strong business environment, and an exciting variety of arts and cultural venues with endless leisure and entertainment opportunities. The potential for impacts grows as well. Implementing our mitigation strategy will be essential to help to preserve our community and improve its ability to handle a disaster when it occurs. Our multi-jurisdictional approach allows our participating communities to become more resilient to the effects of major disasters as well.

As the Orange County LMS Working Group presses on, the strategy must continue to be updated, reviewed, and revised in the future to account for any changes in risks and address emerging hazards. Our County has had plenty of experience with dealing with disasters in the past, several of which have shaped the way we prepare for, respond to, and mitigate for the future. The ever-changing conditions of hazards means we must also find ways of incorporating new participation from our jurisdictions, public sector agencies, and our private sector and non-profit partners. The revision process and future versions of the Orange County Local Mitigation Strategy will be used as a means to inform and involve our general public and other interested groups so that they can fully participate in making our communities more resilient to the impacts of disasters that take place in the years to come.

Orange County Board of County Commissioners' Adoption Resolution

Annex 3 contains the full Orange County Board of County Commissioners' Adoption resolution that was presented to the Board in 2022 for the unincorporated county.

The signed adoption resolutions for the other jurisdictions can be found in Annex 3.

Name of Jurisdiction	Type of Jurisdiction	Adoption Date
Orange County (unincorporated)	County	1/11/2022
City of Apopka	City	2/2/2022
City of Belle Isle	City	2/1/2022
Town of Eatonville	Town	
City of Edgewood	City	1/18/2022
City of Maitland	City	12/13/2021
Town of Oakland	Town	3/22/2022
City of Ocoee	City	
City of Orlando	City	4/25/2022
Town of Windermere	Town	2/8/2022
City of Winter Garden	City	2/24/2022
City of Winter Park	City	
Greater Orlando Aviation Authority	Aviation Authority	2/16/2022
Ranger Drainage District	Drainage District	1/12/2022
University of Central Florida	University	11/29/2021

Section 1 - Introduction

The Orange County Local Mitigation Strategy (LMS) is a strategic plan that addresses mitigation activities taking place in County. Mitigation is defined as an effort that permanently reduces loss of life, injury, and property damage caused by natural, human-caused, or technological hazards by lessening the impact of disasters. Actions taken now, prior to the next disaster, help reduce the human, physical, and financial consequences later.

Purpose

Local Mitigation Strategies are required under Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) as enacted under the Disaster Mitigation Act of 2000 (DMA2K) in order to be eligible to receive federal hazard mitigation grants. The mitigation plan identifies potential hazards and vulnerabilities, researches historical occurrences and probability rates of return, and determines their impacts. Based on this information, vulnerable areas and populations are determined and anticipated risks are evaluated.

The LMS Working Group then sets goals and objectives for the overall mitigation strategies to be implemented. Various partnering agencies then submit specific projects or mitigation actions to reduce risk to people, buildings, the economy, critical infrastructure, and the environment. Projects and/or programs must be long-term solutions that decrease or are also cost effective . As Florida is a state that experiences many types of hazards, Florida has built a comprehensive mitigation planning program that remains one of the most proactive programs in the United States.

The LMS Working Group was established to make the whole community more resistant to natural, human-caused, and technological hazards by identifying and prioritizing mitigation projects. Following a disaster, the LMS Working Group convenes to discuss these projects and evaluate ways to implement them to reduce or eliminate the threats from future hazards.

Scope

The Orange County LMS Working Group serves as the county's multi-jurisdictional, multi-hazard mitigation advisory group and is responsible for the annual update of the LMS, along with the five (5) year update and revision. As per Florida Administrative Code (FAC) 27P-22, the LMS Working Group and associated LMS plan is required to receive federal funds post-disaster, such as the Hazard Mitigation Grant Program (HMGP) and other pre-disaster sources, such as the Pre-Disaster Mitigation and Flood Mitigation Assistance Programs.

Members of the Orange County LMS Working Group take part in conducting a hazard identification and vulnerability assessment where the hazards that may impact residents are evaluated. A hazard is considered to be any event or condition with the potential to

cause fatalities or injuries to people, property damage, infrastructure damage that effects the operation(s) of the County or its jurisdictions, agricultural loss, environmental damage, business interruption, or other structural and financial loss. The extent that the impacts that are felt as the result of a hazard and the probability of occurrence or recurrence are weighed as part of the assessment. Associated vulnerabilities are analyzed and taken into consideration, such as population demographics, economic loss, or geopgraphic areas that may be susceptible to a hazard. Other risks and a prioritized project list to address those hazards is created.

In early 2018, the National Institute of Building Sciences issued the "*Natural Hazard Mitigation Saves: 2017 Interim Report*" that reported mitigation funding "can save the nation $6 in future disaster costs for every $1 spent on hazard mitigation." This estimate was based off of 23 years of federally funded grant projects provided by the Federal Emergency Management Agency (FEMA), the U.S. Economic Development administration (EDA), and the U.S. Department of Housing and Urban Development (HUD). Hazard mitigation is extremely important because of this fact. Hazard mitigation is defined as any action taken to reduce or eliminate the long term risks to human life and property from natural, human-caused, or technological hazards. A hazard is any event or condition with the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, environmental damage, business interruption, or other structural and financial loss.

As Orange County's communities continue to grow, hazard mitigation will play an even more important role in protecting our citizens and their health, safety, and welfare. Hazard mitigation aims to make human development and the natural environment safer and more resilient. Hazard mitigation generally involves altering the built environment to significantly reduce risks and vulnerability to hazards so that life and property losses can be avoided or reduced. Mitigation can also include removing the built environment from disaster prone areas and maintaining natural mitigating features, such as wetlands or floodplains. Hazard mitigation makes it easier and less expensive to respond to and recover from disasters by breaking the damage and repair cycle.

Examples of hazard mitigation measures include, but are not limited to, the following:

- Development of mitigation standards, regulations, policies, and programs
- Land use/zoning policies
- Strong building codes and floodplain management regulations
- Dam safety program and levee systems
- Acquisition of flood prone and environmentally sensitive lands
- Retrofitting, hardening, or elevating structures and critical facilities
- Relocation of structures, infrastructure, and facilities out of vulnerable areas
- Public awareness or education campaigns
- Improvement of warning and evacuation systems

Benefits of hazard mitigation include:

- Saving lives and protecting public health
- Preventing or minimizing property damage
- Minimizing social dislocation and stress
- Reducing economic losses
- Protecting and preserving infrastructure
- Reducing legal liability of government and public officials
- Reduced expenses for response and recovery efforts

Section 2 – Planning Process and Considerations

The Orange County Local Mitigation Strategy Working Group is comprised of representatives from Orange County with a variety of government agencies at the municipal, county, and regional levels, private sector, education, healthcare, non-profit organizations, and interested citizens. The LMS Working Group has standing meetings that are typically conducted on the second Wednesday of each quarter (February, May, August, and November). These meetings are designed to update the members on current and ongoing mitigation activities; present information on hazards, vulnerabilities, and risk from subject matter experts; review mitigation methods and tactics; provide an overall update on new or emerging technologies or research methods; and to solicit input on new or potential mitigation projects from organization representatives and municipalities. Below is a list of LMS Working Group members from a variety of local organizations in the public sector from the municipal, county, and regional levels; private sector; education; and non-profit sector.

Table 1: Orange County Local Mitigation Strategy Working Group Membership

First Name	Last Name	Agency	Title/Position	Committee Participation
Albert	English	Town of Eatonville	Director – Public Works	
Art	King	Valencia College		
Bea	Meeks	City of Edgewood	City Clerk	
Bob	Boyd	Orange County Public Schools		
Bob	Francis	City of Belle Isle		
Brandon	Lawrence	City of Maitland Fire Department		
Bryan	Garey	University of Central Florida Emergency Management		Steering
Cliff	Frazier	Florida Forest Service		
Corey	Bowles	City of Ocoee Fire Department		
Dan	Hagedorn	City of Winter Park Fire Department	Fire Chief	
Dan	Niederman	Orange County Office of the Medical Director		
Daniel	Negron	Orange County Public Works Department		Vice-Chair and Planning
David	Hamstra	City of Maitland Public Works / Pegasus Engineering		
Dawn	Mullins	Ranger Drainage District		Planning
Dominic	Mezzatesta	City of Orlando/UCF		

First Name	Last Name	Agency	Title/Position	Committee Participation
Doug	Gaines	City of Ocoee		
Eric	Alberts	Orlando Health		Planning
Gary	Rudolph	University of Central Florida		
Hazem	El-Assar	Orange County Traffic Engineering		
Humberto	Castillero	Orange County Traffic Engineering		
Jacinta	Mathis	Town of Eatonville		
James	Benderson	Town of Eatonville		
Jason	McCright	Vista Lakes Community Development District		
Jim	Hunt	City of Orlando Public Works Department		Planning
Jim	Sula	City of Maitland Fire Department		
John	Corfield	Orlando Health		Planning
John	Mulhall	Orange County Emergency Management		Staff
John	Miller	Ocoee Fire Department	Fire Chief	
John	Petrelli	Orange County Risk Management Division		
Jose	Canas	Orange County Fiscal and Operational Support		
Jose	Gainza	City of Winter Garden	Fire Chief	
Joseph	Thalheimer	University of Central Florida Emergency Management	Emergency Manager	
Juan	Salazar	Orange County Risk Management Division		
Karen	Gilbert	City of Winter Park Police Department		
Kate	Hardie	Orange County Public Schools		Planning
Keila	Walker-Denis	Greater Orlando Aviation Authority	Assistant Director – Airport Operations	Planning
Kevin	Roesner	City of Winter Park Police Department		
Laura	Houston	City of Belle Isle Police Department		
Lauraleigh	Avery	Orange County Emergency Management	Director – Emergency Management	
Leylah	Saavedra	City of Maitland Public Works / Pegasus Engineering		

First Name	Last Name	Agency	Title/Position	Committee Participation
Lihua	Wei	City of Orlando Engineering Division		
Luz	Bossanyi	Florida Division of Emergency Management		
Manny	Soto	City of Orlando		Steering
Matt	McGrew	City of Winter Garden		
Mentha	Antoine	American Red Cross		Planning
Michelle	Cechowski	East Central Florida Regional Planning Council		
Mike	Drozeck	Orange County Public Works Department		
Mike	Parker	Town of Oakland Public Works	Director	
Mike	Galura	Town of Windermere		
Mira	Tanna	City of Orlando Office of Business and Financial Services		
Misael	Lugo	Town of Eatonville		
Nat	Prapinpongsa none	City of Orlando Public Works Department		
Orville	Watson	Orange County Utilities Dept.		Steering
Penni	Long	Orange County Public Schools		
Phillip	Francom	Orange County Fire Rescue Department		
Rachel	Reid	Orlando Health		
Reed	Knowlton	Orange County Capital Projects Division		
Rhonda	Anderson	Town of Eatonville		
Rich	Steiger	Orange County Facilities Management		
Richard	Earp	City of Apopka		Planning
Richard	Campanale	City of Ocoee Public Works		
Robert	Smith	Town of Windermere		
Rodney	Kapel	Universal Orlando		
Scott	Rayburn	Rollins College		
Scott	Brown	Town of Windermere Public Works		
Sean	Wylam	City of Apopka Fire Department	Fire Chief	
Sean	Gallagher	Florida Forest Service		
Stockton	Reeves	Center for Public Safety		

First Name	Last Name	Agency	Title/Position	Committee Participation
Susan	Davis	St. John's River Water Management District		
Tanya	Naylor	Reedy Creek Improvement District		
Tanya	Elliott-Moore	Town of Windermere	Director	
Teri	Curtis	Orange County Convention Center		
Todd	Stalbaum	Orange County Health Services		
Tom	Draper	Greater Orlando Aviation Authority		
Will	Watts	City of Maitland Fire Department	Fire Chief	
William	Graf	South Florida Water Management District		
Yolanda	Quiceno	City of Belle Isle	City Clerk	

LMS Committees

The LMS Working Group utilizes a committee structure, made up of volunteers from the LMS Working Group members, to discuss mitigation projects and activities in further depth. There are two standing committees: the Steering Committee and the Planning Committee; the roles and responsibilities of each committee can be found in Appendix C – LMS Working Group By Laws. The Steering Committee is charged with providing the overall direction and guidance that the LMS Working Group should be taking. They are tasked with the oversight and coordination of actions or decisions made by the LMS Working Group.

The Planning Committee is tasked with identifying, analyzing, and monitoring the potential hazards that may threaten Orange County, mainly the natural hazards, though there are a few human-caused or technological hazards that have been profiled as well. The complete list of the hazards applicable to Orange County is found in the most recent Orange County Comprehensive Emergency Management Plan (CEMP). The Planning Committee is also responsible for reviewing, ranking, and prioritizing potential mitigation projects.

The Planning Committee meets several times each year on an as-needed basis to review projects. The Committee held meetings on August 22, 2013 to begin the process of implementing a new Project Submittal Form and explain the process for project sponsors to submit new projects or update current projects. Subsequent meetings were held throughout the year for the purpose of initiating the annual review and revision of the Local Mitigation Strategy document, along with the five-year plan update. The LMS Plan Update is another responsibility of the Planning Committee.

Plan Update Participation

The LMS document was developed by the LMS Planning Committee in accordance with the Local Mitigation Plan Review Tool (44 CFR 201.6) as established by the Federal Emergency Management Agency (FEMA). The principal planning effort was directed by the Orange County Office of Emergency Management (OCOEM) and accomplished through a combined collaborative effort of various agencies and organizations represented on the LMS Working Group. The Planning Committee consists of the following LMS members:

- Orange County Office of Emergency Management
- Orange County Public Schools
- Orange County Public Works
- City of Orlando
- Greater Orlando Aviation Authority
- Orlando Health
- Ranger Drainage District
- Reedy Creek Improvement District
- University of Central Florida

Update Process 2021

The Orange County LMS Working Group and Planning Committee used the 2020 FL Review Tool to initially review the 2016 Orange County LMS. Based upon the preliminary review, the plan update met the crosswalk requirements, but several sections would need a substantive revision based upon new information and processes to be compliant with the guidance. A complete review of every section of the Orange County LMS was conducted and the plan was updated using the 2020 Florida Local Mitigation Strategy Crosswalk

The following is a description of the review process:

- Executive Summary and Section 1 - Introduction:
  These sections include an overview of the plan, an introduction, a discussion on the scope and purpose of the document, along with goals and objectives, and the participants in the planning process. This section was revised to reflect the current approach taken by the Orange County LMS Working Group and Planning Committee.

- Section 2 – Planning Process and Considerations:
  The Planning Process from the previous 2016 plan was reviewed and utilized for the 2021 update. Minor information was updated, including the update of the LMS Committees and 2021 update process.

- Section 3 – Hazard Risk and Vulnerability Assessment
  - Orange County Demographics and Land Use

The facts and figures here were updated and revised based on the 2019 Census and other statistical estimates provided by the University of Florida, Bureau of Economic and Business Research (BEBR) and the Metro Orlando Economic Development Commission (MOEDC). New information from the revised County Comprehensive Plan was also incorporated.

- Hazard Identification and Vulnerability Analysis
  Several new hazards were identified as potential or emerging trends with other hazards classified as "threats" and not "hazards." Most of the historical occurrences were updated to include current events, facts, or figures since the previous update. Other assessment tools had to be utilized with the lack of maintenance to the Mapping for Emergency Management, Parallel Hazard Information System (MEMPHIS). Other methodologies for a hazard and vulnerability tool were assessed.

- Section 4 – Strategic Goals and Capabilities:
  This section was reviewed and no major changes were specifically identified.
- Appendices
  This section was updated accordingly based on relevant information. Appendix A and D was updated with new information.
- Annexes
  This section was updated accordingly based on relevant information. Annex 4 and 5 were updated with new information

Meeting Summaries and Attendance for each Planning Committee Meeting can be found in Appendix A; below is a brief overview of each meeting.

- The Kick-Off meeting for the LMS Planning Committee's review of the LMS document was held on May 18, 2021; this meeting reviewed the Goals & Objectives of the previous LMS and changes were recommended, along with reviewing the LMS plan hazards and vulnerability analysis.

- The next meeting on June 6, 2021, brought the Committee together to discuss the update process and needed information from stakeholders.

- The meeting on August 11, 2021, brought the Committee together to discuss the updated draft to include the hazard/vulnerability analysis as well as to talk about any identified gaps in information.

Agendas and Sign-In sheets for all Planning Committee and Working Group meetings to discuss the LMS Update will be included in Appendix A.

The draft revisions of all of the LMS sections were distributed to each of the LMS Planning Committee members for their review and comment(s). Upon further revision,

the draft was made available to all Working Group members and stakeholders. A follow up meeting will be conducted to review the final draft to approve all of the revised sections.

Stakeholders

Each regularly scheduled and publicly noticed quarterly LMS Working Group meetings over the past year contained a Plan Update section where Working Group members can receive information on the status of the LMS document. Our stakeholders are comprised primarily of our Working Group members that include County organizations and agencies, municipal and regional representatives, private and non-profit sector members, and others involved in hazard mitigation activities at all levels. Stakeholders are identified through their role in mitigation actions and initiatives, recommendations from current members, or other related agencies or programs; invitations are sent out by the LMS Coordinator.

Each LMS Working Group meeting includes an opportunity for the current Working Group members to identify new or potential stakeholders. Once they are invited to the Working Group meetings, they have an opportunity to provide feedback in the overall planning process. As required by Florida Administrative Code 27P-22.004, the LMS Coordinator, on behalf of the Working Group, will send out annual invitations by mail, e-mail, and/or phone call to those identified agencies/organizations that may have a stake in the LMS planning process. Additional individuals or representative groups within, and around Orange County, will also be identified and invited accordingly.

Public

Members of the public are also welcomed to these meetings to obtain their input in the planning process. Separate public participation activities will also be used to solicit input to involve the community to include their comments and reactions as part of the planning process and to provide basic community outreach and public information on the basics of mitigations and its benefits.

In the past, the drafts and final drafts of the LMS updates were made available to local area public libraries and posted to the County website. For the current review/update process, no public comments were provided. Comments provided by the public are typically received and reviewed for incorporation into the plan by the LMS Committee during scheduled meetings. By providing multiple venues and methods for members of the public to view the LMS update, both in hardcopy and electronic means, the Orange County Local Mitigation Working Group increases the potential for public comment of its draft and final versions of the document. Once the plan has been approved by the State of Florida and FEMA, and adopted by the Board of County Commissioners, it will continue to be made available to our community as a public document.

Existing Plans, Studies, Reports, and Technical Information Integration

Throughout the planning process, the LMS Planning Committee reviewed and evaluated a variety of other existing plans, studies, reports, and other technical information. This included documents from local jurisdictions and municipalities, County departments and agencies, surrounding counties, regional entities, and the State of Florida Enhanced Hazard Mitigation Plan. The information contained in these plans, studies, reports, and information sources were included throughout the LMS to better reinforce the relationship between the LMS planning process, growth management, land use, and emergency management documents already being used within Orange County. The source documents include, but are not limited to:

- Orange County Comprehensive Plan, 2010-2030
- Orange County Comprehensive Emergency Management Plan (CEMP), 2018
- Orange County Public Works Emergency Operations Plan, 2013
- Orange County Post-Disaster Redevelopment Plan (PDRP), 2012
- Orange County Community Wildfire Protection Plan (CWPP) (draft), 2014-2015
- Orange County Disaster Housing Strategy, 2012
- Orange County Traffic and Shelter Operations Manual for Coastal Evacuations, 2014
- Orange County InfoMap FEMA Flood Zones, 2014 (accessed)
- Orange County Stormwater Management Division Lake Index, 2009
- Orange County Repetitive Flood Loss Properties Database, 2013
- Orange County Severe Repetitive Flood Loss Properties Database, 2013
- Orange County Annual Rainfall Report, 2012
- Emergency Management Accreditation Program (EMAP) Orange County, Florida Assessment Report, 2013
- Southern Wildfire Risk Assessment Summary Report for Orange County, 2014
- City of Orlando Growth Management Plan, 2009
- Municipal Flood Plain Ordinances, various
- Threat and Hazard Identification and Risk Assessment (THIRA) for Orlando/Orange Urban Area Security Initiative, 2012
- Central Florida Regional Domestic Security Task Force (RDSTF) Inland Regional Evacuation Plan, 2012
- Central Florida RDSTF Regional Response Plan, 2012
- St. Johns River Water Management District Lands Assessment Implementation Plan for Property in Orange County, 2012
- South Florida Water Management District Strategic Plan, 2012-2017
- State of Florida Multi Year Training Exercise Plan, 2015-2017
- State of Florida Enhanced Hazard Mitigation Plan, 2013
- State of Florida Department of Environmental Protection Sinkhole Database, 2014 (accessed)
- National Weather Service Weather Events Report, 2014
- Federal Emergency Management Agency (FEMA) Digital Flood Insurance Rate Maps, 2014 (accessed)
- FEMA Community Rating System (CRS) Program, 2013

The incorporation of elements from these other documents was designed to increase the compatibility of the LMS document with existing standards and to analyze the hazards that can occur in Orange County. One of the most effective methods to integrate the LMS is the sharing of similar goals and objectives. This includes agreement with floodplain ordinances, county and municipal comprehensive plans, land development codes, strategic plans, building codes, emergency management plans, etc.

Incorporation of the LMS into Other Planning Efforts

The Orange County Office of Emergency Management (OCOEM) and its participating jurisdictions are responsible for incorporating the LMS into their plans, such as the Comprehensive Emergency Management Plan (CEMP) and the Post-Disaster Redevelopment Plan (PDRP). The response and recovery strategies, and the processes developed in other plans, provide a prime example where the LMS has been a driving force. During the planning process, the Office of Emergency Management reviewed the LMS for consistency and identified opportunities to link the LMS to the revised plans. Both of the previously mentioned plans rely heavily on the hazard and vulnerability assessment portion of the LMS. In subsequent revisions, those plans will do the same.

Another critical area for the incorporation of mitigation information is in the area of the Emergency Management Accreditation Program (EMAP). There are several EMAP standards where the Hazard Identification and Risk Assessment (HIRA) document is pivotal for compliance with the standards. Orange County has used the LMS in the past as one of the reference documents to show compliance, along with the CEMP. Therefore, the LMS serves as a keystone document for Orange County's continued accreditation compliance.

The LMS is one of several ways that Orange County's Emergency Management Program can provide technical assistance for mitigation codes and ordinances. For example, all structural retrofits of existing buildings or construction of new buildings must meet the minimum requirements found in the Florida Building Code (FBC) 2000 (and later), as well as other national standards like the American Society for Civil Engineering (ASCE) 7-98 (and later), American Red Cross (ARC) 4496 Standards for Hurricane Evacuation Shelter Selection, and/or Enhanced Hurricane Protection Area (EHPA) recommended design levels.

The Florida Fire Prevention Code deals with the design, construction, erection, alteration, modification, repair, and demolition of buildings, structures, and facilities and is generally enforced by the state, county, or municipal Fire Marshal. The Code is part of Florida Statute (F.S.) Chapter 633. The State also adopted the National Fire Protection Association's Standard 1, Fire Prevention Code, but this does not include a building, mechanical, or plumbing code.

Land-use ordinances are instituted by Florida Statute (F.S.) Chapter 163 and Florida Administrative Code (F.A.C.) Rule 9J-5. The Growth Management Act of 1985 requires

that every local government in Florida adopt a comprehensive plan to guide growth and development and must include elements that address future land us, housing, transportation, infrastructure, conservation, recreation and open space, intergovernmental coordination, and capital improvements. The Orange County Comprehensive Plan that is developed and written by the Orange County Community, Environmental & Development Services (CEDS) Planning Division. The most recent version was amended January 17, 2015 and went into effect on March 30, 2015.

OCOEM staff is also involved in the development of other county, municipal, regional, and statewide plans. Those opportunities for input can connect the Orange County LMS to other plans, policies, and procedures outside of Emergency Management when another plan is under development. OCOEM should consider making those policies and initiatives consistent with the LMS. The Comprehensive/Growth Management Plans at the county and municipal levels serve as an example. Their planning process includes looking at both short- and long-term needs and addressing gaps and initiatives through policy changes, land use development, and budgetary considerations.

Typically, though, they have not focused on hazard mitigation components as part of their designs. The Orange County LMS Coordinator has spoken to some of those involved with the County's Comprehensive Plan to see about attending coordination meetings for the future to represent the goals and objectives of the LMS, as well as provide portions of the hazards analysis and vulnerability assessment so that those priorities are represented. Other potential opportunities for further integration of mitigation information may be in local building code amendments or enforcement, development or revision of local floodplain ordinances, or other land use regulations for developments.

Public education and outreach concerning hazards, vulnerabilities, and potential mitigation solutions is a large component of the OCOEM and its staff. Several events are held each year where groups of residents are provided with information on some of the hazards we face in Orange County. OCOEM regularly provides information to a variety of resident groups, businesses, non-profits, and other partnering agencies on actions they can take to reduce or eliminate the impacts from a disaster.

Orange County hosts an annual Hurricane Expo where government agencies and private sector members provide disaster solutions or demonstrate mitigation tactics, such as screens and shutters, disaster supplies and kits, and flood-proofing buildings. The LMS Coordinator has met with a local area Firewise Neighborhood in Wedgefield to discuss their wildfire mitigation techniques and has incorporated their tactics into the Community Wildfire Protection Plan for implementation countywide or for other neighborhoods looking to become Firewise. Several crossover components of the Community Rating System (CRS) and the LMS are being evaluated to determine what, if any, additional points could be awarded for public education and outreach activities.

By incorporating hazard mitigation information and/or actions into public outreach efforts, the LMS goals and objectives are made known to our stakeholders and the general public. The ultimate aim of the LMS is to provide those in our County with a

means to reduce or eliminate the impacts from a hazard and rebound back to normal after a disaster.

Updates: Evaluate, Maintain, and Revise – Monitoring

The information contained in the LMS document must be updated over time as changes within the growing community of Orange County affects the vulnerability and potential risks faced. This update process will require the continued participation of the public, as well as personnel within Orange County and its municipalities. Consideration for Federal and/or State requirements must be taken into account.

In addition, changes in development trends and land use policies that are outlined in the growth management plans may change how the various strategies and mitigation initiatives are implemented within the county. Further development of building codes, construction materials, data sources, or other applicable legislation, procedures, and guidelines will impact future planning methods. Disaster events or emergency incidents can also alter mitigation plans or reveal new vulnerabilities. These changes will need to be reflected in the LMS. New projects will also be added to the list as the life of the document lengthens. As projects or initiatives are completed, there may be positive changes that have increased the resilience of our community that will factor into the future plan updates. These are all changes that will occur on an ongoing basis that need to be reflected in the LMS document to keep it current with the status of the county. For the 2021 update, there have been no significant changes in development in the county or its jurisdictions that have resulted in revisions to this document.

Every five years, the LMS document is submitted to the State and to FEMA for review, as well as to ensure that any and all legal updates or new information requirements are incorporated into the existing document. The update process, which includes an evaluation of the active plan, as well as public participation and to allow for proper review, should begin at least one year before the expiration of the plan and should be initiated by the LMS Coordinator. Submittal to the State for preliminary review should be six months before the expiration to allow for additions or corrections. Public workshops, which require a public meeting notice to be submitted for purposes of public awareness, will occur during this span of time (approximately six months) to allow for public input.

A periodic evaluation of the plans should also take place before the update process begins. The LMS Working Group and Planning Committee should be comprised of the representation from the county, its jurisdictions, Orange County's Office of Emergency Management, as well as any other volunteers from the Working Group. The Planning Committee should meet at least once a year, or following a disaster declaration, to review the concurrent crosswalk, incorporate any hazard event information, and identify any existing deficiencies in the document. The Chair of the Planning Committee (Vice Chair of the Working Group) and/or the LMS Coordinator will deliver their evaluation of the document at the first LMS Working Group Meeting of the calendar year to coincide with the submittal of the Annual Report sent to the State of Florida, Division of

Emergency Management's Mitigation Bureau no later than January 31 of each year, as per FAC 27P-22.

In order to monitor this document so that it remains current and applicable to Orange County, the LMS Working Group is required to meet, at minimum, once per year. The general consensus has determined that this is too infrequent and the Working Group should meet about four times per year, or once a quarter, to discuss changes in mitigation initiatives, projects, and other issues within the county related to hazard mitigation. These quarterly meetings give the Working Group the opportunity to receive an update of current mitigation projects that are underway, submit for consideration and rank new mitigation projects, and to hear about the progress of completed mitigation projects. Other considerations should be made to track the implementation of the LMS and to help ensure that the listed goals and objectives are being met.

It is essential that all facets of the community be represented at the Working Group meetings, including the public, to ensure that the plan is staying up to date with all aspects of the community. Section 2 of this document contains a description of the update process that provides more detailed information on how the local governments, non-profits, community members, and private sector participation will continue to be involved in the on-going mitigation planning and updating process. There is a standardized format for project submittals that covers particular elements of each project which is detailed in Section 4. Projects can be submitted throughout the planning period where they will be evaluated by the Planning Committee, approved by the Working Group, and then included in the LMS. It is through the schedule of meetings (found in Table 2), currently facilitated by LMS Coordinator, that the LMS document will be monitored, evaluated and updated for Orange County.

Table 2: Schedule for Evaluation, Maintenance, and Revision

Year	Quarter 1		Quarter 2		Quarter 3		Quarter 4	
Adoption of LMS (Year 0)	J		A		J		O	
	F	LMS Adopted by Orange County BCC	M	Working Group Meeting	A	Working Group Meeting	N	Working Group Meeting
	M		J		S		D	
Year 1	J	Maintenance: Annual Report submitted to FDEM	A		J	Evaluation: Planning Committee Meeting for any needed changes	O	Record any updates to the hazard occurrence data in plan
	F	Working Group Meeting	M	Working Group Meeting	A	Working Group Meeting	N	Working Group Meeting
	M		J		S		D	

Year 2	J	Maintenance: Annual Report submitted to FDEM	A		J	Evaluation: Planning Committee Meeting for any needed changes	O	Record any updates to the hazard occurrence data in plan
	F	Working Group Meeting	M	Working Group Meeting	A	Working Group Meeting	N	Working Group Meeting
	M		J		S		D	
Year 3	J	Maintenance: Annual Report submitted to FDEM	A		J	Evaluation: Planning Committee Meeting for any needed changes	O	Record any updates to the hazard occurrence data in plan
	F	Working Group Meeting	M	Working Group Meeting	A	Working Group Meeting	N	Working Group Meeting
	M		J		S		D	
Year 4	J	Maintenance: Annual Report submitted to FDEM	A	Revision: Revised LMS submitted to FDEM for review	J	Revision: Public Workshop for Input	O	Record any updates to the hazard occurrence data in plan
	F	Working Group Meeting	M	Working Group Meeting	A	Working Group Meeting	N	Working Group Meeting
	M		J		S		D	Revision: Required changes from review re-submitted for Approval by FDEM
Year 5 (Updated	J		A		J		O	

LMS Submittal)								
	F	Revision: LMS Adopted by Orange County BCC	M		A		N	
	M		J		S		D	

Plan Adoption Process

Once the LMS has been reviewed by the State and/or FEMA and is found to have met all of the compliance criteria established in the Local Mitigation Plan Review Tool (44 CFR 201.6), the plan will received letter with a status of "approved pending adoption." Upon receiving this letter, the Orange County Board of County Commissioners will be presented with an Adoption Resolution (annex 3) for signature approval. Members of the public will be given a final opportunity for comments at the Board of County Commissioners' meeting. Continued public participation and education is critical for the implementation of the LMS.

Other jurisdictions wishing to adopt the Orange County Local Mitigation Strategy will then be presented with similar adoption resolutions for their governing bodies to adopt as well. In all, there are fourteen (14) entities that plan to adopt the Orange County LMS. Copies of each signed adoption resolution will be presented to the State of Florida, Division of Emergency Management Mitigation Bureau for review and incorporation into the plan.

Section 3 – Hazard Risk and Vulnerability Assessment

The identification of hazards that have the ability to impact Orange County and its municipalities is a crucial step in the process of creating and maintaining a Local Mitigation Strategy. By determining what populations, properties, and areas of the county are most vulnerable to these various hazards, measures can be taken to help prevent or reduce the vulnerabilities and/or their impact(s).

This section is directly related to fulfilling the requirements set forth in the Emergency Management Accreditation Program (EMAP). The particular requirements of the standards will be addressed throughout the following sections to assist Orange County and its jurisdictions with accreditation measures in the future.

The following hazards and sub-hazards are based on the various natural, technological, and/or human-caused disasters that have been identified as having potential to impact Orange County and are as follows:

- Diseases and Pandemic
  - Animal
  - Human
  - Plant/Agriculture
- Extreme Temperatures
  - Drought
  - Freezes/Winter Storms
  - Heat Waves
- Floods
- Severe Thunderstorms
  - Hail
  - Lightning
  - Tornados
- Sinkholes/Land-subsidence
- Hazardous Materials
- Terrorism/CBRNE
- Tropical Systems
- Wildfires

A review of historical data, previous disaster declarations, information provided by the National Weather Service (NWS), and other research was conducted for this section for natural, human-caused, and technological hazards. This section will describe each hazard, its potential impact(s) to the County, as well as list previous occurrences, vulnerabilities, probability of occurrence, and the associated risk(s).

Due to State requirements for the Comprehensive Emergency Management Plan (CEMP), Orange County is required to include the following hazards: Civil Disturbances, Critical Infrastructure Failure, Major Transportation Incidents, Mass Migration, Radiological Nuclear accidents and Special Events. As these hazards were considered to have minimal impacts, they were excluded from an in-depth analysis and as such are not included or otherwise mentioned in the Local Mitigation Strategy (LMS).

Other types of hazards that exist elsewhere in the nation but do not significantly impact the County, or are without recorded occurrences, include: avalanche, coastal erosion, earthquake, expansive soils, tsunamis, or volcano eruptions. Also refer to the updated Appendix B of this document for the LMS Hazards Quick Reference Table for summarized information for Orange County's hazards and the associated risk and vulnerability assessment and consequence and impact analysis.

Demographics

Before the hazards are examined, a description of the county's population characteristics and demographics, land uses, development trends, housing, and income levels of its residents is provided. These aspects of the county are examined in order to determine the levels of vulnerability for different areas of the county and to assist in future land use planning activities.

Population Characteristics

Orange County has a land area of about 903 square miles (or 578,195 acres) and total area of 1,003 square miles. According to the U.S. Census Bureau (USCB), the total resident population in 2019 was 1,393,452, which yielded a density of 1,543 persons per square mile. Around 35.25 % of the County's 2019 population resided in its thirteen incorporated municipalities (Table 3) with the remainder living in the unincorporated County.

Table 3: Estimated Population Totals by Municipality, 2019

Municipalities	Population Totals	Percentage of Total County Population
Apopka	53,447	3.84%
Bay Lake	61	0.00%
Belle Isle	7,010	0.50%
Eatonville	2,321	0.17%
Edgewood	2,899	0.21%
Lake Buena Vista	4	0.00%
Maitland	17,765	1.27%
Oakland	3,014	0.22%
Ocoee	46,305	3.32%
Orlando	280,832	20.15%
Windermere	3,430	0.25%
Winter Garden	43,648	3.13%
Winter Park	30,522	2.19%
Unincorporated Orange County	902,194	64.75%
Total	1,393,452	100%

Source: U.S. Census Bureau ACS, 2019

The most recent population projection for Orange County in 2019 is listed at 1,393,452 according to the USCB American Community Survey (ACS). This would mean a growth rate of 21.6% from 2010. Orange County largest in the eight-county region (which includes Brevard, Lake, Marion, Orange, Osceola, Seminole, Sumter, and Volusia Counties). Orange County still comprises nearly a third of the region's population (32.7% in 2019) despite the region adopting two additional counties (Marion and Sumter Counties) in recent years. Orange County is primarily a metropolitan county and is the hub of the Orlando-Kissimmee-Sanford, Florida Metropolitan Statistical Area (MSA).

The age of the population of Orange County has risen since the previous census. The Median age rose from 33.8 in 2010 to 35.6 in 2019, according to the USCB ACS. The age group distributions for the county are changing as a result. The current age group distribution reflects the youthful low median age with the largest population group of 25 – 54 at 44.2% of the total population; in addition, the 18 – 24 age group was the third highest group at 11.5%. The 55 – 65 population comprised only 10.8% of the population. The elderly and very young may be potentially vulnerable populations and special considerations must be made in their care. The second highest age group was 22.8% for the 0 – 17 years of age. The 65 and over group was the smallest age group at just 10.7%.

Table 4: Population by Race, 2019

Race	Number	Percentage
White	885,678	63.56%
Black	291,789	20.94%
American Indian / Native Alaskan	3,205	0.23%
Asian	71,902	5.16%
Hawaiian / Pacific Islander	1,115	0.08%
Other	89,320	6.41%
Two Race	50,164	3.60%
Total	**1,393,452**	

Source: U.S. Census Bureau ACS, 2019

Vulnerable Populations

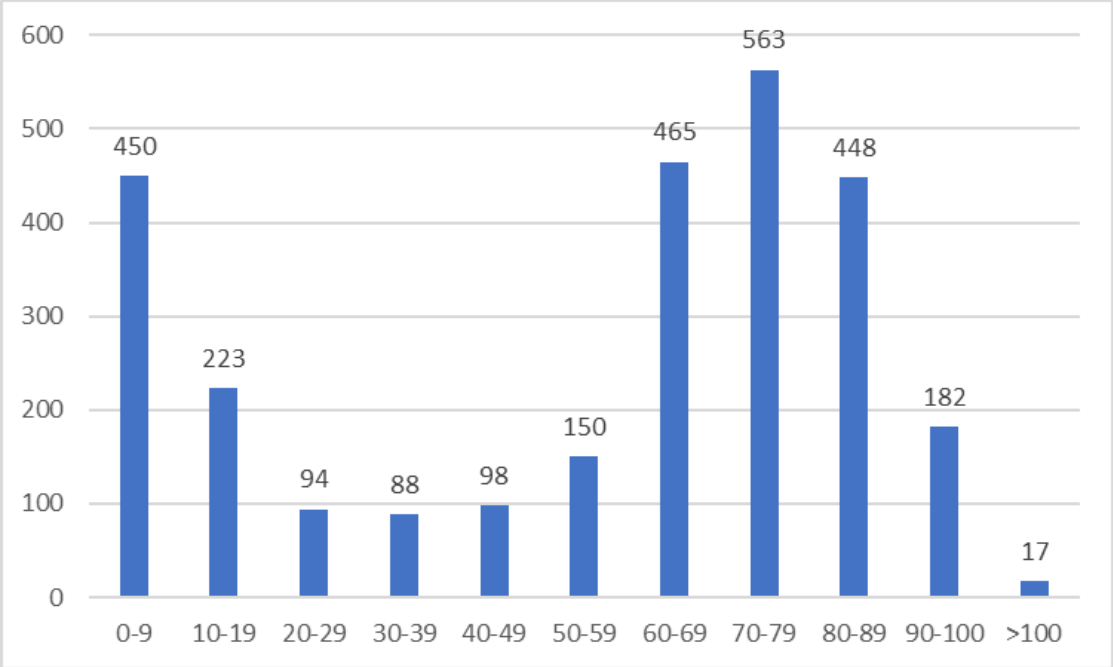
There are several other population groups who require special attention for planning considerations due to their increased vulnerability. These populations

1. **Special Needs Populations**

   Orange County makes considerations for the needs of persons requiring special medical attention through the People with Special Needs (PSN) Program. This program is designed for an Orange County resident or visitor that, during times of disaster evacuation, has no other alternative and/or requires transportation assistance to evacuate their home and/or has a health/medical condition that requires medical attention by skilled medical professional(s) in a shelter environment. As of June 2021, there were over 3,758 people who had registered with the County's special needs program with about 2,818 considered to be active/engaged registrants. During a disaster situation, people who are listed on this registry will be notified ahead of time to make plans for their transport and safety to a nearby shelter, if the need arises. Figure A shows the age groups of persons with special medical needs in Orange County.

   The PSN program also provides emergency preparedness information to special needs citizens throughout the year by participating in community events. In addition, persons registered with the PSN Program receive emergency preparedness information annually. PSN Program staff is also available for community presentation. The PSN Program is also responsible for the management of Special Needs Shelters during times of disaster by developing the necessary equipment and staff utilized to operate a Special Needs Shelter. The PSN Program partners with local emergency responder agencies to ensure that residences of persons housed in a Special Needs Shelter are safe for them to return home. In addition, the PSN Program provides information on disaster related services that may be needed.

Figure A: Population by Age of Persons with Special Needs in Orange County



Source: Orange County Emergency Medical Services Office, 2021

2. **Disabled Population**

According to the 2019 USCB ACS, Orange County has an estimated 137,715 civilian non-institutionalized individuals with a disability. Some of these individuals may be registered with our PSN Program described previously. Others may have "access or functional needs," which may be described as physical, sensory, mental health, and cognitive and/or intellectual disabilities affecting their ability to function independently without assistance. Planning for accommodating our Functional Needs Support Services (FNSS) clientele has been a growing focus over the past few years to ensure that all populations have access to general population shelters while at the same time trying to reserve our Special Needs Shelters for those critical cases. These individuals may have various forms of disabilities including, but are not limited to:

- Deaf and/or Hard of Hearing
- Blind and/or Visually Impaired
- Physical Disabilities
- Mental Disabilities
- Medical Disabilities

3. **Farm Worker Populations**

The Orange County Health Department licenses two permitted labor camps in Orange County. However, in recent years, this has been a declining program in Orange County primarily due to weather freezes and the decline of farming in Orange County as development continues to occur. 2017 USCB ACS estimated that the County had approximately 3,758 farmworkers, accounting for 3.32% of the State total.

4. **Tourism and Seasonal Populations**

According to *Visit Orlando*,[1] the Orlando market, which encompasses a metropolitan area from Kissimmee in Osceola County, Orlando in Orange County, and Sanford in Seminole County, hosted a record number of visitors during the 2019 year with an estimated 69.29 million domestic visitors, with 6.49 million international travelers for a total of 75.79 million tourists. Approximately 84% of the domestic visitors were here for recreational purposes. Due to the COVID-19 Pandemic in 2020, there was a drop of over 50% from 2019 in visitors to the Orlando market.

In order to accommodate these visitors, Orange County has about 450 hotels with more than 127,000 guest rooms.[2] The number of hotel rooms is expected to increase over the next few years as additional attractions continue to be built. This fluctuating population of visitors and seasonal guests means that on any given day, there could be thousands of additional people visiting Orange County area attractions.

Most of these visitors are temporary tourists; however, there is a seasonal influx of longer-term visitors during the late-fall and winter months (November to March). Many international visitors are seasonal as well and may stay for several weeks during various points in the year. The additional tourist and seasonal populations have the potential to put stress on the emergency management systems that are currently in place. Additional capacity for emergency shelters has been included as Orange County is a "host county" to accommodate visitors to the area and other coastal counties' evacuations.

The reliance on the travel and tourism industry is a potential vulnerability as well. If a large-scale disaster were to occur in Orange County, it may discourage tourists from visiting the area temporarily during the initial response and short-term recovery phase. Until Orange County returns to normal, the number of visitors could decline, which means impacts to total revenue as well as tax revenue. The market/industry may take some time to recover from significant impacts, which places this particular vulnerability high at the list for mitigation.

5. **Non-English Speaking**

Orange County is made up of a diverse population that speaks languages other than English. According to the USCB ACS in 2019, 813,017 individuals (62.07%) spoke English as their first language while 496,741 people spoke a language other than English (37.93%). A multitude of other languages are spoken in Orange County. The most prominent foreign languages include: Spanish, Haitian, and Portuguese. Spanish is the largest single foreign language spoken with 356,492 people (27.22%). Haitian is next with 45,662 (3.49%) followed by Portuguese at 15,678 (1.20%). Providing outreach and education information or interpretation services prior to,

[1] https://visitorlando.widen.net/s/hrmrzsb5dq/vo-2021-orlando-visitor-volume-2020
[2] https://www.visitorlando.com/media/research/orlando-data/

during, and following disasters are critical to helping protect our community. This can add a layer of complexity to our emergency preparedness roles.

6. **Homeless Population**

Orange County's current homeless population is estimated at 3,638 individuals.[3] A homeless person is defined by the State as an individual:

- Sleeping in a place not meant for human habitation
- Sleeping in an homeless emergency shelter
- Living in transitional housing having come into that housing from the street or from a homeless emergency shelter

According to the Homeless Services Network and Central Florida Commission on Homelessness (HSNCFL) there are 26 transient camps within the county. These are located throughout the community, but are mainly on the east side of the County.

7. **Inmate Population**

The Orange County Jail serves as the County's central correctional facility. This facility is the 3rd largest jail system in the State of Florida with more than 1,700 employees, including over 1,000 certified correctional employees. The jail's population is estimated to be 3,265 inmates, according to the 2020 BEBR statistics. These populations are vulnerable due to their inability to easily relocate to another facility without advanced notice and many logistical needs for security and protection to prevent an inmate escape. No notice events, such as tornados and hazardous materials incidents may also make it difficult to shelter-in-place for such a concentrated population.

8. **Housing**

According to the USCB American Community Survey (ACS), through the American Fact Finder webpage, estimated that in 2019 there were a total of 556,898 housing units in Orange County. This includes apartments, houses, mobile homes, boats, recreational vehicles and vans. A breakdown of these figures is shown in Table 5-A.

[3] Source: https://www.hmiscfl.org/community_snapshot/

Table 5-A: 2019 Housing Units in Orange County, FL

Types of Housing	Number	Percentage
Occupied housing units	457,949	82.2%
Owner - occupied housing units	*262,330*	*57.3%*
Renter - occupied housing units	*195,619*	*42.7%*
Vacant housing units	98,949	17.8%

Source: U.S. Census Bureau American Community Survey, 2019

For Orange County, our most vulnerable housing units are those that are not secured to a foundation, such as mobile homes, boats, recreational vehicles or vans. According to the USCB ACS estimates in 2019, there were 844 boat, recreational vehicle, van, etc. housing units, or less than 0.2%. The ACS states that approximately 3.8% of all occupied housing in Orange County was mobile homes. The Orange County Property Appraiser estimates that there are 125 mobile home parks with 5,375 manufactured homes within the County.

Table 5-B: 2021 Parcel Stock in Orange County, FL

Parcel Type	Number	Percentage
Single Family Residential	302,798	68.80%
Residential Condos	51,257	11.65%
Townhomes	24,289	5.52%
Timeshares	75	0.02%
Multi-Family	4,119	0.94%
Apartment Complexes	1,066	0.24%
Hotels	315	0.07%
Mobile Home Parks	125	0.03%
Manufactured Homes	5,375	1.22%
Vacant Residential Land	22,343	5.08%
Commercial	23,505	5.34%
Agricultural/Industrial	4,851	1.10%
Total	**440,118**	**100.00%**

Source: Orange County Property Appraiser website, http://www.ocpafl.org/

Another potential vulnerability is the age of the housing structure. Just under half of all housing structures in Orange County (48.1%) were built prior to 1990, which is before the implementation of the Florida Building Code in 1992. Refer to Table 6 for further information. This may mean an increased vulnerability as the standards developed following the devastation of Hurricane Andrew may not exist in many of these homes. There is some likelihood that many of the homes may have been

brought up to the code due to renovations or other work to meet compliance. However, if they have not been, then a large number of homes may be more susceptible to many of the natural/severe weather and tropical system hazards to which Orange County is subjected to on an annual basis. The replacement value on these homes, especially some of the older homes, may also be higher in order to bring them up to the code requirements. Keep in mind that these numbers do not reflect commercial or industrial structure, only housing structures.

Table 6: Year Structure Built in Orange County

Year Structure Built	Number	Percentage
Built 1939 or earlier	7,035	1.3%
Built 1940 to 1949	8,653	1.6%
Built 1950 to 1959	38,723	7.0%
Built 1960 to 1969	37,477	6.7%
Built 1970 to 1979	66,519	11.9%
Built 1980 to 1989	109,140	19.6%
Built 1990 to 1999	106,127	19.1%
Built 2000 to 2009	113,343	20.4%
Built 2010 to 2013	22,914	4.1%
Built 2014 or later	46,997	8.4%
Total	**556,898**	**100%**

Source: U.S. Census Bureau, 2019 estimate

Hazard and Vulnerability Assessment Tool Methodology

The Planning Committee proposed the use of a Hazard and Vulnerability Assessment Tool based of a model developed by Kaiser Permanente, which is used by local area hospitals to systematically address hazards and prioritize planning, mitigation, response, and recovery activities. Several components were modulated to account for differing needs and focuses. The following factors were used to determine the overall risk of each hazard: the probability of future instances; the severity of the hazard, including the magnitude felt by the human impacts, property impacts, spatial impacts, and economic impacts; and mitigation measures currently in place to address the hazard(s). Based on these inputs, the overall vulnerability generated a score which represents the relative risk for the hazards.

> Note: the Orange County Planning Committee has tried to provide the most comprehensive information possible for each potential hazard. In some instances the information was incomplete or there was only partially available data; the Committee should plan to continue its research, seek out further analytical tools or databases, and include new information in the LMS whenever possible as part of its annual monitoring.

Using the formula "Risk = Probability * Severity," each potential hazard described in this section is ranked by level of relative risk, probability, and severity. These scales are defined below:

Probability Scale – This scale takes into effect the likelihood that Orange County will be impacted by the hazard within a given period of time or the return rate of a hazard and is based on the historical data, estimated return periods, recurrence, or chance of occurrence.

- 0 = None – Although the hazard is noted, no previous occurrence has been recorded; or less than a 0.1% chance of occurrence; or a 1,000-year event or greater.
- 1 = Low – The hazard has occurred 10 years or more ago; or greater than 0.1% to 1.0% chance of occurrence; or a 100-year event.
- 2 = Moderate – The hazard has occurred in the past 6 to 10 years; or greater than 1.0% to 2.0% chance of occurrence; or a 50-year event.
- 3 = High – The hazard to occurred in the past 1-5 years; or greater than 2.0% chance of occurrence; or less than a 50-year event.

Severity Scale – based on the magnitude of the hazard and the on-going mitigation measures in place to counteract those hazards. The severity describes how intense a hazard may be felt and comprised of its impacts, as well as any mitigation actions to offset the impacts.

Magnitude – the degree to which impacts may be felt or a measured intensity:

Human Impacts – Possibility of death or injury to the population

- 0 = None – No possibility of death or injury
- 1 = Low – Less than 2 deaths or 10 injuries reported or expected
- 2 = Moderate – Between 2 – 5 deaths or 10 – 25 injuries reported or expected
- 3 = High – More than 5 deaths or 25 injuries reported or expected

Property Impacts – Physical losses and damages to property, buildings, or other critical infrastructure

- 0 = None – No possibility of physical loss and/or damage
- 1 = Low – Physical losses and/or damages are reported or expected to be less than $10,000
- 2 = Moderate – Physical losses and/or damages are reported or expected to be between $10,000 and $1,000,000
- 3 = High – Physical losses and/or damages are reported or expected to be greater than $1,000,000

Spatial Impacts – Amount of geographic area affected

- 0 = None – No geographic area affected
- 1 = Low – Up to 25% of total area or jurisdiction affected
- 2 = Moderate – 26%-50% of total area or jurisdiction affected
- 3 = High – 50% or more of total area or jurisdiction affected

Economic Impacts (Interruption of businesses, infrastructure, or government services)

- 0 = None – No interruption of services or no more than 12 hours
- 1 = Low – Interruption of services between 1 – 3 days
- 2 = Moderate – Interruption of services between 3 – 7 days
- 3 = High – Interruption of services greater than 7 days

Mitigation – methods, tactics, or plans used to address vulnerabilities to offset impacts felt by the jurisdiction

Preparedness – Specialized Plans that address a particular hazard

- 0 = High – Specific plan dedicated to this hazard
- 1 = Moderate – Hazard is addressed in multiple plans
- 2 = Low – Hazard is addressed in one plan
- 3 = None – No plans address this hazard

Training and Exercising – as part of a multi-year training and exercise plan

- 0 = High – Yearly training and exercising
- 1 = Moderate – Training and exercising completed every other year
- 2 = Low – Rarely trained or exercised
- 3 = None – No training or exercising on this hazard

Logistics – Availability of specialized equipment, teams, or support

- 0 = High – Highly specialized equipment, teams, or support available
- 1 = Moderate –Some specialized equipment, teams, or support available
- 2 = Low – Minimal equipment, teams, or support available
- 3 = None – No specialized equipment, teams, or support available

Relative Risk – Risk is culmination of all of these factors to determine the overall exposure of the county and its municipalities to danger, harm, or losses. Relative risk is used to bring a level of parity to all of the variables that go in to the assessment of the threats that may impact our community as compared to each of the hazards. The risk scoring is based on a 0% to 100% scale and is calculated using the below formula:

Probability x (Magnitude-Mitigation) = Relative Risk

- Low – Risk scoring is less than 30%
- Medium – Risk scoring is between 31% to 60%
- High – Risk scoring is 61% or greater

Please note that the scoring of the main hazard is an average of the scoring for the sub-hazards. If there is any difference of scoring, these items will be noted.

Figure B: Orange County LMS Hazard and Vulnerability Assessment Tool

ORANGE COUNTY LMS
HAZARD AND VULNERABILITY ASSESSMENT TOOL

HAZARD	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)							RISK
		HUMAN IMPACT	PROPERTY IMPACT	ENVIRONMENTAL	PROGRAM OPERATIONS	PREPAREDNESS	TRAINING EXERCISE	LOGISTICS	
	Likelihood this will occur	*Possibility of death or injury*	*Physical losses and damages*	*Amount of Environment Affected (Spatial Impacts)*	*Interruption of services*	*Specialized Plans*	*Multi-year Training and/or Exercise Planning*	*Equipment, Teams, and/or Support*	*Relative threat**
SCORE	0 = No threat 1 = 10+ years 2 = 6-10 yrs 3 = 1-5 yrs	0 = None 1 = Low 2 = Moderate 3 = High	0 = None 1 = Low 2 = Moderate 3 = High	0 = None 1 = Up to 25% 2 = 26-50% 3 - 51% or more	0 = None 1 = Low 2 = Moderate 3 = High	0 = Specific Plan 1 = Addressed in other plans 2 = Addressed in one plan 3 = No plans address	0 = Yearly 1 = Every other year 2 = Rarely 3 = None	0 = Highly Specialized 1 = Moderate 2 = Minimal 3 = None	*0 - 100%*
Diseases and Pandemic	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**1**	**52%**
Animal	2	1	3	2	3	2	2	1	44%
Human	3	3	2	3	3	1	0	0	57%
Plant / Agriculture	2	1	3	2	3	2	3	2	51%
Extreme Temperatures	**3**	**1**	**1**	**2**	**2**	**2**	**3**	**2**	**54%**
Drought	3	0	1	2	3	2	2	2	57%
Freezes / Winter Storms	2	1	1	2	2	2	3	2	41%
Heat Waves	3	1	1	2	1	2	3	3	62%
Floods	**3**	**1**	**2**	**2**	**2**	**1**	**1**	**0**	**43%**
Severe Thunderstorms	**3**	**1**	**2**	**1**	**2**	**2**	**3**	**1**	**59%**
Hail	3	0	2	1	1	2	3	2	52%
Lightning	3	1	2	1	1	2	3	1	52%
Tornados	3	3	3	2	3	1	2	1	71%
Sinkholes / Land-subsidence	**3**	**1**	**3**	**1**	**2**	**1**	**3**	**2**	**62%**
Hazardous Materials	**3**	**2**	**1**	**1**	**2**	**0**	**0**	**0**	**29%**
Terrorism / CBRNE	**2**	**3**	**3**	**1**	**3**	**0**	**0**	**0**	**32%**
Cyberterrorism	**3**	**1**	**2**	**3**	**3**	**1**	**2**	**1**	**62%**
Tropical Systems	**3**	**3**	**3**	**3**	**3**	**1**	**0**	**1**	**67%**
Wildfires	**3**	**1**	**3**	**1**	**3**	**1**	**1**	**1**	**52%**

**Threat increases with percentage.*

LOW	0%-30%	MEDIUM	31%-60%	HIGH	61%+

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Hazard/Risk Identification and Vulnerability Descriptions

The following section identifies and describes the potential hazards for Orange County and its jurisdictions. Each potential hazard and sub-hazard that has been identified for Orange County has been evaluated and analyzed by the Planning Committee. While these potential hazards that may threaten Orange County are mainly natural hazards, there are a few human-caused or technological hazards that have been profiled as well. The complete list of the hazards applicable to Orange County is found in the most recent Orange County Comprehensive Emergency Management Plan (CEMP). A hazard/risk identification and vulnerability assessment is conducted as a process of defining, identifying, and classifying vulnerabilities and their risks to Orange County and its municipalities. For the following section, the hazards will be briefly described, along with any sub-hazards.

Each hazard will then have a listing of previous occurrences (as applicable), the location of the affected area(s), and the extent of damages. Other factors, such as those measured by the Hazard and Vulnerability Assessment Tool, will be discussed here to present the overall risk of each hazard. This includes: the probability of future instances; the severity of the hazard, including the magnitude felt by the human impacts, property impacts, spatial impacts, and economic impacts; mitigation measures currently in place to address the hazard(s); the overall vulnerability; and the relative risk for the hazards.

Diseases and Pandemic

Description: Diseases and Pandemic are caused by a number of different microbiological organisms such as bacteria, viruses, fungi, parasites, or other pathogens. According to the Orange County Health Department there are a variety of diseases that can affect animals, humans, and plants/agriculture in Orange County. For the most part, these diseases have been mild in nature with minimal impacts or widespread casualties in Orange County. The majority of diseases or pandemic outbreaks are controlled by the Health Department and most of the trends we see are reported by physicians, hospitals, laboratories, or other medical providers and community partners.

Several diseases present an annual threat to Orange County. Societal, environmental and technological factors impact the occurrence and persistence of diseases worldwide, as new diseases emerge or new vulnerabilities present themselves each year. Old diseases may even reappear or develop drug-resistant strains in animals or humans, such as malaria, tuberculosis, or bacterial pneumonias. Many diseases can be carried by infected people, animals, and/or insects. There are even those that can contaminate local agriculture and impact the crop harvest.

Animal

There are a number of diseases that can be transmitted amongst Orange County's animal population, both for pets as well as livestock. The State of Florida's Department of Agriculture and Consumer Services, Division of Animal Industry oversees the reporting of these diseases.

- Avian Influenza
- Hoof and Mouth
- Rabies
- Swine Influenza

There have been isolated reports of these Animal diseases, but none to the degree to cause large impacts or losses in Orange County. However, there is still a chance that these diseases or others could create significant impacts in the future.

Human

Human diseases can be caused by a range of pathogens with varying symptoms and effects, from mild to lethal. Many of these are regularly occurring, such as influenza or its many different strains that circulates across the United States and overseas. Most healthy people recover from the flu without problems, but certain people, such as children, elderly, or individuals with compromised immune systems, are at a higher risk for serious complications. Due to the large visitor populations that come to Orange County, there is a higher chance for exposure to many types of human diseases from all over the country or even the world.

During 2013-2014 Orange County experienced a handful of cases of Middle East Respiratory Syndrome (MERS) from international travelers. The monitoring for Ebola and preparedness efforts were significantly higher over the past year as well due to its outbreak in West African countries, but no cases occurred in Florida. Tuberculosis has also seen a higher than normal rate of occurrence, especially in the transient and farm worker populations. In 2015-2016, the Zika virus, another mosquito-borne virus, made an appearance primarily through travel-related cases around the country with several hundred people in Orange County being infected. As is the case with emerging infectious diseases, it is tough to predict where, when, and how many people may be affected, or how long the effects may last.

On January 11, 2020, Chinese health authorities preliminarily identified more than 40 human infections with novel coronavirus in an outbreak of pneumonia under investigation in Wuhan City, Hubei Province, China. Chinese health authorities subsequently posted the full genome of the so-called "novel coronavirus 2019", or "2019-nCoV", in GenBank ®, the National Institutes of Health genetic sequence database.

On February 11, 2020 the World Health Organization announced an official name for the disease that is causing the 2019 novel coronavirus outbreak, COVID-19 and declared it a pandemic outbreak on March 11, 2020.[4]

Human diseases can come in a variety of different pathogens, each with their own varying degrees of infection, symptoms, and lethality. Some of these that have been diagnosed in Orange County are listed below; however, this is by no means a comprehensive list of possible diseases that exist or may come to exist in the future.

- Botulism
- Coronavirus
- Dengue Fever
- E. Coli
- Hepatitis A, B, and C
- Influenza strains
- Meningitis (Bacterial & Mycotic)
- Salmonellosis
- Tuberculosis
- West Nile Virus
- Zika Virus

Public health systems in Orange County and support from other health and medical providers help to create an extensive network for monitoring infection trends.

Plant / Agriculture

Florida is among the top three agriculture-producing states in the nation with Orange County listed as the 9th highest county for the value of agricultural products in 2007 at $270 million. These industries are susceptible to many hazards including freezes, droughts, and exotic pests or diseases. Agricultural crops are grown predominantly in the rural areas of the county, including the eastern and northwestern portions of the county. Most crops are vulnerable to the effects of some kind of disease or pest/infestation. As a result, much like the rest of Florida, growers in Orange County uses large volumes of pesticides to help promote healthy crops. Silviculture and agriculture, especially citrus production, plays a role in the Orange County economy. The main threats to the Orange County agriculture industry are:

- Citrus Canker
- Fungal diseases
- Huanglongbing (or Citrus Greening)

[4] Florida Department of Health – Novel Coronavirus (2019nCoV)

Previous Occurrences: Orange County has already experienced some significant occurrences of diseases over the years, such as the COVID-19 Pandemic in 2020 and 2021, various influenza strains like H1N1 in 2009, Norovirus in 2010 and 2012, MERS in 2014, and West Nile virus in 2014. Most of these cases were isolated instances with relatively minor impacts to those affected.

Other diseases, like Tuberculosis and Influenza occur each year or along a seasonal cycle. These impact a significant number of people. Tuberculosis cases numbered 72 in 2012 and 57 in 2013 in Orange County. Influenza cases are typically higher in Orange County than other surrounding counties due to the higher population, more dense/urban locations, and access to monitoring and reporting from healthcare agencies, like hospitals and urgent care facilities.

Several diseases that do not naturally occur in the State were imported into the Orange County, such as malaria, Dengue Fever, and Chikungunya fever. The instances of the imported diseases were relatively few in number and did not typically spread. In addition, the past couple of years has seen a world-wide awareness of pandemic diseases, like Ebola, although there were no incidents in the entire State of Florida. Other infectious diseases, the Zika virus, saw several hundred instances, but the lethality is extremely low. There have been cases of pregnant women whose offspring have developed microcephaly and other severe fetal brain defects.
There has not been a large scale epidemic or pandemic of animal, human, or plant/agriculture diseases in Orange County. They have stayed relatively isolated or on a small scale.

Location: All of Orange County may be susceptible to diseases and pandemic, whether animal, human, or plant/agriculture. The centrally developed urban areas would be more likely to transmit human diseases or contain outbreaks whereas the more rural areas would be able to sustain the impacts from livestock/animal diseases. Plant or agricultural diseases would be found on or near farmlands and other agricultural properties. While these diseases do not acknowledge political boundaries, they can have an impact on the individuals who run the services and systems of the County-wide infrastructure, businesses, and government services.

Extent: Three terms are commonly used to classify disease impacts: endemic, epidemic, and pandemic. An endemic is present at all times at a low frequency, like chicken pox. An epidemic is a sudden severe outbreak of disease, much as the bubonic plague was during Middle Ages in Europe. A pandemic is an epidemic that becomes very widespread and affects a whole region, a continent, or the world, such as the 2020 COVID-19 pandemic caused over 600,000 deaths in the U.S. and over 4 million deaths worldwide. Fears of pandemic outbreaks have risen in recent years as new diseases enter our populations.

Orange County's growing visitor population, foreign residents, transportation network, and international travelers may also play a role for increasing the likelihood of infection. Our growing resident population may also increase the

extent that most areas of the county could become exposed to a disease as it can travel more quickly and creates difficulty in preventing the spread of infection. Expectations are that Orange County would first experience an epidemic with smaller-scale outbreaks; every attempt would be made by the public health system in place to address this type of incident. If the public health system were to become overwhelmed, or if the rate of spread were to reach a tipping point, a pandemic level could be reached in a worst-case scenario. The most likely situation for a pandemic in Orange County would likely be from a strain of Influenza; this is the scenario public health agencies are preparing for their operations and are focusing on for their prevention activities.

Probability: There is a high probability that Orange County will experience some form of disease every 1 – 5 years and, depending on the different types of pathogens, there may be multiple diseases that can impact Orange County at multiple points throughout the year. While many of the diseases are cyclical in nature with a high rate of occurrence, most will not reach the epidemic or pandemic state. Historically, influenza pandemics have occurred every 11-39 years.

Impacts: There have been injuries associated with diseases in Orange County where people or animals have been hospitalized for periods of time or, in some cases, have resulted in death. The nature of some of these pathogens have the potential to be lethal, especially in vulnerable populations like children, the elderly, transient populations, or others.

Buildings, infrastructure, and critical facilities have some potential for impact by this hazard. The resulting impacts of and outbreak can vary from complete shut-down of a facility, limited use, or added protective actions to slow or stop the spread.

The spatial extent of damage as a result of disease outbreak is noted as high, the incident can be expected to encompass more than 50% of the total land mass of the County. Pandemics have always been a continuing risk for Orange County and the State of Florida. Pandemic refers to the global spread of a disease, while an epidemic is localized to a geographic region. An influenza pandemic occurs when there is a worldwide spread of a new strain of influenza.

Economic impacts or interruption of service may be associated with disease and pandemic outbreak. There may also be some law enforcement/security issues if a large-scale pandemic were to occur. Infectious disease control would also impact social services, mass care, and healthcare systems. Economic losses may be seen in terms of lost revenue to individuals due to sickness or impact supply chains, worker populations, and/or tourism dollars.

Mitigation Measures: Orange County's Health Services (ESF-8) is the lead agency if a pandemic outbreak were to occur. On a day-by-day basis, they conduct mitigation measures that include epidemiological surveillance, public outreach, and distribute medicine for treatment. They

also track the trends of possible outbreaks throughout the county while monitoring the state, country, and world for potential issues. They also maintain plans to address mainly human diseases and conduct annual exercises and periodic training. There are also more specialized teams that are equipped to deal with human diseases. During 2020 the County developed the OC Strategic Response to COVID-19 Playbook to document and assist in potential future pandemic/infectious disease incidents. Animal and plant/agriculture diseases do not tend to have as much preventative measures.

Vulnerability: Any place where living creatures gather has the potential to be vulnerable to diseases and pandemics. Orange County has several urban areas where populations are more densely concentrated, such as Orlando, Ocoee, Maitland, Winter Garden, Apopka, and Winter Park. Other vulnerable areas may present themselves at area theme parks where visitors or seasonal residents from around the world are present. This may allow human diseases to be more easily transmissible, especially in vulnerable populations like children and the elderly. On the positive side, there are a number of local area hospitals, medical clinics, and other healthcare providers that monitor for potential epidemiology and infectious disease. Systems are in place to provide medicines and other mass prophylaxis through Points of Dispensing (PODs) in case of epidemic or pandemic and additional support can be brought in through other State agencies. This helps to decrease the vulnerability of the county and its municipalities.

Meanwhile, less densely populated municipalities or rural areas of the unincorporated county that are used for agriculture, silviculture, or raising livestock are more susceptible to animal and plant diseases. There are monitoring systems in place around the county, such as sentinel chickens, that are used to detect the presence of certain pathogens, like Dengue Fever or West Nile virus that are spread by mosquitos. Other State agencies are also on hand to help provide additional support, supplies, or equipment to identify, assess, or treat diseases found in animal or plant/crops that reduces the vulnerability of the county and its municipalities.

There are several different vulnerable populations that exist for Diseases and Pandemic. Farm workers could potentially impact the spread of plant or agriculture diseases without realizing they are carrying mold, bacteria, or viral agents on their clothing or footwear. Those workers that come into contact with animal may potentially help spread pathogens to other animal populations as well. Children, elderly, inmates, and transient populations may be the most vulnerable to human diseases, as well as those with specials needs whose immune systems may be compromised. Seasonal visitors may also be susceptible to human diseases as they may come into contact with large numbers of people from all over the world.

Risk: Medium – 48% overall;
Animal – 44%, Human – 43%, and Plant/Agriculture – 51%

As previously stated, the most likely pandemic Orange County would face would be from a strain of Influenza. This type of pandemic would occur when a new influenza virus emerges for which there is little or no immunity for humans. This new virus could then begin to cause serious illness, and spread easily from person-to-person. Prior to the COVID-19 Pandemic that started in 2020, Orange County has occasionally experienced small-scale health related incidents such as a heightened threat to the H1N1 Influenza virus in 2009.

Diseases, especially when they reach an epidemic or pandemic phase, can result in thousands of people becoming ill or dying. Property impacts for animals and plants/crops could reach into the millions of dollars in damages as well. This hazard could also disrupt government services and businesses due to sickness or quarantine efforts of individuals/employees, as well as cause major disruption in our critical infrastructure (electrical, telecommunication, roadways, water, wastewater, etc.) through the absence of the individuals who maintain these systems and operations. These disruptions would generally be isolated, but could potentially include the multiple portions around the County thereby making the impact to diseases equally felt countywide.

Extreme Temperatures

Orange County, as a whole, can experience natural temperature changes throughout the year; generally the temperatures are characteristic of a tropical climate, but its geography has it situated on the southern fringe of the humid subtropical climate zone. There are two main climatic seasons each year. The first is warm with good amounts of rainfall that lasts from May until late September. The second is drier and relatively cooler, from late October through April, which has less rainfall. The county's warm and humid climate is due to a low, flat elevation near the center of Florida peninsula.

Several types of sub-hazards are associated with Orange County's Extreme Temperatures: drought, freezes/winter storms, and heat waves. Each of these hazards has its own list of previous occurrences, affected locations, extent of damages, probability of future incidents, impacts, vulnerabilities, and overall risks. As such, these sub-hazards will each be described and evaluated separately.

Drought

Description: Drought is basically a deficiency of precipitation over an extended period of time, resulting in a water shortage for some type of activity, group, or an environmental sector.

Drought should be considered relative to some long-term average condition of balance between precipitation and "evapotranspiration" (i.e., evaporation plus transpiration) in a particular area, a condition often perceived as "normal." It is

also related to the timing (i.e., principal season of occurrence, delays in the start of the rainy season, occurrence of rains in relation to principal crop growth stages) and the effectiveness (i.e., rainfall intensity, number of rainfall events) of the rains. Other climatic factors such as high temperature, high wind, and low relative humidity are often associated with it in many regions of the world and can significantly intensify its severity.

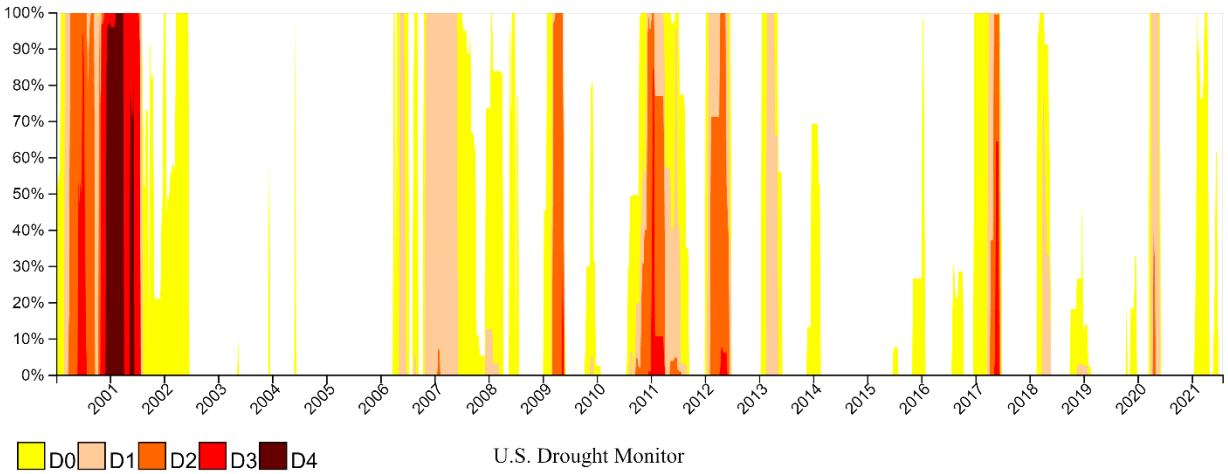
When drought begins, the agricultural sector is usually the first to be impacted because of its heavy dependence on stored soil water. Those who rely on surface water (i.e., reservoirs and lakes) and subsurface water (i.e., ground water), for example, are usually the last to be affected. A short-term drought that persists for three to six months may have little impact on these sectors, depending on the characteristics of the hydrologic system and water use requirements.

Previous Occurrences: Since 2000, the longest duration of drought (D1-D4) in Florida lasted 124 weeks beginning on April 11, 2006 and ending on August 19, 2008. The most intense period of drought occurred the week of February 27, 2001 where D4 (Exceptional Drought) affected 39.08% of Florida land.

No major drought events have taken place since the last LMS update.

The figure below shows a 20-year comparison of drought by condition for Orange County. D4 drought conditions are defined as conditions where exceptional and widespread crop/pasture losses occur as well as shortages of water which create water emergencies.

Figure C: 20-Year Drought Comparison for Orange County, FL (2001 – 2021)



Source: The National Oceanic and Atmospheric Administration's (NOAA's) National Integrated Drought Information System (NIDIS) (https://www.drought.gov)

Location: All of Orange County is equally able to experience drought conditions as the lack of soil moisture is felt all of the county. However, the degrees to which the impacts of drought may affect an area differ based upon the social,

environmental, or economic effects. Rural areas of the unincorporated County and its jurisdictions, such as Apopka, Winter Garden, or Oakland may be more susceptible to the impacts from drought as their local economies are dependent upon plants, crops, agriculture, silviculture, or livestock. Other areas that are affected by drought due to its impact on water systems for commercial, industrial, or tourism economies such as Bay Lake, Lake Buena Vista, or Winter Park may also be impacted. Residential communities may also be affected by long term or severe droughts, as the homes or other structures that attract residents are situated by water sources could dry up and become less desirable, such as in Belle Isle, Edgewood, Maitland, Orlando, Ocoee, Windermere, and Winter Park. All jurisdictions and municipalities could be impacted by this hazard.

Extent: The categorical U.S. Drought Monitor statistic is the percent of the area in a certain drought category. This ranges from "None" to "D4," with a comprehensive list of impacts corresponding to the severity of the drought. The Drought Monitor uses these labels to denote general drought areas by the intensity of the impacts being felt at that time based upon soil moisture deficits.

Table 7: Categorical U.S. Drought Monitor Statistic Drought Severity Classification

Category	Description	Possible Impacts
None	No drought conditions	No impacts
D0	Abnormally Dry (not a drought)	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed
D4	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions spread water shortages or restrictions
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies

Source: U.S. Drought Monitor

Probability: The likelihood of drought returning in Orange County is high as it is likely for an occurrence, in some form, to be nearly annual. However, the severity for each incident is variable and can range anywhere from a D1 (moderate drought) to D4 (exceptional drought). A lower severity is more likely to occur and generally precedes the higher severity for many weeks before the greater impacts are felt. Drought conditions have generally improved since the last peak drought period in 2012. Weather outlooks extend only so far, but as new data is gathered and interpreted, these predictions can change. At this time, our nation

is moving into an El Niño weather system for the next few months, which typically means a period of time of above average precipitation and cooler temperatures. This is not a guarantee that drought will not occur in the coming years though.

Impacts: Drought is usually associated with long periods of intense heat and/or small amounts of precipitation. Drought usually does not directly affect humans, but extreme heat associated with a drought period can cause injury and even death, particularly among our vulnerable populations, such as children, elderly citizens, transient populations, and/or other special needs populations. Injuries and potential deaths are most likely to impact rural or economically disadvantaged areas that lack air conditioning and immediate medical care.

The largest impact for periods of prolonged drought is the financial impact to the agriculture industry for crops or livestock. Severe drought would likely damage or possibly destroy crops prior to harvest or limit the number of livestock that could be reared. Exceptional droughts would devastate much of the agricultural and ornamental plants sector for Orange County. According to the Small Business Administration (SBA), there has not been a disaster loan issued for drought from 2008 to 2021. This does not eliminate the fact that drought has potentially affected agricultural businesses over the past several years, only that there has not been a declared disaster by the SBA related to drought. While drought may not have a measurable effect on residences, public facilities, or critical infrastructure, there are other consequences that could be felt. Impacts to water supplies or water utilities would likely be the worst-case scenario for a period of severe to exceptional drought.

Extended periods of drought over a number of months, or even years, could have long-term environmental impacts on the area, including species endangerment, changes to the local agricultural makeup, and produce prices. Much of the citrus industry in Orange County has seen losses in production due to drought over the past several years. There is also an increased risk for sinkhole formation after a long period of drought conditions is followed by a downpour in precipitation. Flooding is another potential hazard associated with drought as the dry ground cannot absorb the sudden amount of moisture. Wildfires may also be more likely to occur during drought conditions as the soil moisture can impact vegetative growth, which provides a fuel source for the fire.

Mitigation Measures: As a result of recurring droughts, the local St. Johns River Water Management District (SJRWMD) and the South Florida Water Management District (SFWMD) have imposed watering restrictions for landscaping irrigation in Florida to improve efficient use of water resources that can become scarce during drought periods. Limiting the number of days per week and the time of day watering occurs has helped to reduce drought impacts and conserve our water resources for some of the most necessary places. Orange County has adopted ordinances for water use and drought resistant landscaping to help reduce watering

needs during drought. Other jurisdictions, such as Apopka, Maitland, Ocoee, Winter Garden, and Winter Park have adopted similar types of ordinances.

Drought generally has not made its way into many of Orange County's preparedness plans, but it is addressed in the Comprehensive Emergency Management Plan (CEMP). Very little training and exercise are conducted in relationship to drought due to its slow-moving, long-term nature. Concerted efforts by the Water Management Districts and Land-Use or Growth Management groups to help prevent the impacts from drought are where most of the mitigation efforts are focused, but very little logistical support is dedicated to drought mitigation or relief.

Vulnerability: Orange County is vulnerable to drought due to how widespread its impacts can be felt across the entire county and its jurisdictions. While the impacts themselves have not directly resulted in loss of life or many casualties, the absence of soil moisture that indicates drought are mainly determined by our weather patterns and how much rain falls in Orange County. This hazard can be somewhat unpredictable as to when it occurs, or at least how severe it will be, and that in part makes Orange County and its jurisdictions vulnerable to it. Orange County has experienced only minimal impacts to property with very little directly caused by drought. However, there have been economic impacts experienced in the past to agriculture, crops, and plants that have brought about moderate losses to the county.

Orange County and its jurisdictions are equally vulnerable to droughts. Populations that are directly vulnerable to drought are limited, but may include those groups whose employment is directly tied to soil moisture, such as farm workers. Associated hazards, such as heat waves, sinkholes, wildfires, and even flooding may be exacerbated due to drought conditions in Orange County. Other populations may be affected by these resulting or associated hazards, such as the transient population that are looking for refuge from the conditions caused by drought. The tourist, visitors, and seasonal residents may also be discouraged to visit or relocate to Orange County because of these associated hazards.

The natural environment of Orange County and its jurisdictions is also vulnerable to the effects of drought as smaller water bodies can dry up or recede, and further impacts to neighborhoods, homes, and other communities may experience the secondary hazards associated with drought such as wildfire, sinkholes, and heat wave. Periods of drought may also worsen flood conditions if and when a substantial amount of rain arrives. Stormwater/runoff may increase as the ground has hardened and is unable to absorb the moisture quickly enough. This can cause ponding or flooding in areas that might not usually be susceptible to flooding.

Our critical infrastructure may not be directly vulnerable to drought as most buildings are not impacted by the drought itself; however, other related conditions may affect water lines or damage the ground near power lines or gas pipelines that could create a utility outage. These conditions would require long periods of drought and are an extreme instance, but could potentially occur in Orange County.

Risk: Medium – 57%

Due to the high rate of return for drought and the anticipated severity, but with few mitigation measures currently in place, this hazard is scored as a Medium relative risk. In addition, drought has great potential to be a long-term hazard and can persist for many months or even years with little to no abatement. Existing policies, legislation, and action by Water Management Districts and Land-Use/Growth Management have helped to curb the impacts in Orange County. For the most part though, the hazard on its own does not impact residents or visitors to Orange County and its jurisdictions; it is the associated hazards that can create the most disruption.

Freezes / Winter Storms

Description: A winter storm is defined as a storm that can range from a few hours of moderate snow to blizzard-like conditions with wind-driven snow that can last for days. Winter storms can impede visibility, affect driving conditions, and can have an impact on communications, electricity, or other critical services. Winter storms can range from several states to one county. Orange County is not generally susceptible to winter storms, because temperatures rarely reach snow-producing levels. This does not mean that snow and winter weather is unheard of, but it is a rare occurrence. The climactic conditions for long lasting winter storms are also not favorable.

Temperatures, however, can reach freezing levels low enough to cause damage to crops and water lines/pipes. Freezing occurs when temperatures are below freezing (32° F) over a wide spread area for a significant period of time. Freezing temperatures can damage agricultural crops and burst water pipes in homes and other buildings. Frost, often associated with freezes can increase damaging effects. Frost is a layer of ice crystals that is produced by the deposit of water from the air onto a surface that is at, or below, the freezing point. A freeze warning is issued to make the public and agricultural interests aware of anticipated freezing conditions over a large area. Similarly, a hard freeze is issued under the same conditions as a freeze warning, but the temperatures may stay well below 28° F for the duration of four hours or more.

Previous Occurrences: During the winter season, humidity is normally lower and the temperatures are more moderate, but they can easily change back and forth from high to low. Temperatures can dip below the freezing mark on an average of 2.4 nights per year. The lowest recorded temperature was 18 °F, which was

set on December 28, 1894. These low temperatures caused great damage to the burgeoning citrus industry in Orange County and are known as the "Great Freeze of 1894-1895."

Because the winter season is dry and freezing temperatures usually occur only after cold fronts have passed, snow is exceptionally rare in Orange County. The only accumulation ever to occur in the county, at least since written records began, was in 1948. It is also quite possible that accumulations occurred in connection with the Great Blizzard of 1899. Flurries, ice, and other winter weather have also been sporadically observed in 1989 and 2006. More recently, a handful of freezes were recorded in 2003, 2009, and 2010, some of which caused damage mainly to the citrus crops. These events are recorded in Table 8 below with data comprised from the National Weather Service (NWS) and the Spatial Hazard Events and Losses Database for the United States (SHELDUS™). There have not been any significant freezes or winter storms in Orange County since 2010. A freeze warning was issued for some parts of Central Florida for February 20, 2015; Orange County received a wind-chill advisory. Winter temperatures since 2011 have approached freezing on a few occasions, but either did not dip below the temperature thresholds or for a long enough time to be considered a freeze.

Table 8: Historical Winter Weather in Orange County

Start Date	End Date	Winter Weather Type	Estimated Crop Damages ($)	Adjusted Crop Damage (2013 $)
03/23/1968	03/25/1968	Winter Weather*	$3,676	$24,611
01/10/1977	01/21/1977	Winter Weather*	$746,269	$2,868,787
01/21/1985	01/23/1985	Winter Weather*	$74,627	$161,569
02/23/1989	02/23/1989	Winter Weather*	$1,136,360	$2,134,863
12/22/1989	12/25/1989	Winter Weather*	$746,269	$1,402,005
01/24/2003	01/24/2003	Winter Weather*	$10,000	$12,661
01/21/2009		Frost/Freeze	$0	$0
01/02/2010	01/13/2010	Frost/Freeze*	$840,000	$897,402
12/14/2010		Frost/Freeze	$0	$0
12/27/2010	12/29/2010	Frost/Freeze*	$1,110,000	$1,185,853
Total Estimated Damages			**$4,667,201**	**$7,501,898**

**Note: Information obtained from SHELDUS™*
Source: NWS and SHELDUS™

Location: While all of Orange County is equally vulnerable to freezes and winter storms. The degree that the impacts of freezes or winter storms may affect an area can differ based upon the social, environmental, or economic effects. Rural areas of the unincorporated County and its jurisdictions, such as Apopka, Winter Garden, or Oakland may be more susceptible to the impacts of cold weather as their local economies are dependent upon plants, crops, agriculture, silviculture,

or livestock. Other more densely populated areas, like Maitland, Ocoee, and Orlando, may have higher vulnerable populations, like the elderly, transient that may be vulnerable to cold weather, freezes, or winter storms.

Extent: The extent of damages for freezes and winter storms is based on the temperature and the length of time that temperature stays below freezing. Orange County has experienced mostly moderate freezes. The worst case scenario would be a severe, or "hard," freeze where the temperature stays well below 28° F for the duration of four hours or more, but these are few in number. When they do occur, they can cause significant damages to agriculture, especially to the citrus industry. In 2010, the freeze damaged between 6 – 10 percent of the orange and grapefruit crop. Orange County can expect much the same for any future freeze and winter storm incidents with moderate freezes being the majority of occurrences with only a handful of hard freezes. Winter storms will be minor in their severity due to their infrequency with only small amounts of property damage to be expected.

Probability: A review of SHELDUS™ data indicates that the likelihood and probability of future occurrences of freezes and/or winter storms in Orange County will be about once every five (5) years. While the potential for moderate freezes may be expected every one to two years, severe freezes, which cause the highest crop losses, may be expected on average once about every 10+ years.

Impacts: Orange County has not experienced high amounts of human impacts directly due to freezes or winter storms. Property damage to residences or other buildings has also been low with only minor physical losses. These are caused mainly by burst water pipes or outdoor faucets that are not insulated. The spatial impacts can be felt by the entire county during a freeze or winter storm, but typically when they occur, the impacted areas are isolated. For economic impacts, rural areas like Apopka, Winter Garden, and Oakland are more susceptible due to their agricultural lands. Urban areas can also be impacted as their vulnerable populations are greater in number. Other crops like citrus, ornamental plants, and livestock may also be at risk from a freeze of winter storm. In Table 9, the Estimated and Adjusted Crop Damages from Winter Weather and Frost/Freezes that have occurred in Orange County are listed from the past several decades. According to SHELDUS™, the total Adjusted Crop Damages (2013 dollars) is estimated to be $7.5 million since 1968. The most recent record frost/freeze occurrence happening in late 2010 and was estimated to have caused $1.185 million in damages (adjusted value). Many times, there is a good deal of notice prior to most of these frost/freeze incidents, so that most areas can prepare prior to the storm. In some cases, though, the temperature may drop more rapidly or hold for longer than anticipated.

Mitigation Measures: In general, there are relatively few mitigation measures enacted by the County or its jurisdictions in regards to freezes or winter storms due to their infrequency. Freezes and cold weather are identified as a hazard and are addressed by the Orange County CEMP. There are

no trainings or exercises conducted in regards to this hazard in at least the past decade. There is very little equipment, teams, or other logistical support to address this hazard.

Vulnerability: Orange County and its jurisdictions are all equally vulnerable to freezes and winter storms due to how widespread its impacts can be felt across the entire county and its jurisdictions. As stated before, the occurrence of the hazard is infrequent with few impacts to life safety and property. While the impacts themselves have not directly resulted in loss of life or many casualties, the results are mainly determined by weather patterns. This hazard can be somewhat unpredictable as to when it occurs, or at least how severe it will be, and that in part makes us vulnerable to it. Orange County has experienced only minimal impacts to property with very little directly caused by freezes and winter storms. However, there have been economic impacts experienced in the past to agriculture, crops, and plants that have brought about moderate losses to the county. Orange County and its jurisdictions are equally vulnerable to freezes and winter storms. Transient populations would be vulnerable during a freeze or winter storms and would need to seek an overnight shelter. Farm workers may be impacted if agricultural crops suffered from freeze conditions.

Risk: Medium – 41%

Due to the moderate rate of return for freezes and winter storms, the anticipated severity, but with few mitigation measures currently in place, this hazard is scored as a Medium relative risk. Freezes have some potential to persist for a few hours to even a couple of days; winter storms could last longer if conditions were favorable, but historically they have only lasted up to a few of days. For the most part though, this hazard does not greatly impact residents or visitors to Orange County and its jurisdictions and only has mild property damages; the impacts are felt mainly by the agriculture industry.

Heat Waves

Description: The middle of Orange County's summer season is quite humid with high temperatures usually in the lower to mid-90s° F, while low temperatures rarely fall below 70° F. The humidity can act like a buffer and typically prevents actual temperatures from exceeding 100 °F. However, the heat index to over 110 °F (43 °C). The city's highest recorded temperature is 103 °F, set on September 8, 1921. During the summer months, strong thunderstorms occur in the afternoon almost daily, which can help to cool the temperature slightly.

A heat wave, which is different from a drought, is when temperatures are abnormally and uncomfortably hot for an extended period of time. This event could continue from one day to several weeks. Heat waves are often accompanied by high humidity and can have a great impact on lives, including heat strokes, heat exhaustion, and even death. Heat kills by pushing the human body beyond its limits. In a humid environment like we have in Orange County,

evaporation is slowed and the body must work harder to maintain a normal temperature. All of Orange County is susceptible to heat wave conditions.

Previous Occurrences: Orange County has experienced thirty six (36) days of record temperatures over 100° F since 1892 with nine (9) days even higher (refer to Table 9). While individual days of record temperatures may not equal a heat wave, these record days are usually flanked by multiple days of high temperatures. According to SHELDUS™, there are two (2) dates that were recorded as hazard instances for heat: on 07/03/1997 with one (1) recorded death; and 06/01/1998. No property damages or crop damages were reported as a direct result of either of these occurrences.

Table 9: Record Temperature Extremes, 1892 - 2021

Date	Record Temperature
09/08/1921	103
05/31/1945	102
08/18/1916	101
08/16/1918	101
06/18/1921	101
08/01/1922	101
06/06/1927	101
07/28/1936	101
07/02/1998	101

Source: ThreadEx Long-Term Station Extremes for America (http://threadex.rcc-acis.org/threadex/process_records)

Location: People living in cities or in urbanized areas, like Orlando, Apopka, Belle Isle, Eatonville, Edgewood, Maitland, Ocoee, Winter Garden, and Winter Park may be more susceptible to the effects of a heat wave due to the Heat Island effect. This occurs where developed urban areas are hotter than nearby rural areas. Heat islands can affect communities by increasing summertime peak energy demands and air conditioning costs, as well as other environmental aspects such as air pollution, greenhouse gas emissions, and water quality. There can also be a higher propensity for heat-related illnesses and mortality.

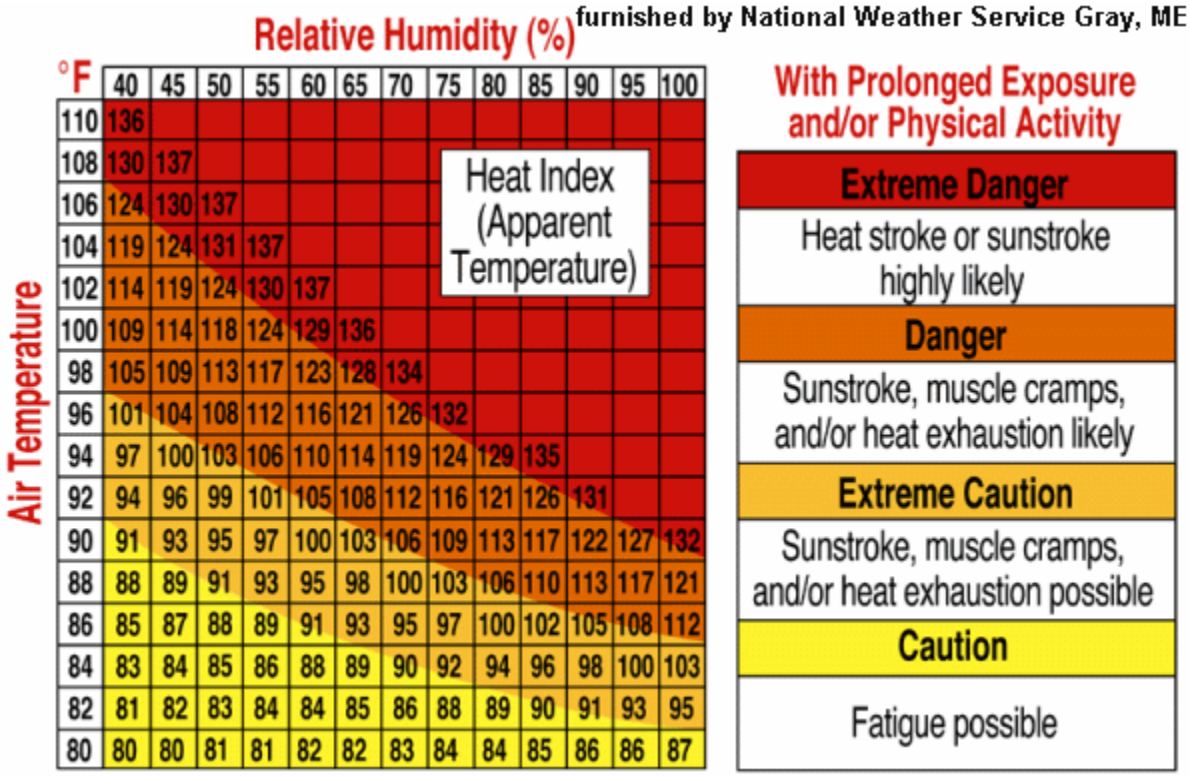
Other more rural locations like the eastern and northwestern parts of the unincorporated Orange County, Oakland, Windermere, and the outskirts of other developed cities can also be vulnerable to the effects of heat waves

Extent: Much as with other climate-related hazards, the temperature is the best scale for this hazard. Below is the Heat Index Chart (Figure C) provided by the NWS that shows that caution should be used at temperatures starting at 80° F. The NWS issues an advisory when the heat index is anticipated to exceed 105° F – 110° F for at least two consecutive days. With increased temperatures and

humidity come increased health effects from prolonged exposure and/or physical activity. Various disorders can range from mild cases of sunburn to more serious illnesses like heat cramps, heat exhaustion, and heat stroke.

Orange County and its jurisdictions regularly experience air temperatures well over 80° F. For a period of about five (5) months each year from May to September the average hovers in the high 90s° F with high humidity. The heat index regularly climbs over 100° F during these months as well, but it is rarely sustained for more than a few days. The record temperature experienced in Orange County reached its maximum at 103° F; we could reasonably expect a temperature similar to this high point to occur again in the future. Orange County expects that heat waves will continue to occur mainly in these summer months.

Figure D: Heat Index Chart



Source: NWS

Probability: The likelihood of long periods of high temperatures and heat waves returning to Orange County is high as it is likely for an occurrence, in some form, to be nearly annual. The severity for each incident is variable. High temperatures occur normally in the summer months and may peak for many days during a heat wave. Weather outlooks extend only so far, but as new data is gathered and interpreted, these predictions can change. At this time, our nation is moving into an El Niño weather system for the next few months, which typically means a period of time of above average precipitation and cooler

temperatures. This is not a guarantee that heat waves will not occur in the future years.

Impacts: The impacts for heat wave are very similar to drought. Loss of life or other injuries that have been recorded as a direct result of heat waves are very low with only one reported death from 1997, according to SHELDUS™. The potential for casualties in the future will persist, especially in vulnerable populations like children, the elderly, transient populations, or other individuals with special needs that are vulnerable to high temperatures. Visitors to Orange County that are not acclimated to higher temperatures and humidity may also be at risk to the various heat disorders.

There have not been any reported cases of property damage to buildings or infrastructure at this time. While this does not mean that there have not been damages, if there were these would be relatively minor. The entire county may be geographically impacted. Rural areas also experience heat waves, but, as stated before, people in urban areas may be more susceptible because of the Heat Island effect. There have not been any major economic impacts reported. Damages to crops because of heat wave Orange County's warm climate attracts many visitors and part-time residents throughout the year, but most visitors may not be deterred by a heat wave. Due to increased usage for water utilities or electricity for air conditioning, there may be temporary power outages, called brown outs, that could impact the County and its jurisdictions. Overall, the impacts from heat wave are minor.

Mitigation Measures: In general, there are relatively few mitigation measures enacted by the County or its jurisdictions in regards to heat waves. Heat waves and other extreme temperatures are identified as a hazard and are addressed by the Orange County CEMP. There are no trainings or exercises conducted in regards to this hazard in at least the past decade. There is no equipment, teams, or other logistical support to address this hazard.

Vulnerability: While all of Orange County and its jurisdictions are just as likely to experience a heat wave, the cities and urban areas may be considered more vulnerable as they typically have replaced open lands and vegetation that help retain moisture with buildings, roads, pavement, and other impermeable surfaces that stay dry. Parks, open land, and water bodies within a city help to reduce temperatures in isolated areas, which are fortunately present in many locations throughout the jurisdictions in Orange County. High temperatures are a near guarantee with heat waves returning likely as well. Their impacts have been historically low in Orange County for human, property, and economic damages and losses. With very few mitigation measures currently in place those, this increases the vulnerability to this hazard.

Risk: Medium – 41%

Due to the moderate rate of return for heat waves, the lower anticipated

severity, but with few mitigation measures currently in place, this hazard is scored as a Medium relative risk. Freezes have some potential to persist for a few hours to even a couple of days; winter storms could last longer if conditions were favorable, but historically they have only lasted up to a few of days. For the most part though, this hazard does not greatly impact residents or visitors to Orange County and its jurisdictions and only has mild property damages; the impacts are felt mainly by the agriculture industry.

Floods

Description: Flood or flooding refers to the general or temporary conditions of partial or complete inundation of normally dry land areas from the overflow of inland or tidal water and of surface water runoff from any source. Waters can collect in areas called floodplains that are defined as any land areas susceptible to being inundated by water from any flooding source. In Orange County and most of its jurisdictions, that flood source is normally rain that exceeds the carrying capacity of its drainage systems. Tropical systems like tropical depressions, tropical storms, or hurricanes can also bring with them large amounts of falling water. The average annual rainfall in Orlando is 50.6 inches (1,290 mm), the majority of which occurs in the period from June to September. The months of October through May are Orlando's driest season.

Other bodies of water like rivers, lakes, streams, wetlands, or even overburdened stormwater systems, can also cause flooding through rising waters where water systems collect. Low lying areas and/or poorly drained land can also accumulate rainfall through ponding on the surface. Floodplains help to store water for eventual release after the end of the storm. In many communities, flooding can cause severe impacts and justifies the importance of carrying flood insurance.

Previous Occurrences: Orange County is at a higher elevation than most of the surrounding counties and serves as the headwaters for many of the major rivers in the area, including: Shingle Creek, Reedy Creek, Cypress Creek, and the Little Econlockhatchee River. This translates into a decreased amount of extended flooding periods as compared to surrounding counties as much of our waterways flow away from the county and its jurisdictions.

Historical information on past floods in Orange County is sparse. The largest flood event in recent memory occurred in 1960 as a result of Hurricane Donna. Heavy rainfall in the early spring and late summer of 1960 left the soil saturated and resulted in a higher than normal water table. When Hurricane Donna passed through the area that September, it caused extensive flooding across Orange County. The flooding associated with this hurricane has been estimated to be between a 50-year (2% probability) to a 100-year event (1% probability) for portions of the county.

There have been no major flooding events during the last 5-year update to

this document.

Flooding can also originate due to excessive rainfall that collects in other water bodies. The table below lists lakes in Orange County with their corresponding record high point. All elevations shown are referenced to the North American Vertical Datum (NAVD). Table 10 shows the historic peak, the date of the historic peak, and the date of the first year of record keeping.

Table 10: Historic Lake Flooding Elevations

Flooding Source	Historic Peak (Feet NAVD)	Date of Historic Peak	First Year of Records
Lake Apopka	68.39	October 1936	1935
Lake Barton	95.12	August 1960	1960
Little Lake Barton	94.37	August 1960	1960
Bay Lake	91.10	August 1960	1960
Lake Beauclair	62.58	July 1968	1960
Lake Bell	90.41	August 1960	1959
Lake Bessie	101.22	August 1960	1960
Black Lake	97.37	August 1960	1960
Lake Blanche	99.89	August 1960	1960
Lake Bosse	63.40	August 1960	1960
Lake Butler	100.89	September 1960	1933
Lake Cane	98.90	August 1960	1959
Lake Carlton	62.61	November 1975	1960
Lake Catherine	92.57	August 1960	1960
Lake Charity	71.54	October 1960	1960
Clear Lake	95.56	October 1960	1951
Lake Conway	88.08	August 1960	1960
Lake Cora Lee	73.65	November 1960	1960
Crooked Lake	76.96	December 1960	1960
Lake Destiny	90.36	October 1960	1960
Lake Dora	64.79	1927	1927
Lake Down	100.74	January 1960	1960
Lake Fairview	89.10	August 1960	1959
Lake Faith	71.34	November 1960	1960
Little Fish Lake	100.86	August 1960	1960
Lake Fuller	67.49	September 1960	1960
Lake Gandy	74.31	August 1960	1960
Lake Georgia	60.43	October 1959	1959
Lake Hart	63.88	September 1945	1941
Lake Herrick	80.05	November 1960	1960
Lake Hiawassa	81.42	November 1960	1960
Lake Holden	91.01	September 1960	1959
Lake Hope	72.89	October 1960	1960
Lake Irma	55.34	September 1960	1959
Lake Jessamine	92.86	September 1960	1959
Johns Lake	97.55	August 1960	1959
Lake Kilarney	84.28	August 1960	1959
Lawne Lake	91.54	September 1960	1959

Lake Lockhart	74.51	August 1960	1960
Long Lake	79.53	October 1960	1959
Lake Maitland	66.68	September 1960	1945
Lake Mann	93.41	September 1960	1959
Lake Mary	93.36	August 1960	1960
Lake Mary Jane	63.79	March 1960	1949
Lake Ola	72.79	November 1975	1959
Lake Orlando	85.40	August 1960	*
Lake Phillips	63.96	September 1960	1960
Lake Pinelock	94.23	September 1960	1959
Lake Pleasant	81.27	December 1960	1959
Pocket Lake	57.27	September1960	1959
Lake Rose	86.09	November 1960	1960
Lake Rowena	74.33	September 1945	1945
Lake Ruby	116.34	August 1960	1960
Big Sand Lake	99.52	November 1960	1959
Little Sand Lake	100.90	August 1960	1960
Lake Shadow	83.30	August 1960	1960
Lake Sheen	100.05	August 1960	1960
Lake Sherwood	87.46	October 1960	1960
South Lake	94.78	August 1960	1960
Spring Lake	100.76	September 1960	1960
Lake Steer	85.98	November 1960	1960
Lake Sue	72.74	September 1964	1960
Lake Telfer	59.19	September 1960	1960
Lake Tibet	99.83	October 1960	1960
Trout Lake	73.93	December 1960	1959
Turkey Lake	95.94	August 1960	1960
Lake Warren	86.57	August 1960	1960
Lake Waunatta	62.04	September 1960	1960

Source: Orange County Public Works, Stormwater Management Division

Location: Orange County has twelve (12) major watersheds with over 690 waterbodies, several of which may experience flooding. The County's eastern border is the St. Johns River, with some conservation lands that may flood occasionally. Lake Apopka is Orange County's largest lake with a surface area of 30,800 acres (48.125 square miles) with an average depth of 15.4 feet. Orange County's Public Works regularly monitors over 120 lakes as part of its lake monitoring program. Orange County has also tracked rain gauge data since 1986 with twenty three (23) gauges scattered around the County. There are fourteen (14) Stage and Flow gauges for several prominent waterways that have sensors installed that can measure in "real-time" that helps provide accurate and reliable rainfall recordings during weather events to alert residents and emergency management officials when conditions are nearing flood conditions or if inundation should be anticipated in floodplains.

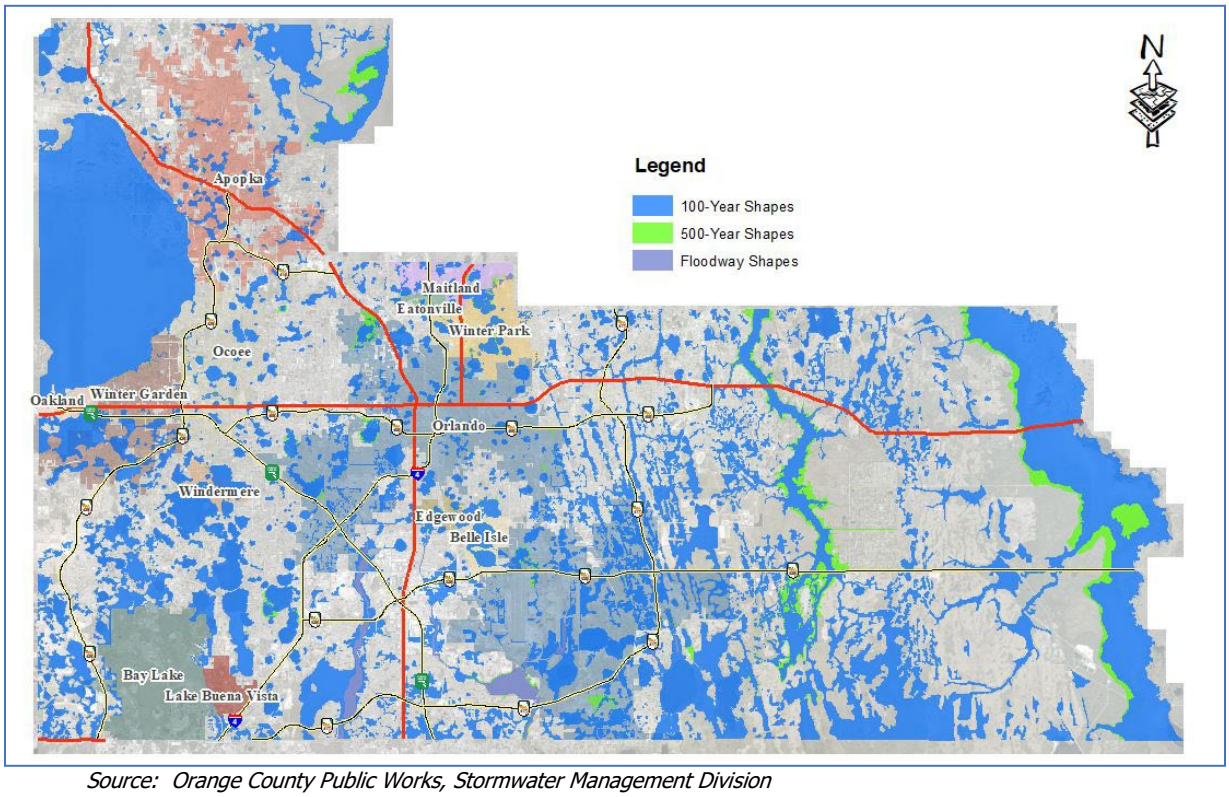
Floodplains in the Unincorporated Orange County are quite prevalent with over a third (38.42%) of the land area in a 100-year or 500-year floodplain. Other jurisdictions with high total areas of floodplain include: Belle Isle (60.15%), Maitland (28.08%), and Windermere (36.62%).

Table 11: Total Area in Floodplains in Orange County, FL

Jurisdiction	Total Area in 100-Year Floodplain (%)	Total Area in 500-Year Floodplain (%)	Total Area Floodplain (%)
Apopka, City of	10.64	0.03	10.67
Bay Lake, City of	1.80	0.00	1.80
Belle Isle, City of	58.88	1.27	60.15
Eatonville, Town of	22.03	2.26	24.29
Edgewood, City of	23.78	1.38	25.16
Lake Buena Vista, City of	0.02	0.00	0.02
Maitland, City of	26.00	2.08	28.08
Oakland, Town of	13.15	0.00	13.15
Ocoee, City of	14.34	0.11	14.45
Orange County Unincorporated	36.64	1.78	38.42
Orlando, City of	26.34	1.04	27.38
Windermere, Town of	36.62	0.00	36.62
Winter Garden, City of	24.54	0.13	24.67
Winter Park, City of	21.88	2.27	24.15

Source: Orange County Public Works, Stormwater Management Division

Figure E: Floodplains in Orange County, FL



Source: Orange County Public Works, Stormwater Management Division

While there is no standard rainfall depth that will create flooding conditions throughout the county, some areas may be more flood-prone than others. The western portion of Orange County is characterized by high recharge areas with many land-locked systems. These areas are typically affected by the total amount of rainfall during a storm event rather than the intensity of the storm. In contrast, the flatter eastern portion of Orange County is characterized by riverine systems, such as the Little Econlockhatchee River, Boggy Creek, the Big Econlockhatchee River, and the St. Johns River. These parts are more sensitive to storm intensities, or the rate of rainfall. The ground water table in the eastern portion of Orange County is also generally much closer to the land surface, which hampers soil infiltration during a storm event.

Most storm events in Orange County, or approximately 90% of storms, create one (1) inch or less of rain. Based on studies conducted by Orange County Public Works, flooding problems generally begin with the mean annual storm, or 4.5 inches in 24 hours. However, portions of the county have experienced localized problems with 2 – 3 inches of rainfall.

Table 12: Storm Events – Rainfall Amount

Storm Event	Rainfall Amount
Mean Annual/ 24 hour	4.5 inches
10 Year / 24 hour	7.5 inches
25 year / 24 hour	8.6 inches
100 year / 24 hour	10.6 inches

Source: Orange County Public Works, Stormwater Management Division

Orange County's current development code calls for the use of increasingly higher storm event mitigation depending on what is being constructed or developed. The more critical structures are designed to a higher standard as their function is essential to operations in Orange County.

Table 13: Development Criteria

Description	Storm Event
Roadway (secondary)	10 Year / 24 hour
Ponds	25-year to 100-year / 24 hour
Residential Homes/Commercial Sites	100 year / 24 hour
Roadway	50-year to 100-year / 24 hour
Critical Facilities	500-year / 24 hour

Source: Orange County Public Works, Stormwater Management Division

Some areas of Orange County are more flood-prone than others. The floodplain map above (Figure D) shows those areas of Orange County that are designated as being within the 100-year (1% probability) and 500-year (0.2% probability)

floodplain as delineated by the Federal Emergency Management Agency (FEMA) as part of the National Flood Insurance Program (NFIP). The NFIP was created to help provide a means for property owners to financially protect themselves. The NFIP offers flood insurance to homeowners, renters, and business owners if their community participates in the NFIP. Participating communities agree to adopt and enforce ordinances that meet or exceed FEMA requirements to reduce the risk of flooding. The unincorporated area of Orange County takes part in NFIP, as do the jurisdictions of Apopka, Belle Isle, Eatonville, Edgewood, Maitland, Oakland, Ocoee, Orlando, Windermere, Winter Garden, and Winter Park. Currently, there are three entities that do not take part in the NFIP: Bay Lake, Lake Buena Vista, and the Reedy Creek Improvement District. The County and participating jurisdictions will undertake the efforts listed in the plan to continue to comply with NFIP requirements.

In addition, three (3) of these communities participate in the Community Rating System (CRS) that recognizes and encourages community floodplain management activities that exceed the minimum NFIP standards. Most communities that do not participate in the CRS program may lack the manpower or funding compared to those locations that are a part of the CRS. The CRS may place a burden on communities due to increased documentation, annual certification requirements, and need for dedicated resources, such as permitting staff, review staff, maintenance, etc.

Table 14: NFIP and CRS Communities in Orange County, FL

Jurisdiction	NFIP Community ID	Initial Flood Hazard Boundary Map (FHBM) Identified	Initial Flood Insurance Rate Map (FIRM) Identified	CRS Entry Date and Class
Apopka, City of	120180	07/19/1974	09/29/1978	10/01/1993, Class 8
Belle Isle, City of	120181	07/19/1974	09/15/1978	
Eatonville, Town of	120182	07/19/1974	12/01/1978	
Edgewood, City of	120183	07/19/1974	09/29/1978	
Maitland, City of	120184	07/19/1974	09/05/1979	
Oakland, Town of	120663		12/06/2000	
Ocoee, City of	120185	08/02/1974	11/01/1978	
Orange County Unincorporated	120179	01/30/1976	12/01/1981	10/01/1991, Class 5
Orlando, City of	120186	08/02/1974	09/03/1980	10/01/1993, Class 6
Windermere, Town of	120381	04/22/1977	12/18/1984	
Winter Garden, City of	120187	07/19/1974	09/29/1978	
Winter Park, City of	120188	10/18/1974	11/15/1979	

Source: FEMA, NFIP, and CRS

Orange County has participated in the NFIP program since the early 1980's. The County's Stormwater Management Division continues to implement and enforce all aspects of the NFIP. Listed below are some of the efforts undertaken to continue to comply with NFIP requirements:

a. Review all development projects impacting the FEMA established floodplain.
b. Ensure compensating storage is provided when projects affect the floodplain.
c. Ensure no development is impacting the designated floodway.
d. Issue floodplain permits ensuring compliance with FEMA regulations.
e. Review Elevation Certificates to ensure structures were built at the appropriate elevation.
f. Continue to update FEMA floodplain maps as new data becomes available.
g. Initiate new flood studies to amend/update floodplain mapping (several on-going projects).
h. Mitigate known flooding problems by constructing drainage improvements.
i. Maintain primary and secondary drainage systems. Primary systems include major canals, ponds, control structures, drain wells, and pump stations. The secondary system is composed of stormwater conveyance to the primary system.

There are other activities that the County's Stormwater Management Division engages the community in on a yearly basis to help promote the NFIP and CRS programs, as well as to bring a general level of flood awareness to the residents of Orange County.

a. Flood prevention and flood insurance information on the county website.
b. Community meetings at Home Owner's Associations (HOAs).
c. Participation in community wide outreach (e.g. Annual Hurricane Expo).
d. Flood prevention and flood insurance yearly mailing to all residents within floodplain (approximately 225,000 letters).
e. Handouts and reference material available to the public at the County Public Works Department Office.
f. Copy of FEMA flood insurance maps available at the Orange County Public Libraries.
g. Floodplain layer available through the Orange County Public InfoMap, an online GIS tool

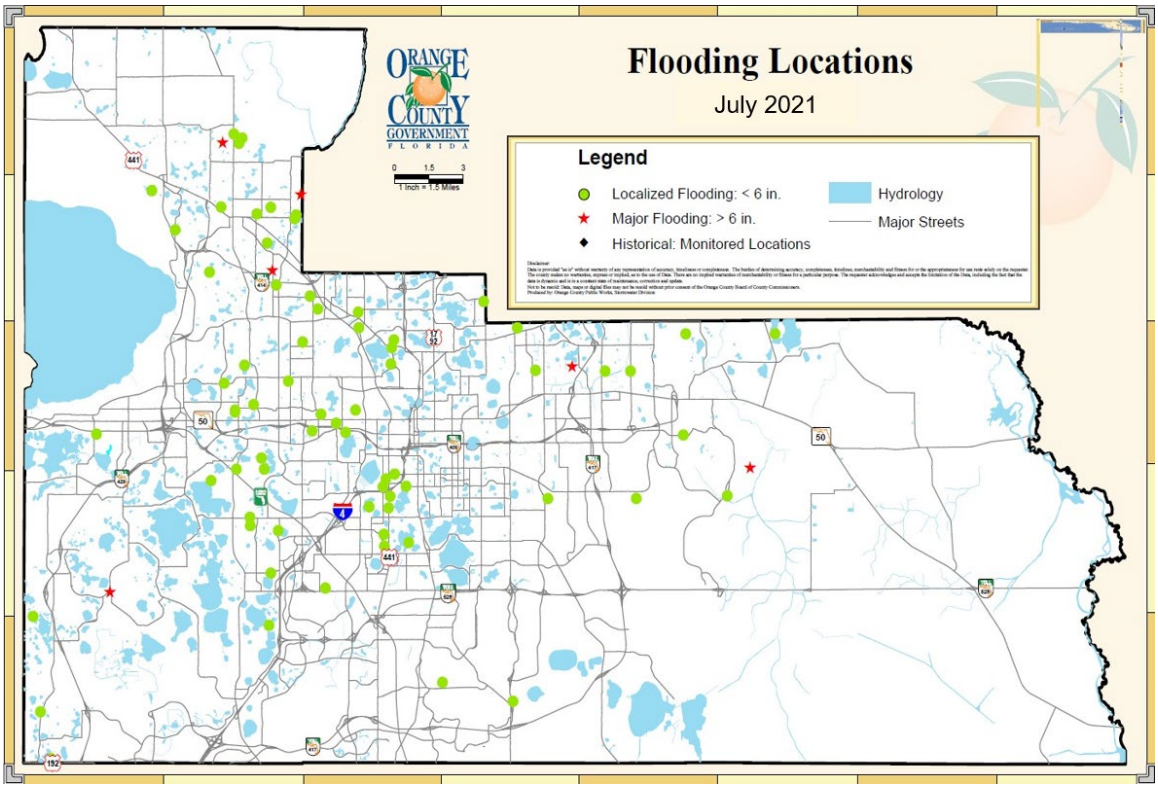
Extent: Due to the generally flat topography in Orange County, just a few inches of rain can mean the difference between "Normal High Water Elevations" (NHWE) and 100-year flood levels. Orange County's Public Works monitors 120 lakes as part of its lake monitoring program. They have also tracked rainfall data since 1986. The current rainfall network consists of twenty three (23) gauging stations scattered throughout the county. There are fourteen (14) stage sensors and flow is calculated at several prominent waterways. The gauging stations have sensors that measure data in "real-time," which provide accurate and

reliable rainfall data during weather events that can be used to alert residents and emergency management officials of potential flooding.

In 2018, Orange County's rainfall gauges measured 4,006 different "storms" that are defined as a rainfall event that does not have a gap or inter-event dry period of more than four continuous hours with rainfall. Of these, 103 instances (2.57%) recorded rainfall of more than 2.00 inches. The number of storms that last longer than 6.00 hours numbered 250 storms (6.24%). From 1940 – 2018, Orange County's average annual rainfall was 53.82 inches with a minimum of 32.45 inches and a maximum of 72.53 inches. Since 2000 – 2018, nine (9) years saw higher than average rainfall: 2001 – 2005, 2008 – 2009, and 2017 – 2018.

Rainfall is closely tied to flooding. The following page contains a map of the routine flooding locations across Orange County as determined in July of 2021. These locations range from depths of one (1) inch up to eighteen (18) inches. The amount of rainfall has a direct relationship to flood depths. For instance four (4) inches of rainfall across a wide area could generate over twelve (12) inches of flood water depth. As much of Orange County is urbanized and runoff amounts have increased, this tends to be the case.

Figure F: Flooding Locations in Orange County



Source: Orange County Public Works, Stormwater Division

The Orange County Public Works tracks floods that occur in Orange County. Several specific locations scattered around the county have routinely experienced at least six (6) inches of flooding and are considered to be major flooding spots.

They include: Haver Lake, Oak Lake, Lakewood Pointe drive, Alexandria Place, Reams Road and Ficquette Road, and Saffron Plum Lane. A few of these locations were severely flooded in 2008 as Tropical Storm Fay drenched the area. The depth of six (6) inches is the Stormwater Division's line of demarcation as to what is considered to be major flooding. For example, there are dozens of other locations throughout the county are typically less than six (6) inches of floodwaters, but are considered to be localized or historical flooding.

The majority of Repetitive Flood Loss (RFL) incidents occur during years with higher than average rainfall. Since 1978, RFL properties are 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. These properties are any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling ten-year period, since 1978. There are 18 RFL properties in the jurisdictions of Orange County: Unincorporated County (10); Ocoee (2); Orlando (3); Winter Garden (1); and Winter Park (2). These properties account for a total of 61 repetitive flood claims. There is also one (1) Severe Repetitive Loss property, which, as defined, must have at least four (4) NFIP claim payments (including building and contents) over $5,000 for each flood event. The cumulative amount of such claims payments must exceed $20,000; or for which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building. For both previously listed items, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart (Source: FEMA).

Table 15: Repetitive Flood Loss Properties in Orange County, FL

Jurisdiction	Occupancy Type	Flood Zone	Number of Losses
Ocoee, City of	Single Family	AE	3
Ocoee, City of	Single Family	X	2
Orange County Unincorporated	Single Family	AE	2
Orange County Unincorporated	Single Family	AE	2
Orange County Unincorporated	Single Family	X	4
Orange County Unincorporated	Single Family	AE	2
Orange County Unincorporated	Single Family	X	2
Orange County Unincorporated	Single Family	A03	2
Orange County Unincorporated	Single Family	X	2
Orange County Unincorporated	Non-Residential	X	4
Orange County Unincorporated	Single Family	X	2
Orange County Unincorporated	Single Family	X	12*
Orange County Unincorporated	Single Family	AE	2
Orange County Unincorporated	Non-Residential	X	2
Orange County Unincorporated	Single Family	X	2

Orlando, City of	Single Family	X	2
Orlando, City of	Non-Residential	X	4
Orlando, City of	Non-Residential	X	4
Winter Garden, City of	Single Family	X	2
Winter Park, City of	Single Family	AE	2
Winter Park, City of	Single Family	X	2
TOTAL			61

**Note: denotes Severe Repetitive Loss (SRL) property*
Source: Florida Division of Emergency Management, 1/31/2017

Probability: The classification of floodplains is due in part to the probability or return rate of a level of water. For instance, 100-year floods are calculated to be the level of flood water to have a 1% chance to be equal or exceeded in any given year. A 500-year floodplain has a 0.2% chance of being equaled or exceeded in any given year. These locations may include areas adjoining a stream, river, or other body of water. Flooding has the potential to occur every year, but the severity can significantly change with each occurrence. While Flooding is still possible in years with less than average rainfall, Repetitive Flood Loss (RFL) properties tend to occur when there is higher than average rainfall during that year.

FEMA uses its Flood Insurance Rate Maps (FIRM) to show different floodplains with different zone designations that may help to categorize the potential for flooding (refer to Table 16). These are primarily for insurance rating purposes, but the zone differentiation can be helpful for other floodplain management purposes.

Table 16: Flood Insurance Rate Map (FIRM) Zones

Zone	Description	
Zone A:	The 100-year or base floodplain. There are six (6) types of A Zones:	
	A	The base floodplain is mapped by approximate methods, *i.e., Base Flood Elevations* (BFEs) are not determined. This is often called an unnumbered A Zone or an approximate A Zone.
	A1-30	These are known as numbered A Zones (*e.g.,* A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).
	AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
	AO	The base floodplain with sheet flow, ponding, or shallow flooding. Base flood depths (feet above ground) are provided.
	AH	Shallow flooding base floodplain. BFEs are provided.
	A99	Area to be protected from base flood by levees or Federal Flood Protection Systems under construction. BFEs are not determined.
	AR	The base floodplain that results from the decertification of a previously accredited flood protection system that is in the process of being restored to provide a 100-year or greater level of flood protection.
Zone V and VE:	V	The coastal area subject to a velocity hazard (wave action) where BFEs are not determined on the FIRM.
	VE	The coastal area subject to a velocity hazard (wave action) where

	BFEs are provided on the FIRM.
Zone B and X (shaded)	Area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. B Zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from the 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile.
Zone C and X (unshaded)	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone C may have ponding and local drainage problems that don't warrant a detailed study or designation as base floodplain. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100-year flood.
Zone D	Area of undetermined but possible flood hazards.

Source: FEMA

Impacts: On a state level, freshwater flooding associated with tropical cyclone events is one of the leading causes of death, accounting for more than half (59%) of all storm-related deaths and nearly two-thirds (63%) for in-land counties from 1970 to 2000 (Edward Rappaport, Tropical Prediction Center). There have been no recorded instances for loss of life associated with flooding in Orange County or its jurisdictions. Flooding may also inundate potential evacuation routes. Flooded roads can often result in fatal accidents. Rainfall associated with tropical systems varies by the size of the storm, forward speed, and other meteorological factors. The rainfall associated with a hurricane is expected to be from 6-12 inches, with possibly higher amounts, while the greatest rainfall amounts occur from weaker storms that move slowly or stall over an area for extended periods of time.

Currently listed RFL properties have recorded over 61 different flood claims to property, with significant losses for both for building damage and contents. NFIP records since 1978 indicate that the total losses are about $2.5 million, with about 500 claims at an average claim of $4,800. The geographic area that is affected because of a flood is relatively small with inundation occurring specifically in lower lying areas or near obstructed stormwater management structures like drains and culverts. The area of Orange County that is situated in a 100-year floodplain is considerable though. Economic impacts have the potential to be high as several properties related Orange County's critical infrastructure are situated in floodplains or near water bodies that can flood. In the past, these impacts felt have been moderate with isolated utility outages, but the potential still exists for critical facilities to be impacted.

Mitigation Measures: There are a number of current mitigation measures being undertaken by Orange County and its jurisdictions regarding flooding. Perhaps one of the biggest steps is participating in the NFIP. CRS communities should continue to work towards recertifying their jurisdictions or achieving higher class levels. Other communities that are at risk of flooding should be encouraged to participate in the CRS as well. Orange County has addressed its flood hazard in multiple other plans. Training and Exercise on flooding occurs at least every other year with simulated events geared towards the impacts from flooding and damage

assessment. There are some logistical support equipment and teams used by Orange County and its jurisdictions to mitigate flood hazards, including a sandbag program and other public works equipment that can be deployed prior to or after a flood event. Warning systems like stafe and flow gauges and rainfall monitors, as well as public notification systems allow Orange County alert is residents and visitors to the potential for flooding, especially in areas that are prone to inundation.

Vulnerability: Orange County and its jurisdictions are situated near the middle of the state. Two major river systems flow from Orange County: the St. Johns River that flows north towards Jacksonville, and Shingle Creek which flows south to the headwaters of the Everglades. A network of other rivers, streams, canals, and creeks crisscross the county. Due to its relatively flat topography, falling water tends to collect and pond in certain low lying areas. There are several large water bodies that can cause issues of rising water as well.

With over one-third of the county area being in a 100-year floodplain, the flood hazard can be very prevalent, especially in years with higher than average rainfall. Much of Orange County's jurisdictions are also developed, which increases the amount of impermeable surface and creates the need for a robust infrastructure system to handle and redirect large amounts of water away from structures. Flooding that occurs in the more urban areas tends to be the result of localized flooding where stormwater drainage systems become overwhelmed due to run-off or obstructed drains, but once cleared, the flood waters recede quickly. The more rural parts of the county, especially those near significant waterways, may experience a more typical flood that can last for a couple of days with slowly receding flood waters.

Significant structural losses to buildings and contents help to place the County's vulnerability to this hazard fairly high. Several mitigation activities that are in place, such as the various monitors, gauges, and public notification systems help to reduce our exposure to flood. All jurisdictions participate in the NFIP with a handful taking part in the CRS.

Risk: Medium – 43%

There is a high probability that Orange County will experience flooding in the future. The potential rate of return of a flood incident is about 2.33 years. The amount of area that resides in the 100-year flood plain for the unincorporated county is high, but most other jurisdictions are less than 25% of their area. Previous property damages since 1978 total about $2.5 million with over 500 claims. Since there have not been any reported serious injuries or deaths and the mitigation systems that are already in place have received a good deal of attention and resources, the County's overall risk to this hazard is moderate.

Severe Thunderstorms

Description: The State of Florida is considered the thunderstorm capital of the United

States. Thunderstorms are a common occurrence in Orange County and its jurisdictions, especially during the hot summer months. A mid-afternoon thunderstorm is almost a daily event. Thunderstorms are created when warm, moist air rises and meets cooler air; these storms can produce lightning, high winds, hail, tornados, and heavy rain, which can cause flooding. Only about 10% are considered severe, according to NOAA. In order to be considered severe, the NWS states that the thunderstorm must include one of three characteristics: produces winds greater than 58 miles per hour, produces hail that is 0.75 inches in diameter or greater, or produces tornados.

Thunderstorms, hail, and lightning affect a relatively small area when compared to other weather events, like tornados or tropical systems. The typical thunderstorm is about 15 miles in diameter and lasts an average of 30 minutes. Despite their small size, all thunderstorms can be dangerous. Of the estimated 100,000 thunderstorms that occur each year in the United States, about 10 percent are classified as severe. The Severe Thunderstorm hazard is comprised of three (3) other sub-hazards, including: hail, lightning, and tornados. The sub-hazards are described in further detail below.

Hail

Hail is composed of ice and range widely in size. Hailstorms are closely associated with thunderstorms, which form the hail stones as they cycle through the storm clouds multiple times. The hailstones are suspended by the strong upward motion of the air until the weight of the hail can no longer be carried by the updraft of wind and they fall to the ground. Hail stones generally fall at faster rates as they grow in size, though other factors such as melting, friction, wind, and rain or other hail stones can slow them down. Severe weather warnings are usually issued for hail when the stones reach a damaging size, causing serious property damage to automobiles and structures, as well as agricultural interests.

Previous Occurrences: Many times hail is combined with other severe weather hazards. Since 1960, there have over 259 recorded hail events in Orange County with a magnitude greater than 0.75" size hail according to NWS data. The most common hail size was 0.75" with 101 occurrences, followed by 1.00" (73) and 0.88" (33). In some cases, multiple hail events were recorded on the same day, but they were in a different location or were of a different magnitude (size).

Table 17: Hail Event Magnitudes in Orange County, FL (1960 - 2021)

Hail Size (inches)	Number of Events
0.00	2
0.75	101
0.88	33
1.00	73
1.25	8
1.50	5
1.75	32
2.25	1
2.75	4
3.00	1
TOTAL	261

Source: NWS

Table 18: Hail Event in Orange County, FL, 2015 – 2021

Date	Location	Magnitude (In Inches)
6/1/2015	OAKLAND	1.75
7/5/2015	OCOEE	0.75
3/28/2016	TANGELO PARK	0.75
6/1/2016	DOCTOR PHILLIPS	0.75
7/12/2016	BEULAH	0.75
4/4/2017	LAKE PICKETT	1.5
7/4/2017	EATONVILLE	0.88
7/4/2017	MAITLAND	1
7/20/2017	SKY LAKE	1
3/20/2018	WESTWOOD	1.75
3/20/2018	PINE CASTLE	1
3/20/2018	CONWAY	1.25
3/20/2018	BITHLO	1
6/7/2018	TAFT	0.88
5/5/2019	UNION PARK	1
5/5/2019	UNION PARK	1
7/19/2019	DUBSDREAD	1.25
7/19/2019	WINTER GARDEN	1.75
7/19/2019	WINTER GARDEN	1.75
5/21/2020	TANGELO PARK	1.75
5/21/2020	(MCO)ORLANDO INTL AR	0.88
5/21/2020	UNION PARK	0.75
5/21/2020	UNION PARK	1.25
5/21/2020	UNION PARK	1
5/22/2020	WINTER GARDEN	1
5/22/2020	CLARCONA	1
6/22/2020	CONWAY	0.75
8/9/2020	CLARCONA	1
4/11/2021	FAIRVILLA	1
4/11/2021	WINTER PARK	1.75
4/11/2021	MAITLAND	1
4/11/2021	UNION PARK	1
AVERAGE HAIL SIZE		**1.12**

Source: NWS

From 2015 to 2021, there were 32 hail events that took place across Orange County and its jurisdictions. According to the NWS, the average hail size was 1.12 inches

Location: Hail has the ability to occur anywhere in the County and its jurisdictions.

Recordkeeping by the NWS for the location for hail did not occur until 1994. Location information prior to that does not appear to have been maintained in the NWS data. Since the unincorporated County covers the largest area, the majority of reported hail events took place there. Other municipalities that cover a large area, such as Orlando, Apopka, Maitland, Windermere, Winter Garden, and Winter Park have all had multiple hail events recorded.

Extent: Hail has been recorded as large as 3.00" in Orange County, but larger hail could possibly form in some extreme circumstances. The more likely to occur, though, is smaller sized hail less than 1.00" in size. Most hail events last for only a short duration of several minutes as the severe thunderstorm passes through. During this time, there can be damages caused to property, such as building roofs and vehicles that are exposed to the elements.

Probability: The likelihood of hail is high as it is a frequent occurrence in Orange County, mainly due to its direct relationship with severe thunderstorms. From 1960 to 2021, there were 261 recorded instances of hail. This means that, on average, there are more than four (4) hail events per year. The highest number of occurrences in one year was in 1999 with 24 hail events. Hail can occur throughout the year, as early as February to October; the height of the hail season is in the late spring to summer months as the probability for thunderstorm activity is at its peak as well.

Impacts: There have been fairly moderate impacts due to hail in Orange County. To date, there has been no loss of life or reported casualties to people. There have been some property damages though; other property damages, especially to vehicles from visitors or those driving through the county and they may not be recorded by the NWS. Reported property damages are listed at $60,300 from three (3) hail events. SHELDUS™ reports much more significant damages for both property damage ($31,623,066.67) and crop damage ($500,500.00) in its statistics. Spatial impacts have been fairly isolated as hail does not generally affect large areas of the county or its municipalities all at once. Economic impacts to critical infrastructure have been minor at best. No outages for utilities were reported, but hail storms have the potential to impact electrical lines or transformers if their size were to be large enough to cause significant damage. Fortunately, no such effects have been recorded. An increased number of hail events could lead to a greater amount of overall damage, even though individual events do not produce a large amount of damage on their own.

Mitigation Measures: Due to its high frequency but low impacts, hail can be difficult to mitigate on a large scale basis. Property owners could install impact resistant roofing materials to help prevent severe impacts from larger sized hail. This hazard is mentioned in the Orange County CEMP, but very few other plans. Training and exercise on hail does not occur with any degree of regularity. Very little logistical resources or support teams are devoted to hail on its own, but it may be included as part of a

response to other associated hazards like severe thunderstorms, lightning, or tornados.

Vulnerability: Orange County and its jurisdictions are vulnerable to the effects from hail due to its frequency and probability for return. Fortunately, reported damages from the NWS remain relatively low and with no loss of life or injuries. Spatial impacts are limited to a small location, but nearly all of the jurisdictions in Orange County have experienced hail at some point in time. They are likely to experience it again.

Risk: Medium – 52%

The overall risk from hail is categorized as a medium threat mainly because of the low impacts. Even with a high probability for occurrence with only minor mitigation measures currently in place, Orange County has not be severely impacted by hail in the past. The potential for impacts to occur is moderate, especially to property, buildings, vehicles, and other infrastructure assets that could be compromised by hail damage. Hail is generally a component of other hazards that may have more significant impacts in Orange County.

Lightning

Lightning is one of the other products of severe thunderstorms that can cause damages, casualties, or deaths. Lightning is basically a giant electrical charge that sparks in the atmosphere or between the atmosphere and the ground. In the initial stages of development of a thunderstorm, the air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. When the difference in charges becomes too great, the capacity of the air to act as an insulator breaks down. Then there is a rapid discharge of electricity that is seen in the form of lightning. Lightning can occur between opposite charges within the thunderstorm cloud (intra-cloud lightning) or between opposite charges in the cloud and on the ground (cloud-to-ground lightning). One of the main dangers of this hazard is that lightning cannot be forecasted.

Previous Occurrences: Actual occurrences of lightning strikes in Orange County and its jurisdictions are nearly too numerous to count. Table 19 shows the annual lightning strikes from 2010 through 2020 with a total of 1,024,219 strikes over the past ten years.

Table 19: Annual Lightning Strikes in Orange County, FL

Year	Number of Strikes
2010	53,494
2011	32,943
2012	40,082
2013	39,645
2014	53,124
2015	182,748
2016	121,471
2017	124,619
2018	151,990
2019	108,064
2020	116,039
TOTAL	**1,024,219**

Source: Earth Networks Weather Stations in Orange County, 2010 – 20120

Instead, the focus of the hazard should be placed on lightning strikes that caused severe damage or impacts, either through loss of life, injuries, and/or property damages. According to NOAA, there have been 70 lightning events since 1960 with associated damages across Orange County. The NWS data has far fewer recorded events, with 33 instances of lightning strikes where damages, injuries, or casualties occurred. The NWS data only goes as far back as 1996 though.

Location: Lightning has the ability to occur anywhere in the County and its jurisdictions. Since the unincorporated County covers the largest area, the majority of reported lightning strikes seem to have taken place in its boundaries. Other municipalities that cover a large area, such as Orlando, Apopka, Maitland, Ocoee, Windermere, Winter Garden, and Winter Park have all had multiple lightning events recorded.

Extent: There is no official severity scale or magnitude range associated with lightning at this time. Lightning can heat the surrounding air to as much as 50,000° F, which is five times as hot as the temperature of the sun. When air is heated, it expands rapidly and creates the sound of thunder.

To measure the extent for the lightning hazard, Orange County utilized information collected from Earth Networks/Weather Bug that provide support to its array of weather stations around the county that records lightning strikes during the period from 2010 through 2020. Using a Geospatial Information System (GIS), we were able to plot lightning strike density throughout Orange County. Each "raster," or cell, on the map represents an area of about thirteen (13) acres (757 square feet). It then measured the number of lightning strikes with a one (1) mile radius of the cell area for a one (1) year period. The data was split into years because the lightning strikes would be so dense that there would not be enough contrast. Density values range from zero (0) strikes to

upwards of 121 lightning strikes within a one (1) mile radius. The worst case scenario for the number of lightning strikes occurring within a mile of a single raster would be over 121 strikes within a one (1) mile radius.

Referring to Table 19, each year, from 2010 through 2020, saw varying numbers of lightning strikes. A pattern was not easily detected visually on each map. However, some of the commonalities from year to year are that the eastern portions of unincorporated Orange County near the Bithlo, Christmas, and Wedgefield neighborhoods, as well as areas along the St. Johns River experience a high density of lightning strikes as the sea breeze develops into thunderstorm systems. Other small pockets of lightning strike activity were also present in the urbanized portions of the county in Orlando, Maitland, and Winter Park. Unincorporated areas of south central Orange County near the various theme park attractions and International Drive also recorded high densities of lightning strikes.

Since 1960, there have been over 70 lightning strikes that impacted people, property, or natural environments. A worst case scenario for a lightning strike in Orange County would be measured by the amount of damages, injuries, or casualties caused by a single event. On August 22, 2010, several houses in Windermere were struck by lightning, which destroyed the homes. Property damages were estimate at over $2 million. During one particular lightning event on August 16, 2011, there was a report of eight (8) injuries at a local theme park. Three (3) guests and five (5) employees were all taken to the hospital as a precaution as they were not directly struck by lightning and were released the next day. Two men were struck and killed by lightning on August 16, 1998 while they were fishing in a canoe on Lake Mack in Orlando.

The above listed events are the direct damages caused by lightning. These do not account for the indirect damages that lightning can create as they relate to other hazards, such as with wildfire.

Probability: The probability of lightning strikes in Orange County and its jurisdictions will remain high as it is directly tied to the likelihood of severe thunderstorms. The lightning strikes that cause property damages, injuries, or casualties should be more infrequent. There are thousands of cloud-to-ground lightning strikes that may occur in Orange County each year. So far, there have been 70 lightning strikes have caused damages or losses since 1960. This is not a comprehensive list of all of the lightning strikes that occur in Orange County. This number represents only a small portion of total strikes that take place and does not include cloud-to-cloud strikes or other lightning without impacts. Due to its unpredictability, lightning has the potential to cause damages during each strike. Lightning has the potential to strike during each month of the year. Much like hail, the height of lightning activity is in the late spring to summer months as the probability for thunderstorms is at its height.

Impacts: Since 1960, there have been 79 reported injuries and 16 deaths associated

with 70 lightning strikes in Orange County. Property damages are reported by NOAA have been approximately $5.03 million over 60 years. The last reported property damages came in 2019; injuries from lightning last occurred in 2018 with the most recent death occurring in 2004. Awareness about the dangers of lightning has certainly improved over the years with far fewer injuries and deaths taking place. Spatial impacts are fairly isolated for a lightning strike, even though a severe thunderstorm system can cover large areas of the County. Critical infrastructure services may be interrupted temporarily during a lightning strike with power failures the most likely of these. Other utilities may experience short disruption because of a power failure, but most critical systems have generator back-ups to avoid an issue. Most power failures are restored within a few hours to a few days following a severe thunderstorm system, depending on the size of the weather system and the number of outages or downed power line. More complex systems may require further time for complete restoration of services.

Technology and detection equipment can play a huge role in preventing injuries from lightning. Other systems for emergency notification could also be important to let those individuals who are participating in outdoor activities to let them know to take cover, especially with the number of visitors that Orange County has at its theme parks, sporting events, and recreational activities. Public outreach to let people know "When thunder roars, go indoors!" has also be increasing, with the posting of signs and posters at public parks, schools, and recreational venues.

Lightning can also create other hazards that we are impacted by in Orange County, such as wildfires. Keep in mind that the above listed events are the direct damages caused by lightning. These figures do not account for the indirect damages that lightning can create as they relate to these other hazards.

Mitigation Measures: Due to its high frequency but low impacts, lightning can be difficult to mitigate on a large scale basis. Property owners could install lightning rods or use non-conductive building materials to help prevent severe impacts from lightning strikes. This hazard is mentioned in the Orange County CEMP, but very few other plans. Training and exercise on lightning may be covered as an ancillary hazard for first responders for during an event, but very rarely, if ever, as a stand-alone hazard. Some logistical resources or support teams are devoted to responding to the effects of lightning, but mainly for electrical restoration. Other resources are included as part of a response to other associated hazards like severe thunderstorms, hail, or tornados.

Vulnerability: Orange County and its jurisdictions are vulnerable to the effects from lightning due to its frequency and probability for return. Fortunately, reported damages from the NWS remain moderate and with some loss of life and several injuries. Spatial impacts are limited to a small location, but nearly all of the

jurisdictions in Orange County have experienced lightning strikes at some point in time. They are likely to experience it again.

Risk: Medium – 52%

The overall risk from lightning is categorized as a medium threat mainly because of the low impacts. With a high probability for occurrence with only minor mitigation measures currently in place, Orange County has had some severe impacts from lightning in the past. The potential for impacts to occur is moderate, especially to property, and individuals who participate in outdoor activities that are unable to find cover during a thunderstorm. Lightning remains very unpredictable, but its impacts can be reduced through better detection technology, public outreach, and emergency notification systems. Lightning is considered by some to be a component of other hazards that may have more significant impacts in Orange County, but awareness of this hazard appears to be on the rise.

Tornados

Tornados are violently rotating, massive columns of air that is in contact with both the surface of the earth and its cloud base. A tornado's wind speed normally ranges from 40 mph to more than 300 mph. They are also described by several names, such as "twisters," "vortexes," or "cyclones." "Funnel clouds" are shaped like their name but do not make contact with the ground. Not all tornados have visible funnel-shaped clouds. "Waterspouts," which form over water bodies, are usually weaker than their land-based counterparts. Waterspouts occasionally move inland, becoming tornadoes and causing damage and injuries.

Although most people associate tornados with the Midwest, Florida has nearly as many tornados as many mid-western States. Florida tornados are generally of short duration and have a narrower path. These funnel clouds can be spawned by hurricanes and appear predominantly along the right-front quadrant of the storm. While tornados are more prevalent in west-central Florida, southeast Florida, and portions of the panhandle, Orange County has seen many of these types of severe weather events over the years.

Previous Occurrences: Florida basically has two tornado seasons. The summer tornado season runs from June until September and has the highest frequencies of storm generation, with usual intensities of EF-0 or EF-1 on the Enhanced Fujita Scale (prior to 2007, tornados were classified using the Fujita Scale, or F-Scale). This includes those tornadoes associated with land-falling tropical cyclones. Orange County sees the most frequency of tornados in the month of June.

The deadly spring season, from February through April, is characterized by more powerful tornadoes because of the presence of the jet stream, strong cold fronts, and strong thunderstorms. These storms can move at speeds of 30 to 50 mph, produce dangerous downburst winds, large hail, and usually the most

deadly tornados. February is the peak month for Orange County during the spring season.

According to data from the NWS, there have been a total of 68 tornados in Orange County from 1950 to 2021 (Table 20). The most frequent storms were weaker tornados classified as an F/EF-0 with 32 events and F/EF-1 numbered at 21 reported tornados. Stronger storms, like F/EF-2 reported 9 events and F/EF-3 tornados with 3 occurrences. Orange County has not experienced anything stronger than an F/EF-3. Since 1950, the State of Florida has only experienced one (1) F/EF-4 tornado and no instances of an F/EF-5 magnitude.

Table 20: Tornado Strikes in Orange County, FL 1950-2021

Date	Magnitude	Location	Property Damage ($)	Injuries	Deaths
05/15/1950	F1	Orlando	25,000.00	0	0
05/15/1950	F2	Unincorporated Orange County	25,000.00	0	0
04/02/1959	F2	Unincorporated Orange County	250,000.00	9	1
02/25/1961	F1	Orlando	2,500.00	0	0
06/08/1963	F1	Winter Garden	2,500.00	0	0
04/28/1964	F2	Unincorporated Orange County	250,000.00	0	0
06/05/1967	F2	Orlando	2,500,000.00	0	0
11/09/1968	F1	Hillsborough, Polk, Lake, Unincorporated Orange County, and Windermere	500,000.00	3	0
04/19/1969	F1	Orlando and Maitland	250,000.00	0	0
05/13/1971	F0	Unincorporated Orange County	-	0	0
02/03/1972	F1	Unincorporated Orange County	25,000.00	0	0
03/31/1972	F1	Apopka	30.00	0	0
03/31/1972	F1	Unincorporated Orange County	30.00	0	0
01/28/1973	F2	Orlando	2,500,000.00	16	0
05/25/1973	F0	Unincorporated Orange County	25,000.00	1	0
08/06/1975	F1	Ocoee	25,000.00	0	0
05/12/1976	F0	Orlando	25,000.00	1	0
02/24/1977	F0	Unincorporated Orange County	2,500.00	0	0
01/08/1978	F2	Windermere	25,000.00	0	0
01/08/1978	F2	Unincorporated Orange County	2,500,000.00	23	0
06/10/1978	F0	Unincorporated Orange County	25,000.00	0	0
07/01/1978	F0	Orlando	250.00	0	0
12/24/1978	F1	Apopka	25,000.00	0	0
12/24/1978	F1	Apopka	25,000.00	0	0
03/19/1981	F3	Unincorporated Orange County	2,500,000.00	1	0
06/10/1981	F0	Unincorporated Orange County	-	0	0
06/20/1981	F0	Winter Park	25,000.00	0	0
06/21/1981	F1	Unincorporated Orange County	250,000.00	0	0
06/21/1981	F0	Apopka	250.00	0	0
06/21/1981	F0	Unincorporated Orange County	2,500.00	0	0

08/27/1981	F0	Apopka	2,500.00	0	0
04/29/1982	F1	Orlando	25,000.00	0	0
09/10/1982	F0	Eatonville	30.00	0	0
02/02/1983	F2	Orlando	250,000.00	0	0
02/02/1983	F0	Winter Park	250.00	1	0
02/02/1983	F2	Orlando	2,500,000.00	9	0
04/23/1983	F1	Apopka	2,500.00	0	0
05/20/1986	F0	Apopka	25,000.00	0	0
11/09/1990	F1	Eatonville	250,000.00	9	0
03/03/1991	F1	Unincorporated Orange County	250,000.00	0	0
02/25/1992	F1	Orlando	250,000.00	11	0
01/07/1995	F1	Orlando	500,000.00	0	0
06/01/1997	F0	Orlando	20,000.00	0	0
02/22/1998	F3	Winter Garden	15,000,000.00	70	3
02/23/1998	F3	Unincorporated Orange County	5,000,000.00	5	0
06/03/2001	F0	Unincorporated Orange County	-	0	0
06/13/2006	F0	Apopka	10,000.00	0	0
10/07/2006	F0	Apopka	70,000.00	0	0
11/07/2006	F0	Orlando	40,000.00	0	0
07/15/2009	EF0*	Unincorporated Orange County	25,000.00	0	0
09/19/2011	EF0*	Unincorporated Orange County	-	0	0
12/10/2012	EF0*	Unincorporated Orange County	-	0	0
03/29/2014	EF0*	Unincorporated Orange County	-	0	0
7/24/2014	EF0*	Christmas	-	0	0
9/1/2016	EF0*	Unincorporated Orange County	21,000.00	0	0
7/7/2017	EF0*	Unincorporated Orange County	-	0	0
12/9/2018	EF0*	Unincorporated Orange County	40,000.00	0	0
6/6/2020	EF0*	Unincorporated Orange County	-	0	0
6/6/2020	EF0*	Unincorporated Orange County	-	0	0
6/6/2020	EF1*	Belle Isle	956,000.00	0	0
TOTALS		**60 Tornados**	**36,005,840.00**	**159**	**4**

**Note: The Enhanced Fujita Scale was not implemented until 2007*

Source: NWS

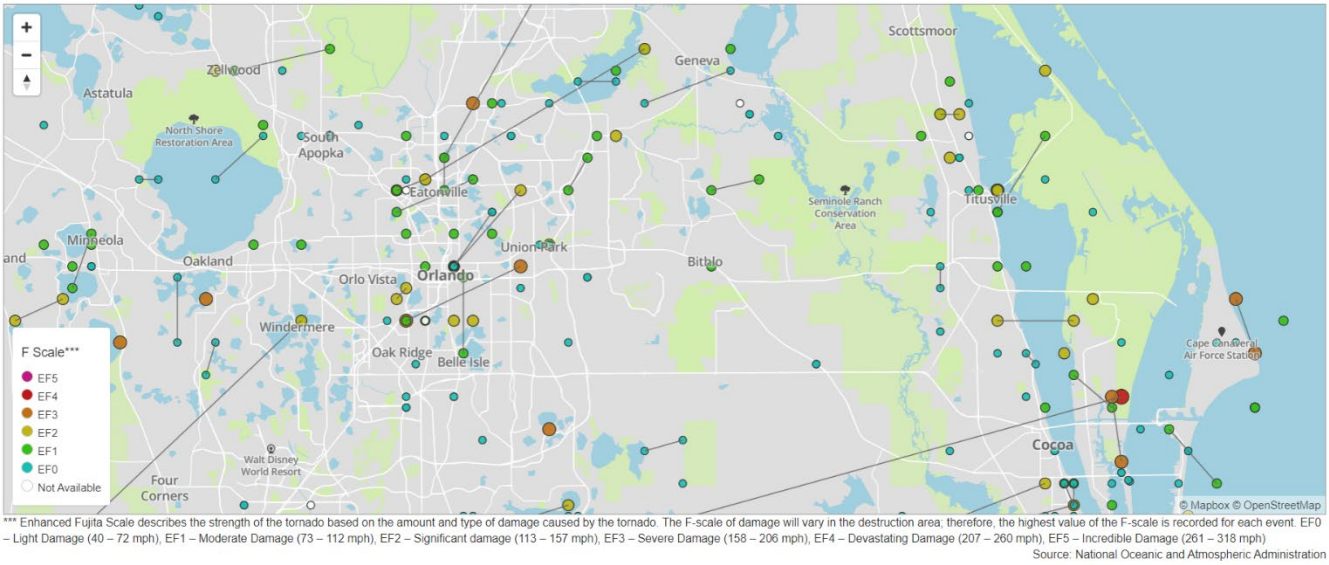
Counties that experienced property damages, injuries, or casualties that did not occur in the boundaries of Orange County were not included in the Table 20. Some of the tornados originated in neighboring counties, but may have impacted parts of Orange County.

Location: Tornados have the ability to occur anywhere in the County and its jurisdictions. Since the unincorporated County covers the largest area, the majority of reported tornados seem to have taken place in its boundaries. Other municipalities that have experienced a tornado are: Orlando, Apopka, Eatonville, Ocoee, Windermere, Winter Garden, and Winter Park.

More urban areas have an increased number of structures and a denser population, which means that a tornado in these parts of the County can

increase the likelihood that a tornado will cause property damage or human casualties. Rural areas are just as likely to experience a tornado, but the impacts may be lower. In addition, jurisdictions with numbers of manufactured homes or mobile homes may be the most susceptible to the effects of a tornado. The image below shows the approximate location and path of each of the above listed tornados, courtesy of the NWS.

Figure G: Map of Tornado Strikes in Orange County, FL, 1950-2021



Source: NOAA

Extent: Unlike hurricanes, which produce wind speeds of similar values over relatively widespread areas as compared to tornados, the maximum winds in tornados are often confined to extremely small areas and vary tremendously over very short distances, or even within the funnel itself. Originally, the Fujita Scale was used to rate tornado intensity and was based on damages to structures and vegetation.

Since 2007, the Enhanced Fujita Tornado Scale, or "EF Scale," has become the definitive scale for estimating wind speeds within tornados based upon the damage done to buildings and structures. The EF Scale is used extensively by the NWS in forensically investigating tornados and by engineers in correlating damage to buildings. All tornadoes are now assigned an EF Scale number. Table 21 outlines the Enhanced Fujita Scale. The strongest tornadoes max out in the EF5 range (more than 200 mph).

Table 21: Enhanced Fujita Scale for Tornados

Size	Funnel Speed (mph)	Damage	Damage Assessment
EF-0	65 – 85	Light Damage	Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF-1	86 – 110	Moderate Damage	Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF-2	111 – 135	Considerable Damage	Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF-3	136 – 165	Severe Damage	Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF-4	166 – 200	Devastating Damage	Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF-5	>200	Incredible Damage	Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (300 ft); steel reinforced concrete structure badly damaged; high-rise buildings have significant structural deformation; incredible phenomena will occur.

Source: NOAA Storm Prediction Center

Orange County has experienced a total of 68 tornados since 1950, comprised mainly of 53 weaker tornados, F/EF-0 and F/EF-1. There have only been 12 stronger storms that have touched down inside the borders of Orange County that have been greater than an F/EF-2 during that same time frame. The peak occurrences of two (2) F/EF-3 tornados struck Winter Garden in 1998. The severity extent that Orange County will most likely experience in the future is the weaker tornados like F/EF-0 and F/EF-1. From a worst case perspective, though, the upper extent of what Orange County and its jurisdictions may experience is an EF-3 tornado. These stronger tornados that bring higher winds and more damages are less likely to occur, but are not improbable.

Probability: With 68 tornados occurring in the span of 71 years, there is a good chance that Orange County will experience a tornado on average about once every 1 – 3 years. These will generally be weaker storms as measured by the Enhanced Fujita Scale. More severe storms have occurred less frequently in the past, but based upon the frequency of severe thunderstorms forming across Orange County, and its jurisdictions, there is equal potential for those stronger

tornados each year. For this reason, the probability for a tornado to occur is categorized as high.

Impacts: Tornados have caused severe impacts in Orange County and its jurisdictions. Records indicate that there have been at least four (4) reported casualties and more than 159 injuries in Orange County. If you include tornados that originated in other areas around Orange County, these human impacts would be even higher. The 1998 seven (7) tornados that struck East Central Florida are considered to be the deadliest tornado event in Florida history with a total of 42 casualties and 260 injuries. One of the tornados formed in Lake County as an F/EF-3 and veered into the western portion of Orange County. It continued into Winter Garden, Oakland, Ocoee, and portions south of Apopka. Three (3) people in Orange County died with over 70 injured.

Total property damages for the 68 recorded tornados in Orange County are listed at over $37 million. The 1998 tornado mentioned previously caused over $15 million worth of property damages alone. This was the single most costly tornado to have occurred in Orange County. Refer to Table 20 for figures on other property damages from tornados in Orange County.

Spatial impacts are typically small and isolated as Florida does not experience very large tornados. The swath of damages for the more intense tornados in Orange County was of course larger than the weaker systems. The widest path for a tornado in Orange County was 500 yards from an F/EF-1 tornado in 1969 with a path length of 5.6 miles. The longest path was an F/EF-1 from the 1968 that ran 69.3 miles from Hillsborough County through Polk and Lake County, until it finally reached Orange County and stopping near Windermere.

Economic impacts from tornados can be devastating as well, causing disruptions to utilities, downed power lines, blocked roadways, and wind-borne debris can impact critical infrastructure and other buildings. The response efforts could last for several days or weeks even, depending upon the severity, with recovery for homes, businesses, and other structures taking even longer.

Mitigation Measures: Due to their prevalence, Orange County has taken several steps to mitigate the hazard. There are multiple other plans that address tornados as a hazard. Where tornados can strike is not as predictable as all of Orange County and its jurisdictions have the same probability of being hit. For this reason, training and exercise drills take place to help familiarize response personnel with their roles and responsibilities, as well as outlining their actions to respond to a tornado event. Because tornados can spawn from tropical systems like hurricanes or tropical storms, there is usually some emphasis placed on the possibility for tornados during the annual State Hurricane Exercise. Other support supplies and equipment have been purchased by the County as part of their anticipated response to tornado events. The County also has a Citizen Assistance Response Team that has gone out to neighborhoods to

help residents with debris from fallen trees and putting up tarps on impacted roofs so that water leaks do not enter the building.

Vulnerability: Because of the unpredictable pattern of storms and tornados and the relatively high frequency of recurrence, all of the Orange County and its jurisdictions are highly vulnerable to damage. As the number of structures and people increase, the potential damage and injury rates increase. Mobile and modular homes, substandard housing, apartment complexes, and/or housing projects may be extremely susceptible to damage and destruction from wind or wind-borne debris during a tornado event.

Depending on the severity or magnitude of the tornado, Orange County has experienced several casualties and a number of injuries due to this hazard. Property damages have also been high as a result of tornadic activity. Even though the storms usually affect a small width or an isolated geographic area, the path can stretch for miles. Building codes in the State of Florida were designed mainly for tropical systems like hurricanes, but tornados are more compact. Their concentrated wind strength can weaken the structure's envelope and compromise the building. Other wind-borne debris can impact property, structures, vehicles, and power lines. This disrupts the daily operations of the County and municipalities until normalcy can be reestablished.

Risk: High – 71%

The overall risk from tornados is categorized as a high threat mainly because of the significant impacts this hazard poses to humans, properties, and economics. In addition, there is a high probability for an occurrence to affect our area. The mitigation measures that are currently in place can help to reduce recovery times, but this hazard will still occur. Tornados remain very unpredictable, but its impacts can be reduced through better detection technology, public outreach, and emergency notification systems.

Tornados are the most significant of the severe thunderstorm associated hazards and awareness of this hazard appears to be on the rise. Orange County's Office of Emergency Management has distributed NOAA weather radios for the past several years and plans to continue to do so to help residents receive important warnings when severe weather happens. The NWS and other media outlets now have improved radar capabilities that can detect potential cyclone activity to issue watches, warnings, and other advisories.

Sinkholes / Land-subsidence

Description: Sinkholes are a common feature of Florida's landscape due to the state's karst topography. This karst topography is terrain produced by the process of erosion associated with the chemical weathering and dissolution of carbonate rock and can include caves, disappearing streams, springs, and underground drainage systems, all of which occur in Florida. A sinkhole is a type of land-subsidence that is formed when the carbonate layers of limestone or dolomite that lie beneath the ground's surface are eroded away, being dissolved by flowing groundwater that is acidic.

During this point, the water helps to support the walls of the cavity, but over time, if the water table drops, the support provided by the groundwater disappears and the cavity erodes further. In addition, the weight from the ground above the void increases stress on the cavern and the collapse occurs, taking with it whatever objects may have been located above. This collapse is usually an abrupt event and can have the potential to be catastrophic to infrastructure, roadways, homes or other buildings situated on the surface above the sinkhole.

Previous Occurrences: According to the Florida Department of Environmental Protection (FDEP) Florida Geological Survey (FGS) Subsidence Incident Report (SIR) database, there have been 195 sinkholes reported by citizens in Orange County from 1961 to 2014. These land subsidence events have not been verified by a geologist, but are rather reports from citizens when a land subsidence occurred that they were aware of. The most number of sinkholes that reported to the FGS in one (1) year was in 1981 with 23 instances. This included the Winter Park Sinkhole (1981) that was reported to have been over 107 feet deep, with a length of 350 feet by a width of 350 feet. There have not been any significant sinkholes that have occurred since 2010.

Table 22: Sinkholes in Orange County, FL, 1961 - 2021

Depth (feet)	Number of Sinkholes
< 5	102
5 – 9	29
10 – 24	39
25 – 49	15
50 – 99	7
100 – 199	2
> 200	1
TOTAL	**195**

Source: FDEP FGS SIR

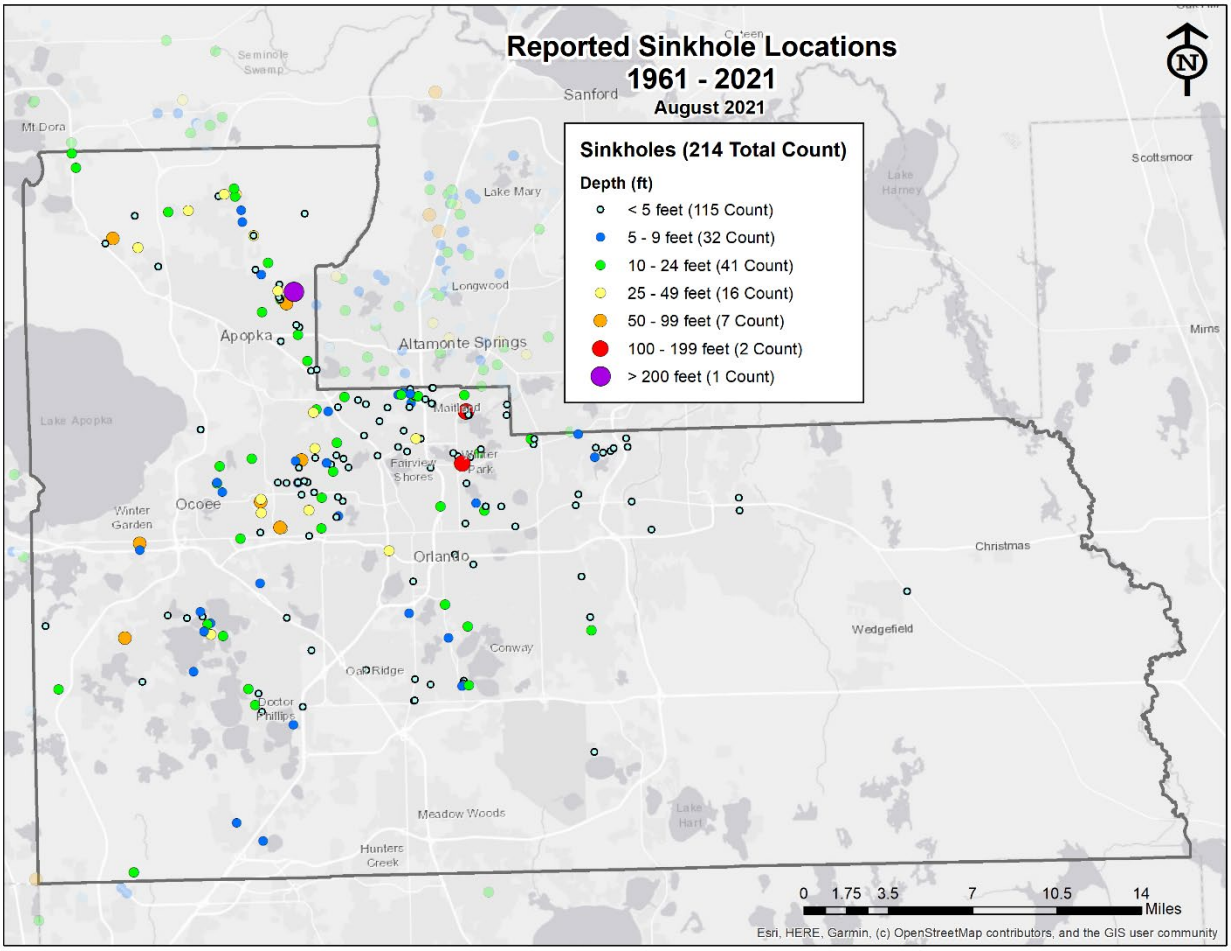
The number of reported sinkholes received by the FDEP FGS SIR is very different from the number of property insurance claims received. Between 2006 – 2010 Orange County had over 510 claims filed, or 2.06% of all claims filed in the State of Florida during the same time period.

Location: The geology of the state has a lot to do with sinkhole locations in Orange County is comprised of three different areas: Area I, Area II, or Area III.

- Area I is described as bare or thinly covered limestone where sinkholes are few, generally shallow and broad, and develop gradually where solution sinkholes dominate. This encompasses most of Lake Apopka and the restoration found to its north.
- Area II occurs where the cover is 30 to 200 feet thick and consists mainly of incohesive and permeable sand where sinkholes are few, small, of small diameter and develop gradually, dominated by cover-subsidence sinkholes. Large portions of the eastern, south western, and south-central County and some parts of Orlando, Belle Isle, and Edgewood are in this category.
- Area III has cover 30 to 200 feet thick as well. However, it is comprised of cohesive clayey sediments of low permeability where sinkholes are most numerous, of varying size, and develop abruptly. Cover-collapse sinkholes are more prevalent in this area that includes such as parts of Apopka, Maitland, Oakland, Ocoee, Orlando, Windermere, Winter Garden, and Winter Park.

Sinkholes can be found throughout Orange County, though they seem to be concentrated in certain areas. The unincorporated County has about 104 reported sinkholes in its boundaries, primarily in the northwestern, central, and southwestern portions. Other jurisdictions with a prevalence of sinkholes include: Apopka, Maitland, Ocoee, Orlando, Windermere, and Winter Park. Others like Belle Isle, Eatonville, Edgewood, Oakland, or Winter Garden have relatively few, though not unheard of, instances of reported sinkholes.

Figure H: Map of Sinkhole Locations in Orange County, FL, 1961 - 2014



Source: FDEP FGS SIR

Extent: Sinkholes in Orange County come in a variety of widths, lengths, and depths. There have been a couple of sinkholes that have been recorded at depths over 100 feet. One sinkhole was reported to the FGS as being 250 feet in depth and would be the worst case scenario. Most sinkholes, though, are less than five (5) feet deep. With 214 sinkholes reported to FGS, the average depth of a sinkhole in Orange County is 11.35 feet, with an average length and width of 22.05 feet and 22.08 feet, respectively. The smaller sinkholes are most commonly the cover-subsidence type that is found mainly in the Area II of the county's geology. These types of sinkholes develop slowly over weeks, months, or even years creating depressions in the ground that can cause building foundations to shift or cracks in floors and walls. They are responsible for the majority of sinkhole related damage that is reported to home insurance companies in the State of Florida, but they do not receive much attention.

The large, cover-collapse sinkholes are generally deeper and are in Area III. They develop much more rapidly with catastrophic consequences to buildings, roadways, or other structures by forming open holes in the earth. These events receive the majority of attention and media coverage, such as the Winter Park Sinkhole (1981). For future occurrences, Orange County will continue to mainly

experience the smaller, cover-subsidence sinkholes and may occasionally have more severe instances of cover-collapse.

Probability: The return rate of sinkholes in Orange County amounts to nearly 4 instances per year since 1961. For this reason, the probability of recurrence of sinkholes in Orange County is high while the extent of damages will be variable based upon the severity of the subsidence. Weather events, like drought, flood, or tropical systems can have an effect on the number of sinkholes that take place as the subsidence is the result of the dissolving of our limestone bedrock. Rapid changes in the water table elevation due to drought, heavy rainfall, or pumping are some of the key triggers for sinkhole formation. Surface loading due to new construction development, well drilling, or new water drainage patterns from runoff can also factor in to subsidence events, but these are less common.

Impacts: Direct impacts due to sinkholes are difficult to determine as FDEP FGS does not currently track damage estimates for each of the reported sinkholes that have occurred previously in Orange County. Some of the estimated side effects across the State have included decreases in home values due to sinkholes, as well as a significant increase in insurance premiums. Loss estimates from the entire State were reported at greater than $1.4 billion across 24,671 claims from 2006 to 2010.

Orange County has not experienced any human impacts for loss of life or injuries related to this hazard. Property damages for Orange County are not currently tracked as noted previously. According to the Florida Office of Insurance Regulation, from 2006 to 2010 there were approximately 510 property insurance claims made in Orange County for sinkhole damage. The average expense for both open and closed claims was $9,936.35, which would mean about $5,067,538.50 total insurance expenses for Orange County sinkhole claims. While this is not an exact dollar for dollar amount of actual property damages, this is the most current and available data that exists.

Spatial impacts are relatively low as sinkholes are generally isolated incidents. Some sinkholes may occur at or around the same time as other sinkholes, but generally there is some separation of time between incident reports. They do not affect large geographic areas, but some like the notable sinkhole in Winter Park from 1981 can draw large amounts of attention. Economic impacts have a moderate level of risk, especially to the insurance industry. Sinkholes obviously have the potential to impact critical infrastructure, roadways, bridges, and water bodies. Disruption of services could also potentially occur as electric, water, sewer, gas, and telecommunications utilities have underground service lines that could be damaged or exposed as the result of a sinkhole.

Mitigation Measures: Sinkhole awareness has been on the rise in the State of Florida. A pilot study program in the North Central Florida region is currently underway and will be implemented statewide in the next few

years to help determine the potential sinkholes by creating a predictive model using geospatial information systems (GIS) and probability statistics. This planning project hopes to enhance other mitigation strategies. As this plan is not yet in place, sinkholes are discussed as a hazard in other plans maintained by the County. Sinkholes as a hazard are generally not exercised and there are limited training courses conducted on sinkhole mitigation. Public Works departments in Orange County and its jurisdictions do have some logistical support in the remediation of sinkholes to assist with stabilization, but this occurs on a case by case basis.

Vulnerability: Orange County is very vulnerable to sinkholes as they are a recurring hazard that can be highly unpredictable in where they occur or how often. Property insurance claims have been on the rise in Orange County, so it is reasonable to expect that further incidents will continue to occur in the future. The overall impacts are mainly to property and economic disruptions. These subsidence events are geographically isolated to a concentrated area and normally occur in certain portions of the County. While there have not been any reported losses of life or casualties due to sinkholes, other parts of the state have seen them, so there is some potential that this could take place in Orange County.

The severity of sinkholes varies from large incidents that are cover-collapses to smaller depressions that are cover-subsidence. Though property insurance coverage may not be enough to properly mitigate this hazard for the future, other mitigation measures are tough to come by for this hazard due in part to its unpredictable nature.

Risk: High – 62%

The overall risk from sinkholes is a high threat mainly because of the significant impacts this hazard poses to property and economics. In addition, there is a high probability for multiple occurrences in our County that will affect residents and even businesses. The mitigation measures that are currently in place can only help so much as this hazard remains very unpredictable. Some impacts may be reduced through better research and predictive modeling as a result of the pilot study. Further training and exercises related to this hazard are needed so that first responders and emergency managers are better aware of what can or should be done to address sinkholes as a major hazard.

Hazardous Materials

Description: Hazardous materials (HazMat) are those substances that are used every day in a variety of industrial and commercial applications. These are deemed to be dangerous due to their toxic nature, through flammability, radioactivity, explosive, corrosive, oxidizing, asphyxiating, bio-hazardous, pathogenic, or

allergenic nature. Orange County and its jurisdictions have a variety of these hazardous materials that are moved into, out of, thru, or within their boundaries.

The accidental or purposeful release or spill of these volatile substances into the environment where human, plant, and/or animal life could be endangered comprises this hazard. Many times, these types of incidents are caused by accidents that occur due to human error(s). They are often unpredictable, no-notice events that can cause significant loss of life, property damage, and economic disruption.

The use of hazardous materials, such as chemicals, toxic substances, and radiological materials, have become commonplace in both urban and rural communities. The transportation of these agents or elements has become commonplace in our society, with uses across the board from industry to agriculture, medical procedures to water treatment, communications to research, and other technological uses. Leaks, spills, or releases can also occur from the containers that are transported on the multi-modal network that crisscrosses Orange County and poses a threat to a large number of residents and visitors.

The primary hazard identified for analysis in Orange County and its jurisdictions are chemicals; however, we do recognize that other dangerous materials that are transported to, from, thru, and within Orange County by highway, surface roads, airports, and rail lines. It is also important to note that this hazard is related to the spill or release of the materials and is separate from the terrorism hazard that will be discussed later.

For chemicals, the types of Extremely Hazardous Substances (EHS) are described in Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986. These refer to various chemicals that could cause serious health effects following short-term exposure from accidental releases. The State of Florida passed a law, referred to as the Emergency Planning and Community Right-To-Know Act (EPCRA) in 1988, for the local regulation of these chemicals. For the first time, passage of the EPCRA allowed emergency planners, responders, and the public access to facility-specific information regarding the identification, location, and quantity of particular hazardous materials at fixed sites.

The law requires facilities that maintain certain chemicals at particular threshold quantities to report annually to state and local emergency officials. In addition, facilities must immediately notify officials of any releases of harmful chemicals that have the potential to result in offsite consequences or impacts to the environment or atmosphere. This information is utilized to prepare emergency plans for hazardous materials incidents, to allow responders to receive training based on specific known threats, and to inform and educate the public regarding the chemicals present in their communities. Orange County has more than 700 fixed facility locations that report the presence of chemicals with over 200 sites having an EHS in mandated threshold amounts.

Previous Occurrences: According to a report from the State Watch Office (SWO), from 2016 to 2020 there have been 447 HazMat incidents from a mixture of transportation and fixed facilities, as well as a variety of involved chemicals. Most of the releases that are transportation or fixed facility related involve petroleum chemicals or non-EHS chemicals. There were 369 reported spills such as gasoline, diesel fuel, automotive oil, ethylene glycol, propane, or a mixture of these. There were also 77 reports of non-petroleum release incidents. The SWO utilizes contacts from facilities, county watch offices, transportation operators, and other first responders for their information. This is not a comprehensive account of all HazMat incidents that take place in Orange County.

In addition to these reports, the State Emergency Response Commission (SERC) maintains information on various HazMat incidents that are reported statewide that include releases with evacuations, injuries, or fatalities. Some transportation incidents may have included information on injuries or fatalities due to trauma from an automotive accident and are not directly related to a chemical exposure. The classification is determined by the local area medical examiner and is reported to the SERC. Table 23 contains information related to reported HazMat incidents that have occurred within Orange County. The reported incidents originated at both fixed facilities and transportation incidents for petroleum and non-petroleum chemicals. On average, there are a higher number of transportation incidents than fixed facility incidents. These occurrences are the more notable incidents that are reported to the SWO and/or the SERC and do not include every release of hazardous materials that may occur within Orange County.

Table 23: Hazardous Materials Incidents in LEPC District VI, FL

Incident Type	2016	2017	2018	2019	2020	Average*
Fixed Facility Non-Petroleum	5	12	11	9	14	10
Fixed Facility Petroleum	7	11	16	12	15	12
Transportation with Petroleum	63	52	69	69	65	64
Transportation without Petroleum	4	2	5	3	3	3
TOTAL	**79**	**77**	**101**	**93**	**97**	**89**

*Rounded to the nearest whole number

Source: State Emergency Response Commission (SERC)

Other previous occurrences in Orange County can be found in the list of Superfund sites in Table 24. These sites were designated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) that are polluted places that require a long-term response and monitoring to clean up contaminations. None of the sites listed have been deleted or partially deleted from the list.

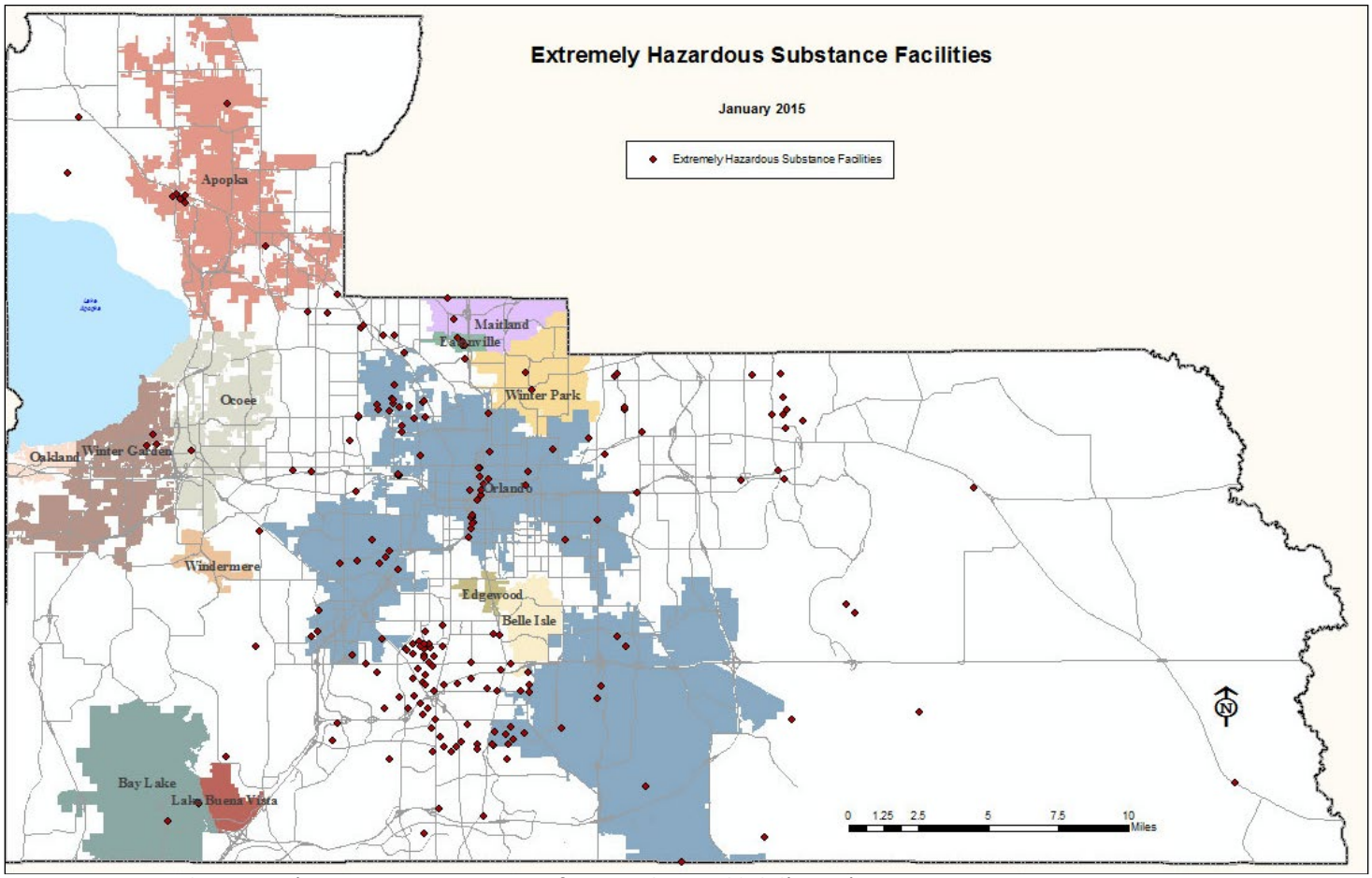
Table 24: Superfund Sites in Orange County, FL

ID Number	Facility Name	Reason Added	Proposed	Listed	Construction Completed
FLD0040 64242	Chevron Chemical Co. (Ortho Division)	Soil and groundwater contamination by pesticides, petroleum products and VOCs, including xylene from waste disposal practices at a former pesticide formulation plant. Contaminated soil has been removed.	01/18/1994	05/31/1994	02/10/1998
FLD0559 45653	City Industries, Inc.	Soil and groundwater contamination by poor waste handling processes and intentional dumping by a former industrial waste handling business. The site was abandoned with around 1,200 drums of hazardous waste and thousands of gallons of sludge in storage tanks. Wastes and contaminated soil were removed in 1983–4; groundwater is being treated.	06/24/1988	10/04/1989	03/02/1994
FLD9841 69235	Orlando Former Gasification Plant	Soil and groundwater are contaminated by coal tar waste products. This site is listed as a Superfund Alternative Site.	-	-	-
FLD0499 85302	Zellwood Ground Water Contamination		12/30/1982	09/08/1983	09/16/2003

Source: http://en.wikipedia.org/wiki/List_of_Superfund_sites_in_Florida

Location: There are 213 fixed facilities in Orange County that hold chemicals that are designated as Extremely Hazardous Substances (EHS). These facilities can be found in almost all of the jurisdictions in Orange County, including: Apopka, Bay Lake, Eatonville, Lake Buena Vista, Maitland, Ocoee, Orlando, Winter Garden, Winter Park, and across the Unincorporated County. Releases of chemicals have the potential to occur at each of these facilities. The County conducts a hazards analysis of each facility every other year to determine the chemical's vulnerability zone radius and the approximate population in any critical facilities located within that zone that would need to evacuate. Critical facilities include schools, hospitals and other medical facilities, fire stations, and police stations. This information is provided to the individual facility, first responders, the LEPC, and the SERC/State.

Figure I: Extremely Hazardous Substance Facilities in Orange County, FL



Source: E-Plan – Emergency Response Information System, 2013 Chemical Inventories

Precise locations for other transportation-based releases are more difficult to obtain. They generally occur along major transportation routes, such as the interstate highways, toll roads, state roads, and significant county roads. Petroleum products are the primary chemical spills from these incidents, but they are less significant. Rail lines may also experience releases of chemicals of an increased severity and quantity. A passive transportation of chemicals in Orange County utilizes a pipeline system for natural gas that is managed by

Peoples Gas System. This pipeline enters Orange County in the northwestern portion of the county around Apopka and moves south to Osceola County. Other spurs come off of this main line towards downtown Orlando and east towards Brevard County.

Of the four (4) previously mentioned Superfund sites, two (2) are in the Unincorporated County and the other two (2) are in Orlando; of these, one (1) is listed as a Superfund Alternative site. The environmental remediation and clean-up/construction has been completed on all of these sites. All of these sites have the human exposure and groundwater migration under control. The future use for these sites will be limited for the foreseeable future and they will continue to be monitored and evaluated.

Extent: The release of HazMat incidents have been numerous over the past several years, most of which have been relatively minor or involving less severe chemicals. The majority of spills are related to petroleum products that mainly pose a threat due to their flammability.

There have been a few severe releases that have taken place in Orange County and its jurisdictions. On December 14, 2004 Orange County Fire Rescue responded to possible nitric acid explosion in the Unincorporated Orange County where the acid was exposed to water from the sprinkler system. There were no serious injuries or damages to the structure.

Then on March 31, 2008, the Diamond R Fertilizer Plant in Winter Garden had a chemical reaction that involved ammonium nitrate and created a significant amount of smoke in the building. Due to smoke in the area, the City of Winter Garden issued a mandatory evacuation of the surrounding residential areas to the east, west and south; a temporary shelter was established at a local area elementary school. Residents who were not immediately evacuated were instructed to "shelter-in-place" through a mass notification system that was issued by the County Warning Point. The incident was brought under control a few hours later and the shelter was closed and residents were allowed to return home.

More recently, a chemical explosion occurred in downtown Orlando on September 26, 2013. A vacant warehouse was being used for storage of an experimental fuel, named "carbo-hydrillium," when the gas cylinder ruptured and combusted, which shook several high-rise buildings in the urban area nearby. A large hole in the building opened up, about 50 feet wide by 20 feet high on the north-side of the building. All of the windows were broken and debris was scattered over a 100 foot area around the rear of the building. There was no fire present when responders arrived, along with no injuries or fatalities. The chemical had a sudden release of pressure as it was being stored inside an incompatible gas cylinder. Several buildings in the vicinity evacuated as a precaution, but there were no other reported damages other than the impacts to the warehouse itself.

It is anticipated that releases of chemicals and spills of petroleum products will continue to occur in Orange County and its jurisdictions. The majority of these will not be severe, but there is always some potential for a large scale release to occur. Facilities that store chemicals are scattered about the County and those with EHS chemicals are concentrated in the industrial areas. These areas are not as populated, but other facilities are located in more commercial and/or residential areas that may increase the chance of exposure.

Probability: There are over 200 fixed facilities that house extremely hazardous substances in Orange County. The probability of an incident occurring is high as there will continue to be hazardous materials present through the continued use of chemicals at fixed facilities and their transport to, from, through, and within Orange County and its jurisdictions. With Orange County being part of a large metropolitan area and centrally located in the State, it is a primary highway and freight passage in the region for goods that are being transported north and south on the Florida peninsula to Jacksonville or Miami, as well as east or west between Daytona Beach/Port Canaveral and Tampa. The likelihood for transportation incidents is amplified due to the number of possible encounters that can occur in a multi-modal setting. The most likely incident that may occur would involve a petroleum product spilling onto a roadway or other impermeable surface that would then require some kind of clean-up.

Other releases at fixed facilities will also continue to happen. While the number of instances will be likely be lower than the transportation incidents, the chemicals involved, such as EHS chemicals like chlorine, ammonia, sulfur dioxide, will be greater in their severity than petroleum products. The degree to which these releases or spills impact the county, either in quantity, severity, or location is an unknown variable. Continued emergency planning, accuracy for inventory reporting, and preparedness training must continue to occur to help reduce the number of occurrences.

Impacts: The potential impacts to humans due to a HazMat release would potentially be severe, depending on the chemical, the quantity released, and the location where incident occurred. Several scenarios have been conducted by the LEPC to show the possible outcomes of a large-scale release at some of the chemical facilities in Orange County or from multi-modal transportation sources. Historically speaking, though, the number of injuries or deaths has been relatively low, making it a moderate impact overall.

Property damage information was not available at this time as there is not a mechanism used to track this type of data. In most cases, the property damages are low due as a HazMat release or spill without any other catalysts will produce localized damages. Other factors that may increase property damages, such as fire, explosions, releases of pressure, water reactivity, or the presence of other chemicals can all exacerbate the emergency response and destroy or further damage buildings.

The geographic area that is impacted during a hazmat/chemical release is relatively small, depending on the type of chemical or other environmental factors like temperature, wind speed, or topography. It is possible that certain chemicals in larger quantities could disturb a greater area, but it is unlikely that this would cover more than 25% of the land area of the county. All of the jurisdictions may be impacted by various releases at some point and may encompass larger proportions of their municipality if a release were to occur.

The economic impact is difficult to quantify due to a release or spill of a hazardous material. It is possible that severe interruptions may follow after an incident, especially if an incident occurred at critical facilities, utility stations, or closures to transportation networks. Other outreaching economic impacts due to a spill or release may negatively impact the industrial area where the incident took place, such as the Superfund sites. Businesses that may need to evacuate or "shelter-in-place" would be affected during a release and could not operate. Residential neighborhoods and the real estate market may experience difficulty for sale of homes, condos, or apartments if an incident creates long-term issues. Most cases would see short-term impact where individuals would be evacuated and would return to normal after several hours. Road or rail closures could create heavy traffic and schedule delays; while this is mainly an inconvenience for most, there may be other ramifications to emergency service vehicles that may have trouble operating or obtaining access to the incident.

Mitigation Measures: There are numerous of mitigation measures employed for this hazard. Preparedness planning activities like the County's Hazards Analysis program help to provide local area responders, the LEPC District, and the State with information on the quantity, type, and storage methods of chemicals at fixed facilities, as well as calculating vulnerability zones for evacuation purposes. The LEPC also maintains a District-wide Hazardous Materials Emergency Plan that addresses direction and control, notification, public information, protective actions, and recovery and reentry. Training courses and exercises are routinely conducted in Orange County by various agencies and departments. Because of this, there are several groups of highly skilled teams of Hazardous Materials Technicians that operate specialized equipment with a high level of support.

Vulnerability: Orange County and its jurisdictions are moderately vulnerable to a release or spill of hazardous materials, mainly due to their prevalence in the County, as well as the high probability that a release will occur. The number of previous incidents is high, especially for transportation-based petroleum spills. Other releases at fixed-facilities are much lower, but the EHSs would have a much greater expected severity if a catastrophic failure happened. The impacts have been relatively low in the past, but the potential for damages to property, humans, and the economy are moderate.

Most of the smaller municipalities do not have large numbers of EHS facilities within their jurisdictional boundaries. The Unincorporated County and Orlando

are more vulnerable because of this. Most all jurisdictions are within close proximity to major roadways, highways, toll roads, interstates, airports, or rail lines. The presence of a multi-modal transportation network that carries large amounts of HazMat increases the vulnerability across the board to all of the municipalities. Transportation incidents with non-petroleum products are relatively few. The types of substances being transported using these various methods, the location, quantity, and topography of where the release might occur is an unknown variable and increases the vulnerability.

Risk: Low – 29%

Even with a high probability of incidents, minor to moderate anticipated or potential impacts, and a moderate vulnerability, the risk of hazardous materials is low. This is a result of the significant amount of mitigation measures that take place in the county to prepare for a release in advance. Training happens on a regular basis throughout the year and an exercise with a HazMat-based scenario is conducted by the LEPC on, at least, a bi-annual basis, if not more frequently. The specialized equipment and HazMat teams provide a consistently high level of support for responding the incidents.

Terrorism / CBRNE

Description: Terrorism is defined in the Code of Federal Regulations as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives." It is the use of force or violence committed by an individual or group of varying degrees of organization that may be foreign or domestic in origin. These actions are carried out against persons that are considered to be civilians or non-combatants, as well as their property, in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom.

In many cases, the use of basic armaments like guns or knives is the primary weapons, but these may limit the damage that results. In some cases, harmful substances are used against the target in the attack(s) for catastrophic results and have been termed "weapons of mass destruction," which includes: chemical, biological, radiological, nuclear, or explosion (CBRNE) materials.

Previous Occurrences: Early in the morning on Sunday, June 12, 2016, a gunman entered a nightclub in the City of Orlando and committed the deadliest mass shooting in modern U.S. history. In the immediate response, members of the Orlando Police Department engaged in a three-hour standoff with the shooter. The shooter barricaded himself inside the building with several people that were taken as hostages. A Special Weapons and Tactics (SWAT) Team entered the club just after 5:00 a.m. in an attempt to rescue the hostages. Gunfire was exchanged with the gunman and the shooter was shot dead. In the aftermath,

49 victims were confirmed dead, 53 were hospitalized. Reports of explosives and/or suspicious devices later turned out to be false.

The City of Orlando Emergency Operations Center (EOC) was activated for eleven (11) days following this tragedy. Personnel and supporting agencies from around the area provided assistance to the on-scene incident command, provided public information, and coordinated support services for victims' families and next of kin. While the immediate threat has ended, the city and local areas are still healing from the wounds, both physical and emotional, that were inflicted during this tragic incident. This type of event is unprecedented in the City of Orlando and Orange County. Much of the information and analysis is still in process and will be for some time to come.

There have not been any other documented terrorist incidents, nor have any incidents involved the malicious use of CBRNE materials, in Orange County or its municipalities. There have been several threats that have taken place, but they did not materialize or were stopped before they could be carried out.

Nevertheless, it is very important for authorities to take all precautions and act accordingly. Due to the magnitude of damage and injury that could occur if a terrorist event were to occur, especially considering the recent tensions at home and abroad, this issue should be taken into consideration when planning for disasters. Efforts should also be made to enhance training, equipment and supplies to Orange County emergency agencies, domestic security resources, and intelligence gathering, analysis, and dissemination from fusion centers.

Location: The single documented instance of a terrorist incident occurred within the City of Orlando, just south of the downtown area on Orange Avenue. Orange County contains an abundance of potential targets, critical infrastructure, or key resources that may present a high profile or a perceived weakness that would open the location to an attack. A terrorism incident would more than likely be located in an area that is more densely populated, such as our urban areas, attractions, or event venues. For the purposes of this document, and in the interest of public safety, the precise location(s) will not be discussed or listed here; law enforcement, emergency management, and other domestic security focused agencies do maintain information related to their jurisdiction's critical facilities. Other facilities and locations that may be potentially threatened also conduct exercises and hold training courses for their employees and staff to help prepare for various scenarios involving terrorism or CBRNE materials.

Extent: While we can never predict what target a terrorist will choose, we do know that there are some factors that may be used when selecting a potential target that could create a worst case scenario. Terrorists want to achieve one or more of the following:

- Produce a large number of victims and mass panic
- Attack places that have a symbolic value
- Get the greatest possible media attention

There are a number of high profile targets in Orange County that, if other incidents were to take place, would produce a mass casualty incident. Local area residents, visitors, and businesses would be placed into panic. There would also be a great deal of national and international concern due to travelers and visitors that come to Orange County and its municipalities. Several of the local area institutions may represent an ideology that some terrorist organizations, both foreign and domestic, are opposed to and would consider attacking.

Other events that Orange County hosts throughout the year, or even on a less frequent basis, receive a great deal of attention. Preparation to help prevent terrorist activity is heightened in advance of these activities. Because of the significance of these establishments or events, any incident would create a large media response and generate continued exposure. Athletic events, parades, concerts, political rallies, or other mass gatherings may all have some potential for a terrorist event.

Probability: Even with a recent recorded instance (2016), the overall probability of recurrence is low. This may be due in part to the continued intelligence analysis and information sharing by law enforcement agencies at the local, state, and federal levels. Another factor may be the result of heightened awareness and the mentality of it being important to engage in the concept of "See Something, Say Something." This situational awareness is critical to helping keep the number of occurrences low.

However, with the number of potential targets, locations, and/or events that take place in Orange County and its municipalities, the potential for a terrorist incident to occur again remains high. Based on this, the overall probability for a terrorist event to happen is a moderate likelihood; Orange County and its municipalities constantly prepare for such events.

Impacts: The impacts from a terrorist event would potentially be severe to loss of life, property, and economic impact. Based on information from the nightclub shooting in 2016, there was an enormous loss of life and resulting injuries. The physical building itself was severely damaged, both inside and out. Other nearby buildings and vehicles were inflicted with minor damage as well. The long-term economic impacts cannot be measured at this time. During the days following the shooting though, several surrounding businesses were closed for business. Traffic along Orange Avenue, a major thoroughfare in Orlando, was re-routed around the incident as investigators conducted their forensic review at the scene. Local area hospitals were effectively shut down as they immediately responded to the rapid influx of patients to the emergency room. Other impacts to the surrounding communities, including psychological and mental health impacts, cannot be measured. In some sense, the community did band together with an immediate outpouring of support to the families and friends of victims, survivors, and others that were affected by this tragedy. We are still in the process of gathering information related to the measureable impacts for this single incident.

The following discussion is based on some of the scenarios that have been developed through the county-wide and regional exercise program. This includes exercises where Orange County and its jurisdictions have participated in discussion or performance based exercises. They may also have acted as part of the Regional Domestic Security Task Force (RDSTF) or the Urban Area Security Initiative (UASI) as many of the scenarios involve a multi-agency, multi-jurisdictional response.

In the various exercise scenarios, casualties could be great in numbers. Estimates range anywhere from just a few individuals to hundreds in human injuries and deaths. A terrorist event does not have to injure or kill anyone, but the use of CBRNE materials, or even conventional weapons, almost guarantees that there would be victims, either from bystanders, responders, or even the terrorists themselves. Property impacts may also reach catastrophic losses depending on the location of the incident or if CBRNE materials are used. Anticipated damages to buildings, vehicles, or other property could be minimal with a cost of just a few thousand dollars or quite extensive where destruction could total hundreds of millions of dollars.

The geographic area of a terrorist incident is generally isolated in spatial components. In Orange County, potential targets are spread out around the unincorporated areas, as well as the municipalities. The jurisdictions with higher population concentrations, attractions, and event venues are the more likely areas. An incident involving CBRNE components would certainly extend the affected area though. Depending upon the type of incident, its potential target, and/or the device(s) used, there may also be some environmental impacts associated with terrorism. CBRNE devices would certainly have cascading effects to the environment but the range of damage would vary. The target itself may be contribute to the harm, especially for some of the critical infrastructures related to electric and water utilities.

Economic impacts could also range from minor disruptions in critical infrastructure and services to large-scale outages and shut downs. Terrorist attacks that concentrated on utility services or other such infrastructure would create more severe interruptions for that sector. Businesses and industry could also be severely impacted; incidents at local attractions or theme parks would have an effect on our tourism economy. Depending on the location, materials used, and severity of the attack, other infrastructure such as transportation networks, hospitals and healthcare facilities, and educational facilities would also be affected as a result of a terrorist incident.

Government services might also be placed under strict security following an attack. The time to recover from such an incident would vary greatly; some sectors may be more affected than other following an incident, but nearly all would experience a disruption.

Mitigation Measures: Mitigation measures for terrorism are fairly robust due to the high potential of an incident occurring. There are several specific plans that deal with terrorism, including the County's CEMP, the THIRA, and other plans developed in conjunction with local law enforcement in the county, as well as the region, state, and nation. The local fusion center, the Central Florida Intelligence Exchange (CFIX) continuously distributes information and analysis to recognized partnering agencies and individuals that have been previously vetted. Training courses and exercise opportunities are also very common with at least annual scenarios that contain an element of potential terrorist activity. This hazard is included as part of the local, regional, and state Training and Exercise Plan (TEP). There are also dedicated equipment, teams, and support resources dedicated to addressing possible terrorist plots, investigating potential leads, and continuous evaluation(s) of likely targets, critical infrastructure, and key resources.

While these mitigation measures may not fully prevent other terrorist events or stop all activities prior to their execution, they do serve to lessen the effects an incident may have by providing a wide range actions to mitigate the impacts and affected people, property, economy, and environment.

Vulnerability: There is some amount of vulnerability present in Orange County to the hazard of terrorism. The number of potential targets in our county with its attractions, event venues, and critical infrastructure is the main reason this hazard is included here, as well as the enormous impacts that could affect the County and its jurisdictions. Extreme loss of life, property damage, and economic and service disruptions would abound in the event of a terrorist incident, especially if another or larger magnitude type of event were to happen. In consideration of this possibility, many mitigation measures have been put into place to help prevent, prepare, or avoid an incident of this type.

Risk: Medium – 32%

Despite the multitude of mitigation actions, the unpredictability of terrorist events and the large number of potential targets means that this hazard has the potential to occur again in the future. It is unknown just how near or far in the future that may be, but the risk is ever present as shown from the recent tragedy that occurred in June 2016.

Severe impacts to loss of life, property damage, and service disruptions would result if an event were to happen in Orange County. Terrorism remains a moderate risk to which Orange County is vulnerable. Several plans currently exist to address the hazard and are regularly updated. Training is conducted on a normal basis throughout the year with exercise scenarios that are created to help responders address their actions in an emergency. The specialized equipment, teams, or support takes several forms, one of which is the RDSTF, which is the culmination of a number of disciplines, such as law enforcement, fire/rescue, emergency

medical services, emergency management, hospitals, public health, schools, and businesses. The fusion center (CFIX) provides intelligence, analysis, and information sharing to a broad range of partnering agencies and individuals as well. These organizations provide a high level of support for responding to, recovering from, preparing for, and preventing terrorist incidents.

Cyberterrorism

Description: A cyberattack is defined as a malicious computer-to-computer attack through cyberspace that undermines the confidentiality, integrity, or availability of a computer (or network), data on that computer, or processes and systems controlled by that computer. National Security Presidential Directive 54/Homeland Security Presidential Directive 23 (NSPD-54/HSPD-23) defines cyberspace as the interdependent network of information technology infrastructures, and includes the Internet, telecommunications networks, computer systems, and embedded processors and controllers in critical industries.

Threats to cyber space are regarded as one of the most serious economic and national security challenges in this day in age for the United States. As the Director of National Intelligence (DNI) recently testified before Congress, "the growing connectivity between information systems, the Internet, and other infrastructures creates opportunities for attackers to disrupt telecommunications, electrical power, energy pipelines, refineries, financial networks, and other critical infrastructures.[5]

The duration of a cyberattack is dependent on the complexity of the attack, how widespread it is, how quickly the attack is detected, and the resources available to aid in restoring the system. One of the difficulties of malicious cyber activity is that it could come from virtually anyone, virtually anywhere.

Location: While cyber risks and threats are mainly thought of as not having specific locations, there are physical sites that would be impacted. Locations at risk could include government agencies, institutions of higher education, medical facilities, and various private sector entities.

Extent: As most day-to-day activities rely on the Internet in one aspect or another, any person or infrastructure is susceptible to cybersecurity threats. Energy pipelines, specifically U.S. natural gas pipelines, have been cited by DHS as targets of cyberattack. While information on these attacks is not publicly available knowledge, cyber security officials warn that, with sufficient access, a hacker

[5] Director of National Intelligence, Annual Threat Assessment of the Intelligence Community for the Senate Armed Services Committee, Statement for the Record, March 10, 2009, at 39.

could "manipulate pressure and other control system settings, potentially reaping explosions and other dangerous conditions."[6]

Probability: Based on the growing sophistication and political climate, there is a high probability of future cyberattack events within Orange County.

Impacts: The public is heavily reliant on technology for daily life, including cell phones, handheld devices such as tablets, and computers. Any disruption to this technology caused by a cyberattack would impair the ability for the public to conduct basic activities, such as communications, mobile banking, and work. Property and facilities may become either uninhabitable or unusable as a result of a cyberattack, particularly if their infrastructure if reliant on technology for sustainability.

Cyberattacks can interfere with emergency response communication and activities. Given that many first responders rely on technology both at operations center and in the field, a cyberattack could impair the ability to communicate. For example, many agencies rely on technology to notify and route responders to the scene of the emergency. More specifically, 911 dispatch centers rely on technology which makes them vulnerable to cyber exploits. Considering all of these factors, cyberattack/cyberterrorism would generally have a high impact to Orange County and its jurisdictions.

Mitigation Measures: The 2019 UASI THIRA addresses Cybersecurity and identified that all critical infrastructure has cyber incident plans/annexes that are reviewed on a regular basis. Much of the critical infrastructure also has dedicated IT/Cybersecurity departments. Additionally, the region has a Region Cyber Response Plan to coordination region efforts.

Vulnerability: There is some amount of vulnerability present in Orange County to the hazard of cyberterrorism. A significant majority of critical infrastructure systems are in some way tied to technology, oftentimes through virtual operations and supervisory control and data acquisition (SCADA) systems. Therefore, a cyberattack could disable the vast majority of systems which control these pieces of critical infrastructure, as well as traffic control, dispatch, utility, and response systems. Targeted cyberattacks can impact water or wastewater treatment facilities. The disruption of the virtual systems tied to this infrastructure could cause water pollution or contamination and subsequent environmental issues..

Risk: High – 62%

Despite the multitude of mitigation actions, the unpredictability of cyberterrorism events and the large number of potential targets means that this hazard has the potential to occur again in the future and often occurs on a daily basis at a smaller scale.

[6] Florida State Hazard Mitigation Plan, 2013

Tropical Systems

Description: Tropical systems, like tropical storms or hurricanes, are one of the most destructive natural hazards. They can cause considerable amounts of damage and property losses in Florida and Orange County. These storms are characterized by sustained high velocity winds circulating around a moving low-pressure center. They form and develop over warm water due to atmospheric instability and have the ability to impact entire regions and can affect the lives of thousands of people, homes, and businesses. Mitigating the hazards associated with tropical cyclones is an important and on-going endeavor.

Sometimes referred to as coastal storms due to their approaching pathways to Florida, the impacts can be felt farther inland as the sheer size of these storms encompasses more than just coastal communities. There are various degrees of tropical cyclones that may affect the state of Florida, and, more specifically, Orange County: tropical depressions, tropical storms, and hurricanes.

- *Tropical depressions* (TD/SD) are a loose grouping of storms containing large amounts of rain associated with a moving low pressure system with a maximum of sustained winds at less than 39 mph. For the scope of this document, tropical depressions were not tracked as they are not "named storms," although they do have a moderate rate of recurrence.

- *Tropical storms* (TS/SS) contain a similar moving low pressure system carrying massive amounts of rain with better organization and a slight counter-clockwise rotation or circulation with sustained winds of 39 to 73 mph. The center of the storm, or the "eye," may be present but difficult to discern.

- *Hurricanes* (H1, H2, H3, H4, H5) have a full rotation around the low pressure center with a distinct eye. These storms can create a variety of severe weather related hazards, and they can dump a torrential amount of rain across a large area. Depending upon the category of the storm (H1, H2, H3, H4, or H5), they can also produce sustained winds anywhere from 74 to over 157 mph with even higher gusts. Other related hazards are tornados, lightning, and flood conditions.

Previous Occurrences: Orange County has experienced 38 different tropical systems that have all come within 65 miles within the center point of the County. Due to the large size of most tropical systems, the occurrences listed below in Table 25 will be those systems whose "eye" or center point of the system crossed the border of Orange County. There have been a total of 14 systems that qualify under this caveat, with all of them impacting at least the Unincorporated County. Other municipal areas that were impacted are also listed in Table 25. The other 24 systems came within close range to Orange County and its jurisdictions, but

their impacts were more indirect, such as rain, elevated winds and gusts, and possible evacuations from surrounding areas to Orange County.

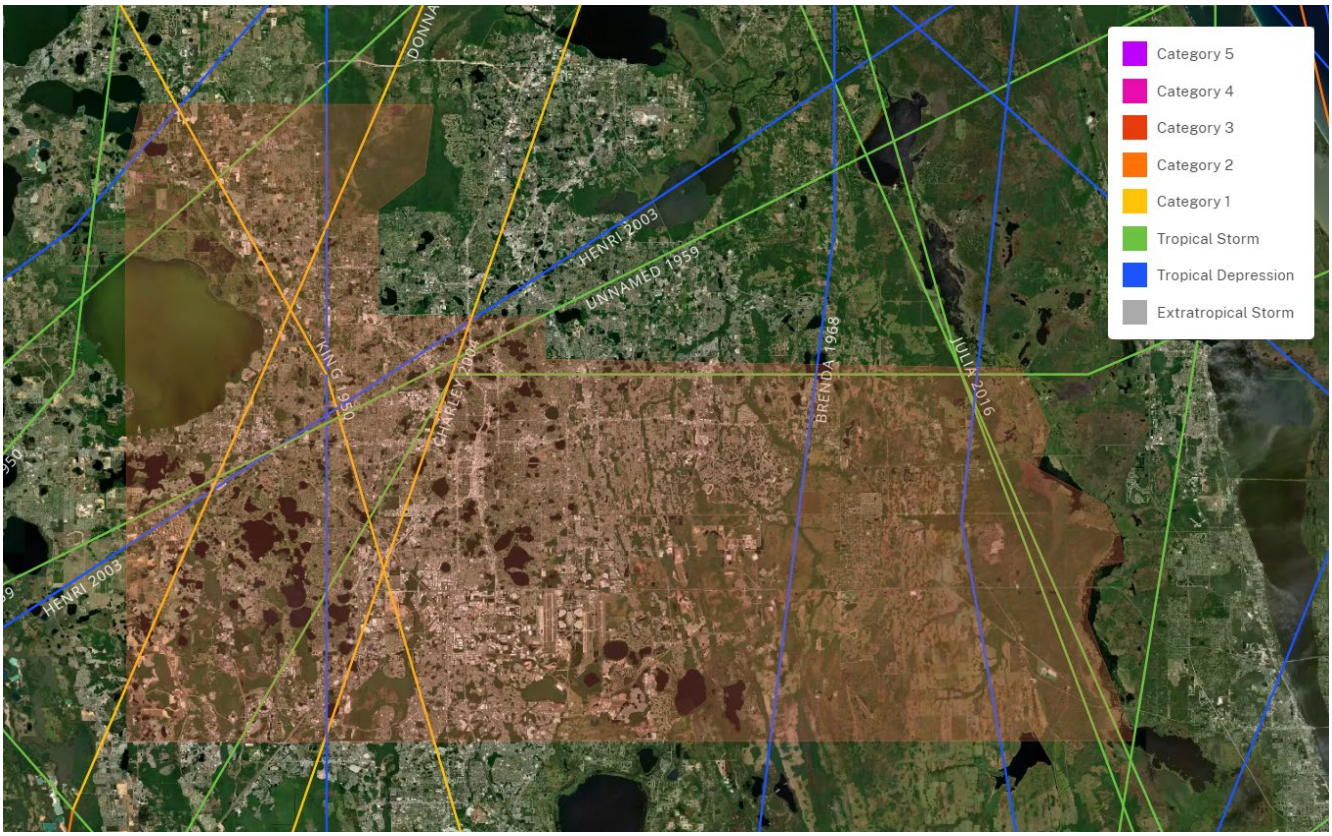
Table 25: Tropical Systems within Borders of Orange County, FL, 1950 – 2015

Storm Name	Date of Impact	Magnitude Crossing Orange County Border	Greatest Magnitude of System	Area(s) of Direct Impact(s) within Orange County
Easy	09/06/1950	TS	H3	Winter Garden, Ocoee, Apopka
King	10/18/1950	H1	H3	Ocoee, Apopka
Unnamed 1959	06/18/1959	TD	H1	Unincorporated Orange County
Donna	09/11/1960	H3	H4	Apopka
Cleo	08/28/1964	TS	H5	Unincorporated Orange County
Brenda	06/19/1968	TD	H1	Unincorporated Orange County
Jenny	10/04/1969	TD	TS	Unincorporated Orange County
Subtropical 1 1974	06/25/1974	SS	SS	Unincorporated Orange County
Subtropical 3 1976	09/13/1976	TD	SS	Windermere, Ocoee, Apopka
Dennis	08/18/1981	TS	H1	Unincorporated Orange County
Gabrielle	09/14/2001	TS	H1	Bay Lake, Lake Buena Vista, Orlando, Winter Park
Henri	09/06/2003	TD	TS	Winter Garden, Ocoee, Orlando, Eatonville, Maitland
Charley	08/14/2004	H1	H4	Lake Buena Vista, Orlando, Eatonville
Irma	09/10/2017	TS	H5	Unincorporated Orange County

Source: Natioanal Oceanic and Atmospheric Administration, Historical Hurricane Tracks

Location: Tropical systems have crisscrossed Orange County with storm approaches from a variety of approaches. Each and every jurisdiction in Orange County has experienced a tropical system of some kind with varying degrees of severity and magnitude. The storm tracks in Figure J are the tropical systems that have passed within 65 miles from the center of Orange County.

Figure J: Tropical Systems 50 Statute Miles from Orange County, FL, 1950 – 2021



Source: Natioanal Oceanic and Atmospheric Administration (NOAA), Historical Hurricane Tracks

Extent: Many types of tropical systems have entered into Orange County with differing levels of severity and magnitude. The Saffir-Simpson Hurricane Wind Scale in Table 26 is the main measurement tool for hurricane magnitude. Using the metric of tropical systems that have come within 65 miles from Orange County, there have been a total of 132 systems since the year 1842. The weaker systems, like tropical storms, have been more prevalent in the past with 108 systems coming within range of Orange County. The more severe storms are less frequent. The worst case scenario for hurricane that could be experienced in Orange County could be high as a Category 5, but this is not likely due to the geographic location of the county being an inland, non-coastal county. Hurricane force winds tend to die down just after they experience a landfall.

While a couple of Category 4 storms are the highest magnitude hurricanes to have passed by Orange County, no direct hits higher than a Category 3 have been experience by Orange County or its jurisdictions. With this in mind, the likelihood for the extent of a hurricane would be from a tropical storm up to a Category 3.

Table 26: Saffir-Simpson Hurricane Wind Scale

Category	Wind Speed	Types of Damage Due to Winds	Estimated Return Period
TD/SD*	<39 mph	***Low pressure system will cause slight damage from wind and rain:*** Damage due to winds from tropical/sub-tropical storms may occur at several points, like the roof, windows and siding, air conditioners, as well as damage to property and automobiles. Water damage may result in flooding, mold, interior damages, or sewage system back-ups.	N/A
TS/SS*	39-73 mph	***High winds will produce minor damage from wind and rain:*** Damage due to winds from tropical/sub-tropical storms may occur at several points, like the roof, windows and siding, air conditioners, as well as damage to property and automobiles. Water damage from rain may result in flooding, mold, interior damages, or sewage system back-ups.	N/A
H1	74-95 mph	***Very dangerous winds will produce some damage:*** Well-constructed frame homes could have damage to roof, shingles, and vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.	10 – 11 years (9.1 – 10%)
H2	96-110 mph	***Extremely dangerous winds will cause extensive damage:*** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.	22 – 28 years (3.58 – 4.55%)
H3	111-129 mph	***Devastating damage will occur:*** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.	39 – 53 years (1.89 – 2.56%)
H4	130-156 mph	***Catastrophic damage will occur:*** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.	85 – 120 years (0.83 – 1.18%)

H5	157 mph or higher	***Catastrophic damage will occur:*** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.	220 – 340 years (0.29 – 0.45%)

*Note: * - Tropical Depressions and Tropical Storms and other sub-tropical systems are not typically part of the Saffir-Simpson Hurricane Scale. Information presented here is from open source.*
Source: NOAA National Hurricane Center

Probability: The vast majority of Atlantic Ocean tropical cyclones occur during a period of time from June 1st to November 30th each year, also known as "Hurricane Season." Through data collected from the National Oceanic and Atmospheric Administration's (NOAA) National Hurricane Center, probabilities were created for the estimated return periods of hurricanes to coastal regions of Florida based upon their storm category. Since Orange County is an inland county, there is an assumption that each storm that hits the coast will probably decrease in its intensity before reaching Clay County, this making the estimated return period slightly lower.

The probability of a hurricane impacting Orange County sometime in the future, either directly or indirectly, is a near certainty. The Florida peninsula has historically received the highest number of tropical system activity in the nation. The category of a storm or its pathway for a strike is not as well-known and is contingent upon a number of factors. The return rates for weaker systems like tropical depressions and tropical storms are more frequent. As noted in Table 26, the return period for a Category 1 hurricane is a 10- to 11-year event (or about 10-11% each year), whereas a Category 5 is a 220- to 340-year event (0.29 – 0.45% each year). Orange County and its jurisdictions are much more likely to experience a lower category of hurricane, storm, or depression than the more severe systems.

Impacts: Impacts that have been experienced specifically by Orange County and its jurisdictions have been difficult to track using databases that record weather-related disasters like SHELDUS™ or the NWS information. This is due in part to the large size of the storm and the great region and state-wide impacts, damages, and losses that are felt are not broken-down county by county, jurisdiction by jurisdiction. In addition, the events tracked by these sources do not align with the tropical systems that directly hit Orange County's borders. A brief open source search for hurricane related deaths in Orange County returned minor results: the Miami Herald reported a story following Hurricane Charley in 2004 that claimed three (3) deaths occurred in Orange County as a result of the storm. Two (2) of these were traffic related just prior to and during the eye of the storm approaching the county. The other was caused during the clean-up phase while dealing with the large amounts of debris when the victim fell from a tree that was being cut.

In an effort to provide information as part of this vulnerability assessment, a probabilistic assessment using software called HAZUS-MH was used to look at likely impacts to Orange County if tropical system events of varying return periods were to occur. HAZUS-MH is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS-MH is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

Table 27: Building Exposure by Occupancy Type in Orange County, FL

Occupancy Type	Exposure (in $1,000's)	Percent of Total Exposure (%)	Number of Buildings	Percent of Total Buildings (%)
Agricultural	184,323	0.1	455	0.12
Commercial	18,045,087	14.4	12,479	3.28
Education	5,412,087	4.3	291	0.08
Government	5,700,162	4.6	1,087	0.29
Industrial	4,802,674	3.8	3,485	0.92
Religious	1,867,583	1.5	769	0.20
Residential	89,213,279	71.2	360,959	95.11
TOTAL	**125,225,195**	**100.0**	**379,525**	**100.0**

Source: HAZUS-MH

The total dollar value for all building types located in Orange County is over $125.2 billion (2006 dollars) with 379,525 buildings, as shown in Table 27. Based on the return period of the storm, HAZUS-MH calculates the number of buildings that would be impacted and their expected damage: none, minor, moderate, severe, and destruction. This analysis will also compare the 10-, 20-, 50-, 100-, and 500-year events to show the various levels of anticipated impacts related to the hazard of tropical systems for Orange County for property damages. As to be expected, the more severe the tropical system, the more damages sustained across all building occupancy types. Due to the probabilistic nature of these figures, they have been rounded to the nearest whole numbers; for that reason, the simple arithmetic will have some discrepancies.

Table 28: HAZUS-MH for Building Damage (#), 10-year Event in Orange County, FL

Occupancy Type	None	Minor	Moderate	Severe	Destruction
Agricultural	452	3	0	0	0
Commercial	12,415	64	0	0	0
Education	289	2	0	0	0
Government	1,081	6	0	0	0
Industrial	3,465	20	0	0	0
Religious	766	3	0	0	0

Residential	359,391	1,438	124	6	0
TOTAL	**377,859**	**1,535**	**125**	**6**	**0**

Source: HAZUS-MH

Table 29: HAZUS-MH for Building Damage (#), 20-year Event in Orange County, FL

Occupancy Type	None	Minor	Moderate	Severe	Destruction
Agricultural	413	32	7	3	0
Commercial	12,186	275	17	1	0
Education	284	7	0	0	0
Government	1,060	25	2	0	0
Industrial	3,390	88	6	0	0
Religious	746	21	1	0	0
Residential	350,017	9,485	1,423	32	2
TOTAL	**368,097**	**9,933**	**1,458**	**36**	**2**

Source: HAZUS-MH

Table 30: HAZUS-MH for Building Damage (#), 50-year Event in Orange County, FL

Occupancy Type	None	Minor	Moderate	Severe	Destruction
Agricultural	406	37	8	3	0
Commercial	11,010	1,205	246	17	1
Education	259	27	5	0	0
Government	960	105	21	1	0
Industrial	3,095	325	61	3	0
Religious	686	73	10	0	0
Residential	312,677	38,793	9,230	217	42
TOTAL	**329,093**	**40,565**	**9,582**	**243**	**43**

Source: HAZUS-MH

Table 31: HAZUS-MH for Building Damage (#), 100-year Event in Orange County, FL

Occupancy Type	None	Minor	Moderate	Severe	Destruction
Agricultural	352	48	30	20	5
Commercial	9,773	1,744	775	179	9
Education	216	43	24	8	0
Government	820	157	85	25	0
Industrial	2,865	429	158	33	0
Religious	619	105	36	8	0
Residential	270,427	62,954	22,916	3241	1,421
TOTAL	**285,073**	**65,479**	**24,023**	**3,515**	**1,435**

Source: HAZUS-MH

Table 32: HAZUS-MH for Building Damage (#), 500-year Event in Orange County, FL

Occupancy Type	None	Minor	Moderate	Severe	Destruction
Agricultural	241	95	63	44	12
Commercial	4,316	3,056	3,300	1,728	79
Education	102	69	74	46	0
Government	351	235	287	214	0
Industrial	1,245	817	880	542	2
Religious	291	228	170	80	0
Residential	131,785	124,957	79,750	17,595	6,872
TOTAL	**138,331**	**129,457**	**84,524**	**20,247**	**6,966**

Source: HAZUS-MH

These losses indicate that any hurricane would cause property damages of some kind to each building type. The spatial impacts from a tropical system may vary greatly depending on the type of storm that affects Orange County. However, most systems are quite large and can encompass the entire county. While impacts would generally be felt worst in the northeast quadrant of a system moving though Orange County and its jurisdictions, other severe weather-related hazards would spawn from the tropical system that would extend beyond the eye of the storm.

Economic impacts and disruption of services would also be significant. Utility outages for electric, water, and sewer would be some of the more immediate issues that would result in a tropical cyclone impacting Orange County. Large amounts of debris would also result from the high winds and torrential rains, which might cause utility and power lines to be down. Debris would also cut off transportation routes for first responders getting access to incident scenes once the winds recede. Most critical infrastructure is hardened to withstand damage related to high winds and most impacts from debris, as well as elevated above the base flood elevation. Back-up generators at these facilities would help provide power to the most important assets and keep critical operations going. In 2004 following Hurricane Charley, electric utilities reported over 415,000 customers were without power. There were 400 out of the 626 lift stations operated by Orange County that were without power resulting in sewage system backups. There were also 425 inoperable traffic signals that complicated roadway traffic following the storm.

Other impacts to the economy would be slower to react and recover following a tropical system. Businesses and industries that cannot operate after a storm and would stay closed until normal conditions, like electric power, utilities, and other essential services, were restored or until roadways are cleared of debris and schools are reopened. Since the storms of 2004, many businesses and industries saw the benefits of being prepared before a storm. Grocery stores, gas stations, pharmacies, and other big box retailers installed generators and purchased emergency supplies in order to keep their facilities open as soon after the system left the area. Employees at other commercial or industrial businesses that cannot open quickly enough would not be able to work, to sell their products or

services, and would suffer losses to wages and income. Table 33 shows in detail the probabilistic losses that Orange County would experience for both capital stock losses and income losses for varying storm severities.

Table 33: HAZUS-MH for Incomes Losses in Orange County, FL

Income Losses (in $1,000's)		10-year Event	20-year Event	50-year Event	100-year Event	500-year Event
Capital Stock Losses	Cost Building Damage	111,798	480,107	1,664,578	3,130,107	12,200,418
	Cost Contents Damage	16,070	67,569	242,284	818,287	3,741,705
	Inventory Loss	0	95	1,441	7,077	74,768
Income Losses	Relocation Loss	2,082	17,818	83,643	355,692	1,551,433
	Capital Related Losses	0	231	7,300	21,142	161,559
	Wages Losses	0	391	27,464	72,136	416,254
	Rental Income Loss	7,523	30,687	137,347	191,298	963,313
TOTAL		**137,473**	**596,897**	**2,164,057**	**4,595,738**	**19,109,451**

Source: HAZUS-MH

Mitigation Measures: Tropical systems receive a good deal of focus for preparedness and mitigation actions in Florida. Hurricanes, tropical storms, and tropical depressions are mentioned in other emergency management plans like the County's CEMP for overall response actions and the PDRP for the long-term recovery strategy. The Orange County Sheriff's Office (OCSO) maintains a Traffic and Shelter Operations Plan that is updated annually that looks at evacuation responsibilities, reverse lane operations, signage, and staffing emergency shelter; this plan would be for any evacuation for any hazard.

Orange County participates in the annual State Hurricane Exercise that takes place in May. This exercise focuses on a statewide response to a tropical system(s) scenario with multiple counties that are impacted. In addition, training classes in response operations for hurricanes is an on-going endeavor with courses in damage assessment, electronic incident management systems for resource tracking of incidents, call center operations, and periodic review of the Emergency Operations Center protocols.

There are several teams in Orange County that have been used for hurricane response operations, such as the Citizens' Assistance Response Team (CART) and Senior Assistance Team (SAT) that utilizes fire department personnel to address resident issues following a storm system. This may include putting tarps on roofs, cutting fallen trees, and other needs for neighborhoods. Community Emergency Response Teams

(CERT) are also scattered around the county that are comprised of residents who have received additional training for emergency response in their neighborhoods. First aid, fire suppression, triage, treatment, and transport of victims are among some of the topics covered in their training. All of these additional support teams have received some backing, but that have been stretched thin for personnel, equipment, and supplies to assist areas of Orange County and its jurisdictions following a hurricane that may pass through.

Vulnerability: Orange County is highly vulnerable to the effects of tropical systems, whether it is direct impacts or indirect consequences. The size of this hazard could encompass the entire county and all of its jurisdictions, as well as entire regions of the State. It has also been nearly a decade since the last hurricanes passed through Orange County. The 2004 hurricane season saw systems like Charley, Frances, and Jeanne within just weeks of each other that stretched resources in the County and across the State. Since then, neighborhoods have developed in new areas, transportation networks have been expanded, and trees have grown taller; all this can increase the needs placed on emergency services during a hurricane.

The frequency of tropical systems for the most severe storms is quite low, but smaller cyclones, storms, and depressions with shorter return periods that have come through the County and its jurisdictions can cause moderate damages as well. The potential for injuries and deaths is always present; continuous warnings and notifications to keep people out of the storm have improved over the past several years. General public awareness about the dangers these tropical systems bring with them is also getting better through events like the annual Hurricane Expo hosted by the Orange County Office of Emergency Management. Property impacts for new construction has also benefited through better building codes. As the severity of the storm increases, though, more property damage is likely to occur through wind-borne debris to other non-structural property. Other impacts to the economy and disruption of services would also be contingent upon storm severity, but most critical infrastructure is equipped to handle the more frequent types of tropical systems we see.

Risk: High – 67%

The overall risk from tropical systems is categorized as a high threat mainly because of the significant impacts this hazard poses to humans, structures and property, the geographic area, and the disruption to economics and services. In addition, there is a high probability for a tropical cyclone to affect our area. The mitigation measures that are currently in place can help to reduce recovery times, but this hazard will still occur. Hurricanes are slightly more predictable than other severe weather, but it is not a perfect science. While impacts can be reduced through better detection technology, public outreach, and emergency notification systems, it is incumbent upon responders to continue to plan, train, exercise, and equip themselves in preparation for an incident.

Tropical systems are the most well-known of the hazards we experience in Orange County and awareness of this hazard continues to be on the rise, especially for residents that are new to the area or to Florida in general. Orange County's Office of Emergency Management has distributed NOAA weather radios for the past several years and plans to continue to do so to help residents receive important warnings when severe weather happens. The NWS and other media outlets now have improved their modeling capabilities for storm tracks and will continue to issue watches, warnings, and other weather advisories.

Wildfires

Description: Wildfire is defined by the Florida Forest Service (FFS) as "any fire that does not meet management objectives or is out of control." Wildfires occur in Orange County nearly every year to some degree. They are a part of the natural cycle of Florida's fire-adapted ecosystems. Many of these fires are quickly suppressed before they can damage or destroy property, homes and lives. Orange County's wildfire season generally runs from January through May when the weather is cooler, rainfall amounts are lower, and vegetative fuel is dry. A combination of these factors, along with moderate winds, makes conditions just right for the spread of fire.

There are different types of wildfires that occur in Orange County:

- Surface Fires: burn along the forest floor consuming the litter layer and small branches on or near the ground.
- Ground Fires: smolder or creep slowly underground. These fires usually occur during periods of prolonged drought and may burn for weeks or months until sufficient rainfall extinguishes the fire, or it runs out of fuel.
- Crown Fires: spread rapidly by the wind, moving through the tops of the trees.
- Wildland/Urban Interface (WUI) Fires: fires occurring within the WUI in areas where structures and other human developments meet and intermingle with undeveloped wildland or vegetative fuels. Homes and other flammable structures can become fuel for WUI fires.

Previous Occurrences: Orange County experiences wildfires nearly every year in some Fashion, but most of these are relatively small brushfires and do not require vast amounts of resources to put out. Over the past five (5) years, there have not been any significant wildfires in Orange County.

The Florida Forest Service (FFS) lists only one (1) "significant" wildfire in Orange County during the period of March 2011 to March 2021. This significant fire was called the "Whispering Pines" fire and occurred on May 27, 2011 due to a lightning strike in south-central area of Orange County, east of Orlando and south of the Beachline (SR-528). The fire burned 3,924 acres and was fully contained on June 3, 2011.

The most prevalent cause of wildfires in Orange County is due to lightning strikes, both in number of fires, as well as acres burned. As discussed in the Severe Thunderstorms, Lightning sub-hazard, Orange County experiences a number of lightning strikes each year, especially in the summer. Even though the thunderstorms bring rain with them, it is generally not enough moisture to stop the formation of a brush fire. In some rare situations, these lightning strike fires can smolder in the undeveloped areas without detection for a few days; during this time, the fire may slowly spread to other areas until it has grown in size.

Table 34: Fires by Cause in Orange County, FL: 1980 - 2020

Cause	Number of Fires	%	Acres Burned	%
Campfire	53	1.9	3,104.3	3.0
Children	217	7.6	4,518.2	4.3
Debris Burn*	173	6.1	4,910.4	4.7
Debris Burn – Authorized (Broadcast/Acreage)	8	0.3	1,283.6	1.2
Debris Burn – Authorized (Piles)	5	0.2	5.6	0.0
Debris Burn – Unauthorized (Piles)	0	0.0	0.0	0.0
Debris Burn – Unauthorized (Yard Trash)	0	0.0	0.0	0.0
Equipment Use*	15	0.5	514.7	0.5
Equipment – Agriculture	19	0.7	333.3	0.3
Equipment – Recreation	36	1.3	545.5	0.5
Equipment – Transportation	10	0.4	110.5	0.1
Incendiary	1	0.0	4.5	0.0
Lightning	2	0.1	426.4	0.4
Miscellaneous – Breakout	11	0.4	180.2	0.2
Miscellaneous – Fireworks	584	20.5	12,355.7	11.8
Miscellaneous – Power Lines	832	29.1	42,072.7	40.2
Miscellaneous – Other	7	0.3	1,016.7	1.0
Railroad	0	0.0	0.0	0.0
Smoking	11	0.4	48.0	0.1
Unknown	20	0.7	127.0	0.1
TOTAL	**2,856**		**104,734.5**	

**Fire cause no longer used.*
Source: Florida Forest Service: January 1, 1980 – December 31, 2020

The most devastating wildfire season in Florida's recent history was in 1998 when a series of wildfires caused major damage in north central Florida, including to Orange County. An unusually wet, mild winter that had encouraged plant growth was followed by very hot, dry conditions that turned the heavy growth into prime wildfire fuel. The early summer of 1998, weather conditions had created a perfect scenario for destructive wildfire, and by July 22 a total of 2,277 fires had burned almost a half million acres of forest in Brevard, Flagler, Orange, Putnam, Seminole, and Volusia counties and destroyed 340 homes and

33 businesses.[7] Statewide there were 4,902 wildfires that consumed 506,976.7 acres of land that year.

In 2004, Hurricanes Charley, Frances, and Jean contributed to an increase in fuel loads across central Florida which has heightened the probability of occurrence of greater intensity fires which are harder to contain and apt to spread rapidly. On average, areas that typically had 10 tons of dead wood per acre had an additional 6 tons of dead wood per acre after the 2004 hurricane season. This led to an increased need for prescribed fire in central Florida, including Orange County.[8]

In April and May of 2009, another outbreak of 44 wildfires burned approximately 9,540 acres that were scattered from southeast Orange County to southern Volusia County.[9] This incident required the establishment of the Orlando-Volusia Wildfire Complex which included a Florida Forestry Service (FFS) Type II Incident Management Team (IMT), over 100 forestry firefighters, and numerous pieces of specialized equipment from all over the state in support of the incident. The Orange-Volusia Complex encompassed parts of Orange, Volusia, Seminole, and Brevard Counties. The majority of the fires in the complex were in Orange County with over 3,000 acres.

According to a report on the National Fire Incident Reporting System (NFIRS) that was accessed by the Orange County Fire Rescue Department (OCFRD) Planning & Technical Services Division, there were 363 wildland fires from March 2010 to March 2016 (please refer to Table 35). These fires burned a total of 2,371.46 acres, or an average of 6.53 acres per fire. These fires are typically smaller in nature and do not require additional coordination or support from agencies outside of the OCFRD.

*Table 35: Wildland Fires per NFIRS in Orange County, FL: 2010 – 2016**

Year	Number of Fires	Acres Burned	Average Acres Burned
2010	71	158.35	2.23
2011	92	1,590.86	17.29
2012	66	257.98	3.90
2013	56	144.42	2.58
2014	38	132.83	3.50
2015	30	57.02	1.90
2016*	10	30.00	3.00
Total	**363**	**2,371.46**	**6.53**

**Note: Figures for 2016 end in March*

[7] Prince, Nick (2010). "1998 Florida Wildfires." Retrieved from http://www.seesouthernforests.org/case-studies/fire
8 Orange County Fire Rescue (2005). "A Prescribed Fire Policy for Orange County Fire Rescue." Retrieved from http://www.usfa.dhs.gov/pdf/efop/efo38559.pdf
9 InciWeb (2009). "Orlando-Volusia Complex." Retrieved from http://www.inciweb.org/incident/1649/

Source: NFIRS Reports, accessed March 28, 2016

Location: Much of Orange County is considered an urbanized, metropolitan area, but there is a large amount of land area that is still undeveloped and covered in forest and wetlands. These areas are mainly is the eastern, southwest, and northwest portions of the County. As a result, many areas of the County are susceptible to wildfires and may be caused by a number of reasons, such as: lightning strikes, arson, or escaped yard debris burns. Periods of drought or long periods of dry conditions may also increase the onset of wildfires, as well as their severity.

Another area of concern for wildfires is residential districts located in the WUI or where the natural vegetation meets homes and communities. According to the Southern Wildfire Risk Assessment Portal (SouthWRAP) Summary Report, it is estimated that 98% of Orange County's population, or 1,119,870 people, live within the WUI.

Figure K: Chart of WUI Population Areas in Orange County, FL

Housing Density	WUI Population	Percent of WUI Population	WUI Acres	Percent of WUI Acres
LT 1hs/40ac	540	0.0 %	26,644	8.8 %
1hs/40ac to 1hs/20ac	647	0.1 %	12,441	4.1 %
1hs/20ac to 1hs/10ac	2,084	0.2 %	17,702	5.8 %
1hs/10ac to 1hs/5ac	5,294	0.5 %	22,822	7.5 %
1hs/5ac to 1hs/2ac	18,906	1.7 %	34,969	11.5 %
1hs/2ac to 3hs/1ac	470,608	42.0 %	135,908	44.8 %
GT 3hs/1ac	621,791	55.5 %	52,637	17.4 %
Total	**1,119,870**	**100.0 %**	303,123	100.0 %

Source: SouthWRAP Summary Report, 2021

People living within the WUI are at risk to the potential impacts of wildfire. The location of where people are living in this interface is contingent upon how dense the homes are, measured as houses per acre. This is one of the key components for determining how wildfires will impact residents. Referring to Figure L, these dense housing areas are located in many of the municipalities in Orange County, such as: Belle Isle, Winter Park, Edgewood, Maitland, Ocoee, Eatonville, and Winter Garden.

Figure L: Map of WUI Population Areas in Orange County, FL

Source: SouthWRAP Summary Report, 2021

Extent: The SouthWRAP Summary Report looks at several outputs of wildfire behavior to determine how bad a wildfire may be if and when it was to occur in Orange County. Fire behavior is the manner in which a fire reacts to environmental influences like fuels, weather, and topography. A large portion of acreage in Orange County is considered "non-burnable:" this amount us 231,268 acres, or about 36% of the total land area of 642,751 acres. Fire behavior characteristics like the rate of spread, flame length, fire intensity scale, and fire type are all used to determine what areas may need mitigation treatment, especially if they are located in close proximity to homes, businesses, or critical facilities.

The "**Rate of Spread**" is the speed with which a fire moves in a horizontal direction across the landscape. This is usually measured in "chains per hour;" one (1) chain is equal to 66 feet, or 1.1 feet per minute. The rate is spread is influenced by fuels present, weather conditions, and topography. The rate of spread with the largest percentage is in the 50 – 150 chains per hour (55 – 165 feet per minute) with 187,499 acres falling into this category, or 29.2% of the land area. This is anticipated to be the most likely rate of spread for wildfire in Orange County; however, the most severe rate would be 150+ chains per hour. This is a relatively small rate of spread for Orange County at 15,612 acres, or 2.4% of the land area, falling in the category.

"**Flame Length**" is defined as the distance between the flame tip and the midpoint of the flame depth as the base of the flame, which is generally the ground surface. This indicator shows the intensity of the fire in feet and how much heat is being generated. The longer the flame, the more heat is being released. Just like rate of spread, flame length is influenced by environmental factors like weather, fuels, and the slope of the terrain. The largest portion of Orange County with the most likely flame length is located in 130,296 acres, or 20.3% of the land area, where it would measure 8 – 12 feet. The worst case scenario could produce a flame length of 30+ feet, but only 16,592 acres, or 2.6% of the land area would be likely to produce these taller flames.

Similar to the Richter scale for earthquakes, the "**Fire Intensity Scale**" (FIS) provides a standard scale to measure the potential wildfire intensity. FIS consists of five (5) classes where the order of magnitude between classes is ten-fold. The minimum class, Class 1, represents very low wildfire intensities and the maximum class, Class 5, represents very high wildfire intensities. In all of Orange County, the FIS class that is most prevalent is Class 4, High intensity, with 124,663 acres, or 19.4% of the land area. This translates to large flames, up to 30 feet in length where a direct attack by trained firefighters, fire engines, and dozers is generally ineffective, but indirect might be more effective. There is significant potential for harm or damage to life and property. The greatest intensity is a Class 5 and Orange County has 13,920 acres, or 2.2% of the land area, in this category.

The "**Fire Type – Extreme**" represents the potential fire type under the extreme percentile weather category, which represents the average weather based on the top three percent fire weather days in the analysis period. It is not intended to represent a worst case scenario weather event, but rather is based on fuel availability, weather conditions, and the landscape elevation changes. There are two (2) primary fire types, surface fire and canopy fire. Canopy fire can be further divided into passive canopy and active canopy fire. The "non-burnable" fire type is 193,155 acres, or 30.1% of the total land area.

- *Surface fire* is a fire that spreads through surface fuel without consuming any overlying canopy fuel. Surface fuels include grass, timber litter, shrub/brush, slash, and other dead or live vegetation within about six (6) feet of the ground. This is the largest acreage in Orange County with 413,446 acres, or 64.3% of the land area.
- *Passive Canopy fire* is a type of crown fire in which the crowns of individual trees or small groups of trees burn, but solid flaming in the canopy cannot be maintained except for short periods.[10] This is the smallest portion in Orange County with only 5,019 acres, or 0.8% of the county.

[10] Scott, J. H., & Reinhardt, E. D. (2001). Assessing the Crown Fire Potential by Linking Models of Surface and Crown Fire Behavior. Ft. Collins, CO, Rocky Mountain Research Station: USDA Forest Service, Research Paper RMRS-RP-29.

- *Active Canopy fire* is a crown fire in which the entire fuel complex (canopy) is involved in flame, but the crowning phase remains dependent on heat released from surface fuel for continued spread.[11] There are 31,133 acres for this fire type, or 4.8% of the county's land. Active canopy fires would be the worst case scenario wildfire in Orange County.

For Orange County, many of the areas that would encounter the worst of these fire behaviors are located in the eastern and northwestern parts of the County. Fortunately, these parts of the County are mostly undeveloped and are not heavily populated, so the risk to homes and businesses is greatly reduced. There are several critical facilities that operate in these locations though, such as utility facilities, power lines, water lines, pipelines, etc. The areas with the potential for significant fire behavior are adjacent to the County's population centers and that is where the WUI exists. This means the population densities are much higher and the potential for impacts and damage is increased. Based on the previous occurrences, the immediate effects from fire are fairly low due to the presence of professional firefighting organizations. There are also several proactive fuel reduction programs conducted in the county, including: the Florida Forestry Service, Florida Department of Environmental Protection (FDEP), Orange County Environmental Protection Division, Orange County Parks and Recreation Division, and the St. Johns and South Florida Water Management Districts.

Probability: Orange County experiences wildfires nearly every year to some degree. Most of the fires are surface or brush fires that are not very large or extensive in their damages. They are handled much in a routine fashion. Other large fires, like the ones described previously in 1998, 2004, and 2009, have required a multi-agency, multi-jurisdictional response to combat the wildfire. These are much less frequent, but there is usually a large amount of fuel available for the fire that is built up over the years due to the low frequency in between occurrences.

[11] Scott, J. H., & Reinhardt, E. D. (2001). Assessing the Crown Fire Potential by Linking Models of Surface and Crown Fire Behavior. Ft. Collins, CO, Rocky Mountain Research Station: USDA Forest Service, Research Paper RMRS-RP-29.

Figure M: Chart of Burn Probability in Orange County, FL

Class	Acres	Percent
1	16,032	3.6 %
2	24,697	5.6 %
3	29,489	6.7 %
4	22,878	5.2 %
5	77,676	17.5 %
6	94,519	21.4 %
7	94,537	21.4 %
8	74,073	16.7 %
9	8,701	2.0 %
10	0	0.0 %
Total	**442,602**	**100.0 %**

Source: SouthWRAP Summary Report, 2021

In Figure M and Figure N is information on Orange County's Burn Probability (BP). Figure M is a chart of the burn probability for the entirety of Orange County, which includes the entire incorporated area and all of the municipalities. Each jurisdiction has its own burn probability based on the same methodology used by the SouthWRAP Summary Report. Figure N depicts the probability of an area that could burn given current landscape conditions, percentile weather, historical ignition patterns, and historical fire prevention and suppression efforts. This map is not intended to show the return rate or interval between fires; is also does not predict the path a wildfire might take or how large a fire might become.

Based on simulated fires with different ignition locations and weather streams, the generated probabilities modeled in this map show the areas that would be most susceptible to a wildfire incident. Again, the areas with the highest probability for a wildfire are the undeveloped, less populated areas of Orange County in the eastern and northwestern portions of the unincorporated county. The municipalities of Apopka, Oakland, Ocoee, Orlando, Windermere, and Winter Garden are those jurisdictions with the higher burn probabilities. The developed areas of Orange County that are not directly in the WUI are more insulated from the effects of wildfire. These other jurisdictions, like Belle Isle, Eatonville, Edgewood, Maitland, and Winter Park, are not as susceptible to wildfire due to the lack of fuel sources that contribute to the spread of wildfires.

This is not to say that the jurisdictions in Orange County that are not within the WUI would not experience a wildfire, but the likelihood of a wildfire spreading into their boundaries is lower.

Figure N: Map of Burn Probability in Orange County, FL

Source: SouthWRAP Summary Report, 2014

Impacts: While there have been several large wildfires that have taken place in Orange County in the past, there has not been a significant wildfire event over the past five (5) years. During this time, there have fortunately not been a drastic number of injuries or deaths because of this hazard, either from residents or responders. While it is rare, there is some potential for impacts on humans to occur, but they usually occur during the beginning stages of wildfires when sudden flare-ups result from high wind conditions or changing weather. Generally speaking, though, most people have an opportunity to evacuate the area and avoid harm. Responders are at the greatest risk during the fire suppression process.

Property damages and impacts can be much more severe as homes, businesses, and other structures cannot move out of harm's way. According to a report funded by the Joint Fire Science Program, the total damages from the 1998 fires ranged from $622 – 880 million. The bulk of the losses were incurred by timberland owners and the tourism industry.

Depending on their size, wildfires can sometimes cover thousands of acres and send smoke across multiple counties that impact the air quality for miles. Most fires in Orange County are much smaller events and consume a couple dozen

acres of land. Based on Table 35, the number of acres burned and the number of fires averages to 6.53 acres per fire.

The Joint Fire Science Program report also estimated that the economic impact to Orange County was also very high as the county lost approximately $110 million in tourist revenues that summer. This was attributed in part to both the hot, dry conditions that may have served as a deterrent to visitors and the nationwide media coverage that detailed the extent and side effects of the 1998 wildfires. These combined factors may have served to discourage travel to the state. The 1998 wildfires also caused an increase in hospital visits for respiratory conditions, especially among children and the elderly.[12] Other disruptions for electric and gas utilities may occur as many of the high voltage lines or pipelines that cross eastern Orange County are cut through the wooded areas. Wildfires and drought are closely linked hazards, water utilities may also suffer indirectly due to the dry conditions. Transportation routes are also affected by wildfires and can shutdown roadways.

Mitigation Measures: Due to the common occurrence of wildfires, there are a variety of mitigation actions that are conducted in Orange County. The Office of Emergency Management is working on the Community Wildfire Protection Plan, a specific plan to address the wildfire hazard, but it is not yet complete. Other plans also discuss wildfire, such as the CEMP. The Wedgefield subdivision is located in the eastern portion unincorporated county and, as part of the WUI, is surrounded by heavily wooded areas with high burn probabilities. Due to their proximity in the WUI, the residents here developed a plan to address their vulnerability and became a Firewise Community in 2002, the first designated community in Florida. A Firewise Community provides public education and outreach to neighborhoods about the threats wildfires pose and mitigation tactics that can be implemented by residents to help keep their homes safer.

Training occurs on a normal basis for wildfire suppression from a firefighting standpoint for fire departments and the Florida Forestry Service. Exercises are less common than the trainings, but would be closer to about every other year.

Wildfire preparedness receives a moderate amount of logistical consideration as prescribed burnings are conducted routinely to reduce the supply of fuel for wildfires, as weather conditions allow. In times of drought or high winds, prescribed burning is less commonly used to prevent a planned event from getting out of control and turning into a disaster event.

[12] Mercer, D. E., Pye, J. M., Prestemon, J.P., Butry, D.T., & Holmes, T.P. (2000). Economic Effects of Catastrophic Wildfires: Assessing the Effectiveness of Fuel Reduction Programs for Reducing the Economic Impacts of Catastrophic Forest Fire Events. Retrieved from http://www.fl-dof.com/publications/joint_fire_sciences/jfs_pdf/economic_effects.pdf

Vulnerability: Due to the amount of forested areas and availability of fuel sources, Orange County is very vulnerable to wildfires. Their common occurrence increases this vulnerability for much of the County, especially in the Wildland-Urban Interface (WUI), which is where structures and other development meet or intermingle with undeveloped wildland areas. This creates an environment where fire can move between vegetative and structural fuels. Historical events have shown that large wildfires can and do occur in Orange County and have far reaching impacts to its jurisdictions, air quality, and even the economy.

Risk: Medium – 52%

The overall risk for wildfire in Orange County and its jurisdictions is a moderate risk. Contributing factors would be the high probability, property damages, and economic impacts. The number of wildfires since 1980 is at 2,856 fires with 104,734.5 acres burned. Property damages have been sizable to the timberland industry with some impacts to homes and other structures. The number of homes at risk is increasing as development near and within the WUI continues to occur. Firewise Communities like Wedgefield are a good example of how neighborhoods should prepare themselves in case of wildfire. While the geographic area that is affected can be relatively small, there is some potential for large wildfire complexes to develop that would require a multi-agency, multi-jurisdictional response. Injuries and loss of life have been kept to a minimum, but the risk is an ever present one, especially to responders that fight the fires. Some wildfires are prevented as they are the result of human activity, but many of the forest fires are caused by naturally by lightning strikes, which are difficult to prevent. Mitigation actions will continue to alleviate some of these risks so that when a wildfire occurs, the impacts will not devastate our County or its jurisdictions.

Section 4 – Strategic Goals and Capabilities

Goals and objectives help capture the overall purpose of the plan and assist with determining possible new directions for hazard mitigation efforts. Setting goals and objectives ensures that Orange County is moving in the right direction for hazard mitigation planning by providing ways that success can be measured for the reduction or avoidance of long-term vulnerabilities to the identified hazards. It is important that both the goals and objectives are reviewed for continuing relevance to the vision of the county regarding hazard mitigation.

For the Orange County Local Mitigation Strategy 2021 update, the Planning Committee felt that it was important to review/confirm its previous goals and objectives and try to align them with the State of Florida Enhanced Hazard Mitigation Plan. The intent was to help bring the goals and objectives to a more strategic level and to provide consistency between the State and the County's newly revised goals and objectives.

Goals and Objectives

The following definitions for goals and objectives will be used:

- Goal: a broad, long-term vision that should be accomplished with regard to hazard mitigation.
- Objective: the approach to be taken in order to achieve the goal(s).

The following list represents the newly revised goals and objectives by for the 2021 Orange County Local Mitigation Strategy.

Goal 1: Implement an effective comprehensive countywide hazard mitigation plan.

Objective 1.1: Educate the public, elected officials, and other key stakeholders in Orange County on the application of mitigation practices and the benefits of mitigation.

Objective 1.2: Identify and pursue methodologies that will enhance mitigation successes.

Objective 1.3: Integrate mitigation practices throughout county and municipal plans, programs, and policies.

Goal 2: Support county, municipal, and regional mitigation strategies.

Objective 2.1: Maintain current risk assessment information in coordination with local communities.

Objective 2.2: Assist in integrating hazard mitigation into county and municipal planning efforts, such as ordinances, policies, and procedures.

Objective 2.3: Ensure communities are aware of available mitigation funding

sources and their cycles.

Objective 2.4: Assist local planning efforts in the integration of new information, data, research, and emerging trends for disasters and their potential consequences.

Objective 2.5: Conduct all possible actions to mitigate hazards identified in the Orange County Local Mitigation Strategy.

Goal 3: Increase public, non-profit, and private sector awareness of, support for, and involvement in hazard mitigation.

Objective 3.1: Work with other local jurisdictions and area entities to incorporate mitigation concepts and information into their outreach efforts.

Objective 3.2: Educate private sector in Orange County about potential hazards, vulnerabilities, mitigation concepts, and partnership opportunities.

Objective 3.3: Educate risk management and insurance entities on mitigation incentives for residents, non-profits, private sector, municipalities, and county agencies.

Objective 3.4: Support hazard mitigation research and development of public outreach events promoting the message of the benefits of mitigation in the community.

Goal 4: Support mitigation initiatives and policies that protect the county's culture, commerce and economy, tourism, residences, transportation systems, recreation and natural resources.

Objective 4.1: Continue to identify potentially vulnerable areas and support smart growth and development in Orange County.

Objective 4.2: Support land acquisition programs that reduce or eliminate potential future losses due to natural hazards and that are compatible with the protection of culture or natural resources.

Objective 4.3: Support restoration and conservation of natural resources wherever possible.

Objective 4.4: Seek mitigation opportunities that reduce economic losses and promote responsible growth.

Objective 4.5: Retrofit existing county and local facilities.

Objective 4.6: Participate in activities that will further the county and local government's ability to plan for and mitigate the impacts of future vulnerability.

Objective 4.7: Coordinate effective partnerships between county and local jurisdictions for floodplain management.

Authorities, Policies, Programs, and Resources

Orange County currently utilizes several existing planning mechanisms, such as comprehensive land use planning, comprehensive emergency management planning, post-disaster redevelopment strategies, capital improvement planning, and building codes to guide mitigation efforts in County. The adopted Local Mitigation Strategy recommends that local municipalities address natural hazard planning and mitigation measures in their comprehensive plans. Land use regulations or flood plain ordinances that are currently in place are an excellent beginning. The incorporation of other policies or programs, such as the Community Rating System or Firewise Community standards, would also help to expand and/or improve their current mitigation practices at the most local level possible.

Specifically, one of the goals of the Local Mitigation Strategy Working Group is to "support mitigation initiatives and policies that protect the county's culture, commerce and economy, tourism, residences, transportation systems, recreation and natural resources." The Orange County Growth Management Department will conduct periodic reviews of the County's comprehensive plans and land use policies, analyze any plan amendments, and provide technical assistance to other local municipalities in implementing these requirements.

The Comprehensive Emergency Management Plan (CEMP) is a critical component of the County's emergency operations and response plan that is implemented by the OEM. This plan provides the overall direction of the Orange County Emergency Response Team (OCERT). In addition, the Post-Disaster Redevelopment Plan (PDRP) is a strategic plan that will be used to oversee long-term recovery efforts following an incident. It is recommended that future iterations of these plans incorporate mitigation planning as part of the transition plan following a disaster and during or after the recovery.

The capital improvement planning that occurs in the future will also contribute to the goals in the Local Mitigation Strategy to incorporate mitigation measures to county and local government buildings prior to new construction. Related to this are building codes that are largely implemented at a state level with Florida Building Codes. They are a necessary component of shelter retrofits and hardening projects to ensure that critical facilities are operational before, during, and after hazards have occurred. Orange County will review and revise the Local Mitigation Strategy to meet the changing needs of the county. This review process will ensure that pre-disaster planning and mitigation initiatives are attainable and cost effective.

Strategies for Implementation

One of the main aims for this most recent iteration of the Local Mitigation Strategy was to allow the document to become more "strategic," and focus less on the minutia and "wish-list" mentality that the document had become. In order to accomplish this, a thorough analysis of each of the projects had to be conducted. Previously, the 2009-2010 Plan contained approximately 250 "Current-Active" on a large spread sheet with projects dating back to 1999. The vast majority of the projects were added in 2005 following Hurricanes Charlie, Frances, and Jeanne.

By 2012, the number of projects was reduced to about 160 separate projects as several had been completed. Most projects were either deferred until a later time when funds or resources became available. Many were just deleted due to inactivity. Much of the specific information for each of the projects had been lost due several reasons, including: turnover in staff at each of the varying sponsoring agencies, changes in priorities, or a lack of available mitigation grant funding. Many of the projects had sat on the priority list for nearly a decade without any further consideration or evaluation as to whether they were achievable projects that could be completed. In addition, the scoring of the projects was incomplete as the project evaluation categories were left off of the main spreadsheet.

In 2015, the LMS Planning Committee decided that it would be best for the Orange County LMS Working Group to adopt a simplified project priority list. The overhaul of the outdated project list would allow flexibility for a variety of projects, encourage more "shovel-ready" projects, as well as provide a more strategic platform for mitigation projects in Orange County. In looking at the existing projects and their descriptions, the Planning Committee found several trends in the types of projects that had been submitted over the years. The Committee developed eight (8) broad based projects with nine (9) additional sub-projects as a starting point for a new priority list.

This single change in the Project Priority List represents a fairly substantial change in goals, objectives, and priorities as defined in the previous 2009-2010 Local Mitigation Strategy. It helps to move the Project Priority List away from a "wish list" and into a list of actionable items. It aids in the strategic composition of the mitigation plan and allows stakeholders to move away from a competitive perspective and into a more collaborative mindset. Having a proactive project priority list also makes the Working Group and sponsoring organizations more likely to pursue mitigation grant funds.

In 2021, the LMS Working Group reviewed all major components of the LMS document with an emphasis on hazards and mitigation goals and objectives. The updated hazard information was accepted and the goals and objectives were confirmed with no changes.

Table 36 – Orange County LMS Strategic Projects

Rank	Project Name & Description
1	Improve Stormwater Drainage Measures
1.1	Perform Engineering Studies
1.2	Retrofit and Upgrade Flood Control Devices for New and Existing Structures
1.3	Clear Waterways of Debris
1.4	Elevate Structures in Floodplains
2	Provide Public Outreach and Responder Training
3	Harden and Retrofit New and Existing Structures
3.1	Emergency Shelter Retrofits
3.2	Perform Engineering Studies
3.3	Critical Facilities and Infrastructure for New and Existing Structures
3.4	Back-Up Power Systems and Generators
3.5	Historic Preservation
4	Identify and Detect Hazards
5	Purchase and Install Emergency Notification Systems
6	Acquire Property and Equipment
7	Enhance Public Safety and Prevention Efforts
8	Preserve and Restore Environmentally Sensitive Areas

Source: Orange County LMS Project Priority List_2016-08-10

Annex 4 contains the entire Orange County Project Priority List that identifies each project, the components of its score with a total priority score, the location or responsible agency/jurisdiction for implementing the project, the hazard(s) mitigated, as well as any relevant mitigation goals and/or objectives that are established through this plan. In addition, the Project Priority List includes potential mitigation funding sources, if applicable matching funds are required, along with an estimated cost of the project and an estimated timeframe to completion. This Project Priority List was a complete reimagining of the mitigation cycle and process, so all of the projects are new; none have been deferred or deleted at this point. Many of these projects are strategic in nature, so while an individual mitigation task or initiative may have a completion timeframe, several of the overarching projects are ongoing or continuing projects that will continue to be applicable for several years to come.

Annex 5 contains the Orange County Local Mitigation Strategy (LMS) Active Initiatives List. This list includes the most current action items that were submitted to the LMS Planning Committee for review and ranking. In order to be favorably considered for inclusion to the list, the initiative should score at least twenty (20) points out of a forty one (41) total. All of the qualifying initiatives are then presented to the full Working Group for a motion to include them on the list. The mitigation initiatives are linked to the strategic projects and sub-projects found in Annex 4. Annex 5 is updated usually on a quarterly basis, or at the most recent Orange County LMS Working Group meeting when new projects are added or older projects are revised.

Prioritization Methodology

Sponsoring agencies can submit new projects for consideration, or they can propose a more detailed "initiative" that is related to a project or sub-project. The initiatives will be evaluated using a more objective methodology through an initiative submittal form that was developed by the Planning Committee. The submittal form will collect the necessary information from the initiative sponsor for each task so that it can be properly assessed by the Planning Committee. The intended result will be a better mitigation action item for implementation that will not sit on a wish list for several years. A copy of the "Orange County Local Mitigation Strategy (LMS) Project Submission Form Template can be found in Annex 1. There is also a copy of the complete guidance document that accompanies the submittal form and provides sponsors with the framework necessary to complete the application in Annex 2.

The submittal form looks at a total of ten (10) components with responses ranging from a score of zero (0) to four (4) points; there is also a one (1) point tie breaker question for environmental acceptability. The highest potential score is forty-one (41) points. The scoring methodology below was designed to be as objective as possible and account for various types of sponsoring agencies, organizations, and jurisdictions. Below is an excerpt from the submittal form guidance that explains the score values and walk applicants through the form.

1. Select from the drop down menu the estimated total population number that will receive a benefit from this project. Benefits may be direct or indirect.

    0 – Less than 10,000 people benefited
    1 – 10,000 to 24,999 people benefited
    2 – 25,000 to 74,999 people benefited
    3 – 75,000 to 149,999 people benefited
    4 – 150,000 or more people benefited

2. Select from the drop down menu the percentage of the population that will benefit from this project. A percentage measurement will help provide leverage for communities that do not have large population numbers. This percentage should directly correlate to the total population from Item 8.

    0 – Less than 5% benefited
    1 – 5% to 24% benefited
    2 – 25% to 49% benefited
    3 – 50% to 74% benefited
    4 – More than 75% benefited

3. Select form the drop down menu the estimated cost of the project. This is the monetary cost to implement the project based upon estimates or quotes. The approximation should be as accurate as possible.

0 – More than $5,000,000
1 – $1,000,000 to $4,999,999
2 – $250,000 to $999,999
3 – Less than $249,000
4 – No Cost ($0)

4. Select from the drop down menu the cost benefit of the project. The cost benefit includes any possible outcomes that the project may produce. This assessment may be based on monetary benefits like damages avoided for buildings, inventory, and contents; non-monetary benefits, such as protection of life or safety, may be more difficult to quantify.

   0 – No cost Benefit ($0)
   1 – Less than $249,999
   2 – $250,000 to $999,999
   3 – $1,000,000 to $4,999,999
   4 – More than $5,000,000

5. Enter the estimated benefit to cost ratio. The benefit to cost ratio will consist of the total cost benefit of the initiative (Item 11) divided by the total expense of the initiative (Item 10). This number should be at least 1.0 or higher, meaning that all potential projects should provide greater benefits than costs.

   0 – Less than 1.00
   1 – Between 1.00 and 1.49
   2 – Between 1.50 and 1.99
   3 – Between 2.00 and 2.49
   4 – Greater than 2.50

6. Select from the drop down list whether the proposed project is consistent with other plans and/or programs. This may involve researching various county/municipal documents, such as the Comprehensive Emergency Management Plan, the Post-Disaster Redevelopment Plan, the Community Wildfire Protection Plan, the Floodplain Management Plan, the Capital Improvement Plan, or other programs, studies, or feasibility assessments. Projects do not have to be listed specifically by name, only that they are consistent with the mission, purpose, and/or scope of the reference plan or program.

   0 – Initiative may be inconsistent with other plans or programs
   1 – Initiative is not listed in another plan or program
   2 – Initiative is included in one other plan or program
   3 – Initiative is included in two other plans or programs
   4 – Initiative is included in several other plans or programs

In addition, please list all associated plans or programs below the dropdown in the text box that include the project for consistency. When applicable, at least one (1) plan or program should be included to demonstrate consistency.

7. Select from the drop down menu the feasibility of implementation. This category involves how easy a project may be to complete, or the amount of time it will take to accomplish/implement. Factors to take into account when estimating the feasibility may include the physical location, scale or scope of the project, costs and expenses, population affected, susceptibility to other hazards, etc.

    0 – Very difficult to put into place due to extremely complex requirements
    1 – Difficult to put in place because of significantly complex requirements
    2 – Somewhat difficult to put in place because of complex requirements
    3 – Not anticipated to be difficult to put in place
    4 – Relatively easy to put in place within 1 year

8. Select from the drop down menu the probability of community acceptance. This item may involve surveying the community, analyzing demographic information, and/or determining the need of the project where the project will be implemented. Sensitive issues may impact the scoring for this item. This category is intended to serve as a kind of "litmus test" of the population and its views on the project(s).

    0 – Would be strongly opposed by nearly all of the population
    1 – Would be strongly opposed by a significant percentage of the community
    2 – Would be somewhat controversial with a small percentage of the community
    3 – Of benefit only to those directly affected and would not adversely affect others
    4 – Likely to be endorsed by the entire community

9. Select from the drop down menu the probability of receiving funding. This question is related to Item 5, as funding sources may be intended for particular mitigation projects to address a certain hazard, timeline for implementation, or type of project proposed.

    0 – No potential funding identified/likely
    1 – Only source of funding is a mitigation grant for full funding
    2 – Grant funding likely but difficult to obtain the match portion
    3 – Local match is readily available
    4 – Full funding from local budget

10. Select from the drop down menu the estimated time needed to complete the project. This includes the total time needed upon receiving funding until competition. This may involve calculating feasibility of implementation, cost, location, and population impact.

    0 – Greater than two (2) years

1 – Two (2) years
2 – One (1) year
3 – Six (6) months
4 – Less than six (6) months

11. Select from the drop down menu the project's environmental acceptability. Some projects may contain a component where any work that is performed must meet guidelines that limit or reduce the environmental impacts. Environmental acceptability may require back-up documentation, such as an Environmental & Historic Preservation (EHP) determination form, environmental impact analysis/assessment, engineering study/report, etc. These do not have to be provided at the time of submittal of the project, but they may be requested if a project is submitted for grant funding consideration. This question will be used as a "tiebreaker," so the project sponsors should select their choice for evaluation by the Planning Committee.

    1 – Yes
    0 – Not Applicable
    -1 – No

Once the Project Submission Form is completed, there are several options on the electronic form in the top left corner that you may select: Clear Form, E-Mail Form, Print Form, or Save Form.

The form should be sent electronically using the "E-mail Form" button, which will automatically send your form to the current LMS Coordinator and to the Orange County Office of Emergency Management (OEM) at ocoem@ocfl.net. You will be sent an e-mail response once your project has been received for review. You may also select the "Print Form" button to print a copy of the form for your records. Please do not send a hardcopy of the form or a scanned printout of the form to the LMS Coordinator; only e-mail the electronic form.

The Orange County LMS Planning Committee will review submitted projects at their next meeting. The Planning Committee will review the Project Submittal Form's self-assessment and determine if it agrees with the responses selected. Upon review, the Planning Committee will either deny the project request or it will recommend the project for approval. If the project is denied, the LMS Coordinator will send an e-mail to the primary and secondary contact informing them of the Planning Committee's decision and the explanation of denial. The LMS Coordinator may ask for further information from the sponsor, or suggest that the project be revised and resubmitted for consideration by the Planning Committee.

If the project is recommended for approval, the form will be signed by the Planning Committee Chair and will present the Committee's recommendation to the whole Working Group at the next meeting. The Working Group will take a vote to approve the project and add it to the Project Priority List. The Chair of the Working Group will sign the form for the approved project.

To ensure that the project is reviewed in a timely manner, it should be submitted to the LMS Coordinator or Orange County OEM four (4) weeks prior to the regularly scheduled LMS Working Group Quarterly Meetings. These meetings usually occur the second Wednesday of February, May, August, and November each year. Please note that due to unforeseen circumstances; these meetings may be moved and will be noticed to the Orange County Office for Agenda Development with the correct date and time.

Plan Update and Project Progress

This plan is a completely new update from previous Local Mitigation Strategies that takes a much more strategic approach to mitigation and how it views projects. The prioritization methodology places emphasis on a prepared approach to mitigation tasks and initiatives. The update has taken a couple of years from the initial vision to its completion with input from a variety of sources, public agencies and jurisdictions at all levels of government, non-profits, and even the private sector.

Since the approval of the initial Orange County Local Mitigation Strategy, there has been a great deal of progress. Over 152 mitigation projects have been completed since 1999. A total of 38 projects have been deferred, mostly due to lack of funding, changing priorities, or changes in sponsoring agency/jurisdiction personnel. Only 18 projects have been deleted as many of the projects were no longer needed or further development in the county and its jurisdictions made the project no longer necessary. In order to preserve the historicity of this progress, these projects have been maintained, but as they are no longer as relevant to the County's overall mitigation strategy and direction, they will not continue to be tracked on the current projects list. Further information can be found in Appendix D.

Appendix A – Orange County LMS Updates and Public Participation

List of Meetings:

LMS Planning Committee Meeting, February 10, 2016

LMS Planning Committee Meeting, March 23, 0216

LMS Working Group Meeting, May 3, 2016

LMS Planning Committee Meeting, August 5, 2016

LMS Working Group Meeting, August 10, 2016

LMS Working Group Meeting, November 16, 2016

LMS Working Group Meeting, February 8, 2017

LMS Working Group Meeting, May 25, 2017

LMS Working Group Meeting, October 11, 2017

LMS Working Group Meeting, November 8, 2017

LMS Planning Committee Meeting, February 8, 2018

LMS Planning Committee Meeting, May 25, 2018

LMS Planning Committee Meeting, July 20, 2018

LMS Working Group Meeting, February 14, 2018

LMS Working Group Meeting, May 30, 2018

LMS Working Group Meeting, July 25, 2018

LMS Working Group Meeting, November 14, 2018

LMS Working Group Meeting, February 13, 2019

LMS Working Group Meeting, May 22, 2019

LMS Working Group Meeting, August 21, 2019

LMS Working Group Meeting, November 13, 2019

LMS Working Group Meeting, August 26, 2020

LMS Working Group Meeting, November 11, 2020

LMS Working Group Meeting, February 10, 2021

LMS Working Group Meeting, June 9, 2021

LMS Working Group Meeting, August 11, 2021

Appendix B – Orange County LMS Hazards Quick Reference

Risk and Vulnerability Assessment Summary					
Hazard Name	**People**	**Property**	**Environment**	**Program Operations**	**Risk – Relative Threat**
Diseases and Pandemic	Low	High	Moderate	High	**Moderate 52%**
Animal	Low	High	Moderate	High	Moderate 44%
Human	High	Moderate	High	High	Moderate 57%
Plant/Agriculture	Low	High	Moderate	High	Moderate 51%
Extreme Temperatures	Low	Low	Moderate	Moderate	**Moderate 54%**
Drought	None	Low	Moderate	High	Moderate 57%
Freezes/Winter Storms	Low	Low	Moderate	Moderate	Moderate 41%
Heat Waves	Low	Low	Moderate	Low	High 62%
Floods	Low	Moderate	Moderate	Moderate	**Moderate 43%**
Severe Thunderstorms	Low	Moderate	Low	Moderate	**Moderate 59%**
Hail	None	Moderate	Low	Low	Moderate 52%
Lightning	Low	Moderate	Low	Low	Moderate 52%
Tornados	High	High	Moderate	High	High 71%
Sinkholes/Land-subsidence	Low	High	Low	Moderate	**High 62%**
Hazardous Materials	Moderate	Low	Low	Moderate	**Low 29%**
Terrorism/CBRNE	High	High	Low	High	**Moderate 32%**
Cyberterrorism	Low	Moderate	High	High	**High 62%**
Tropical Systems	High	High	High	High	**High 67%**
Wildfires	Low	High	Low	High	**Moderate 52%**

Consequence and Impact Analysis Summary							
Hazard Name	**Public**	**Responders**	**Continuity of Operations**	**Property, Facilities, and Infrastructure**	**Environment**	**Economic Condition**	**Public Confidence**
Diseases and Pandemic	Moderate	Low	Low	Low	Moderate	Moderate	Moderate
Animal	Moderate	Low	Low	Low	Moderate	Low	Low
Human	High	Moderate	Moderate	Low	Moderate	Moderate	Moderate
Plant/Agriculture	Moderate	Low	Low	Low	Moderate	Moderate	Moderate
Extreme Temperatures	Low	Low	Low	Moderate	Moderate	Moderate	Moderate
Drought	Low	Low	Low	Moderate	High	Moderate	Moderate
Freezes/Winter Storms	Low	Low	Low	Low	Moderate	Low	Low
Heat Waves	Moderate	Low	Low	Low	Moderate	Low	Low
Floods	Moderate	Moderate	High	High	High	Moderate	Moderate
Severe Thunderstorms	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Hail	Low	Low	Low	Low	Low	Low	Low
Lightning	Moderate	Low	Low	Moderate	Moderate	Low	Moderate
Tornados	High	High	High	High	Moderate	High	High
Sinkholes/Land-subsidence	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Hazardous Materials	High	High	High	Moderate	High	Moderate	Moderate
Terrorism/CBRNE	High	High	High	High	Moderate	High	High
Cyberterrorism	High	Moderate	High	High	Moderate	High	High
Tropical Systems	High	High	High	High	Moderate	High	High
Wildfires	Moderate	Moderate	Moderate	High	Moderate	Moderate	Moderate

Appendix C – Orange County LMS Working Group and Committee By-Laws

ARTICLE I. PURPOSE OF THE ORANGE COUNTY LMS WORKING GROUP

The purpose of the Orange County Local Mitigation Strategy (LMS) Working Group is to decrease the vulnerability of the residents, governments, businesses, and institutions of Orange County to the future human, economic, and environmental costs of natural, technological, and human-caused disasters. The Orange County LMS Working Group will develop, monitor, implement, and maintain a comprehensive plan for hazard mitigation which will be intended to accomplish purpose.

ARTICLE II. MEMBERSHIP

Participation in the Orange County LMS Working Group is voluntary by all entities. Membership in the Working Group is open to all jurisdictions, non-profit organizations, and individuals that have a role in mitigation and the purposes of the Working Group.

ARTICLE III. ORGANIZATIONAL STRUCTURE

The organizational structure of the Orange County LMS Working Group shall consist of two (2) permanent committees: Steering Committee and Planning Committee. Other temporary subcommittees as determined by the Working Group and/or Steering Committee may also be created and established; these may include, but are not limited to: Public Information, Marketing, Volunteer Coordination, or LMS Plan Review and Update subcommittees.

A. STEERING COMMITTEE

The Steering Committee should be comprised of a variety of different county agencies, municipalities, non-profit organization, and private sector partners. Membership is voluntary and shall consist of the Working Group participants.

The Steering Committee shall provide general direction of the overall working group and is the group responsible for the oversight of other committees, subcommittees, and ensuring that the processes that have been put into place are followed. The Steering Committee will be led by the Chair of the Working Group, who is voted on by the participants of the Working Group at the first calendar meeting of the Working Group every other year during the even-numbered years. The candidate for the Chair position shall be selected by a plurality of votes.

The Chair shall sign any required official correspondence of the Working Group or Steering Committee. Committee Members should be in good standing regarding attendance to the Working Group Meetings, meaning that they should not miss more than two (2) Working Group Meetings per year.

B. PLANNING COMMITTEE

The Planning Committee should be comprised of a variety of different county agencies, municipalities, non-profit organization, and private sector partners. Membership is voluntary and shall consist of the Working Group participants.

The Planning Committee is responsible for reviewing the various mitigation projects, initiatives, and tasks that comprise the County's Mitigation Strategy. The items submitted for consideration shall be reviewed as needed and ranked according to the current methodology being used. The Planning Committee should meet at least twice a year, but may meet more frequently, dependent upon the workload. The Planning Committee shall be led by the Vice-Chair of the Working Group, who is voted on by the participants of the Working Group at the first calendar meeting of the Working Group every other year during the even-numbered years. The candidate for the Vice-Chair position shall be selected by a plurality of votes.

Committee Members should be those agencies or groups that have a high degree of involvement in mitigation project implementation. This includes, but is not limited to: emergency management, fire/rescue, public schools, public works, engineering, building, facilities, code enforcement, property, environmental, or non-profits.

C. PROGRAM STAFF

The LMS Working Group and its Committees and subcommittees shall be supported by the Orange County Office of Emergency Management (OEM). The Program Staff member will serve as the LMS Coordinator and support the Working Group's various activities. OEM shall provide a staff member who will administrate the meetings, provide technical support, record keeping, subject matter expertise, and liaise with the State of Florida Division of Emergency Management (FDEM) Bureau of Mitigation.

Other clerical support may include taking attendance and meeting minutes and/or notes for the Working Group and its Committees; correspond with the State, county agencies, its jurisdictions, and other partners; assisting mitigation grant applicants with submitting projects and/or documentation for funding consideration; and other duties as necessary to promote mitigation activities in Orange County.

The LMS Coordinator will also oversee the plan's update process, which includes the evaluation, maintenance, revision, and monitoring for compliance with all relevant criteria for approval and adoption of the Orange County Local Mitigation Strategy.

D. MEETINGS and VOTING

Meetings of the Working Group and its Committees shall be conducted in accordance with Robert's Rules of Order. Regular meetings of the Working Group should occur at least quarterly (every three [3] months) and advance public notice should be given within at least ten (10) working days. All meetings of the Working Group are considered to be public meetings and are openly advertised to obtain participation from members of the public. Committee Meetings should be held at least twice a year, or more often, as needed, at the discretion of the Committee's chairperson.

ARTICLE IV. ADOPTION OF AND AMENDMENTS TO THE BYLAWS

These Bylaws may be adopted and/or amended by a two-thirds majority vote of the participants in attendance. All proposed changes should be provided to the Steering Committee, who will decide by a simple majority on whether or not to bring up the amendment for a vote of the Working Group. The Working Group is an on-going group dedicated to provide assistance to the mitigation strategy for Orange County and its jurisdictions.

Appendix D – Project Priority List History

Orange County Local Mitigation Strategy – COMPLETED PROJECTS, 1999 - 2021

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Belmont Estates - Drainage Improvement	20	Orange County Public Works - Stormwater Management	05/06/15	PDM	$649,105.00	12 Months
Bonnie Brook - Canal Erosion / Electric Panel Repair	22	Orange County Public Works - Stormwater Management	05/06/15	PDM	$366,838.00	6 Months
Wildfire Public Education	38	Orange County Fire Rescue Department	7/31/1999	General Fund	$ 25,000.00	12 Months
A-09 Facilities / Fixed Assets / Audit and Assmnt	35	City of Orlando	3/22/2005	HMGP, PDM	$ 93,400.00	12 Months
Infrastructure Protection and Disaster Assessment	35	Orange County Building Division	1/12/2007	EMPA, General Fund	$ 266,805.00	12 Months
Provision of wildland firefighting gear	35	Orange County Fire Rescue Department	7/31/1999	General Fund	$ 150,000.00	12 Months
Conway Middle School shelter retrofit	35	Orange County on behalf of Orange County Public Schools	2/20/2005	HMGP	$ 400,000.00	5 Years / August 2010

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Fortification of Operations Building	35	Orange County Sheriff's Office	12/12/2001	HMGP, PDM, General Fund, HLS Grants	$ 175,983.00	12 Months
Fortification of the John L. Cassady Jr. Building	35	Orange County Sheriff's Office	11/18/2001	General Fund, HLS Grants	$ 228,905.00	12 Months
Critical Facility Duty Officer Initiative	34	Orange County Sheriff's Office	1/23/2002	General Fund	$ 822,000.00	12 Months
A-82 Lift Stations Vegetation Removal	33	City of Orlando	2/21/2005	HMGP, PDM	$ 35,000.00	12 Months
Prescribed burns	33	Orange County Fire Rescue Department	7/31/1999	General Fund	$ 20,000.00	12 Months
Fortification of the Communications Center	33	Orange County Sheriff's Office	12/12/2001	HMGP, PDM, General Fund, HLS Grants	$ 419,896.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Fortification of the Sheriff's Central Complex	33	Orange County Sheriff's Office	1/23/2002	HMGP, PDM, General Fund, HLS Grants	$ 358,825.00	12 Months
Juvenile Assessment Center project	32	Orange County Facilities Management Division	2/23/2005	HMGP, PDM	$250,000.00 / $40,268.00	12 Months / September 2012
Protect exterior of Public Works Dept. building	32	Orange County Public Works Department	10/23/2001	HMGP, PDM	$ 75,000.00	12 Months
Fortification of Orange County S.O. Substations	32	Orange County Sheriff's Office	1/23/2002	HMGP, PDM, General Fund, HLS Grants	$ 309,700.00	12 Months
Katherine Street Sewage Pump Mitigation	32	Town of Eatonville	3/18/2002	CBDG, HMGP, PDM, General Fund	$ 47,000.00	12 Months
Hardening of Fire Station #1	31	City of Apopka	2/23/2005	HMGP	$ 17,728.00	12 Months
Hardening of Fire Station #2	31	City of Apopka	2/23/2005	HMGP	$ 29,315.00	5 Years

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Hardening of Fire Station #3	31	City of Apopka	1/30/2005		$ 29,315.00	12 Months
Hardening of Fire Station #4	31	City of Apopka	1/30/2005	HMGP	$ 2,964.00	12 Months
Hardening of Police Station	31	City of Apopka	1/30/2005	HMGP	$ 15,000.00	2 Years
Cassidy Building Project	31	Orange County Facilities Management Division	2/23/2005	HMGP, PDM	$582,220.00 /$393,688.08	12 Months /October 2009
Reinforce Roof of Fire Rescue Headquarters	31	Orange County Fire Rescue Department	1/2/2008-Updated	HMGP, PDM	$ 1,000,000.00	12 Months
Wildfire Education-Fire Wise Community- USA 00003	31	Orange County on behalf of Wedgefield Firewise Community	1/31/2005	General Fund, PDM, HMGP	$ 57,500.00	12 Months
8100 Presidents Dr. Operations Facility	31	Orange County Utilities Department	2/23/2005	HMGP, PDM	$ 480,000.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Computer System Vulnerability Reduction	31	Town of Oakland	1/21//2001	CBDG, HMGP, PDM, General Fund	$ 14,000.00	12 Months
Storm Shutters for Wastewater buildings	30	City of Apopka	3/18/2002	CBDG, HMGP, PDM, General Fund	$ 50,000.00	12 Months
Hazard Mitigation GIS Software	30	Orange County Growth Management Department	1/1/2006-Updated	General Fund	$ 341,583.00	12 Months
Tractor to maintain firebreaks	30	Orange County on behalf of Wedgefield Firewise Community	1/31/2005	General Fund, PDM, HMGP	$ 75,000.00	12 Months
Lake Hiawassee Drainwell Replacement	30	Orange County Public Works Department	12/9/2004	HMGP, PDM	$ 330,000.00	12 Months
Install outfalls in lieu of current drainwells:	29	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 100,000.00	12 Months
Library Roof	29	University of Central Florida	2/18/2005	HMGP E&G Funding	$ 921,114.00	8/11/2009

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Physical Plant Bldg Retrofit	29	University of Central Florida	2/18/2005	HMGP E&G Funding	$ 34,733.00	6/30/2008
Purchase of an SUV with winch attachment	28	City of Edgewood	4/25/2002	EMPA, HMGP, Community Assistance Program - State	$ 35,000.00	12 Months
Maitland Fire Department Advanced Terrorism Trng	28	City of Maitland	10/23/2001	Chemical Emergency Preparedness and Prevention Technical Assistance Grants Program, EMPA	$ 10,000.00	12 Months
EOC Construction	28	City of Ocoee	7/31/1999	General Fund, HMGP	$ 200,000.00	12 Months
Big Econlockhatchee River Basin Land Acquisition	28	Orange County Public Works Department	8/23/2002	HMGP, PDM	$ 8,267,000.00	12 Months
Installation of bypass system from Lake Valarie	28	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 1,000,000.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Emergency Preparedness Training	28	Town of Eatonville	12/18/2001	EMPA, CBDG	$ 20,000.00	12 Months
Fire Station #2-Emergency Fuel Facility	27	City of Apopka	11/14/2004	CBDG, HMGP, PDM, General Fund	$ 20,000.00	5 Months
Maitland Fire Department Automated Infrastructure Inventory	27	City of Maitland	12/12/2001			5 Months
Mobile Communications trailer	27	City of Ocoee	7/31/1999	EMPA, HMGP	$ 100,000.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Provide flood prevention for Fire St. #4	27	City of Ocoee	4/25/2002	Watershed Program and Flood Prevention , NFIP, Pollution Prevention Incentives for States	$ 50,000.00	6 Months
A-57 WASTEWATER DIV 17 STATIONARY GENERATORS	27	City of Orlando	1/29/2005	HMGP, PDM	$ 832,000.00	2 Years
Urban Search and Rescue Equipment	27	City of Winter Park	10/15/2006-Updated	CBDG, EMPA	$ 700,000.00	12 Months
Canal Bank Protection	27	Orange County Public Works Department	10/4/2002	HMGP, PDM	$ 1,200,000.00	12 Months
Canal Profiles for Flood Control	27	Orange County Public Works Department	10/4/2002	HMGP, PDM	$ 1,200,000.00	12 Months
Hurricane hardening Eastern Water Reclamation	27	Orange County Utilities Department	2/23/2005	HMGP, PDM	$ 771,000.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Hurricane hardening of control building	27	Orange County Utilities Department	2/7/2005	HMGP, PDM	$ 150,000.00	12 Months
UCF Data Center Retrofit	27	University of Central Florida	2/7/2005	HMGP, UIMP Funding	$ 551,715.00	8/6/2010
Generator for Police Dept./City Hall	26	City of Edgewood	4/25/2002	EMPA, HMGP	$ 33,597.00	12 Months
Hazmat Training	26	City of Edgewood	4/25/2002	Chemical Emergency Preparedness and Prevention Technical Assistance Grants	$ 10,000.00	5 Months
Stormwater outfall construction	26	City of Ocoee	7/31/1999	General Fund, PDM, HMGP	$ 350,000.00	12 Months
Install wind-resistant doors on fire station	26	City of Winter Garden	3/18/2002	HMGP, PDM	$ 40,000.00	12 Months
Upgrade emergency backup generator system	26	City of Winter Garden	3/18/2002	HMGP, CBDG, PDM, General Fund	$ 10,000.00	12 Months
Electronic Weather Stations	26	City of Winter Park	2/12/2007-Updated	CBDG, General Fund, EMPA	$ 1,800.00	6 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
East Orange Community Center project (Countywide)	26	Orange County Facilities Management Division	2/23/2005	HMGP, PDM	$314,295.00 / Building A - $55,605.00 Building C - $46,939.00 Building D - $39,452.00	12 months / May 2012
Health Central Roof Enhancement	26	Orange County on behalf of Health Central Hospital	1/29/2005	HMGP	$ 630,000.00	6 Months
Installation of stormwater control structure	26	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 315,000.00	12 Months
Lake Sherwood pumping station installation	26	Orange County Public Works Department	3/18/2002	HMGP, PDM	$ 1,434,000.00	12 Months
Powers DR/Balboa DR Flood Control	26	Orange County Public Works Department	5/23/2002	HMGP, PDM	$ 100,000.00	12 Months
First Ave. and Oakdale St. Drainage Improvements	26	Town of Windermere	1/31/2005	HMGP, General Revenue Fund	$114,304.87	2/2/2010

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Campus Shelter Retrofits	26	University of Central Florida	2/7/2005	HMGP, UIMP Funding	$ 2,103,824.00	12/13/2013
Emergency Generator for LS #9	25	City of Apopka	3/18/2002	CBDG, HMGP, PDM, General Fund	$ 45,000.00	12 Months
Flood prevention for Lakeshore Dr.	25	City of Ocoee	1/30/2009-Updated	General Fund, PDM, HMGP	$ 300,000.00	5 Years
A-40 OFD STA 7 ENHANCEMENT	25	City of Orlando	1/26/2005	HMGP, PDM	$ 50,000.00	12 Months
Generators for Critical Facilities	25	City of Winter Garden	1/14/2002	HMGP, PDM	$ 74,550.00	12 Months
Upgrade generator/ shutter two water treatment plants	25	City of Winter Garden	3/18/2002	HMGP, PDM	$ 100,000.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
33rd Street Prison Complex Project	25	Orange County Facilities Management Division	2/23/2005	HMGP, PDM	$2,542,000.00 / VVB - $42,561.00 CEP - $41,587.99 CAB - $820,849.00	12 Months / September 2010
500 Radiological Pagers	25	Orange County Fire Rescue Department	2/1/2007	UASI	$ 100,000.00	6 Months
Disaster Resistant Neighborhoods (Countywide)	25	Orange County on behalf of the American Red Cross of Central Florida	11/8/2002	General Fund, EMPA	$ 10,000.00	12 Months
Bearhead Lake Area Flood Control	25	Orange County Public Works Department	8/23/2002	HMGP, PDM	$ 340,000.00	12 Months
Border Lake outfall/pumping station installation	25	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 606,000.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Control structure/outfall pipeline installation	25	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 194,000.00	12 Months
Flood protection study	25	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 447,000.00	12 Months
Install outfalls in lieu of current drainwells	25	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 4,259,000.00	12 Months
Lake Buchanan Drainwell Replacement:	25	Orange County Public Works Department	10/4/2002	HMGP, PDM	$ 80,000.00	12 Months
Lake Douglas outfall installation	25	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 224,000.00	12 Months
Reaves Rd. Drainage Improvements	25	Orange County Public Works Department	1/31/2005	HMGP, PDM	$ 87,000.00	12 Months
12th Ave. and Oakdale St. Drainage Improvements	25	Town of Windermere	12/9/2004	HMGP, General Revenue Fund	$124,901.00	5/18/2010
Emergency Generator for LS #2	24	City of Apopka	3/18/2002	CBDG, HMGP, PDM, General Fund	$ 45,000.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Emergency Generator for LS #25	24	City of Apopka	3/18/2002	CBDG, HMGP, PDM, General Fund	$ 40,000.00	6 Months
Emergency Generator for LS #32	24	City of Apopka	3/18/2002	CBDG, HMGP, PDM, General Fund	$ 40,000.00	12 Months
Belle Isle West Flood Mitigation	24	City of Belle Isle	1/30/2005	HMGP	$ 123,190.00	12 Months
Hal Martson Community Center project	24	Orange County Facilities Management Division	2/23/2005	HMGP, PDM	$300,000.00 /$119,246.00	12 Months /January 2012
Retrofitting of Orange County fire stations	24	Orange County Fire Rescue Department	2/7/2005	HMGP, PDM	$900,000.00 / $621,567.00	5 Years / July 2010
Bonnie Brook Subdivision Flooding	24	Orange County Public Works Department	1/31/2005	HMGP, PDM	$ 225,537.00	12 Months
Edgewater Vegetated Slope	24	Orange County Public Works Department	10/4/2002	HMGP, PDM	$ 525,000.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
High water level outfall installation	24	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 149,000.00	12 Months
Install diversion box for Minnesota AV runoff:	24	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 1,572,000.00	12 Months
Lake Rhea flowway easement	24	Orange County Public Works Department	5/23/2002	HMGP, PDM	$ 189,000.00	12 Months
Maitland BLVD Sedimentation Basin	24	Orange County Public Works Department	8/23/2002	HMGP, PDM	$ 1,110,000.00	12 Months
Obtain a flowway easement	24	Orange County Public Works Department	5/23/2002	HMGP, PDM	$ 189,000.00	12 Months
Obtain access to drainage canal	24	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 344,000.00	12 Months
Obtain easement from Lake Bryan	24	Orange County Public Works Department	3/18/2002	HMGP, PDM	$ 1,640,000.00	6 Months
Windermere Rd-Roberson Rd. Drainage Improvements	24	Orange County Public Works Department	12/9/2004	HMGP, PDM	$ 230,516.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Construction of a drainage system along Bancroft	24	Ranger Drainage District	12/9/2004	HMGP, PDM	$ 200,000.00	10/31/2010
Apopka Community Center/Emergency Shelter	23	City of Apopka	1/30/2005	COMPLETED	$ 1,500,000.00	3 years
Emergency Generator for LS #18	23	City of Apopka	3/18/2002	CBDG, HMGP, PDM, General Fund	$ 40,000.00	2 Years
Lake Conway Shore Flood Mitigation	23	City of Belle Isle	1/30/2005	HMGP	$ 177,550.00	12 Months
Health Dept./Medical Clinic Project	23	Orange County Facilities Management Division	2/23/2005	HMGP, PDM	$1,554,440.00 / $158,734.65	5 Years / July 2010
Bonnie Lou DR Drainwell Replacement	23	Orange County Public Works Department	8/23/2002	HMGP, PDM	$ 68,000.00	12 Months
Crane Strand System Flood Control	23	Orange County Public Works Department	8/23/2002	HMGP, PDM	$ 162,000.00	12 Months
Drainwell Replacement-Lake Sherwood	23	Orange County Public Works Department	1/31/2005	HMGP, PDM	$ 500,000.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Fern Creek Drainwell Replacement	23	Orange County Public Works Department	5/22/2002	HMGP, PDM	$ 105,000.00	12 Months
Hydrologic evaluation of Little Sand Lake	23	Orange County Public Works Department	3/18/2002	HMGP, PDM	$ 430,000.00	12 Months
Install sedimentation/retention pond	23	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 250,000.00	12 Months
Isle of Pines/Lake and Pines Estates Subdivisions	23	Orange County Public Works Department	8/23/2002	HMGP, PDM	$ 300,000.00	12 Months
Lake Lotta Drainwell Installation	23	Orange County Public Works Department	1/30/2005	HMGP, PDM	$ 380,000.00	12 Months
Lake Olivia-West Drainwell Replacement	23	Orange County Public Works Department	8/23/2002	HMGP, PDM	$ 116,000.00	12 Months
Londonderry Hills Subdivision Flood Control	23	Orange County Public Works Department	5/24/2002	HMGP, PDM	$ 10,000.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Stormwater line installation	23	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 258,000.00	12 Months
A-77 Al Coith Park/Euclid Ave-Gore St Drain Improvement:	22	City of Orlando	2/23/2005	HMGP, PDM	$ 760,000.00	12 Months
Fairways Mobile Home Park	22	Orange County Fire Rescue Department	5/30/2009-Updated	COMPLETED	$ 250,000.00	12 Months
Gulfstream Mobile Home Park	22	Orange County Fire Rescue Department	1/31/2005	COMPLETED	$ 250,000.00	12 Months
Community Outreach for Holden Heights residents	22	Orange County on behalf of the Holden Heights Front Porch Association	Ongoing	General Fund, HLS Grants	$ 250,000.00	12 Months
Bates RD Erosion Control	22	Orange County Public Works Department	5/23/2002	HMGP, PDM	$ 500,000.00	12 Months
Mckinnon Road Drainage Improvements	22	Orange County Public Works Department	12/9/2004	HMGP, PDM	$ 465,000.00	12 Months
Purchase of outflow path	22	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 671,000.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Purchase property for detention basin	22	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 574,000.00	12 Months
Big Sand Lake Drainwell Installation	21	Orange County Public Works Department	1/31/2005	HMGP, PDM, General Fund	$ 97,725.00	12 Months
Bulova DR Flood Control	21	Orange County Public Works Department	5/23/2002	HMGP, PDM	$ 190,000.00	12 Months
Install a pump station and outfall pathway	21	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 933,000.00	12 Months
Installation of sedimentation/retention pond	21	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 753,000.00	12 Months
Pennington Road Drainage Improvements - Added - West Lake Fairview Drainage Improvement	20	City of Orlando	10/19/2009	PDM	$ 450,000.00	2 Years

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Retrofitting to two Great Oaks Village facility	20	Great Oaks Village	2/7/2005	HMGP, PDM	$906,110.00 / Evans Dining Hall - $33,290.00 GOV Youth Shelter - $71,957.00 GOV Drainage Project - $170,132.00	12 Months / Evans Dining Hall - January 2010 GOV Youth Shelter - January 2010 GOV Drainage Project - October 2012
Walker Middle School shelter retrofit	20	Orange County on behalf of Orange County Public Schools	2/20/2005	HMGP	$ 300,000.00	5 Years / March 2012
Disaster Planning for Small Business (Countywide)	20	Orange County on behalf of the American Red Cross of Central Florida	11/8/2002	General Fund, EMPA	$ 20,000.00	6 Months
Barry ST Flood Control	20	Orange County Public Works Department	10/4/2002	HMGP, PDM	$ 350,000.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Christmas Park stormwater development	20	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 3,181,000.00	12 Months
Conduct study of Sunflower Trail watershed	20	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 1,765,000.00	12 Months
Elba Dredge and Grade	20	Orange County Public Works Department	10/4/2002	HMGP, PDM	$ 1,110,000.00	12 Months
Install Lake Robert Drainwell	20	Orange County Public Works Department	1/30/2005	HMGP, PDM	$ 380,000.00	12 Months
Installation of bypass system from Lake Valarie	20	Orange County Public Works Department	7/31/1999	HMGP, PDM	$ 883,000.00	12 Months
Maitland Chain Control Structure	20	Orange County Public Works Department	5/23/2002	HMGP, PDM	$ 552,000.00	12 Months
Master drainage plan for Plantation Estates	20	Orange County Public Works Department	3/18/2002	HMGP, PDM	$ 896,000.00	12 Months

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Oak Park Road Drainage System Installation (OS)	20	Orange County Public Works Department	12/12/2008	HMGP, PDM	$ 1,200,000.00	12 Months
Outfall pipeline replacement	20	Orange County Public Works Department	7/31/1999	PDM, HMGP	$ 2,800,000.00	12 Months
Emergency Response Team equipment purchase	20	Orange County Sheriff's Office	2/1/2006	HLS Grants	$ 100,000.00	2 Months
Riser Barrels Drainage Project	20	Ranger Drainage District	9/21/2009	HMGP	$ 3,614,425.00	9/30/2012
Jones AV Stormwater Restoration	19	Orange County Public Works Department	5/23/2002	HMGP, PDM	$ 2,011,000.00	12 Months
Kingswood Manor Subdivision Flood Control	19	Orange County Public Works Department	5/22/2002	HMGP, PDM	$ 550,000.00	12 Months
Randolph AV Area Flood Control	19	Orange County Public Works Department	5/22/2002	HMGP, PDM	$ 650,000.00	12 Months
Riverside Acres Pipe Arch Replacement/Land Acquire	18	Orange County Public Works Department	5/23/2002	HMGP, PDMM	$ 1,500,000.00	12 Months
Melville Street Drainage Project	18	Ranger Drainage District	9/21/2009	HMGP	$ 655,062.00	8/31/2012

Project Name	Total Priority Score	Responsible Agency	Date Approved	Funding Source	Actual Cost	Projected Timeframe
Beggs RD/Overland RD Drainage Improvements	17	Orange County Public Works Department	10/4/2002	HMGP, PDM	$ 1,000,000.00	12 Months
A-83 Englewood Homeowner Rehabilitation Initiative	15	City of Orlando	2/22/2005	HMGP, PDM	$ 550,000.00	12 Months
Community Disaster Education: Community Disaster Education Program (Countywide)	15	Orange County on behalf of the American Red Cross of Central Florida	11/8/2002	General Fund, EMPA	$ 10,000.00	12 Months
Subcontract to clear roots	15	Orange County on behalf of Wedgefield Firewise Community	12/9/2004	General Fund, PDM, HMGP	$ 10,000.00	12 Months
Maxim Parkway, Marlin Street, Ascot Avenue Drainage Project	15	Ranger Drainage District	9/21/2009	HMGP	$ 694,008.00	8/31/2012
Memorial MS Shelter Retrofit	14	Orange County on behalf of Orange County Public Schools	2/20/2005	HMGP	$ 500,000.00	12 Months / August 2009
Work Release Facility Project		Orange County Facilities Management Division	2/23/2005	HMGP	$516,545.00	12 Months / February 2012

Orange County Local Mitigation Strategy – DEFERRED PROJECTS, 1999 - 2021

Project Name	Total Priority Score	Responsible Agency	Date Approved	Potential Funding Source	Estimated Cost	Reason it was Deferred
Cathodic Protection	32	University of Central Florida	5/25/2017	HMGP	$999,999	Information gaps for project application
Ranger Drainage District (Emergency Pumps)	32	Ranger Drainage District	5/3/2016	HMGP	$249,999	Terminology of emergency pumps
A-01 Acquisition and Rehab of Special Needs Facility	20	City of Orlando	2/23/2008	HMGP, PDM	$ 6,000,000.00	
Corrections Compound Water Tower	N/A	Orange County Corrections Department	N/A	PDM	$1.5M to $2M	Lack of Funds
Hazard Mitigation Educational Campaign	N/A	Orange County Office of Emergency Management	N/A	Any funding source available	$ 10,000.00	

Project Name	Total Priority Score	Responsible Agency	Date Approved	Potential Funding Source	Estimated Cost	Reason it was Deferred
People with Special Needs Shelter Generator or Transfer Switch for Emergency Generator	N/A	Orange County on behalf of Orange County Public Schools	N/A	PDM	$ 1,000,000.00	Lack of Funds
Emergency Power Project	N/A	Orange County on behalf of the Salvation Army	N/A	PDM	$ 50,000.00	New Priorities Identified
Black Lake Floodplain Restoration	N/A	Orange County Public Works Department	N/A	PDM	$ 50,000.00	New Priorities Identified
Crane Strand Erosion Control	N/A	Orange County Public Works Department	N/A	PDM	$ 50,000.00	New Priorities Identified
Design replacement for frontal panel wall for the Main Utility Plant	N/A	University of Central Florida	N/A	PDM	$ 500,000.00	Lack of Funds
Drainage mitigation for Engineering III building	N/A	University of Central Florida	N/A	PDM	$ 500,000.00	Lack of Funds
Drainage mitigation for Health and Public Affairs I and II building	N/A	University of Central Florida	N/A	PDM	$ 500,000.00	Lack of Funds
Drainage mitigation for Math and Physics Building	N/A	University of Central Florida	N/A	PDM	$ 500,000.00	Lack of Funds
Drainage mitigation for the Howard Phillips Hall building	N/A	University of Central Florida	N/A	PDM	$ 200,000.00	New Priorities Identified

Project Name	Total Priority Score	Responsible Agency	Date Approved	Potential Funding Source	Estimated Cost	Reason it was Deferred
Drainage mitigation for the Library building	N/A	University of Central Florida	N/A	PDM	$ 750,000.00	Lack of Funds
Drainage mitigation of Academic Village residence halls	N/A	University of Central Florida	N/A	PDM	$ 150,000.00	New Priorities Identified
Drainage mitigation of Teaching Academy building	N/A	University of Central Florida	N/A	PDM	$ 250,000.00	Lack of Funds
Hazard Mitigation Plan	N/A	University of Central Florida	N/A	PDM	$ 100,000.00	New Priorities Identified
Remove/replace existing roof and penthouse from Main Utility Plant	N/A	University of Central Florida	N/A	PDM	$ 350,000.00	New Priorities Identified
Wildfire Mitigation Project	N/A	University of Central Florida	N/A	PDM	$ 30,000.00	New Priorities Identified
County Courthouse Building Shuttering project	N/A	Orange County Facilities Management Division	2/23/2005		$ 245,000.00	
Bearhead Lake Area Flood Control	N/A	Orange County Public Works Department	8/23/2002	General Fund	$ 600,000.00	Lack of Funds
Border Lake outfall/pumping station installation	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 560,000.00	Lack of Funds

Project Name	Total Priority Score	Responsible Agency	Date Approved	Potential Funding Source	Estimated Cost	Reason it was Deferred
Christmas Park stormwater development	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 450,000.00	By the request of the Public Works Dept. Director
Crane Strand System Flood Control	N/A	Orange County Public Works Department	8/23/2002	General Fund	$ 200,000.00	By the request of the Public Works Dept. Director
Edgewater Vegetated Slope	N/A	Orange County Public Works Department	10/4/2002	General Fund	$ 100,000.00	Lack of Funds
Elba Dredge and Grade	N/A	Orange County Public Works Department	10/4/2002	General Fund	$ 200,000.00	Lack of Funds
Flood protection study	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 100,000.00	Lack of Funds
High water level outfall installation	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 100,000.00	New Priorities Identified
Install outfalls in lieu of current drainwells	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 400,000.00	New Priorities Identified

Project Name	Total Priority Score	Responsible Agency	Date Approved	Potential Funding Source	Estimated Cost	Reason it was Deferred
Install sedimentation/retention pond	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 150,000.00	By the request of the Public Works Dept. Director
Install stormwater control structure	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 600,000.00	By the request of the Public Works Dept. Director
Isle of Pines/Lake and Pines Estates Subdivisions	N/A	Orange County Public Works Department	8/23/2002	General Fund	$ 40,000.00	By the request of the Public Works Dept. Director
Plan and install outfall from Lake Price	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 100,000.00	Lack of Funds
Purchase property for detention basin	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 1,000,000.00	Lack of Funds
Retrofit culverts along Apopka Blvd	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 500,000.00	By the request of the Public Works Dept. Director
Stormwater line installation	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 300,000.00	Lack of Funds

Project Name	Total Priority Score	Responsible Agency	Date Approved	Potential Funding Source	Estimated Cost	Reason it was Deferred
Stormwater systems retrofit:	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 560,000.00	New Priorities Identified
Upgrade Park Manor	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 1,500,000.00	By the request of the Public Works Dept. Director
Upgrade pump station	N/A	Orange County Public Works Department	7/31/1999	General Fund	$ 250,000.00	New Priorities Identified

Orange County Local Mitigation Strategy – DELETED PROJECTS, 1999 - 2021

Project Name	Total Priority Score	Responsible Agency	Date Approved	Potential Funding Source	Estimated Cost	Reason project was Deleted
Mesh Network Electric Outage Detection	34	University of Central Florida	5/25/2017	HMGP	$999,999	Unable to receive funding for mitigation
Repair of Emergency Storm water Pop-off Pipe from C-2	37	Greater Orlando Aviation Authority	05/30/18	HMGP	$230,000	Unable to receive funding for mitigation
Blue Lot By-pass Canal Clean-out	34	Greater Orlando Aviation Authority	05/30/18	HMGP	$850,000	Unable to receive funding for mitigation
Drilling of new aquifer wells	35	Orange County Utilities Department	2/1/2008	General Fund	$ 1,000,000.00	No longer needed.
Flood prevention on SR 50	30	City of Ocoee	7/31/1999	DELETED	FDOT Funds	2 years
Station 62 Shuttering Project	29	City of Winter Park	2/12/2005	CBDG, General Fund, HMGP	$ 15,000.00	Windows had a storm-rated film applied instead.
Storm shutters for Landfill Administrative Office	29	Orange County Utilities Department	7/31/1999	HMGP, PDM	$ 80,000.00	

Project Name	Total Priority Score	Responsible Agency	Date Approved	Potential Funding Source	Estimated Cost	Reason project was Deleted
Maitland Fire Department EOC Retrofit	28	City of Maitland	2/7/2005	EMPA, HMGP, PDM, General Fund	$ 53,000.00	Project reassessed, reassigned and completed September 2013.
Senior Center Retrofit	28	City of Maitland	2/23/2005	HMGP	$ 69,550.00	Facility not qualified as approved shelter due to structural design to minimum State wind loading requirement. The facility structural design was not as an essential facility.
Storm shutters for Public Works Garage (OS)	26	City of Winter Garden	7/31/1999	HMGP, CBDG, PDM, General Fund		
Structural improvements to Police Dept.	26	City of Winter Garden	3/18/2002	HMGP, PDM	$ 50,000.00	Police Department moved into the old City Hall Building.
Storm shutters for L.B. McLeod Transfer Station	24	Orange County Utilities Department	7/31/1999	HMGP, PDM	$ 80,000.00	

Project Name	Total Priority Score	Responsible Agency	Date Approved	Potential Funding Source	Estimated Cost	Reason project was Deleted
East Orlando/Azalea Park System Flood Control	23	Orange County Public Works Department	5/23/2002	HMGP, PDM	$ 2,899,110.00	
Lake Rose Hill Flood Control	23	Orange County Public Works Department	10/4/2002	HMGP, PDM	$ 318,000.00	No longer needed.
Storm shutters for Porter Transfer Station	23	Orange County Utilities Department	7/31/1999	HMGP, PDM	$ 90,000.00	
Storm shutters for City Hall	22	City of Winter Garden	7/31/1999	HMGP, CBDG, PDM, General Fund	$ 80,000.00	A new building was built for City Hall.
A-03 Communications Response Unit	N/A	City of Orlando	12/6/2002	HLS Grants	$ 50,000.00	Equipment was obtained through the region and the city no longer needed the asset.
County Administration Building Hardening project	N/A	Orange County Government	3/1/2007	General Fund	$ 275,000.00	
Fire Station Refurbishment and Expansion	N/A	Town of Eatonville	12/6/2002	General Fund	$ 10,000.00	Eatonville's FD was disbanded.
Purchase of (3) Apparatus Units	N/A	Town of Eatonville	12/6/2002	General Fund	$ 600,000.00	Eatonville's FD was disbanded.

Annex 1– Orange County LMS Project Priority Submission Form Template

The following pages are the Orange County Local Mitigation Strategy Project Priority Submission Form Template that is used by the Planning Committee to review and rank various projects, tasks, and initiatives submitted for consideration.

Annex 2– Orange County LMS Project Priority Submission Form Guide

The following pages are the Orange County Local Mitigation Strategy Project Priority Submission Form Guide. This guide will help to explain the various components that are used by the Planning Committee to review and rank various projects, tasks, and initiatives submitted for consideration. This guide may change to reflect various changes to priorities in mitigation projects, tasks, and initiatives.

Annex 3– Orange County LMS Adoption Resolutions

The following pages are the Orange County Local Mitigation Strategy (LMS) Adoption Resolutions signed and submitted by the various participating jurisdictions. Those jurisdictions that have adopted the Orange County LMS are able to directly apply for federal mitigation grant funding.

APPROVED BY ORANGE
COUNTY BOARD OF COUNTY
COMMISSIONERS

BCC Mtg. Date: Jan. 11, 2022

RESOLUTION

of the

ORANGE COUNTY BOARD OF COUNTY COMMISSIONERS

Regarding

LOCAL MITIGATION STRATEGY

Resolution No. 2022-M-02

WHEREAS, the areas of unincorporated Orange County are vulnerable to the human and economic costs of natural, technological and societal disasters; and

WHEREAS, the Orange County Board of County Commissioners recognizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community; and

WHEREAS, Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. §5165, as amended by the Disaster Mitigation Act of 2000, provides for States and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning; and

WHEREAS, the Federal Emergency Management Agency has implemented various hazardous mitigation planning provisions through regulation at 44 CFR §201.6 requiring local governments to have a FEMA approved Local Mitigation Strategy ("LMS") in order to apply for and/or receive project grants; and

WHEREAS, 44 CFR §201.6(d)(3) requires local jurisdictions to review and revise their LMS to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding; and

WHEREAS, the representatives and staff of Orange County government have identified, justified, and prioritized a number of proposed projects and programs needed to mitigate the vulnerabilities of unincorporated areas of Orange County to the impacts of future disasters; and

WHEREAS, these proposed projects and programs have been incorporated into the 2021 edition of the Orange County Local Mitigation Strategy that has been prepared and issued for consideration and implementation by the communities of Orange County.

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF ORANGE COUNTY:

Section 1. Orange County hereby accepts and approves its designated portion of the Orange County Local Mitigation Strategy.

Section 2. The staff of Orange County are requested and instructed to pursue available funding opportunities for implementation of the proposals designated therein.

Section 3. Orange County will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the strategy.

Section 4. Orange County will continue to participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

Section 5. Orange County will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of Orange County to also participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

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Section 6. Effective Date. The resolution shall take effect upon the date of its adoption.

ADOPTED THIS 11TH DAY OF January, 2022.

ORANGE COUNTY, FLORIDA
By: Board of County Commissioners

By: _____
for Jerry L. Demings
Orange County Mayor

ATTEST: Phil Diamond, CPA, County Comptroller
As Clerk of the Board of County Commissioners

By: _____
Deputy Clerk

RESOLUTION NO. 2022-03

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF APOPKA, FLORIDA, ACCEPTING AND APPROVING THE DESIGNATED PORTION OF THE ORANGE COUNTY LOCAL MITIGATION STRATEGY.

WHEREAS, the areas of the City of Apopka are vulnerable to the human and economic costs of natural, technological and societal disasters; and

WHEREAS, the City Council of the City of Apopka recognize the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community; and

WHEREAS, Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. §5165, as amended by the Disaster Mitigation Act of 2000, provides for state and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning; and

WHEREAS, the Federal Emergency Management Agency has implemented various hazardous mitigation planning provisions through regulation at 44 CFR §201.6 requiring local governments to have a FEMA approved Local Mitigation Strategy ("LMS") in order to apply for and/or receive project grants; and

WHEREAS, 44 CFR §201.6(d)(3) requires local jurisdictions to review and revise their LMS to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding; and

WHEREAS, the representatives and staff of Orange County government have identified, justified and prioritized a number of proposed projects and programs needed to mitigate the vulnerabilities of areas of the City of Apopka to the impacts of future disasters; and

WHEREAS, these proposed projects and programs have been incorporated into the 2016 edition of the Orange County Local Mitigation Strategy that has been prepared and issued for consideration and implementation by the communities of Orange County.

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF APOPKA:

Section 1. City of Apopka hereby accepts and approves its designated portion of the Orange County Local Mitigation Strategy.

Section 2. The staff of Orange County and the City of Apopka are requested and instructed to pursue available funding opportunities for implementation of the proposals designated therein.

Section 3. City of Apopka will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the strategy.

Section 4. City of Apopka will continue to participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

Section 5. City of Apopka will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of Orange County and the City of Apopka to also participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

Section 6. **Effective Date.** The resolution shall take effect upon the date of its adoption.

ADOPTED THIS 2nd DAY OF FEBRUARY, 2022

City of Apopka, FLORIDA
By: City Council of the City of Apopka

Bryan Nelson, Mayor

ATTEST:

Susan M. Bone, City Clerk

RESOLUTION NO. 22-08

Orange County Local Mitigation Strategy Resolution

WHEREAS, the (jurisdiction's name) are vulnerable to the human and economic costs of natural, technological and societal disasters;

WHEREAS, the (jurisdiction's governing board) recognizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community;

WHEREAS, Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5165, as amended by the Disaster Mitigation Act of 2000 provides for States and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning;

WHEREAS, the Federal Emergency Management Agency has implemented various hazard mitigation planning provisions through regulation at 44.CFR 201.6 requiring local governments to have a FEMA approved Local Mitigation Strategy (LMS) in order to apply for and/or receive project grants;

WHEREAS, 44 CFR 201.6(d)(3) requires local jurisdictions to review and revise their LMS to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding;

WHEREAS, the representatives and staff of (jurisdiction's name) have identified, justified and prioritized a number of proposed projects and programs needed to mitigate the vulnerabilities to the impacts of future disasters; and

WHEREAS, these proposed projects and programs have been incorporated into the 2009 edition of the Orange County Local Mitigation Strategy that has been prepared and issued for consideration and implementation by the communities of Orange County.

Now therefore, be it resolved on this day, February 1, 2022 that,

1. The City of Belle Isle hereby accepts and approves its designated portion of the Orange County Local Mitigation Strategy,
2. The staff of the City of Belle Isle are requested and instructed to pursue available funding opportunities for implementation of the proposals designated therein,
3. The City of Belle Isle will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the strategy, and
4. The City of Belle Isle will continue to participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead, and
5. The City of Belle Isle will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of the City of Belle Isle to also participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

ADOPTED at a regular meeting of the City Commission of the City of Belle Isle held at City Hall 1600 Nela Avenue, Belle Isle, FL 32809, on the February 1, 2022.

NICHOLAS FOURAKER, MAYOR

So resolved, Attest:

Yolanda Quiceno, CMC-City Clerk

Approved as to form and legality

City Attorney

STATE OF FLORIDA

COUNTY OF ORANGE

I, YOLANDA QUICENO, CITY CLERK OF BELLE ISLE, FLORIDA, do hereby certify that the above and foregoing Resolution 22-08 was duly and legally passed and adopted by the Belle Isle City Council in session assembled. At this session, a quorum of its members was present on the 1st day of February 2022.

Yolanda Quiceno, City Clerk

YOLANDA QUICENO
Notary Public - State of Florida
Commission # HH 045091
My Comm. Expires Nov 11, 2024
Bonded through National Notary Assn.

Resolution 2022-01
Orange County Local Mitigation Strategy Resolution

WHEREAS, the City of Edgewood is vulnerable to the human and economic costs of natural, technological and societal disasters;

WHEREAS, the Edgewood City Council recognizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community;

WHEREAS, Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5165, as amended by the Disaster Mitigation Act of 2000 provides for States and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning;

WHEREAS, the Federal Emergency Management Agency has implemented various hazard mitigation planning provisions through regulation at 44.CFR 201.6 requiring local governments to have a FEMA approved Local Mitigation Strategy (LMS) in order to apply for and/or receive project grants;

WHEREAS, 44 CFR 201.6(d)(3) requires local jurisdictions to review and revise their LMS to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding;

WHEREAS, the representatives and staff of the City of Edgewood have identified, justified and prioritized a number of proposed projects and programs needed to mitigate the vulnerabilities to the impacts of future disasters; and

WHEREAS, these proposed projects and programs have been incorporated into the 2009 edition of the Orange County Local Mitigation Strategy that has been prepared and issued for consideration and implementation by the communities of Orange County.

Now therefore, be it resolved on this 18th Day of January, 2022, that,

1. The City of Edgewood hereby accepts and approves its designated portion of the Orange County Local Mitigation Strategy,

2. The staff of City of Edgewood are requested and instructed to pursue available funding opportunities for implementation of the proposals designated therein,

3. The City of Edgewood will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the strategy, and

4. The City of Edgewood will continue to participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead, and

5. The City of Edgewood will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of City of Edgewood to also participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

PASSED AND ADOPTED at a regular meeting of the City Council of the City of Edgewood held Edgewood City Hall 405 Bagshaw Way, Edgewood, FL 32809, on the 18th day of January 22.

Richard A. Horn, Council President

ATTEST:

Bea Meeks, City Clerk

GOAA DATE 2/16/2023
ITEM NO 3.H.
DOCUMENTARY # 101299

RESOLUTION
of the
GREATER ORLANDO AVIATION AUTHORITY
Regarding
LOCAL MITIGATION STRATEGY

WHEREAS, while the areas under the jurisdiction of the Greater Orlando Aviation Authority are owned by the City of Orlando, the Greater Orlando Aviation Authority operates and controls the Orlando International Airport and the Orlando Executive Airport pursuant to that certain Amended and Restated Operation and Use Agreement, dated August 31, 2015, by and between the City of Orlando and the Greater Orlando Aviation Authority; and

WHEREAS, the areas of the Greater Orlando Aviation Authority are vulnerable to the human and economic costs of natural, technological and societal disasters; and

WHEREAS, the Greater Orlando Aviation Authority recognizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community; and

WHEREAS, Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. §5165, as amended by the Disaster Mitigation Act of 2000, provides for States and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning; and

WHEREAS, the Federal Emergency Management Agency has implemented various hazardous mitigation planning provisions through regulation at 44 CFR §201.6 requiring local governments to have a FEMA approved Local Mitigation Strategy ("LMS") in order to apply for and/or receive project grants; and

WHEREAS, 44 CFR §201.6(d)(3) requires local jurisdictions to review and revise their LMS to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding; and

WHEREAS, the representatives and staff of Orange County government and the Greater Orlando Aviation Authority will identify, justify and prioritize a number of proposed projects and programs needed to mitigate the vulnerabilities of areas of the Greater Orlando Aviation Authority to the impacts of future disasters; and

WHEREAS, these proposed projects and programs will be incorporated into the 2021edition of the Orange County Local Mitigation Strategy that has been prepared and issued for consideration and implementation by the communities of Orange County.

NOW THEREFORE, BE IT RESOLVED BY THE GREATER ORLANDO AVIATION AUTHORITY:

Section 1. The Greater Orlando Aviation Authority hereby accepts and approves its designated portion of the Orange County Local Mitigation Strategy.

Section 2. The staff of Orange County and the Greater Orlando Aviation Authority are requested and instructed to pursue available funding opportunities for implementation of the proposals designated therein.

Section 3. The Greater Orlando Aviation Authority will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the strategy.

Section 4. The Greater Orlando Aviation Authority will continue to participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

Section 5. The Greater Orlando Aviation Authority will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of Orange County and the Greater Orlando Aviation Authority to also participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

Section 6. Effective Date. The resolution shall take effect upon the date of its adoption.

ADOPTED THIS 16 **DAY OF** February**, 2022**

GREATER ORLANDO AVIATION AUTHORITY

By: _____
M. Carson Good, Chairman

ATTEST:

By: _____
Anna M. Farmer, Assistant Secretary

RESOLUTION NO. 16-2021

A RESOLUTION OF THE CITY OF MAITLAND, FLORIDA, APPROVING MAITLAND'S PORTION OF THE 2021 ORANGE COUNTY LOCAL MITIGATION PLAN; AND PROVIDING FOR AN EFFECTIVE DATE

WHEREAS, the City of Maitland is vulnerable to the human and economic costs of natural, technological and societal disasters; and

WHEREAS, the Maitland governing body recognizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community; and

WHEREAS, Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5165, as amended by the Disaster Mitigation Act of 2000 provides for States and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning; and

WHEREAS, the Federal Emergency Management Agency has implemented various hazard mitigation planning provisions through regulation at 44.CFR 201.6 requiring local governments to have a FEMA approved Local Mitigation Strategy (LMS) in order to apply for and/or receive project grants; and

WHEREAS, 44 CFR 201.6(d)(3) requires local jurisdictions to review and revise their LMS to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding; and

WHEREAS, the representatives and staff of City of Maitland have identified, justified and prioritized a number of proposed projects and programs needed to mitigate the vulnerabilities to the impacts of future disasters; and

WHEREAS, these proposed projects and programs have been incorporated into the 2009 edition of the Orange County Local Mitigation Strategy that has been prepared and issued for consideration and implementation by the communities of Orange County.

NOW THEREFORE, BE IT RESOLVED, by the **City Council of the City of Maitland, Florida,** that:

SECTION 1. Maitland hereby accepts and approves its designated portion of the Orange County Local Mitigation Strategy.

SECTION 2. The staff of Orange County and Maitlandare requested and instructed to pursue available funding opportunities for implementation of the proposals designated therein.

SECTION 3. Maitland will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the strategy.

SECTION 4. Maitland will continue to participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

SECTION 5. Maitland will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of the City of Maitland to also participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

SECTION 6. Effective Date. The resolution shall take effect upon the date of its adoption.

PASSED AND ADOPTED by the City Council of the City of Maitland, Florida, on the 13th Day of December, 2021.

CITY OF MAITLAND

JOHN P. LOWNDES, MAYOR

ATTEST:

MARIA WALDROP, CITY CLERK

Resolution

Resolution No. 2022-03
Orange County Local Mitigation Strategy Resolution

WHEREAS, the Town of Oakland is vulnerable to the human and economic costs of natural, technological and societal disasters;

WHEREAS, the Town Commission recognizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community;

WHEREAS, Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5165, as amended by the Disaster Mitigation Act of 2000 provides for States and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning;

WHEREAS, the Federal Emergency Management Agency has implemented various hazard mitigation planning provisions through regulation at 44.CFR 201.6 requiring local governments to have a FEMA approved Local Mitigation Strategy (LMS) in order to apply for and/or receive project grants;

WHEREAS, 44 CFR 201.6(d)(3) requires local jurisdictions to review and revise their LMS to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding;

WHEREAS, the representatives and staff of Town of Oakland have identified, justified and prioritized a number of proposed projects and programs needed to mitigate the vulnerabilities to the impacts of future disasters; and

WHEREAS, these proposed projects and programs have been incorporated into the 2009 edition of the Orange County Local Mitigation Strategy that has been prepared and issued for consideration and implementation by the communities of Orange County.

Now therefore, be it resolved on this 22nd Day of March 2022 that,

1. The Town of Oakland hereby accepts and approves its designated portion of the Orange County Local Mitigation Strategy,

2. The staff of the Town of Oakland are requested and instructed to pursue available funding opportunities for implementation of the proposals designated therein,

3. The Town of Oakland will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the strategy, and

4. The Town of Oakland will continue to participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead, and

5. The Town of Oakland will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of the Town to also participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

ADOPTED at a regular meeting of the Town Commission of the Town of Oakland held at the Oakland Meeting Hall on March 22, 2022.

TOWN OF OAKLAND, FLORIDA

Kathy Stark, Mayor

ATTEST:

Elise Hui, Town Clerk

TOWN OF OAKLAND INCORPORATED SEAL 1911 ORANGE COUNTY, FLORIDA

CITY OF ORLANDO

RESOLUTION NO.: 220425E01

WHEREAS, the areas within the City of Orlando are vulnerable to the human and economic costs of natural, technological and societal disasters; and

WHEREAS, the City of Orlando City Council recognizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community; and

WHEREAS, Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5165, as amended by the Disaster Mitigation Act of 2000 provides for States and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning; and

WHEREAS, the Federal Emergency Management Agency has implemented various hazard mitigation planning provisions through regulation at 44.CFR 201.6 requiring local governments to have a FEMA approved Local Mitigation Strategy (LMS) in order to apply for and/or receive project grants; and

WHEREAS, 44 CFR 201.6(d)(3) requires local jurisdictions to review and revise their LMS to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding; and

WHEREAS, the representatives and staff of the City of Orlando have identified, justified and prioritized a number of proposed projects and programs needed to mitigate the vulnerabilities to the impacts of future disasters; and

WHEREAS, these proposed projects and programs have been incorporated into the 2021 edition of the Orange County Local Mitigation Strategy that has been prepared and issued for consideration and implementation by the communities of Orange County.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Orlando, Florida:

Section 1. The City of Orlando hereby accepts and approves its designated portion of the Orange County Local Mitigation Strategy.

Section 2. The staff of the City of Orlando are requested and instructed to pursue available funding opportunities for implementation of the proposals designated therein.

City Council Meeting: 4-25-22
Item: E-1 Documentary: 220425E01

Section 3. The City of Orlando will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the strategy.

Section 4. The City of Orlando will continue to participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

Section 5. The City of Orlando will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of the City of Orlando to also participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

BE IT FURTHER RESOLVED, that this Resolution shall take effect upon its passage.

DONE AND RESOLVED in regular session this 25th day of April 2022.

ATTEST:

Laurie E Nossair

~~Stephanie Herdocia~~, City Clerk
Laurie E. Nossair Deputy

(SEAL)

By: _____
Mayor/Mayor Pro Tem

APPROVED AS TO FORM AND LEGALITY for the use and reliance of the City of Orlando, Florida, only.

Alison C. Brackins
April 25, 2022

Alison C. Brackins
Assistant City Attorney

City Council Meeting: 4-25-22
Item: E-1 Documentary: 220425E01

THE TOWN OF
Windermere

Resolution # 2022-01
Town of Windermere Adopting Orange County's Local Mitigation Strategy Resolution

WHEREAS, the Town of Windermere is vulnerable to the human and economic costs of natural, technological and societal disasters;

WHEREAS, the Town Council of Windermere recognizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community;

WHEREAS, Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5165, as amended by the Disaster Mitigation Act of 2000 provides for States and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning;

WHEREAS, the Federal Emergency Management Agency has implemented various hazard mitigation planning provisions through regulation at 44.CFR 201.6 requiring local governments to have a FEMA approved Local Mitigation Strategy (LMS) in order to apply for and/or receive project grants;

WHEREAS, 44 CFR 201.6(d)(3) requires local jurisdictions to review and revise their LMS to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding;

WHEREAS, the representatives and staff of the Town of Windermere have identified, justified and prioritized a number of proposed projects and programs needed to mitigate the vulnerabilities to the impacts of future disasters; and

WHEREAS, these proposed projects and programs have been incorporated into the 2009 edition of the Orange County Local Mitigation Strategy that has been prepared and issued for consideration and implementation by the communities of Orange County.

Now therefore, be it resolved on this February 8, 2022 that,

1. The Town of Windermere hereby accepts and approves its designated portion of the Orange County Local Mitigation Strategy,

2. The staff of the Town of Windermere are requested and instructed to pursue available funding opportunities for implementation of the proposals designated therein,

3. The Town of Windermere will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the strategy, and

4. The Town of Windermere will continue to participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead, and

5. The Town of Windermere will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of the Town of Windermere to also participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

ADOPTED at a regular meeting of the Town Council of the Town of Windermere held at 520 Main St. Windermere, FL 34786 on the February 8, 2022.

So resolved,

Mayor Jim O'Brien

ATTEST:

Town Clerk Dorothy Burkhalter

RESOLUTION NO. 22-03

A RESOLUTION OF THE CITY COMMISSION OF THE CITY OF WINTER GARDEN, FLORIDA, ADOPTING ORANGE COUNTY LOCAL MITIGATION STRATEGY RESOLUTION.

WHEREAS, the City of Winter Garden are vulnerable to the human and economic costs of natural, technological and societal disasters; and

WHEREAS, the City Commission recognizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community; and

WHEREAS, Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. §5165, as amended by the Disaster Mitigation Act of 2000 provides for States and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning; and

WHEREAS, the Federal Emergency Management Agency has implemented various hazard mitigation planning provisions through regulation at 44.CFR §201.6 requiring local governments to have a FEMA approved Local Mitigation Strategy (LMS) in order to apply for and/or receive project grants; and

WHEREAS, 44 CFR §201.6(d)(3) requires local jurisdictions to review and revise their LMS to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding; and

WHEREAS, the representatives and staff of the City of Winter Garden have identified, justified and prioritized a number of proposed projects and programs needed to mitigate the vulnerabilities of areas of the City of Winter Garden to the impacts of future disasters; and

WHEREAS, these proposed projects and programs have been incorporated into the 2021 edition of the Orange County Local Mitigation Strategy that has been prepared and issued for consideration and implementation by the communities of Orange County.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COMMISSION OF THE CITY OF WINTER GARDEN, FLORIDA:

1. The City of Winter Garden hereby accepts and approves its designated portion of the Orange County Local Mitigation Strategy,

2. The staff of the City of Winter Garden are requested and instructed to pursue available funding opportunities for implementation of the proposals designated therein,

3. The City of Winter Garden will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the strategy, and

4. The City of Winter Garden will continue to participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead, and

5. The City of Winter Garden will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of the City of Winter Garden to also participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

ADOPTED this 24TH day of FEBRUARY, 2022, by the City Commission of the City of Winter Garden, Florida.

CITY COMMISSION OF THE CITY OF WINTER GARDEN, FLORIDA

JOHN REES, Mayor/Commissioner

ATTEST:

ANGELA GRIMMAGE, City Clerk

UNIVERSITY OF CENTRAL FLORIDA

Department of Emergency Management
3504 Perseus Loop
Orlando, FL 32816

November 29, 2021

Lauraleigh Avery
Emergency Manager
Office of Emergency Management
Orange County Fire Rescue Department
P.O. Box 5879
Winter Park, Florida 32793-5879

Chief Avery,

This letter serves to acknowledge adoption of the 2021 Orange County Local Mitigation Strategy by the University of Central Florida (UCF). Adoption of the document is intended to comply with the state and federal hazard mitigation planning standards contained in 44 CFR 201.6(b)-(d) and Fla. Admin. Code r. 27P-22.003. Moreover, UCF recognizes the importance of establishing mitigation projects and initiatives to reduce or eliminate long-term risk to the community.

The University remains an active contributor in the County's Local Mitigation Strategy, and will continue to participate in the county's ongoing mitigation and resiliency efforts.

Sincerely,

Gerald Hector
Senior Vice President, Administration and Finance
University of Central Florida

CC: Joe Thalheimer, Director, UCF Department of Emergency Management
Kristin Lentz, Mitigation Planner, Florida Division of Emergency Management

RESOLUTION

of the

Ranger Drainage District

Regarding

LOCAL MITIGATION STRATEGY

Resolution 2022-1

WHEREAS, the areas of Ranger Drainage District are vulnerable to the human and economic costs of natural, technological and societal disasters; and

WHEREAS, the Ranger Drainage District recognize the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community; and

WHEREAS, Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. §5165, as amended by the Disaster Mitigation Act of 2000, provides for States and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning; and

WHEREAS, the Federal Emergency Management Agency has implemented various hazardous mitigation planning provisions through regulation at 44 CFR §201.6 requiring local governments to have a FEMA approved Local Mitigation Strategy ("LMS") in order to apply for and/or receive project grants; and

WHEREAS, 44 CFR §201.6(d)(3) requires local jurisdictions to review and revise their LMS to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding; and

WHEREAS, the representatives and staff of Ranger Drainage District, Orange County government and the Local Mitigation Strategy Working Group have identified, justified and prioritized a number of proposed projects and programs needed to mitigate the vulnerabilities of areas of Ranger Drainage District to the impacts of future disasters; and

WHEREAS, these proposed projects and programs have been incorporated into the 2021 edition of the Orange County Local Mitigation Strategy that has been prepared and issued for consideration and implementation by the communities of Orange County.

NOW THEREFORE, BE IT RESOLVED BY THE Ranger Drainage District.

Section 1. Ranger Drainage District hereby accepts and approves its designated portion of the Orange County Local Mitigation Strategy.

Section 2. The staff of Orange County and Ranger Drainage District are requested and instructed to pursue available funding opportunities for implementation of the proposals designated therein.

Section 3. Ranger Drainage District will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the strategy.

Section 4. Ranger Drainage District will continue to participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

Section 5. Ranger Drainage District will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of Orange County and Ranger Drainage District to also participate in the updating and expansion of the Orange County Local Mitigation Strategy in the years ahead.

Section 6. Effective Date. The resolution shall take effect upon the date of its adoption.

ADOPTED THIS 12 **DAY OF** January, 2022.

Orange County, FLORIDA
By: Ranger Drainage District

By: Dave Mauck
Dave Mauck, President

ATTEST: Russ Beyersdorf, Russ Beyersdorf
As Secretary of the Ranger Drainage District

By: _____
Secretary

Annex 4 – Orange County LMS Project Priority List

The following page is the Orange County Local Mitigation Strategy (LMS) Project Priority List. This list includes the strategic projects identified by the LMS Working Group to guide and direct the more specific mitigation and active initiatives that are found in Annex 5.

The strategic projects found here in Annex 4 are more stable with less frequent changes than the active initiatives in Annex 5. The strategic projects and sub-projects are evaluated every five (5) years to coincide with the plan update that is submitted to the Florida Division of Emergency Management (FDEM) Bureau of Mitigation for approval.

Annex 5 – Orange County LMS Active Initiatives List

The following pages are the Orange County Local Mitigation Strategy (LMS) Active Initiatives List. This list includes the most current action items that were submitted to the LMS Planning Committee for review and ranking. In order to be favorably considered for inclusion to the list, the initiative should score at least twenty (20) points out of a forty one (41) total. All of the qualifying initiatives are then presented to the full Working Group for a motion to include them on the list.

The action items found here in Annex 5 change frequently. The mitigation initiatives are linked to the strategic projects and sub-projects found in Annex 4. Annex 5 is updated usually on a quarterly basis, or at the most recent Orange County LMS Working Group meeting when new projects are added or older projects are revised.