

WILLIAMSON COUNTY HAZARD MITIGATION ACTION PLAN UPDATE

2025 UPDATE

Mitigating Risk for a Safe, Secure, Sustainable Future



ACKNOWLEDGEMENT PAGE

HAZARD MITIGATION ACTION PLAN UPDATE

2025 DRAFT

Mitigating Risk for a Safe, Secure, Sustainable Future

We at H2O Partners are honored to have had the opportunity to develop the Plan Update for Williamson County and participating jurisdictions. We extend our sincere thanks to the county's leadership and community members for their invaluable insights, collaboration, and support throughout this process. It has been a privilege to work alongside such a dedicated team and to contribute to a vision that reflects the aspirations and needs of Williamson County. Our work is a testament to the collective effort and commitment of all those involved, and we are proud to have played a role in shaping the future of this vibrant community.



For more information, visit our website at:

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SECTION 1 – INTRODUCTION

Background.....	1
Scope	2
Purpose	2
Authority.....	3
Summary of Sections.....	3

SECTION 2 – PLANNING PROCESS

Plan Preparation and Development.....	1
Review and Incorporation of Existing Plans	9
Timeline for Implementing Mitigation Actions	12
Public and Stakeholder Involvement	13

SECTION 3 – COUNTY PROFILE

Overview.....	1
Population and Demographics	3
Population Growth	5
Economic Impact	6
Natural, Cultural, and Historic Resources.....	7
Existing Land Use and Development Trends	9
Changes in Vulnerability	10
Future Growth and Development	11

SECTION 4 – RISK OVERVIEW

Hazard Description	1
Disaster Declaration History	4
Natural Hazards and Climate Change	6
Overview of Hazard Analysis	8
Hazard Ranking	9

SECTION 5 – DAM FAILURE

Hazard Description	1
Location	3
Extent	5
Historical Occurrences	23

Probability of Future Events	24
Vulnerability and Impact	24
Climate Change Considerations	27

SECTION 6 – DROUGHT

Hazard Description	1
Location	1
Extent	4
Historical Occurrences	5
Probability of Future Events	7
Vulnerability and Impact	7
Climate Change Considerations	11

SECTION 7 – EARTHQUAKE

Hazard Description	1
Location	2
Extent	4
Historical Occurrences	7
Probability of Future Events	7
Vulnerability and Impact	7
Climate Change Considerations	8

SECTION 8 – EXPANSIVE SOILS

Hazard Description	1
Location	1
Extent	4
Historical Occurrences	5
Probability of Future Events	5
Vulnerability and Impact	5
Climate Change Considerations	9

SECTION 9 – EXTREME HEAT

Hazard Description	1
Location	1
Extent	1

Historical Occurrences	4
Probability of Future Events	6
Vulnerability and Impact	6
Climate Change Considerations	9

SECTION 10 – FLOOD

Hazard Description	1
Location	1
Extent	12
Historical Occurrences	14
Probability of Future Events	17
Vulnerability and Impact	17
Climate Change Considerations	23
National Flood Insurance Program (NFIP) Participation	23
NFIP Compliance and Maintenance	25
Repetitive Loss	25

SECTION 11 – HAIL

Hazard Description	1
Location	1
Extent	2
Historical Occurrences	3
Probability of Future Events	6
Vulnerability and Impact	6
Climate Change Considerations	10

SECTION 12 – HURRICANE / TROPICAL STORM

Hazard Description	1
Location	1
Extent	2
Historical Occurrences	2
Probability of Future Events	4
Vulnerability and Impact	4
Climate Change Considerations	8

SECTION 13 – LIGHTNING

Hazard Description	1
Location	1
Extent	1
Historical Occurrences	2
Probability of Future Events	4
Vulnerability and Impact	4
Climate Change Considerations	8

SECTION 14 – THUNDERSTORM WIND

Hazard Description	1
Location	1
Extent	2
Historical Occurrences	3
Probability of Future Events	9
Vulnerability and Impact	9
Climate Change Considerations	14

SECTION 15 – TORNADO

Hazard Description	1
Location	1
Extent	2
Historical Occurrences	4
Probability of Future Events	8
Vulnerability and Impact	8
Climate Change Considerations	14

SECTION 16 – WILDFIRE

Hazard Description	1
Location	2
Extent	8
Historical Occurrences	17
Probability of Future Events	21
Vulnerability and Impact	21

Climate Change Considerations	33

SECTION 17 – WINTER STORM

Hazard Description	1
Location	3
Extent	3
Historical Occurrences	5
Probability of Future Events	8
Vulnerability and Impact	9
Climate Change Considerations	13

SECTION 18 – HAZARDOUS MATERIALS

Hazard Description	1
Location	2
Extent	5
Historical Occurrences	6
Probability of Future Events	6
Vulnerability and Impact	6
Climate Change Considerations	9

SECTION 19 – TRAIN DERAILMENT

Hazard Description	1
Location	1
Extent	3
Historical Occurrences	4
Probability of Future Events	6
Vulnerability and Impact	6
Climate Change Considerations	8

SECTION 20 – MITIGATION STRATEGY

Mitigation Goals	1
Goal 1	1
Goal 2	1
Goal 3	2
Goal 4	2

Goal 5	2
Goal 6	2
Goal 7	3

SECTION 21 – PREVIOUS ACTIONS

Summary	1
Williamson County	2
City of Hutto	17

SECTION 22 – MITIGATION ACTIONS

Summary	1
Williamson County	3
City of Hutto	48
Georgetown ISD	61
Hutto ISD	68
Liberty Hill ISD	71
Meridian World School	75

SECTION 23 – PLAN MAINTENANCE

Plan Maintenance Procedures	1
Incorporation	1
Monitoring and Evaluation	5
Updating	6
Continued Public Involvement	7

APPENDIX A – PLANNING TEAM

APPENDIX B – PUBLIC SURVEY RESULTS

APPENDIX C – CRITICAL FACILITIES

APPENDIX D – DAM LOCATIONS

APPENDIX E – MEETING DOCUMENTATION

APPENDIX F – CAPABILITY ASSESSMENT

APPENDIX G – STATE AND FEDERAL FUNDING OPPORTUNITIES

ADOPTION – RESOLUTIONS



SECTION 1 INTRODUCTION

SECTION 1: INTRODUCTION

Background.....	1
Scope.....	2
Purpose.....	2
Authority.....	3
Summary of Sections.....	3

BACKGROUND

Williamson County is located in Central Texas. The county seat, Georgetown, is 25 miles north of Austin. Bell County is adjacent to the north, Travis County to the south, Milam County to the east, Burnet County to the west, Lee and Bastrop Counties to the southeast.

Texas is prone to extremely heavy rains and flooding with half of the world record rainfall rates (48 hours or less).¹ While flooding is a well-known risk, Williamson County is susceptible to a wide range of natural hazards, including but not limited to tornadoes, extreme heat, wildfire, and drought. These life-threatening hazards can destroy property, disrupt the economy, and lower the overall quality of life for individuals.

While it is impossible to prevent an event from occurring, the impacts from many hazards on people and property can be lessened through mitigation. The Federal Emergency Management Agency (FEMA) defines mitigation as *sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects*.² Communities participate in hazard mitigation by developing hazard mitigation plans. The Texas Division of Emergency Management (TDEM) is required to review the plan and FEMA has the authority to review and approve hazard mitigation plans through the Disaster Mitigation Act of 2000.

The Disaster Mitigation Act requires that hazard mitigation plans be reviewed and revised every five years to maintain eligibility for Hazard Mitigation Assistance (HMA) grant funding. In January of 2017, Williamson County developed their Hazard Mitigation Plan to be specific to the County and the participating jurisdictions of City of Cedar Park, City of Florence, and City of Hutto. FEMA approved the Williamson County HMAP in 2017, which expired in 2022. Therefore, the County began the process of developing a Hazard Mitigation Plan Update in order to regain eligibility for grant funding. The HMAP Update planning process provided an opportunity for Williamson County to evaluate successful mitigation actions and explore opportunities to avoid future disaster loss.

Williamson County selected H2O Partners, Inc. to write and develop the 2025 HMAP Update, hereinafter titled: “Williamson County Hazard Mitigation Action Plan Update 2025: Maintaining a Safe, Secure, and Sustainable Community” (Plan or Plan Update). This is a multi-jurisdictional plan; the participating jurisdictions include:

o Williamson County	o Liberty Hill ISD**
o City of Hutto	o Meridian World School**
o Georgetown ISD**	
o Hutto ISD**	

**denotes new Plan participant

¹ Source: <http://www.floodsafety.com/texas/regional-info/san-antonio-flooding/>

² Source: <http://www.fema.gov/hazard-mitigation-planning-resources>

SECTION 1: INTRODUCTION

The City of Cedar Park and City of Florence were given the opportunity to participate in the Williamson County HMAP Update and chose to opt out. The County took additional steps to enhance community resilience and stakeholder engagement, as outlined in Section 2.

Hazard mitigation activities are an investment in a community's safety and sustainability. It is widely accepted that the most effective hazard mitigation measures are implemented at the local government level, where decisions on the regulation and control of development are ultimately made. A comprehensive review of a hazard mitigation plan addresses vulnerabilities to hazards that exist today and in the foreseeable future. Therefore, it is essential that a plan identify projected patterns of how future development will increase or decrease a community's overall hazard vulnerability.

SCOPE

The focus of the Plan Update is to identify activities to mitigate hazards classified as "high" or "moderate" risk, as determined through a detailed hazard risk assessment conducted for Williamson County and the participating jurisdictions. The hazard classification enables the participating jurisdictions to prioritize mitigation actions based on hazards which can present the greatest risk to lives and property in the geographic scope.

PURPOSE

The Plan Update was prepared by Williamson County, participating jurisdictions, and H2O Partners, Inc. The purpose of the Plan Update is to protect people and structures and to minimize the costs of disaster response and recovery. The goal of the Plan Update is to minimize or eliminate long-term risks to human life, property, operations, and the environment from known hazards by identifying risks and implementing cost-effective hazard mitigation actions. The planning process is an opportunity for participating jurisdictions within Williamson County, stakeholders, and the general public to evaluate and develop successful hazard mitigation actions to reduce future risk of loss of life and damage to property resulting from a disaster in Williamson County.

The Mission Statement of the Plan Update is, *"Maintaining a secure and sustainable future through the revision and development of targeted hazard mitigation actions to protect life and property."*

Participating jurisdictions within Williamson County, and planning participants identified thirteen natural hazards and two human-caused hazards to be addressed by the Plan Update. The specific goals of the Plan Update are to:

- o Provide a comprehensive update to the 2017 HMAP;
- o Minimize disruption to participating jurisdictions within Williamson County following a disaster;
- o Streamline disaster recovery by articulating actions to be taken before a disaster strikes to reduce or eliminate future damage;
- o Demonstrate a firm local commitment to hazard mitigation principles;
- o Serve as a basis for future funding that may become available through grants and technical assistance programs offered by the State or Federal government. The Plan

SECTION 1: INTRODUCTION

- will enable participating jurisdictions within Williamson County to take advantage of rapidly developing mitigation grant opportunities as they arise; and
- o Ensure that participating jurisdictions within Williamson County maintain eligibility for the full range of future Federal disaster relief.

AUTHORITY



The Plan is tailored specifically for participating jurisdictions within Williamson County and plan participants including Planning Team members, stakeholders, and the general public who participated in the Plan Update development process. The Plan complies with all requirements promulgated by the Texas Division of Emergency Management (TDEM) and all applicable provisions of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Section 104 of the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390), and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108-264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al). Additionally, the Plan complies with the Interim Final Rules for the Hazard Mitigation Planning and Hazard Mitigation Grant Program (44 CFR, Part 201), which specify the criteria for approval of mitigation plans required in Section 322 of the DMA 2000 and standards found in FEMA's "Local Mitigation Planning Policy Guide" (April 2023), and the "Local Mitigation Planning Handbook" (May 2023).

SUMMARY OF SECTIONS

Sections 1 and 2 of the Plan Update outline the Plan's purpose and development, including how Planning Team members, stakeholders, and members of the general public were involved in the planning process. Section 3 profiles Williamson County's population and economy.

Sections 4 through 19 present a hazard overview and information on individual natural and human-caused hazards in the planning area. For each hazard, the Plan Update presents a description of the hazard, a list of historical hazard events, and the results of the vulnerability and risk assessment process.

Section 20 presents hazard mitigation goals and objectives. Section 21 gives an analysis for the previous actions and Section 22 presents hazard mitigation actions for Williamson County and the participating jurisdictions. Section 23 identifies Plan maintenance mechanisms.

The list of planning team members and stakeholders is located in Appendix A. Public survey results are analyzed and presented in Appendix B. Appendix C contains a detailed list of critical facilities for the area. Appendix D contains information regarding Dam locations within Williamson County. Appendix E contains information regarding workshops and meeting documentation. Capability Assessment results for participating jurisdictions within Williamson County are in Appendix F. Appendix G includes State and Federal Funding Opportunities.³

³ Information contained in some of these appendices are exempt from public release under the Freedom of Information Act (FOIA).



SECTION 2

PLANNING PROCESS

SECTION 2: PLANNING PROCESS

Plan Preparation and Development	1
Overview of the Plan	1
Planning Team	2
Planning Process	6
Kickoff Workshop	7
Hazard Identification.....	7
Risk Assessment	7
Mitigation Review and Development	8
Review and Incorporation of Existing Plans.....	9
Review.....	9
Incorporation of Existing Plans into the HMAP Process.....	9
Incorporation of the HMAP into Other Planning Mechanisms	10
Plan Review and Plan Update.....	12
Timeline for Implementing Mitigation Actions	12
Public and Stakeholder Involvement.....	13
Underserved Communities / Vulnerable Populations	14
Stakeholder Involvement.....	14
Public Meetings	21
Public Participation Survey	21

PLAN PREPARATION AND DEVELOPMENT

Hazard mitigation planning involves coordination with various constituents and stakeholders to develop a more disaster-resistant community. Section 2 provides an overview of the planning process including the identification of key steps and a detailed description of how stakeholders and the public were involved.

OVERVIEW OF THE PLAN

Williamson County hired H2O Partners, Inc. (Consultant Team), to provide technical support and oversee the development of the Williamson County Hazard Mitigation Action Plan Update 2025. The Consultant Team used the FEMA “Local Mitigation Planning Policy Guide” (April 2023), and the “Local Mitigation Planning Handbook” (May 2023) to develop the Plan Update. The overall planning process is shown in Figure 2-1 below.

SECTION 2: PLANNING PROCESS

Figure 2-1. Mitigation Planning Process



Williamson County, the participating jurisdictions, and the Consultant Team met in March 2024 to begin organizing resources, identify Planning Team members, and conduct a Capability Assessment.

PLANNING TEAM

Key members of H2O Partners, Inc. developed the Plan Update in conjunction with the Planning Team. The Planning Team was established using a direct representation model. Some of the responsibilities of the Planning Team included: completing Capability Assessment surveys, providing input regarding the identification of hazards, identifying mitigation goals, and developing mitigation strategies. An Executive Planning Team consisting of key personnel involved in hazard mitigation activities from each of the participating jurisdictions within Williamson County, shown in Table 2-1, was formed to coordinate planning efforts and request input and participation in the planning process.

Table 2-2 reflects the Advisory Planning Team, consisting of additional representatives from area organizations and departments from the participating jurisdictions within Williamson County that participated throughout the planning process. All Executive and Advisory Planning Team members are involved in hazard mitigation activities; those with the authority to regulate development are identified with an asterisk next to their title.

Table 2-1. Executive Planning Team

ORGANIZATION / DEPARTMENT	TITLE
Williamson County – Emergency Management	Director
Williamson County – Emergency Services	Project Manager II
City of Hutto – Emergency Management	Deputy Director
Georgetown ISD - Health and Safety Services	Director
Hutto ISD – Safety and Emergency Management	Emergency Operations & Campus Safety Coordinator
Liberty Hill ISD – Administration	Chief of Schools
Meridian World School	Chief Operations Officer

SECTION 2: PLANNING PROCESS

Table 2-2. Advisory Planning Team

ORGANIZATION / DEPARTMENT	TITLE
Williamson County – Conservation Foundation	Environmental Program Director
Williamson County – Conservation Foundation	Office Administrator
Williamson County – Emergency Management	Deputy Director
Williamson County – Emergency Management	Emergency Management Specialist
Williamson County – Emergency Management	Emergency Management Specialist ¹
Williamson County – Emergency Services	Senior Director
Williamson County – Development Services and Drainage	Floodplain Manager*
Williamson County – Fire	Assistant Fire Marshal
Williamson County – Fire	Fire Marshal
Williamson County – Geographic Information Systems	GIS Analyst
Williamson County – Geographic Information Systems	GIS Manager
Williamson County – Geographic Information Systems	Public Safety GIS Analyst
Williamson County – Government	County Judge*
Williamson County – Government	Precinct 1 Commissioner*
Williamson County – Government	Precinct 4 Commissioner*
Williamson County – Housing and Urban Development	Community Development Administrator*
Williamson County – Infrastructure	County Engineer / Development & Drainage Division Director*
Williamson County – Infrastructure	Senior Director of Infrastructure*
Williamson County – Infrastructure	Deputy Director of Infrastructure / Director of Road and Bridge*
Williamson County – Public Affairs	Communications and Media Relations Director
Williamson County – Public Affairs	Communications Specialist

¹ Please note county representatives have the same title, and this is not a duplicate entry

SECTION 2: PLANNING PROCESS

ORGANIZATION / DEPARTMENT	TITLE
Williamson County – Sherrif’s Office	County Sheriff
Williamson County – Sherrif’s Office	Lieutenant
City of Hutto - Administration	City Manager*
City of Hutto - Administration	Mayor*
City of Hutto – Emergency Management	Director
City of Hutto – Development Services	Code Compliance *
City of Hutto – Development Services	Planning Representative
City of Hutto – Parks & Recreation	Director
City of Hutto – Police	Chief
City of Hutto – Public Works	Director
Georgetown ISD – Campus and Learner Support	Assistant Superintendent
Georgetown ISD – Special and Federal Programs	Executive Director
Georgetown ISD – Support Services	Executive Director
Georgetown ISD – Support Services	Director of Maintenance
Hutto ISD – Administration	Superintendent
Hutto ISD – Maintenance and Operations	Operations Manager
Liberty Hill ISD – Administration	Superintendent
Liberty Hill ISD – Administration	Construction Director
Liberty Hill ISD – Administration	Safety and Security Coordinator
Liberty Hill ISD – Human Resources	Director
Liberty Hill ISD – Police	Chief
Liberty Hill ISD – Student Support Services	Executive Director
Meridian World School	CEO / Founder
Meridian World School	Director of Community Engagement

Additionally, a Stakeholder Group was invited via e-mail to participate in the planning process by attending meetings, commenting on draft versions of the Plan, and/or by providing data to inform the planning process. The Consultant Team, Planning Teams, and Stakeholder Group coordinated to identify mitigation goals, and develop mitigation strategies and actions for the Plan.

SECTION 2: PLANNING PROCESS

Appendix A provides a complete listing of all participating Planning Team members and stakeholders from participating jurisdictions within Williamson County by organization, title, and stakeholder type. Stakeholder involvement is discussed further below.

Based on results of completed Capability Assessment, participating jurisdictions within Williamson County described methods for achieving future hazard mitigation measures by expanding existing capabilities. For example, each jurisdiction has an opportunity to identify opportunities for cross-training or increasing the technical expertise of staff by attending free training available through FEMA and the Texas Division of Emergency Management (TDEM) by monitoring classes and availability through preparingtexas.org. In addition, each jurisdiction can identify Planning Team members with the authority to monitor the Plan and identify grant funding opportunities for expanding staff. Other options for improving capabilities for each jurisdiction include the following:

Table 2-3 Opportunities for Improving and Expanding Existing Capabilities by Jurisdiction

JURISDICTION	OPPORTUNITIES
Williamson County	- o Integrate risk information from HMAP into future updates to Capital Improvement Plan. - o Develop a Comprehensive Plan based on information in the risk assessment and identified mitigation projects within the HMAP. - o Integrate risk information from HMAP into future updates to Community Wildfire Protection Plan. - o Review current floodplain ordinances for opportunities to increase resiliency such as modifying permitting or building codes. - o Support current land use ordinances that will require all new developments to conform to the highest mitigation standards. - o Support building ordinances that will require all new developments to conform to the highest mitigation standards.
City of Hutto	- o Integrate risk information from HMAP into future updates to Capital Improvement Plan. - o Integrate risk information from HMAP into future updates to Comprehensive Plan. - o Develop a Community Wildfire Protection Plan based on information in the risk assessment and identified mitigation projects within the HMAP. - o Review current floodplain ordinances for opportunities to increase resiliency such as modifying permitting or building codes. - o Review current land use and building ordinances that will require all new developments to confirm to the highest mitigation standards.
Georgetown ISD	- o Integrate risk information from HMAP into future updates to Capital Improvement Plan. - o Integrate risk information from HMAP into future updates to Community Wildfire Protection Plan. - o Develop an all-hazards outreach program in coordination with Williamson County, City of Hutto, and all independent school districts and schools within the County.

SECTION 2: PLANNING PROCESS

JURISDICTION	OPPORTUNITIES
Hutto ISD	- o Integrate risk information from HMAP into future updates to Capital Improvement Plan. - o Develop an all-hazards outreach program in coordination with Williamson County, City of Hutto, and all independent school districts and schools within the County.
Liberty Hill ISD	- o Develop a Capital Improvement Plan based on information in the risk assessment and identified mitigation projects within the HMAP. - o Develop an all-hazards outreach program in coordination with Williamson County, City of Hutto, and all independent school districts and schools within the County.
Meridian World School	- o Integrate risk information from HMAP into future updates to Capital Improvement Plan. - o Review current building ordinances that will require all new buildings to confirm to the highest mitigation standards. - o Develop an all-hazards outreach program in coordination with Williamson County, City of Hutto, and all independent school districts and schools within the County.

Sample hazard mitigation actions developed with similar hazard risk were shared at the meetings. These important discussions resulted in the development of multiple mitigation actions that are included in the Plan Update to further mitigate risk from natural hazards in the future.

The Planning Team developed hazard mitigation actions for mitigating risk from all of the hazards including potential flood, hurricane / tropical storm, and wildfire events. These actions include but are not limited to the county and participating jurisdictions purchasing and installing generators at all critical facilities in order to prevent malfunctions during hazard events, as well as implementing a routine tree trimming program county-wide. In addition, the county and participating jurisdictions will identify repetitive loss properties and will implement actions to reduce or eliminate flooding at the identified properties.

PLANNING PROCESS

The process used to prepare the Plan Update followed the four major steps included at Figure 2-1. After the Planning Team was organized, a capability assessment was developed and distributed at the Kick-Off Workshop. Hazards were identified and assessed, and results associated with each of the hazards were provided at the Risk Assessment Workshop. Based on Williamson County's identified vulnerabilities, specific mitigation strategies were discussed and developed at the Mitigation Strategy Workshop. Finally, Plan maintenance and implementation procedures were developed and are included in Section 23. Participation of Planning Team members, stakeholders, and the public at each of the workshops is documented in Appendix E. Throughout the planning process, the Consultant Team followed up directly with all participating jurisdictions to review information discussed and to gather documents that were collected during the workshops.

At the Plan development workshops held throughout the planning process described herein, the following factors were taken into consideration:

- o The nature and magnitude of risks currently affecting the community;

SECTION 2: PLANNING PROCESS

- o Hazard mitigation goals to address current and expected conditions;
- o Whether current resources will be sufficient for implementing the Plan Update;
- o Implementation problems, such as technical, political, legal, and coordination issues that may hinder development;
- o Anticipated outcomes; and
- o How participating jurisdictions within Williamson County, agencies, and partners will participate in implementing the Plan Update.

KICKOFF WORKSHOP

The Kickoff Workshop was held on April 22, 2024, at the Williamson County Emergency Medical Services (EMS) Administration and Training Facility in the City of Georgetown. The initial workshop informed participating officials and key department personnel about how the planning process pertained to their distinct roles and responsibilities and engaged stakeholder groups that focus on vulnerable populations and underserved communities including, but not limited to public libraries, economic development agencies, local colleges, and surrounding communities. In addition to the kickoff presentation, participants received the following information:

- o Project overview regarding the planning process;
- o Public survey access information;
- o Hazard Ranking form; and
- o Capability Assessment survey for completion.

A risk ranking exercise was conducted at the Kickoff Workshop to get input from the Planning Team and stakeholders pertaining to various risks from a list of natural hazards affecting the planning area. Each participant at the Kickoff Workshop was provided a risk ranking sheet that asked participants to rank hazards in terms of the probability or frequency of occurrence, extent of spatial impact, and the magnitude of impact. The results of the ranking sheets identified unique perspectives on varied risks throughout the planning area. The assessments were also used to set priorities for hazard mitigation actions based on potential loss of lives and dollar losses.

HAZARD IDENTIFICATION

At the Kickoff Workshop, and through e-mail and phone correspondence, the Planning Team conducted preliminary hazard identification. The Planning Team in coordination with the Consultant Team reviewed and considered a full range of natural hazards. Once identified, the teams narrowed the list to significant hazards by reviewing hazards affecting the area, the 2023 State of Texas Hazard Mitigation Plan, and initial study results from reputable sources such as federal and state agencies. Based on this initial analysis, the teams identified a total of thirteen natural hazards and two human-caused hazards which pose a significant threat to the planning area.

RISK ASSESSMENT

An initial risk assessment for participating jurisdictions within Williamson County was completed in June 2024 and results were presented to Planning Team members at the Risk Assessment Workshop held on July 9, 2024, in conjunction with the Mitigation Strategy Workshop at the Williamson County Georgetown Annex in the City of Georgetown. At the workshop, the characteristics and consequences of each hazard were evaluated to determine the extent to which the planning area would be affected in terms of potential danger to property and citizens.

SECTION 2: PLANNING PROCESS

Property and crop damages were estimated by gathering data from the National Centers for Environmental Information (NCEI) and National Oceanic and Atmospheric Administration (NOAA). The assessment also examined the impact of various hazards on the built environment, including general building stock, critical facilities, lifelines, and infrastructure. The resulting risk assessment profiled hazard events provided information on previous occurrences, estimated probability of future events, and detailed the spatial extent and magnitude of impact on people and property. Following the risk assessment workshop past event data from NCEI is provided to the planning team for their review and assistance in identifying significant events. A hazard profile and vulnerability analysis for each of the hazards can be found in Sections 4 through 19.

MITIGATION REVIEW AND DEVELOPMENT

Developing the Mitigation Strategy for the Plan involved identifying mitigation goals and new mitigation actions. A Mitigation Workshop was held on July 9, 2024, in conjunction with the Risk Assessment Workshop at the Williamson County Georgetown Annex in the City of Georgetown. In addition to the Planning Team, stakeholder groups were invited to attend the workshop. Regarding hazard mitigation actions, workshop participants emphasized the desire for extreme heat and wildfire projects. Additionally, the participating jurisdictions were proactive in identifying mitigation actions to lessen the risk of all the identified hazards included in the Plan Update.

An inclusive and structured process was used to develop and prioritize new hazard mitigation actions for the Plan Update. The prioritization method was based on FEMA's STAPLE+E criteria and included social, technical, administrative, political, legal, economic, and environmental considerations. As a result, each Planning Team Member assigned an overall priority to each hazard mitigation action. The overall priority of each action is reflected in the hazard mitigation actions found in Section 22.

Planning Team Members then developed action plans identifying proposed actions, costs and benefits, the responsible organization(s), effects on new and existing buildings, implementation schedules, priorities, and potential funding sources.

Specifically, the process involved:

- Listing optional hazard mitigation actions based on information collected from previous plan reviews, studies, and interviews with federal, state, and local officials. Workshop participants reviewed the optional mitigation actions and selected actions that were most applicable to their area of responsibility, cost-effective in reducing risk, easily implemented, and likely to receive institutional and community support.
- Workshop participants inventoried federal and state funding sources that could assist in implementing the proposed hazard mitigation actions. Information was collected, including the program name, authority, purpose of the program, types of assistance and eligible projects, conditions on funding, types of hazards covered, matching requirements, application deadlines, and a point of contact.
- Planning Team Members considered the benefits that would result from implementing the hazard mitigation actions compared to the cost of those projects. Although detailed cost-benefit analyses were beyond the scope of the Plan Update, Planning Team Members utilized economic evaluation as a determining factor between hazard mitigation actions.
- Planning Team Members then selected and prioritized mitigation actions.

SECTION 2: PLANNING PROCESS

Hazard mitigation actions identified in the process were made available to the Planning Team for review. The draft Plan Update was maintained on file by Williamson County and participating jurisdictions and was made available to the general public for review.

REVIEW AND INCORPORATION OF EXISTING PLANS

REVIEW

Background information utilized during the planning process included various studies, plans, reports, and technical information from sources such as FEMA, the United States Army Corps of Engineers (USACE), the U.S. Fire Administration, National Oceanic and Atmospheric Administration (NOAA), the Texas Water Development Board (TWDB), the Texas Commission on Environmental Quality (TCEQ), the Texas State Data Center, Texas Forest Service, the Texas Division of Emergency Management (TDEM), and local hazard assessments and plans. Section 4 and the hazard-specific sections of the Plan (Sections 5-19) summarize the relevant background information.

Specific background documents, including those from FEMA, provided information on hazard risk, hazard mitigation actions currently being implemented, and potential mitigation actions. Previous hazard events, occurrences, and descriptions were identified through NOAA's National Centers for Environmental Information (NCEI). Results of past hazard events were found through searching the NCEI. The USACE studies were reviewed for their assessment of risk and potential projects in the region. Information from the State Demographer was reviewed for population and other projections and included in Section 3 of the Plan. Data from the Texas Forest Service was used to appropriately rank the wildfire hazard, and to help identify potential grant opportunities. Materials from FEMA and TDEM were reviewed for guidance on Plan Update development requirements.

INCORPORATION OF EXISTING PLANS INTO THE HMAP PROCESS

A Capability Assessment was completed by key departments from the participating jurisdictions within Williamson County which provided information pertaining to existing plans, policies, ordinances, and regulations to be integrated into the goals and objectives of the Plan Update. The relevant information was included in a master Capability Assessment, Appendix F.

Existing projects and studies were utilized as a starting point for discussing hazard mitigation actions among Planning and Consultant Team members. For example, Williamson County completed a mitigation project from the previous Plan by purchasing and dispersing radios to residents to use for hazard events. Williamson County also completed the Atlas 14 study to gain further insight in identifying repetitive flood loss properties and structures. The City of Hutto established an Agricultural Zoning District Ordinance to preserve open space of land in high-hazard areas. For a comprehensive list of actions from the previous 2017 Williamson County HMAP, please refer to Section 21.

Additionally, policies and ordinances were reviewed by several of the participating jurisdictions. These jurisdictions have included actions to develop and adopt higher building code standards. Other plans were reviewed, such as Capital Improvement Plans and Emergency Operations Plans, to identify any additional mitigation actions. Finally, the 2023 State of Texas Hazard Mitigation Plan, developed by TDEM, was discussed in the initial planning meeting in order to develop a specific group of hazards to address in the planning effort. The 2023 State Plan was

SECTION 2: PLANNING PROCESS

also used as a guidance document, along with FEMA materials, in the development of the Williamson County Hazard Mitigation Action Plan Update 2025.

INCORPORATION OF THE HMAP INTO OTHER PLANNING MECHANISMS

Planning Team members will integrate implementation of the Plan Update with other planning mechanisms for Williamson County, such as the Emergency Operations Plan. Existing plans for participating jurisdictions will be reviewed and incorporated into the Plan Update, as appropriate. This section discusses how the Plan will be implemented by the participating jurisdictions within Williamson County. It also addresses how the Plan will be evaluated and improved over time, and how the public will continue to be involved in the hazard mitigation planning process.

Participating jurisdictions within Williamson County will be responsible for implementing hazard mitigation actions contained in Section 22. Each hazard mitigation action has been assigned to a specific County, City, ISD, or school department that is responsible for tracking and implementing the action.

A funding source has been listed for each identified hazard mitigation action and may be utilized to implement the action. An implementation time period has also been assigned to each hazard mitigation action as an incentive and to determine whether actions are implemented on a timely basis.

Participating jurisdictions within Williamson County will integrate hazard mitigation actions contained in the Plan Update with existing planning mechanisms such as ordinances, Emergency Operations or Management Plans, and other local and area planning efforts. Williamson County will work closely with area organizations to coordinate implementation of hazard mitigation actions that benefit the planning area in terms of financial and economic impact.

Upon formal adoption of the Plan Update, Planning Team members from the participating jurisdictions will review existing plans along with building codes to guide development and ensure that hazard mitigation actions are implemented. Each of the jurisdictions will be responsible for coordinating periodic review of the Plan Update with members of the Advisory Planning Team to ensure integration of hazard mitigation strategies into these planning mechanisms and codes. The Planning Team will also conduct periodic reviews of various existing planning mechanisms and analyze the need for any revisions or updates in light of the approved Plan Update. Participating jurisdictions within Williamson County will ensure that future long-term planning objectives will contribute to the goals of the Plan to reduce the long-term risk to life and property from moderate and high-risk hazards. Within one year of formal adoption of the Plan, existing planning mechanisms will be reviewed and analyzed as they pertain to the Plan Update.

Planning Team members will review and revise, as necessary, the long-range goals and objectives in its strategic plan and budgets to ensure that they are consistent with the Plan Update.

Furthermore, Williamson County will work with neighboring jurisdictions to advance the goals of the Plan Update as it applies to ongoing, long-range planning goals and actions for mitigating risk to natural hazards throughout the planning area.

Table 2-4 identifies types of planning mechanisms and examples of methods for incorporating the Plan into other planning efforts.

SECTION 2: PLANNING PROCESS

Table 2-4. Examples of Methods of Incorporation

Planning Mechanism	Incorporation of Plan
Annual Budget Review	Various departments and key personnel that participated in the planning process for participating jurisdictions within Williamson County will review the Plan and mitigation actions therein when conducting their annual budget review. Allowances will be made in accordance with grant applications sought, and mitigation actions that will be undertaken, according to the implementation schedule of the specific action.
Capital Improvement Plans	Several participating jurisdictions within Williamson County have a Capital Improvement Plan (CIP) in place or under development. Prior to any revisions to the CIP, County, City, ISD, and school departments will review the risk assessment and mitigation strategy sections of the HMAP, as limiting public spending in hazardous zones is one of the most effective long-term mitigation actions available to local governments.
Community Wildfire Protection Plan	Currently, two participating jurisdictions within Williamson County have a Community Wildfire Protection Plan (CWPP). CWPPs include preventative and corrective actions to address a community's risk of damage from wildfire. Information found in Section 16 of this Plan Update discussing the people and property at risk to wildfire will be reviewed and revised when Williamson County and Georgetown ISD update their CWPP or develop new plans.
Comprehensive Plans	One participating jurisdiction within Williamson County, the City of Hutto, has a Comprehensive Land Use Plan in place. Since comprehensive plans involve developing a unified vision for a community, the mitigation vision and goals of the Plan will be reviewed in the development or revision of a Comprehensive Plan.
Floodplain Management Plans	Floodplain Management Plans include preventative and corrective actions to address the flood hazard. Therefore, the actions for flooding and information found in Section 10 of this Plan Update discussing the people and property at risk to flood will be reviewed and revised when Williamson County and the City of Hutto update their management plans or develops new plans.

SECTION 2: PLANNING PROCESS

Planning Mechanism	Incorporation of Plan
Grant Applications	The HMAP will be evaluated by participating jurisdictions within Williamson County when grant funding is sought for mitigation projects. If a project is not in the Plan Update, a Plan Revision may be necessary to include the action in the Plan.
Regulatory Plans	Currently, several participating jurisdictions within Williamson County have regulatory plans in place, such as Emergency Operations Plans, Land Use Plans, and Evacuation Plans. The Plan Update will be consulted when County, City, ISD, and school departments review or revise their current regulatory planning mechanisms, or in the development of regulatory plans that are not currently in place.

Appendix F Capability Assessment provides an overview of Planning Team members' existing planning and regulatory capabilities. These existing capabilities provide the mechanisms to implement the mitigation strategy objectives. For example, the adoption of building codes and implementation of land use regulations have been demonstrated to help communities avoid losses from natural hazard events. Currently the City of Hutto and Meridian World School have building codes in place. Williamson County, the City of Hutto, and Georgetown ISD have zoning ordinances and land use restrictions in place as well. Please refer to Appendix F for a complete inventory of each participating jurisdiction's capabilities.

It should be noted for the purposes of the Plan Update that the HMAP has been used as a reference when reviewing and updating all plans and ordinances for the entire planning area, including all participating jurisdictions. The Emergency Management Action Plans developed for Williamson County, City of Hutto, Georgetown ISD, Hutto ISD, and Liberty Hill ISD are updated every 5 years and incorporate goals, objectives and actions identified in the mitigation plan.

PLAN REVIEW AND PLAN UPDATE

As with the development of Plan Update, participating jurisdictions within Williamson County will oversee the review and update process for relevance and if necessary, make adjustments. At the beginning of each fiscal year, Planning Team Members will meet to evaluate the Plan and review other planning mechanisms to ensure consistency with long-range planning efforts. In addition, planning participants will also meet once a year, by conference call or presentation, to re-evaluate prioritization of the hazard mitigation actions.

TIMELINE FOR IMPLEMENTING MITIGATION ACTIONS

Both the Executive Planning Team (Table 2-1) and the Advisory Planning Team (Table 2-2) will engage in discussions regarding a timeframe for how and when to implement each hazard mitigation action. Considerations include when the action will be started, how existing planning mechanisms' timelines affect implementation, and when the action should be fully implemented. Timeframes may be general, and there will be short, medium, and long-term goals for implementation based on prioritization of each action, as identified on individual Hazard Mitigation

SECTION 2: PLANNING PROCESS

Action worksheets included in the Plan Update for participating jurisdictions within Williamson County.

Both the Executive and Advisory Planning Team will evaluate and prioritize the most suitable hazard mitigation actions for the community to implement. The timeline for implementation of actions will partially be directed by participating jurisdictions' comprehensive planning process, budgetary constraints, and community needs. Participating jurisdictions within Williamson County are committed to addressing and implementing hazard mitigation actions that may be aligned with and integrated into the Plan Update.

Overall, the Planning Team is in agreement that goals and actions of the Plan Update shall be aligned with the timeframe for implementation of hazard mitigation actions with respect to annual review and updates of existing plans and policies.

PUBLIC AND STAKEHOLDER INVOLVEMENT

An important component of hazard mitigation planning is public participation and stakeholder involvement. Input from individual citizens and the community as a whole provides the Planning Team with a greater understanding of local concerns and increases the likelihood of successfully implemented hazard mitigation actions. If citizens and stakeholders, such as local businesses, non-profits, hospitals, and schools are involved, they are more likely to gain a greater appreciation of the risks that hazards may present in their community and take steps to reduce or mitigate their impact.

To enhance community resilience and stakeholder engagement, Williamson County Office of Emergency Management offered each non-participating jurisdiction and ISD that resides within Williamson County an opportunity to have their critical facilities, priority projects, and overall input integrated into the Williamson County Hazard Mitigation Action Plan Update 2025. The County solicited engagement from these entities by: (1) direct outreach with representatives from each non-participating jurisdiction; (2) distribution of a survey to collect valuable information from each non-participating jurisdiction and ISD; and (3) invitations distributed to non-participants for the Plan Update workshops. Provided responses were incorporated into the Plan and outlined under the County.

The public was also involved in the development of the Williamson County Hazard Mitigation Action Plan Update 2025 at different stages prior to official Plan approval and adoption. Public input was sought using three methods: (1) open public meetings; (2) survey instruments; and (3) making the draft Plan Update available for public review on participating jurisdictions' websites.

The draft Plan Update was made available to the general public for review and comment on participating jurisdictions' websites. The public was notified at the public meetings that the draft Plan Update would be available for review. No feedback was received on the draft Plan Update, although it was given on the public survey, and all relevant information was incorporated into the Plan Update. Public input was utilized to assist in identifying hazards that were of most concern to the citizens of the County and what actions they felt should be included and prioritized.

The Plan Update will be advertised and posted on Williamson County and participating jurisdictions' websites upon approval from FEMA, and a copy will be kept at the Williamson County Courthouse.

SECTION 2: PLANNING PROCESS

UNDERSERVED COMMUNITIES / VULNERABLE POPULATIONS

A goal of the Planning Team was building equity into the planning process. Including organizations that aid underserved communities and socially vulnerable populations to participate in the Plan helps ensure equitable access to the planning process and the meaningful participation of all residents. In addition, these groups can make sure that the interests of vulnerable populations are accurately represented and act as a valuable resource to share information with those vulnerable populations.

The Planning Team worked to identify local agencies, organizations and community leaders that focus on reaching vulnerable populations and underserved communities. These organizations were included in the planning process as stakeholders and were invited to participate in the planning process via e-mail. These agencies were encouraged to post public planning meetings as well as solicit feedback via the public survey.

All stakeholders and planning team members were invited to participate in the development of the Plan during this process, including all public meetings, and surveys. All stakeholders are listed in Table 2-5 below. Some stakeholders have been detailed below along with the agency's mission, including:

- o Habitat for Humanity - A non-profit, Christian ministry, with a mission to bring communities and people together to create and sustain home ownership in Williamson County.
- o United Way – Williamson County – A community of dedicated and generous donors and volunteers, engaged corporate partners, visionary civic leaders, courageous friends with lived experience, and a steadfast staff united to leverage data, coalitions, services and support, and advocacy to transform Central Texas and create lasting change in the face of urgent need.
- o Williamson County Veterans Services - Provides eligible Veterans, dependents and survivors direct and general support and assistance in obtaining all benefits they have earned from the U.S. Department of Veterans Affairs, State of Texas and Williamson County.

The Office of Emergency Management also toured the community to distribute flyers and engage with residents. In addition, public notices were posted on a public bulletin board throughout the planning area, such as in Liberty Hill ISD, as well as posted on the participating jurisdictions' websites and social media platforms. For a sample of these postings, please see Appendix E. In addition to public meetings, the Planning and Consultant Teams developed a public survey designed to solicit public input during the planning process from citizens and stakeholders and to obtain input and feedback on the mitigation plan. For each form of engagement, all efforts were made to reach Williamson County's underserved communities and vulnerable populations throughout the planning process. Additional survey information is provided at the end of this section.

STAKEHOLDER INVOLVEMENT

Stakeholder involvement is essential to hazard mitigation planning since a wide range of stakeholders can provide input on specific topics and from various points of view. Throughout the planning process, members of community groups, local businesses, and neighboring jurisdictions were invited to participate in development of the Plan Update. The Stakeholder Group (Table 2-5) included a broad range of representatives from both the public and private sector and served as a key component in Williamson County's outreach efforts for development of the Plan Update.

SECTION 2: PLANNING PROCESS

Documentation of stakeholder meetings is found in Appendix E. A list of organizations invited to attend via e-mail is found in Table 2-5. Those that participated in the public meetings are identified with a plus symbol (+) next to their stakeholder type.

Table 2-5. Stakeholder Working Group

AGENCY	TITLE	STAKEHOLDER TYPE
A. Frank Smith Jr. Library Center (Southwestern University Library)	Associate Director	Community Organization
American Red Cross	Chief Executive Officer	Community Organization
American Red Cross	Disaster Program Manager for Central Texas	Community Organization
American Red Cross	Senior Community Disaster Program Manager	Community Organization
Bastrop County	Emergency Management Coordinator	Neighboring Community
Baylor Scott and White Hospital - Round Rock	Chief Executive Officer	Healthcare Agency
Bell County	Emergency Management Coordinator	Neighboring Community
Brazos River Authority	Emergency Management	Community Organization / Utility Provider
Brazos River Authority	Service Manager	Community Organization / Utility Provider
Brookwood in Georgetown	Executive Organization	Community Organization
Burnet County	Emergency Management Coordinator	Neighboring Community
Brushy Creek MUD	District Engineer	Utility Provider+
Capital Area Council of Governments	Homeland Security Director	Regional Agency
Capital Area Council of Governments	Regional Homeland Security Planner	Regional Agency
Cedar Park Library	Library Director	Community Organization
City of Bartlett	City Administrator	Neighboring Community+
City of Cedar Park	Assistant Emergency Management Coordinator	Neighboring Community
City of Cedar Park	Emergency Management Coordinator	Neighboring Community+
City of Coupland	Mayor	Neighboring Community+
City of Florence	Building Services Director	Neighboring Community

SECTION 2: PLANNING PROCESS

AGENCY	TITLE	STAKEHOLDER TYPE
City of Florence	Chief of Police	Neighboring Community
City of Florence	Mayor	Neighboring Community
City of Georgetown	Emergency Management Coordinator	Neighboring Community
City of Granger	Mayor	Neighboring Community
City of Jarrell	City Manager	Neighboring Community
City of Jarrell	Emergency Management Coordinator	Neighboring Community
City of Leander	Assistant Emergency Management Coordinator	Neighboring Community
City of Leander	Emergency Management Coordinator	Neighboring Community
City of Liberty Hill	Mayor	Neighboring Community
City of Round Rock	Emergency Management Coordinator	Neighboring Community
City of Taylor	Assistant Fire Chief / Fire Marshal	Neighboring Community
City of Taylor	Emergency Management Coordinator	Neighboring Community
City of Taylor	Fire Chief	Neighboring Community+
City of Thrall	Mayor	Neighboring Community+
City of Weir	City Administrator	Neighboring Community+
City of Weir	Mayor	Neighboring Community
City of Weir	Mayo Pro-Tem	Neighboring Community
Cornerstone Hospital - Austin - Round Rock	Chief Executive Officer	Healthcare Agency
Coupland ISD	Principal	Academia+
Environmental Protection Agency (EPA) – Region 6	Deputy Regional Administration	Federal Agency
Environmental Protection Agency (EPA) – Region 6	Director of Superfund and Emergency Management Division	Federal Agency
Environmental Protection Agency (EPA) – Region 6	Regional Administration	Federal Agency
Eula Hunt Beck Florence Library	General Representative	Community Organization

SECTION 2: PLANNING PROCESS

AGENCY	TITLE	STAKEHOLDER TYPE
Exxon Mobil	County Representative	Utility Provider
Florence ISD	Assistant Superintendent of Curriculum & Instruction	Academia
Florence ISD	Director of Information Systems & Safety	Academia+
Florence ISD	Superintendent	Academia
Georgetown Airport	General Representative	Community Organization
Georgetown Animal Shelter	General Representative	Community Organization
Georgetown Library	Library Director	Community Organization
Granger ISD	Safety Coordinator	Academia+
Granger ISD	Superintendent	Academia
Habitat for Humanity	Media Coordinator	Non-Profit Organization
Halff	Atlas 14 Contractor	Private Organization+
Halff	Atlas 14 Contractor	Private Organization+
HEB	Emergency Preparedness Manager	Community Organization+
HNTB	Atlas 14 Contractor	Private Organization+
HNTB	Atlas 14 Contractor	Private Organization+
Hutto Has a Heart	Pastor	Religious Organization
Hutto Historical Preservation Commission	Director	Community Organization
Hutto Public Library	Circulation Clerk	Community Organization
Jarrell ISD	DAEP Administrator	Academia+
Jarrell ISD	Safety / DAEP Administrator	Academia
Jarrell ISD	ISD Chief of Police	Academia
Jarrell ISD	ISD Police Administrative Assistant	Academia
Leander ISD	Director of Emergency Management	Academia+
Leander ISD	Risk Management Director	Academia
Leander ISD	Security Director	Academia

SECTION 2: PLANNING PROCESS

AGENCY	TITLE	STAKEHOLDER TYPE
Leander Public Library	Library Director	Community Organization
Lee County	Emergency Management Coordinator / Grants Writer	Neighboring Community
Lower Brushy Creek WCID	General Manager	Utility Provider+
Meals on Wheels	Director of Community Services	Non-Profit Organization
Milam County	Emergency Management Coordinator	Neighboring Community
National Weather Services (NWS)	Austin / San Antonio Regional Contact	Federal Agency
Rifline	Atlas 14 Contractor	Private Organization
Samsung	Environmental Technician	Utility Provider
Samsung	Safety Specialist	Utility Provider
Samsung	SemiConductor	Utility Provider
Samsung	Senior Environmental Engineer	Utility Provider
St. David's Medical Center and Hospital - Georgetown	Chief Executive Officer	Healthcare Agency
State Legislature	House District 20	State Legislature
State Legislature	House District 52	State Legislature
State Legislature	House District 136	State Legislature
State Senate	Senate District 5	State Senate
State Senate	Senate District 24	State Senate
Taylor ISD	Assistant Superintendent of Teaching and Learning	Academia
Taylor ISD	Director of Elementary Schools and Federal Programs	Academia
Taylor ISD	Principal	Academia
Temple College - East Williamson County Higher Education Center	Chief of Operations	Academia
Texas A&M AgriLife Extension	District 8 Representative	State Agency
Texas A&M Forest Service	Mitigation and Prevention Program Coordinator for Williamson County	State Agency

SECTION 2: PLANNING PROCESS

AGENCY	TITLE	STAKEHOLDER TYPE
Texas Commission on Environmental Quality (TCEQ) - Region 11	Executive Assistant	State Agency
Texas Commission on Environmental Quality (TCEQ) - Region 11	Regional Director	State Agency
Texas Department of Health and Human Services, Region 7	Deputy Regional Director	State Agency
Texas Department of Health and Human Services, Region 7	Program Manager	State Agency
Texas Department of Health and Human Services, Region 7	Regional Director	State Agency
Texas Department of Housing and Community Affair	Director of Single-Family and Homeless Program	State Agency
Texas Department of Housing and Community Affair	Manager of Single-Family Program	State Agency
Texas Department of Transportation (TXDOT)	District Engineer	State Agency
Texas Division of Emergency Management (TDEM)	Administrative Associate V	State Agency
Texas Division of Emergency Management (TDEM)	County Liaison Officer	State Agency
Texas Division of Emergency Management (TDEM)	Regional Disaster Finance Coordinate	State Agency
Texas Floodplain Management Association, Region 5	Director	State Agency
Texas Parks and Wildlife	District Leader	State Agency
Texas State Technical College (TSTC)	Deputy Safety Officer	Academia
Texas State University – Round Rock Campus	Interim Vice President	Academia
Texas State University – Round Rock Campus	University Police Sergeant	Academia
Texas Water Development Board (TWDB)	Deputy Executive Administrative of the Planning Division	State Agency
Texas Windstorm Insurance Association	Chief Deputy Commissioner	State Agency

SECTION 2: PLANNING PROCESS

AGENCY	TITLE	STAKEHOLDER TYPE
Travis County	Deputy Emergency Management Coordinator	Neighboring Community
United Way – Williamson County	Executive Director	Community Organization
University Village	General Representative	Residential Community - Vulnerable Populations
U.S. Army Corps of Engineers / Texas Silver Jackets	Regional Representative for Fort Worth/Galveston Office	Federal Agency
U.S. Fish & Wildlife	Southwest Regional Representative	Federal Agency
Williamson County ARES	Director	Community Organization+
Williamson County Cities Health District	Health District Representative I	Community Organization
Williamson County Cities Health District	Health District Representative II	Community Organization
Williamson County Cities Health District	Health District Representative III	Community Organization
Williamson County Cities Health District	Emergency Preparedness and Response Specialist	Community Organization+
Williamson County Cities Health District	Emergency Preparedness and Response Specialist – Team Lead	Community Organization+
Williamson County Cities Health District	Executive Director	Community Organization
Williamson County Conservation Foundation	Assistant to the Director	Community Organization+
Williamson County Conservation Foundation	WCCF Board President	Community Organization+
Williamson County ESD #6	Assistant Chief	Community Organization+
Williamson County ESD #6	Chief	Community Organization
Williamson County Landfill	General Representative	Community Organization / Utility Provider
Williamson County Regional Animal Shelter	Animal Services Director	Community Organization
Williamson County Regional Animal Shelter	Community Programs Coordinator	Community Organization
Williamson County Veterans Services	County VSO	Community Organization
Williamson County WCID #3	Chief	Community Organization+

SECTION 2: PLANNING PROCESS

Stakeholders and participants from neighboring communities that attended the Planning Team and public meetings played a key role in the planning process. For example, stakeholders were concerned with maintaining and protecting infrastructure, along with ensuring the continuity of operations of emergency services, so Williamson County included an action to acquire and install generators with hard wired quick connections at all critical facilities as well as evaluate road conditions for response vehicles.

PUBLIC MEETINGS

A series of public meetings were held throughout the planning area to collect public and stakeholder input. Topics of discussion included the purpose of hazard mitigation, discussion of the planning process, and types of natural hazards. Each participating jurisdiction within Williamson County released information regarding the public meetings in their area to increase public participation in the Plan Update development process, through posting on their website, on social media sources including Facebook and X (formerly known as Twitter), and/or posting the information on bulletin boards in public facilities. A sampling of these notices can be found in Appendix E, along with the documentation on the public meetings. Both public meetings were held at the Williamson County Georgetown Annex.

Public meetings were held on the following dates:

- o April 22, 2024, at Williamson County Georgetown Annex
- o July 9, 2024, at Williamson County Georgetown Annex

PUBLIC PARTICIPATION SURVEY

In addition to public meetings, the Planning and Consultant Teams developed a public survey designed to solicit public input during the planning process from citizens and stakeholders to obtain data regarding the identification of any potential hazard mitigation actions or problem areas. The survey was promoted by local officials and a link to the survey was posted on participating jurisdictions' websites. A total of 226 surveys were completed online. The survey results are analyzed in Appendix B. Participating jurisdictions within Williamson County reviewed the input from the surveys and decided which information to incorporate into the Plan as hazard mitigation actions. For example, results indicate that extreme heat and drought are the hazards of highest concern for the public. Improving the reliability of utilities and restricting development in hazard-prone areas were the two main actions indicated that the local government should take to mitigate risk to these hazards. As a result, the Planning Team has included mitigation actions related to implementing fuel reduction on private on public lands, along with incorporating higher standards for hazard resistance in local application of the building code.



SECTION 3

COUNTY PROFILE

SECTION 3: COUNTY PROFILE

Overview	1
Population and Demographics	3
ISD Population	4
Population Growth	5
Economic Impact	6
Natural, Cultural, and Historic Resources	7
Existing Land Use and Development Trends	9
Changes in Vulnerability	10
Future Growth and Development	11

OVERVIEW

Williamson County is located just north of Austin in central Texas. It sits on the Balcones Escarpment, a geologic fault zone several miles wide that has remained inactive for 15 million years. The Balcones Escarpment divides the county into two regions. It runs from north to south along a line from Jarrell to Georgetown to Round Rock.

In 1848 Williamson County was created from Milam County. The county has been the site of human habitation for at least 11,000 years, with the first people living there in the latter part of the Pleistocene period. Around 9,200 BC the Clovis people left behind evidence at the Gault Site. The Tonkawa's were the first known occupants of the county. The eighteenth century saw the arrival of the Comanche people in the area; they lived there until as late as 1838, when the settlers crowded them out. The Comanche raided settlements until 1860. In addition to the Comanche and Tonkawa people, there were also the Kiowa, Yojuane, Tawakoni, and Mayeye people who settled in the county.

In 1838 the first civilian settlement was established by Dr. Thomas Kenney, and a party of settlers built Kenney's Fort on Brushy Creek. Other settlers came to establish a home but due to raids they did not last long. In 1842 Governor Sam Houston advised settlers to pull back from the frontier and many farms were abandoned. After tensions had calmed and Texas was annexed, settlers came back to the frontier. In 1848 250 settlers came to Milam County where 107 of them signed a petition to make a new county. With that petition came the establishment of Williamson County by the Texas Legislature. The county was named after Robert Williamson, a prominent judge and soldier. The City of Georgetown was established as the county seat and the first district court was held in October 1848.

Agriculture was the biggest export of the time, with corn being the top producing crop. The agriculture production in the county was flourishing in 1850, the rich Blackland soils in the eastern half of the county were swelling with wheat and corn. Cotton production was also in the works but was not as important to farmers at the time. The inclusion of wild cattle in the 1840's had increased cattle production and consumption in the county. The number of cattle tripled from 12,000 in 1850 to 39,000 in 1860. Sheep production also increased from 3,000 sheep with 3,500 pounds of wool production in 1850 to 17,000 sheep with 33,000 pounds of wool production.

Political upheaval during the reconstruction era impacted Williamson County, as did crime with outlaws such as John Wesley Hardin and Sam Bass arriving in the area. The Civil War did minimal

SECTION 3: COUNTY PROFILE

material damage to the county, but it did impact the economy. Farm and livestock value fell drastically in 1870. The introduction of the railroad in the 1870's assisted the livestock industry in the area. Cotton production was increasing in popularity which helped the economy bounce back and helped with the growth of the cattle and sheep industry. By 1900 the demand for cotton and mohair from goats was in high demand and production increased tenfold.

The International-Great Northern Railroad was built in the area in 1876 leading to the founding of the City of Taylor, the third largest city in the county, the City of Hutto, and the City of Round Rock. The railroad still plays a significant role in the county today with three railroads crossing the county, the Union Pacific, the Austin Area Terminal Railroad, and the Georgetown Line.¹

The area continues to have a robust economy and diverse population. In 2021 it was named as one of the healthiest counties in Texas. It was deemed the second healthiest place to live among 254 Texas counties. The area continues to boast a low crime rate, friendly people, and affordable living.²

Figure 3-1 shows the general location of Williamson County and the cities within the county.

Figure 3-1. Location of Williamson County



Figure 3-2 shows the participating jurisdictions within Williamson County that are covered in the risk assessment analysis of the Plan Update.

Figure 3-2. Williamson County Planning Area

¹ Source: <https://www.tshaonline.org/handbook/entries/williamson-county>

² Source: <https://www.wilcotx.gov/916/History>

SECTION 3: COUNTY PROFILE

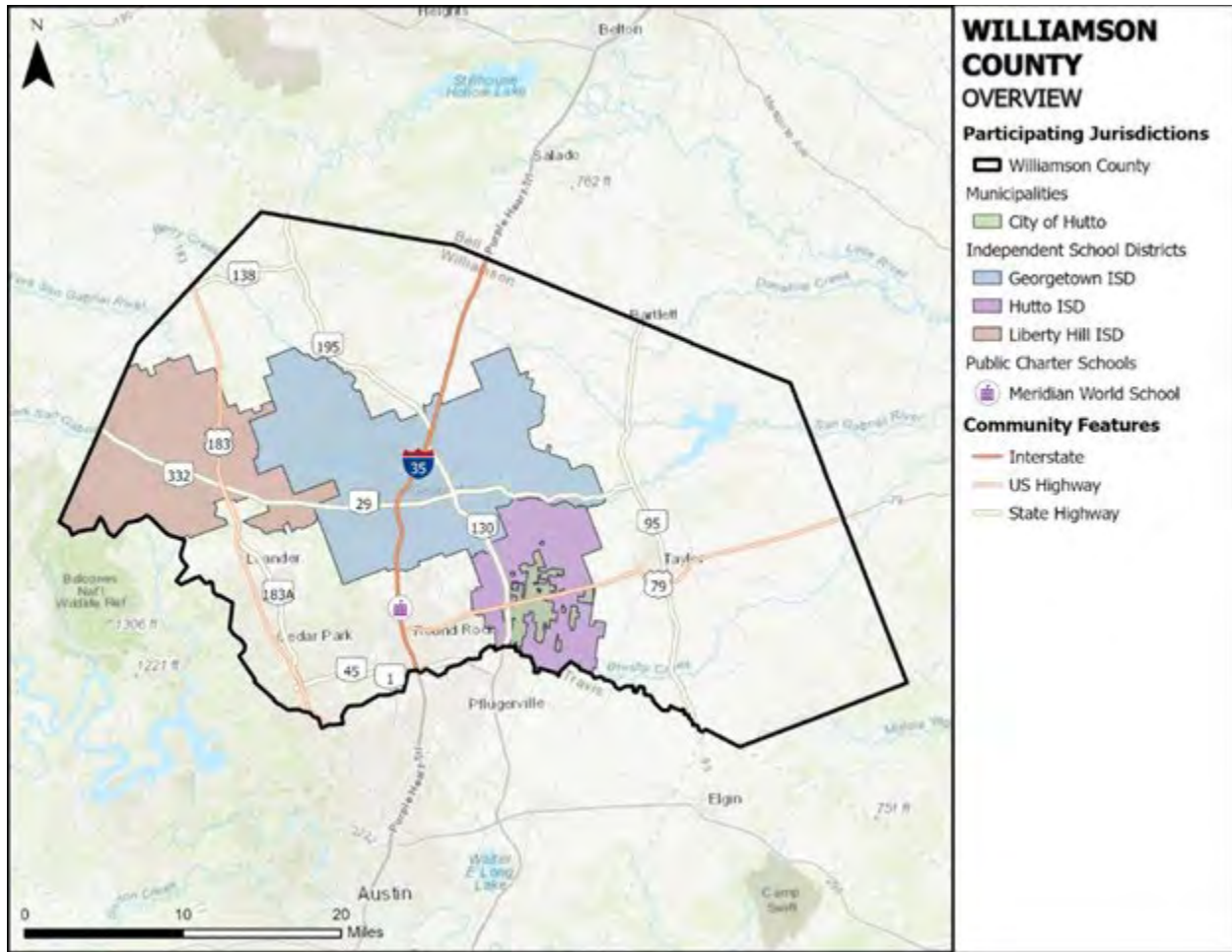


Table 3-1 below lists the jurisdictions in Williamson County that participated in the Williamson County Hazard Mitigation Action Plan Update 2025.

Table 3-1. Participating Jurisdictions

PARTICIPATING JURISDICTIONS	
Williamson County	City of Hutto
Georgetown ISD	Hutto ISD
Liberty Hill ISD	Meridian World School

POPULATION AND DEMOGRAPHICS

According to the 2020 Census, Williamson County has an official population of 609,017 residents, a 44 percent increase since the 2010 census. Table 3-2 shows the population distribution in Williamson County and the participating jurisdictions in 2010, 2020 (Census population count), and 2022 (2022 American Community Survey (ACS) five-year estimates). Note that in some

SECTION 3: COUNTY PROFILE

cases, the 2022 ACS estimates may differ from the 2020 census counts: the ACS estimates are used throughout this section for consistency.³

Table 3-2. Population Distribution by Jurisdiction

JURISDICTION	TOTAL 2010 POPULATION	TOTAL 2020 POPULATION (Census)	TOTAL 2022 POPULATION (ACS Estimates)	PERCENT CHANGE 2010- 2022
Williamson County ⁴	422,679	609,017	617,396	46%
City of Hutto	14,698	27,577	29,498	101%

Table 3-3 summarizes select characteristics of vulnerable or sensitive populations in Williamson County and the participating jurisdictions using data from the U.S. Census Bureau 2022 American Community Survey (ACS) five-year estimates.

Between official U.S. Census population counts, the estimate uses a formula based on new residential building permits and household size. It is simply an estimate, and many variables are involved in achieving an accurate estimation of the number of people living in a given area at a given time.

Table 3-3. Populations at Greater Risk by Jurisdiction

JURISDICTION	ELDERLY (over 65)	YOUTH (under 5)	WITH A DISABILITY	BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Williamson County ⁵	77,609	37,584	61,524	38,896	138,476
City of Hutto	1,830	2,155	2,658	2,301	7,141

ISD POPULATION

Figure 3-2 shows the participating Independent School Districts (ISDs) within Williamson County that are covered in the risk assessment analysis of the Plan Update.

The mission of Georgetown ISD is “Inspiring and empowering every learner to lead, grow, and serve”. The district is made up of eleven elementary schools and nine secondary schools that consist of middle and high schools. The school district provides services for children from pre-kindergarten to 12th grade.

The mission statement of Hutto ISD is “Hippo Nation inspires all students to achieve excellence in academics, character, and community.” Hutto ISD is made up of seventeen schools, eight

³ Source: <https://demographics.texas.gov/Data/Decennial/2010/>, <https://www.census.gov/en.html> and <https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2022/>

⁴ County totals include the entire population within the county lines, including unincorporated areas and non-participating jurisdictions within the County.

⁵ County totals include the entire population within the county lines, including unincorporated areas and non-participating jurisdictions within the County.

SECTION 3: COUNTY PROFILE

elementary schools and nine secondary schools that are both middle and high schools. They offer a virtual secondary school. The school district provides services for children under the age of five.

The mission statement of Liberty Hill ISD is “to empower all students to achieve at their academic and creative potential.” Liberty ISD consists of four schools, two elementary, one middle and one high school. The school district provides services for children under the age of five.

The mission statement of Meridian World School “Meridian will develop responsible citizens who can artfully navigate our complex world and enjoy a good life with others.” Meridian World School provides services for children from kindergarten to 12th grade.

Table 3-4 provides the number of people employed, students enrolled, and vulnerable or sensitive populations by each participating ISD, as provided by the ISDs.

Table 3-4. ISD Population

INDEPENDENT SCHOOL DISTRICT	EMPLOYEES	STUDENTS	ESTIMATED VULNERABLE OR SENSITIVE POPULATIONS	
			Children (Under 5)	Staff Works Outdoors
Georgetown ISD	2,020	13,600	469	428
Hutto ISD	1,738	10,533	415	222
Liberty Hill ISD	1,250	9,050	240	300
Meridian World School	250	1,700	0	2

POPULATION GROWTH

The official 2020 Williamson County population is 609,017. Overall, Williamson County experienced a population increase of 336% between 1990 and 2020, or 469,466 residents. Both the City of Hutto and Williamson County experienced large degrees of population growth. Table 3-5 provides historical growth rates in Williamson County.

Table 3-5. Population Growth by Jurisdictions 1990-2020⁶

JURISDICTIONS	1990	2000	2010	2020	POP CHANGE 1990-2020	PERCENT OF CHANGE	POP CHANGE 2010-2020	PERCENT OF CHANGE
Williamson County ⁷	139,551	249,967	422,679	609,017	469,466	336%	186,338	44%
City of Hutto	630	1,250	14,698	27,577	26,947	4,277%	12,879	88%

⁶ U.S. Census Bureau

⁷ County totals include the entire population within the county lines, including unincorporated areas and non-participating jurisdictions within the County.

SECTION 3: COUNTY PROFILE

ECONOMIC IMPACT

Building and maintaining infrastructure depends on the economy, and therefore, protecting infrastructure from risk due to natural hazards in the planning area is important to the participating jurisdictions within Williamson County. Whether it is expanding culverts under a road that washes out during flash flooding, shuttering a fire station, or flood-proofing a wastewater facility, infrastructure must be mitigated from natural hazards in order to continue providing essential utility and emergency response services in a fast-growing planning area.

Based on the American Community Survey 2022 estimates, 70 percent of the population 16 years and over is employed in the labor force. The per capita income is \$47,574 and the median household income countywide is \$119,776. It is estimated that 19 percent of households have incomes below \$50,000. Families with incomes below the poverty level in 2022 made up 6.6 percent of all families. Of families that have children under 18 years old, 6.8 percent are below the poverty level.

Tables 3-6 and 3-7 show the various occupations and industries within Williamson County, according to the 2022 estimates by the American Community Survey.

Table 3-6. Occupations of Employed Population in Williamson County⁸

OCCUPATION	ESTIMATE	PERCENT
Civilian employed population 16 years and over	325,009	
Management, business, science, and arts occupations	164,001	50.50%
Sales and office occupations	71,340	22.00%
Production, transportation, and material moving occupations	41,629	12.80%
Service occupations	26,874	8.30%
Natural resources, construction, and maintenance occupations	21,164	6.50%

Table 3-7. Industries of Employed Population in Williamson County⁹

INDUSTRY	ESTIMATE	PERCENT
Civilian employed population 16 years and over	325,008	
Educational services, and health care, and social assistance	65,943	20.3%
Manufacturing	56,168	17.3%
Agriculture, forestry, fishing and hunting, and mining	39,116	12.0%

⁸ 2022 American Community Survey 5-Year Estimates Data Profiles.

⁹ 2022 American Community Survey 5-Year Estimates Data Profiles.

SECTION 3: COUNTY PROFILE

INDUSTRY	ESTIMATE	PERCENT
Construction	29,757	9.2%
Finance and insurance, and real estate and rental and leasing	25,993	8.0%
Retail trade	24,213	7.4%
Professional, scientific, and management, and administrative and waste management services	20,910	6.4%
Transportation and warehousing, and utilities	18,180	5.6%
Other services, except public administration	15,168	4.7%
Arts, entertainment, and recreation, and accommodation and food services	13,597	4.2%
Public administration	7,533	2.3%
Wholesale trade	6,500	2.0%
Information	1,930	0.60%

NATURAL, CULTURAL, AND HISTORIC RESOURCES

Williamson County is just north of Austin and consists of 1,137 square miles, of which 1,115 square miles is land and the rest is water. The county geography varies from one side of the county to the other which is split by the Balcones Escarpment. The western half of the county is bound by western plains filled with hilly brushland around 850 feet in elevation. The eastern region is a part of the Coastal Plains with flat and gently rolling hills around six hundred feet in elevation. San Gabriel River runs through the center and to the south in the county. Loamy and clay “Blackland” soils to the east with dark and loamy soils to the west. Tall grasses with oak, juniper, and mesquite can be seen throughout the southeast corner. This geographical makeup is ripe for agricultural growth and wildlife.

To further understand natural resources that may be vulnerable to a hazard event and those that need consideration when implementing mitigation activities, it is important to identify at-risk species (i.e., endangered species) in the planning area. A federally endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or most of its range. A threatened species is a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Both endangered and threatened species are protected by federal law, and any future hazard mitigation projects are subject to these laws. Candidate species are plants and animals that have been proposed as endangered or threatened but are not currently listed.

According to the U.S. Fish and Wildlife Service, as of September 2024, there are 18 federally endangered, threatened, or candidate species in Williamson County, listed in Table 3-8. Additionally, two species are listed as being recovery (the bald eagle and the black-capped vireo), one is listed as under review (western chicken turtle), and another is listed as resolved taxon (plains spotted skunk).

SECTION 3: COUNTY PROFILE

Table 3-8. Endangered Species in Williamson County¹⁰

TYPE of SPECIES	COMMON NAME	SCIENTIFIC NAME	SPECIES STATUS
Arachnids	Tooth Cave spider	Tayshaneta myopica	Endangered
Arachnids	Bone Cave harvestman	Texella reyesi	Endangered
Birds	Whooping crane	Grus americana	Endangered
Birds	Golden cheeked warbler	Setophaga chrysoparia	Endangered
Clams	Texas pimpleback	Cyclonaias petrina	Endangered
Clams	False spike	Fusconaia mitchelli	Endangered
Clams	Texas fatmucket	Lampsilis bracteate	Endangered
Insects	Tooth Cave ground beetle	Rhadine Persephone	Endangered
Insects	Coffin Cave mold beetle	Batrisodes texanus	Endangered
Mammals	Tricolored bat	Perimyotis subflavus	Proposed Endangered
Amphibians	Salado Salamander	Eurycea chisholmensis	Threatened
Amphibians	Georgetown Salamander	Eurycea naufragia	Threatened
Amphibians	Jollyville Plateau Salamander	Eurycea tonkawae	Threatened
Birds	Rufa red knot	Calidris canutus rufa	Threatened
Birds	Piping Plover	Charadrius melodus	Threatened
Clams	Texas fawnsfoot	Truncilla macrodon	Threatened
Flowering Plants	Bracted twistflower	Streptanthus bracteatus	Threatened
Insects	Monarch butterfly	Danaus plexippus	Candidate

Williamson County has a rich history that is preserved through its designated historic buildings and sites. Throughout the county there are seventy-five properties that are designated by the National Register of Historic Places. In Georgetown there are fifty-six buildings and five districts. Of those buildings four are churches. The City of Hutto has a commercial district that is recognized as a historic district. The City of Round Rock has five designated properties or districts on the registry. The Cities of Liberty Hill and Taylor have multiple districts as well with Liberty Hill having one historic building and Taylor having six buildings and one district. Historic buildings are vulnerable to natural hazards as their construction pre-dates modern building codes. There are also historic preservation considerations and requirements for historic structures when they are

¹⁰ Source: <https://ecos.fws.gov/ecp/report/species-listings-by-current-range-county?fips=48491>

SECTION 3: COUNTY PROFILE

included in mitigation or recovery projects. Due to the large volume of recognized historic buildings and districts there is no table to represent this.

EXISTING LAND USE AND DEVELOPMENT TRENDS

A zoning ordinance sets forth regulations and standards related to the extent of land and structure uses that are allowed in certain areas. A zoning map shows the areas within a community where the various zoning districts and standards are located and gives an overall picture of what types of development are located in a community and how a community intends to continue to grow.

A review of building permits can also give a picture of the built environment and the number of buildings being constructed in the county and each jurisdiction. Table 3-9 lists the number of residential buildings and total units authorized through a permit from each jurisdiction, where data was available, between 2019 and 2023. The data includes total buildings and total units permitted. Permits are reported annually in September, and the data includes that from 2019 through 2023 to demonstrate growth. Of the residential building permits issued in this period, there were more permits issued for multi-family buildings over single-family buildings. Housing type can also be an indication of an individual's ability to recover from a disaster.

Table 3-9. Building Permits, by Jurisdiction, 2019-2023¹¹

JURISDICTION	2019		2020		2021		2022		2023	
	Total Buildings	Total Units	Total Buildings	Total Units	Total Buildings	Total Units	Total Buildings	Total Units	Total Buildings	Total Units
City of Hutto	533	533	851	851	2,080	2,080	709	709	1,129	1,129
Williamson County ¹²	4,777	6,135	6,518	8,466	7,519	12,956	5,799	9,300	4,918	7,169
Total	5,310	6,668	7,369	9,317	9,599	15,036	6,508	10,009	6,047	8,298

Certain types of housing found in the Williamson County planning area are more vulnerable than typical site-built, newly constructed residential structures. This includes mobile or manufactured homes, of which 4,899 (2 percent of total housing stock) are in the planning area. Additionally, single-family residences (SFR) built before 1980 are typically built to lower or less stringent construction standards than newer construction, making these homes more susceptible to damage during hazard events. These older homes comprise 11 percent (approximately 25,704 structures) of housing stock in the planning area. Table 3-10 includes housing inventory data for the participating jurisdictions per the 2022 American Community Survey five-year estimates.

¹¹ U.S. Census Bureau, Building Permit Survey, 1992-2021, <https://www.census.gov/construction/bps/>

¹² County totals include all total building permits within the county lines, including unincorporated areas and non-participating jurisdictions within the County.

SECTION 3: COUNTY PROFILE

Table 3-10. Housing Inventory and Vulnerable Structures, By Jurisdiction¹³

JURISDICTION	TOTAL HOUSING UNITS	BUILT PRIOR TO 1980	MOBILE HOME
Williamson County ¹⁴	240,082	25,704	4,899
City of Hutto	10,135	374	37
Georgetown ISD	-	4	21
Hutto ISD	-	1	24
Liberty Hill ISD	-	6	25
Meridian World School	-	-	-

CHANGES IN VULNERABILITY

The Williamson County planning area experienced an overall population increase of 44 percent between 2010 and 2020. The American Community Survey estimates the 2022 total housing units for the planning area to be 240,082. The total building permits issued between 2019 and 2023 represent approximately 14.5 percent of the total housing units available in the planning area. The overall population increase, combined with the increase in housing units, indicates a slight increase in vulnerability to all hazards in terms of populations and the built environment. Changes in vulnerability vary by jurisdiction based on each jurisdiction's trends in population and development (Table 3-11).

Table 3-11. Changes in Vulnerability, by Jurisdiction

JURISDICTION	POPULATION TREND	HOUSING TREND	OVERALL VULNERABILITY CHANGES
Williamson County	Increasing	Increasing	Slight Increase
City of Hutto	Increasing	Increasing	Slight Increase

Changes in vulnerability are applicable to all natural hazards except when discussing dam failure as vulnerability for this hazard is discussed in relation to changes in the estimated inundation areas for profiled dams. For the ten dams profiled in Section 5, there is no known increase in vulnerability in the estimated inundation areas. While flood and wildfire hazards feature geographical boundaries, increases in population and building inventory can increase overall vulnerability for these hazards even when the trends occur outside of the known hazard boundary. Development decreases permeable surface areas and increases runoff, increasing flood risk. As

¹³ The Housing Inventory and Vulnerable Structures are based off the 2022 American Community Survey 5-Year Estimates Data Profiles. The participating ISDs and school do not have housing units, however they did provide buildings built prior to 1980 and mobile buildings.

¹⁴ County totals include all housing units within the county lines, including unincorporated areas and non-participating jurisdictions within the County.

SECTION 3: COUNTY PROFILE

population density increases, the Wildland Urban Interface (WUI) typically increases. WUI growth often results in more wildfire ignitions, which puts more houses and lives at risk.

FUTURE GROWTH AND DEVELOPMENT

To better understand how future growth and development in Williamson County might affect hazard vulnerability, it is useful to consider population growth, occupied and vacant land, the potential for future development in hazard areas, and current planning and growth management efforts. This section includes an analysis of the projected population change and economic impacts.

Population projections from 2010 to 2050 are listed in Table 3-12, provided by the Office of the State Demographer, Texas State Data Center, and the Institute for Demographic and Socioeconomic Research. Population projections are based on a 0.5 scenario growth rate, which is 50 percent of the population growth rate from 2000-2010. This information is only available at the county level; however, the population projection shows an increase in population density for the county, which would mean overall growth for the county.

Table 3-12. Williamson County Population Projections¹⁵

LAND AREA (square miles)	2010		2020		2030		2040		2050	
	Population									
	Total Number	Density (Land Area, sq. mi.)	Total Number	Density (Land Area, sq. mi.)	Total Number	Density (Land Area, sq. mi.)	Total Number	Density (Land Area, sq. mi.)	Total Number	Density (Land Area, sq. mi.)
1,115	422,679	37.8%	589,914	52.8%	830,421	74.4%	1,175,338	105.3%	1,645,982	147.5%

Comprehensive Plans are guiding documents in a community that set forth a vision, goals, policies, and guidelines to direct future physical, social, and economic development within a jurisdiction. They are part of a continuous process to provide an environment for citizens and consider the general desire of the community to conserve, preserve, and protect the natural environment of their jurisdiction. These plans guide staff, decision-makers, and citizens in making decisions that affect the community with an understanding of the long-term effects.

The City of Hutto has a comprehensive plan that dates to 2014 and is updated routinely. The most recent comprehensive plan runs through 2040. Williamson County has a strategic plan that runs from 2023-2033 to assist with community development while highlighting strategic goals. They also have a master parks plan for recreational growth in the county. Refer to the Capability Assessment in Appendix F for a complete list of the plans, ordinances, and other resources for all participating jurisdictions.

¹⁵ Office of the State Demographer, Texas State Data Center, and the Institute for Demographic and Socioeconomic Research

A longhorn cow with brown and white speckled fur and long, curved horns stands in a grassy field. The background shows a line of trees and a hazy sky. The entire image is overlaid with a semi-transparent blue filter and a series of concentric, light blue circular patterns in the lower-left quadrant.

SECTION 4

RISK OVERVIEW

SECTION 4: RISK OVERVIEW

Hazard Description	1
Disaster Declaration History	4
Natural Hazards and Climate Change	6
Overview of Hazard Analysis	8
Hazard Ranking	9

HAZARD DESCRIPTION

Section 4 is the first phase of the Risk Assessment, providing background information for the hazard identification process and descriptions of the hazards identified. The Risk Assessment continues with Sections 5 through 19, which include hazard descriptions and vulnerability assessments.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, participating jurisdictions within Williamson County identified 13 natural hazards and 2 human-caused hazard that are addressed in the Hazard Mitigation Plan Update, and were identified as significant, as shown in Table 4-1. The hazards were identified through input from Planning Team members and a review of the current 2023 State of Texas Hazard Mitigation Plan (State Plan). Readily available online information from reputable sources such as federal and state agencies was also evaluated and utilized to supplement information as needed.

In general, there are three main categories of natural hazards: atmospheric, hydrologic, and technological. Atmospheric hazards are events or incidents associated with weather-generated phenomena. The following have been identified as significant for the planning area: extreme heat, hail, hurricane / tropical storm, lightning, thunderstorm wind, tornado, and winter storm (Table 4-1).

Hydrologic hazards are events or incidents associated with water-related damage and account for over 75 percent of federal disaster declarations in the United States. Hydrologic hazards identified as significant for the planning area include flood and drought.

Technological hazards refer to the origins of incidents that can arise from human activities, such as the construction and maintenance of dams. They are distinct from natural hazards primarily because they originate from human activity. The risks presented by natural hazards may be increased or decreased due to human activity. However, they are not inherently human-induced. Therefore, dam failure is classified as a quasi-technological hazard and referred to as “technological” in Table 4-1 for description purposes.

For the Risk Assessment, wildfire, earthquake, and expansive soil hazards are considered “other” since these hazards are not considered atmospheric, hydrologic, or technological.

Human-caused hazards are events or incidents caused by human intent, human error, or failed systems. They can be caused or exacerbated by accidental or intentional human actions that result in the loss of life or property. The human-caused hazards identified as significant for the county include hazardous materials and train derailment.

SECTION 4: RISK OVERVIEW

Table 4-1. Hazard Descriptions

HAZARD	DESCRIPTION
ATMOSPHERIC	
Extreme Heat	Extreme heat is the condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period of time.
Hail	Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and subsequent cooling of the air mass.
Hurricane / Tropical Storm	A hurricane is an intense tropical weather system of strong thunderstorms with a well-defined surface circulation and maximum sustained winds of 74 mph or higher.
Lightning	Lightning is a sudden electrostatic discharge that occurs during an electrical storm. This discharge occurs between electrically charged regions of a cloud, between two clouds, or between a cloud and the ground.
Thunderstorm Wind	A thunderstorm occurs when an observer hears thunder. Radar observers use the intensity of the radar echo to distinguish between rain showers and thunderstorms. Lightning detection networks routinely track cloud-to-ground flashes, and therefore thunderstorms.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. The destruction caused by tornadoes ranges from light to catastrophic, depending on the location, intensity, size, and duration of the storm.
Winter Storm	Severe winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 mph, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads, and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.
HYDROLOGIC	
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality.

SECTION 4: RISK OVERVIEW

HAZARD	DESCRIPTION
Flood	The accumulation of water within a body of water, which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, and shallow flooding.
OTHER	
Earthquake	An earthquake is the sudden, rapid, shaking of the earth, caused by the breaking and shifting of subterranean rock as it releases strain that has accumulated over a long time. Initial mild shaking may strengthen and become extremely violent within seconds.
Expansive Soils	Expansive soils are soils and soft rock that tend to swell or shrink due to changes in moisture content. Changes in soils volume present a hazard primarily to structures built on top of expansive soils.
Wildfire	A wildfire is an uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase the risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors.
TECHNOLOGICAL	
Dam Failure	Dam failure is the collapse, breach, or other failure of a dam structure resulting in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream of the dam.
HUMAN-CAUSED	
Hazardous Materials	Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. A hazardous material (HAZMAT) incident involves a substance outside normal safe containment in sufficient concentration to pose a threat to life, property, or the environment.
Train Derailment	Trains carry various items across the state of Texas and cities within Texas. A train derailment is a type of train wreck that occurs when a rail vehicle comes off of its tracks. Derailments are typically caused by outside force damaging the train and/or its attached cars with leading causes being track and equipment failures ¹ .

¹Source <https://www.aar.org/issue/derailments/#:~:text=Any%20time%20even%20a%20single,be%20reported%20as%20an%20accident>

SECTION 4: RISK OVERVIEW

Hazards that were not considered significant and were not included in the Plan Update are located in Table 4-2, along with the evaluation process used for determining the significance of each of these hazards. Hazards not identified for inclusion at this time may be addressed during future evaluations and updates.

Table 4-2. Other Hazards Deferred

HAZARD CONSIDERED	REASON FOR DETERMINATION
Coastal Erosion	The planning area is not located on the coast. Therefore, coastal erosion does not pose a risk.
Land Subsidence	The planning area has no historical land subsidence occurrences, and it is in an area where occurrences are considered rare. Land subsidence has not impacted critical structures, systems, populations, or other community assets or vital services in the past, and none is expected in the future.

DISASTER DECLARATION HISTORY

One method of understanding hazards that pose a risk to Williamson County is to identify past hazard events that triggered federal or state disaster declarations. Federal and state declarations may be granted when the severity and magnitude of an event surpass the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. Table 4-3 list state and federal disaster declarations received by Williamson County. Many of the disaster events were regional or statewide.

Between 1953 and 2023, Williamson County received 25 federal disaster declarations. The largest share (8) was related to wildfire, followed by declarations for severe storm (4), hurricane (4), winter storm (3), biological (2), flood (2), and one classified as “other” was related to the loss of the Space Shuttle Columbia.

In addition to the 25 federally declared disaster there have been 33 U.S. Department of Agriculture (USDA) Secretarial disaster designations between 2012 and 2023. The Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans available to producers suffering losses in those counties and in counties that are contiguous to a designated county.² Of the 33 USDA designations for Williamson County, many listed multiple factors as having caused the disaster area designation. The leading cause was drought, which was included in 30 designations. Other factors listed include excessive heat (13 designations), high wind (12), fire / wildfire (11), insects (11), excessive rain (1), and winter storm (1).

² United States Department of Agriculture https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdfiles/FactSheets/emergency_disaster_designation_declaration_process-factsheet.pdf

SECTION 4: RISK OVERVIEW

Table 4-3. Disaster Declaration History of Williamson County, 1953-2023

YEAR	DECLARATION TITLE	HAZARD	DECLARATION TYPE	DISASTER No.
1974	Severe Storms, Flooding	Severe Storms	DR	DR-454
1989	Severe Storms, Tornadoes, Flooding	Severe Storms	DR	DR-828
1991	Severe Storms, Thunderstorms	Severe Storms	DR	DR-930
1993	Extreme Fire Hazard	Wildfire	EM	EM-3113
1998	Tropical Storm Charlie	Severe Storm	DR	DR-1239
1999	Extreme Fire Hazard	Wildfire	EM	EM-3142
2003	Loss of the Space Shuttle Columbia	Other	EM	EM-1371
2005	Hurricane Katrina	Hurricane	EM	EM-3216
2005	Hurricane Ike	Hurricane	EM	EM-3261
2005	Hurricane Rita	Hurricane	DR	DR-1606
2006	Extreme Wildfire Threat	Wildfire	DR	DR-1624
2007	Severe Storms, Tornadoes, Flooding	Severe Storms	DR	DR-1709
2008	Wildfires in Texas	Wildfires	EM	EM-3284
2008	Florence Fire	Wildfire	FM	FM-2785
2008	Hurricane Ike	Hurricane	EM	EM-3294
2011	Grand Mesa Fire	Wildfire	FM	FM-2922
2011	Horseshoe Fire	Wildfire	FM	FM-2949
2011	Moonglow Fire	Wildfire	FM	FM-2963
2011	Wildfire in Texas	Wildfire	FM	DR-4029
2015	Severe Storms, Tornadoes, Straight-line Winds, Flooding	Severe Storms	DR	DR-4223
2020	Texas Covid-19	Biological	EM	EM-3458
2020	Covid-19	Biological	DR	DR-4485
2021	Severe Winter Storm	Winter Storm	EM	EM-3554
2021	Severe Winter Storm	Winter Storm	DR	DR-4586
2023	Severe Winter Storm	Winter Storm	DR	DR-4705

SECTION 4: RISK OVERVIEW

NATURAL HAZARDS AND CLIMATE CHANGE

Climate change is defined as a long-term shift in temperature and weather patterns. These shifts can increase or decrease the risk of natural hazards. Global climate change is expected to exacerbate the risks of certain types of natural hazards impacted by rising sea levels, warmer ocean temperatures, higher humidity, the possibility of stronger storms, and an increase in wind and flood damage due to storm surges. Texas is considered one of the more vulnerable states in the U.S. to both abrupt climate changes and the impact of gradual climate changes on the natural and built environments.

Climate change is expected to lead to an increase in average temperatures as well as an increase in the frequency, duration, and intensity of extreme heat events. With no reductions in emissions worldwide, the state of Texas is projected to experience an additional 30 to 60 days per year above 100°F than what is experienced now.³

The State Climatologist's *Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036* identifies ongoing and likely future trends through 2036 based on analysis of historic observations of temperatures, precipitation, and extreme weather. Table 4-4 highlights future trends in extreme weather from the report.

Table 4-4. Future Trends in Extreme Weather in Texas⁴⁵

HAZARDS	EXPECTED TRENDS
Extreme Temperatures	- o The average annual surface temperature in 2036 is expected to be 3.0°F warmer than the 1950-1999 average and 1.8°F warmer than the 1991-2020 average. - o Nearly double the number of 100°F days by 2036 compared to 2001-2020. - o Higher frequency of 100°F days in urban areas. - o The number of nighttime temperatures below 32°F are expected to decrease. - o The number of frost days per year are expected to decrease. - o The coolest days of the summer are expected to continue becoming warmer. - o The number of heatwaves per year and number of days per year classified as heatwaves are expected to increase.
Precipitation	- o Precipitation has increased by 10 percent or more in eastern Texas, but little trend is present in western Texas. - o Precipitation trends to 2036 are likely to be dominated by natural variability.

³ Kloesel, K., B. Bartush, J. Banner, D. Brown, J. Lemery, X. Lin, C. Loeffler, G. McManus, E. Mullens, J. Nielsen-Gammon, M. Shafer, C. Sorensen, S. Sperry, D. Wildcat, and J. Ziolkowska, 2018: Southern Great Plains. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 987–1035. doi: 10.7930/NCA4.2018.CH23. <https://nca2018.globalchange.gov/chapter/23/>

⁴ Nielsen-Gammon, John, Holman, Sara, Buley, Austin and Jorgensen, Savannah. *Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, 2021 Update*. Texas A&M University Office of the Texas State Climatologist. October 7, 2021. <https://climatetexas.tamu.edu/files/ClimateReport-1900to2036-2021Update>

⁵ University of Texas at Austin, February 2023, *Austin Future Climate, Climate Change Predictions for the City of Austin 2022*, Technical Report.

SECTION 4: RISK OVERVIEW

HAZARDS	EXPECTED TRENDS
	- o Extreme precipitation is expected to increase in intensity on average statewide by 6-10 percent compared to the 1950-1999 averages and 2-3 percent relative to the 2001-2020 averages. - o This translates to an increase in the frequency of extreme rain of 30-50 percent relative to the climatological expected frequency in 1950-1999 and 10-15 percent relative to 2001-2020. - o Annual precipitation is projected to increase while the number of extreme precipitation (>2") will remain relatively consistent.
Drought	- o Increasing temperatures, rainfall variability, and other factors will decrease water availability, but impact changes will vary strongly across applications. - o Impact trends to be highly sector-specific, with the impacts possibly smaller for agriculture than for surface water supply.
Flood	- o No long-term river flooding trend has been identified in the observations, nor is such a trend projected at this point, except perhaps for the most extreme floods and areas with normally high rainfall. - o Urban flooding is projected to increase, both as a simple matter of urban population increase and because of the projected increase of precipitation intensity, which drives flooding in fast-response drainages like those usually found in urban areas. - o The climate-driven trend in urban flood frequency should be similar to the climate-driven trend in extreme precipitation frequency: 30-50 percent in 2036 relative to 1950-1999 and 10-15 percent relative to 2001-2020. - o Areas already experiencing flooding are likely to see an increase in the frequency and magnitude of events.
Winter Weather	- o As the climate warms, the likelihood of winter weather decreases. - o Both extreme cold and snowfall either become less frequent or are expected to do so. - o Widespread snowfall events in Texas, such as the one that took place in February 2021, are extremely rare. - o Fewer cold spells are projected to occur per year, but the length of cold spells will be longer when they do occur.
Thunderstorms (Wind, Hail, Lightning)	- o Historical trend data is unreliable. - o Indirect evidence supports an increase in the number of days capable of producing severe thunderstorms and an increase in the frequency of very large hail in early springtime. Still, these possible trends are too uncertain to quantify.
Wildfire	o Weather and climate drivers of wildfire risk are projected to increase the risk of wildfires throughout the state, primarily due to increased drying rates and fuel load.

SECTION 4: RISK OVERVIEW

OVERVIEW OF HAZARD ANALYSIS

The methodologies utilized to develop the Risk Assessment are a historical analysis and a statistical approach. Both methodologies provide an estimate of potential impact by using a common, systematic framework for evaluation.

Records retrieved from the National Centers for Environmental Information (NCEI) and the National Oceanic and Atmospheric Administration (NOAA) were reported for participating jurisdictions within Williamson County. The remaining records identifying the occurrence of hazard events in the planning area and the maximum recorded magnitude of each event were also evaluated.

Geographic information system (GIS) technology was used to identify and assess risks for Williamson County and evaluate community assets and their vulnerability to hazards.

The four general parameters that are described for each hazard in the Risk Assessment include frequency of return, approximate annualized losses, a description of general vulnerability, and a statement of the hazard's impact.

The frequency of return was calculated by dividing the number of events in the recorded time period for each hazard by the overall time period that the resource database was recording events. Frequency of return statements are defined in Table 4-5, and impact statements are defined in Table 4-6 below.

Table 4-5. Frequency of Return Statements

PROBABILITY	DESCRIPTION
Highly Likely	Event is probable in the next year.
Likely	Event is probable in the next three years.
Occasional	Event is probable in the next five years.
Unlikely	Event is probable in the next ten years.

Table 4-6. Impact Statements

POTENTIAL SEVERITY	DESCRIPTION
Substantial	Multiple deaths. Complete shutdown of facilities for 30 days or more. More than 50 percent of property destroyed or with major damage.
Major	Injuries and illnesses resulting in permanent disability. Complete shutdown of critical facilities between one and four weeks. More than 25 percent of property destroyed or with major damage.
Minor	Injuries and illnesses do not result in permanent disability. Complete shutdown of critical facilities for up to one week. More than 10 percent of property destroyed or with major damage.

SECTION 4: RISK OVERVIEW

POTENTIAL SEVERITY	DESCRIPTION
Limited	Injuries and illnesses are treatable with first aid. Shutdown of critical facilities and services for 24 hours or less. Less than 10 percent of property destroyed or with major damage.

Each of the hazard profiles includes a description of a general Vulnerability Assessment. Vulnerability is the total of assets that are subject to damage from a hazard based on historic recorded damages. Assets in the region were inventoried and defined in hazard zones where appropriate. The total amount of damage, including property and crop damages, for each hazard is divided by the total number of assets (building value totals) in that community to determine the percentage of damage that each hazard can cause to the community. Risk and consequences will be addressed and covered within each hazard profile under the Vulnerability and Impact section as well as under the Assessment of Impact sections, where applicable.

To better understand how future growth and development in the Williamson County region might affect hazard vulnerability, it is useful to consider population growth, occupied and vacant land, the potential for future development in hazard areas, and current planning and growth management efforts. Hazard vulnerability for all participating jurisdictions within Williamson County was reviewed based on recent development changes that occurred throughout the planning area. The population of Williamson County has grown by 44 percent between 2010 and 2020, according to the U.S. Census Bureau. Therefore, the vulnerability to the population, infrastructure, and buildings has increased for hazards that do not have a geographical boundary.

Once loss estimates and vulnerability were known, an impact statement was applied to relate the potential impact of the hazard on the assets within the area of impact.

HAZARD RANKING

During the 2024 planning process, the Planning Team conducted a risk ranking exercise to get input from the Planning Team and stakeholders. Table 4-7 portrays the results of the risk assessment analysis, including the frequency of occurrence and potential severity and the Planning Team's self-assessment for hazard ranking based on local knowledge of past hazard events and impacts for each identified hazard. The definitions for frequency of occurrence and potential severity can be found in Table 4-5 and Table 4-6.

Table 4-7. Hazard Risk Ranking

HAZARD	FREQUENCY OF OCCURRING	POTENTIAL SEVERITY	RANKING
NATURAL HAZARDS			
Drought	Highly Likely	Limited	High
Extreme Heat	Highly Likely	Substantial	High
Flood	Highly Likely	Substantial	High
Hail	Highly Likely	Minor	High

SECTION 4: RISK OVERVIEW

HAZARD	FREQUENCY OF OCCURRING	POTENTIAL SEVERITY	RANKING
Lightning	Highly Likely	Substantial	High
Thunderstorm Wind	Highly Likely	Major	High
Tornado	Highly Likely	Substantial	High
Wildfire	Highly Likely	Minor	High
Dam Failure	Unlikely	Limited	Moderate
Expansive Soils	Occasional	Limited	Moderate
Hurricane/Tropical Storm	Unlikely	Substantial	Moderate
Winter Storm	Highly Likely	Limited	Moderate
Earthquake	Unlikely	Limited	Low
HUMAN-CAUSED HAZARDS			
Hazardous Materials	Likely	Limited	High
Train Derailment	Highly Likely	Limited	High



SECTION 5

DAM FAILURE

SECTION 5: DAM FAILURE

Hazard Description	1
Location	3
Extent.....	5
Historical Occurrences.....	23
Probability of Future Events.....	24
Vulnerability and Impact.....	24
Assessment of Impacts	26
Climate Change Considerations	27

HAZARD DESCRIPTION

Dams are water storage, control, or diversion structures that impound water upstream in reservoirs. Dam failure can take several forms, including a collapse of or breach in the structure. While most dams have storage volumes small enough that failures have few or no repercussions, dams storing large amounts can cause significant flooding downstream. Dam failures can result from any one or a combination of the following causes:

- o Prolonged periods of rainfall and flooding, which cause most failures;
- o Inadequate spillway capacity, resulting in excess overtopping of the embankment;
- o Internal erosion caused by embankment or foundation leakage or piping;
- o Improper maintenance, including failure to remove trees, repair internal seepage problems, or maintain gates, valves, and other operational components;
- o Improper design or use of improper construction materials;
- o Failure of upstream dams in the same drainage basin;
- o High winds, which can cause significant wave action and result in substantial erosion;
- o Destructive acts of terrorism; and,
- o Earthquakes, which typically cause longitudinal cracks at the tops of the embankments, leading to structural failure.

Benefits provided by dams include water supplies for drinking; irrigation and industrial uses; flood control; hydroelectric power; recreation; and navigation. Dams in Texas serve many purposes, some of which include recreation, flood mitigation, irrigation, water supply, and fire protection. About 1 in 3 of the state's dams are for flood risk mitigation and 1 in 7 dams are for irrigation or water supply.¹

While dams serve a role in helping communities' function, dams also represent a risk to public safety. Dams require ongoing maintenance, monitoring, safety inspections, and sometimes even rehabilitation to continue safe service.

In the event of a dam failure, the energy of the water stored behind the dam is capable of causing rapid and unexpected flooding downstream, resulting in loss of life and substantial property damage. A devastating effect on water supply and power generation could be expected as well.

¹ American Society of Civil Engineers. "2021 Report Card for America's Infrastructure: Infrastructure Texas Report Card." 2021. <https://infrastructurereportcard.org/state-item/texas/>

SECTION 5: DAM FAILURE

The terrorist attacks of September 11, 2001, generated increased focus on protecting the country's infrastructure, including ensuring the safety of dams.

One major issue with the safety of dams is their age. The average age of the United States' more than 90,000 dams is 57 years.² According to estimates released in 2022 by the Association of State Dam Safety Officials, the total cost of rehabilitating non-federal dams is \$75.69 billion. Of non-federal dams, the high-hazard potential dams are estimated at a total of \$24.04 billion for rehabilitation.³ In addition to the continual aging of dams, there have not been significant increases in the number of safety inspectors resulting in haphazard maintenance and inspection. Within Texas there are over 3,200 dams exempt from dam safety requirements by State legislation.⁴ The current maintenance budget does not match the scale of the United States' long-term modifications of its watersheds. Worse still, more people are moving into risky areas. As the population grows, dams that once could have failed without major repercussions are now upstream of cities and development.



² American Society of Civil Engineers. "2021 Report Card for America's Infrastructure." 2021.

<https://infrastructurereportcard.org/>

³ Association of State Dam Safety Officials, "The Cost of Rehabilitating Our Nation's Dams". March 2022.

https://damsafety-stag.s3.amazonaws.com/s3fs-public/files/Cost%20of%20Rehab%20Report-2022%20FINAL_0.pdf

⁴ American Society of Civil Engineers. "2021 Report Card for America's Infrastructure: Infrastructure Texas Report Card." 2021. <https://infrastructurereportcard.org/state-item/texas/>

SECTION 5: DAM FAILURE

LOCATION

The State of Texas has 7,413 dams, all regulated by the Texas Commission on Environmental Quality (TCEQ). The National Dam Safety Review Board (in coordination with FEMA), the National Inventory of Dams (NID) and Williamson County officials list a total of 69 dams in the entire Williamson County planning area, including all jurisdictions. Each of these dams were analyzed individually by location, volume, elevation, and condition (where available) when determining the risk, if any, for each dam. Each dam site was further analyzed for potential risks utilizing FEMA's National Flood Hazard Layer to map locations and fully understand development near the dam and topographical variations that may increase risk.

Most of the dams listed were embankments for typically dry detention drainage areas or shored up stream embankments. These types of structures are utilized for flood control and do not pose a dam failure risk. Other dams in the planning area feature such limited storage capacity that they pose no risk to structures, infrastructure, or citizens. Dams that were deemed to pose no past, current, or future risk to the planning area are not profiled in the plan as no loss of life or impact to critical facilities or infrastructure is expected in the event of a breach. Based on this detailed analysis, the planning team was able to determine that only 16 of the 66 dams identified pose a potential risk to the planning area. All 16 of these dams are listed in Table 5-1 with regulation information. These dams are profiled in detail in the Extent section of this hazard profile.

Figure 5-1 illustrates the general location for the critical dams in the planning area, while Figures 5-2 through 5-17 give a closer look at each individual dam. While inundation maps are not available for the profiled dams, an estimated inundation radius has been included on the individual maps for each profiled dam (indicated by the red circle). For dams with a maximum storage capacity of 100,000 acre-feet or more, all structures within five miles are considered to be at risk of potential dam or levee failure hazards. For dams with a maximum storage capacity between 10,000 and 100,000 acre-feet, all structures within three miles are considered to be at risk of potential dam or levee failure hazards. For dams with a maximum storage capacity of less than 10,000 acre-feet, all structures within one mile are considered to be at risk of potential dam failure hazards.

Williamson County is the only participating jurisdiction profiling dam failure. The City of Hutto and the remaining ISDs and school are not profiling dam failure, even if they may experience localized flooding due to a dam breach, as flood is addressed as a separate hazard in this plan.



SECTION 6 **DROUGHT**

SECTION 6: DROUGHT

Hazard Description	1
Location	1
Extent.....	4
Historical Occurrences.....	5
Significant Events	6
Probability of Future Events.....	7
Vulnerability and Impact.....	7
Assessment of Impacts	9
Climate Change Considerations	11

HAZARD DESCRIPTION

Drought is a period of time without substantial rainfall that persists from one year to the next. Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of anticipated natural precipitation reduction over an extended period of time, usually a season or more in length. Droughts can be classified as meteorological, hydrologic, agricultural, and socioeconomic. Table 6-1 presents definitions for these different types of droughts.

Droughts are one of the most complex of all natural hazards as it is difficult to determine their precise beginning or end. In addition, droughts can lead to other hazards such as extreme heat and wildfires. Their impact on wildlife and area farming is enormous, often killing crops, grazing land, edible plants, and even in severe cases, trees. A secondary hazard to drought is wildfire because dying vegetation serves as a prime ignition source. Therefore, a heat wave combined with a drought is a very dangerous situation.

Table 6-1. Drought Classification Definitions¹

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

LOCATION

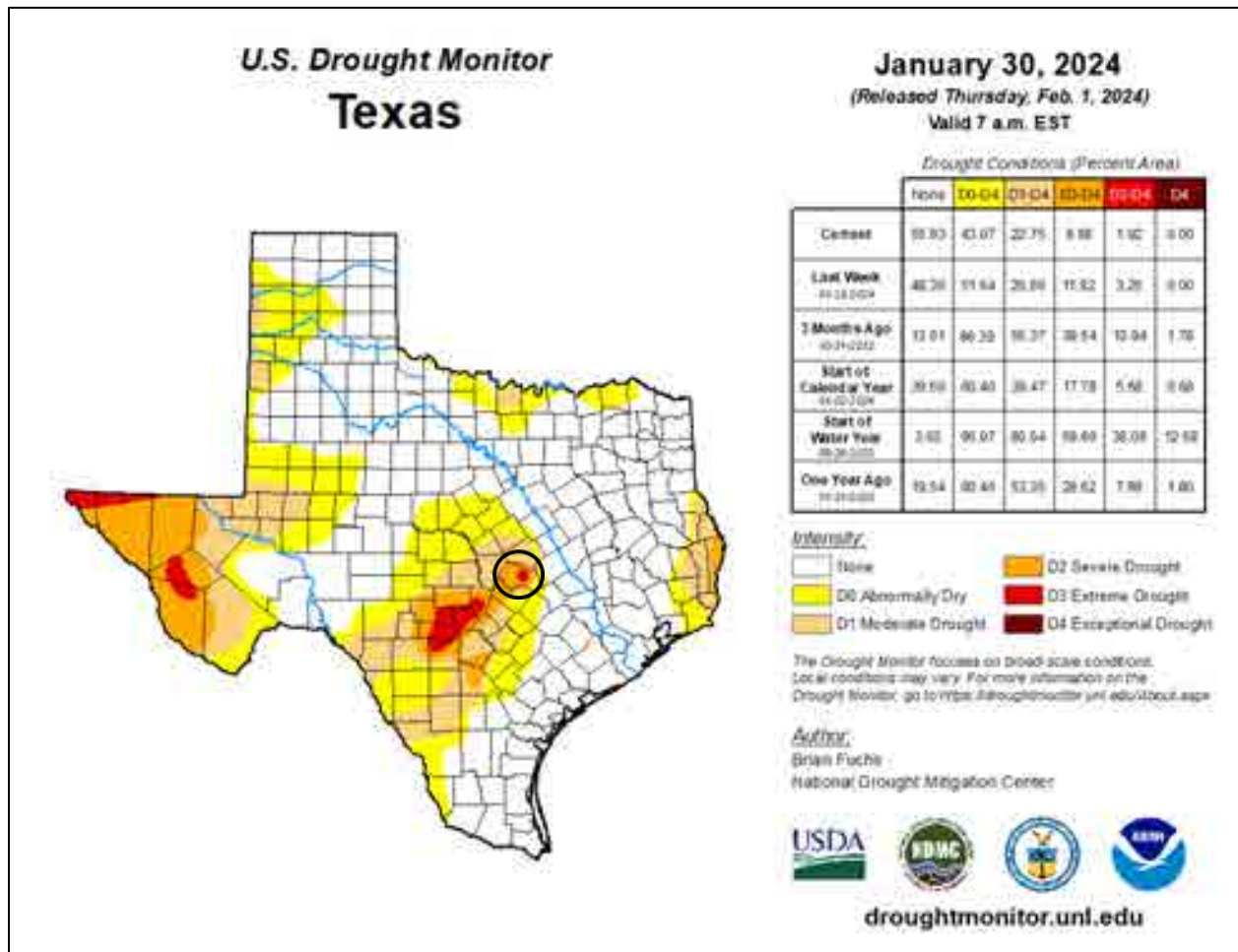
Droughts occur regularly throughout Texas and the Williamson County planning area, including all participating jurisdictions, ISDs and schools, and are considered a normal condition. However, they can vary greatly in their intensity and duration. The U.S. Drought Monitor, produced through

¹ Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, FEMA

SECTION 6: DROUGHT

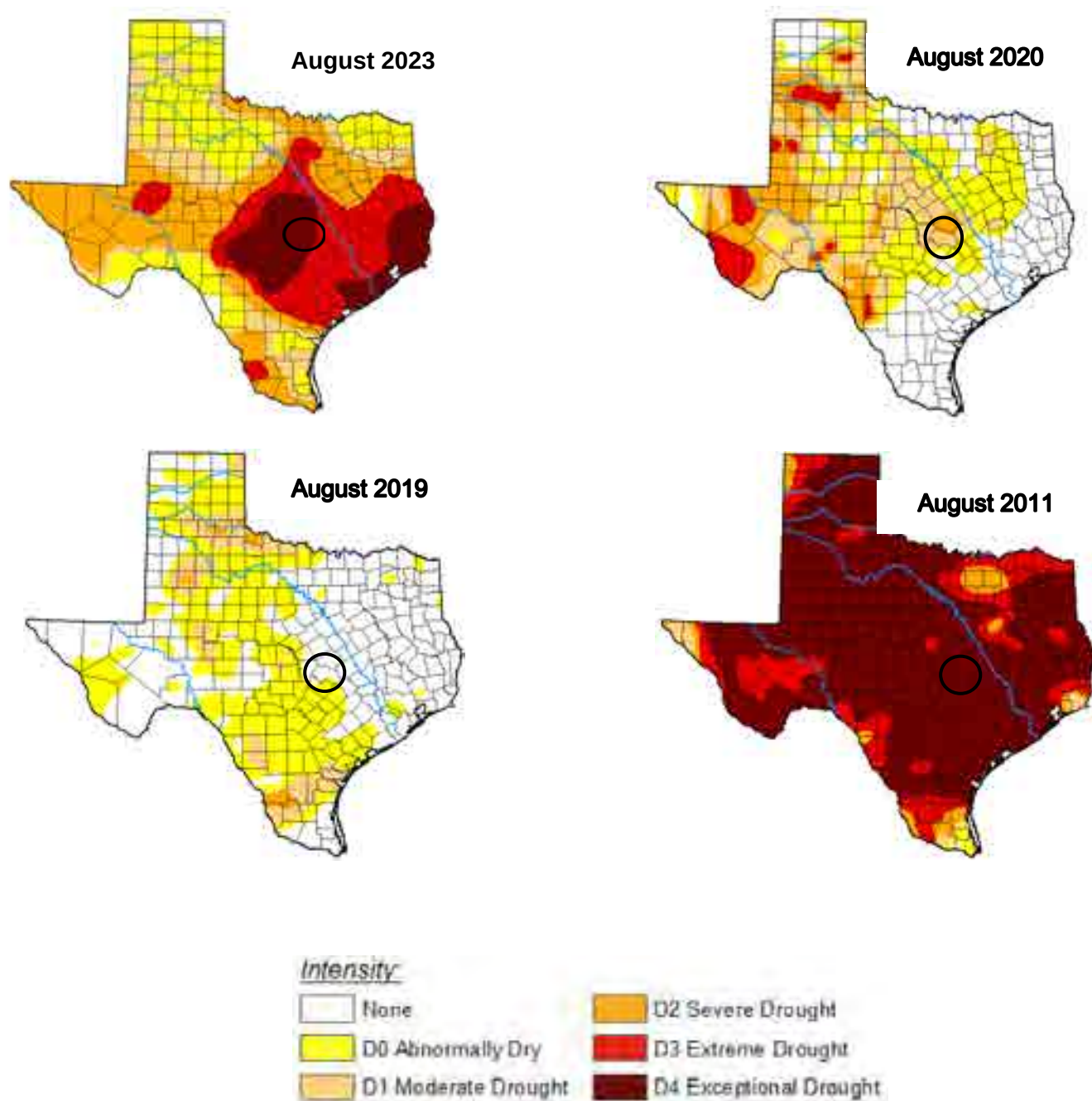
a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, U.S. Department of Agriculture and the National Oceanic and Atmospheric Administration, shows that as of January 2024, the planning area is currently experiencing severe to extreme drought conditions (Figure 6-1) but has experienced a range of conditions from none to exceptional drought conditions over the last decade (Figure 6-2). There is no distinct geographic boundary to drought; therefore, it can occur anywhere throughout the Williamson County planning area.

Figure 6-1. U.S. Drought Monitor, January 2024



SECTION 6: DROUGHT

Figure 6-2. U.S. Drought Monitor, August 2011, August 2019, August 2022, August 2023



SECTION 6: DROUGHT

EXTENT

The Palmer Drought Index is used to measure the extent of drought by measuring the duration and intensity of long-term drought-inducing circulation patterns. Long-term drought is cumulative, with the intensity of drought during the current month dependent upon the current weather patterns plus the cumulative patterns of previous months. The hydrological impacts of drought (e.g., reservoir levels, groundwater levels, etc.) take longer to develop. Table 6-2 depicts magnitude of drought, while Table 6-3 describes the classification descriptions.

Table 6-2. Palmer Drought Index

DROUGHT INDEX	DROUGHT CONDITION CLASSIFICATIONS						
	Extreme	Severe	Moderate	Normal	Moderately Moist	Very Moist	Extremely Moist
Z Index	-2.75 and below	-2.00 to -2.74	-1.25 to -1.99	-1.24 to +.99	+1.00 to +2.49	+2.50 to +3.49	n/a
Meteorological	-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above
Hydrological	-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above

Table 6-3. Palmer Drought Category Descriptions²

CATEGORY	DESCRIPTION	POSSIBLE IMPACTS	PALMER DROUGHT INDEX
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures; fire risk above average. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.	-1.0 to -1.9
D1	Moderate Drought	Some damage to crops, pastures; fire risk high; streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested.	-2.0 to -2.9
D2	Severe Drought	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed.	-3.0 to -3.9
D3	Extreme Drought	Major crop/pasture losses; extreme fire danger; widespread water shortages or restrictions.	-4.0 to -4.9
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells, creating water emergencies.	-5.0 or less

² Source: National Drought Mitigation Center

SECTION 6: DROUGHT

Drought is monitored nationwide by the National Drought Mitigation Center (NDMC). Indicators are used to describe broad scale drought conditions across the U.S. and correspond to the intensity of drought.

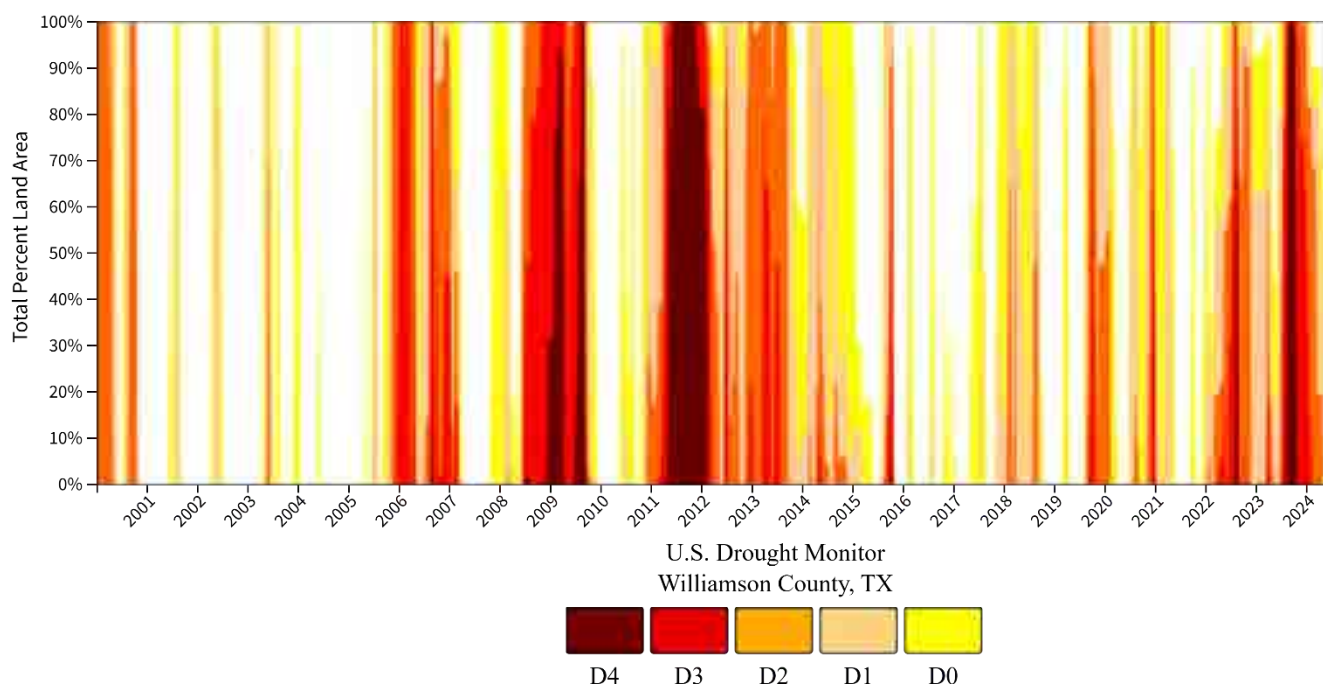
Based on the historical occurrences for drought and the location of the Williamson County planning area, the area can anticipate the full range of drought from abnormally dry to exceptional drought, or D0 to D4, based on the Palmer Drought Category. The entire planning area has experienced exceptional drought conditions. This is the highest level of drought severity and the most extreme drought conditions the planning area can anticipate in the future.

The City of Hutto currently has a drought contingency plan in place with four water conservation stages that may be implemented during periods of drought to preserve local water supply.³

HISTORICAL OCCURRENCES

The Williamson County planning area may experience an extreme drought in any given year. According to the U.S. Drought Monitor, between January 2000 and June 2024, the Williamson County planning area spent a total of 826 weeks (66%) in some level of drought as defined as Abnormally Dry (D0) or worse conditions. The longest continual drought period during this time lasted 239 weeks. Williamson County has received 33 USDA disaster declarations for drought from 2012 through 2023.

Figure 6-3. Williamson County Drought Intensity, 2000-2024⁴



³ City of Hutto Water Conservation Restrictions. <https://www.huttotx.gov/DocumentCenter/View/2583/City-of-Hutto-Water-Restrictions-by-Stage---June-2023>.

⁴ U.S. Drought Monitor

SECTION 6: DROUGHT

Table 6-4 includes the historical events summary for drought impacts that have been reported for Williamson County in the National Centers for Environmental Information Storm Events Database (NCEI). A total of 53 drought impacts were reported in the NCEI over 22 unique drought periods impacting Williamson County from 2000 through June 2024. Historical drought events reported in the NCEI database for the Williamson County planning area, including all participating jurisdictions, ISDs and schools, over the 24.5-year reporting period has resulted in no reported injuries, fatalities, or damages.

Historical drought information shows drought activity across a multi-county forecast area for each event, the appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event. Historical drought data is provided on a county-wide basis per the NCEI Storm Events database.

Table 6-4. Historical Drought Events Summary, 2000-2023

JURISDICTION	DROUGHT EVENTS	DROUGHT PERIODS	INJURIES & DEATHS	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	53	22	0	\$0	\$0

Based on the historical drought events for the Williamson County planning area 25 drought impacts were reported during 5 drought periods since the 2017 Plan.

SIGNIFICANT EVENTS

May 2011 – March 2012

One of the most severe droughts on record impacted the Williamson County planning area. The dry, parched conditions caused billions of dollars in crop and livestock losses, sparked wildfires, pushed power grids to the limit, and reduced reservoirs to dangerously low levels. Williamson County was not spared from these drought conditions and remained at some level of drought (between D2 and D4) for an extended period of time.

The first report of dry conditions for Williamson County was in May of 2011. Most of the southern Texas area was in exceptional drought conditions (D4). The fire danger in South Central Texas remained moderate to high and burn bans were in effect for Williamson County. The Texas A&M agricultural program report indicated the agricultural situation was rapidly deteriorating. Forage availability remained below average, many stock tanks remained extremely low, and some were in danger of drying up. Area lakes and reservoirs remained below normal with Lake Travis around 55 feet below normal by the month of September. These conditions remained over the next few months, with high fire risk and water conservation efforts ongoing. By March of 2012, an ongoing La Nina event brought above average rainfall to the area and helped bring drought conditions down to state D2.

May 2022 – November 2022

Exceptional (D4) to severe (D2) drought conditions affected the Williamson County planning area from May to November of 2022. Despite a few instances of soaking rains, drought continued to plague much of the region as precipitation was low. All public water systems in the Central Texas region encouraged voluntary water restrictions and many had mandatory restrictions in effect. Area reservoirs continued to fall farther below normal conservation pool levels. Williamson County also had a burn ban in place. This is the second most severe drought to impact the planning area, following 2011 the drought.

SECTION 6: DROUGHT

PROBABILITY OF FUTURE EVENTS

Based on available records of historic events, there have been 53 reported drought impacts in the NCEI over 22 drought periods (ranging in length from approximately 5 weeks to just under 8 months) within a 24.5-year reporting period, which provides a probability of approximately one event every year. This frequency supports a “Highly Likely” probability of future events for the Williamson County planning area. The impact of climate change could produce longer, more severe droughts, exacerbating the current drought impacts.

VULNERABILITY AND IMPACT

Loss estimates were based on 24.5 years of statistical data from the NCEI and the U.S. Drought Monitor. A drought event frequency-impact was then developed to determine an impact profile on agriculture products and estimate potential losses due to drought in the area. All existing and future buildings, facilities, and populations are exposed to this hazard and could potentially be impacted. However, drought impacts are mostly experienced in water shortages, breaks in water lines, or crop and livestock losses on agricultural lands and typically have minimal impact on buildings.

The Williamson County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by drought events. For a comprehensive list by participating jurisdiction, please see Appendix C.

Table 6-5. Critical Facilities Vulnerable to Drought Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS, Hospitals)	- Increased law enforcement activities may be required to enforce water restrictions. - Firefighters may have limited water resources to aid in firefighting and suppression activities, increasing risk to lives and property. - Potential for increased number of emergency calls as drought events can lead to cascading hazard events such as wildfires and flash flooding.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters, Governmental Facilities	- Strain on staff as drought may cause health problems related to low water flows and poor water quality. - Water main breaks due to soil shrinking and swelling cycles could lead to facility closures. - Building foundations may crack due to soil shrinking and swelling cycles. - Operations dependent on water supply may be adversely impacted. - Economic disruptions due to cracked foundations and infrastructure damages as a result of soil shrinking and swelling cycles.
Commercial Suppliers (food, gas, etc.)	Operations dependent on water supply may be adversely impacted.

SECTION 6: DROUGHT

CRITICAL FACILITIES	POTENTIAL IMPACTS
	o Economic disruptions due to cracked foundations and infrastructure damages as a result of soil shrinking and swelling cycles.
Utility Services and Infrastructure (electric, water, wastewater, communications)	- o Potential for increased number of emergency calls as drought events can lead to cascading hazard events such as wildfires and flash flooding. - o Water main breaks due to soil shrinking and swelling cycles could lead to facility closures. - o Operations dependent on water supply may be adversely impacted.

Even with the planning area relying on multiple water utility providers as well as local and private service, high demand can still deplete these resources during extreme drought conditions. As resources are depleted, potable water is in short supply and overall water quality can suffer, elevating health concerns for all residents but especially vulnerable populations – typically children, the elderly, and the ill. In addition, potable water is used for drinking, sanitation, patient care, sterilization, equipment, heating and cooling systems, and many other essential functions in medical facilities.

The average person will survive only a few days without potable water, and this timeframe can be drastically shortened for those people with more fragile health – typically children, the elderly, and people with disabilities. During summer drought, or hot and dry conditions, elderly persons, small children, infants, those with disabilities, or who do not have adequate cooling units in their homes may become more vulnerable to injury and/or death. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures. The population over 65 in the Williamson County planning area is estimated at 13 percent of the total population and children under the age of 5 are estimated at 6 percent. Individuals with a disability are estimated at 10 percent of the total population. In addition, an estimated 6 percent of the planning area population live below the poverty level and 22 percent of the populations speaks a language other than English (Table 6-6). Vulnerable populations for participating special districts are listed in Table 6-7.

Table 6-6. Populations at Greater Risk by Participating Jurisdiction

JURISDICTION	ELDERLY (over 65)	YOUTH (under 5)	WITH A DISABILITY	BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Williamson County	77,609	37,584	61,524	38,896	138,476
City of Hutto	1,830	2,155	2,658	2,301	7,141

SECTION 6: DROUGHT

Table 6-7. Populations at Greater Risk for Special Districts

JURISDICTION	POPULATION UNDER 5
Georgetown ISD	469
Hutto ISD	415
Liberty Hill ISD	240
Meridian World School	0

The planning area is also vulnerable to food shortages when drought conditions exist, and potable water is in short supply. Potable water is used for drinking, sanitation, patient care, sterilization, equipment, heating and cooling systems, and many other essential functions in medical facilities. All residents in the Williamson County planning area could be adversely affected by drought conditions, which could limit water supplies and present health threats.

The economic impact of droughts can be significant as they produce a complex web of impacts that spans many sectors of the economy and reach well beyond the area experiencing physical drought. This complexity exists because water is integral to our ability to produce goods and provide services. If droughts extend over several years, the direct and indirect economic impact can be significant.

Crop production can also suffer greatly during extreme drought conditions, limiting fresh local food supplies, driving up costs, and negatively impacting the local economy. Drought conditions could adversely affect the agricultural industry throughout the Williamson County planning area.

Impacts of past droughts experienced in the Williamson County planning area, including participating jurisdictions, ISDs and schools, have not resulted injuries or fatalities, supporting a “Limited” severity of impact meaning injuries and/or illnesses do not result in permanent disability, shutdown of facilities and services for 24 hours or less, and more than 10 percent of property is impacted. There is no reported crop, livestock or property damage due to drought over the 24.5-year reporting period in the Williamson County planning area.⁵

ASSESSMENT OF IMPACTS

The Drought Impact Reporter was developed in 2005 by the University of Nebraska-Lincoln to provide a national database of drought impacts. Droughts can have an impact on agriculture, business and industry; energy; fire; plants and wildlife; relief, response, and restrictions; society and public health; tourism and recreation; and water supply and quality. The reports are submitted from individuals to Federal, State, and local agencies, as well as the general public. Table 6-11 lists the drought impacts to Williamson County from 2005 to 2023 based on reports received by the Drought Impact Reporter.

⁵ Crop and livestock losses associated with drought conditions are typically unavailable to the general public.

SECTION 6: DROUGHT

Table 6-8. Drought Impacts, 2005-2024⁶

DROUGHT IMPACTS 2005-2023	
Agriculture	332
Business & Industry	2
Energy	9
Fire	242
Plants & Wildlife	344
Relief, Response & Restrictions	271
Society & Public Health	33
Tourism & Recreation	15
Water Supply & Quality	342

Drought has the potential to impact people in the Williamson County planning area. While it is rare that drought, in and of itself, leads to a direct risk to the health and safety of people in the U.S., severe water shortages could result in inadequate supply for human needs. Williamson County is the 6th fastest growing county in the State of Texas. Its major cities include Round Rock, Cedar Park, Georgetown (#1 fastest growing city in the U.S.), Leander (#3 fastest growing city in the U.S.), Taylor, and Hutto. The population in Williamson County is estimated to be 1,377,000 by 2045, almost doubling in size.⁷ This level of future growth can cause concern for the current water infrastructure and demand for the planning area. Severe drought conditions can be frequently associated with a variety of impacts, including:

- o Dry clay soil can lead to water main lines shifting and breaking. Often repair to water lines includes shutting off water to multiple homes at one time.
- o The number of health-related low-flow issues (e.g., diminished sewage flows, increased pollution concentrations, reduced firefighting capacity, and cross-connection contamination) will increase as the drought intensifies.
- o Public safety from forest / range / wildfires will increase as water availability and/or pressure decreases.
- o Respiratory ailments may increase as the air quality decreases.
- o There may be an increase in disease due to wildlife concentrations (e.g., rabies, Rocky Mountain spotted fever, Lyme disease).
- o Residents may disagree with the County and participating Cities over water use / water rights, creating conflict.
- o Political conflicts may increase between municipalities, counties, states, and regions.
- o Water management conflicts may arise between competing interests.

⁶ January 2005 through June 2024 reporting period.

⁷ Williamson County Growth At A Glance. <https://www.wilcotx.gov/DocumentCenter/View/2824/Growth-at-a-Glance-2024-PDF?bidId=>

SECTION 6: DROUGHT

- o Increased law enforcement activities may be required to enforce water restrictions.
- o Severe water shortages could result in inadequate supply for human needs as well as lower quality of water for consumption.
- o Firefighters may have limited water resources to aid in firefighting and suppression activities, increasing risk to lives and property.
- o During drought there is an increased risk for wildfires and dust storms.
- o The community may need increased operational costs to enforce water restriction or rationing.
- o Prolonged drought can lead to increases in illness and disease related to drought.
- o Utility providers can see decreases in revenue as water supplies diminish.
- o Utilities providers may cut back energy generation and service to their customers to prioritize critical service needs.
- o Hydroelectric power generation facilities and infrastructure would have significantly diminished generation capability. Dams simply cannot produce as much electricity from low water levels as they can from high water levels.
- o Fish and wildlife food and habitat will be reduced or degraded over time during a drought and disease will increase, especially for aquatic life.
- o Wildlife will move to more sustainable locations creating higher concentrations of wildlife in smaller areas, increasing vulnerability, and further depleting limited natural resources.
- o There are 18 federally endangered, threatened or candidate species in Williamson County. Severe and prolonged drought can result in the reduction of a species or cause the extinction of a species altogether.
- o Plant life will suffer from long-term drought. Wind and erosion will also pose a threat to plant life as soil quality will decline. The urban tree canopy, including county and city parks, are vulnerable to the impacts of prolonged drought.
- o Dry and dead vegetation will increase the risk of wildfire.
- o Drought poses a significant risk to annual and perennial crop production and overall crop quality leading to higher food costs.
- o Drought-related declines in production may lead to an increase in unemployment.
- o Drought may limit livestock grazing resulting in decreased livestock weight, potential increased livestock mortality, and increased cost for feed.
- o Negatively impacted water suppliers may face increased costs resulting from the transport water or developing supplemental water resources.
- o Long term drought may negatively impact future economic development.

The overall extent of damage caused by periods of drought is dependent on its extent and duration. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a drought event.

CLIMATE CHANGE CONSIDERATIONS

With the range of factors influencing drought conditions, it is impossible to make quantitative statewide projections of drought trends; however, many factors point toward increased drought severity. Drought will continue to be driven largely by precipitation variability over multiple decades, with long-term precipitation trends expected to be relatively small. Other factors affecting drought impacts, such as increased temperatures and improved plant water use

SECTION 6: DROUGHT

efficiency, decrease water availability but will cause drought impact trends to be highly sector-specific, with the impacts possibly smaller for agriculture than for surface water supply.⁸

The Williamson County planning area can anticipate an increased likelihood of droughts in the future due to an estimated increase in the number of dry days in the Williamson County area. In addition, it is projected that future changes to Williamson County will include increased temperatures, which according to the U.S. Climate Explorer, the planning area may experience a 6°F increase in the average extreme heat temperatures. Historically, extreme temperatures averaged 100°F in Williamson County, but between 2035 and 2064 the average will be 106°F, increasing the severity and frequency of drought events. The increase in temperature could be higher but will depend on overall future emissions.

⁸ Cleaveland, M. K., T. H. Votteler, D. K. Stahle, R. C. Casteel, and J. L. Banner, 2011: Extended Chronology of Drought in South Central, Southeastern and West Texas. Texas Water Journal, 2, 54-96, as cited in as cited in Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.



SECTION 7 **EARTHQUAKE**

SECTION 7: EARTHQUAKE

Hazard Description	1
Location	2
Extent.....	4
Historical Occurrences.....	7
Probability of Future Events.....	7
Vulnerability and Impact.....	7
Climate Change Considerations	8

HAZARD DESCRIPTION

An earthquake is the sudden movement of the Earth's surface caused by the release of stress accumulated within or along the edge of the Earth's tectonic plates, volcanic eruption, or by a manmade explosion. The majority of earthquakes occur along faults; however, earthquakes can occur within plate interiors. Over geologic time, plates move and plate boundaries change, pushing weakened boundary regions to the interior part of the plates. These areas of weakness within the continents can cause earthquakes in response to stresses that originate at the edges of the plate or in the deeper crust.

Earthquake locations are described by the focal depth and geographic position of the epicenter. The focal depth of an earthquake is the depth from the Earth's surface to the region where an earthquake's energy originates (the focus or hypocenter). The epicenter is the point on the Earth's surface directly above the hypocenter. Earthquakes usually occur without warning, with their effects impacting great distances away from the epicenter.

According to the U.S. Geological Society (USGS) Earthquake Hazards Program, an earthquake hazard is anything associated with an earthquake that may influence an individual's normal activities. Table 7-1 describes definition of examples.

Table 7-1. Definitions of Earthquake Hazards¹

HAZARD	DESCRIPTION
Surface Faulting	Displacement that reaches the earth's surface during slip along a fault. Commonly occurs with shallow earthquakes, those with an epicenter less than 20 kilometers.
Ground Motion (shaking)	The movement of the earth's surface from earthquakes or explosions. Ground motion or shaking is produced by waves that are generated by sudden slip on a fault or sudden pressure at the explosive source and travel through the earth and along its surface.
Landslide	A movement of surface material down a slope.
Liquefaction	A process by which water-saturated sediment temporarily loses strength and acts as a fluid, like when you wiggle your toes in the wet sand near the water at the beach. This effect can be caused by earthquake shaking.

¹ Source: USGS, 2012

SECTION 7: EARTHQUAKE

HAZARD	DESCRIPTION
Tectonic Deformation	A change in the original shape of a material due to stress and strain.
Tsunami	A sea wave of local or distant origin that results from large-scale seafloor displacements associated with large earthquakes, major submarine slides, or exploding volcanic islands.
Seiche	The sloshing of a closed body of water from earthquake shaking.

LOCATION

Earthquake hazard areas are mapped by the USGS's National Seismic Hazard Model (NSHM). Figure 7-1 shows the most recent 2023 iteration of this USGS model. The NSHM defines the potential for earthquake ground shaking for various probability levels across the United States. The 2023 NSHM is an update to the previous 2018 version, and compiles data and findings from a number of sources including earthquake catalogs, geodetic- and geologic-based fault and deformation models, and ground motion models (GMMs), among others.² The map shows the percent chance that a given area will experience a category VI (or stronger) earthquake in 100 years, as defined by the Modified Mercalli Intensity (MMI) Scale (Table 7-3). The likelihood of a significant earthquake event is signified by the color-coding on the map. Densely populated areas are also highlighted on the map (purple and black dotting) to indicate areas of elevated vulnerability in relation to higher seismic risk. The Williamson County planning area, as identified in Figure 7-1, is located in a low hazard area, with less than five percent chance of experiencing a strong earthquake every 100 years.

² A comprehensive overview of the modelling process can be found at the USGS website, <https://www.usgs.gov/programs/earthquake-hazards/science/2023-50-state-long-term-national-seismic-hazard-model-0#overview>

SECTION 7: EARTHQUAKE

Figure 7-1. U.S. Map of Peak Ground Acceleration³

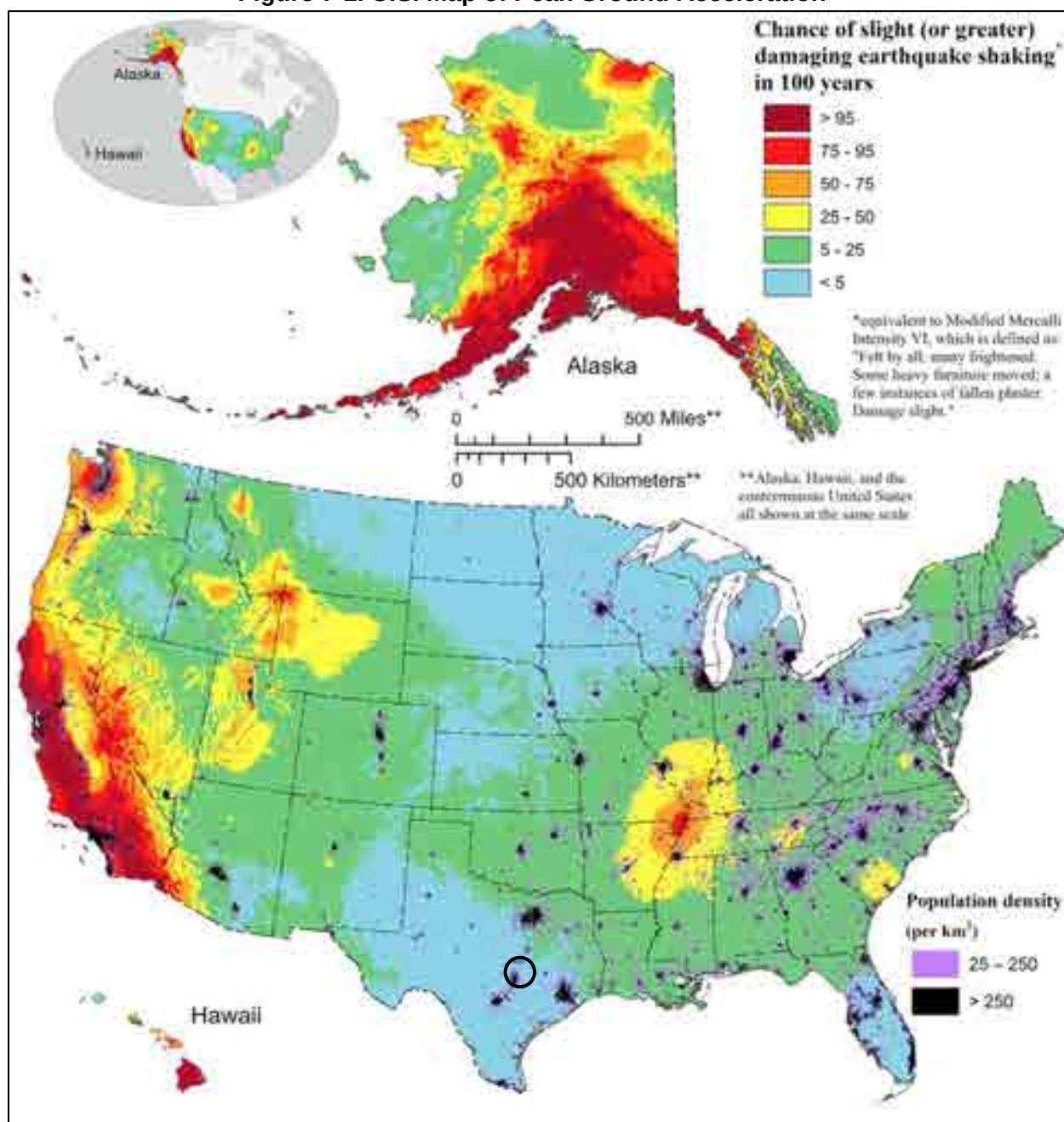
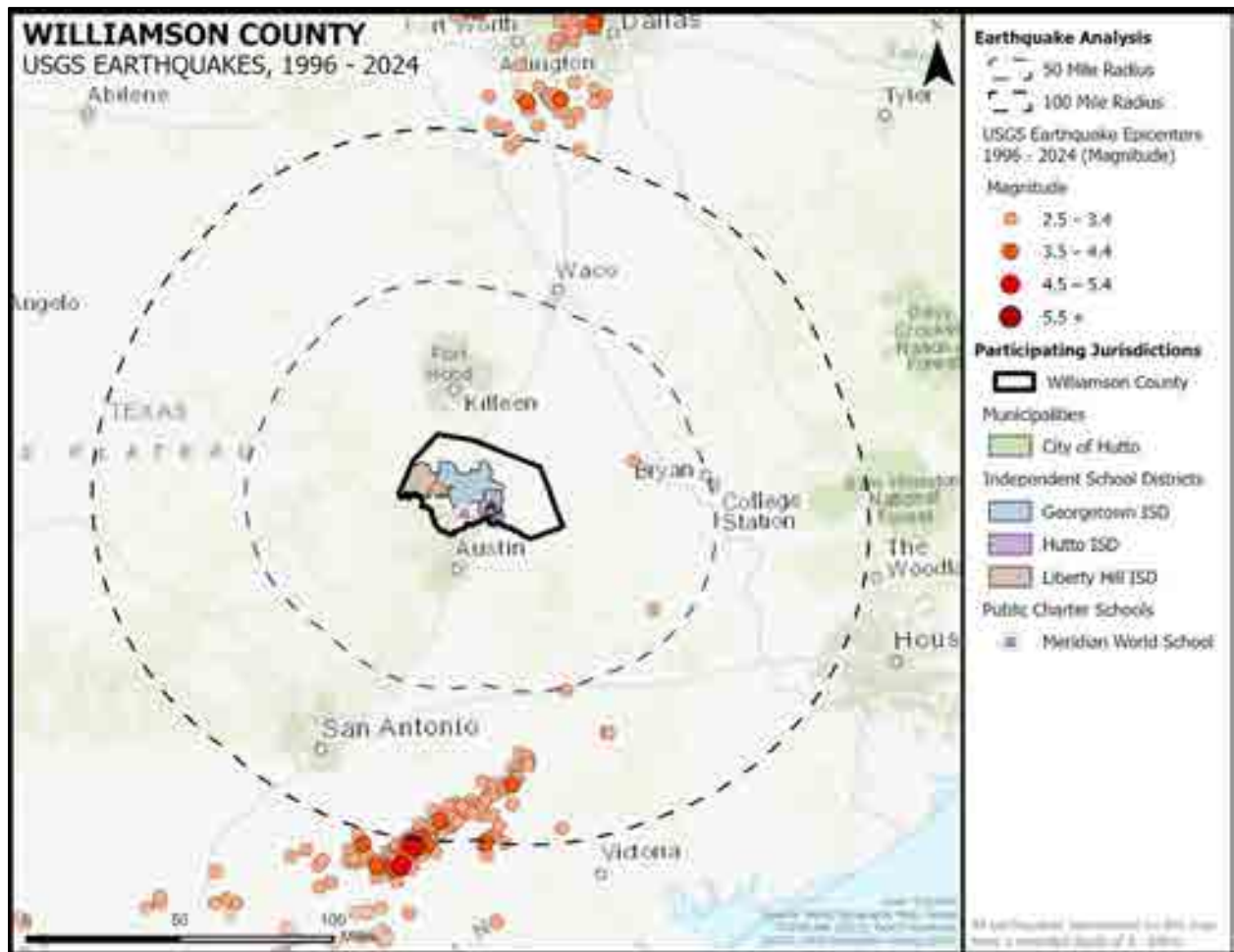


Figure 7-2 maps historic earthquake epicenters across Texas surrounding the Williamson County planning area, including participating jurisdictions, ISDs and schools, between 1996 and 2024, per data available in the USGS Earthquake Catalog database.

³ The Williamson County planning area is indicated by the black circle.

SECTION 7: EARTHQUAKE

Figure 7-2. Historic Earthquake Epicenters in Central Texas, 1996-2024⁴



EXTENT

Earthquakes are measured in terms of magnitude and intensity. The prevalent magnitude measurement in use today is based on the Moment Magnitude Scale (MMS). MMS measures the movement of rock along the fault. It accurately measures larger earthquakes, which can last for minutes, affect a much larger area, and cause more damage. Magnitudes are based on a logarithmic scale (base 10), meaning that for each whole number you go up on the magnitude scale, the amplitude of the ground motion recorded by a seismograph goes up ten times. Using this scale, a magnitude 5 earthquake would result in ten times the level of ground shaking as a magnitude 4 earthquake (and about 32 times as much energy would be released).⁵ The USGS reports earthquake magnitudes above 4.0 as “moment magnitude,” often described in the press

⁴ Source: <https://www.usgs.gov/programs/earthquake-hazards>. Event data reported from January 1950 through April 2024.

⁵ (n.d.). How Do We Measure Earthquake Magnitude? Michigan Tech. <https://www.mtu.edu/geo/community/seismology/learn/earthquake-measure/#:~:text=The%20moment%20magnitude%20scale%20is,the%20earthquake%20at%20multiple%20stations>.

SECTION 7: EARTHQUAKE

as "Richter" magnitude. Table 7-2 shows the magnitude levels for the current Richter / Moment Magnitude scale.

Table 7-2. Richter / Moment Magnitude Scale⁶

MAGNITUDE	CATEGORY	DESCRIPTION OF EFFECTS	EVENTS PER YEAR
< 3.0	Micro	Usually not felt, but can be recorded by seismograph	+100,000
3.0 – 3.9	Minor	Often felt, but causes no damage	12,000 - 100,000
4.0 – 4.9	Light	Felt by all, minor breakage of objects	2,000 - 12,000
5.0 – 5.9	Moderate	Some damage to weak structures	200 – 2,000
6.0 – 6.9	Strong	Moderate damage in populated areas	20 – 200
7.0 – 7.9	Major	Serious damage over large areas with loss of life expected	3 – 20
> 7.9	Great	Severe destruction and loss of life over large areas	Less than 3

Earthquake Intensity measurement is an on-the-ground description. The measurement qualitatively explains the severity of earthquake shaking and its effects on people and their environment. Intensity measurements will differ depending on each location's proximity to the epicenter or point on the surface of the earth directly above the focus where the earthquake started. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and total destruction. There can be multiple intensity measurements associated with an earthquake as opposed to one magnitude measurement.⁷ The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the nonscientist than the magnitude because intensity refers to the effects actually experienced at a specific location. The scale provides the intensity of the earthquake in values ranging from I to X. Table 7-3 describes the typical effects and intensities associated with earthquakes of various magnitudes. The intensity and effects depend on multiple factors (earthquake depth, epicenter location, site geology, population density, to name a few) and can vary widely.

⁶ (n.d.). Earthquakes. Britannica. <https://www.britannica.com/science/earthquake-geology>

⁷ Wood, H. O., and Neumann, Frank (1931). Modified Mercalli Intensity Scale of 1931: Seismological Society of America Bulletin, v. 21, no. 4, p. 277-283.

SECTION 7: EARTHQUAKE

Table 7-3. Magnitude and Modified Mercalli Intensity (MMI) Scale⁸

INTENSITY	CATEGORY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER MAGNITUDE
I	Not Felt	Not felt except by a very few under especially favorable conditions	< 2.0
I	Not Felt	Felt only by a few persons at rest, especially on upper floors of buildings.	2.0 – 2.9
II – III	Weak	Felt quite noticeably by persons indoors, with shaking of indoor objects. Rarely causes damages.	3.0 – 3.9
IV – V	Light to Moderate	Noticeable shaking of indoor objects and rattling noises. Felt by most people in the affected area. Generally, no to minimal damage	4.0 – 4.9
VI – VII	Strong to Very Strong	Significant damages to poorly constructed buildings. Limited to moderate damages to well-built structures.	5.0 – 5.9
VIII – IX	Severe to Violent	Damage slight in specially designed structures; considerable damage in ordinary buildings with partial collapse. Damage great in poorly built structures.	6.0 – 6.9
VIII +	Severe to Extreme	Damage considerable in specially designed structures. Damage substantial to most buildings, with partial or complete collapse. Felt across great distances with major damage mostly limited to 250 km from Epicenter.	7.0 – 7.9
VIII – IX	Severe to Violent	Major damage to buildings, structures likely to be destroyed; will cause moderate to heavy damage to sturdy or earthquake-resistant buildings; damaging in large areas; felt in extremely large regions.	8.0 – 8.9
VIII +	Severe to Extreme	At or near total destruction. Severe damage or collapse to all buildings; heavy damage and shaking extends to distant locations and permanent changes in ground topography.	9.0+

⁸ Source: USGS

SECTION 7: EARTHQUAKE

Taking into consideration the possible extent of an earthquake for the area, by reviewing Tables 7-2 and 7-3 in conjunction with no significant previous occurrences, as depicted in Figure 7-2, the Williamson County planning area experiences on average less than 3.0 magnitude or Levels II-III (weak impact) on the Modified Mercalli intensity scale. This is the greatest extent the entire planning area can anticipate in the future, based on historic records.

HISTORICAL OCCURRENCES

According to USGS, and the National Geophysical Data Center (NGDC), there are no “significant” earthquakes on record for the State of Texas and the entire Williamson County planning area from 2150 B.C. to present. A significant earthquake, as defined by NGDC, is one that has caused at least moderate damage (approximately \$1 million or more), has resulted in 10 or more deaths, has registered as a magnitude 7.5 or greater, has registered as Modified Mercalli Intensity (MMI) Scale X or greater, or generated a tsunami. None of these criteria have been met by any seismic activity known to have impacted the planning area.

Low magnitude seismic activity in and around the Williamson County planning area that has occurred since 1996 includes 95 earthquakes within 100 miles of the planning area, 2 within 50 miles, and 1 within the planning area. The strongest of these events occurred between the 100-mile and 50-mile radiuses around the planning area with a magnitude of 4.0 (light to moderate intensity). The only earthquake within the planning area occurred on September 3, 2015, and registered a 2.9 magnitude (not felt). None of these events are known to have impacted Williamson County or the participating jurisdictions, ISDs and schools, with the vast majority likely not perceptible within the planning area.

PROBABILITY OF FUTURE EVENTS

Earthquake Hazard Maps show the distribution of earthquake shaking levels that have a certain probability of occurring over a given period. According to the USGS, the entire Williamson County planning area, including participating jurisdictions and special districts, has a less than five percent chance of a slightly damaging (or greater) earthquake within 100 years. Based on historical records, the probability of an earthquake affecting the planning area is “Unlikely”, meaning that an event is probable in the next 10 years.

VULNERABILITY AND IMPACT

Little warning is usually associated with earthquakes and can impact areas a great distance away from the epicenter. The amount of damage depends on the density of population and buildings, and infrastructure construction in the affected area. Some places may be more vulnerable than others based on soil type, building age, and building codes in the Williamson County planning area.

The Williamson County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by earthquake events. For a comprehensive list by participating jurisdiction, please see Appendix C.

SECTION 7: EARTHQUAKE

Table 7-4. Critical Facilities Vulnerable to an Earthquake

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	- o Emergency operations and services may be significantly impacted due to power outages, damaged facilities, fires and/or loss of communications. Impact can impede emergency response vehicle access to areas. - o Power outages could disrupt communications, delaying emergency response times. - o Extended power outages may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	- o Power outages could disrupt critical care. - o Backup power sources could be damaged. - o Evacuations may be necessary due to extended power outages or other associated damages to facilities. - o Economic disruption due to power outages negatively impact airport services as well as area businesses reliant on airport operations.
Commercial Supplier (food, fuel, etc.)	- o Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. - o Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	- o Emergency operations and critical services may be significantly impacted due to power outages, damaged facilities, and/or loss of communications. Impact can impede emergency service vehicle access to areas. - o Power outages could disrupt communications, delaying emergency response times further straining the capacity and resources of emergency service personnel.

With no significant historical events recorded, neither annualized loss-estimates or a breakdown of potential dollar losses of critical facilities and infrastructure from earthquakes are available. One earthquake event has occurred in the planning area; however this event registered a magnitude of 2.9, falling within the “micro” category and causing no damages. The potential severity of impact from an earthquake for the entire Williamson County planning area, including participating jurisdictions, ISDs and schools, is classified as “Limited”, meaning that less than 10 percent of infrastructure would be damaged with critical facilities being shut down for less than 24 hours.

CLIMATE CHANGE CONSIDERATIONS

Damaging earthquakes are rare within the State of Texas, including the Williamson County planning area. Changing conditions of weather patterns and climate change has not been established as having a direct impact on earthquake intensity or frequency.

SECTION 7: EARTHQUAKE

According to the USGS, statistically there is an approximately equal distribution of earthquakes in all cold weather, hot weather, rainy weather, etc. Very large low-pressure changes associated with major storm systems, like typhoons and hurricanes, are known to trigger episodes of fault slip or slow earthquakes in the Earth's crust and may also play a role in triggering some damaging earthquakes. However, the numbers are small and are not statistically significant.⁹

The Williamson County planning area is located outside of any known earthquake hazard areas and is not located on or near any active fault lines. Climate change is assumed to have no impact on the probability or intensity of potential earthquakes in the planning area.

⁹ (n.d.). *Natural Hazards*. United States Geological Survey. <https://www.usgs.gov/faqs/there-earthquake-weather>



SECTION 8

EXPANSIVE SOILS

SECTION 8: EXPANSIVE SOILS

Hazard Description	1
Location	1
Extent.....	4
Historical Occurrences.....	5
Probability of Future Events.....	5
Vulnerability and Impact.....	5
Assessment of Impacts	7
Climate Change Considerations	9

HAZARD DESCRIPTION

Expansive soils are soils and soft rocks with a relatively high percentage of clay minerals that are subject to changes in volume as they swell and shrink with changing moisture conditions. Expansive soils contain minerals such as smectite clays that are capable of absorbing water. When these clays absorb water, they increase in volume and expand. The change in soil volume and resulting expansion can exert enough force on a building or other structure to cause damage.



Expansive soils will also lose volume and shrink when they dry. Drought conditions can cause soils to contract in response to a loss of soil moisture. A reduction in soil volume can affect the support to buildings or other structures and result in damage. Fissures in the soil can also develop and facilitate the deep penetration of water when moist conditions or runoff occurs. This produces a cycle of shrinkage and swelling that place repetitive stress on structures. The effect of expansive soil is most prevalent in regions prone to prolonged periods of drought followed by periods of moderate to high precipitation.

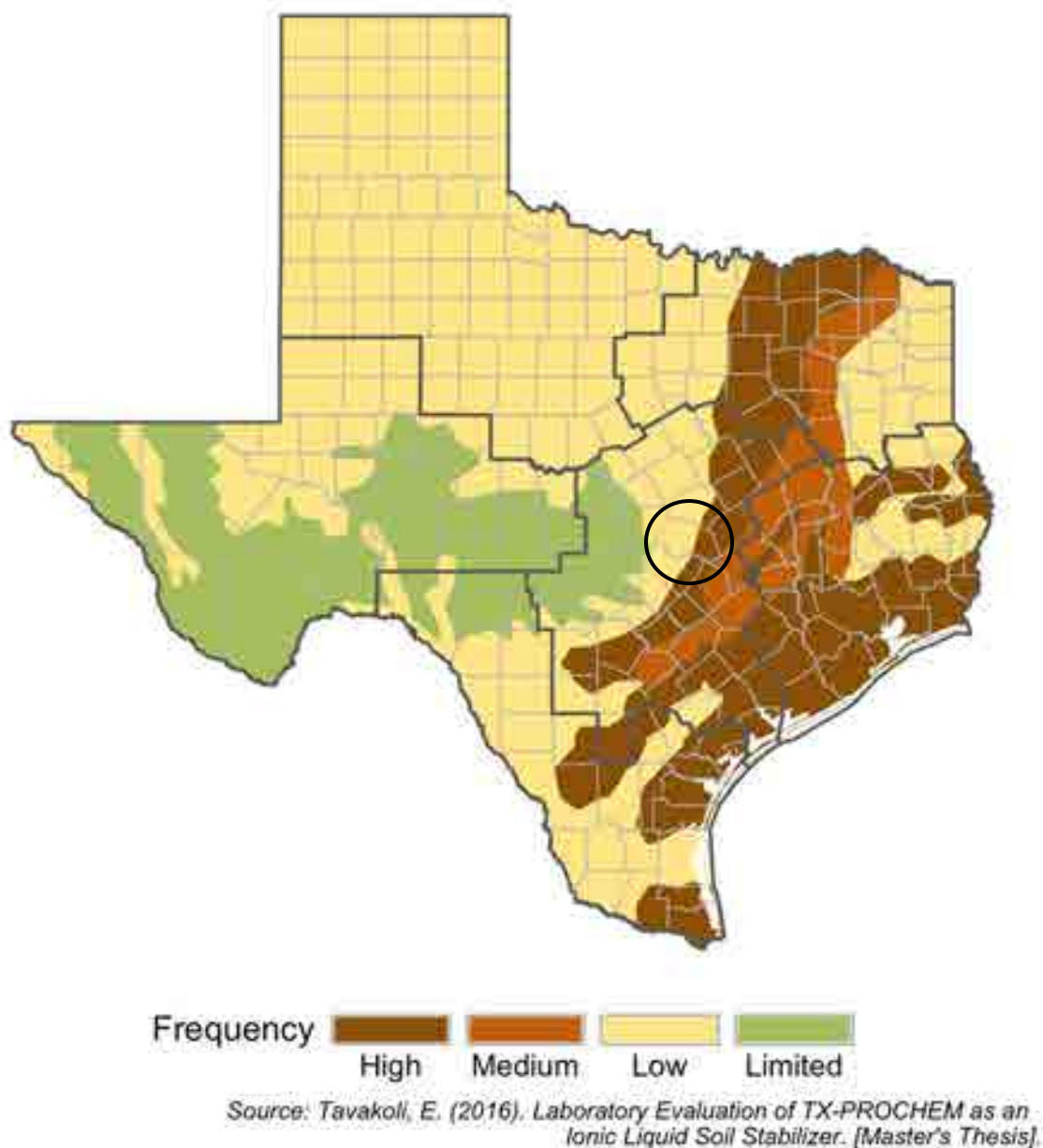
LOCATION

In Texas the most expansive soils are in a band 200 miles west from the coastline, stretching approximately from Beaumont down to Brownsville. These areas receive the most moisture and are also vulnerable to droughts, which can cause the soil to contract. In the Williamson County planning area, the problems associated with expansive soil typically occur during drought periods. Expansive soils (bentonite, smectite, or other reactive clays) expand when the soil particles attract water and can shrink when the clay dries.

Figure 8-1 shows areas of expansive soil in Texas. Most of Williamson County falls within the low-risk area, indicated in yellow, while the eastern portion falls within the high-risk area, indicated in brown. Figure 8-2 depicts the types of land resources in the State of Texas due to their soil types.

SECTION 8: EXPANSIVE SOILS

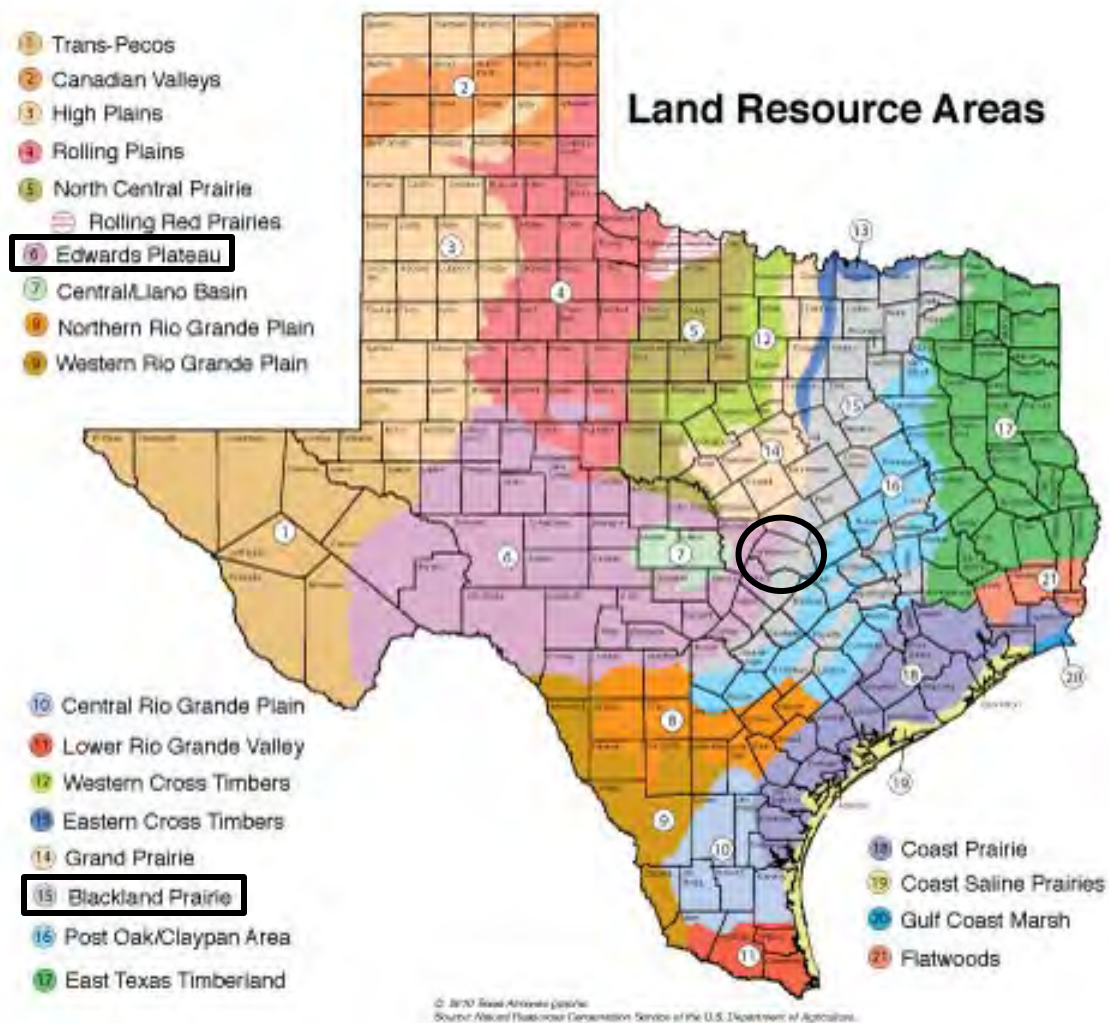
Figure 8-1. Location of Expansive Soils in Texas¹



¹ Tavakoli, E. (2016). Laboratory Evaluation of TX-PROCHEM as an Ionic Liquid Soil Stabilizer. [Master's Thesis]. The Williamson County planning area is indicated by the black circle.

SECTION 8: EXPANSIVE SOILS

Figure 8-2. Texas Geological Survey²



The Williamson County planning area, as identified within the black circle in Figure 8-2, is located within two land resource areas: the Edwards Plateau and the Blackland Prairie. The entire planning area, including all participating jurisdictions, ISDs, and schools, is located in an area affected by expansive soils.

Blackland Prairie: The Blackland Prairie region is named for the deep, fertile black soils that characterize the area. Blackland Prairie soils once supported a tallgrass prairie dominated by tall-growing grasses such as big bluestem, little bluestem, Indiangrass, and switchgrass. Because of the fertile soils, much of the original prairie has been plowed to produce food and forage crops. The south-central part of the Blackland Prairie region receives fairly uniform rainfall distribution throughout the year.

² Source: USDA, <http://www.nrcs.usda.gov>. The Williamson County planning area is indicated by the black circle.

SECTION 8: EXPANSIVE SOILS

Typically, soils are uniformly dark-colored alkaline clays, often referred to as "black gumbo," interspersed with some gray acidic sandy loams. The landscape is gently rolling to nearly level, and elevations range from 300 to 800 feet above sea level. Crop production and cattle ranching are the primary agricultural industries.

Edwards Plateau: The 22.7 million acres of the Edwards Plateau are in South Central Texas, east of the Trans-Pecos and west of the Blackland Prairie. Uplands are nearly level to undulating, except near large stream valleys, where the landscape is hilly with deep canyons and steep slopes. There are many cedar brakes in this area and surface drainage is rapid.

Upland soils are mostly shallow, stony, or gravelly, and consisting of dark alkaline clays and clay loams underlain by limestone. Lighter-colored soils are on steep side slopes and deep, less-stony soils are in the valleys. Bottomland soils are mostly deep, dark-gray or brown, with alkaline loams and clays.

Raising beef cattle is the main enterprise in this region, but it is also the center of Texas' and the nation's mohair and wool production. The area provides a major deer habitat and hunting leases produce income. Cropland is mostly in the valleys on the deeper soils and is used mainly for growing forage crops and hay. The major soil-management concerns are brush control, large stones, low fertility, excess lime, and limited soil moisture.³

EXTENT

Expansive soils risk is measured by the degree to which soils may shrink or swell. Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent, moderate if 3 to 6 percent, high if 6 to 9 percent, and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures.⁴

Figure 8-3. NRCS Soil Linear Extensibility Risk Categories

Potential Category	Linear Extensibility %	Clay %
Low	< 3%	< 25%
Moderate	3% - 6%	25% - 35%
High	6% - 9%	35% - 45%
Very High	> 9%	> 45%

The Soil Survey was developed by the USDA Soils Conservation Service and contains information that can be applied in determining the suitability of soils in the planning area when

³ Source: <https://www.texasalmanac.com/articles/soils-of-texas#:~:text=The%2022.7%20million%20acres%20of,cedar%20brakes%20in%20this%20area.>

⁴ (2009). *Soil Reports*. Natural Resources Conservation Service. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_016186.pdf

SECTION 8: EXPANSIVE SOILS

selecting sites for roads, structures, and infrastructure. Based on Soil Survey data, roughly 39 percent of the Williamson County planning area is subject to moderate (<3%) linear extensibility and therefore moderate frequency of expansive soils (Figure 8-1). The next most common linear extensibility category is very high (>9%) found in 33 percent of the planning area, followed by roughly 18 percent subject to high (6-9%) linear extensibility and 9 percent subject to low (<3%) linear extensibility. The remaining one percent of land is constituted of materials which do not receive linear extensibility ratings such as water, landfills, quarries, or dams.⁵

HISTORICAL OCCURRENCES

Expansive soil is a condition that is native to Texas soil characteristics and cannot be documented as a time-specific event, except when it leads to structural and infrastructure damage. Extreme conditions can damage roads, structures, and infrastructure, including projects still under construction. Previous occurrences for expansive soils often align with historical drought periods. Damages associated with expansive soils are typically considered negligible. The Williamson County planning area, including participating jurisdictions, ISDs and schools, largely has no known recorded events of damaging expansive soils. Planning Team members from Hutto ISD reported that some of their facilities sit on expansive clays, and they have experienced broken pipes historically due to this. Specific data on these impacts such as the date, number of instances, location, or monetary damages to repair the broken pipes was not available. Refer to the Drought profile (Section 6) of this plan for more information on the impacts of past drought events.

PROBABILITY OF FUTURE EVENTS

The Texas Department of Licensing and Regulation requires structures built after 2005 to include soil tests to be conducted for the likelihood of soil expansion, compression, or shifting. In such cases, top or subsoils are required to be removed and remaining soils stabilized. Builders must ensure that water drains away from the structure on all sides and building owners notified of the potential for damage if changes in drainage flow occur. These measures significantly reduce the probability of expansive soil impacts on newer and future development. It is considered “Occasional” that the high-risk areas in the Williamson County planning area, including participating jurisdictions, ISDs and schools, will experience expansive soil impacts such as problems with foundations, roadways, sidewalks and other structures and infrastructure in the future, especially during times of drought. Older structures will be impacted with greater frequency due to the soil testing and stabilization requirements for newer structures.

VULNERABILITY AND IMPACT

The effects of expansive soils are most prevalent when periods of moderate to high precipitation are followed by drought and then again by periods of rainfall. Other cases of damage result from increases in moisture volume from such sources as broken or leaking water and sewer lines. Dry clays are capable of absorbing water and will increase in volume in an amount proportional to the amount of water absorbed. Soils capable of changes in volume present a hazard to structures built over them and to the pipelines buried in them. Houses and one-story commercial buildings

⁵ Source: <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>

SECTION 8: EXPANSIVE SOILS

are more apt to be damaged by the expansion of swelling clays than are multi-story buildings, which are usually heavy enough to counter swelling pressures. However, if constructed on wet clay, multi-story buildings may also be damaged by clay shrinkage when moisture levels are substantially reduced.

Cracked foundations and floors, jammed windows and doors, and ruptured pipelines are typical types of damage resulting from swelling soils. Damage to the upper floors of larger buildings can occur when motion in the structure is significant. While all infrastructure within the planning area is minimally vulnerable, slab on grade structures are more likely to suffer damages from expansive soils. In addition, older structures built to less stringent building codes may also be more susceptible to damage than new construction.



While the number of slabs on grade structures is not available, the U.S. Census data indicates approximately 25,704 of the housing units (11 percent of all housing units) in the planning area were built before 1980 and may be more susceptible to damages. Table 8-3 lists the housing units built before 1980 for each participating jurisdiction and Table 8-4 lists the facilities built before 1980 for each participating special district.

Table 8-3. Residential Structures at Greater Risk

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980
Williamson County	25,704
City of Hutto	374

Table 8-4. Special District Structures at Greater Risk

SPECIAL DISTRICT	STRUCTURES BUILT BEFORE 1980
Georgetown ISD	4
Hutto ISD	1
Liberty Hill ISD	6
Meridian World School	0

The Williamson County Planning Team identified the following critical facilities (Table 8-5) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by expansive soils. For a comprehensive list by participating jurisdiction, please see Appendix C.

SECTION 8: EXPANSIVE SOILS

Table 8-4. Critical Facilities Vulnerable to Expansive Soils

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	- o Uneven settling and shifting cause cracks in building foundations impacting the integrity of critical facility structures and lead to doors being unable to open or close properly. - o Damages and cracks in streets and highway infrastructure may lead to emergency vehicles being unable to access areas increasing the need for emergency operations. - o Ruptured water pipes can lead to loss of function or water pressure impacting drinking water availability and firefighting capabilities.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	- o Uneven settling and shifting cause cracks in building foundations impacting the integrity of critical facility structures and lead to doors being unable to open or close properly. - o Damages and cracks in streets and highway infrastructure may lead to emergency vehicles being unable to access areas increasing the need for emergency operations.
Commercial Supplier (food, fuel, etc.)	o Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	- o Wastewater and drinking water facilities and infrastructure may be damaged or destroyed resulting in services disruption or outage for multiple days or weeks. - o Disruptions and outages impact public welfare as safe drinking water is critical. - o A break in essential and effective wastewater collection and treatment is a health concern, potentially spreading disease. - o Exposure to untreated wastewater is harmful to people and the environment.

ASSESSMENT OF IMPACTS

Expansive soils are generally influenced by how wet or dry reactive clay types of soils become, so the climate of an area, and more specifically the seasonal precipitation-drought cycle associated with arid or semi-arid regions, influences the occurrence and severity of these hazards. Problems associated with expansive soils in Williamson County typically occur during extended periods of drought.

Expansive soils present a hazard to lightweight buildings and other infrastructure. Uneven settling and shifting in such structures may occur, causing cracks in foundations, walls, streets, driveways, and sidewalks; ruptured pipes; and windows and doors that do not open and close properly. Special provisions are necessary in the construction of footings and slabs resting on expansive soils to minimize damages due to the expansiveness. Homeowners and public agencies that assume they cannot afford preventative measures such as more costly foundations and floor systems, often incur the largest percentage of damage and costly repairs from expanding soil. No figures are available for the total damage to homes in the planning area from expansive clays.

SECTION 8: EXPANSIVE SOILS

The greatest damage occurs when structures are constructed when clays are dry (such as during a drought) and then subsequent soaking rains swell the clay.

Infrastructure such as pipelines can be damaged, causing increased maintenance and repairs, replacement, or damage to the point of failure. Sewer and water lines are also affected by shrinking and swelling soils. The movement of the soil can snap water and sewer lines, producing a minimum of temporary discomfort, and a maximum of serious health and welfare risk. Field monitoring and testing should be conducted on a regular basis, especially during extended drought periods, to avoid loss of function or water pressure, which could impact drinking water and firefighting capabilities. In addition, highways (US Route 183, US Route 190, US Route 281) can be affected by expansive soils and could hinder evacuations if deemed not usable during disasters.

Unlike many other environmental hazards, the effects of expansive soil are deceptive in that they are not revealed suddenly or caused by a single event, but rather become increasingly evident and destructive over time. As such, the vast majority of expansive soil impacts are relatively benign in terms of emergency management and emergency response.

Expansive soil can directly impact infrastructure and, as a result, indirectly create impacts on residents. The impact of climate change could produce more severe expansive soils events, exacerbating the current expansive soils impacts. The following are a summary of impacts frequently associated with expansive soils:

- Expansive soils are influenced by the seasonal precipitation-drought cycle. Most impacts on Williamson County typically occur during extended periods of drought.
- Impacts to lightweight buildings and other infrastructure are most likely to occur. Impacts include uneven settling and shifting in structures; cracks in foundations, walls, streets, driveways, and sidewalks; ruptured pipes; and windows and doors that do not open and close properly.
- 11 percent of homes in Williamson County were built before 1980 leading them to more susceptible to damages from expansive soils. 75 buildings and sites in Williamson County are on the National Register of Historic Places, many of which pre-date modern building codes.
- Highways (Interstate 35, US Highway 183, US Highway 79) can be affected by expansive soils.
- Economic impacts are limited to uninsured damages.
- Impacts on people are indirect, with impacts related to disruption in county and city services such as water and sewer.
- As population grows and development increases in the county, the potential risk to expansive soils will also increase.
- Limited impact is anticipated to the natural environment other than changes in soil characteristics.

The impact of expansive soils experienced in Williamson County has resulted in no injuries and fatalities or reported damages, supporting a “Limited” severity of impact, meaning injuries and illnesses are treatable with first aid, shutdown of critical facilities and services for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

SECTION 8: EXPANSIVE SOILS

CLIMATE CHANGE CONSIDERATIONS

Expansive soils are directly connected to drought and flood conditions as they literally swell and shrink with changing moisture conditions. Impacts of climate change on drought and flood events indicate similar changes to expansive soil frequency and impacts. Refer to Probability of Future Events section in Section 6 (Drought) and Section 10 (Flood) for more information on those hazards.



SECTION 9

EXTREME HEAT

SECTION 9: EXTREME HEAT

Hazard Description	1
Location	1
Extent.....	1
Historical Occurrences.....	4
Significant Events.....	5
Probability of Future Events.....	6
Vulnerability and Impact.....	6
Assessment of Impacts	8
Climate Change Considerations	9

HAZARD DESCRIPTION

Extreme heat is a prolonged period of excessively high temperatures and exceptionally humid conditions. Extreme heat during the summer months is a common occurrence throughout the State of Texas, and the Williamson County planning area is no exception. The County typically experiences extended heat waves or an extended period of extreme heat and is often accompanied by high humidity.



Although heat can damage buildings and facilities, it presents a more significant threat to the safety and welfare of citizens. The major human risks associated with extreme heat include heat cramps; sunburn; dehydration; fatigue; heat exhaustion; and even heat stroke. The most vulnerable population to heat casualties are children and the elderly or infirmed who frequently live on low fixed incomes and cannot afford to run air-conditioning on a regular basis. This population is sometimes isolated, with no immediate family or friends to look out for their well-being.

Critical infrastructure can also be damaged or impacted by extreme heat. High temperatures may cause a rise in electricity consumption as homes, schools, and businesses try to regulate the temperature. This may lead to energy shortages and possible blackouts.

LOCATION

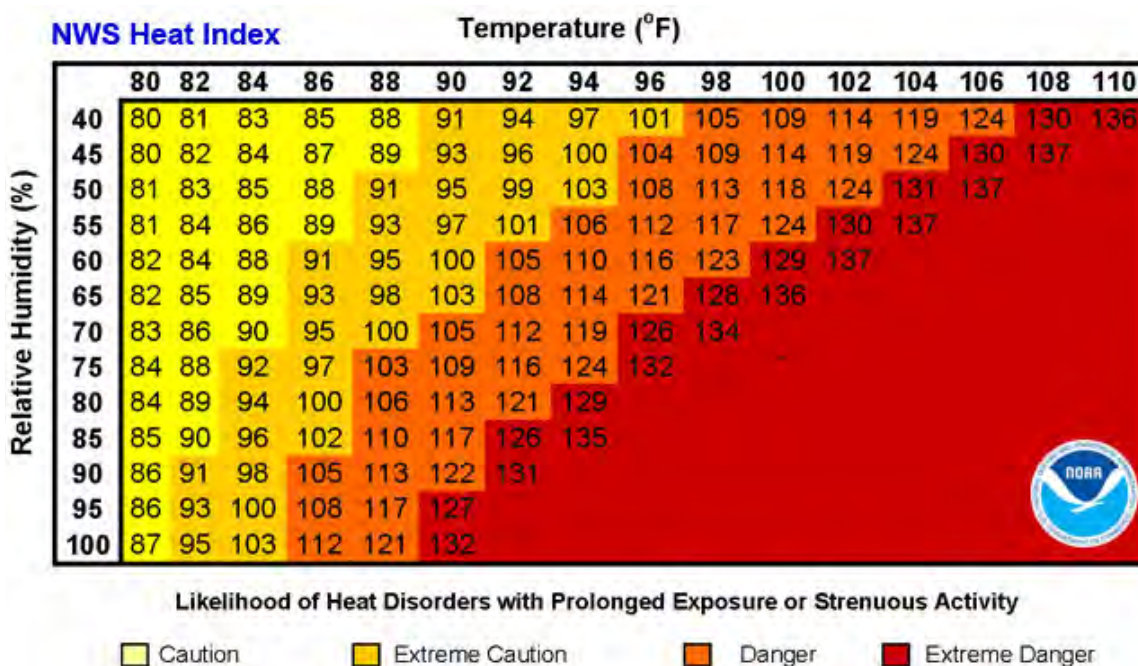
Extreme heat events can occur throughout the Williamson County planning area as there is no specific geographic scope to the extreme heat hazard. The entire Williamson County planning area, including all participating jurisdictions, ISDs and schools, is subject to extreme heat events.

EXTENT

The magnitude or intensity of an extreme heat event is measured according to temperature in relation to the percentage of humidity. According to the National Oceanic Atmospheric Administration (NOAA), this relationship is referred to as the “Heat Index” and is depicted in Figure 9-1. This index measures how hot it feels outside when humidity is combined with high temperatures.

SECTION 9: EXTREME HEAT

Figure 9-1. Extent Scale for Extreme Heat¹



The index in Figure 9-1 displays varying categories of caution depending on the relative humidity combined with the temperature. For example, when the temperature is at 90 degrees Fahrenheit (°F) or lower, caution should be exercised if the humidity level is at or above 40 percent.

The shaded zones on the chart indicate varying symptoms or disorders that could occur depending on the magnitude or intensity of the event. “Caution” is the first category of intensity, and it indicates when fatigue due to heat exposure is possible. “Extreme Caution” indicates that sunstroke, muscle cramps, or heat exhaustion are possible, and a “Danger” level means that these symptoms are likely. “Extreme Danger” indicates that heat stroke is likely. The National Weather Service (NWS) initiates alerts based on the Heat Index as shown in Table 9-1.

Table 9-1. Heat Index and Warnings

CATEGORY	HEAT INDEX	POSSIBLE HEAT DISORDERS	WARNING TYPE
Extreme Danger	125°F and higher	Heat stroke or sun stroke likely.	An Excessive Heat Warning is issued if the Heat Index rises above 105°F at least 3 hours during the day or above 80°F at night.
Danger	103 – 124°F	Sunstroke, muscle cramps, and/or heat exhaustion are likely. Heatstroke possible with prolonged exposure and/or physical activity.	An Excessive Heat Warning is issued if the Heat Index rises above 105°F at least 3 hours during the day or above 80°F at night.

¹ Source: NOAA

SECTION 9: EXTREME HEAT

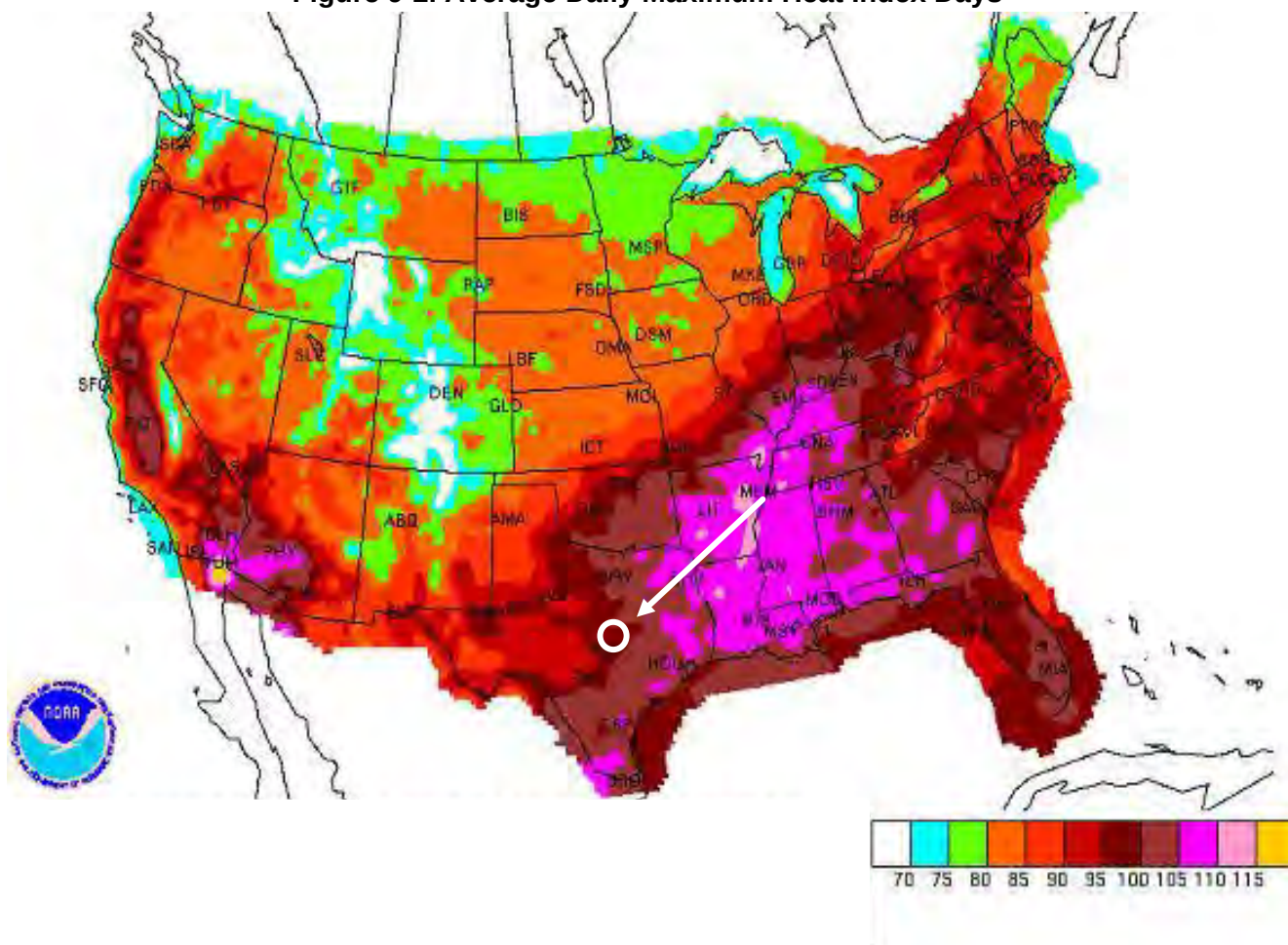
CATEGORY	HEAT INDEX	POSSIBLE HEAT DISORDERS	WARNING TYPE
Extreme Caution	90 – 103°F	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.	A Heat Advisory will be issued to warn that the Heat Index may exceed 105°F.
Caution	80 – 90°F	Fatigue is possible with prolonged exposure and/or physical activity.	A Heat Advisory will be issued to warn that the Heat Index may exceed 105°F.

Due to its geography and its warm, sunny, and humid subtropical climate, the Williamson County planning area can expect an extreme heat event each summer. Citizens, especially children and the elderly should exercise caution by staying out of the heat for prolonged periods when a heat advisory or excessive heat warning is issued. In addition, those working or remaining outdoors for extended periods of time are at greater risk.

Figure 9-2 displays the daily maximum heat index as derived from NOAA based on data compiled from 1838 to 2015. The white circle shows the Williamson County planning area. The planning area is represented in dark red across the County. The dark red color indicates an average daily heat index of 95°F to 100°F. Therefore, Williamson County could experience dangerous heat from 95°F to 100°F and should mitigate to the extent of “Extreme Caution,” which can include sunstroke, muscle cramps, and potential heat exhaustion. This is the average maximum temperature the planning area can anticipate based on historical events.

SECTION 9: EXTREME HEAT

Figure 9-2. Average Daily Maximum Heat Index Days²



HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) Storm Events database is a national data source organized under the National Oceanic and Atmospheric Administration (NOAA). The NCEI is the largest archive available for historic storm events data. Previous occurrences for extreme heat are derived from the NCEI database, which identifies extreme heat events at the county level for each event. According to heat related incidents located within Williamson County, there have been 5 extreme heat events on record for the planning area (Table 9-2). Historical extreme heat information, as provided by the NCEI, shows extreme heat activity across a multi-county forecast area for each event, the appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event.

² NRDC and the white circle indicates the Williamson County planning area.

SECTION 9: EXTREME HEAT

Historical extreme heat data for the Williamson County planning area, including all participating jurisdictions, ISDs and schools, is provided on a County-wide basis per the NCEI database from 1996 through 2023. There has been one reported fatality due to an extreme heat event, but no additional injuries or damages. Only extreme heat events that have been reported have been factored into this Risk Assessment. It is highly likely additional extreme heat occurrences have gone unreported before and during the recording period. Due to the limited number of reported events, average high temperatures have been analyzed in order to determine the probability of future events.

Table 9-2. Historical Extreme Heat Events, 1996-2023³

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	7/25/2000	1	0	\$0	\$0
Williamson County	7/19/2018	0	0	\$0	\$0
Williamson County	6/15/2023	0	0	\$0	\$0
Williamson County	7/12/2023	0	0	\$0	\$0
Williamson County	8/7/2023	0	0	\$0	\$0
TOTALS		1	0	\$0	\$0

Table 9-3. Historical Extreme Heat Events Summary, 1996-2023

JURISDICTION	NUMBER OF EVENTS	DEATH	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	5	1	0	\$0	\$0

Based on the list of historical extreme heat events for the Williamson County planning area, 4 events were reported to the NCEI since the 2017 Plan.

SIGNIFICANT EVENTS

July 25, 2000

The Williamson County planning area experienced extreme heat temperatures, which lead to one fatality during this reported event. The victim was found in their home in front of an open refrigerator. The home had no central air conditioning, only a window fan.

August 7, 2023

Excessive heat was observed nearly every day of August across parts of South Central Texas. Temperatures for the area reached a high of 112°F. All the National Weather Service climate sites set or tied numerous daily record high temperatures and record high low temperatures during this heat wave event.

³ NOAA, NCEI Storm Events Database

SECTION 9: EXTREME HEAT

PROBABILITY OF FUTURE EVENTS

According to historical records, the Williamson County planning area, including all participating jurisdictions and special districts, has experienced 5 events in a 28-year reporting period. Although there are no records of events between the year 2000 and 2018 for the planning area, it can be assumed that events have gone unreported due to the average daily temperatures throughout the summer. Historical records in combination with an analysis of maximum average temperatures provides a probability of at least one event every year. This frequency supports a “Highly Likely” probability of future events.

VULNERABILITY AND IMPACT

While the entirety of the Williamson County planning area is exposed to extreme temperatures, existing buildings, infrastructure, and critical facilities are not likely to sustain significant damage from extreme heat events. Therefore, any estimated property losses associated with the extreme heat hazard are anticipated to be minimal across the area.

Every summer, the hazard of heat-related illness becomes a significant public health issue throughout much of the United States. Mortality rates increase during heat waves, and excessive heat is an important contributing factor to deaths from other causes, particularly among the elderly. Extreme temperatures present a significant threat to life and safety for the population of the County as a whole. Heat casualties, for example, are typically caused by a lack of adequate air-conditioning or heat exhaustion. The most vulnerable population to heat casualties are the elderly or infirmed who frequently live on fixed incomes and cannot afford to run air-conditioning on a regular basis. This population is sometimes isolated, with no immediate family or friends to look out for their well-being. Children may also be more vulnerable if left unattended in vehicles. Populations living below the poverty level are often unable to run air-conditioning on a regular basis and are limited in their ability to seek medical treatment.

The population over 65 in the Williamson County planning area is estimated at 13 percent of the total population and children under the age of 5 are estimated at 6 percent. Individuals with a disability are estimated at 10 percent of the total population. In addition, an estimated 6 percent of the planning area population live below the poverty level and 22 percent of the populations speaks a language other than English (Table 9-4).

Vulnerable and underserved populations are disproportionately impacted by extreme heat events as they may be more susceptible to health risks. The population below the poverty level are less likely to be able to afford air conditioning during the hot summer months as well as less likely to have access to medical care. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

Students are also susceptible due to sporting events and practices often held outside during early fall or late spring when temperatures are at the highest. The ISDs and school also have several employees that work outdoors such as maintenance, coaches, and others that may be subject to severe weather conditions and extreme heat temperatures (Table 9-5).

SECTION 9: EXTREME HEAT

Table 9-4. Populations at Greater Risk by Participating Jurisdiction

JURISDICTION	ELDERLY (over 65)	YOUTH (under 5)	WITH A DISABILITY	BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Williamson County	77,609	37,584	61,524	38,896	138,476
City of Hutto	1,830	2,155	2,658	2,301	7,141

Table 9-5. Populations at Greater Risk for Special Districts

JURISDICTION	POPULATION UNDER 5	EMPLOYEES THAT WORK OUTDOORS
Georgetown ISD	469	428
Hutto ISD	415	222
Liberty Hill ISD	240	300
Meridian World School	0	2

Extremely high temperatures can have significant secondary impacts, leading to droughts, water shortages, increased fire danger, and prompt excessive demands for energy. The possibility of rolling blackouts increases with unseasonably high temperatures in what is a normally mild month with low power demands. Typically, more than 12 hours of warning time would be given before the onset of an extreme heat event.

In terms of vulnerability to structures, the impact from extreme heat is considered negligible. It is possible that critical facilities and infrastructure could be shut down for 24 hours if cooling units are running constantly, leading to a temporary power outage (Table 9-6). Less than ten percent of residential and commercial property could be damaged if extreme heat events lead to structure fires. Based on historical records, annualized property and crop losses for the Williamson County planning area, including all participating jurisdictions and special districts, are negligible. However, due to one reported fatality, the impact of extreme heat is considered “Substantial” with multiple deaths possible depending on the severity and length of the event.

The Williamson County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by extreme heat events. The following critical facilities would be vulnerable to extreme heat events in the Williamson County planning area. For a comprehensive list by participating jurisdiction, please see Appendix C.

Table 9-6. Critical Facilities Vulnerable to Extreme Heat Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS, Hospitals)	- Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. - Exposure to heat can cause heat illnesses in first responders, especially for those in heavy equipment.

SECTION 9: EXTREME HEAT

CRITICAL FACILITIES	POTENTIAL IMPACTS
	- o Roads may become impassable due to excessive heat causing asphalt roads to soften and concrete roads to shift or buckle impacting response times by emergency services. - o Extended power outages due to increased usage may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters, Governmental Facilities	- o Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. - o Power outages due to increased usage could disrupt critical care. - o Backup power sources could be damaged. - o Evacuations may be necessary due to extended power outages, breaks in water main lines or other associated damage to facilities. - o Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. - o Economic disruption due to power outages negatively impact airport services as well as area businesses reliant on airport operations.
Commercial Suppliers (food, gas, etc.)	- o Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. - o Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	- o Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. - o Roads may become impassable due to excessive heat causing asphalt roads to soften and concrete roads to shift or buckle impacting response times by emergency services. - o Breaks in water main lines or other associated damage to facilities.

ASSESSMENT OF IMPACTS

The greatest risk from extreme heat is to public health and safety. Extreme heat conditions can be frequently associated with a variety of impacts, including:

- o Vulnerable populations, particularly the elderly (13 percent of total population), children under 5 (6 percent of total population), and those with a disability (10 percent of total population) can face serious or life-threatening health problems from exposure to extreme heat including hyperthermia, heat cramps, heat exhaustion, and heat stroke (or sunstroke).
- o Response personnel, including utility workers, public works personnel, and any other professions where individuals are required to work outside, are more subject to extreme heat related illnesses since their exposure would typically be greater.

SECTION 9: EXTREME HEAT

- o High energy demand periods can outpace the supply of energy, potentially creating the need for rolling brownouts which would elevate the risk of illness to vulnerable residents.
- o Highways and roads may be damaged by excessive heat causing asphalt roads to soften and concrete roads to shift or buckle.
- o Vehicle engines and cooling systems typically run harder during extreme heat events resulting in increases in mechanical failures.
- o Extreme heat events during times of drought can exacerbate the environmental impacts associated with drought, decreasing water and air quality and further degrading wildlife habitat.
- o Extreme heat increases ground-level ozone (smog), increasing the risk of respiratory illnesses.
- o Negatively impacted water suppliers may face increased costs resulting from the transport of water resources or development of supplemental water resources.
- o Tourism and recreational activities at places may be negatively impacted during extreme heat events, reducing seasonal revenue.
- o Outdoor activities may see an increase in school injury or illness during extreme heat events.

The economic and financial impacts of extreme heat on the community will depend on the duration of the event, demand for energy, drought associated with extreme heat, and many other factors. The level of preparedness and the amount of planning done by the community, local businesses, and citizens will impact the overall economic and financial conditions before, during, and after an extreme heat event.

CLIMATE CHANGE CONSIDERATIONS

Climate change is expected to lead to an increase in average temperatures as well as an increase in frequency, duration, and intensity of extreme heat events. With no reductions in emissions worldwide, the state of Texas is projected to experience an additional 30 to 60 days per year above 100°F than what is experienced now.⁴ In addition, it is projected that future changes to Williamson County will include increased temperatures, which according to the U.S. Climate Explorer, the planning area may experience a 6°F increase in the average extreme heat temperatures. Historically, extreme temperatures averaged 100°F in Williamson County, but between 2035 and 2064 the average will be 106°F, increasing the severity and frequency of extreme heat events. The increase in temperature could be higher but will depend on overall future emissions.

⁴ Nielsen-Gammon, John, Holman, Sara, Buley, Austin and Jorgensen, Savannah. Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, 2021 Update. Texas A&M University Office of the Texas State Climatologist. October 7, 2021. <https://climatexas.tamu.edu/files/ClimateReport-1900to2036-2021Update>



SECTION 10 **FLOOD**

SECTION 10: FLOOD

Hazard Description	1
Location	1
Extent	12
Historical Occurrences	14
Significant Events	16
Probability of Future Events	18
Vulnerability and Impact.....	18
Assessment of Impacts.....	22
Climate Change Considerations.....	24
National Flood Insurance Program (NFIP) Participation	24
NFIP Compliance and Maintenance.....	26
Repetitive Loss	26

HAZARD DESCRIPTION

Floods generally result from excessive precipitation. The severity of a flood event is determined by a combination of several major factors, including: stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and the degree of vegetative clearing and impervious surfaces. Typically, floods are long-term events that may last for several days.

The primary types of general flooding are inland and coastal flooding. Due to Williamson County's inland location, only inland flooding is profiled in this section. Inland or riverine flooding is a result of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Inland or riverine flooding is overbank flooding of rivers and streams, typically resulting from large-scale weather systems that generate prolonged rainfall over a wide geographic area. Therefore, it is a naturally occurring and inevitable event. Some river floods occur seasonally when winter or spring rainfalls fill river basins with too much water, too quickly. Torrential rains from decaying hurricanes or tropical systems can also produce river flooding.

The Williamson County planning area is subject to extreme rainfall events, often in short durations, leading to dangerous flash flooding events. Floods are a natural and recurrent event and take place every year, in all seasons.

LOCATION

The Flood Insurance Rate Maps (FIRMs) prepared by FEMA provide an overview of flood risk but can also be used to identify the areas of the County that are vulnerable to flooding. FIRMs are used to regulate new development and to control the substantial improvement and repair of substantially damaged buildings. Flood Insurance Studies (FIS) are often developed in conjunction with FIRMs. The FIS typically contains a narrative of the flood history of a community and discusses the engineering methods used to develop the FIRMs. The FIS also contains flood profiles for studying flooding sources and can be used to determine Base Flood Elevations (BFEs) for some areas.

SECTION 10: FLOOD

The FIS for Williamson County is dated December 20, 2019. This FIS is composed of seven volumes and compiles all previous flood information including data collected on numerous waterways. This study indicates that the principal flood problems are due to intense rainfall, which can occur year-round. In addition, the primary flooding sources identified include Berry Creek, South Fork San Gabriel River, Brushy Creek, and Mustang Creek.

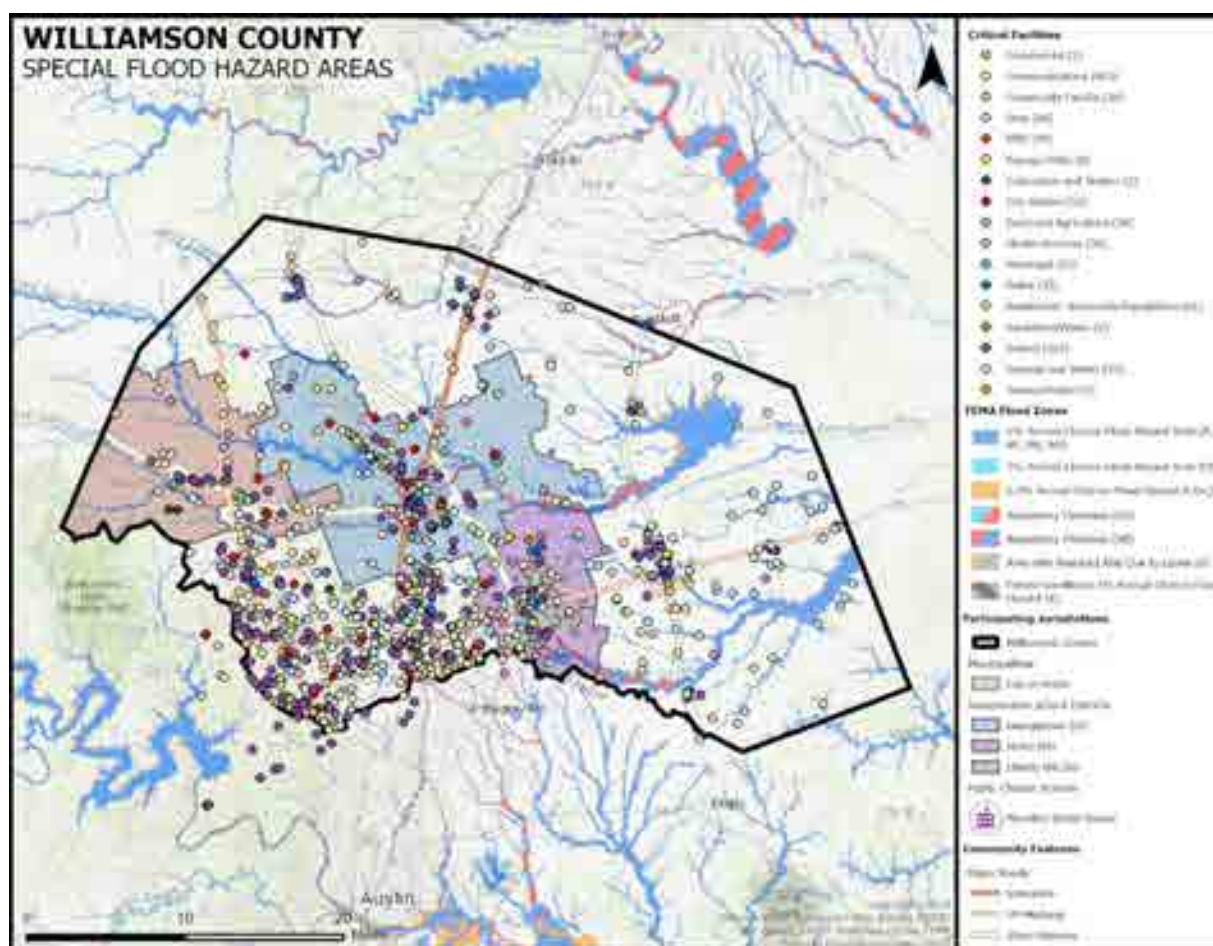
The Digital Flood Insurance Rate Map (DFIRM) data provided by FEMA for Williamson County shows the following flood hazard areas:

- Zone A: Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance requirements and floodplain management standards apply.
- Zone AE: Areas subject to inundation by 1-percent-annual-chance shallow flooding. It is the base floodplain where BFEs are provided. AE zones are now used on new format FIRMs instead of A1-30 zones.

Locations of flood zones in Williamson County based on the Digital Flood Insurance Rate Map (DFIRM) from FEMA are illustrated in Figures 10-1 to 10-6.

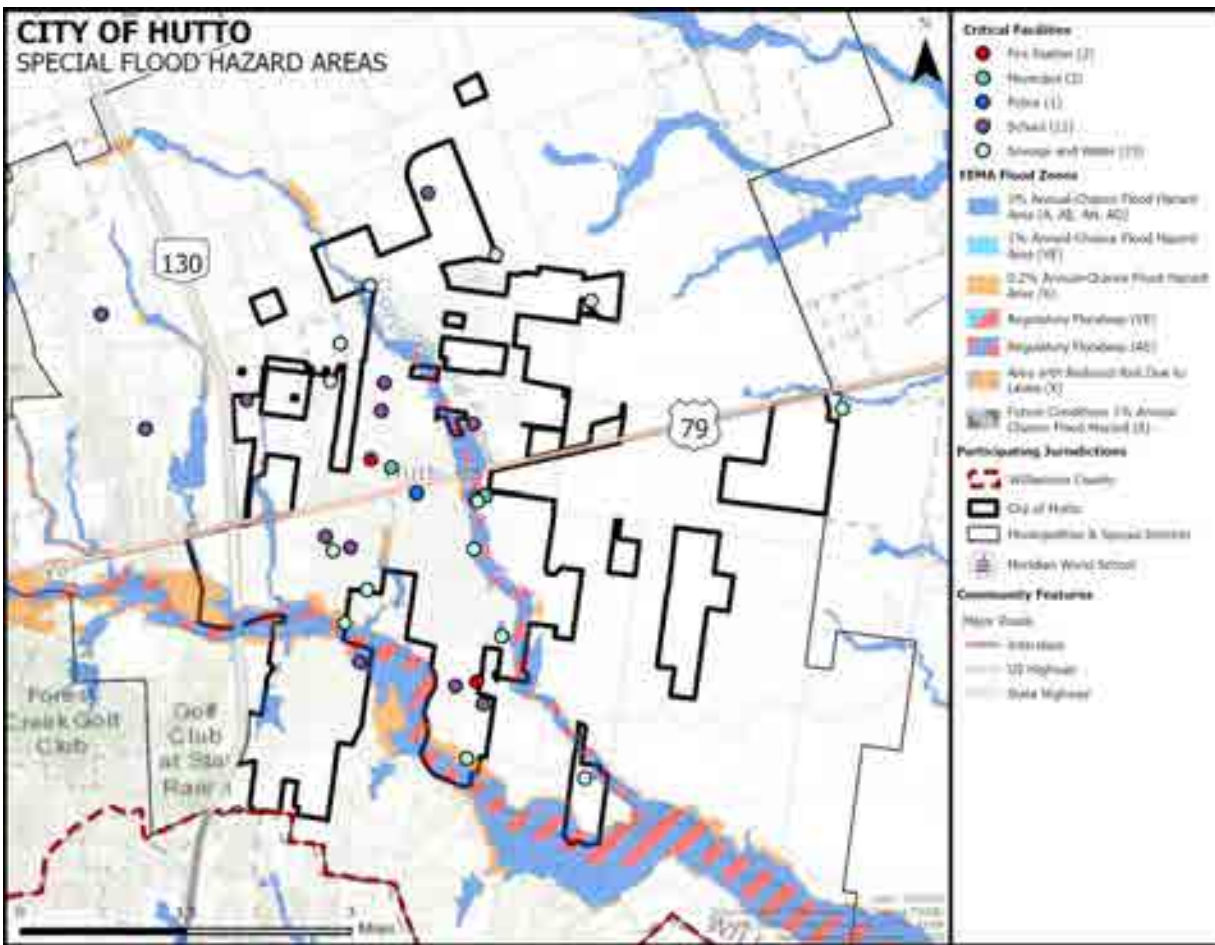
SECTION 10: FLOOD

Figure 10-1. Estimated Flood Zones in Williamson County



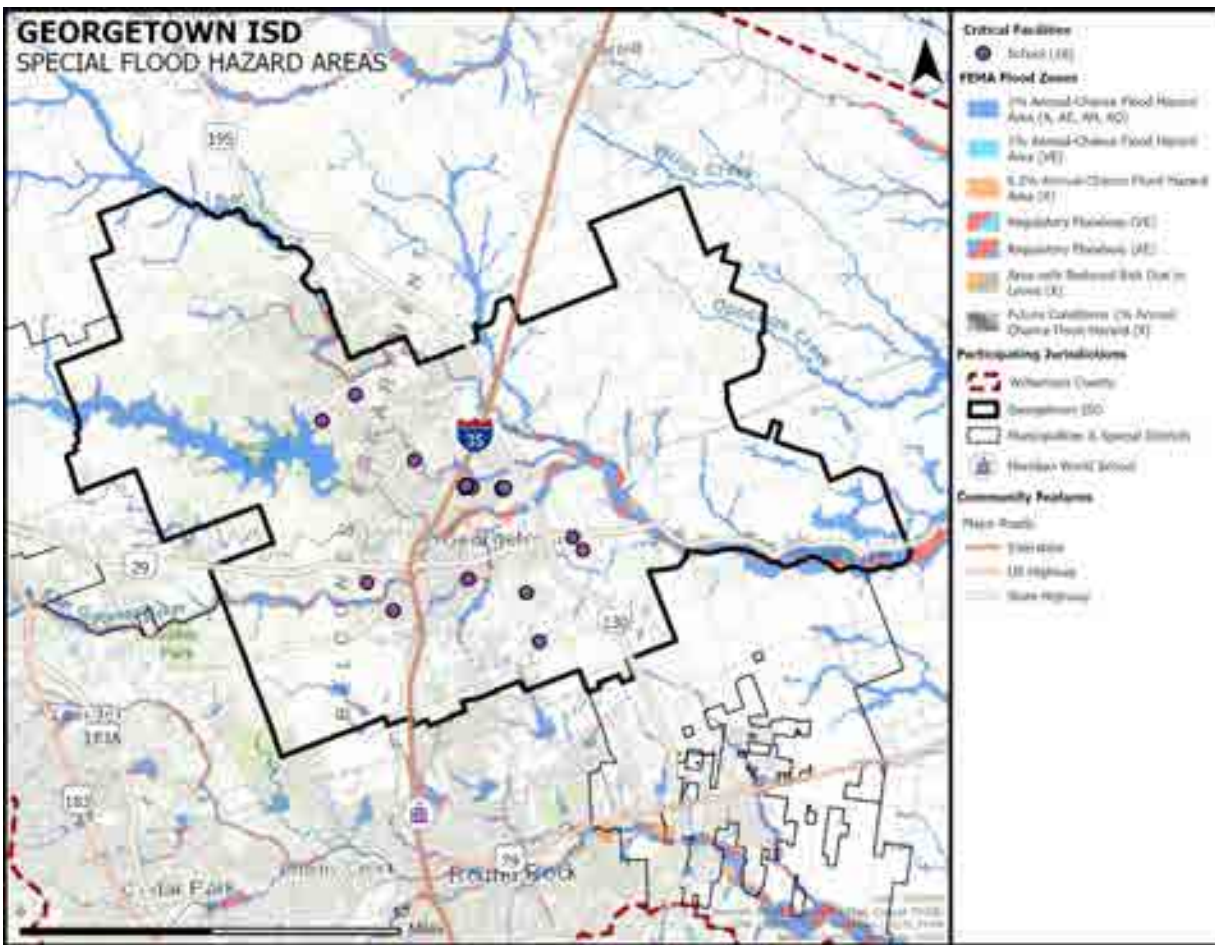
SECTION 10: FLOOD

Figure 10-2. Estimated Flood Zones in the City of Hutto



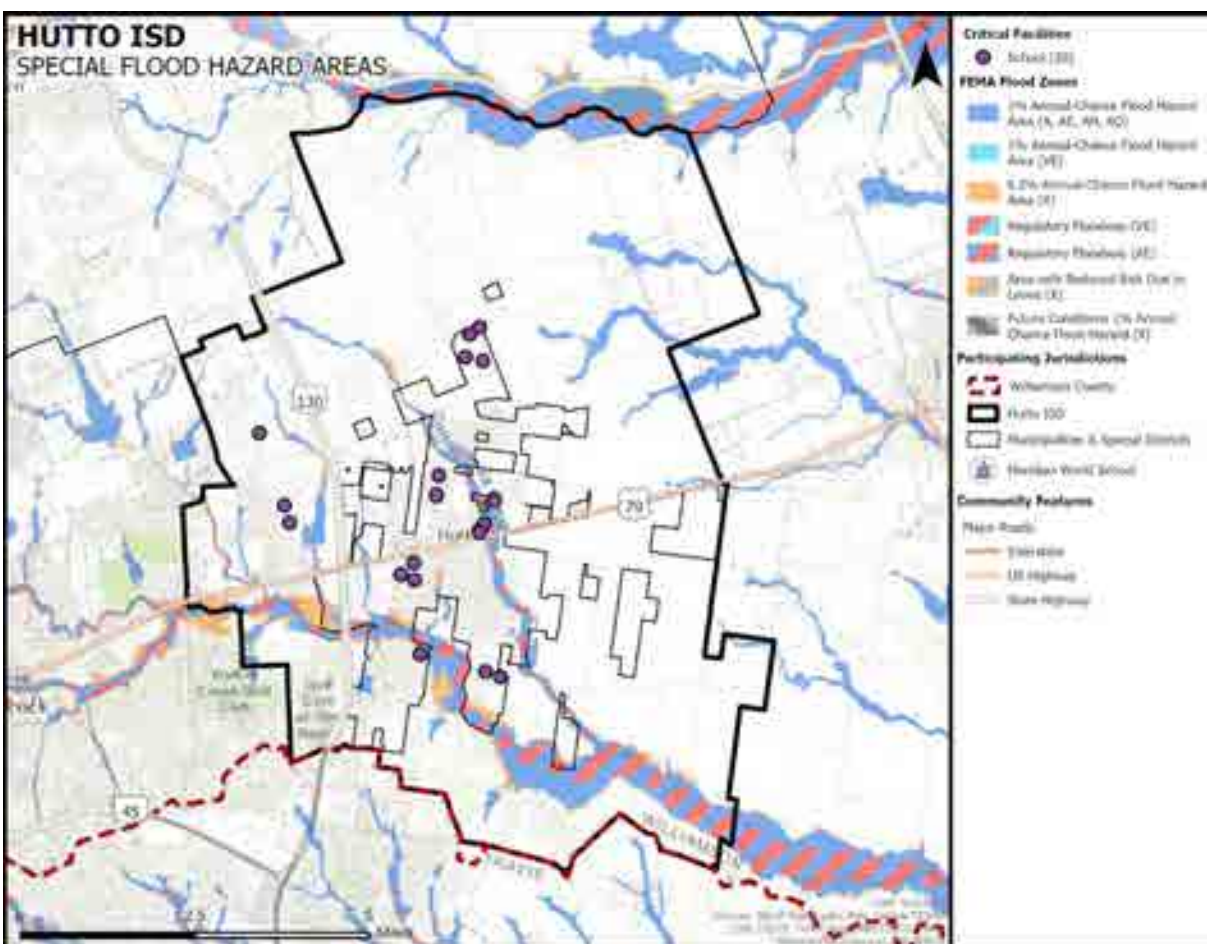
SECTION 10: FLOOD

Figure 10-3. Estimated Flood Zones for Georgetown ISD



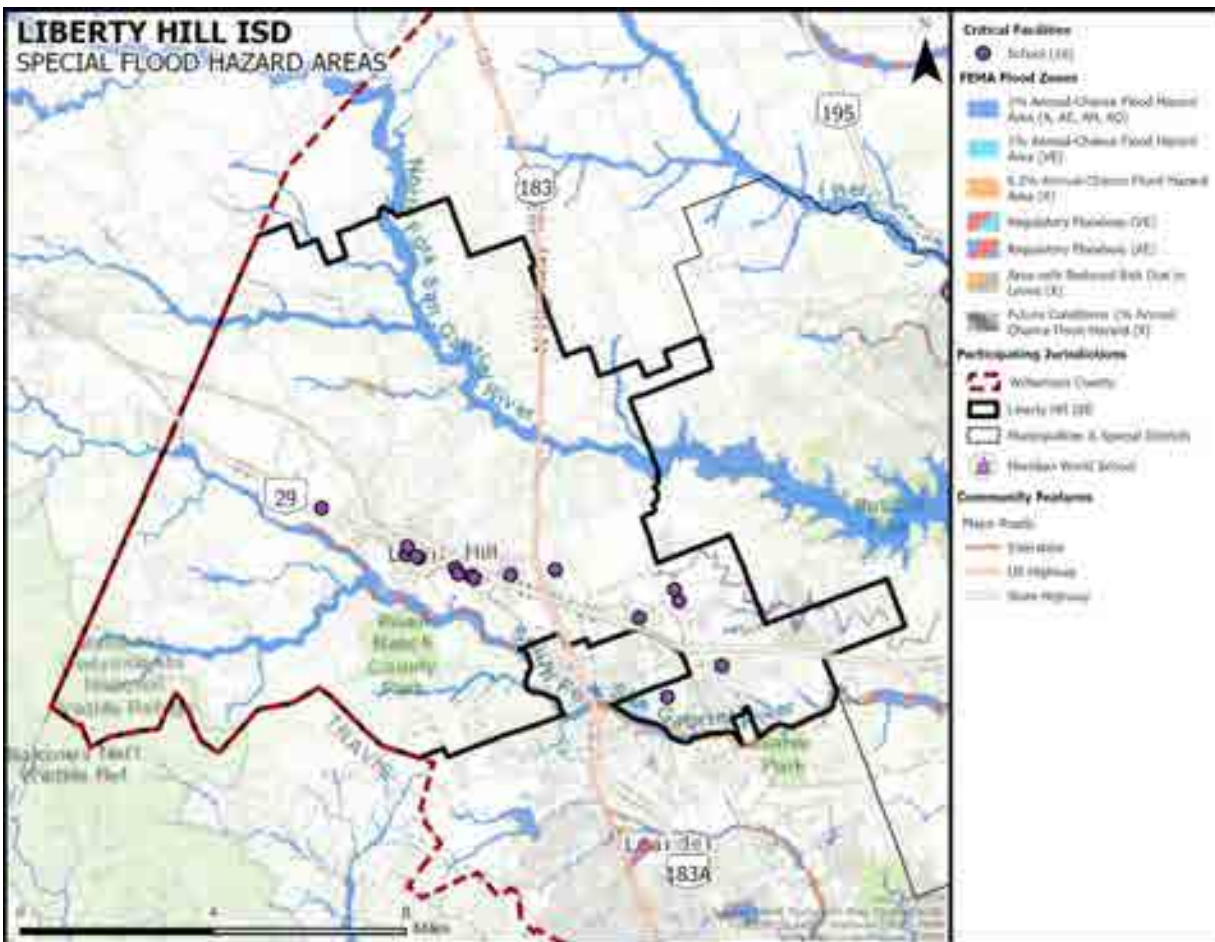
SECTION 10: FLOOD

Figure 10-4. Estimated Flood Zones for Hutto ISD



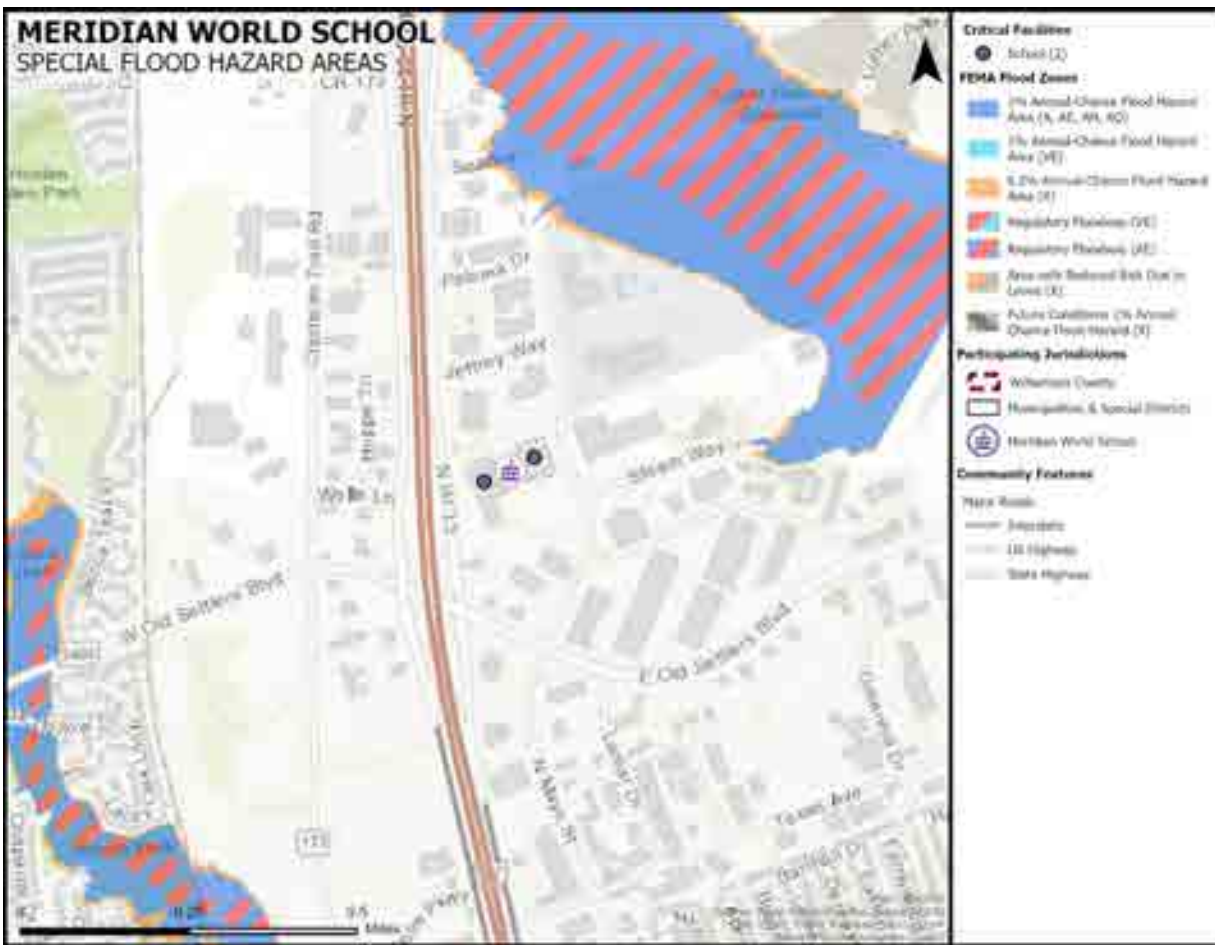
SECTION 10: FLOOD

Figure 10-5. Estimated Flood Zones for Liberty Hill ISD



SECTION 10: FLOOD

Figure 10-6. Estimated Flood Zones for the Meridian World School



SECTION 10: FLOOD

Current DFIRM data and maps provided by FEMA within Williamson County display approximate and detailed riverine flood exposure information. Some of the maps were updated in 2019 for numerous streams in the Upper Brushy Creek and San Gabriel watersheds. There are still many floodplains that were last studied more than 30 years ago, and many effective approximate floodplains that have not received a detailed engineering study. To address this gap, Williamson County is working in partnership with the Texas Water Development Board to update floodplain information throughout the county with Atlas 14 rainfall data, which was released in 2018 by the National Oceanic and Atmospheric Administration (NOAA). This data analyzes historical rainfall records to produce updated precipitation-frequency estimates across the country and was provided to Texas in 2018.

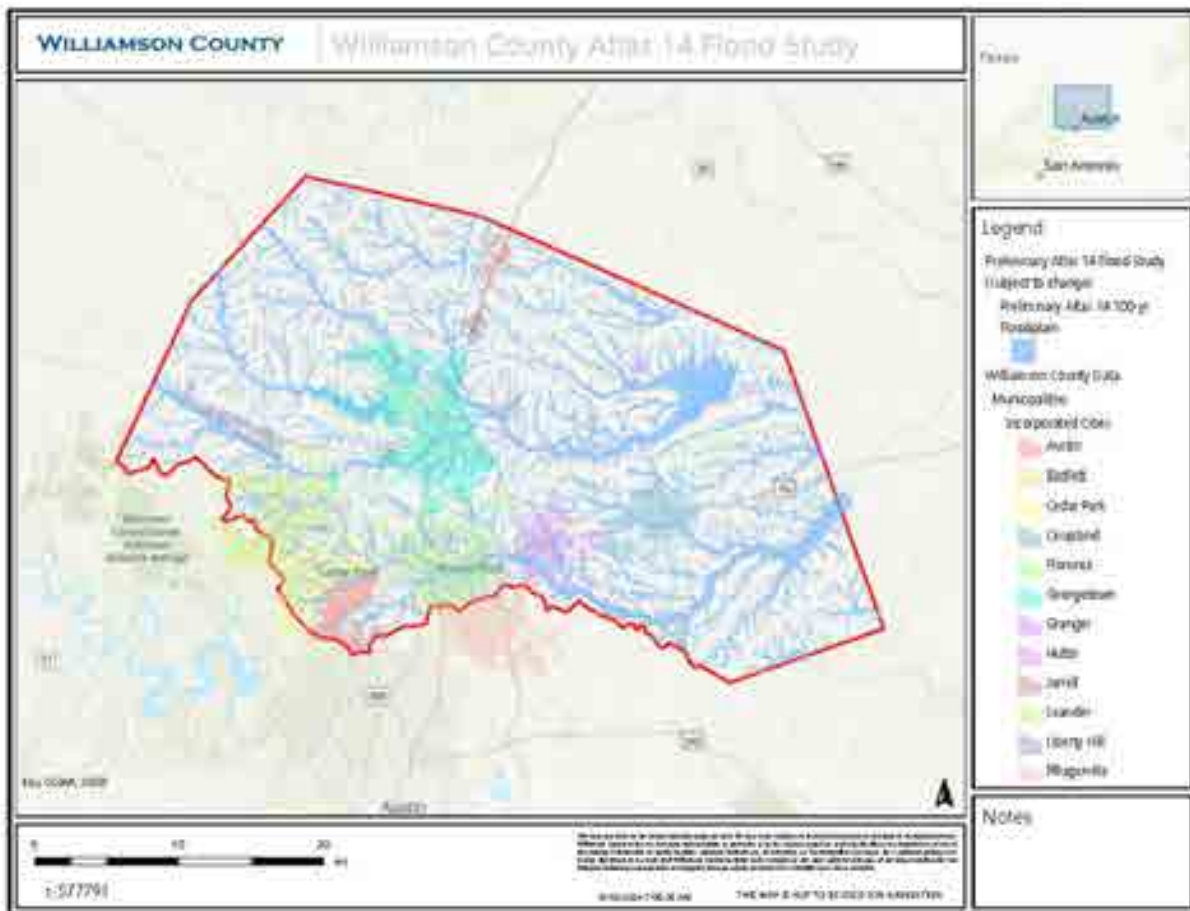
The Williamson County Atlas 14 Floodplain Study Project began in 2021 and has an expected completion date of 2026. Additional work to identify specific mitigation strategies based on the study will be conducted at a later phase in this process. This project will allow the county to:

- o Update floodplain information throughout the county using NOAA's Atlas 14 rainfall data;
- o Model streams and waterways that have never been studied;
- o Gather accurate information about topography, drainage structures, and bridges;
- o Assess the risk of extreme weather and identify areas that are prone to future flood events;
- o Guide new construction to be more resilient; and
- o Develop prevention measures that could be implemented to reduce flooding.

The Atlas 14 rainfall study results indicate that the 1% annual chance (100-year) event may be greater than previously considered. Locations of flood zones in Williamson County based on the Atlas 14 rainfall data provided by the NOAA are illustrated for each participating jurisdiction in Figures 10-7 and 10-8.

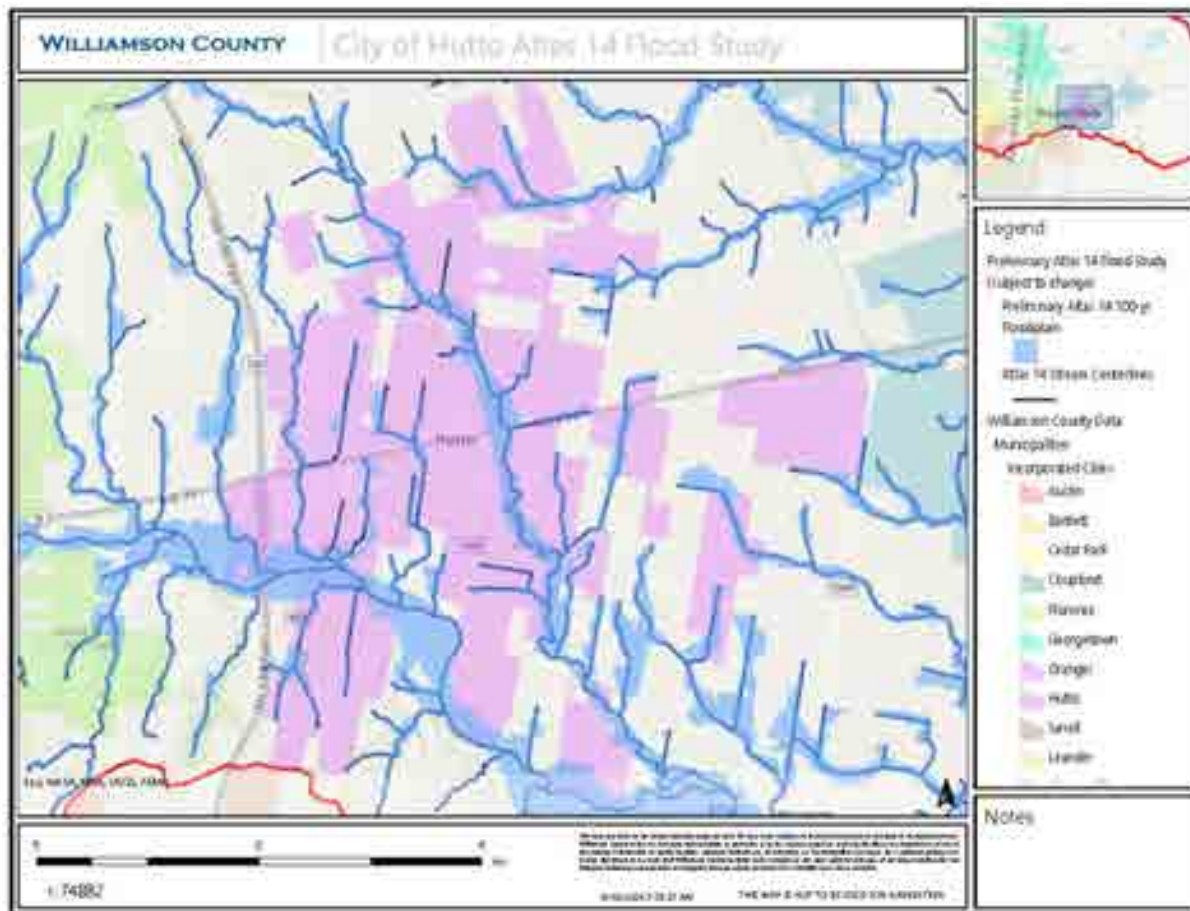
SECTION 10: FLOOD

Figure 10-7. Estimated Atlas 14 Flood Zones in Williamson County



SECTION 10: FLOOD

Figure 10-8. Estimated Atlas 14 Flood Zones in the City of Hutto



SECTION 10: FLOOD

EXTENT

The severity of a flood event is determined by a combination of several major factors, including stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and the degree of vegetative clearing and impervious surfaces. Typically, floods are long-term events that may last for several days.

Determining the intensity and magnitude of a flood event is dependent upon the flood zone and location of the flood hazard area in addition to the depths of flood waters. The extent of flood damages can be expected to be more damaging in the areas that will convey a base flood. FEMA categorizes areas on the terrain according to how the area will convey flood water. Flood zones are the categories that are mapped on FIRMs. Table 10-1 provides a description of FEMA flood zones and the flood impact in terms of severity or potential harm. Flood Zones A and AE are the hazard areas mapped in the region. Figures 10-1 through 10-6 should be read in conjunction with the extent for flooding in Tables 10-1 and 10-2 to determine the intensity of a potential flood event.

Table 10-1. Flood Zones

INTENSITY	ZONE	DESCRIPTION
HIGH	ZONE A	Areas with a 1-percent-annual-chance of flooding and a 26 percent chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.
	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 Base Flood Elevation (BFE) (old format).
	ZONE AE	The base floodplain where BFEs are provided. AE Zones are now used on the new format FIRMs instead of A1-A30 Zones.
	ZONE AO	River or stream flood hazard areas and areas with a 1-percent-annual-chance or greater of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26 percent chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
	ZONE AH	Areas with a 1-percent-annual-chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26 percent chance of flooding over the life of a 30-year mortgage. BFEs derived from detailed analyses are shown at selected intervals within these zones.
	ZONE A99	Areas with a 1-percent-annual-chance of flooding that will be protected by a federal flood control system where construction has reached specified legal requirements. No depths or BFEs are shown within these zones.
	ZONE AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam).

SECTION 10: FLOOD

INTENSITY	ZONE	DESCRIPTION
		Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
MODERATE to LOW	ZONE X 500	An area inundated by 500-year flooding; an area inundated by 100-year flooding with average depths of less than 1 foot or with drainage areas less than 1 square mile; or an area protected by levees from 100-year flooding.

Zone A is interchangeably referred to as the 100-year flood, the 1-percent-annual-chance flood, the Special Flood Hazard Area (SFHA), or more commonly, the base flood. This is the area that will convey the base flood and constitutes a threat to the planning area. The impact from a flood event can be more damaging in areas that will convey a base flood.

Structures built in the SFHA are subject to damage by rising waters and floating debris. Moving flood water exerts pressure on everything in its path and causes erosion of soil and solid objects. If not elevated above Base Flood Elevation, utility systems, such as heating, ventilation, air conditioning, fuel, electrical systems, sewage maintenance systems and water systems, may also be damaged.

The intensity and magnitude of a flood event is also determined by the depth of flood water. Table 10-2 describes the stream gauge data provided by the United States Geological Survey (USGS). Peak flood data at the locations available in the planning area indicate a peak flood depth range of 2 to 29 feet above average peak flows.

Table 10-2. Extent for Williamson County¹

JURISDICTION ²	PEAK FLOOD EVENT
Williamson County	Brushy Creek near Taylor, Texas reached an estimated overflow elevation of 22 feet in June of 2021. The average peak flow at this site is 20 feet. This indicates a maximum flood depth of 2 feet above the average peak flow at this site.
Williamson County	Lake Creek at Lake Creek Parkway near Austin, Texas reached an overflow elevation of 9 feet in September of 2010. The average peak flow at this site is 7 feet. This indicates a maximum flood depth of 2 feet above the average peak flow at this site.
Williamson County	San Gabriel River in Georgetown, Texas reached an overflow elevation of 41 feet in April

¹ Severity estimated by averaging floods at certain stage level over the history of flood events. Severity and peak events are based on USGS data.

² Severity is provided where peak data was provided throughout for the County but unavailable for individual jurisdictions.

SECTION 10: FLOOD

JURISDICTION ²	PEAK FLOOD EVENT
	of 1957. The average peak flow at this site is 12 feet. This indicates a maximum flood depth of 29 feet above the average peak flow at this site.
Williamson County	The Willis Creek near Granger, Texas reached an overflow elevation of 23 feet in May of 2015. The average peak flow at this site is 18 feet. This indicates a maximum flood depth of 5 feet above the average peak flow at this site.
Williamson County	The Berry Creek near Georgetown, Texas reached an overflow elevation of 29 feet in September of 2010. The average peak flow at this site is 17 feet. This indicates a maximum flood depth of 12 feet above the average peak flow at this site.

The range of flood intensity that the planning area can experience is high, or Zone A. Based on historical occurrences, the planning area could expect to experience from 4 to 6 inches of rain within a 2-hour period, resulting in flash flooding. The data described in Tables 10-1 and 10-2, together with Figures 10-1 through 10-6, and historical occurrences for the area, provides an estimated potential magnitude and severity for the Williamson County planning area.

HISTORICAL OCCURRENCES

Historical evidence indicates that areas within the planning area are susceptible to flooding, especially in the form of flash flooding. It is important to note that only flood events that have been reported have been factored into this risk assessment, therefore it is likely that additional flood occurrences have gone unreported before and during the recording period. Table 10-3 identifies historical flood events that resulted in damages, injuries, or fatalities within the Williamson County planning area. Table 10-4 provides the historical flood event summary by jurisdiction. Historical Data is provided by the Storm Prediction Center (NOAA), National Centers for Environmental Information (NCEI) database for Williamson County, and the participating jurisdictions. There have been 152 recorded flood events in Williamson County.

Historical flood data events for each participating ISD and school, are primarily provided in the NCEI database within the county or city in which they are located as most do not have events reported separate and apart from the reported community events. The Meridian World School reported a flood event in 2018 that resulted in \$2,000 of flooring and sheetrock damage. No additional flood events separate from the NCEI database have been provided by the remaining participating special districts.

SECTION 10: FLOOD

Table 10-3. Historical Flood Events, 1996-2023³

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	8/31/1996	0	0	\$10,000	\$0
Williamson County	9/18/1996	0	0	\$6,000	\$0
Williamson County	9/19/1996	0	0	\$6,000	\$0
Williamson County	4/4/1997	0	0	\$19,600	\$0
Williamson County	4/4/1997	0	0	\$19,600	\$0
Williamson County	4/25/1997	0	0	\$9,800	\$0
Williamson County	6/8/1997	0	0	\$97,900	\$0
Williamson County	6/22/1997	0	0	\$978,100	\$97,900
Williamson County	7/4/1998	0	0	\$9,700	\$0
Williamson County	10/17/1998	0	0	\$57,400	\$19,200
Williamson County	10/17/1998	0	0	\$95,600	\$19,200
Williamson County	5/10/1999	0	0	\$28,300	\$0
Williamson County	5/11/1999	0	0	\$18,900	\$0
Williamson County	6/13/1999	0	0	\$5,700	\$0
Williamson County	6/21/1999	0	0	\$15,100	\$0
Williamson County	7/10/1999	0	0	\$37,700	\$0
Williamson County	7/12/1999	0	0	\$9,500	\$0
Williamson County	5/1/2000	0	0	\$73,200	\$0
Williamson County	11/23/2000	0	0	\$27,100	\$0
Williamson County	5/6/2001	0	0	\$26,500	\$0
Williamson County	7/1/2001	0	0	\$88,400	\$0
Williamson County	8/26/2001	0	0	\$17,700	\$0
Williamson County	11/15/2001	2	10	\$883,800	\$0
Williamson County	2/20/2003	0	0	\$17,200	\$0
Williamson County	5/12/2003	0	0	\$17,100	\$0

³ Values are in 2024 dollars.

SECTION 10: FLOOD

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	1/16/2004	0	0	\$8,500	\$0
Williamson County	10/26/2004	0	0	\$164,300	\$0
Williamson County	3/13/2007	1	0	\$0	\$0
Williamson County	6/3/2007	0	0	\$15,100	\$0
Williamson County	6/26/2007	0	0	\$752,500	\$0
Williamson County	6/28/2007	0	0	\$225,800	\$0
Williamson County	9/8/2010	1	0	\$11,365,200	\$0
Williamson County	10/30/2013	0	0	\$1,476,900	\$0
Williamson County	5/5/2015	0	0	\$26,400	\$0
Williamson County	5/6/2015	0	0	\$26,400	\$0
City of Hutto	5/25/2015	1	0	\$9,229,600	\$0
Williamson County	9/22/2018	0	0	\$248,500	\$0
Meridian World School	9/22/2018	0	0	\$2,000	\$0
Total Losses		5	10	\$26,117,100	\$136,300

Table 10-4. Summary of Historical Flood Events, 1997-2023

JURISDICTION	NUMBER OF EVENTS	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	142	4	10	\$16,885,500	\$136,300
City of Hutto	9	1	0	\$9,229,600	\$0
Georgetown ISD	0	-	-	-	-
Hutto ISD	0	-	-	-	-
Liberty Hill ISD	0	-	-	-	-
Meridian World School	1	0	0	\$2,000	-
Total Losses	152	5	10	\$26,253,400	

Based on the list of historical flood events for the Williamson County planning area and including all participating jurisdictions, 21 events have occurred since the 2017 Plan.

SIGNIFICANT EVENTS

November 15, 2001 – Williamson County

SECTION 10: FLOOD

Rainfall began near sunrise over Williamson County, with totals in the mid-morning approaching 3 inches. By the end of the afternoon, amounts were generally 4 to 6 inches over the south portion of the county, with a major portion of the rainfall occurring over the drainage area of Brushy Creek. Emergency planners reported the flooding along the San Gabriel River to be some of the worst since 1957. Numerous rescues were required, with some victims having to be pulled out of trees. At least 3 cars washed off a bridge over Brushy Creek south of the City of Hutto. Several dozen people were evacuated from their homes and a few homes were destroyed. Nearly 3 dozen trailers and recreational vehicles were damaged or destroyed at resorts along SH 29 east of Georgetown along the San Gabriel Creek. Power outages were common but short-lived. Two fatalities occurred in the Brushy Creek area when separate individuals got stuck in their vehicles and drowned. This event caused \$883,800 (2024 dollars) in damages.

SECTION 10: FLOOD

Flash Flood on March 13, 2007 – Williamson County

Thunderstorms developed over most of South Central Texas as an upper level low moved slowly across North Texas. County Roads 258, 268, and 3N/A5 were all closed due to high water, among many others. A couple was driving home in the Georgetown area when their vehicle stalled in high water in Berry Creek. Rescuers reached the couple and attempted to bring them to safety, both were swept downstream. One individual drowned.

Flash Flood on September 8, 2010 – Williamson County

Tropical Storm Hermine made landfall near the Texas / Mexico border and caused strong winds and flooding in South Central Texas. The region was hit very hard with widespread rains of 8-12 inches across much of the I-35 corridor from Austin down to San Antonio. Hardest hit areas include north Austin, Round Rock, Cedar Park, and Georgetown, where sixteen inches of rain were reported. Williamson County reported 637 homes having been damaged by flood waters, ranging from minor to major damage. Damage estimates are more than \$11 million dollars (2024 dollars) for county infrastructure including roads, bridges, public buildings and parks. Heavy rain produced flash flooding which closed I-35 in both directions in Georgetown and caused one death when a man was stuck and sucked down through a drainage culvert. The flooding also caused the evacuation of several homes along Brushy Creek near Round Rock.

Flash Flood on May 25, 2015 – City of Hutto

Thunderstorms produced heavy rain that caused flash flooding around Williamson County. Numerous roads were closed, including Hairy Man Road. The Bull Run Creek hike and bike trail were flooded. An individual died when their vehicle was swept away near County Road 143 and Highway 195 north of Georgetown. An estimated 38 homes were destroyed, and another 57 homes sustained major damage. Losses for infrastructure totaled more than \$9,229,600 (2024 dollars).

PROBABILITY OF FUTURE EVENTS

Based on 152 recorded historical occurrences within a 28-year reporting period within the Williamson County planning area, including all participating jurisdictions, ISDs and schools, flooding is considered “Highly Likely,” meaning an event is probable within the next year.

VULNERABILITY AND IMPACT

A property’s vulnerability to a flood depends on its location and proximity to the floodplain. The Williamson County Atlas 14 Floodplain Study preliminary results estimates that 11,550 buildings in Williamson County are located in the floodplain. Structures that lie along banks of a waterway are the most vulnerable and are often repetitive loss structures. Williamson County encourages development outside of the floodplain, and the impact for flood for the entire planning area, in terms of structure and infrastructure damages would be considered Limited, with critical facilities shutdown for 24-hours or less and less than ten percent of property destroyed or with major damage. However, with ten injuries and five fatalities, the impact would be considered “Substantial”, with multiple deaths possible depending on the size and extent of the event.

Table 10-5 includes the comprehensive critical facilities identified in Appendix C that were considered the most important to the planning area and are susceptible to a range of impacts from a variety of natural hazards, including those facilities located in the regulatory floodplain. For

SECTION 10: FLOOD

a comprehensive list of identified critical facilities by participating jurisdiction, please see Appendix C.

Table 10-5. Critical Facilities in the Floodplain by Participating Jurisdiction

CRITICAL FACILITY TYPES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
Emergency Response Departments (EOC, Fire, Police, EMS), Hospitals	Williamson County: 1 Municipal	- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. - Emergency vehicles can be damaged by rising flood waters. - Flood-related rescues may be necessary at swift and low water crossings or in flooded neighborhoods where roads have become impassable, placing first responders in harm's way. - Evacuations may be required for entire neighborhoods because of rising floodwaters, further taxing limited response capabilities and increasing sheltering needs for displaced residents. - Power outages could disrupt communications, delaying emergency response times. - Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. - Washed out roads and bridges can impede emergency response vehicle access to areas. - Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. - First responders are exposed to downed power lines, contaminated and unusual debris, hazardous materials, and generally unsafe conditions. - Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters, Governmental Facilities	Williamson County: 2 Residential (Vulnerable Populations), 7 Schools, 2 Transportation City of Hutto: 1 School Hutto ISD: 2 Schools	- Structures can be damaged by rising flood waters. - Power outages could disrupt critical care. - Backup power sources could be damaged, inundated or otherwise inoperable. - Critical staff may be impacted and unable to report for duty, limiting response capabilities. - Evacuations may be necessary due to extended power outages, gas line ruptures, or inundation of facilities. - Additional emergency responders and critical aid workers may not be able to reach the area for days. - Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations.

SECTION 10: FLOOD

CRITICAL FACILITY TYPES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
		- Temporary break in operations may significantly inhibit post event evacuations. - Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Suppliers (food, gas, etc.)	Williamson County: 3 Food and Agriculture	- Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. - Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	Williamson County: 18 Communications, 59 Dams, 7 Sewage and Water City of Hutto: 5 Sewage and Water	- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. - Emergency service vehicles can be damaged by rising flood waters. - Flood-related rescues may be necessary at swift and low water crossings or in flooded neighborhoods where roads have become impassable, placing emergency service workers in harm's way. - Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. - Service responders are exposed to downed power lines, contaminated and unusual debris, hazardous materials, and generally unsafe conditions. - Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

Historic loss estimates due to flood are presented in Table 10-6 below. Considering 152 flood events over a 28-year period, frequency is approximately five to six events every year.

Table 10-6. Average Annualized Losses by Jurisdiction, 1996-2023

JURISDICTION	NUMBER OF EVENTS	PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Williamson County	142	\$17,021,800	\$607,900
City of Hutto	9	\$9,229,600	\$329,600
Georgetown ISD	0	-	-
Hutto ISD	0	-	-
Liberty Hill ISD	0	-	-
Meridian World School	1	\$2,000	\$100
PLANNING AREA	152	\$26,253,400	\$937,600

SECTION 10: FLOOD

While all citizens are at risk of the impacts of a flood, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. In addition, due to factors like limited mobility, communication difficulties, medical needs, reliance on support services, transportation challenges, housing accessibility issues, and possible shortages in emergency shelter accommodations, the elderly, children, and people with disabilities are also disproportionately affected by flooding events. People who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

The population over 65 in the Williamson County planning area is estimated at 13 percent of the total population and children under the age of 5 are estimated at 6 percent. The population with a disability is estimated at 10 percent of the total population. An estimated 6 percent of the planning area population live below the poverty level and 22 percent of the populations speaks a language other than English.

Table 10-7. Populations at Greater Risk by Jurisdiction⁴

JURISDICTION	ELDERLY (over 65)	YOUTH (under 5)	WITH A DISABILITY	BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Williamson County	77,609	37,584	61,524	38,896	138,476
City of Hutto	1,830	2,155	2,658	2,301	7,141

Table 10-8. Populations at Greater Risk for Special Districts⁵

JURISDICTION	POPULATION UNDER 5
Georgetown ISD	469
Hutto ISD	415
Liberty Hill ISD	240
Meridian World School	0

The Center for Disease Control (CDC) created a Social Vulnerability Index (SVI) which includes a database and mapping application that identifies and quantifies communities experiencing social vulnerability. The current CDC SVI uses 16 U.S. census variables from the 5-year American Community Survey (ACS) to identify communities that may need support before, during, or after disasters. All 16 variables fall under four broad categories including socioeconomic status (population in poverty, unemployment, etc.), household characteristics (age, disability status, etc.), racial and ethnic minority status, and housing type and transportation (mobile homes, no vehicles, etc.). Populations experiencing social vulnerability may be adversely impacted by

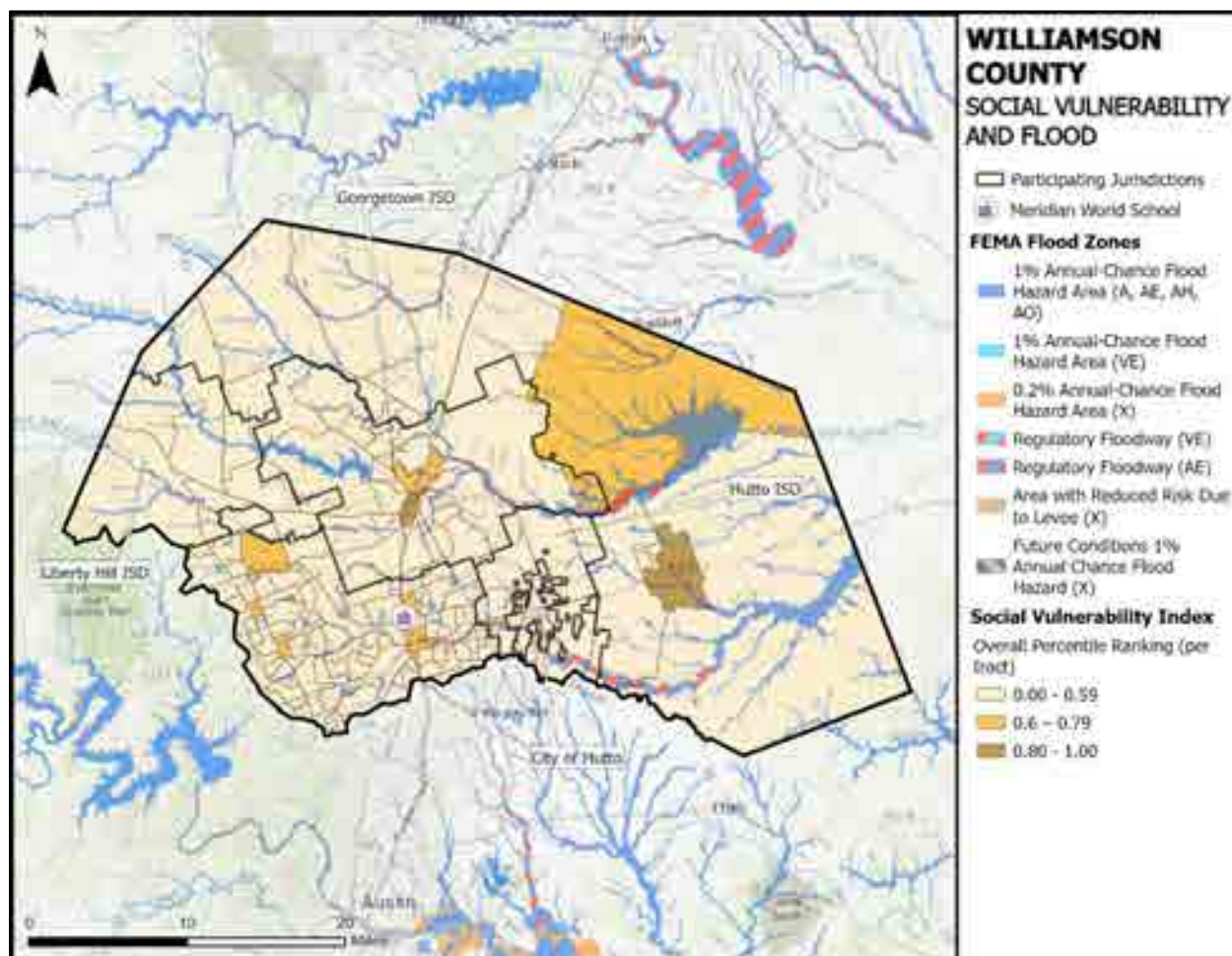
⁴ U.S. Census Bureau Five-Year estimates

⁵ ISDs and the Meridian World School vulnerable populations data has been provided by Planning Team members from each participating ISD and school

SECTION 10: FLOOD

natural hazards, disasters, and other community-level stressors. Figure 10-9 identifies areas of social vulnerability using the CDC's SVI and where these areas overlap Williamson County's flood hazard areas.

Figure 10-9. Williamson County Social Vulnerability and Flood Hazard Areas



ASSESSMENT OF IMPACTS

Flooding is the deadliest natural disaster that occurs in the U.S. each year, and it poses a constant and significant threat to the health and safety of the people in the Williamson County planning area. Impacts to the planning area can include:

- o Flood-related rescues may be necessary at swift water and low water crossings or in flooded neighborhoods where roads have become impassable, placing first responders in harm's way.
- o Evacuations may be required for entire neighborhoods because of rising floodwaters, further taxing limited response capabilities and increasing sheltering needs for displaced residents.
- o Health risks and threats to residents are elevated after the flood waters have receded due to contaminated flood waters (untreated sewage and hazardous chemicals) and mold growth typical in flooded buildings and homes.

SECTION 10: FLOOD

- o Significant flood events often result in widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- o Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- o Floods can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.
- o First responders are exposed to downed power lines, contaminated and potentially unstable debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- o Emergency operations and services may be significantly impacted due to damaged facilities.
- o Significant flooding can result in the inability of emergency response vehicles to access areas of the community.
- o Critical staff may suffer personal losses or otherwise be impacted by a flood event and be unable to report for duty, limiting response capabilities.
- o City or county departments may be flooded, delaying response and recovery efforts for the entire community.
- o Private sector entities that the planning area and its residents rely on, such as utility providers, financial institutions, and medical care providers, may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- o Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- o Some businesses not directly damaged by the flood may be negatively impacted while utilities are being restored or water recedes, further slowing economic recovery.
- o When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- o Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- o Residential structures substantially damaged by a flood may not be rebuilt for years and uninsured or underinsured residential structures may never be rebuilt, reducing the tax base for the community.
- o Large floods may result in a dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- o Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- o Recreation activities may be unavailable, and tourism can be unappealing for years following a large flood event, devastating directly related local businesses and negatively impacting economic recovery.
- o Flooding may cause significant disruptions of clean water and sewer services, elevating health risks and delaying recovery efforts.

SECTION 10: FLOOD

- o The psychosocial effects on flood victims and their families can traumatize them for long periods of time, creating long term increases in medical treatment and services.
- o Extensive or repetitive flooding can lead to decreases in property value for the affected community.
- o Flood poses a potential catastrophic risk to annual and perennial crop production and overall crop quality, leading to higher food costs.
- o Flood related declines in production may lead to an increase in unemployment.
- o Large floods may result in loss of livestock, potential increased livestock mortality due to stress and water borne disease, and increased cost for feed.

The overall extent of damage caused by floods is dependent on the extent, depth, and duration of flooding, in addition to the velocities of flows in the flooded areas. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a flood event.

CLIMATE CHANGE CONSIDERATIONS

River flooding in Texas is projected to have no substantial change through 2036. This is in large part due to the construction of dams and reservoirs for flood management in the 20th century. There is a mixture of historical trends categorized by season, with no one clear trend to project. In addition, meteorological drivers of river flooding (increased rainfall intensity, decreased soil moisture) are projected to have competing influences. On balance, if an increasing trend is present in river flooding, it will be at the most extreme flood events or in the wettest parts of the state where there is so much rainfall that a decrease in soil moisture would have little mitigating impact.⁶

According to the U.S. Climate Explorer, which analyzes the top regional hazards for Williamson County, according to the National Climate Assessment and compares projections for the middle third of this century (2035-2064) with average conditions observed from 1961-1990, the planning area may see a slight increase in precipitation events. Annual counts of intense rainstorms, those that drop two or more inches in one day, are projected to increase up to 6%, depending on the overall future level of emissions.

NATIONAL FLOOD INSURANCE PROGRAM (NFIP) PARTICIPATION

Flood insurance offered through the National Flood Insurance Program (NFIP) is the best way for home and business owners to protect themselves financially against the flood hazard. Williamson County and the City of Hutto are participating in the planning area participate in the NFIP and are in good standing. It is noted that ISDs and schools are not eligible participants in the NFIP.

As an additional indicator of floodplain management responsibility, communities may choose to participate in FEMA's Community Rating System (CRS). This is an incentive-based program that

⁶ Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.

SECTION 10: FLOOD

allows communities to undertake flood mitigation activities that go beyond NFIP requirements. Currently, none of the participating communities in the planning area participate in the CRS.

Williamson County and the City of Hutto currently have in place standard flood damage prevention ordinances which include minimum NFIP standards for new construction and substantial Improvements of structures. Both NFIP participating jurisdictions are considering adopting higher regulatory NFIP standards to limit or further regulate floodplain development.

The flood hazard areas throughout Williamson County are subject to periodic inundation, which may adversely affect public safety, resulting in loss of life and property, health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief. Flood losses are created by the cumulative effect of obstructions in floodplains which cause an increase in flood heights and velocities, and by the occupancy of flood hazard areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, flood-proofed, or otherwise protected from flood damage. Mitigation actions are included to address flood maintenance issues as well, including routinely clearing debris from roadside ditches and bridges, and expanding drainage culverts and storm water structures to convey flood water more adequately.

It is the purpose of Williamson County and the City of Hutto to continue to promote public health, safety, and general welfare by minimizing public and private losses due to flood conditions in specific areas. Williamson County and the City of Hutto are guided by their local Flood Damage Prevention Ordinance. These communities will continue to comply with NFIP requirements through their local permitting, inspection, and record-keeping requirements for new and substantially developed construction. Further, the NFIP program promotes sound development in floodplain areas and includes provisions designed to:

- o Protect human life and health;
- o Minimize expenditure of public money for costly flood control projects;
- o Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- o Minimize prolonged business interruptions;
- o Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in floodplains;
- o Help maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to minimize future flood blight areas; and
- o Ensure that potential buyers are notified that property is in a flood area.

In order to accomplish these tasks, Williamson County and the City of Hutto seek to observe the following guidelines in order to achieve flood mitigation:

- o Restrict or prohibit uses that are dangerous to health, safety, or property in times of flood, such as filling or dumping, that may cause excessive increases in flood heights or velocities;
- o Require that uses vulnerable to floods, including facilities, which serve such uses, be protected against flood damage at the time of initial construction, as a method of reducing flood losses;
- o Control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters;

SECTION 10: FLOOD

- o Control filling, grading, dredging, and other development, which may increase flood damage; and
- o Prevent or regulate the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.

NFIP COMPLIANCE AND MAINTENANCE

All NFIP participating jurisdictions have developed mitigation actions that relate to either NFIP maintenance or compliance. Compliance and maintenance actions can be found in Section 22.

Flooding was identified as one of the higher risk hazards during hazard ranking activities at the Risk Assessment Workshop by the planning team. As such, many of the mitigation actions were developed with flood mitigation in mind. A majority of these flood actions address compliance with the NFIP and implementing flood awareness programs. Both participating jurisdictions recognize the need and are working towards adopting higher NFIP regulatory standards to further minimize flood risk in their community. In addition, all jurisdictions are focusing on public flood awareness activities. This includes promoting the availability of flood insurance by placing NFIP brochures and flyers in public libraries or public meeting places in participating jurisdictions.

Both NFIP participating jurisdictions in this planning process have a designated floodplain administrator. All floodplain administrators in the planning area will continue to maintain compliance with the NFIP, including continued floodplain administration, zoning ordinances, and development regulation. The floodplain ordinance adopted by each participating jurisdiction outlines the minimum requirements for development in Special Flood Hazard Areas.

Both participating jurisdictions have a permitting process in place and each local floodplain administrator is responsible for coordinating inspections of damaged homes located in the floodplain. Following a flood event, local officials inspect damaged homes to make a substantial damage determination. Substantially damaged homes must be brought into compliance. Similarly, proposed improvements to homes located in the floodplain are reviewed by local building officials to determine if a substantial improvement is proposed. The floodplain administrator oversees permitted repairs and improvements to ensure compliance during the rebuilding or improvement process.

REPETITIVE LOSS

The Flood Mitigation Assistance (FMA) Grant Program under FEMA provides federal funding to assist states and communities in implementing mitigation measures to reduce or eliminate the long-term risk of flood damage to buildings that are insured under the National Flood Insurance Program. The Texas Water Development Board (TWDB) administers the FMA grant program for the State of Texas. One of the goals of the FMA program is to reduce the burden of repetitive loss and severe repetitive loss properties on the NFIP through mitigation activities that significantly reduce or eliminate the threat of future flood damages.

Repetitive Loss properties are defined as structures that are:

- o Any insurable building for which 2 or more claims of more than \$1,000 each, paid by the National Flood Insurance Program (NFIP) within any 10-year period, since 1978;
- o May or may not be currently insured under the NFIP.

SECTION 10: FLOOD

Severe Repetitive Loss properties are defined as structures that are:

- o Covered under the NFIP and have at least 4 flood related damage claim payments (building and contents) over \$5,000.00 each, and the cumulative amount of such claims payments exceed \$20,000; or
- o At least 2 separate claim 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.

In either scenario, at least 2 of the referenced claims must have occurred within any 10-year period and must be greater than 10 days apart.⁷ Table 10-9 shows repetitive loss and severe repetitive loss properties for Williamson County. There are 31 Repetitive Loss structures in Williamson County, including 4 that are considered Severe Repetitive Loss properties. There are no repetitive or severe repetitive loss properties reported for the City of Hutto.

Table 10-9. Repetitive Loss and Severe Repetitive Loss Properties

JURISDICTION	BUILDING TYPE	NUMBER OF STRUCTURES	NUMBER OF LOSSES
Williamson County	Single Family	31	109

⁷ Source: Texas Water Development Board.



SECTION 11

HAIL

SECTION 11: HAIL

Hazard Description	1
Location	1
Extent.....	2
Historical Occurrences.....	3
Significant Events.....	5
Probability of Future Events.....	6
Vulnerability and Impact.....	6
Assessment of Impacts	9
Climate Change Considerations	10

HAZARD DESCRIPTION



Hailstorm events are a potentially damaging outgrowth of severe thunderstorms. During the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere, and the subsequent cooling of the air mass. Frozen droplets gradually accumulate into ice crystals until they fall as precipitation that is round or irregularly shaped masses of ice typically greater than 0.75 inches in diameter. The size of hailstones is a direct result of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a by-product of heating on the Earth's surface. Higher temperature gradients above Earth's surface result in increased suspension time and hailstone size.

According to the National Insurance Crime Bureau (NICB), between 2018 and 2020 the State of Texas had the greatest number of hail loss claims in the U.S. with 605,866 loss claims (23 percent of total hail claims in the U.S.) due to hail events. In this two-year period Texas experienced a total of 584 severe hail days. Five of the top ten cities for hail loss claims between 2017 and 2019 were in Texas, three of which were in the Dallas-Fort Worth metropolitan area.¹

In 2021, 6.8 million properties in the U.S. experienced one or more damaging hail events, resulting in a total of \$16.5 billion in insured losses. Texas had the highest number of properties affected by hail with over 1.5 million properties or 17 percent of total properties in the state affected; an increase of 80,000 properties affected between 2020 and 2021. Texas hailstorms accounted for almost a quarter of total U.S. properties affected by hail in 2021.

LOCATION

Hailstorms are an extension of severe thunderstorms that could potentially cause severe damage. As a result, they are not confined to any specific geographic location and can vary greatly in size, location, intensity, and duration. Therefore, the entire Williamson County planning area, including

¹ Manasek, Thomas, "2018-2020 United States Hail Loss Claims and Questionable Claims" (National Insurance Crime Bureau, March 15, 2021). <http://www.rmiaa.org/downloads/PUBLIC%202018%20-%202020%20Hail%20foreCAST-%20TJM.pdf>

SECTION 11: HAIL

participating jurisdictions, ISDs and schools, is equally at risk to the hazard of hail. Refer to Figure 11-1 for the location of past hail events in the planning area.

EXTENT

The National Weather Service (NWS) classifies a storm as “severe” if there is hail three-quarters of an inch in diameter (approximately the size of a penny) or greater, based on radar intensity or as seen by observers. The intensity category of a hailstorm depends on hail size and the potential damage it could cause, as depicted in the National Centers for Environmental Information (NCEI) Intensity Scale in Table 11-1.

Table 11-1. Hail Intensity and Magnitude²

SIZE CODE	INTENSITY CATEGORY	SIZE (diameter inches)	DESCRIPTIVE TERM	TYPICAL DAMAGE
H0	Hard Hail	Up to 0.33	Pea	No damage
H1	Potentially Damaging	0.33 – 0.60	Marble	Slight damage to plants and crops
H2	Potentially Damaging	0.60 – 0.80	Dime	Significant damage to plants and crops
H3	Severe	0.80 – 1.20	Nickel	Severe damage to plants and crops
H4	Severe	1.2 – 1.6	Quarter	Widespread glass and auto damage
H5	Destructive	1.6 – 2.0	Half Dollar	Widespread destruction of glass, roofs, and risk of injuries
H6	Destructive	2.0 – 2.4	Ping Pong Ball	Aircraft bodywork dented and brick walls pitted
H7	Very Destructive	2.4 – 3.0	Golf Ball	Severe roof damage and risk of serious injuries
H8	Very Destructive	3.0 – 3.5	Hen Egg	Severe damage to all structures
H9	Super Hailstorms	3.5 – 4.0	Tennis Ball	Extensive structural damage, could cause fatal injuries
H10	Super Hailstorms	4.0 +	Baseball	Extensive structural damage, could cause fatal injuries

The intensity scale in Table 11-1 ranges from H0 to H10, with increments of intensity or damage potential in relation to hail size (distribution and maximum), texture, fall speed, speed of storm translation, and strength of the accompanying wind. Based on the best available data regarding the previous occurrences for the area, the Williamson County planning area may experience hailstorms ranging from an H0 (pea size) to an H10 (baseball size). The largest size hail to be reported was 4 inches in diameter, or a H10, which is considered a very destructive hailstorm that can cause severe damage to structures. Events of this magnitude occurred on two occasions

² NCEI Intensity Scale, based on the TORRO Hailstorm Intensity Scale.

SECTION 11: HAIL

including May 14, 2008, and September 24, 2023. Refer to the Historical Occurrences section below for more details on these events. This is likely the greatest extent the planning area can anticipate in the future.

HISTORICAL OCCURRENCES

Historical evidence shown in Figure 11-1 demonstrates that the planning area is vulnerable to hail events overall. Historical events with reported damages, injuries, or fatalities are shown in Table 11-2. A total of 361 reported historical hail events impacted the Williamson County planning area from 1959 through 2023; these events were reported to NCEI and NOAA databases and may not represent all hail events to have occurred during the past 65 years. Only those events for the Williamson County planning area with latitude and longitude available were plotted (Figure 11-1).

Historical hail event data for the participating school and ISDs are provided within the Williamson County events or the participating jurisdiction events in which the school resides. In the NCEI database, these entities do not have events reported separate and apart from the reported county and jurisdiction events. Meridian World School, Hutto ISD, and Georgetown ISD all reported previous hail events which caused damage, though dollar estimates were not available for all of these occurrences. Event data provided by these special districts was integrated into Tables 11-2 and 11-3 below, when available.

SECTION 11: HAIL

Figure 11-1. Spatial Historical Hail Events, 1959-2023

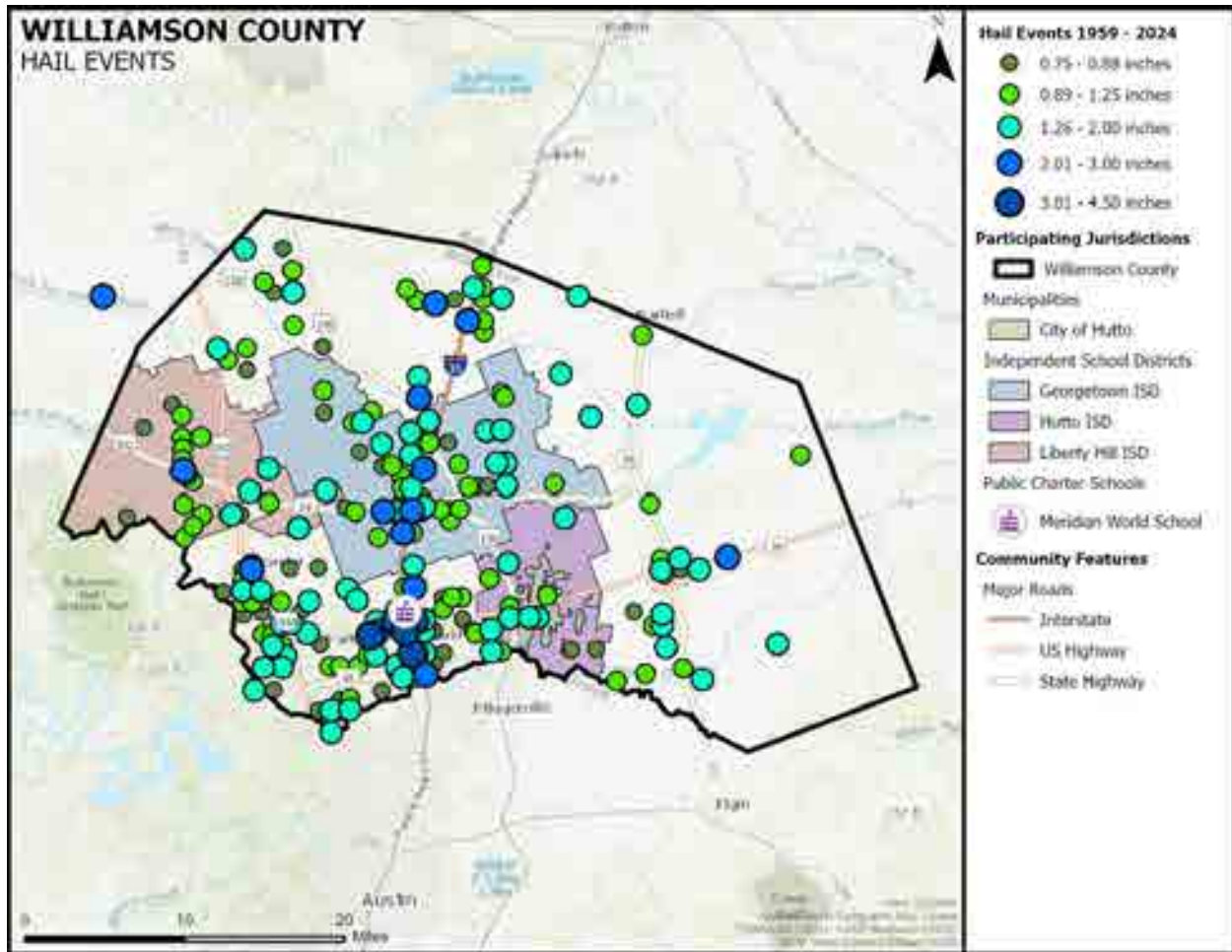


Table 11-2. Damaging Historical Hail Events, 1959-2023³

JURISDICTION	DATE	MAGNITUDE (inches)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	5/17/1995	2.75	0	0	\$41,300	\$103,100
Williamson County	10/17/1996	1.5	0	0	\$29,800	\$0
Williamson County	5/1/2000	1	0	0	\$146,300	\$274,300
Williamson County	5/20/2001	3.5	0	0	\$352,900	\$0
Williamson County	9/24/2023	4	0	0	\$305,613,300	\$0
Meridian World School	9/24/2023	4	0	0	\$3,500,000	\$0
TOTALS		(Max Extent)	0	0	\$309,683,600	\$377,400

³ Only recorded events with damages are listed. Monetary damage amounts have been inflated to reflect their 2024 value. No reports of injuries or fatalities were recorded in the NCEI database.

SECTION 11: HAIL

Table 11-3. Historical Hail Events Summary, 1959-2023

JURISDICTION	NUMBER of EVENTS	MAX MAGNITUDE (inches)	INJURIES	DEATHS	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	350	4	0	0	\$306,183,600	\$377,400
City of Hutto	11	2	0	0	\$0	\$0
Georgetown ISD	0	-	-	-	-	-
Hutto ISD	0	-	-	-	-	-
Liberty ISD	0	-	-	-	-	-
Meridian World School	1	4	0	0	\$3,500,000	\$0
TOTAL LOSSES	110	(Max Extent)	0	0	\$310,061,000	

Based on the list of historical hail events for the Williamson County planning area (listed above), 116 of the events have occurred across 34 separate days since the 2017 Plan, according to reports in the NCEI database. The most significant event in relation to reported damages occurred on September 24, 2023, resulting in \$305,613,300 (2024 dollars) in damages for Williamson County as well as \$3,500,000 in damages for Meridian World School.

SIGNIFICANT EVENTS

May 17, 1995 – Williamson County

A storm system developed late in the night which brought hail and high winds to the Williamson County planning area. The eastern portion of the county experienced baseball-size hail, while the western part of the county reported only smaller hail during the storm. Widespread crop and property damage was reported during this event due to hail, with property damage estimated at \$41,300 (2024 dollars) and crop damage estimated at \$103,100 (2024 dollars).

May 20, 2001 – Williamson County

A thunderstorm complex which began over Llano and Burnet counties, damaging trees and homes in those areas, moved east over the Williamson County planning area. Very large hail, reported at 3.5 inches in diameter, or tennis ball size, damaged the roofs of homes and broke the windows of homes and vehicles. The storm, which also included strong thunderstorm winds, left some 20,000 residents of the Austin metroplex without power for several hours. In Williamson County, property damage was estimated at \$352,900 (2024 dollars).

September 24, 2023 – Williamson County

Thunderstorms developed along a cold front as a major storm system moved south through South Central Texas. One supercell formed over the City of Georgetown, the City of Austin, and the City of Round Rock. In Williamson County, hail as big as four inches in diameter, or baseball size, was reported. The giant hail from this supercell storm did considerable damage to the planning area and surrounding region, with NCEI estimating that \$700,000,000 in total damages were caused throughout Texas due to these storms. It is estimated that for Williamson County, in particular, hail from this event caused \$305,613,300 (2024 dollars) in property damage across the planning

SECTION 11: HAIL

area. Meridian World School also reported \$3,500,000 in property damages to their facilities due to hail from this event.

PROBABILITY OF FUTURE EVENTS

Based on available records of historic events, 361 events in a 65-year reporting period for Williamson County provides an average annual occurrence of five to six events per year. This frequency supports a “Highly Likely” probability of future events for the Williamson County planning area, including all participating jurisdictions, ISDs and schools.

VULNERABILITY AND IMPACT

Much of the damage inflicted by hail is to crops. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are most damaged by hail.

Utility systems on roofs of buildings and critical facilities would be vulnerable and could be damaged. Hail could cause a significant threat to people, as they could be struck by hail and falling trees and branches. Outdoor activities and events may elevate the risk to residents and visitors when a hailstorm strikes with little warning. Portable buildings typically utilized by schools and commercial sites such as construction areas would be more vulnerable to hail events than the typical site-built structures.

The Williamson County planning area features mobile or manufactured home parks throughout the planning area. These parks are typically more vulnerable to hail events than typical site-built structures. In addition, manufactured homes are located sporadically throughout the planning area including all participating jurisdictions which would also be more vulnerable. The U.S. Census data indicates a total of 4,899 (2 percent of total housing stock) manufactured homes located in the Williamson County planning area. In addition, 11 percent (approximately 25,704 structures) of the housing structures in the Williamson County planning area were built before 1980. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant wind events.

Table 11-4. Structures at Greater Risk by Participating Jurisdiction

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Williamson County	25,704	4,899
City of Hutto	374	37

Table 11-5. Structures at Greater Risk by Participating Special District

JURISDICTION	STRUCTURES BUILT BEFORE 1980	MANUFACTURED FACILITIES/ PORTABLE BUILDINGS
Georgetown ISD	4	21
Hutto ISD	1	24
Liberty Hill ISD	6	25

SECTION 11: HAIL

JURISDICTION	STRUCTURES BUILT BEFORE 1980	MANUFACTURED FACILITIES/ PORTABLE BUILDINGS
Meridian World School	0	4

While all citizens are at risk of the impacts of hail, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 6 percent of the planning area population live below the poverty level (Table 11-6). While warning times for this type of hazard events should be substantial enough for these individuals to seek shelter, the elderly, children, and people with a disability may have trouble taking shelter due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

Table 11-6. Populations at Greatest Risk by Jurisdiction⁴

JURISDICTION	ELDERLY (over 65)	YOUTH (under 5)	WITH A DISABILITY	BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Williamson County	77,609	37,584	61,524	38,896	138,476
City of Hutto	1,830	2,155	2,658	2,301	7,141

Some participating ISDs and schools also have vulnerable populations based on age or work location, such as employees that work outdoors and may be subject to severe weather conditions, or children under 5 who attend school at the participating schools (Table 11-7).

Table 11-7. Populations at Greater Risk by Special District⁵

JURISDICTION	POPULATION UNDER 5	EMPLOYEES OPERATING OUTDOORS
Georgetown ISD	469	428
Hutto ISD	415	222
Liberty Hill ISD	240	300
Meridian World School	0	2

The Williamson County Planning Team identified the following critical facilities (Table 11-8) as assets that are considered the most important to the planning area and are susceptible to a range

⁴ US Census Bureau 2022 data for Williamson County

⁵ ISDs and the Meridian World School vulnerable populations data has been provided by Planning Team members from each participating ISD and school.

SECTION 11: HAIL

of impacts caused by hail events. For a comprehensive list by participating jurisdiction, please see Appendix C.

Table 11-8. Critical Facilities Vulnerable to Hail

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. - Emergency vehicles can be damaged by hailstones. - Power outages could disrupt communications, delaying emergency response times. - Accumulated hail on the streets may impede emergency response vehicle access to areas. - Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	- Structures can be damaged by hailstones. - Power outages could disrupt critical care. - Backup power sources could be damaged. - Evacuations may be necessary due to extended power outages, gas line ruptures, or structural damage to facilities. - Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. - Temporary break in operations may significantly inhibit post event evacuations. - Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Supplier (Food, fuel, etc.)	- Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. - Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. - Power outages could disrupt communications, delaying emergency response times. - Accumulated hail on the streets may impede service response vehicle access to areas. - Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

Hail has been known to cause injury to humans and occasionally has been fatal. Overall, the damage to property and crops in the planning area is estimated at \$310,061,000 (2024 dollars) over the reporting period, with an average annualized loss of \$4,770,100. Based on historic loss and damages, the impact of hail damages on the Williamson County planning area, including participating jurisdictions, ISDs and schools, can be considered “Minor” severity of impact, meaning injuries and illnesses do not result in permanent disability, complete shutdown of critical facilities for up to one week, and more than 10 percent of property destroyed or with major damage.

SECTION 11: HAIL

Table 11-9. Estimated Annualized Losses by Jurisdiction

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Williamson County	\$306,561,000	\$4,716,300
City of Hutto	\$0	\$0
Georgetown ISD	\$0	\$0
Hutto ISD	\$0	\$0
Liberty Hill ISD	\$0	\$0
Meridian World School	\$3,500,000	\$53,800
TOTALS	\$310,061,000	\$4,770,100

ASSESSMENT OF IMPACTS

Hail events have the potential to pose a significant risk to people and can create dangerous situations. Hail conditions can be frequently associated with a variety of impacts, including:

- o Hail may create hazardous road conditions during and immediately following an event, potentially delaying critical staff from reporting for duty as well as delaying first responders from providing for or preserving public health and safety and.
- o Individuals and first responders who are exposed to the storm may be struck by hail, falling branches, or downed trees resulting in injuries or possible fatalities.
- o Large hail events will likely cause extensive roof damage to residential structures along with siding damage and broken windows, creating a spike in insurance claims and a rise in premiums, and potentially result in physical harm to occupants.
- o Automobile damage may be extensive depending on the size of the hail and length of the storm.
- o Hail events can result in power outages over widespread areas increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- o Extended power outage can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- o First responders are exposed to downed power lines, damaged structures, hazardous spills, and debris that often accompany hail events, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- o Some businesses not directly damaged by the hail event may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- o Businesses that are more reliant on utility infrastructure than others may suffer greater damage without a backup power source.
- o Depending on the severity and scale of damage caused by large hail events, damage to power transmission and distribution infrastructure can require days or weeks to repair.

SECTION 11: HAIL

- o A significant hail event could significantly damage agricultural crops, resulting in extensive economic losses for the community and surrounding area.
- o Hail events may injure or kill livestock and wildlife or destroy wildlife habitat.
- o A large hail event could impact the accessibility of recreational areas and parks due to extended power outages or debris clogged access roads.
- o Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There are 75 historical sites listed on the National Register of Historic Places for Williamson County.

The economic and financial impacts of hail will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning conducted by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of any hail event.

CLIMATE CHANGE CONSIDERATIONS

Although the impact of climate change on the frequency and severity of hail events is uncertain, some climate studies attempt to give insight on the future conditions of hailstorms. As ocean temperatures rise due to climate change, more moisture is evaporating into the atmosphere. The warm and moist air masses that fuel severe weather may become more unstable on average, which could favor the increased development of thunderstorms and hail. However, it is also suggested that in a warming climate, the average melting level will rise in thunderstorms, meaning small hailstones will have more of a chance to melt as they fall to the ground. Therefore, hail may become less frequent, but large hail can be expected when it does occur, leading to the possibility of increased damages.⁶

⁶ Yale Climate Connections, Hailstorms and Climate Change, March 17, 2022.



SECTION 12
**HURRICANE /
TROPICAL STORM**

SECTION 12: HURRICANE / TROPICAL STORM

Hazard Description	1
Location	1
Extent.....	2
Historical Occurrences.....	2
Significant Events.....	3
Probability of Future Events.....	4
Vulnerability and Impact.....	4
Assessment of Impacts	6
Climate Change Considerations	8

HAZARD DESCRIPTION

According to the National Oceanic and Atmospheric Administration (NOAA), a hurricane is an intense tropical weather system of strong thunderstorms with well-defined surface circulation and maximum sustained winds of 74 mph or higher. In the Northern Hemisphere, circulation of winds near the Earth's surface is counterclockwise.

Hurricanes often begin as tropical depressions that intensify into tropical storms when maximum sustained winds increase to between 35–64 knots (39–73 mph). At these wind speeds, the storm becomes more organized and circular in shape and begins to resemble a hurricane. Tropical storms can be equally problematic without ever becoming a hurricane. Tropical storms resulting in high winds and heavy rainfall can be dangerous to people and property, as Tropical Storm Frances was for southeast Texas in September 1998. Once sustained winds reach or exceed 74 mph, the storm becomes a hurricane. The intensity of a landfalling hurricane is expressed in categories relating wind speeds to potential damage. Tropical storm-force winds are strong enough to be dangerous to those caught in them. For this reason, emergency managers plan to have evacuations completed and personnel sheltered before winds of tropical storm-force arrive, which precedes the arrival of hurricane-force winds.



LOCATION

The location of the Williamson County planning area is approximately 200 miles from the coast making the planning area vulnerable to threats directly and indirectly related to a hurricane event, such as high-force winds and flooding. While Williamson County is not located along the Gulf Coast, due to the regional nature of hurricanes and tropical storms, the County is exposed and susceptible to the impacts of hurricane and tropical storm events. Hurricanes and tropical storms can impact Williamson County from June to November, the official Atlantic U.S. hurricane season. Williamson County planning area is in a low to moderate risk area for hurricane wind speeds up to 200 miles per hour (mph).

SECTION 12: HURRICANE / TROPICAL STORM

EXTENT

As a hurricane develops, the barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour, the storm is deemed a hurricane.

Hurricanes are categorized according to the strength and intensity of their winds using the Saffir-Simpson Hurricane Scale (Table 12-1). A Category 1 storm has the lowest wind speeds, while a Category 5 hurricane has the highest. However, a lower category storm can inflict greater damage than higher category storms depending on where they strike, the amount of storm surge, other weather they interact with, and how slow they move.

Table 12-1. Extent Scale for Hurricanes¹

CATEGORY	MAXIMUM SUSTAINED WIND SPEED (mph)	MINIMUM SURFACE PRESSURE (millibars)	STORM SURGE (feet)
1	74 – 95	Greater than 980	3 – 5
2	96 – 110	979 – 965	6 – 8
3	111 – 130	964 – 945	9 – 12
4	131 – 155	944 – 920	13 – 18
5	155+	Less than 920	19+

The average estimated extent to be mitigated for is a low Category 1 storm for the entire planning area, based on historical storm tracks. However, it is noted that most hurricanes turn into tropical storms by the time they reach Williamson County.

HISTORICAL OCCURRENCES

Williamson County is located inland and is not directly along the coastline. As hurricanes typically form over the ocean and affect coastal areas, Williamson County is less prone to direct impacts from hurricanes. The hurricanes usually fade and downgrade to tropical storms or tropical depressions as they move away from the coast. However, it is important to note that the remnants of tropical systems, including hurricanes, can still bring heavy rainfall and potential flooding to inland areas.

Hurricanes and tropical storms do not typically track across the planning area. The last known system to track across Williamson County was Tropical Storm Candy in 1968. Historical systems that have tracked in close proximity to the planning area, bringing storm systems, excessive precipitation and potentially damaging wind to Williamson County, participating jurisdictions, ISDs and schools, are listed in Table 12-2 below.

¹ Source: National Hurricane Center, https://www.nhc.noaa.gov/HAW2/english/basics/saffir_simpson.shtml

SECTION 12: HURRICANE / TROPICAL STORM

Historical hurricane impacts for the participating school and ISDs are recorded under the county or city in which they are located as they do not have events reported separately and apart from the events reported to the historical hurricane tracks. There have been no reported losses as a result of hurricane events for any of the participating ISDs or school.

According to the historical hurricane tracks from NOAA's National Hurricane Center, there have been six storms that are known to have come within 60 miles of the Williamson County planning area from 1996 through 2023. Only one event was reported to the NCEI between 1996 and 2023 related to Tropical Storm Hermine on September 8, 2010, and this event caused one fatality and \$11,365,200 (2024 dollars) in damages.

Table 12-2. Historical Hurricane / Tropical Storm Events, 1996-2023²

DATE	STORM NAME	CATEGORY (max)
9/8/1998 - 9/13/1998	Frances	Tropical Storm
6/5/2001 – 6/19/2001	Allison	Tropical Storm
8/30/2003 – 9/2/2003	Grace	Tropical Storm
8/3/2008 - 8/6/2008	Edouard	Tropical Storm
9/4/2010 - 9/10/2010	Hermine	Tropical Storm
6/16/2015 - 6/21/2015	Bill	Tropical Storm

Based on the list of historical hurricane events for Williamson County planning area, including all participating jurisdictions, ISDs and school, no events have occurred since the 2017 Plan.

SIGNIFICANT EVENTS

There have been 4 declared disasters and emergency declarations between 1996 and 2023 (Table 12-3) related to hurricane or tropical storm events. These declarations were related to Hurricane Katrina, Hurricane Rita, and Hurricane Ike.

Table 12-3. Disaster Declarations for Hurricane/Tropical Storm, 1996-2023

YEAR	DECLARATION TITLE	DECLARATION TYPE	DISASTER NO.
2005	Hurricane Katrina in Texas	EM	3216
2005	Hurricane Rita in Texas	EM	3261
2005	Hurricane Rita in Texas	DR	1606
2008	Hurricane Ike in Texas	EM	3294

September 8, 2010 – Williamson County (Tropical Storm Hermine)

Tropical Storm Hermine made landfall near the Texas / Mexico border and caused strong winds and flooding in South Central Texas. The region was hit very hard with widespread rains of 8-12

² Source: NOAA Historical Hurricane Tracks, <https://coast.noaa.gov/hurricanes/#map=4/32/-80>

SECTION 12: HURRICANE / TROPICAL STORM

inches across much of the I-35 corridor from Austin down to San Antonio. Hardest hit areas include north Austin, Round Rock, Cedar Park, and Georgetown, where sixteen inches of rain were reported. Williamson County reported 637 homes having been damaged by flood waters, ranging from minor to major damage. Damage estimates are more than \$11 million dollars (2024 dollars) for county infrastructure including roads, bridges, public buildings and parks. Heavy rain produced flash flooding which closed I-35 in both directions in Georgetown and caused one death when a man was stuck and sucked down through a drainage culvert. The flooding also caused the evacuation of several homes along Brushy Creek near Round Rock.

June 16-17, 2015 – Williamson County (Tropical Storm Bill)

Tropical Storm Bill made landfall on Matagorda Island, Texas on June 16, 2015. Its maximum sustained wind speed at landfall was 60 mph. Tropical Storm Bill moved inland and was downgraded to a tropical depression on June 17, 2015. According to the NOAA, although Bill brought coastal flooding and gusty winds to the Texas Coast at landfall, the biggest impact was flash flooding from intense rainfall. A Flash Flood Watch was issued for Williamson County, but no serious flooding occurred. Rainfall totals for the Williamson County area during this event ranged from 1 to 3 inches.

PROBABILITY OF FUTURE EVENTS

Based on historical occurrences of significant hurricane events, the probability of future events is “Unlikely”, with an event probable in the next ten years for Williamson County planning area, including all participating jurisdictions, ISDs and schools. Impacts of climate change are not expected to increase the average frequency of events but may lead to an increase in the intensity of these storms.

VULNERABILITY AND IMPACT

Hurricane and tropical storm events can cause major damage to large areas; hence, all existing buildings, facilities, and populations are equally exposed and vulnerable to this hazard and could potentially be impacted. Williamson County planning area features multiple mobile or manufactured home parks throughout the planning area. These mobile home parks are typically more vulnerable to hurricane events than typical site-built structures. The U.S. Census data indicates a total of 4,899 (2 percent of total housing stock) manufactured homes located in Williamson County planning area (Table 12-4). In addition, 11 percent of the single family residential (SFR) structures in Williamson County were built before 1980.³ These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damages during significant events.

Table 12-4. Structures at Greater Risk⁴

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES/STRUCTURES
Williamson County	25,704	4,899

³ Source: US Census Bureau data estimates for 2022.

⁴ US Census Bureau American Community Survey Five-Year Estimates 2018-2022 data for Williamson County.

SECTION 12: HURRICANE / TROPICAL STORM

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES/STRUCTURES
City of Hutto	374	37
Georgetown ISD	4	21
Hutto ISD	1	24
Liberty Hill ISD	6	25
Meridian World School	0	4

Williamson County identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by hurricane and tropical storm events. For a comprehensive list by participating jurisdiction, please see Appendix C.

Table 12-5. Critical Facilities Vulnerable to Hurricane and Tropical Storm Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	- o Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. - o Emergency vehicles can be damaged by falling trees or flying debris. - o Power outages could disrupt communications, delaying emergency response times. - o Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. - o Debris/downed trees can impede emergency response vehicle access to areas. - o Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. - o First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions. - o Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	- o Structures can be damaged by falling trees or flying debris. - o Power outages could disrupt critical care. - o Backup power sources could be damaged. - o Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. - o Evacuations may be necessary due to extended power outages, gas line ruptures, or structural damages to facilities.
Commercial Supplier (Food, fuel, etc.)	o Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible.

SECTION 12: HURRICANE / TROPICAL STORM

CRITICAL FACILITIES	POTENTIAL IMPACTS
	- o Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed. - o Additional emergency responders and critical aid workers may not be able to reach the area for days.
Utility Services and Infrastructure (electric, water, wastewater, communications)	- o Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. - o Emergency vehicles can be damaged by falling trees or flying debris. - o Power outages could disrupt communications, delaying emergency response times. - o Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. - o Debris/downed trees can impede emergency response vehicle access to areas. - o Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. - o First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.

Storm track data was available for the past 150 years, however, there was only one reported event in the NCEI related to tropical storm events in Williamson County. Tropical Storm Hermine caused one fatality and \$11,365,200 (2024 dollars) in property damages. The annualized estimated losses due to hurricane events over the 28-year reporting period in the Williamson County planning area are significant with an annual loss estimate of \$405,900. Table 12-6 shows annualized exposure.

Table 12-6. Estimated Annualized Losses for Williamson County

JURISDICTION	TOTAL PROPERTY & CROP LOSS (2023 dollars)	ANNUAL LOSS ESTIMATES (2023 dollars)
Williamson County	\$11,365,200	\$405,900

In terms of structure and infrastructure damage, the potential severity of impact to the Williamson County planning area due to hurricanes is considered Limited with critical facilities shut down for 24-hours or less and less than ten percent of property destroyed or with major damage. However, with one reported fatality, the potential severity of impact from a hurricane event for the Williamson County planning area, including all participating jurisdictions, ISDs and schools, is considered to be “Substantial”, with multiple deaths possible depending on the severity and duration of the event.

ASSESSMENT OF IMPACTS

Hurricane and tropical storm events have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. The impact of

SECTION 12: HURRICANE / TROPICAL STORM

climate change could produce larger, more severe hurricane events, exacerbating the current hurricane impacts. Impacts to the planning area can include:

- o Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- o Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- o Driving conditions in the planning area may be dangerous during a hurricane event, especially over elevated bridges, elevating the risk of injury and accidents during evacuations if not timed properly.
- o Emergency evacuations may be necessary prior to a hurricane landfall, requiring emergency responders, evacuation routing, and temporary shelters.
- o Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- o Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- o During hurricane landfall, first responders may be prevented from responding to calls as the winds may reach a speed in which their vehicles and equipment are unsafe to operate.
- o Hurricane events often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- o Extended power outage often results in an increase in structure fires and carbon monoxide poisoning as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- o Extended power outages can also be deadly for individuals reliant on electricity to live independently in their homes.
- o Extreme hurricane events may rupture gas lines and down trees and power lines, increasing the risk of structure fires during and after a storm event.
- o Extreme hurricane events may lead to prolonged evacuations during search and rescue, and immediate recovery efforts requiring additional emergency personnel and resources to prevent entry, protect residents, and protect property.
- o First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
- o Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications.
- o Critical staff may be unable to report for duty, limiting response capabilities.
- o County and City departments may be damaged, delaying response and recovery efforts for the entire community.
- o Private sector entities that the County, Cities, and residents rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- o Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- o Some businesses not directly damaged by the hurricane may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- o Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to hurricane damage. In Williamson County, 11 percent of

SECTION 12: HURRICANE / TROPICAL STORM

homes were built before 1980, and 75 buildings and sites in the County are on the National Register of Historic Places, many of which pre-date modern building codes.

- o Vegetation in the City urban parks may become flattened or oversaturated from high winds and heavy rains.
- o Large scale hurricanes can have significant economic impact on the affected area, as it must now fund expenses such as infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- o Businesses that are more reliant on utility infrastructure than others may suffer greater damage without a backup power source.
- o As the Williamson County planning area continues to increase in population, the number of people and housing developments exposed to the hazard increases. Continued public education on the planning area's risks to hurricane and tropical storm events will continue to be key to the Planning Team's overall mitigation strategy.

The economic and financial impacts of hurricane events on the area will depend on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any hurricane event.

CLIMATE CHANGE CONSIDERATIONS

Hurricane and tropical storm events have the potential to pose a significant risk to people and property. Such events can create dangerous situations for public health and safety officials and cause catastrophic damages. The impact of climate change could produce larger, more severe hurricane events, exacerbating the current hurricane impacts. The economic and financial impacts of hurricanes and tropical storms will depend entirely on the scale of the events, what is damaged, and how quickly repairs to critical components of the economy can be implemented.

The current climate assessment report for Texas indicates an expected increase in the intensity of very strong hurricanes, despite an expected lack of increase, or even a decrease, in hurricane frequency overall. Different research studies have produced some conflicting results. While some recent research has pointed to an apparent trend for U.S. tropical cyclones to move more slowly at landfall, much like Hurricane Harvey, other research suggests that Texas may be spared from such a slowdown. At this point, the enhanced risk is difficult to quantify, but substantial scientific progress on this topic is likely as climate models become better able to simulate the observed spatial distribution, frequency, and intensity of hurricanes.⁵

⁵ Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.



SECTION 13 **LIGHTNING**

SECTION 13: LIGHTNING

Hazard Description	1
Location	1
Extent.....	1
Historical Occurrences.....	2
Significant Events.....	4
Probability of Future Events.....	4
Vulnerability and Impact.....	4
Assessment of Impacts	7
Climate Change Considerations	8

HAZARD DESCRIPTION

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

According to the National Weather Service (NWS), the 10-year (2012–2021) average for fatalities is 23 people with an average of 300 injuries in the United States each year by lightning. Lightning can occur as cloud to ground flashes or as intra-cloud lightning flashes. Direct lightning strikes can cause significant damage to buildings, critical facilities, infrastructure, and communication equipment affecting emergency response. Lightning is also responsible for igniting wildfires that can result in widespread damages to property before firefighters have the ability to contain and suppress the resultant fire.

LOCATION

Lightning can strike in any geographic location and is considered a common occurrence in Texas. The Williamson County planning area is in a region of the country that is moderately susceptible to a lightning strike. Therefore, lightning could occur at any location within the entire planning area. It is assumed that the entire Williamson County planning area, including participating jurisdictions, ISDs and schools, is uniformly exposed to the threat of lightning.

EXTENT

According to the 2023 Annual Lightning Report by Vaisala, the State of Texas ranks tenth in the U.S. for lightning strike density with an average of 157.7 flashes per square mile.¹ Vaisala’s U.S. National Lightning Detection Network lightning flash density map shows an average of 181.3 lightning events per square mile per year for the Williamson County planning area. This rate

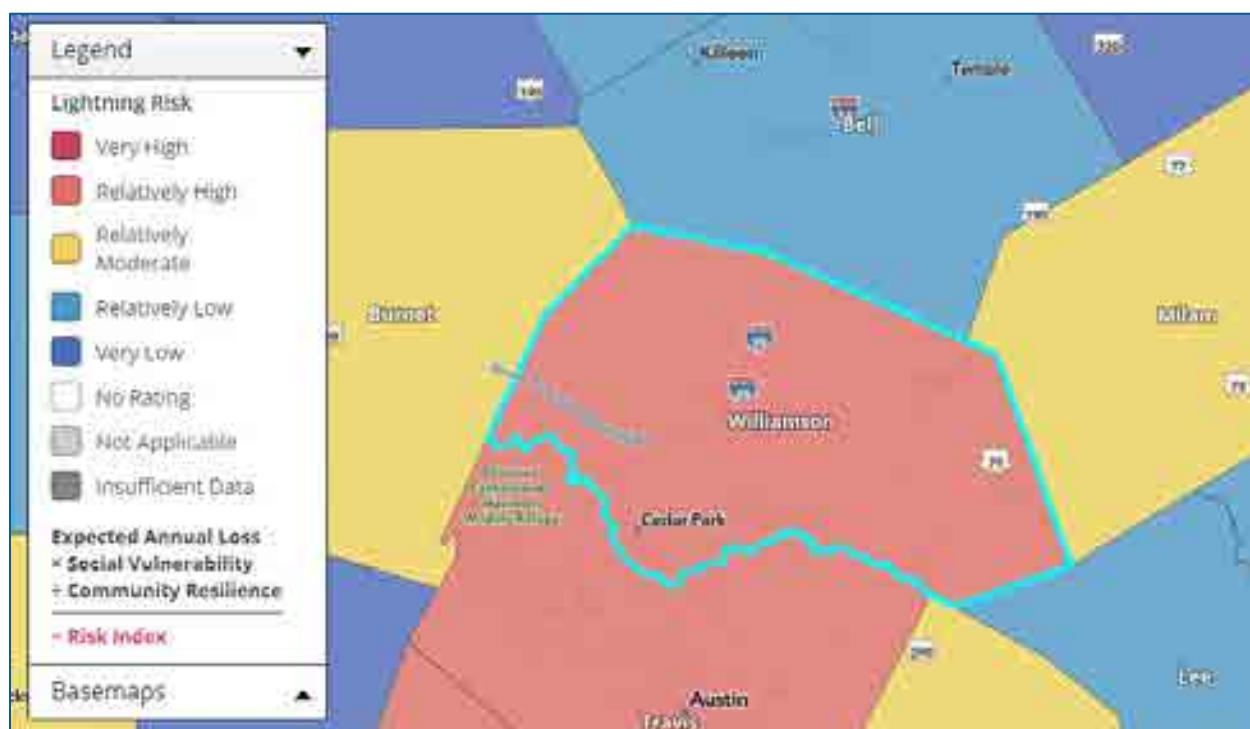
¹ Source: <https://www.xweather.com/annual-lightning-report>

SECTION 13: LIGHTNING

equates to approximately 202,300 flashes per year for the entire planning area, or five to six flashes per fifteen minute interval.

FEMA's National Risk Index includes an analysis of the planning area's expected annual loss and the community's risk factor which incorporates social vulnerability as well as community resilience to determine the lightning risk for the area, compared to the rest of the United States. Williamson County is located in an area where the extent is classified as relatively high (Figure 13-1).

Figure 13-1. Williamson County Lightning Risk, National Risk Index, August 2024²



HISTORICAL OCCURRENCES

NCEI database indicates nine recorded lightning events for the Williamson County planning area, occurring from 1998 to 2023. It is highly likely multiple lightning occurrences have gone unreported before and during the recording period. The NCEI is a national data source organized under the National Oceanic and Atmospheric Administration and considered a reliable resource for hazards. However, the flash density for the planning area along with input from local team members indicates regular lightning occurrences that simply have not been reported.

Historical lightning data for the school and ISDs are provided within the Williamson County events, per the NCEI database, as they do not have events reported separate and apart from the reported county and jurisdiction events. Georgetown ISD reported prior lightning damage to their facilities, but specific event data was not available; no other participating school or ISD reported previous lightning events.

² Source: Map | National Risk Index, <https://hazards.fema.gov/nri/map>

SECTION 13: LIGHTNING

Table 13-1. Historical Lightning Events, 1996-2023³

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	7/19/1998	1	0	\$0	\$0
Williamson County	4/17/2008	0	0	\$43,800	\$0
City of Hutto	5/14/2008	0	0	\$7,300	\$0
Williamson County	5/8/2015	0	0	\$6,600	\$0
Williamson County	5/9/2017	0	0	\$64,100	\$0
Williamson County	7/24/2017	0	0	\$128,100	\$0
Williamson County	7/24/2017	0	0	\$288,300	\$0
Williamson County	7/24/2017	0	0	\$345,900	\$0
Williamson County	7/24/2017	0	0	\$768,600	\$0
TOTALS		1	0	\$1,652,700	

Table 13-2. Historical Lightning Events Summary, 1996-2023⁴

JURISDICTION	NUMBER OF EVENTS	DEATHS	INJURIES	PROPERTY DAMAGES	CROP DAMAGES
Williamson County	8	1	0	\$1,645,400	\$0
City of Hutto	1	0	0	\$7,300	\$0
Georgetown ISD	0	-	-	-	-
Hutto ISD	0	-	-	-	-
Liberty Hill ISD	0	-	-	-	-
Meridian World School	0	-	-	-	-
TOTALS	9	1	0	\$1,652,700	\$0

Based on the list of historical lightning events for the Williamson County planning area, including participating jurisdictions, ISDs and schools, there have been six reported events since the 2017 Plan.

³ Values are in 2024 dollars. Database was searched for events between 1998 and 2023.

⁴ Participating jurisdictions with no reported events show a “-” in table columns where damages, deaths or injuries would be otherwise reported.

SECTION 13: LIGHTNING

SIGNIFICANT EVENTS

July 19, 1998 - Williamson County

In the evening, lightning activity in Williamson County led to a 38-year-old man being struck by lightning while cleaning his pool in the City of Georgetown. He was pronounced dead approximately one hour after the lightning strike.

May 14, 2008 – City of Hutto

Thunderstorms originating across Val Verde County in an unstable environment ahead of an upper-level trough moving in from the Western U.S. The line of convection moved to the northeast, bringing severe weather to much of the hill country, including Williamson County. In the City of Hutto, a lightning strike caused a house fire on Legends of Hutto Trail near State Highway 1660. Property damage was estimated at \$7,300 (2024 dollars).

July 24, 2017 – Williamson County

Thunderstorms developed along an outflow boundary that was generated by convection over North Texas, leading to severe lightning, wind, and hail moving over the Williamson County planning area. Lightning strikes caused four house fires throughout the planning area. One event occurred on Paden Drive in Cedar Park, with the other three occurring in Leander at homes off of Monahans Drive, Lookout Knoll Drive, and Goodnight Trail. A separate event report was made for each of the house fires; altogether, the estimated damages are estimated at \$1,530,900 (2024 dollars).

PROBABILITY OF FUTURE EVENTS

Based on historical records and input from the planning team the probability of occurrence for future lightning events in the Williamson County planning area, including participating jurisdictions ISDs and schools, is considered “Highly Likely”, or an event probable in the next year. The planning team stated that lightning occurs regularly in the area. According to the 2023 Annual Lightning Report by Vaisala, the Williamson County planning area is in an area of the country that experiences approximately 181.3 lightning flashes per square mile per year (approximately 202,300 flashes per year). Given this estimated probability of events, it can be expected that future lightning events will continue to threaten life and cause minor property damage throughout the planning area. Impacts of climate change are not expected to increase the average frequency of lightning events but may lead to an increase in the intensity of events when they do occur.

VULNERABILITY AND IMPACT

Vulnerability is difficult to evaluate since lightning events can occur at different strength levels, in random locations, and can create a broad range of damage depending on the strike location. Due to the randomness of these events, all existing and future structures and facilities in the Williamson County planning area could potentially be impacted and remain vulnerable to possible injury and property loss from lightning strikes.

The direct and indirect losses associated with these events include injury and loss of life, damage to structures and infrastructure, agricultural losses, utility failure (power outages), and stress on community resources. The entire population of the Williamson County planning area, including participating jurisdictions, ISDs and schools, are considered exposed to the lightning hazard. The peak lightning season in the State of Texas is from June to August; however, the most fatalities occur in July. Fatalities occur most often when people are outdoors and/or participating in some

SECTION 13: LIGHTNING

form of recreation. The population located outdoors during a lightning event is considered at risk and more vulnerable to a lightning strike compared to those inside a structure. Moving to a lower risk location will decrease a person's vulnerability.

The entire general building stock and all infrastructure of the Williamson County planning area, are considered exposed to the lightning hazard. Lightning can be responsible for damages to buildings, cause electrical, forest and/or wildfires, and damage infrastructure such as power transmission lines and communication towers.

While all citizens are at risk to the impacts of lightning, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 6 percent of the planning area population live below the poverty level. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures. These and several other vulnerable populations within the planning area are listed in table 13-3 below.

Table 13-3. Populations at Greater Risk by Jurisdiction⁵

JURISDICTION	ELDERLY (over 65)	YOUTH (under 5)	WITH A DISABILITY	BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Williamson County	77,609	37,584	61,524	38,896	138,476
City of Hutto	1,830	2,155	2,658	2,301	7,141

Some participating schools and ISDs also have vulnerable populations based on age or work location, such as employees that work outdoors and may be subject to severe weather conditions, or children under 5 who attend school at the participating schools (Table 13-4).

Table 13-4. Populations at Greater Risk by Special District⁶

JURISDICTION	POPULATION UNDER 5	EMPLOYEES OPERATING OUTDOORS
Georgetown ISD	469	428
Hutto ISD	415	222
Liberty Hill ISD	240	300
Meridian World School	0	2

The Williamson County Planning Team identified the following critical facilities (Table 13-5) as assets that are considered the most important to the planning area and are susceptible to a range

⁵ US Census Bureau, American Community Survey Five-Year Estimates, 2022

⁶ ISDs and the Meridian World School vulnerable populations data has been provided by Planning Team members from each participating ISD and school.

SECTION 13: LIGHTNING

of impacts caused by lightning events. For a comprehensive list by participating jurisdiction, please see Appendix C.

Table 13-5. Critical Facilities Vulnerable to Lightning Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	- Emergency operations and services may be significantly impacted due to power outages, damaged facilities, fires and/or loss of communications as a result of lightning strikes. - Emergency vehicles, including critical equipment, can be damaged by lightning strikes or by falling trees damaged by lightning. - Power outages could disrupt communications, delaying emergency response times. - Downed trees due to lightning strikes can impede emergency response vehicle access to areas. - Lightning strikes can be associated with structure fires and wildfires, further straining the capacity and resources of emergency personnel. - Extended power outages may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	- Structures can be damaged by falling trees damaged by lightning. - Power outages could disrupt critical care. - Backup power sources could be damaged. - Evacuations may be necessary due to extended power outages, fires, or other associated damages to facilities.
Commercial Supplier (food, fuel, etc.)	- Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. - Essential supplies like medicines, water, food, and equipment deliveries may be delayed. - Economic disruption due to power outages and fires negatively impact airport services as well as area businesses reliant on airport operations.
Utility Services and Infrastructure (electric, water, wastewater, communications)	- Emergency operations and critical services may be significantly impacted due to power outages, damaged facilities, fires and/or loss of communications as a result of lightning strikes. - Emergency vehicles, including critical equipment, can be damaged by lightning strikes or by falling trees damaged by lightning. - Power outages could disrupt communications, delaying emergency response times. - Downed trees due to lightning strikes can impede emergency response vehicle access to areas.

SECTION 13: LIGHTNING

CRITICAL FACILITIES	POTENTIAL IMPACTS
	- Lightning strikes can be associated with structure fires and wildfires, further straining the capacity and resources of emergency personnel. - Extended power outages may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

Total losses for the planning area (in 2024 dollars) is estimated at \$1,652,700 over the 28-year reporting period, with an average annualized loss of \$59,000 (Table 13-5). This level of damages supports a Limited severity of impact in terms of structures and infrastructure, meaning critical facilities shutdown for less than 24 hours and less than 10 percent of property destroyed or with major damage. However, with one reported fatality due to lightning, the severity of impact for the Williamson County planning area, including participating jurisdictions, ISDs and schools, is considered “Substantial,” with mulitple deaths possible depending of the severity and duration of the event.

Table 13-5. Potential Annualized Losses by Jurisdiction⁷

JURISDICTION	TOTAL PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATE
Williamson County	\$1,645,400	\$58,800
City of Hutto	\$7,300	\$300
Georgetown ISD	-	-
Hutto ISD	-	-
Liberty Hill ISD	-	-
Meridian World School	-	-
PLANNING AREA	\$1,652,700	\$59,100

ASSESSMENT OF IMPACTS

Lightning events have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. Additional impacts to the planning area can include:

- The Williamson County planning area features developed parks and green spaces. Lightning events could impact recreational activities, placing residents and visitors in imminent danger, potentially requiring emergency services or park evacuation.
- Older structures built to less stringent building codes may suffer greater damage from a lightning strike as they are typically built with less fire-resistant materials and often lack any fire mitigation measures such as sprinkler systems. 11 percent of homes in the County

⁷ Damage values are in 2024 dollars. Participating jurisdictions with no reported events show a “-” in table columns where damages would be otherwise reported.

SECTION 13: LIGHTNING

were built before 1980. Similarly, historic buildings may lack fire mitigation materials or measures due to their historic status. Currently, 75 sites and districts in the Williamson County planning area are listed on the National Register of Historic Places.

- o Vegetation in urban parks may be destroyed by lightning caused brush fires and result in poor air quality impacting public health.
- o Individuals exposed to the storm can be directly struck, posing significant health risks and potential death.
- o Structures can be damaged or crushed by falling trees damaged by lightning, which can result in physical harm to the occupants.
- o Lightning strikes can result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- o Extended power outage often results in an increase in structure fires and carbon monoxide poisoning as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- o Lightning strikes can be associated with structure fires and wildfires, creating additional risk to residents and first responders.
- o Emergency operations and services may be significantly impacted due to power outages and/or loss of communications.
- o County and city departments may be damaged, delaying response and recovery efforts for the entire community.
- o Economic disruption due to power outages and fires negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- o Some businesses not directly damaged by lightning events may be negatively impacted while utilities are being restored, further slowing economic recovery.
- o Businesses that are more reliant on utility infrastructure than others may suffer greater damage without a backup power source.

The economic and financial impacts of lightning on the area will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any significant lightning event.

CLIMATE CHANGE CONSIDERATIONS

As CO₂ increases and the land surface warms, stronger updrafts are more likely to produce lightning. In a climate with double the amount of CO₂, we may see fewer lightning storms overall, but 25 percent stronger storms, with a 5 percent increase in lightning. Lightning damage is also likely to increase because of its role in igniting forest fires, where dry vegetation, also caused by rising temperatures, creates more 'fuel' for fires, so even a small climate change may have huge consequences. While the impact climate change will have on our weather still remains uncertain, researchers agree that implementing simple measures like lightning detection systems and installing grounding systems in buildings could go a long way in avoiding deaths and injuries.⁸

Lightning events have the potential to pose a significant risk to people and property throughout the planning area. The economic and financial impacts of lightning on the area will depend entirely

⁸ Environmental Journal, Nathan Neal, January 11, 2021.

SECTION 13: LIGHTNING

on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. While no increase in the number of hazard events is anticipated, the impact of the hazard may see an increase in losses. As populations grow and urban development continues to rise, the overall vulnerability and impact are expected to increase in the next five years.



SECTION 14
**THUNDERSTORM
WIND**

SECTION 14: THUNDERSTORM WIND

Hazard Description	1
Location	1
Extent.....	2
Historical Occurrences.....	3
Significant Events.....	8
Probability of Future Events.....	9
Vulnerability and Impact.....	9
Assessment of Impacts	13
Climate Change Considerations	14

HAZARD DESCRIPTION

Thunderstorms create extreme wind events which includes straight line winds. Wind is the horizontal motion of the air past a given point, beginning with differences in air pressures. Pressure that is higher at one place than another sets up a force pushing from high toward low pressure; the greater the difference in pressures, the stronger the force. The distance between the area of high pressure and the area of low pressure also determines how fast the moving air accelerates.

Thunderstorms are created when heat and moisture near the Earth's surface are transported to the upper levels of the atmosphere. By-products of this process are the clouds, precipitation, and wind that become the thunderstorm.

According to the National Weather Service (NWS), a thunderstorm occurs when thunder accompanies rainfall. Radar observers use the intensity of radar echoes to distinguish between rain showers and thunderstorms.



Straight line winds are responsible for most thunderstorm wind damages. One type of straight-line wind, the downburst, is a small area of rapidly descending air beneath a thunderstorm. A downburst can cause damage equivalent to a strong tornado and make air travel extremely hazardous.

LOCATION

Thunderstorm wind events can develop in any geographic location and are considered a common occurrence in Texas. Therefore, a thunderstorm wind event could occur at any location within the Williamson County planning area. These storms develop randomly and are not confined to any geographic area within the County. It is assumed that the entire Williamson County planning area, including all participating jurisdictions, ISDs and schools, is uniformly exposed to the threat of thunderstorm winds.

SECTION 14: THUNDERSTORM WIND

EXTENT

The extent or magnitude of a thunderstorm wind event is measured by the Beaufort Wind Scale. Table 14-1 describes the different intensities of wind in terms of speed and effects, from calm to violent and destructive.

Table 14-1. Beaufort Wind Scale¹

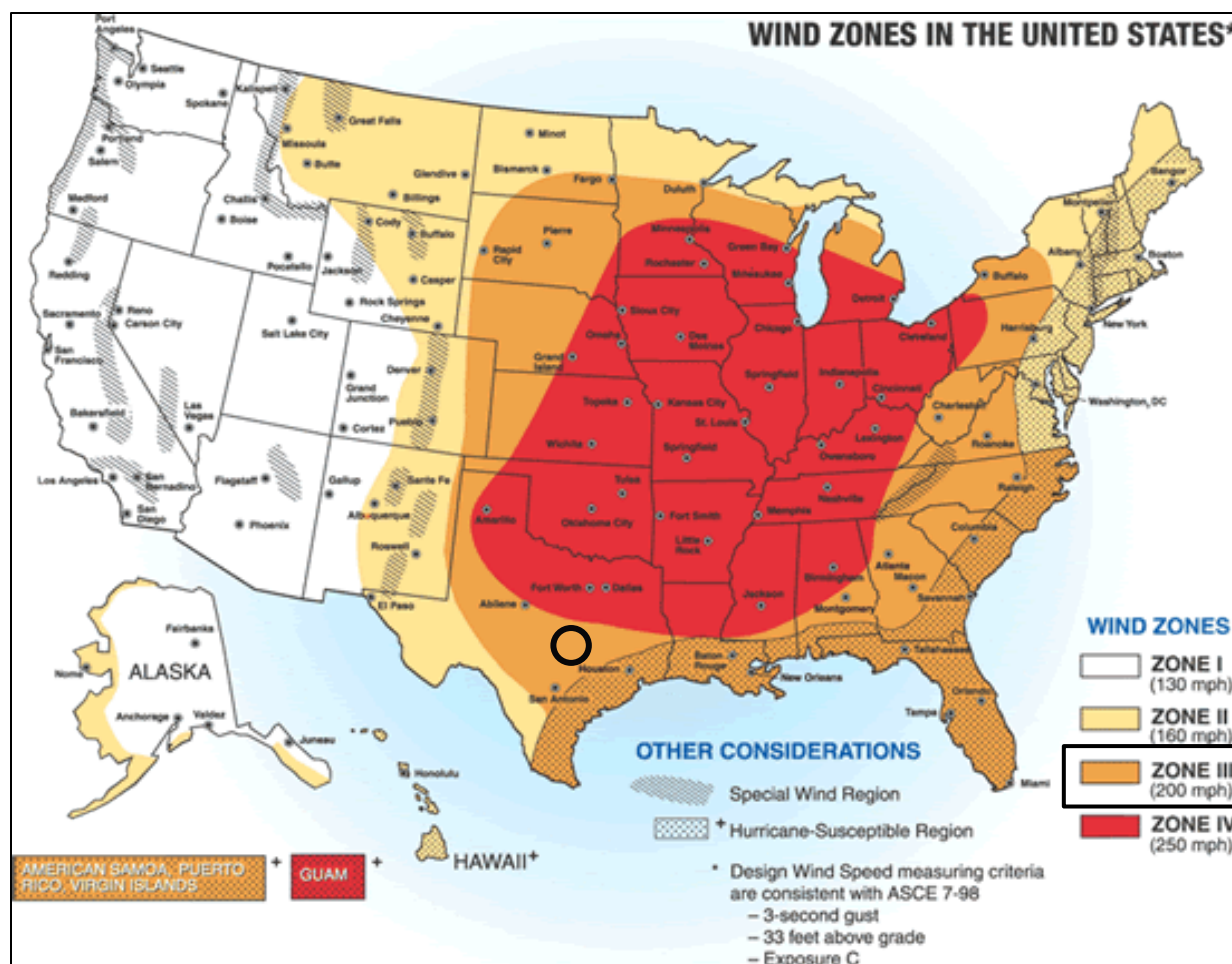
FORCE	WIND (mph)	WIND (knots)	WMO CLASSIFICATION	APPEARANCE OF WIND EFFECTS
0	Less than 1	Less than 1	Calm	Calm, smoke rises vertically
1	1-3	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4-7	4-6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	7-10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	13-18	11-16	Moderate Breeze	Dust, leaves and loose paper lifted, small tree branches move
5	19-24	17-21	Fresh Breeze	Small trees in leaf begin to sway
6	25-31	22-27	Strong Breeze	Larger tree branches moving, whistling in wires
7	32-38	28-33	Near Gale	Whole trees moving, resistance felt walking against wind
8	39-46	34-40	Gale	Whole trees in motion, resistance felt walking against wind
9	47-54	41-47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	55-63	48-55	Storm	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	64-72	56-63	Violent Storm	If experienced on land, widespread damage
12	72-83	64-71	Hurricane	Violence and destruction

Figure 14-1 displays the wind zones as derived from NOAA.

¹ Source: World Meteorological Organization

SECTION 14: THUNDERSTORM WIND

Figure 14-1. Wind Zones in the United States²



On average, the planning area experiences two to three thunderstorm wind events every year. The Williamson County planning area is located within Wind Zone III, meaning it can experience winds up to 200 mph. The Williamson County planning area has experienced a significant wind event, or an event with winds in the range of “Force 12” on the Beaufort Wind Scale with winds above 72 mph. This is the worst to be anticipated for the entire planning area based on historic events.

Based on a search of past events from 1955 through 2023, the greatest magnitude wind event that Williamson County planning area experienced was 100 knots, or 115 mph, during an event occurring on February 20, 2017. Two injuries occurred in the planning area during this event.

HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) Storm Events database is a national data source organized under the National Oceanic and Atmospheric Administration. The NCEI is the largest archive available for historic storm events data; however, it is important to note that only incidents recorded in the NCEI have been factored into this risk assessment unless otherwise

² The Williamson County planning area is indicated by the black circle.

SECTION 14: THUNDERSTORM WIND

noted. It is likely that a high number of occurrences have gone unreported over the past 69 years. Tables 14-2 and 14-3 depict historical occurrences of thunderstorm wind events for the Williamson County planning area according to the NCEI database.

Since 1955, 203 thunderstorm wind events are known to have occurred in the Williamson County planning area. Table 14-3 presents information on known historical events impacting the Williamson County planning area, resulting in damages, injuries, or fatalities. The strongest event reported in the planning area occurred in Williamson County on February 20, 2017, with reported wind speeds of 100 knots, or 115 mph.

Historical thunderstorm wind data for the school and ISDs are provided within the Williamson County events, per the NCEI database, as they do not have events reported separate and apart from the reported county and jurisdiction events. Georgetown ISD reported sustaining previous thunderstorm wind damage, though specific monetary damages or event summaries were unavailable. No other ISD or school reported previous occurrences of thunderstorm wind that were not captured in the NCEI data.

It is important to note that high wind events associated with other hazards, such as tornadoes, are not accounted for in this section. Property damage estimates are not always available. Where an estimate has been provided in a table for losses, the dollar amounts have been modified for inflation to indicate the damage in 2024 dollars.

Table 14-2. Historical Thunderstorm Wind Speeds, 1955-2023

MAXIMUM WIND SPEED RECORDED (knots)	NUMBER OF REPORTED EVENTS
0-30	0
31-40	3
41-50	16
51-60	76
61-70	37
71-80	2
81-90	1
91-100+	1
Unknown	67

Table 14-3. Historical Thunderstorm Wind Events, 1955-2023³

JURISDICTION	DATE	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	11/15/1987	65	0	1	\$0	\$0

³ Only recorded events with fatalities, injuries or damages are listed. Magnitude is listed when available. Damage values are in 2024 dollars.

SECTION 14: THUNDERSTORM WIND

JURISDICTION	DATE	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	10/28/1991	-	0	1	\$0	\$0
Williamson County	9/14/1993	-	0	0	\$10,900	\$0
Williamson County	5/29/1994	52	0	0	\$10,700	\$10,700
Williamson County	5/8/1995	-	0	0	\$41,300	\$20,700
Williamson County	5/17/1995	-	0	0	\$41,300	\$41,300
Williamson County	6/11/1995	52	0	0	\$20,600	\$20,600
Williamson County	6/11/1995	51	0	0	\$20,600	\$20,600
City of Hutto	9/7/1995	-	0	0	\$2,046,700	\$102,400
Williamson County	6/2/1996	-	0	0	\$10,100	\$0
Williamson County	9/19/1996	-	0	0	\$6,000	\$0
Williamson County	10/17/1996	-	0	0	\$10,000	\$0
Williamson County	11/7/1996	-	0	0	\$59,400	\$0
Williamson County	7/6/1997	-	0	0	\$39,100	\$0
Williamson County	7/6/1997	-	0	0	\$5,900	\$0
Williamson County	7/30/1997	-	0	0	\$5,900	\$0
Williamson County	2/25/1998	-	0	0	\$193,700	\$38,800
Williamson County	4/8/1998	-	0	0	\$29,000	\$0
Williamson County	8/29/1998	-	0	0	\$96,000	\$0
Williamson County	8/29/1998	69	0	0	\$19,200	\$0
Williamson County	3/18/1999	-	0	0	\$152,100	\$0
Williamson County	5/11/1999	-	0	0	\$28,300	\$0
Williamson County	3/26/2000	-	0	0	\$36,700	\$0
Williamson County	4/11/2000	-	0	0	\$27,500	\$0
Williamson County	9/2/2000	-	0	0	\$36,200	\$0
Williamson County	3/12/2001	-	0	0	\$178,000	\$0
Williamson County	5/20/2001	-	0	0	\$529,400	\$88,300
Williamson County	6/21/2001	-	0	0	\$88,100	\$0
Williamson County	10/12/2001	58	0	0	\$176,500	\$0
Williamson County	10/12/2001	-	0	0	\$88,300	\$0

SECTION 14: THUNDERSTORM WIND

JURISDICTION	DATE	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	5/27/2002	-	0	0	\$436,000	\$174,400
Williamson County	6/16/2002	-	0	0	\$174,300	\$0
Williamson County	6/26/2002	55	0	0	\$261,500	\$0
Williamson County	6/26/2002	-	0	0	\$174,300	\$0
Williamson County	6/26/2002	-	0	0	\$87,200	\$0
Williamson County	10/19/2002	-	0	0	\$138,400	\$0
Williamson County	6/13/2003	60	0	0	\$51,300	\$0
Williamson County	6/13/2003	50	0	0	\$8,600	\$0
Williamson County	8/8/2003	60	0	0	\$169,900	\$0
Williamson County	5/14/2006	80	0	0	\$154,900	\$0
Williamson County	5/14/2006	65	0	0	\$154,900	\$0
Williamson County	7/22/2006	60	0	0	\$46,300	\$0
Williamson County	5/22/2007	60	0	0	\$75,400	\$0
Williamson County	1/31/2008	34	0	0	\$14,900	\$0
Williamson County	4/25/2008	50	0	0	\$7,300	\$0
Williamson County	5/14/2008	70	0	0	\$289,500	\$0
Williamson County	8/22/2009	45	0	0	\$3,000	\$0
Williamson County	8/25/2009	70	0	0	\$363,200	\$0
Williamson County	8/27/2009	52	0	0	\$14,600	\$0
Williamson County	8/27/2009	50	0	0	\$11,700	\$0
Williamson County	10/1/2009	56	0	0	\$14,600	\$0
Williamson County	8/16/2010	56	0	0	\$36,000	\$0
Williamson County	5/21/2011	50	0	0	\$7,000	\$0
Williamson County	1/25/2012	43	0	0	\$7,000	\$0
Williamson County	5/10/2012	43	0	0	\$13,700	\$0
Williamson County	7/9/2012	39	0	0	\$300	\$0
Williamson County	8/13/2012	35	0	0	\$700	\$0
Williamson County	8/10/2013	43	0	0	\$700	\$0
Williamson County	2/20/2017	100	0	2	\$0	\$0

SECTION 14: THUNDERSTORM WIND

JURISDICTION	DATE	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	5/23/2017	65	0	0	\$1,300	\$0
Williamson County	3/17/2018	52	0	0	\$31,500	\$0
Williamson County	3/18/2018	61	0	0	\$62,900	\$0
Williamson County	3/18/2018	61	0	0	\$6,300	\$0
Williamson County	6/3/2018	52	0	0	\$6,300	\$0
Williamson County	6/3/2018	60	0	0	\$1,300	\$0
City of Hutto	6/3/2018	52	0	0	\$1,300	\$0
Williamson County	5/8/2019	61	0	0	\$6,200	\$0
Williamson County	6/9/2019	52	0	0	\$1,300	\$0
Williamson County	6/9/2019	52	0	0	\$1,300	\$0
Williamson County	4/9/2020	65	0	0	\$12,300	\$0
Williamson County	4/9/2020	65	0	0	\$12,300	\$0
Williamson County	4/9/2020	52	0	0	\$12,300	\$0
Williamson County	4/9/2020	52	0	0	\$6,200	\$0
Williamson County	4/9/2020	52	0	0	\$2,500	\$0
Williamson County	7/31/2020	56	0	0	\$12,200	\$0
Williamson County	3/22/2021	52	0	0	\$6,000	\$0
Williamson County	3/21/2022	56	0	0	\$11,000	\$0
Williamson County	5/24/2022	56	0	0	\$2,200	\$0
Williamson County	5/24/2022	52	0	0	\$2,200	\$0
Williamson County	10/24/2022	70	0	0	\$52,700	\$0
Williamson County	10/24/2022	70	0	0	\$26,400	\$0
Williamson County	10/24/2022	52	0	0	\$5,300	\$0
Williamson County	9/14/2023	65	0	0	\$10,200	\$0
Williamson County	9/24/2023	61	0	0	\$2,100	\$0
TOTALS		(MAX EXTENT)	0	4	\$7,020,300	\$517,800

SECTION 14: THUNDERSTORM WIND

Table 14-4. Summary of Historical Events by Jurisdiction, 1955-2023

JURISDICTION	NUMBER OF EVENTS	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	200	100	0	4	\$4,972,300	\$415,400
City of Hutto	3	52	0	0	\$2,048,000	\$102,400
Georgetown ISD	0	-	-	-	-	-
Hutto ISD	0	-	-	-	-	-
Liberty Hill ISD	0	-	-	-	-	-
Meridian World School	0	-	-	-	-	-
TOTALS	78	(MAX EXTENT)	0	4	\$7,538,100	

Based on the list of historical thunderstorm wind events for the Williamson County planning area, including participating jurisdictions, ISDs, and schools, 58 of the events have occurred since the 2017 Plan.

SIGNIFICANT EVENTS

September 7, 1995 – City of Hutto

A severe thunderstorm brought strong winds into the City of Hutto in the evening, with damage including roofs blown off of houses as well as the main building of Hutto's High School, several barns being flattened, and powerlines being destroyed. The damages to the High School led to a school closure the following day. A high school football game was underway as the storm approached; authorities cancelled the remainder of the game and evacuated all in attendance into the school, preventing any injuries from occurring. Total property damage was estimated to be \$2,046,700 (2024 dollars) in addition to \$102,400 (2024 dollars) in crop damage due to the severe winds.

August 25, 2009 – Williamson County

A weak upper-level low pressure area moved toward South Central Texas and produced isolated thunderstorms, with one over Williamson County becoming severe. This storm produced wind gusts of 80 mph that tore the metal roof off a building and downed numerous trees across the Town of Taylor. Several businesses sustained roof damage, including a brick building downtown. The widespread property damages were totaled at an estimate of \$363,200 (2024 dollars).

February 20, 2017 – Williamson County

An upper-level trough pushed a cold front into a warm, moist airmass over South Central Texas, leading to the development of a severe thunderstorm over the Williamson County planning area. The storm produced wind gusts, ranging from 60 mph to 115 mph, that caused significant damage to a metal building system, at least 10 homes, at least 12 farm buildings, mobile homes, and RVs north of the City of Thrall in Williamson County. A couple residing in an RV suffered minor injuries when it blew over. No monetary damage estimates are available for this event.

SECTION 14: THUNDERSTORM WIND

October 24, 2022 – Williamson County

A shortwave trough pushed a cold front through South Central Texas, including the Williamson County planning area, leading to the development of thunderstorms with damaging winds. In Williamson County, the winds between 60 mph and 80 mph caused numerous damages to property. These included many fences being blown down, a fire station's doors blown out, a business's garage doors blown out, and downed trees. Automobile damage also occurred along I-35 within the planning area, including a trailer being rolled onto the I-35 service road and multiple cars blown into ditches, shutting down I-35 for two hours while the damage was cleared. Three separate event reports were made in Williamson County for these thunderstorm winds; altogether, these reports estimate \$84,400 (2024 dollars) in property damage.

PROBABILITY OF FUTURE EVENTS

Most thunderstorm winds occur during the spring and fall seasons and during the months of March, April, May, and September. Based on available records of historic events, there have been a total of 203 events in a 69-year reporting period, which provides a annual frequency of two to three events every year. Even though the intensity of thunderstorm wind events is not always damaging for the Williamson County planning area, the frequency of occurrence for a thunderstorm wind event is "Highly Likely". This means that an event is probable within the next year for the Williamson County planning area, including participating jurisdictions, ISDs and schools.

VULNERABILITY AND IMPACT

Vulnerability is difficult to evaluate since thunderstorm wind events can occur at different strength levels, in random locations, and can create relatively narrow paths of destruction. Due to the randomness of these events, all existing and future structures, and facilities within the Williamson County planning area, could potentially be impacted and remain vulnerable to possible injury and property loss from strong winds.

Trees, power lines and poles, signage, manufactured housing, radio towers, concrete block walls, storage barns, windows, garbage receptacles, brick facades, and vehicles, unless reinforced, are vulnerable to thunderstorm wind events. More severe damage involves windborne debris; in some instances, patio furniture and other lawn items have been reported to have been blown around by wind and, very commonly, debris from damaged structures in turn have caused damage to other buildings not directly impacted by the event. In numerous instances roofs have been reported as having been torn off of buildings. The portable buildings typically used at schools and construction sites would be more vulnerable to thunderstorm wind events than typical site-built structures and could potentially pose a greater risk for wind-blown debris.

According to the American Community Survey (ACS) five-year estimates for 2022, a total of 4,899 manufactured homes are located in the Williamson County planning area (2 percent of total housing stock). In addition, 11 percent (approximately 25,704 structures) of the housing units were built before 1980. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant wind events. Tables 14-5 and 14-6 list the number of vulnerable structures in each participating jurisdiction, ISD and school.

SECTION 14: THUNDERSTORM WIND

Table 14-5. Structures at Greater Risk by Participating Jurisdiction

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Williamson County	25,704	4,899
City of Hutto	374	37

Table 14-6. Structures at Greater Risk by Participating Special District

JURISDICTION	STRUCTURES BUILT BEFORE 1980	MANUFACTURED FACILITIES/ PORTABLE BUILDINGS
Georgetown ISD	4	21
Hutto ISD	1	24
Liberty Hill ISD	6	25
Meridian World School	0	4

While all citizens are vulnerable to the impacts of thunderstorm wind, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 6 percent of the planning area population live below the poverty level (Table 14-7). While warning times for these types of hazard events should be substantial enough for these individuals to seek shelter, the elderly, children, and people with a disability may have trouble taking shelter due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

Table 14-7. Populations at Greater Risk by Jurisdiction⁴

JURISDICTION	ELDERLY (over 65)	YOUTH (under 5)	WITH A DISABILITY	BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Williamson County	77,609	37,584	61,524	38,896	138,476
City of Hutto	1,830	2,155	2,658	2,301	7,141

Some participating school and ISDs also have vulnerable populations based on age or work location, such as employees that work outdoors and may be subject to severe weather conditions, or children under 5 who attend school at the participating schools (Table 14-8).

⁴ US Census Bureau 2022 data for Williamson County

SECTION 14: THUNDERSTORM WIND

Table 14-8. Populations at Greater Risk by Special District⁵

JURISDICTION	POPULATION UNDER 5	EMPLOYEES OPERATING OUTDOORS
Georgetown ISD	469	428
Hutto ISD	415	222
Liberty Hill ISD	240	300
Meridian World School	0	2

The Williamson County Planning Team identified the following critical facilities (Table 14-9) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by thunderstorm wind events. The critical infrastructure with the greatest vulnerability to thunderstorms are power and communications facilities. Failures of these facilities can result in a loss of service and cascading impacts such as posing enormous risk to individuals dependent on electricity as a medical necessity. For a comprehensive list by participating jurisdiction, please see Appendix C.

Table 14-9. Critical Facilities Vulnerable to Thunderstorm Wind Event

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. - Emergency vehicles can be damaged by falling trees or flying debris. - Power outages could disrupt communications, delaying emergency response times. - Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. - Debris/downed trees can impede emergency response vehicle access to areas. - Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. - First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/	- Structures can be damaged by falling trees or flying debris. - Power outages could disrupt critical care. - Backup power sources could be damaged. - Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. - Evacuations may be necessary due to extended power outages, gas line ruptures, or structural damage to facilities.

⁵ ISDs and the Meridian World School vulnerable population data has been provided by Planning Team members from each.

SECTION 14: THUNDERSTORM WIND

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
Assisted Living Facilities	- o Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. - o Temporary break in operations may significantly inhibit post event evacuations. - o Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Supplier (food, fuel, etc.)	- o Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. - o Essential supplies like medicines, water, food, and equipment deliveries may be delayed. - o Economic disruption due to power outages and fires negatively impact airport services as well as area businesses reliant on airport operations.
Utility Services and Infrastructure (electric, water, wastewater, communications)	- o Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. - o Emergency vehicles can be damaged by falling trees or flying debris. - o Power outages could disrupt communications, delaying emergency response times. - o Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. - o Debris/downed trees can impede emergency response vehicle access to areas. - o Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel.

A thunderstorm wind event can also result in traffic disruptions, injuries and in rare cases, fatalities. The impact of thunderstorm winds experienced in the Williamson County planning area has resulted in four injuries. In terms of structures and infrastructure damage, the impacts of thunderstorm wind events would be considered Limited, with less than 10 percent of property expected to be destroyed and critical facilities shut down for less than 24-hours. However, with four injuries, the impact for the Williamson County planning area, including all participating jurisdictions, ISDs and school, is considered "Major" with multiple injuries resulting in permanent disability possible depending on the severity of the event. Overall, in the past 69 years there has been a total estimate of \$7,538,100 damages (in 2024 dollars) in the Williamson County planning area due to thunderstorm wind events. The estimated average annual loss from a thunderstorm wind event is \$109,200.

SECTION 14: THUNDERSTORM WIND

Table 14-10. Estimated Annualized Losses by Participating Jurisdiction⁶

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Williamson County	\$5,387,700	\$78,000
City of Hutto	\$2,150,400	\$31,200
Georgetown ISD	-	-
Hutto ISD	-	-
Liberty Hill ISD	-	-
Meridian World School	-	-
PLANNING AREA	\$7,538,100	\$109,200

ASSESSMENT OF IMPACTS

Thunderstorm wind events have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. Thunderstorm wind conditions can be frequently associated with a variety of impacts, including:

- o Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- o Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- o Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- o Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- o Thunderstorm wind events often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- o Extended power outage often results in an increase in structure fires and carbon monoxide poisoning, as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- o Critical staff may be unable to report for duty, limiting response capabilities.
- o Private sector entities that residents rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- o Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.

⁶ Damage values are in 2024 dollars. Participating jurisdictions with no reported events show a “-” in table columns where damages would be otherwise reported.

SECTION 14: THUNDERSTORM WIND

- o Some businesses not directly damaged by thunderstorm wind events may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- o Older structures, specifically those built before 1980 (11 percent of the planning area), were built to less stringent building codes may suffer greater damage as they are typically more vulnerable to thunderstorm winds.
- o Recreational areas such as community parks and green spaces may be damaged or inaccessible due to downed trees or debris, causing temporary impacts to associated businesses in the area.
- o Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There are 75 historical sites listed on the National Register of Historic Places for Williamson County.

The economic and financial impacts of thunderstorm winds on the area will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any thunderstorm wind event.

CLIMATE CHANGE CONSIDERATIONS

The impacts on the frequency and severity of severe thunderstorm wind events due to climate change are unclear. According to the Texas A&M 2021 Climate Report Update, changes in severe thunderstorm reports over time have been more closely linked to changes in population than changes in the hazard event. At this time there is low confidence of an ongoing trend in the overall frequency and severity of thunderstorm events, due to the lack of climate data records for severe thunderstorms. Based on climate models that are available, the environmental conditions needed for severe thunderstorms are estimated to become more likely, resulting in an overall increase in the number of days capable of producing a severe thunderstorm event.⁷

⁷ Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 Update.



SECTION 15 **TORNADO**

SECTION 15: TORNADO

Hazard Description	1
Location	1
Extent.....	2
Historical Occurrences.....	4
Significant Events.....	7
Probability of Future Events.....	8
Vulnerability and Impact.....	8
Assessment of Impacts	12
Climate Change Considerations	14

HAZARD DESCRIPTION



Tornadoes are among the most violent storms on the planet. A tornado is a rapidly rotating column of air extending between, and in contact with, a cloud and the surface of the earth. The most violent tornadoes are capable of tremendous destruction and have wind speeds of 250 miles per hour (mph) or more. In extreme cases, winds may approach 300 mph. Damage paths can be in excess of one mile wide and 50 miles long.

The most powerful tornadoes are produced by “Supercell Thunderstorms.” These thunderstorms are created when horizontal wind shears (winds moving in different directions at different altitudes) begin to rotate the storm. This horizontal rotation can be tilted vertically by violent updrafts, and the rotation radius can shrink, forming a vertical column of very quickly swirling air. This rotating air can eventually reach the ground, forming a tornado.

Table 15-1. Variations among Tornadoes

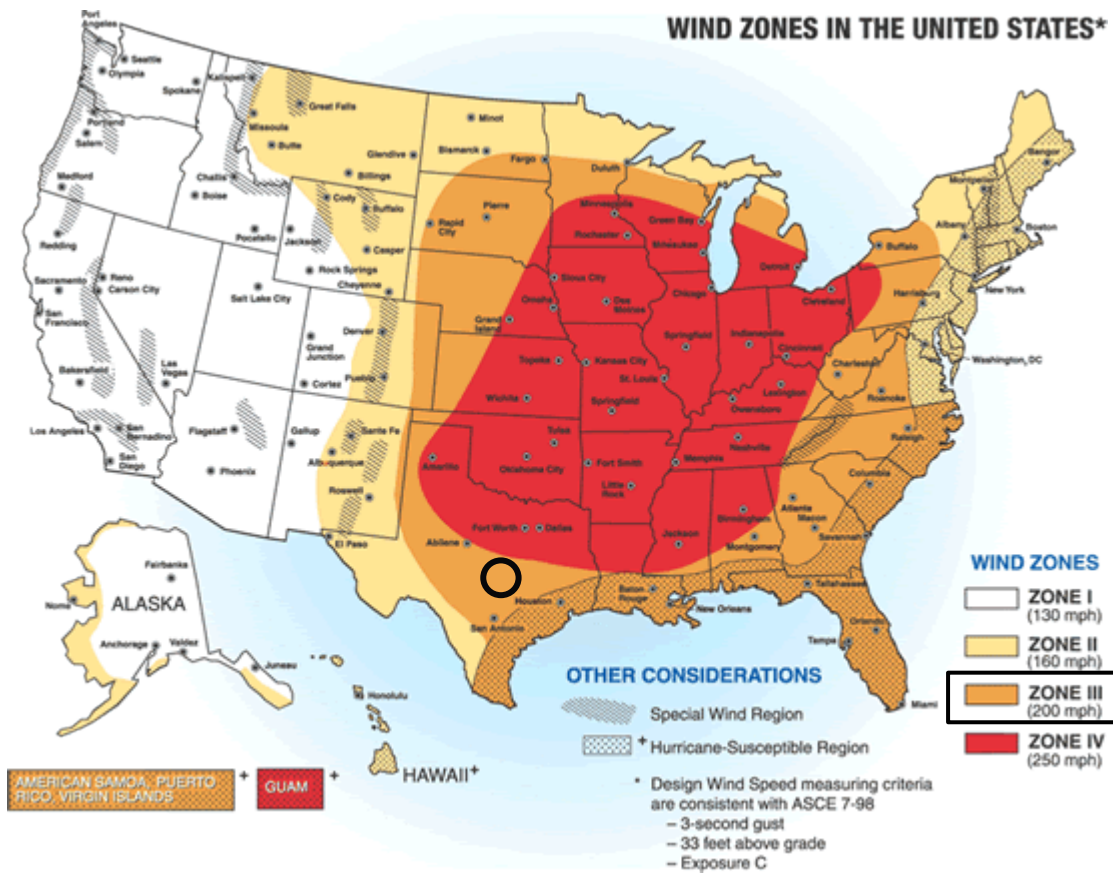
WEAK TORNADOES	STRONG TORNADOES	VIOLENT TORNADOES
- o 69% of all tornadoes - o Less than 5% of tornado deaths - o Lifetime 1-10+ minutes - o Winds less than 110 mph	- o 29% of all tornadoes - o Nearly 30% of all tornado deaths - o May last 20 minutes or longer - o Winds 110 – 205 mph	- o 2% of all tornadoes - o 70% of all tornado deaths - o Lifetime can exceed one hour - o Winds greater than 205 mph

LOCATION

Tornadoes do not have any specific geographic boundary and can occur throughout the county uniformly. It is assumed that the entire Williamson County planning area, including participating jurisdictions, ISDs and schools, is uniformly exposed to tornado activity. The entire Williamson County planning area is in Wind Zone III (Figure 15-1), where tornado winds can be as high as 200 mph.

SECTION 15: TORNADO

Figure 15-1. FEMA Wind Zones in the United States¹



EXTENT

The destruction caused by tornadoes ranges from light to inconceivable, depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, such as residential homes (particularly mobile homes).

Tornado magnitudes prior to 2007 were determined using the traditional version of the Fujita Scale, which estimated tornado wind speeds based on the damage caused by an event. Since February 2007, the Enhanced Fujita Scale has been utilized to classify tornadoes, which included improvements to the original scale. The original Fujita scale had limitations, such as a lack of damage indicators, no account for construction quality and variability, and no definitive correlation between damage and wind speed. These limitations led to some tornadoes being rated in an inconsistent manner and, in some cases, an overestimate of tornado wind speeds. The Enhanced Fujita scale retains the same basic design and six strength categories as the previous scale. The newer scale reflects more refined assessments of tornado damage surveys, standardization, and damage consideration to a wider range of structures. Table 15-2 includes both scales for reference when analyzing historical tornadoes since tornado events prior to 2007 will follow the original Fujita Scale.

¹ The Williamson County planning area is indicated by the circle

SECTION 15: TORNADO

Table 15-2. The Fujita and Enhanced Fujita Tornado Scale²

Enhanced Fujita Scale				Fujita Scale			
Category	Wind Speed	Damage Level	Damage	Category	Wind Speed	Intensity	Damage
EF0	65-85 MPH	Gale	The environment sustained minor damage: tree branches are broken, some shallow-rooted trees are uprooted, and some chimneys are damaged.	F0	45-78 MPH	Gale	Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
EF1	86-110 MPH	Weak	The environment sustained moderate damage: mobile homes are tipped over, windows are broken, roof tiles may be blown off, and some tree trunks have snapped.	F1	79-117 MPH	Moderate	Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
EF2	111-135 MPH	Strong	The environment sustained considerable damage: mobile homes are destroyed, roofs are damaged, debris flies in the air, and large trees are snapped or uprooted.	F2	118-161 MPH	Significant	Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165 MPH	Severe	The environment sustained severe damage: roofs and walls are ripped off buildings, small buildings are destroyed, and most trees are uprooted.	F3	162-209 MPH	Severe	Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
EF4	166-200 MPH	Devastating	The environment sustained devastating damage: well-built homes are destroyed, buildings are lifted off their foundations, cars are blown away, and large debris flies in the air.	F4	210-261 MPH	Devastating	Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown, and large missiles generated.
EF5	200+ MPH	Incredible	The environment sustained incredible damage: well-built homes are lifted from their foundations, reinforced concrete buildings are damaged, the bark is stripped from trees, and car-sized debris flies through the air.	F5	262-317 MPH	Incredible	Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

² Source: <http://www.tornadoproject.com/fscale/fscale.htm>

SECTION 15: TORNADO

Both the Fujita Scale and Enhanced Fujita Scale should be referenced in reviewing previous occurrences since tornado events that occurred before 2007 will follow the original Fujita Scale. The greatest magnitude reported within the planning area is an F5 (an EF5 when converted to the Enhanced Fujita Scale), an incredible tornado with wind speeds above 262 mph. Based on the planning area's location in Wind Zone III, the planning area has the potential to experience anywhere from an EF0 to an EF5 depending on the wind speed. Previous tornado events in the Williamson County planning area (converted from the Fujita Scale) have been between EF0 and EF5 (Figure 15-2).

HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) Storm Events database is a national data source organized under the National Oceanic and Atmospheric Administration (NOAA). The NCEI is the largest archive available for historic storm events data; however, it is important to note that only incidents recorded in the NCEI have been factored into this risk assessment unless otherwise noted. It is likely that a number of occurrences have gone unreported over time.

Figure 15-2 identifies the locations of previous occurrences in the Williamson County planning area from 1954 through 2023. A total of 71 events have been recorded by NOAA's Storm Prediction Center and the NCEI Storm Events databases for the Williamson County planning area. The strongest event reported in the planning area was an F5 tornado on May 27, 1997. That date also saw the most devastating impacts in terms of injuries, fatalities, and damages, as the F5 tornado (as well as several smaller tornados) caused 27 fatalities, 27 injuries, and an estimated \$215,723,600 (2024 dollars) in damages to property and crops. See the significant events subsection below for a detailed account of this event.

Historical tornado data for the school and ISDs are provided within the Williamson County events, per the NCEI database, as they do not have events reported separate and apart from the reported county and jurisdiction events. No participating schools or ISDs reported additional tornado events that are not already captured in the NCEI database.

SECTION 15: TORNADO

Figure 15-2. Spatial Historical Tornado Events, 1954-2023³

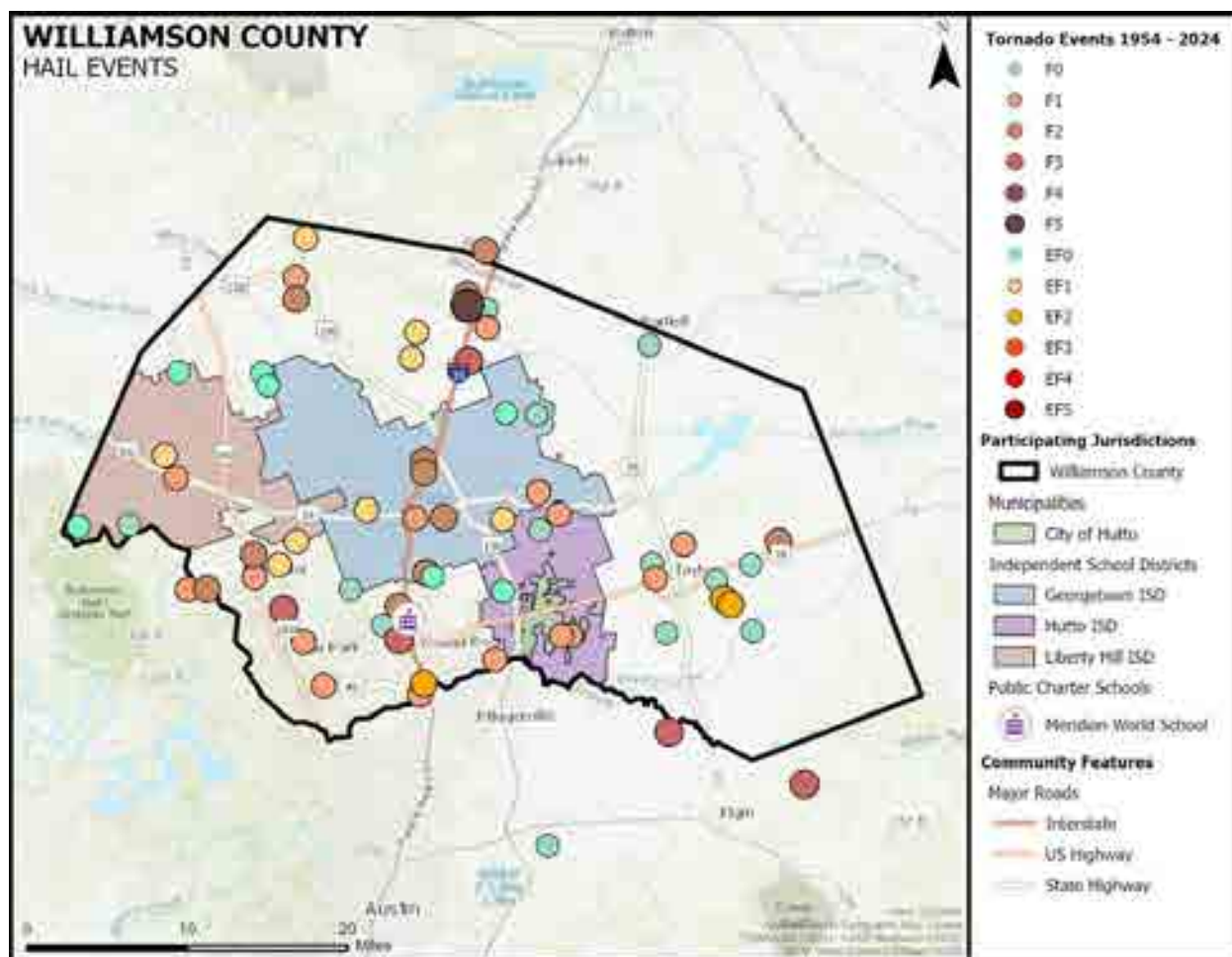


Table 15-3. Historical Tornado Events, 1954-2023⁴

JURISDICTION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	4/30/1954	F3	0	6	\$2,924,900	\$0
Williamson County	9/4/1956	F2	0	0	\$286,100	\$0
Williamson County	4/24/1957	F3	0	0	\$2,809,600	\$0
Williamson County	4/24/1957	F1	0	0	\$28,100	\$0
Williamson County	5/2/1958	F1	0	0	\$400	\$0
Williamson County	3/10/1963	F1	0	0	\$2,600	\$0

³ Source: NOAA Storm Prediction Center

⁴ Only recorded events with fatalities, injuries or damages are listed. Magnitude is listed when available. Damage values are in 2024 dollars.

SECTION 15: TORNADO

JURISDICTION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	4/26/1964	F2	0	0	\$25,400	\$0
Williamson County	5/18/1966	F1	0	0	\$24,300	\$0
Williamson County	5/24/1972	F1	0	0	\$1,900	\$0
Williamson County	10/21/1972	F1	0	0	\$185,400	\$0
Williamson County	5/7/1975	F1	0	0	\$14,800	\$0
Williamson County	4/14/1977	F2	0	0	\$1,306,500	\$0
Williamson County	7/28/1978	F2	0	0	\$119,400	\$0
Williamson County	4/7/1980	F3	1	2	\$967,800	\$0
Williamson County	8/10/1980	F0	0	0	\$941,100	\$0
Williamson County	2/10/1981	F2	0	0	\$891,800	\$0
Williamson County	5/16/1981	F1	0	4	\$873,000	\$0
Williamson County	5/18/1983	F1	0	0	\$8,000	\$0
Williamson County	6/4/1983	F1	0	0	\$787,900	\$0
Williamson County	9/19/1983	F0	0	0	\$100	\$0
Williamson County	12/10/1985	F2	0	2	\$7,171,800	\$0
Williamson County	12/10/1985	F1	0	1	\$717,200	\$0
Williamson County	5/17/1989	F3	1	28	\$6,331,800	\$0
Williamson County	5/13/1994	F0	0	0	\$10,700	\$10,700
Williamson County	5/27/1997	F3	0	15	\$137,091,600	\$98,000
Williamson County	5/27/1997	F5	27	12	\$78,338,100	\$195,900
Williamson County	7/4/1998	F1	0	0	\$57,700	\$0
Williamson County	3/16/2000	F2	0	0	\$549,500	\$0
Williamson County	4/27/2009	EF1	0	0	\$1,470,400	\$0
Williamson County	5/21/2011	EF0	0	0	\$138,800	\$0
Williamson County	5/25/2015	EF1	0	0	\$66,000	\$0
Williamson County	7/15/2017	EF0	0	0	\$128,100	\$0
Williamson County	5/20/2018	EF1	0	0	\$62,400	\$0
City of Hutto	7/4/2018	EF0	0	0	\$1,300	\$0

SECTION 15: TORNADO

JURISDICTION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	6/9/2019	EF0	0	0	\$6,200	\$0
Williamson County	4/12/2022	EF1	0	0	\$108,500	\$0
Williamson County	10/24/2022	EF1	0	0	\$526,100	\$0
TOTALS		(MAX EXTENT)	29	70	\$244,975,300	\$304,600

Table 15-4. Summary of Historical Tornado Events, 1954-2023

JURISDICTION	NUMBER OF EVENTS	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	69	F5	29	70	\$244,974,000	\$304,600
City of Hutto	2	EF0	0	0	\$1,300	\$0
Georgetown ISD	0	-	-	-	-	-
Hutto ISD	0	-	-	-	-	-
Liberty Hill ISD	0	-	-	-	-	-
Meridian World School	0	-	-	-	-	-
TOTALS	71	(MAX EXTENT)	29	70	\$245,279,900	

Based on the list of historical tornado events for the Williamson County planning area including all participating jurisdictions, ISDs and schools, there have been 16 recorded events since the 2017 Plan.

SIGNIFICANT EVENTS

April 7, 1980 – Williamson County

In the afternoon, an F3 tornado touched down and caused destruction in a neighborhood on the northwest side of the City of Round Rock. The tornado was estimated at 100 yards in width and followed a roughly 6.5-mile path southeast after touching down. The path of destruction caused one fatality, two injuries, and an estimated \$967,800 (2024 dollars) in property damage.

May 17, 1989 – Williamson County

An F3 tornado developed around 3am about 3 miles south of the City of Jarrell and proceeded north and northeast, causing extensive damage on the south and east sides of the City. Impacts included 35 homes and 12 mobile homes either heavily damaged or destroyed, 16 heavily damaged business structures, a 12-unit apartment complex being destroyed, as well as 2 school buildings being destroyed. Additionally, one woman was killed in her mobile home when it was demolished, and 28 people sustained injuries. I-35 was heavily impacted as the tornado turned over 18 trucks and scattered debris across the highway. Total property damages are estimated at \$6,331,800 (2024 dollars).

SECTION 15: TORNADO

May 27, 1997 – Williamson County

Eyewitnesses reported a 10-minute period of very small, short-lived tornadoes, including two F2 tornadoes, that dissipated quickly after touching down. The final tornado developed as a small rope-shaped tornado which quickly expanded into a devastating, nearly half-mile wide F5 after touching down. This tornado crossed CR 308, 305, and CR 307, ripping off approximately 525 feet of asphalt off the roads. The tornado reached its strongest point as it entered the Double Creek subdivision in the City of Jarrell, growing to three-quarters of a mile wide. Once in this area, the tornado killed 300 cattle grazing in a pasture, totally destroyed approximately 40 structures, completely stripped trees of bark, threw and flattened at least 6 cars, as well as causing 27 fatalities and 12 injuries. This tornado is regarded as one of the most destructive and devastating tornado events in the history of the State of Texas. Three separate NCEI reports were made for this event; in total, these reports estimate \$215,429,700 (2024 dollars) in property damages and \$293,900 (2024 dollars) in crop damages.

July 15, 2017 – Williamson County

An upper-level trough moved into Texas from the Gulf of Mexico and generated thunderstorms which brought damaging wind gusts as well as an EF0 tornado to the Williamson County planning area. The tornado caused minor damage to 6-8 homes off Teravista Club Drive and Caldwell Palm Circle in the City of Georgetown. Damages included sections of roof being peeled off several homes and a trampoline being thrown from a backyard. Property damage is estimated at \$128,100 (2024 dollars).

October 24, 2022 – Williamson County

A shortwave trough pushed a cold front through South Central Texas, leading to the development of storms which included one EF1 tornado. This tornado touched down just west of CR 234 and north of CR 239, moving southeast for nearly four miles. Early destruction from the tornado indicated high-end EF0 damage, with some trees and homes impacted. As the tornado crossed I-35, it strengthened to EF1 windspeeds, leading to damaged power poles, many large tree branches snapping, a semi-trailer being flipped, one home sustaining roof damage, and a barn's roof being partially removed. Altogether, these impacts resulted in an estimated \$526,100 (2024 dollars) in damages.

PROBABILITY OF FUTURE EVENTS

Tornadoes can occur at any time of year and at any time of day, but they are typically more common in the spring months during the late afternoon and evening hours. A smaller, high frequency period can emerge in the fall during the brief transition between the warm and cold seasons. With 71 historical events over a 70-year reporting period, the Williamson County planning area, including participating jurisdictions, ISDs and schools, can anticipate a tornado touchdown approximately once a year. This frequency supports a "Highly Likely" probability of future events for the Williamson County planning area.

VULNERABILITY AND IMPACT

Because tornadoes often cross jurisdictional boundaries, all existing and future buildings, facilities, and populations in the entire Williamson County planning area, including participating jurisdictions, ISDs and schools, are considered to be exposed to this hazard and could potentially

SECTION 15: TORNADO

be impacted. The damage caused by a tornado is typically a result of high wind velocity, wind-blown debris, lightning, and large hail.

The average tornado moves from southwest to northeast, but tornadoes have been known to move in any direction. Consequently, vulnerability of humans and property is difficult to evaluate since tornadoes form at different strengths, in random locations, and create relatively narrow paths of destruction. Although tornadoes strike at random, making all buildings vulnerable, three types of structures are more likely to suffer damage:

- o Manufactured Homes;
- o Homes built of peer and beam construction (more susceptible to lift); and
- o Buildings with large spans, such as shopping malls, gymnasiums, and factories.

Tornadoes can cause a significant threat to people as they could be struck by flying debris, falling trees / branches, utility lines, and poles. Blocked roads could prevent first responders from responding to calls. Tornadoes commonly cause power outages which could cause health and safety risks to residents and visitors, as well as to patients in hospitals.

The Williamson County planning area features mobile or manufactured home parks throughout the planning area. These parks are typically more vulnerable to tornado events than typical site-built structures. In addition, manufactured homes are located sporadically throughout the planning area, which would also be more vulnerable. The U.S. Census data indicates a total of 4,899 (2 percent of total housing stock) manufactured homes located in the Williamson County planning area. In addition, 11 percent (approximately 25,704 structures) of the single family residential (SFR) structures in the entire planning area were built before 1980. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant wind events. Tables 15-5 and 15-6 list the number of vulnerable structures in each plan participant.

Table 15-5. Structures at Greater Risk by Participating Jurisdiction

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Williamson County	25,704	4,899
City of Hutto	374	37

Table 15-6. Structures at Greater Risk by Participating Special District

JURISDICTION	STRUCTURES BUILT BEFORE 1980	MANUFACTURED FACILITIES/ PORTABLE BUILDINGS
Georgetown ISD	4	21
Hutto ISD	1	24
Liberty Hill ISD	6	25
Meridian World School	0	4

SECTION 15: TORNADO

While all citizens are at risk to the impacts of a tornado, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. The elderly, children, and people with a disability may have trouble taking shelter due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures. The population over 65 in the Williamson County planning area is estimated at 13 percent of the total population and children under the age of 5 are estimated at 6 percent. The population with a disability is estimated at 10 percent of the total population. An estimated 6 percent of the planning area population live below the poverty level and 22 percent of the populations speaks a language other than English (Table 15-7).

Table 15-7. Populations at Greater Risk by Jurisdiction⁵

JURISDICTION	ELDERLY (over 65)	YOUTH (under 5)	WITH A DISABILITY	BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Williamson County ⁶	77,609	37,584	61,524	38,896	138,476
City of Hutto	1,830	2,155	2,658	2,301	7,141

Some participating ISDs as well as the Meridian World School also have vulnerable populations based on age or work location, such as employees that work outdoors and may be subject to severe weather conditions, or children under 5 who attend the participating schools (Table 15-8).

Table 15-8. Populations at Greater Risk by Special District⁷

JURISDICTION	POPULATION UNDER 5	EMPLOYEES OPERATING OUTDOORS
Georgetown ISD	469	428
Hutto ISD	415	222
Liberty Hill ISD	240	300
Meridian World School	0	2

The Williamson County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by tornado events (Table 15-9). The critical infrastructure with the greatest vulnerability to tornadoes are power and communications facilities. Failures of these facilities can result in a loss of service and cascading impacts such as posing enormous risk to individuals dependent on

⁵ US Census Bureau 2022 data for Williamson County

⁶ County totals include the entire population within the county lines, including unincorporated areas and non-participating jurisdictions within the County.

⁷ ISDs and the Meridian World School vulnerable population data has been provided by participating Planning Team members.

SECTION 15: TORNADO

electricity as a medical necessity. For a comprehensive list by participating jurisdiction, please see Appendix C.

Table 15-9. Critical Facilities Vulnerable to Tornado Event

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. - Emergency vehicles can be damaged by falling trees or flying debris. - Power outages could disrupt communications, delaying emergency response times. - Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. - Debris/downed trees can impede emergency response vehicle access to areas. - Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. - First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions. - Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	- Structures can be damaged by falling trees damaged by lightning. - Power outages could disrupt critical care. - Backup power sources could be damaged. - Evacuations may be necessary due to extended power outages, fires, or other associated damage to facilities. - Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. - Temporary break in operations may significantly inhibit post event evacuations. - Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Supplier (Food, fuel, etc.)	- Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. - Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed. - Additional emergency responders and critical aid workers may not be able to reach the area for days.
Utility Services and Infrastructure (electric, water, wastewater, communications)	- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. - Emergency vehicles can be damaged by falling trees or flying debris. - Power outages could disrupt communications, delaying emergency response times.

SECTION 15: TORNADO

CRITICAL FACILITIES	POTENTIAL IMPACTS
	- o Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. - o Debris/downed trees can impede emergency response vehicle access to areas. - o Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. - o First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions. - o Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

The total loss estimate due to tornado events is \$245,279,900 (in 2024 dollars), having an approximate average annual loss estimate of \$3,504,000. Additionally, tornadoes have resulted in 29 fatalities and 70 injuries within Williamson County. Based on historic damages and best available data, the impact of a tornado event on the Williamson County planning area is considered “Substantial”, meaning a complete shutdown of critical facilities for 30 days or more, more than 50 percent of property destroyed or with major damage, and multiple fatalities possible depending on the size and severity of the event.

Table 15-10. Estimated Average Annual Losses by Jurisdiction⁸

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Williamson County	\$245,278,600	\$3,503,980
City of Hutto	\$1,300	\$20
Georgetown ISD	-	-
Hutto ISD	-	-
Liberty Hill ISD	-	-
Meridian World School	-	-
PLANNING AREA	\$245,279,900	\$3,504,000

ASSESSMENT OF IMPACTS

Tornadoes have the potential to pose a significant risk to the population and can create dangerous situations. Often, providing and preserving public health and safety is difficult. The impact of climate change could produce larger, more severe tornado events, exacerbating the current

⁸ Damage values are in 2024 dollars. Participating jurisdictions with no reported events show a “-” in table columns where damages would be otherwise reported.

SECTION 15: TORNADO

tornado impacts. More destructive tornado conditions can be frequently associated with a variety of impacts, including:

- o Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- o Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- o Manufactured homes (2 percent of total housing stock) may suffer substantial damage as they would be more vulnerable than typical site-built structures.
- o Portable classrooms may also suffer substantial damage as they would be more vulnerable than other classroom structures.
- o Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- o Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- o Tornadoes often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- o Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- o Tornadoes can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.
- o First responders must enter the damage area shortly after the tornado passes to begin rescue operations and to organize cleanup and assessments efforts, therefore they are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- o Emergency operations and services may be significantly impacted due to damaged facilities, loss of communications, and damaged emergency vehicles and equipment.
- o Private sector entities such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- o Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue, especially if damage is sustained to major employers within the planning area.
- o Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- o When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, and normal day-to-day operating expenses.
- o Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- o Residential structures destroyed by a tornado may not be rebuilt for years, reducing the tax base for the community.
- o Large or intense tornadoes may result in a dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.

SECTION 15: TORNADO

- o Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- o Recreation activities may be unavailable, and tourism can be unappealing for years following a large tornado, devastating directly related local businesses.
- o Tornadoes may destroy or degrade endangered species habitat.
- o Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. The Williamson County planning area has 75 historical properties.

The economic and financial impacts of a tornado event on the community will depend on the scale of the event, what is damaged, costs of repair or replacement, lost business days in impacted areas, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a tornado event.

CLIMATE CHANGE CONSIDERATIONS

The impacts on the frequency and severity of tornado events due to climate change are unclear. According to the Texas A&M 2021 Climate Report Update, the most robust trend in tornado activity in Texas is a likelihood for a greater number of tornadoes in large outbreaks, although the factors contributing to this trend are not expected to continue. Tornadoes spawn from less than 10 percent of thunderstorms, usually supercell thunderstorms that are in a wind shear environment that promotes rotation.⁹ Based on climate models that are available, the environmental conditions needed for severe thunderstorm events are estimated to become more likely, resulting in an overall increase in the number of days capable of producing a severe thunderstorm event and potential tornadoes to develop from these storms.¹⁰

⁹ Treisman, Rachel. *The exact link between tornadoes and climate change is hard to draw. Here's why*. NPR. December 13, 2021. <https://www.npr.org/2021/12/13/1063676832/the-exact-link-between-tornadoes-and-climate-change-is-hard-to-draw-heres-why>

¹⁰ Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.



SECTION 16 **WILDFIRE**

SECTION 16: WILDFIRE

Hazard Description	1
Location	2
Extent.....	8
Historical Occurrences.....	17
Significant Events	20
Probability of Future Events.....	21
Vulnerability and Impact.....	21
Assessment of Impacts	32
Climate Change Considerations	33

HAZARD DESCRIPTION

Wildfire is an unplanned fire burning in natural or wildland areas such as forests, shrub lands, grasslands, or prairies.¹ Texas is one of the fastest growing states in the Nation, with much of this growth occurring adjacent to metropolitan areas. This increase in population across the state will impact counties and communities that are located within the Wildland Urban Interface (WUI). The WUI is described as the area where structures and other human improvements meet and intermingle with undeveloped wildland or vegetative fuels. Population growth within the WUI substantially increases the risk of wildfire. In Texas nearly 85 percent of wildfires occur within two miles of a community. The Williamson County planning area has an estimated 60 percent of the total planning area population that live within the WUI.²

Wildfires have the potential to spread quickly given the right environmental conditions, particularly within the wildland urban interface and intermix. Most ignition sources for wildfires are a result of human activities, such as an electrical line sparking dry grasses, an improperly discarded cigarette, burning debris, or arson.

Development has increased drastically in central Texas, resulting in more populated areas within the wildland interface/intermix. Additionally, the area is experiencing hotter, drier climatic conditions. These factors combine to make central Texas at risk from wildfires. While the planning area is continually at some risk for wildfires, that risk is elevated during two periods each year: the winter wildfire season (February through April) and the summer wildfire season (August through October).³

The Williamson County population is expected to increase over time following population trends over the last few decades. Continued housing development in the WUI will put more people at a greater risk of catastrophic wildfire and put more pressure on land managers and fire department personnel to mitigate fire risk.

¹ Source: FEMA: <https://hazards.fema.gov/nri/wildfire>

² Source: Texas A&M Forest Service, Texas Wildfire Risk Assessment Summary Report, Williamson County: <https://texaswildfirerisk.com/>

³ Austin American Statesman, "Winter wildfire risk is rising in Central Texas. Here's what you should know." January 2023: <https://www.statesman.com/story/news/environment/2023/01/30/wildfire-risk-is-rising-in-central-texas-what-you-should-know/69845234007/>

SECTION 16: WILDFIRE

Wildfires spread based on the type and quantity of fuel that surrounds it. Fuel can include everything from trees, underbrush and dry grassy fields to homes. The amount of flammable material that surrounds a fire is referred to as the fuel load. Conditions in the weather and environment, such as drought, winds and extreme heat, can cause a fire to spread more quickly.⁴ A wildfire event often begins unnoticed and spreads quickly, lighting brush, trees, and homes on fire. For example, a wildfire may be started by a campfire that was not doused properly, a tossed cigarette, burning debris, or arson.

Texas has seen a significant increase in the number of wildfires in the past 30 years, which included wildland, urban interface, or intermix fires. Wildland fires are fueled almost exclusively by natural vegetation, while interface or intermix fires are urban / wildland fires in which vegetation and the built environment provide fuel.

LOCATION

A wildfire incident can face devastating consequences due to human activities, drought conditions, lightning, or wind event, if the conditions allow. Wildfires can vary greatly in terms of size, location, intensity, and duration. While wildfires are not confined to any specific geographic location, they are most likely to occur in open grasslands.

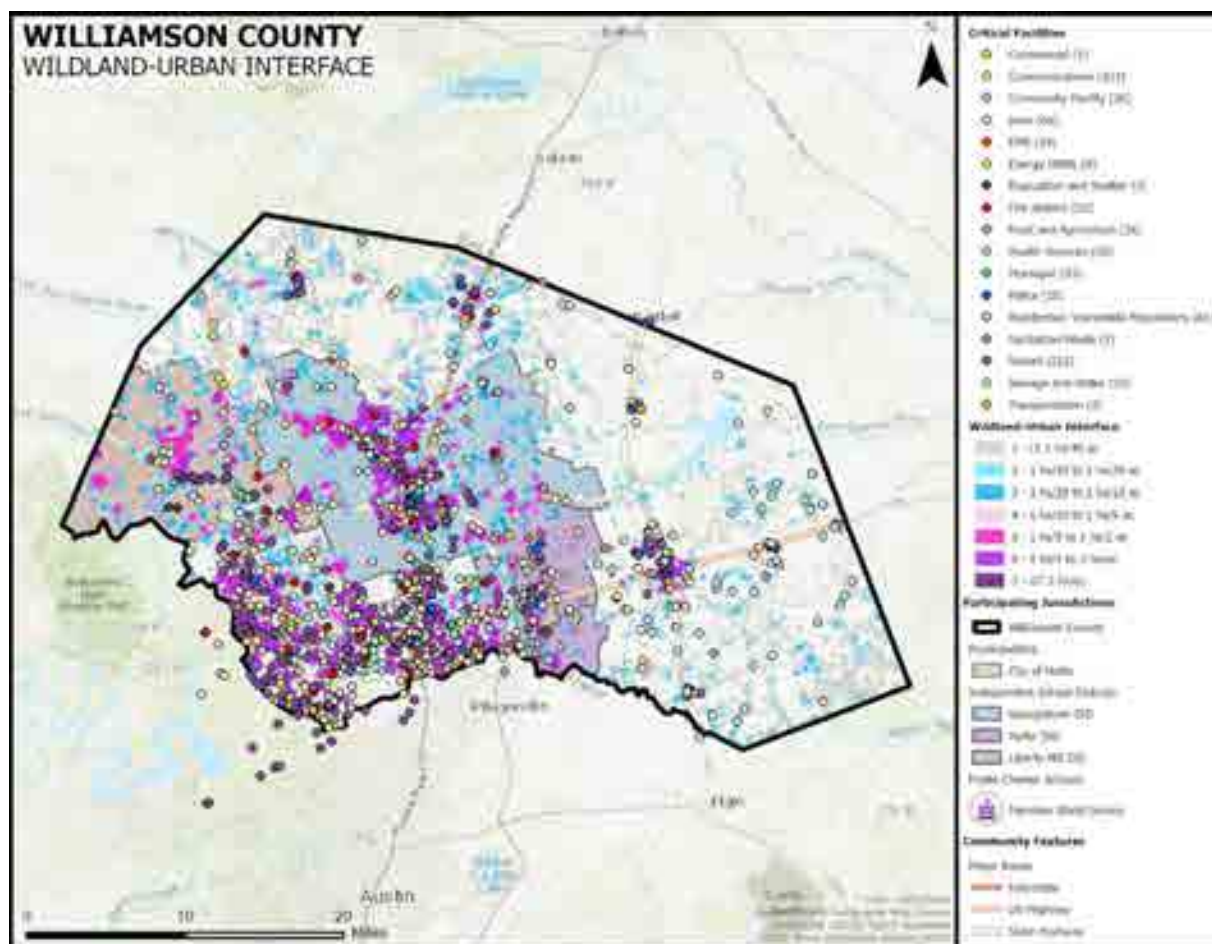
The Texas A&M Forest Service Wildfire Risk Assessment Portal (TxWRAP) provides historical wildfire data for Texas counties along with mapping resources that includes data layers on the WUI, ignition density, and fire intensity scales for communities throughout the Williamson County planning area, along with multiple tips, recommendations and mitigation solutions for communities and residents. The TxWRAP portal was utilized to produce the maps found in this profile.

The threat to people and property from a wildfire event is greater in the fringe areas where developed areas meet open grass lands, such as the Wildland Urban Interface (WUI) (Figures 16-1 through 16-6). It is estimated that 60 percent of the total population in the Williamson County planning area live within the WUI. However, the entire planning area is at some risk for wildfires.

⁴ NOAA Weather Forecasting: <https://scijinks.gov/wildfires/>

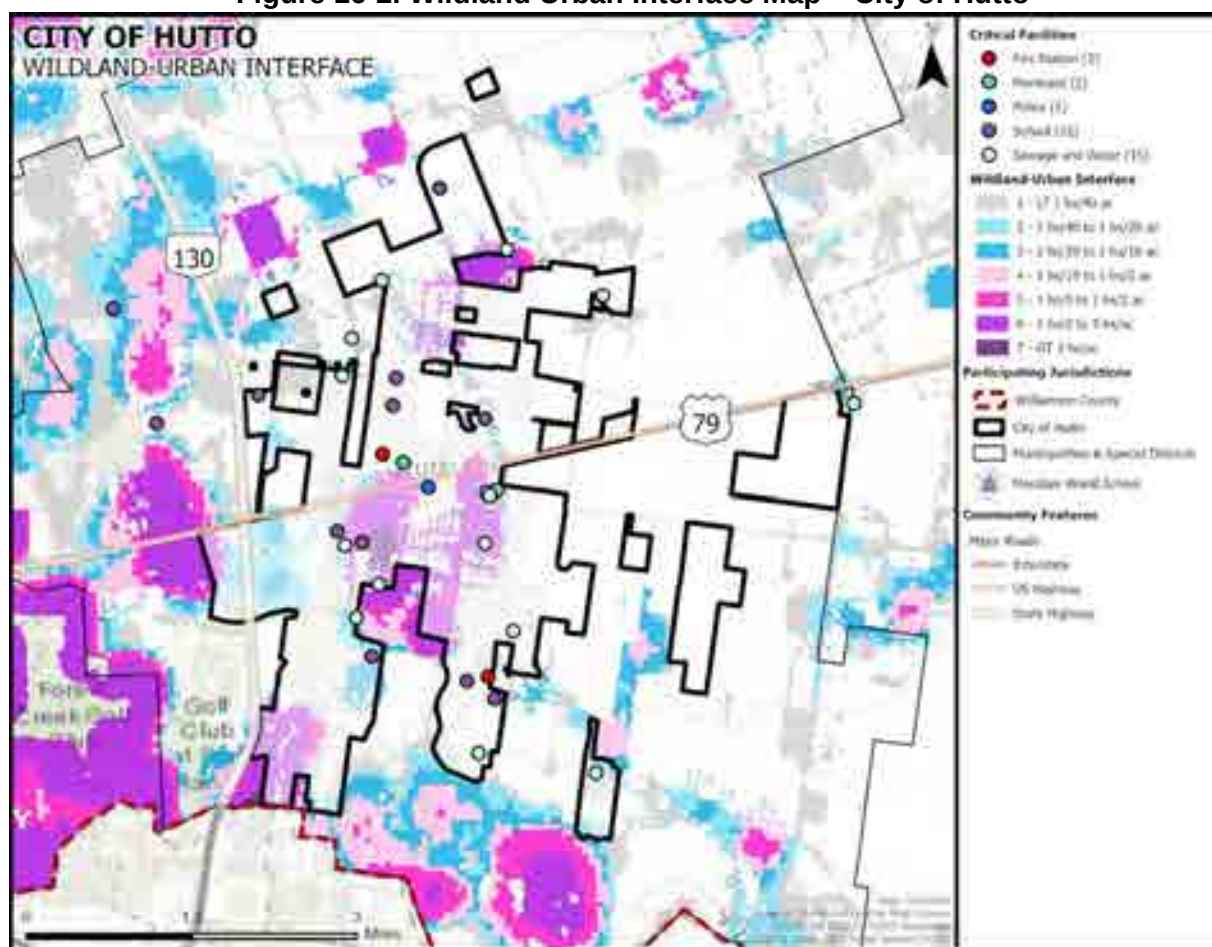
SECTION 16: WILDFIRE

Figure 16-1. Wildland Urban Interface Map – Williamson County



SECTION 16: WILDFIRE

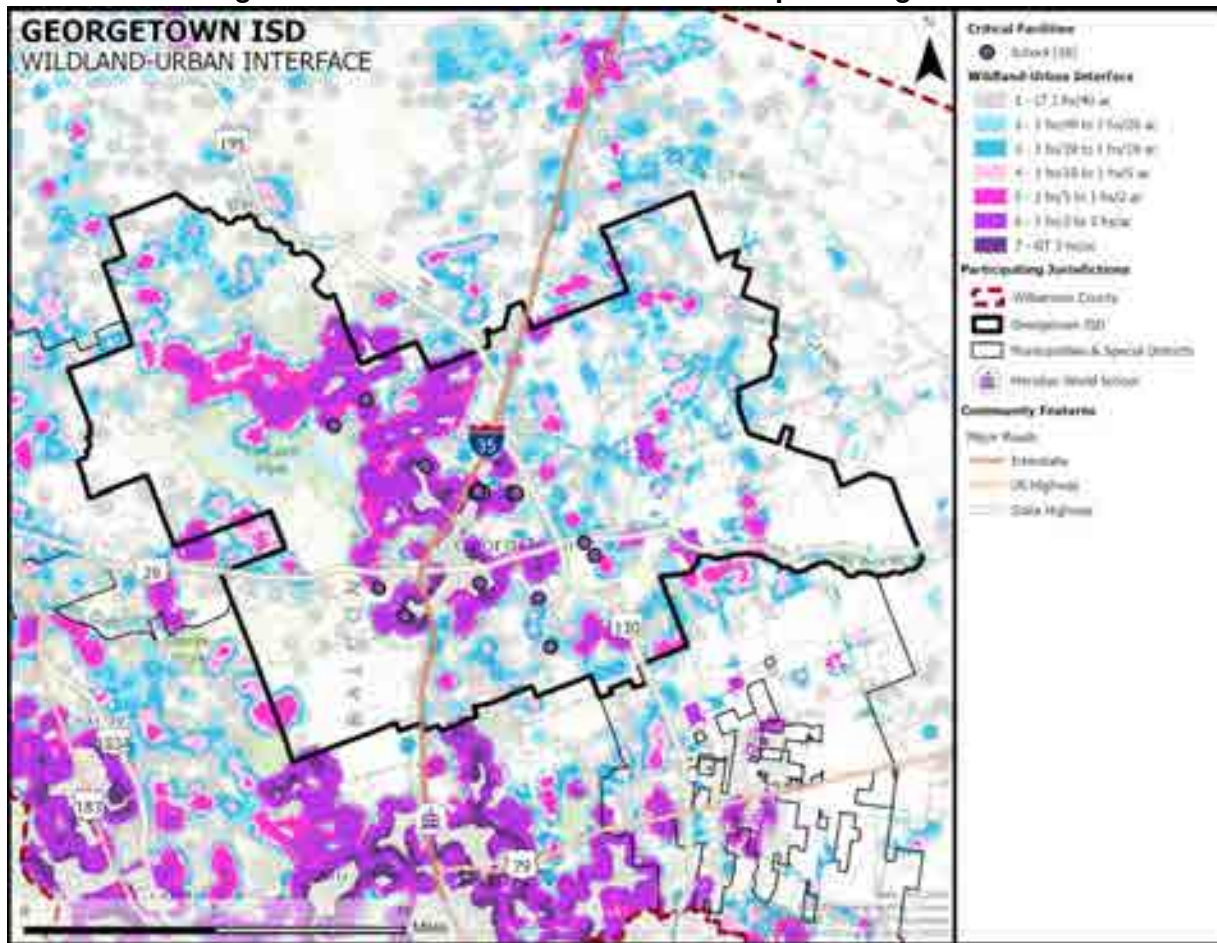
Figure 16-2. Wildland Urban Interface Map – City of Hutto



It is estimated that 51 percent of the total population in the City of Hutto live within the WUI. However, the entire City is at some risk of wildfires.

SECTION 16: WILDFIRE

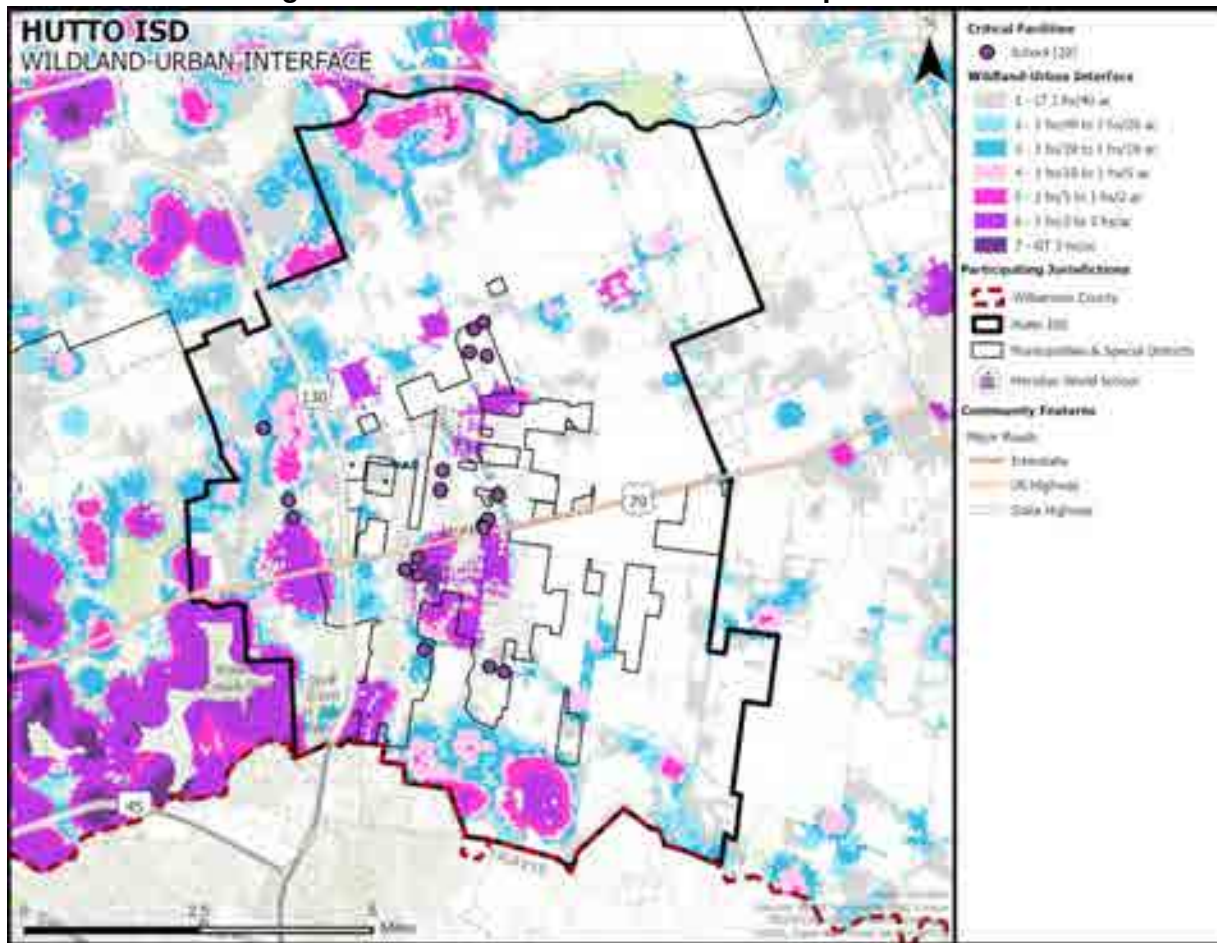
Figure 16-3. Wildland Urban Interface Map – Georgetown ISD



Thirteen Georgetown ISD facilities are located within the WUI. However, all district facilities are at some risk for wildfires.

SECTION 16: WILDFIRE

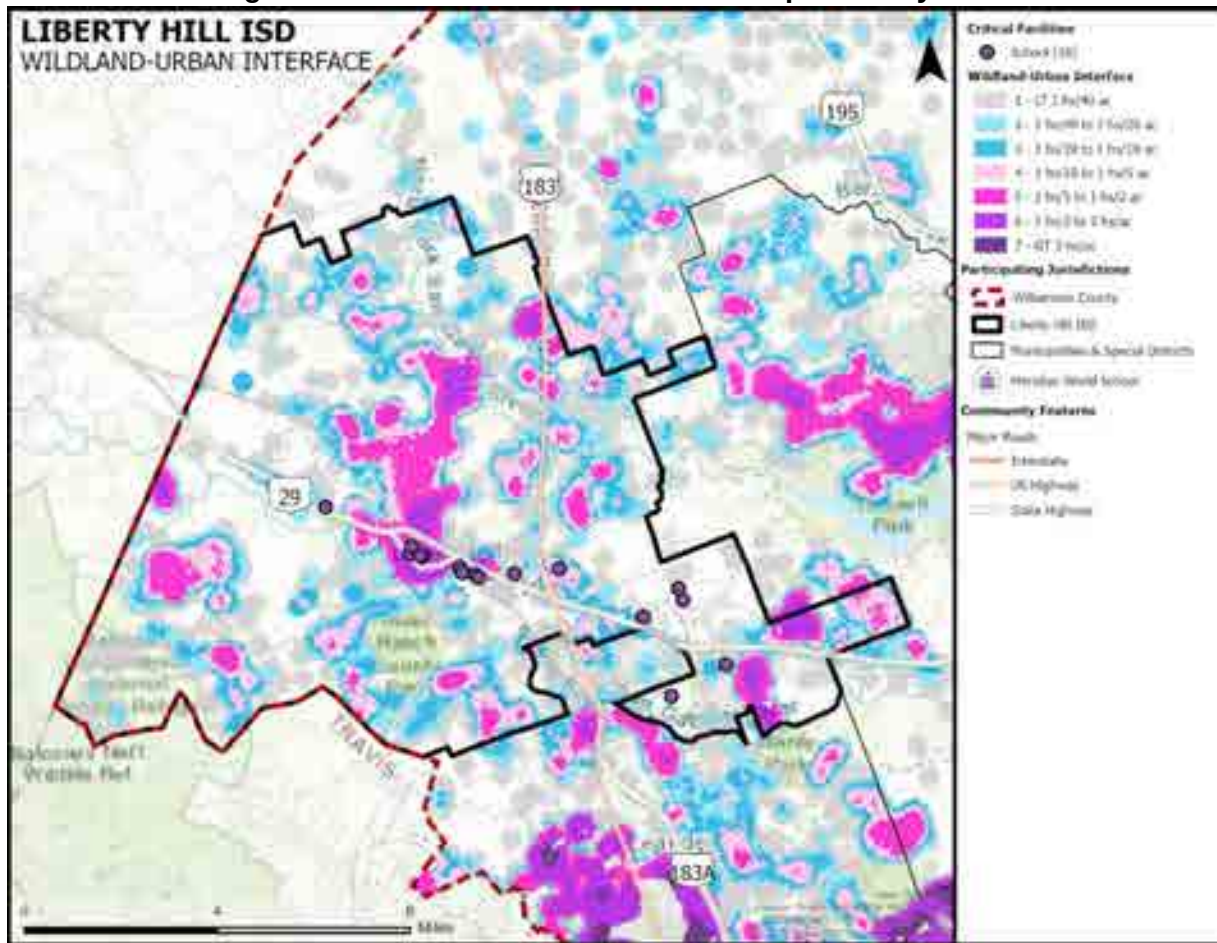
Figure 16-4. Wildland Urban Interface Map – Hutto ISD



Seven Hutto ISD facilities are located within the WUI. However, all district facilities are at some risk for wildfires.

SECTION 16: WILDFIRE

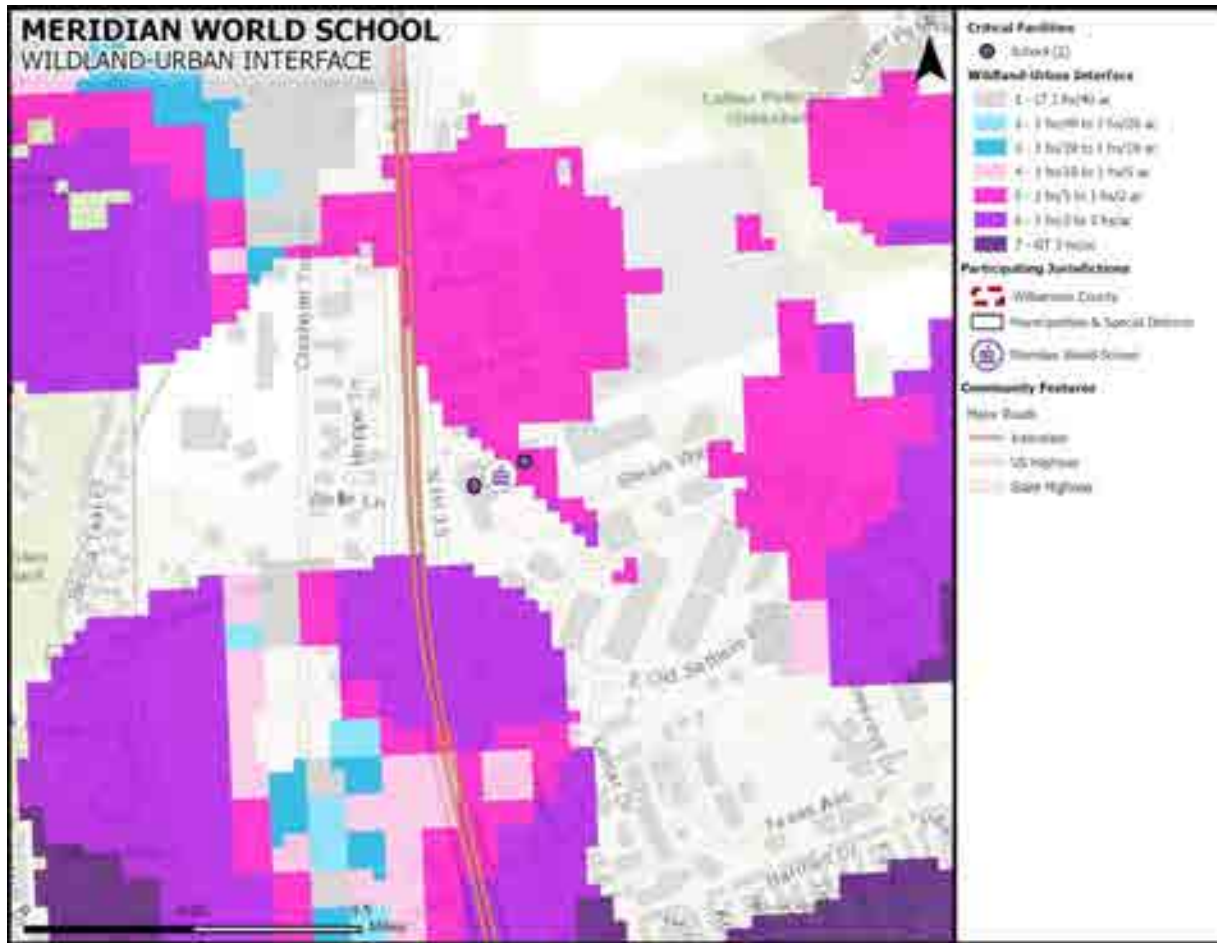
Figure 16-5. Wildland Urban Interface Map – Liberty Hill ISD



Eleven Liberty Hill ISD facilities are located within the WUI. However, all district facilities are at some risk for wildfires.

SECTION 16: WILDFIRE

Figure 16-6. Wildland Urban Interface Map – Meridian World School



One of the Meridian World School facilities is located within the WUI. However, all school facilities are at some risk for wildfires.

EXTENT

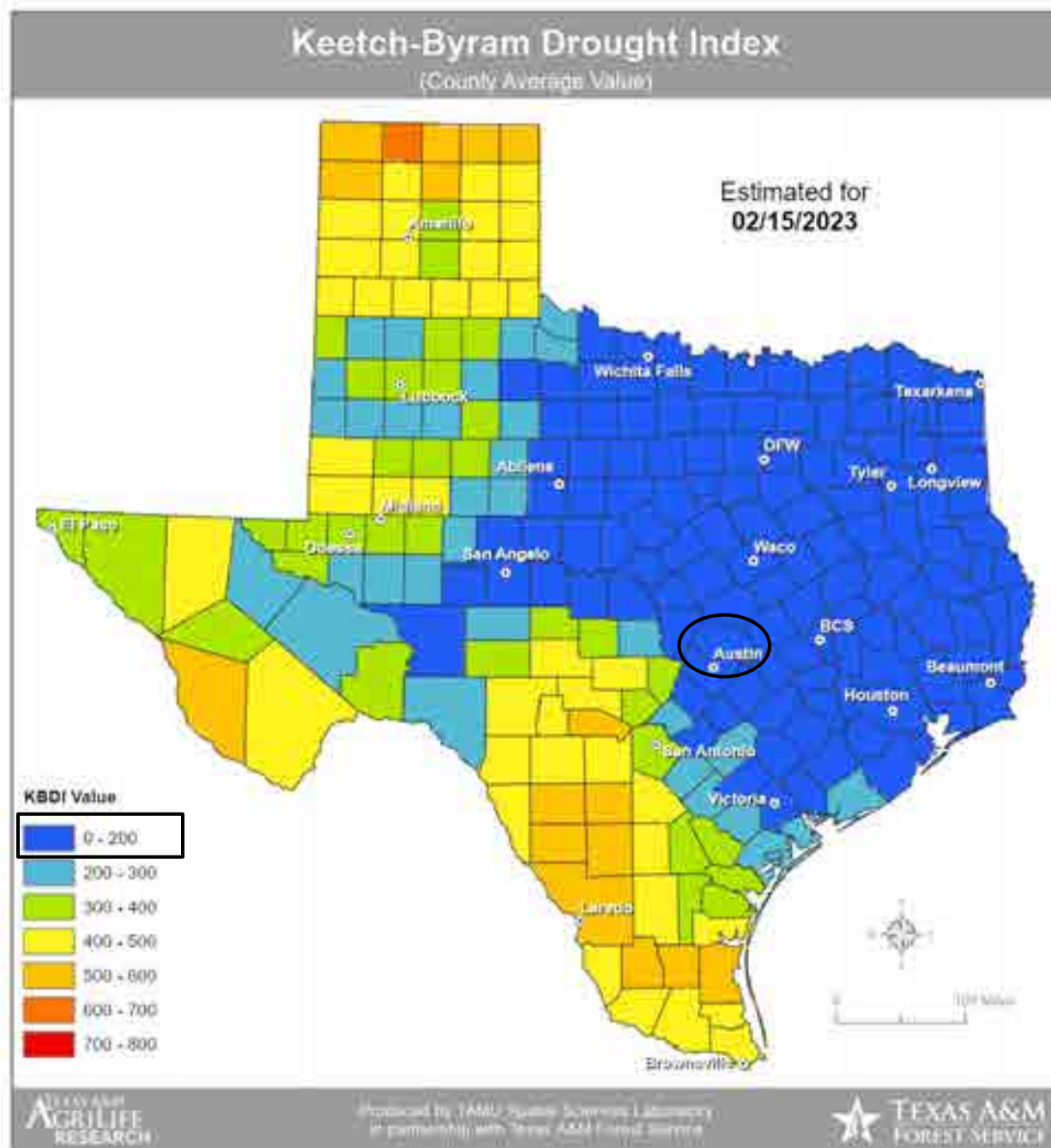


Risk for a wildfire event is measured in terms of magnitude and intensity using the Keetch Byram Drought Index (KBDI), a mathematical system for relating current and recent weather conditions to potential or expected fire behavior. The KBDI determines forest fire potential based on a daily water balance, derived by balancing a drought factor with precipitation and soil moisture (assumed to have a maximum storage capacity of eight inches), and is expressed in hundredths of an inch of soil moisture depletion.

Each color in Figure 16-7 and 16-8 represents the drought index at that location, by date. The drought index ranges from 0 to 800. A drought index of 0 represents no moisture depletion, and a drought index of 800 represents absolutely dry conditions.

SECTION 16: WILDFIRE

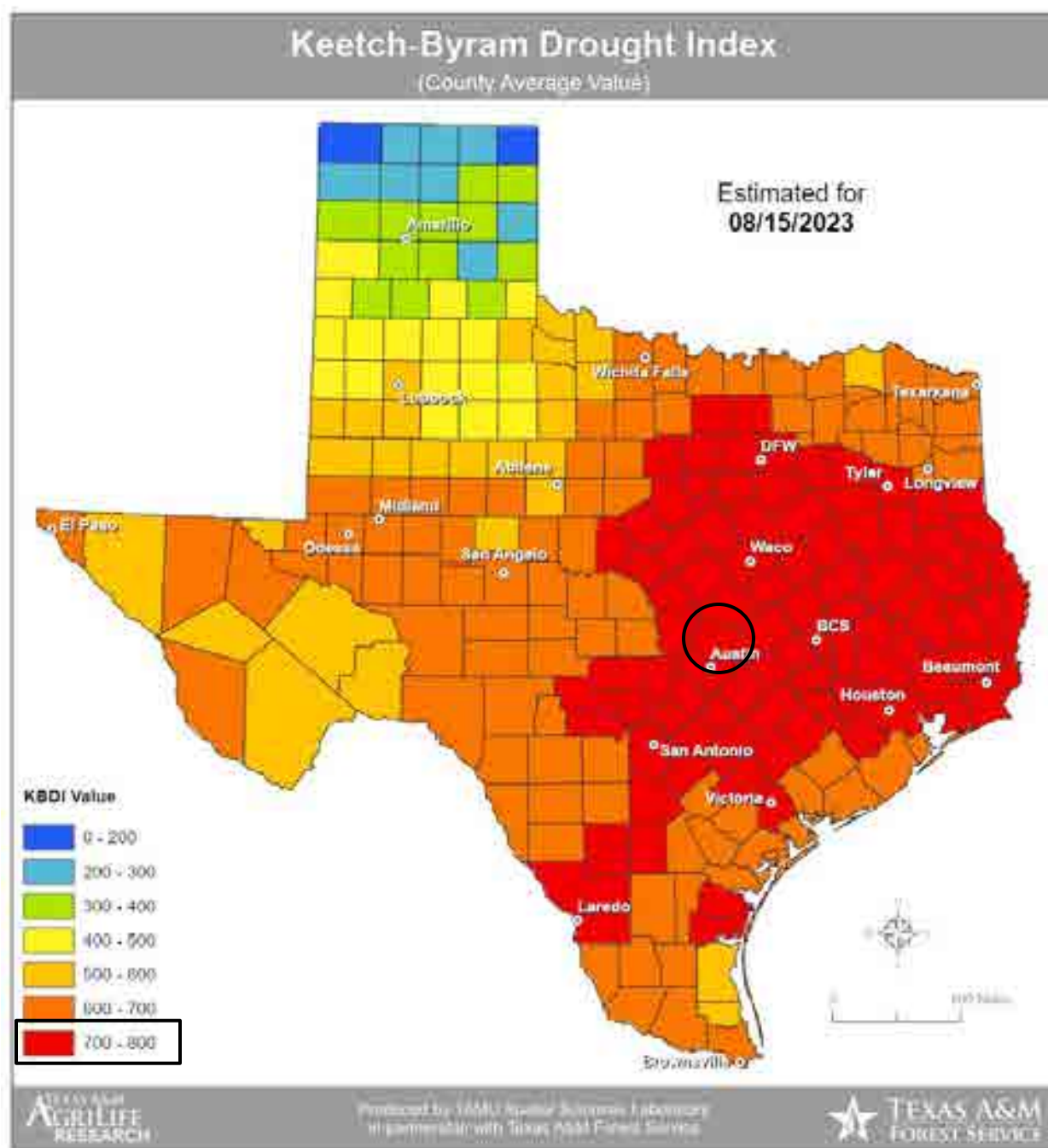
Figure 16-7. Keetch-Byram Drought Index (KBDI), February 2023⁵



⁵ Williamson County planning area is located within the black circle.

SECTION 16: WILDFIRE

Figure 16-8. Keetch-Byram Drought Index (KBDI), August 2023



Fire behavior can be categorized at four distinct levels on the KBDI:

- **0 -200:** Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in spots and patches.
- **200 -400:** Fires more readily burn and will carry across an area with no gaps. Heavier fuels will not readily ignite and burn. Expect smoldering and the resulting smoke to carry into and possibly through the night.

SECTION 16: WILDFIRE

- o **400 -600:** Fires intensity begins to significantly increase. Fires will readily burn in all directions exposing mineral soils in some locations. Larger fuels may burn or smolder for several days creating possible smoke and control problems.
- o **600 -800:** Fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity.

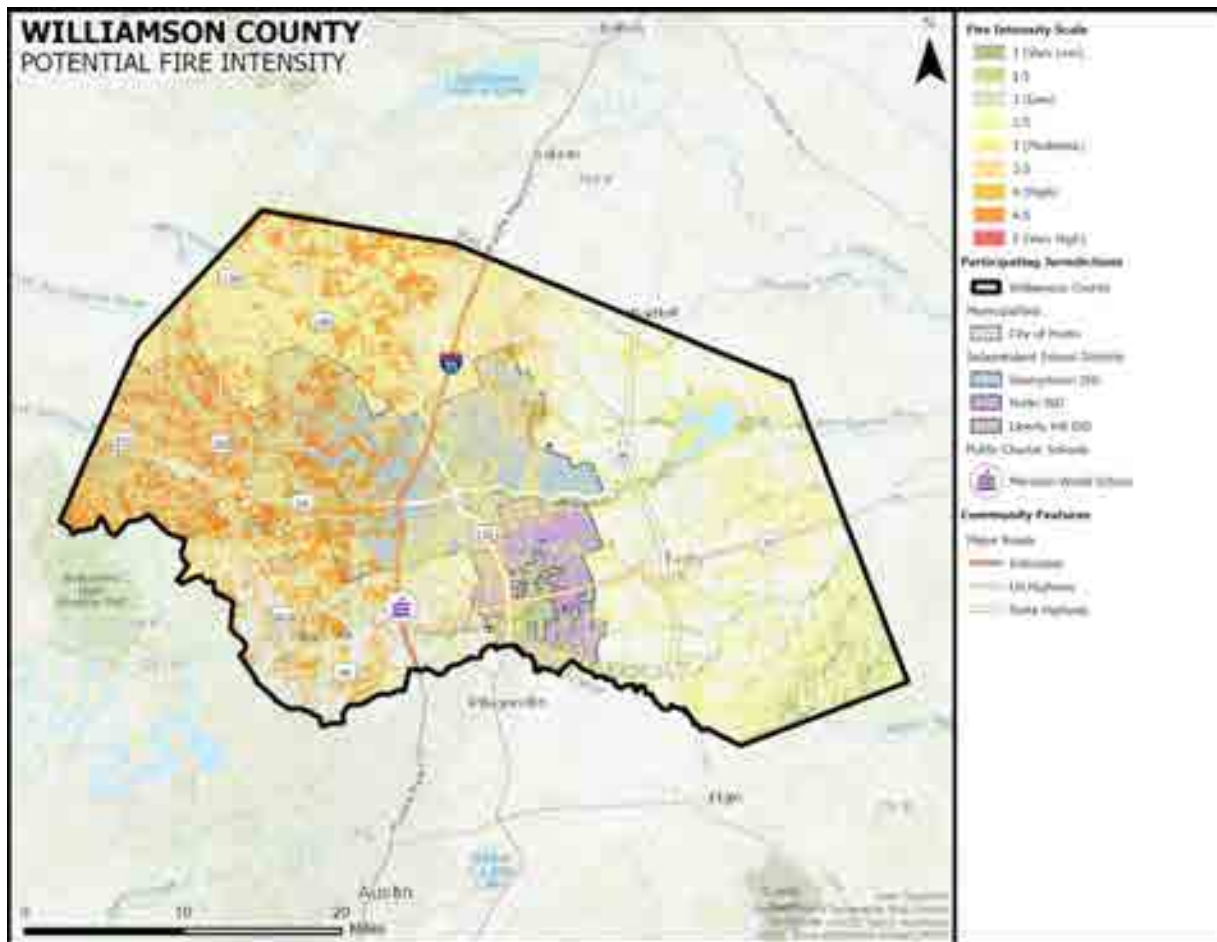
The KBDI is a good measure of the readiness of fuels for a wildfire event. It should be referenced as the area experiences changes in precipitation and soil moisture, while caution should be exercised in dryer, hotter conditions.

The range of intensity for the Williamson County planning area, in a wildfire event, is within 700 to 800. The average extent to be mitigated for the planning area is a KBDI of 525. Based on historical occurrences and readily available fuel, the planning area can anticipate a KBDI range from 0 to 800. At the high end of this range fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity.

The Texas Forest Service's Fire Intensity Scale identifies areas where significant fuel hazards and associated dangerous fire behavior potential exist based on weighted average of four percentile weather categories. The Williamson County planning area has a potential for a full range of wildfire intensities. Figure 16-9 through 16-14 identifies the wildfire intensity for the planning area.

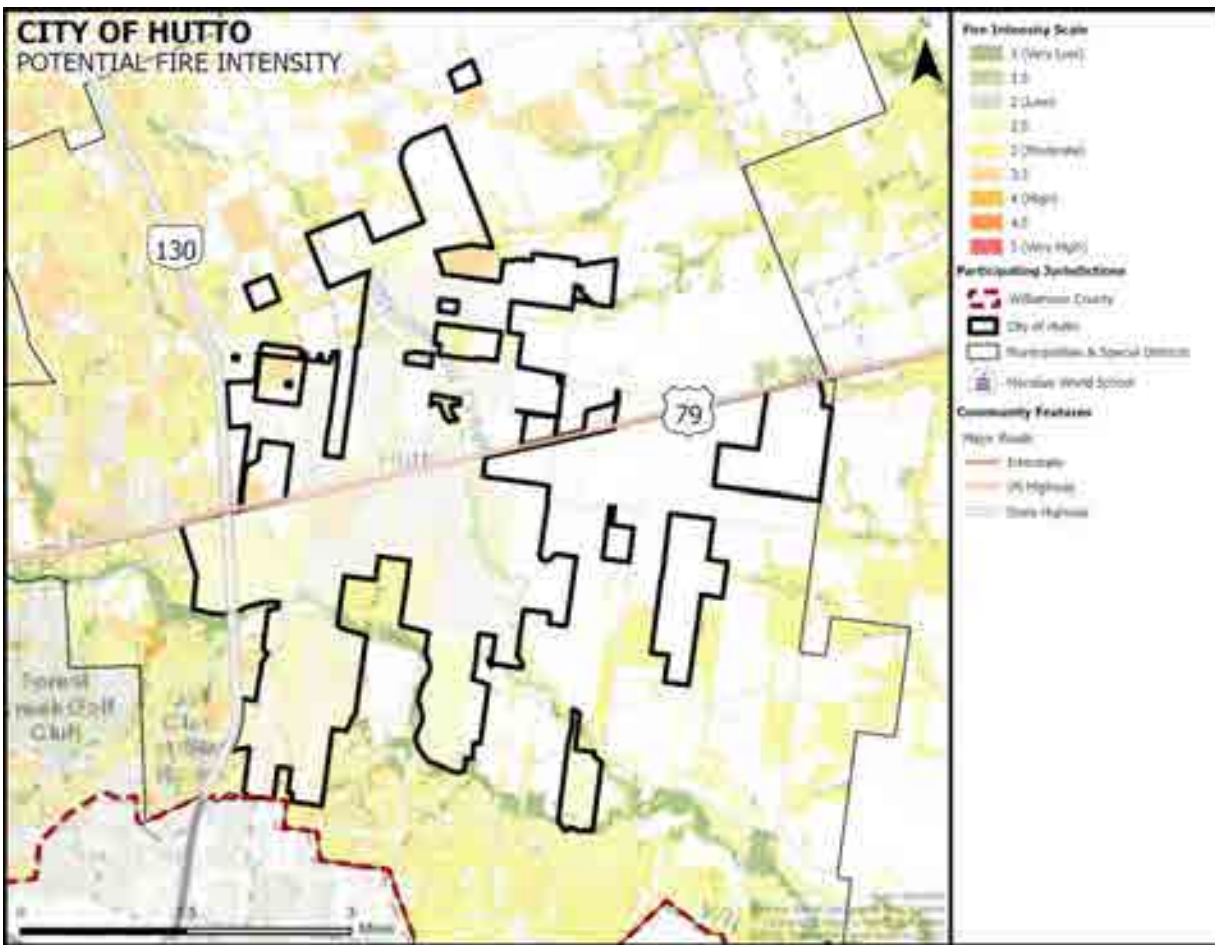
SECTION 16: WILDFIRE

Figure 16-9. Fire Intensity Scale Map – Williamson County



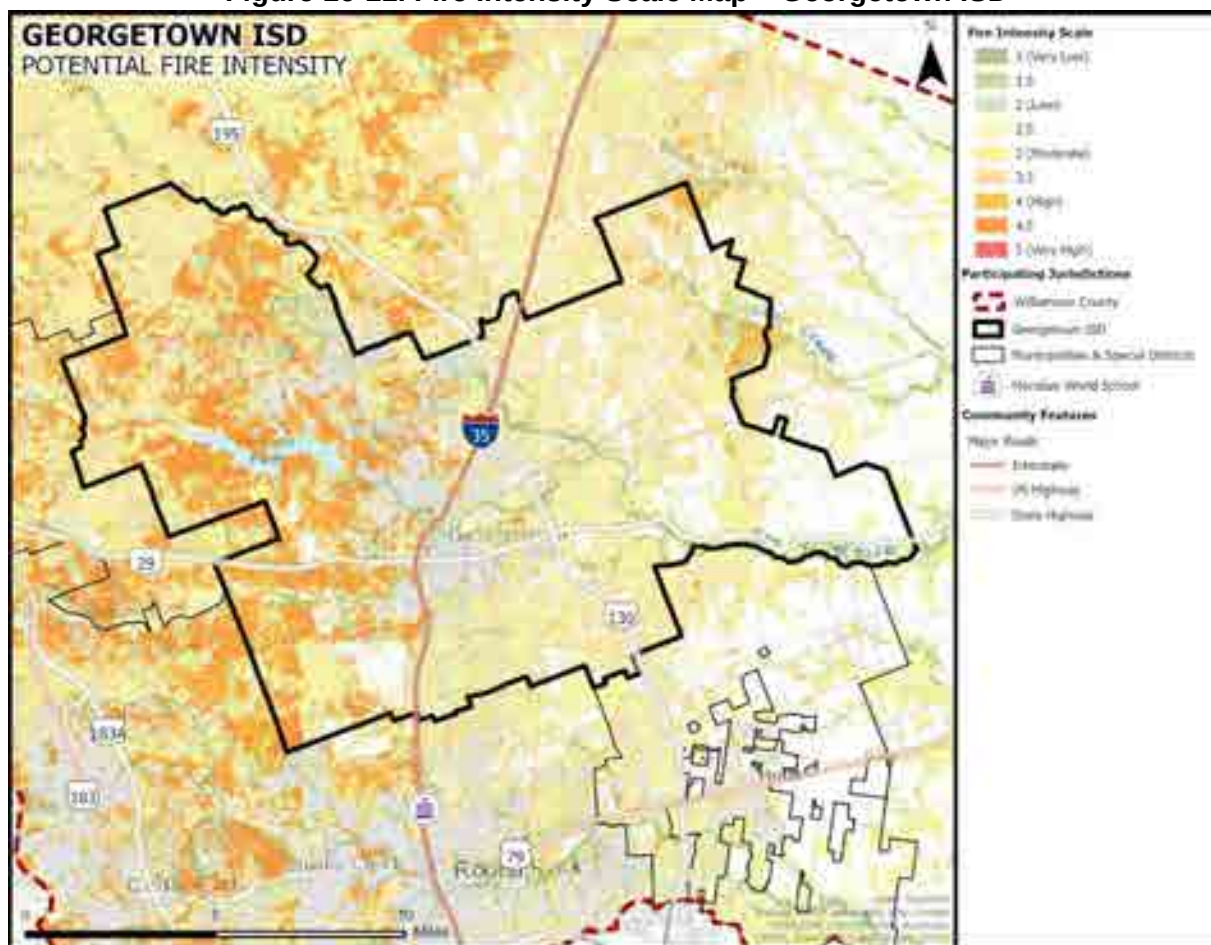
SECTION 16: WILDFIRE

Figure 16-10. Fire Intensity Scale Map – City of Hutto



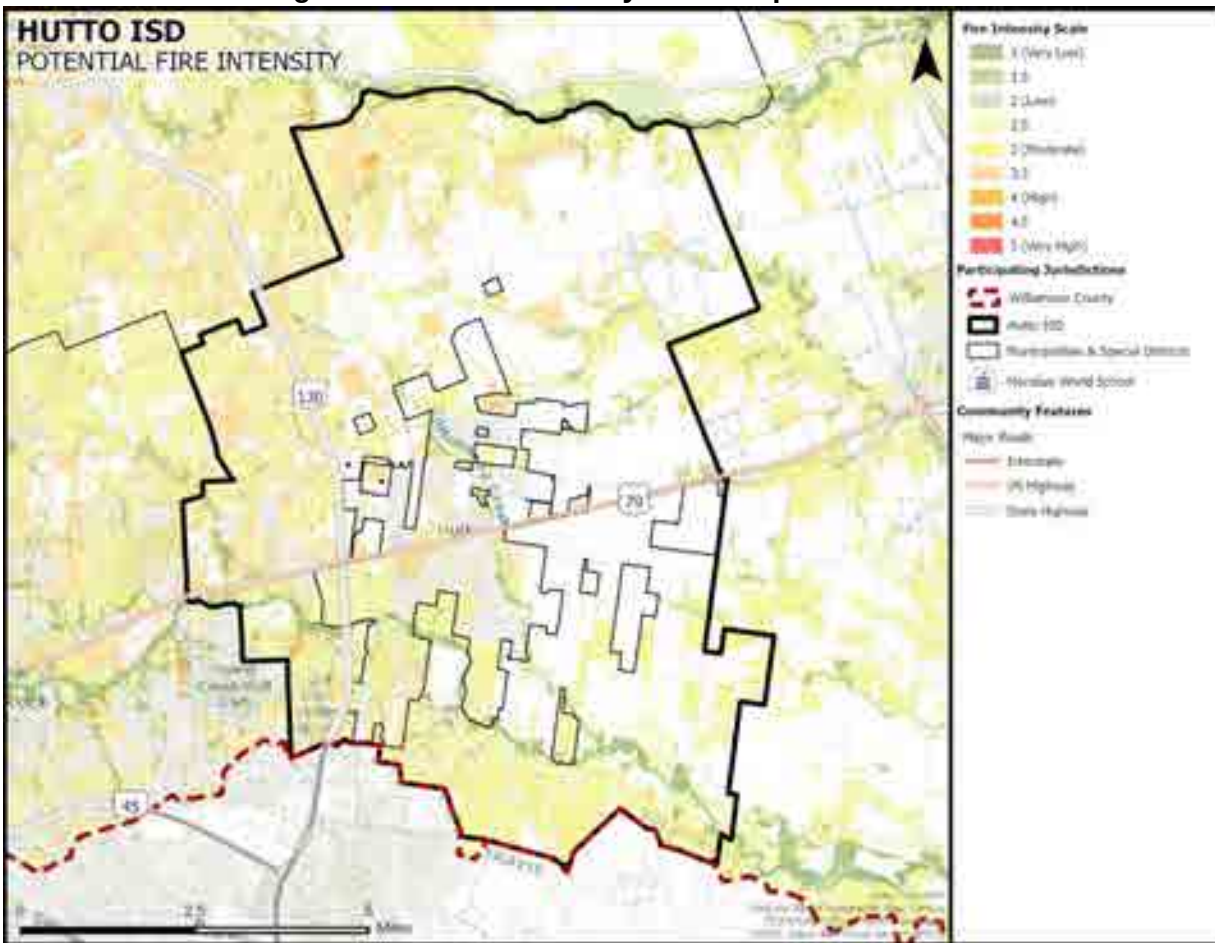
SECTION 16: WILDFIRE

Figure 16-11. Fire Intensity Scale Map – Georgetown ISD



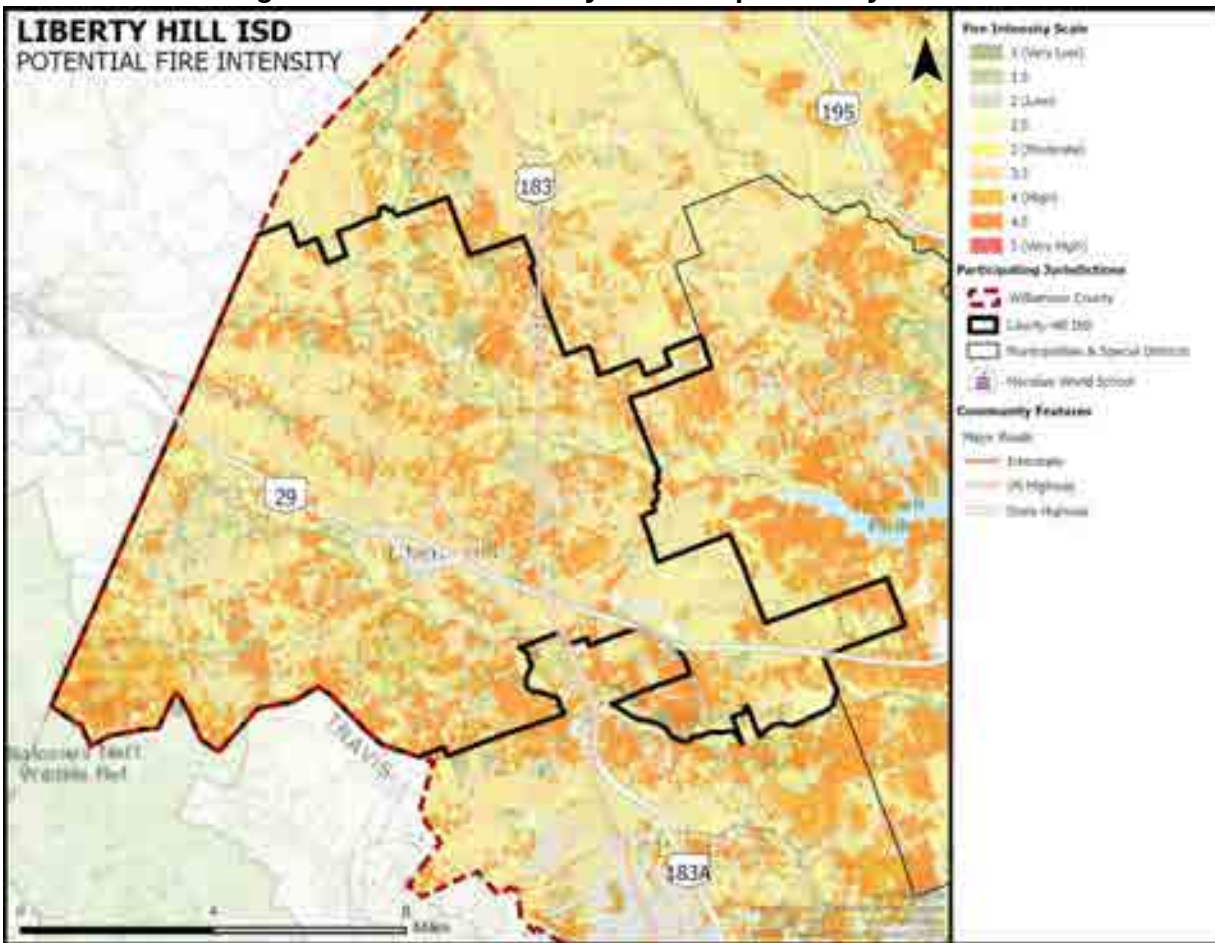
SECTION 16: WILDFIRE

Figure 16-12. Fire Intensity Scale Map – Hutto ISD



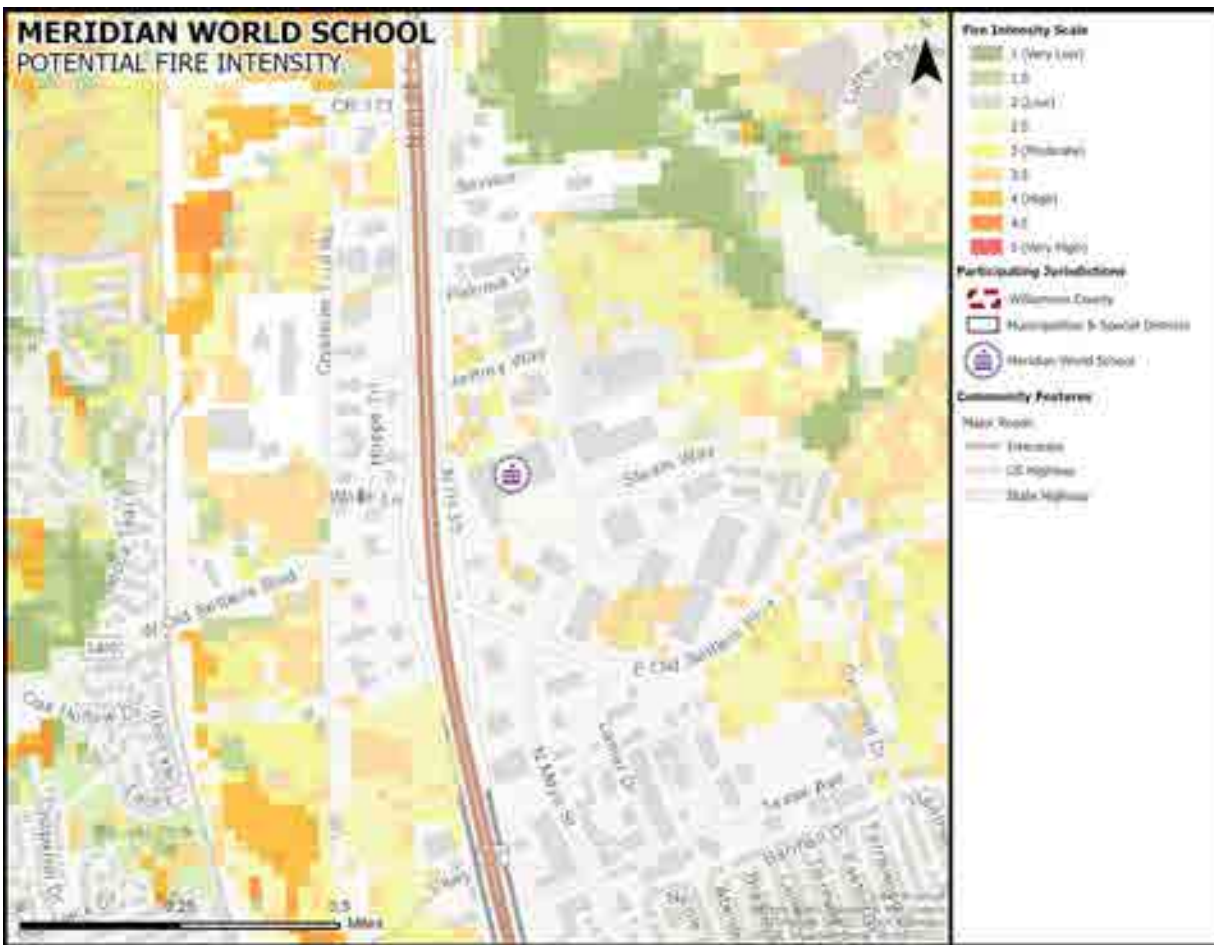
SECTION 16: WILDFIRE

Figure 16-13. Fire Intensity Scale Map – Liberty Hill ISD



SECTION 16: WILDFIRE

Figure 16-14. Fire Intensity Scale Map – Meridian World School



HISTORICAL OCCURRENCES

The Texas Forest Service reported 1,703 wildfire events for the Williamson County planning area between 2005 and 2021. The NCEI Storm Events Database includes five records of wildfire events from 1996 through 2023. Two of these events took place in 2011, two events in 2022, and one event in 2023. These wildfires resulted in an estimated \$5,084,000 in damages. The Texas A&M Forest Service (TFS) started collecting wildfire reported by volunteer fire departments in 2005. Due to a lack of recorded data for wildfire events prior to 2005 and after 2021, frequency calculations are based on a 17-year reporting period, using only data from recorded years. The map below shows approximate locations of wildfires, which can be grass or brushfires of any size (Figure 16-15). Tables 16-1 through 16-3 identify the number of wildfires and total acreage burned each year within the county boundaries.

Historical wildfire data for participating ISDs and schools are provided within the reported county or city in which they are located as they do not have events reported separately and apart from the county and city events reported to the TFS. There have been no reported losses as a result of wildfire events for the participating ISDs and school.

SECTION 16: WILDFIRE

Figure 16-15. Location and Historic Wildfire Events in Williamson County

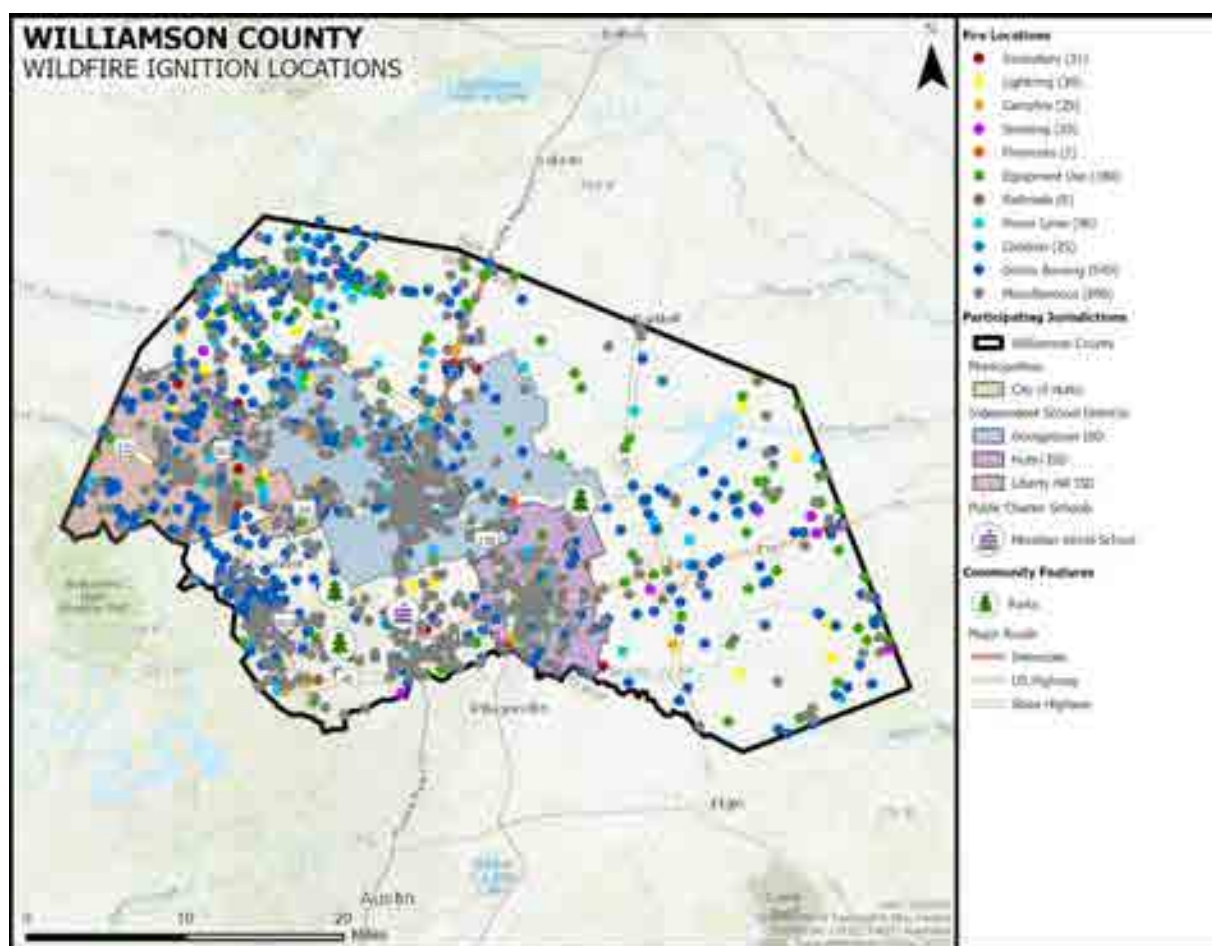


Table 16-1. Historical Wildfire Events Summary, 2005 - 2021⁶

JURISDICTION	NUMBER OF EVENTS	ACRES BURNED
Williamson County	1,639	10,515
City of Hutto	64	115

Table 16-2. Historical Wildfire Events by Year

YEAR	WILLIAMSON COUNTY	CITY OF HUTTO
2005	37	0
2006	131	1
2007	63	0
2008	186	0

⁶ Source: Texas A&M Forest Service

SECTION 16: WILDFIRE

YEAR	WILLIAMSON COUNTY	CITY OF HUTTO
2009	174	1
2010	125	0
2011	286	26
2012	115	9
2013	88	9
2014	99	3
2015	111	5
2016	53	2
2017	51	8
2018	66	0
2019	15	0
2020	34	0
2021	5	0
Total	1,639	64

Based on the list of historical wildfire events for the Williamson County planning area (listed above), 179 events have occurred since the 2017 plan.

Table 16-3. Acreage of Suppressed Wildfire by Year

YEAR	WILLIAMSON COUNTY	CITY OF HUTTO
2005	387	0
2006	839	2
2007	371	0
2008	2974	0
2009	2289	2
2010	132	0
2011	770	65
2012	481	10
2013	240	9
2014	150	3

SECTION 16: WILDFIRE

YEAR	WILLIAMSON COUNTY	CITY OF HUTTO
2015	557	14
2016	343	2
2017	209	8
2018	336	0
2019	50	0
2020	218	0
2021	169	0
Total	10,515	115

SIGNIFICANT EVENTS

There have been 8 declared disasters related to wildfire in Williamson County between 1953 and 2023 (Table 16-4). Additional details on certain wildfire events are described below.

Table 16-4. Disaster Declarations for Wildfire, 1953-2023

YEAR	DECLARATION TITLE	DECLARATION TYPE	DISASTER NO.
1999	Texas Extreme Fire Hazards	EM	EM-3142-TX
2006	Extreme Wildfire Threat in Texas	DR	DR-1624-TX
2008	Wildfires in Texas	EM	EM-3284-TX
2008	Texas Florence Fire	FM	FM-2785-TX
2011	Texas Grand Mesa Fire	FM	FM-2922-TX
2011	Texas Horseshoe Fire	FM	FM-2949-TX
2011	Texas Moonglow Fire	FM	FM-2963-TX
2011	Wildfires in Texas	DR	DR-4029-TX

August 8, 2023 – Williamson County

The Parmer Lane Wildfire started near Parmer Lane and East Whitestone Boulevard in Cedar Park. Red Flag conditions were observed with relative humidity as low as 20 percent and winds 10-20 mph with gusts up to 30 mph when the fire started. Two apartment buildings at the Silverado Apartment Complex were destroyed. The American Red Cross assisted 150 displaced apartment units. The number of people impacted was unknown. The wildfire burned 37 acres before being brought under control two days later. This is the most damaging event reported for the planning area, causing \$2,042,500 (2024 dollars) in damages.

SECTION 16: WILDFIRE

PROBABILITY OF FUTURE EVENTS

Wildfires can occur at any time of the year. As Williamson County communities move into wildland, the potential area of occurrence of wildfire increases. With 1,703 events in a 17-year period, an event within the Williamson County planning area is “Highly Likely”, meaning an event is probable within the next year. According to NOAA, research shows that changes in climate create warmer, drier conditions, leading to longer and more active fire seasons, indicating an increase in the frequency and severity of events in the planning area going forward.

VULNERABILITY AND IMPACT

Periods of drought, dry conditions, high temperatures, and low humidity are factors that contribute to the occurrence of a wildfire event. Less developed areas, such as along interstates or in more remote areas where fuels are more prevalent have an increased risk of being affected by wildfire.

The more heavily populated areas of the planning area are not highly likely to experience large, sweeping fires. Unoccupied buildings and open spaces that have not been maintained have the greatest vulnerability to wildfire. The overall level of concern for wildfires is located across the county where wildland and urban areas interface. Figure 16-9 through 16-14⁷ illustrates the areas that are the most vulnerable to wildfire throughout the Williamson County planning area.

The Williamson County Planning Team identified the following critical facilities (Table 16-5) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by wildfire events. These critical facilities are located in the WUI and are considered at greater risk to wildfires. For a comprehensive list by participating jurisdiction, please see Appendix C.

Table 16-5. Critical Facilities / Critical Services Vulnerable to Wildfire Events

CRITICAL FACILITIES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	Williamson County: 20 EMS, 35 Fire Stations, 28 Health Services, 11 Police City of Hutto: 1 Fire Station	- Emergency services may be disrupted during a wildfire if facilities are impacted, roadways are inaccessible, or personnel are unable to report for duty. - First responders are at greater risk of injury when in close proximity to the hazard while extinguishing flames, protecting property, or evacuating residents in the area. - Critical city departments may not be able to function and provide necessary services depending on the location of the fire and the structures or personnel impacted. - Roadways in or near the WUI could be damaged or closed due to smoke and limited visibility, slowing or preventing access for emergency response vehicles.

⁷ Source: TxWRAP portal at the following site: <https://texaswildfirerisk.com/>

SECTION 16: WILDFIRE

CRITICAL FACILITIES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
		- o Fire suppression costs can be substantial, exhausting the financial resources of the community. - o First responders can experience heart disease, respiratory problems, and other long-term related illnesses from prolonged exposure to smoke, chemicals, and heat. - o Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. - o Power outages could disrupt communications, delaying emergency response times. - o Structures can be damaged or destroyed in the path of the wildfire. - o Power outages could disrupt critical care. - o Backup power sources could be damaged or destroyed. - o Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	Williamson County: 1 Church, 17 Community Facilities, 1 Evacuation Shelter, 27 Municipal, 47 Residential (Vulnerable Populations), 147 Schools, 2 Transportation City of Hutto: 1 Municipal, 4 Schools Meridian World School: 1 School Hutto ISD: 7 Schools Liberty Hill ISD: 11 Schools Georgetown ISD: 13 Schools	- o Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. - o Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed. - o Additional emergency responders and critical aid workers may not be able to reach the area for days. - o Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations.

SECTION 16: WILDFIRE

CRITICAL FACILITIES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
Commercial Supplier (food, fuel, etc.)	Williamson County: 22 Food and Agriculture	- Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. - Essential supplies like medicines, water, food, and equipment deliveries may be delayed. - Economic disruption due to power outages and fires negatively impact services as well as area businesses reliant on commercial suppliers.
Utility Services and Infrastructure (electric, water, wastewater, communications)	Williamson County: 269 Communications, 39 Dams, 6 Energy Utility, 24 Sewage and Water City of Hutto: 9 Sewage and Water	- Wastewater and drinking water facilities and infrastructure may be damaged or destroyed resulting in service disruption or outage for multiple days or weeks. - Disruptions and outages impact public welfare as safe drinking water is critical. - A break in essential and effective wastewater collection and treatment is a health concern, potentially spreading disease. - Exposure to untreated wastewater is harmful to people and the environment. - Any service disruptions can negatively impact or delay emergency management operations. - Power losses

Within the Williamson County planning area, a total of 1,703 fire events were reported from 2005 through 2021 by Texas A&M Forest Service. All events were suspected wildfires. Historic loss and annualized estimates of acres burned due to wildfires are presented in Table 16-6 below. The average frequency is approximately 100 events every year.

Table 16-6. Average Annualized Acreage Losses⁸

JURISDICTION	TOTAL ACRES BURNED	AVERAGE ANNUAL ACRE LOSSES
Williamson County	10,515	619
City of Hutto	115	7
Georgetown ISD	N/A	N/A
Hutto ISD	N/A	N/A
Liberty Hill ISD	N/A	N/A
Meridian World School	N/A	N/A
PLANNING AREA	10,630	626

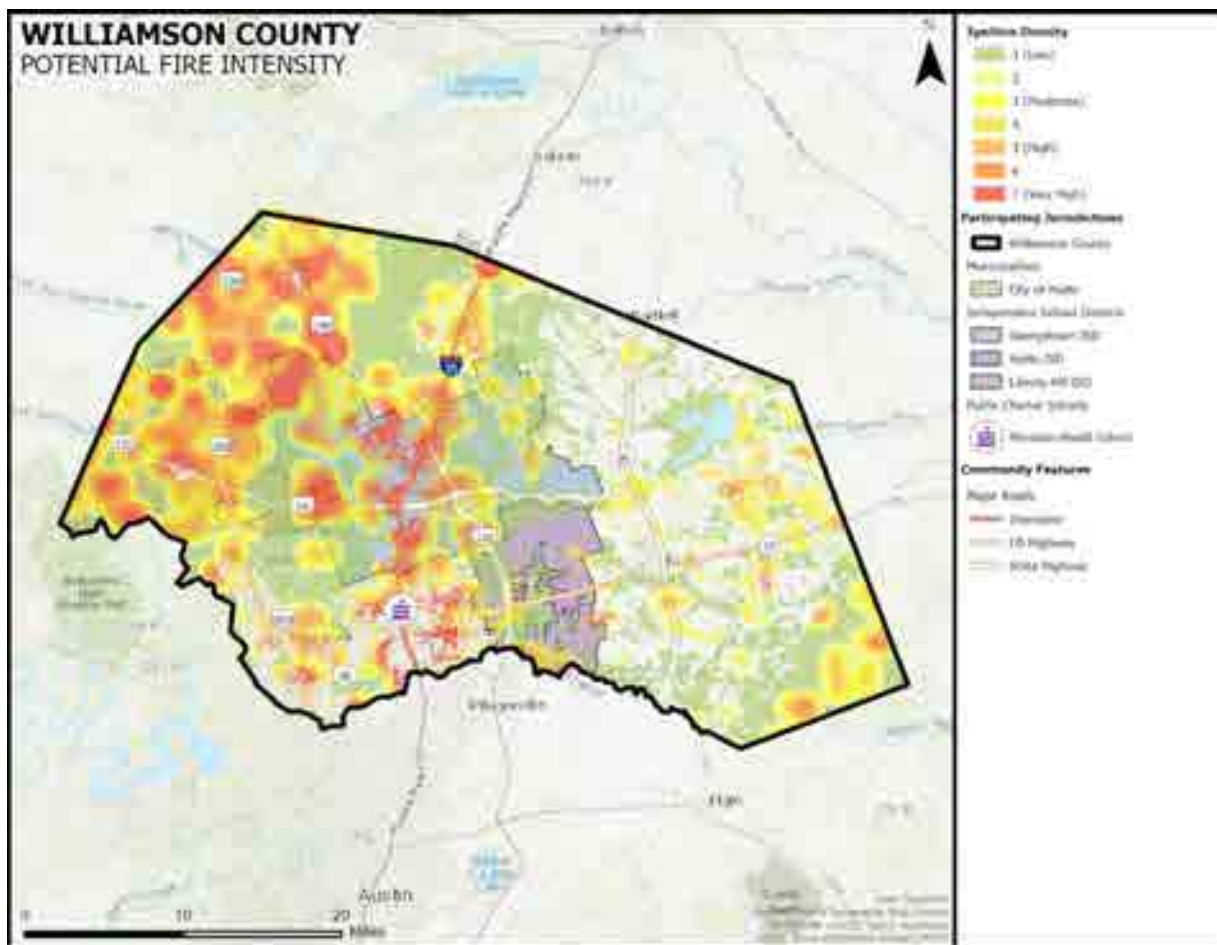
⁸ Events divided by 17 years of data.

SECTION 16: WILDFIRE

Wildfire Ignition Density shows the likelihood of a wildfire starting based on historical ignition patterns. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. The ignition rate is measured in the number of fires per year per 1,000 acres. Wildfire Ignition Density is a key input into the calculation of the Wildfire Threat output. With most Texas fires being human caused, there is a repeatable spatial pattern of fire ignitions over time. This pattern identifies areas where wildfires are most likely to ignite, and prevention efforts can be planned accordingly.⁹

Figures 16-16 through 16-21 show the threat of wildfire to the Williamson County planning area.

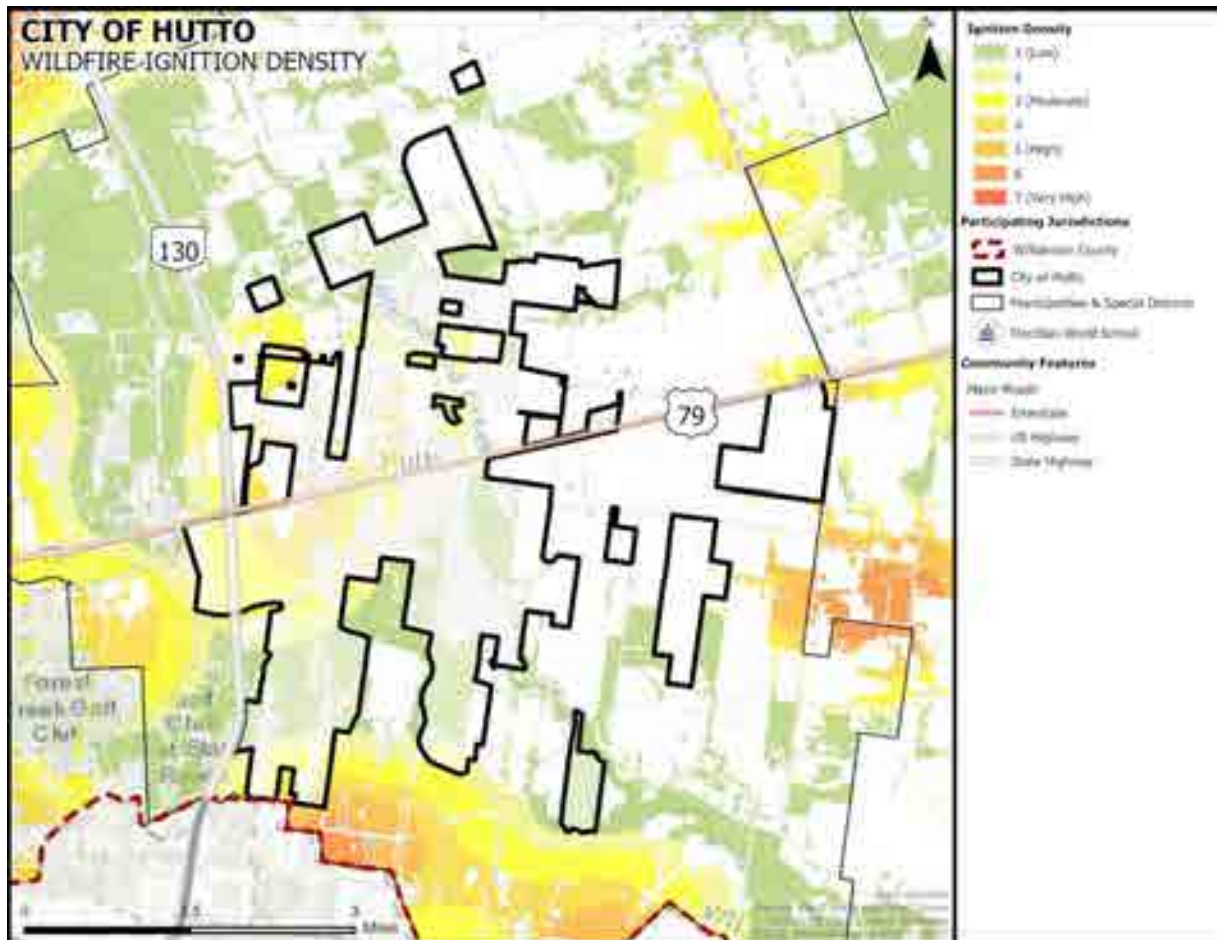
Figure 16-16. Wildfire Ignition Density – Williamson County



⁹ Source: TxWRAP portal at the following site: <https://texaswildfirerisk.com/>

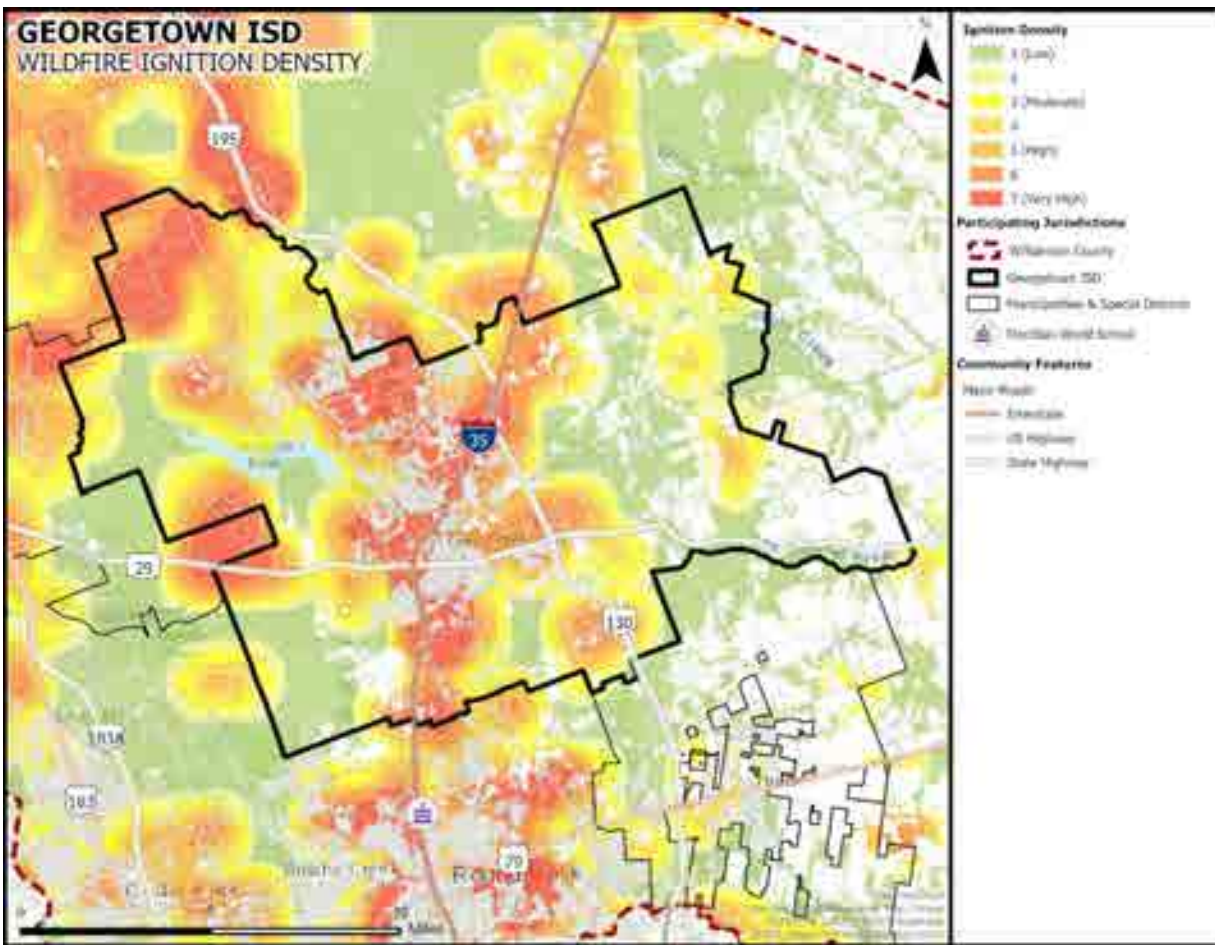
SECTION 16: WILDFIRE

Figure 16-17. Wildfire Ignition Density – City of Hutto



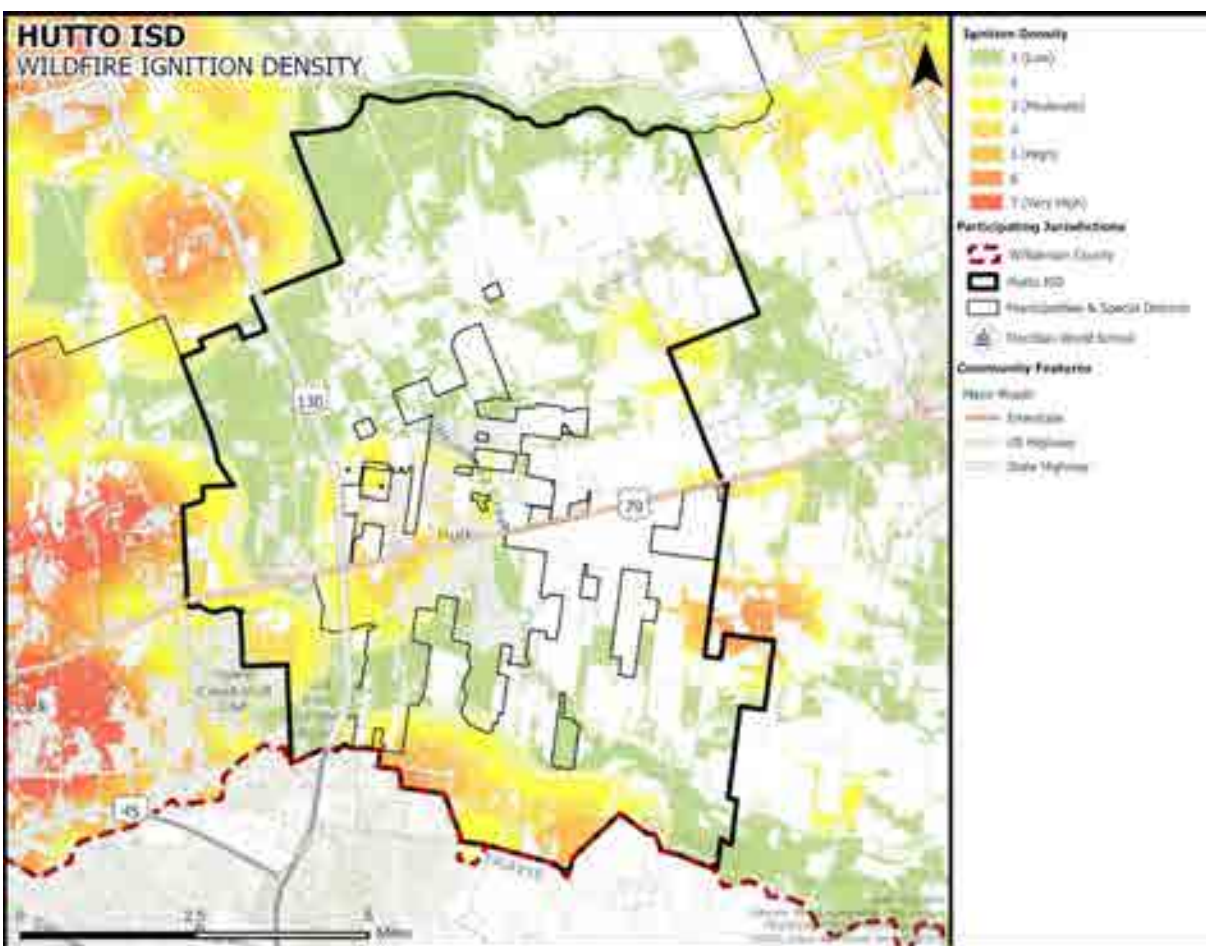
SECTION 16: WILDFIRE

Figure 16-18. Wildfire Ignition Density – Georgetown ISD



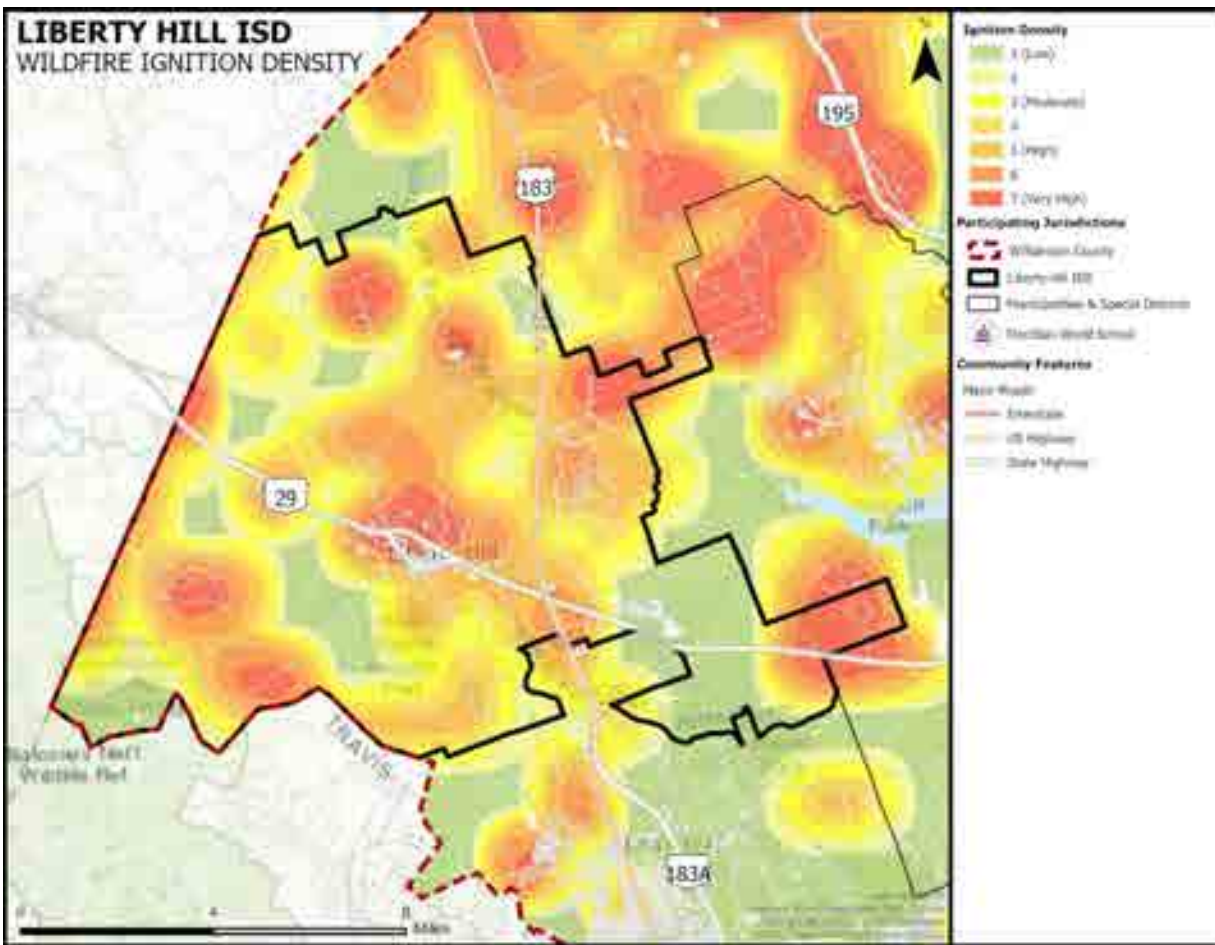
SECTION 16: WILDFIRE

Figure 16-19. Wildfire Ignition Density – Hutto ISD



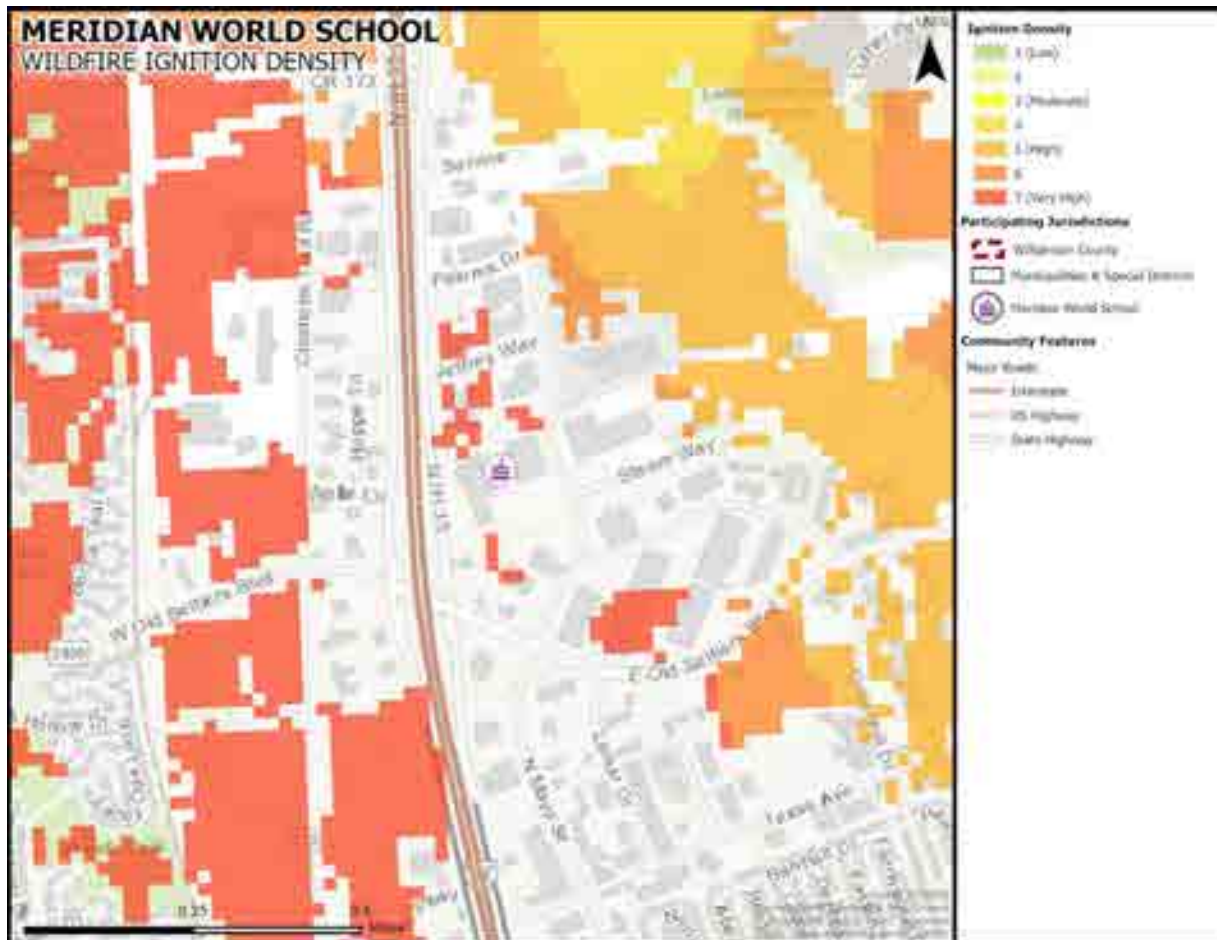
SECTION 16: WILDFIRE

Figure 16-20. Wildfire Ignition Density – Liberty Hill ISD



SECTION 16: WILDFIRE

Figure 16-21. Wildfire Ignition Density – Meridian World School

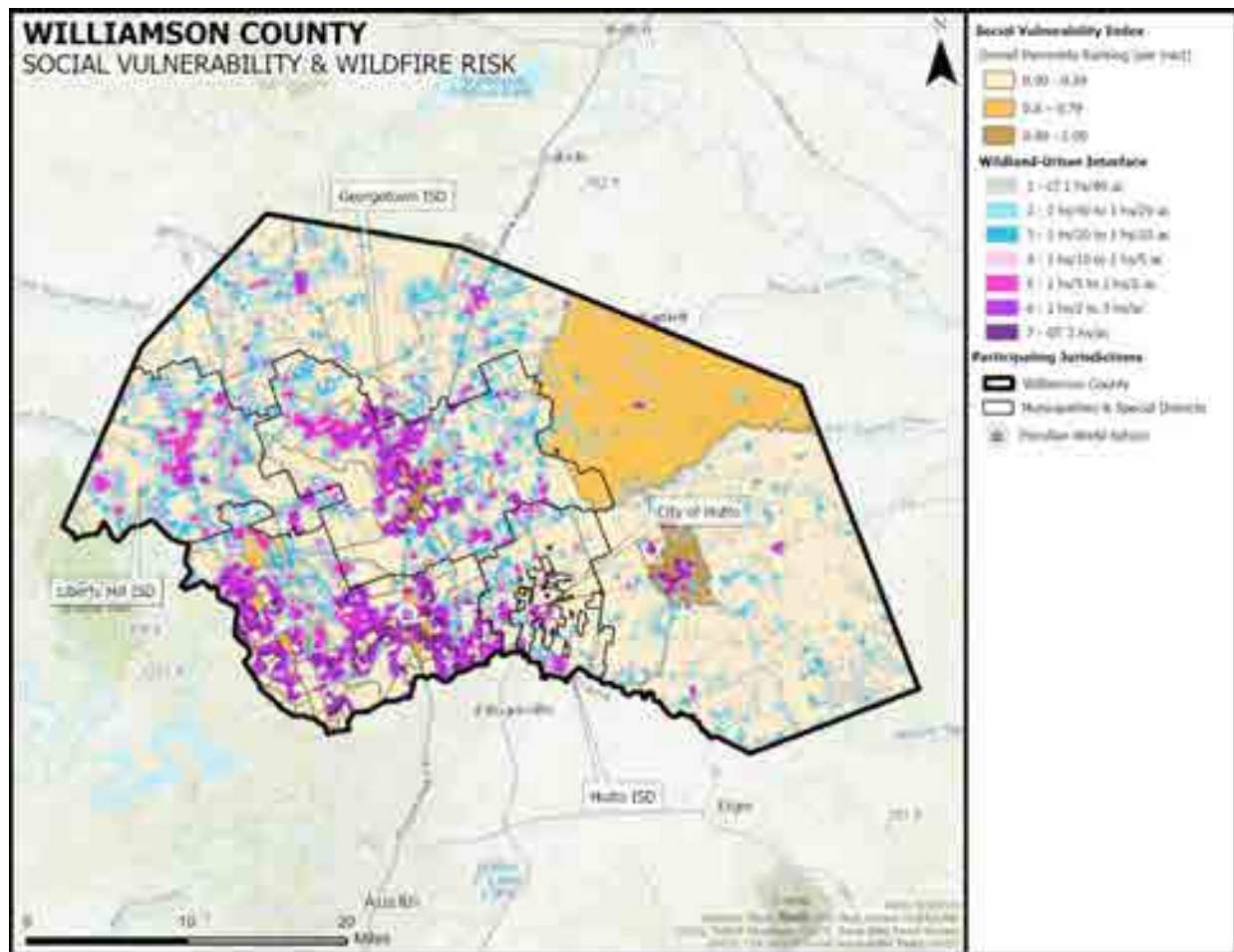


Diminished air quality is an environmental impact that can result from a wildfire event and pose a potential health risk. The smoke plumes from wildfires can contain potentially inhalable carcinogenic matter. Fine particles of invisible soot and ash that are too small for the respiratory system to filter can cause immediate and possibly long-term health effects. The elderly or those individuals with compromised respiratory systems may be more vulnerable to the effects of diminished air quality after a wildfire event.

The Center for Disease Control (CDC) created a Social Vulnerability Index (SVI) which includes a database and mapping application that identifies and quantifies communities experiencing social vulnerability. The current CDC SVI uses 16 U.S. census variables from the 5-year American Community Survey (ACS) to identify communities that may need support before, during, or after disasters. All 16 variables fall under four broad categories including socioeconomic status (population in poverty, unemployment, etc.), household characteristics (age, disability status, etc.), racial and ethnic minority status, and housing type and transportation (mobile homes, no vehicles, etc.). Populations experiencing social vulnerability may be adversely impacted by natural hazards, disasters, and other community-level stressors. Figure 16-22 identifies areas of social vulnerability using the CDC's SVI and where these areas overlap the Williamson County's WUI areas, where wildfire risk is considered the highest.

SECTION 16: WILDFIRE

Figure 16-22. Williamson County's Social Vulnerability and WUI



Climatic conditions such as severe freezes and drought can significantly increase the intensity of wildfires since these conditions kill vegetation, creating a prime fuel source for wildfires. The intensity and rate at which wildfires spread are directly related to wind speed, temperature, and relative humidity.

The severity of impact from major wildfire events can be substantial. Such events can cause multiple deaths, shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. Severity of impact is gauged by acreage burned, homes and structures lost, and the number of resulting injuries and fatalities.

For the Williamson County planning area, including all participating jurisdictions, ISDs and schools, the impact from a wildfire event can be considered "Minor," meaning injuries and/or illnesses do not result in permanent disability, complete shutdown of facilities and services for up to one week and more than 10 percent of property is destroyed or with major damage. Severity of impact is gauged by acreage burned, homes and structures lost, injuries and fatalities.

SECTION 16: WILDFIRE

Table 16-7. Impact for Williamson County

JURISDICTION	IMPACT	DESCRIPTION
Williamson County	Minor	Williamson County has an estimated 246,680 people or 60% of the total population that live within the Wildland Urban Interface (WUI). The housing density is most commonly 3 houses per 1 acre. County residents may suffer injuries that do not result in permanent disability. Critical facilities could be shut down for more than one week, and more than 10 percent of total property could be damaged.
City of Hutto	Minor	Within the City of Hutto, it is estimated 4,093 people or 51% of the total population that live within the Wildland Urban Interface (WUI). Average housing density is most commonly 3 houses per 1 acre. City residents may suffer injuries that result in permanent disability. Critical facilities could be shut down for more than one week, and more than 10 percent of total property could be damaged.
Georgetown ISD	Minor	Georgetown ISD has thirteen facilities located within the WUI and has a moderate risk to wildfire. Students and faculty could be injured or suffer illnesses, but not permanent disability. Critical facilities could be shut down for a week, and 10 percent or more of total property could be damaged.
Hutto ISD	Minor	Hutto ISD has seven facilities located within the WUI and has a moderate risk to wildfire. Students and faculty could be injured or suffer illnesses, but not permanent disability. Critical facilities could be shut down for a week, and 10 percent or more of total property could be damaged.
Liberty Hill ISD	Minor	Liberty Hill ISD has eleven facilities located within the WUI and has a moderate risk to wildfire. Students and faculty could be injured or suffer illnesses, but not permanent disability. Critical facilities could be shut down for a week, and 10 percent or more of total property could be damaged.
Meridian World School	Minor	Meridian World School has one facility located within the WUI and has a moderate risk to wildfire. Students and faculty could be injured or suffer illnesses, but not permanent disability. Critical facilities could be shut down for a week, and 10 percent or more of total property could be damaged.

SECTION 16: WILDFIRE

ASSESSMENT OF IMPACTS

A Wildfire event poses a potentially significant risk to public health and safety, particularly if the wildfire is initially unnoticed and spreads quickly. The impacts associated with a wildfire are not limited to direct damage. Significant wildfire events can be frequently associated with a variety of impacts, including:

- o The Williamson County planning area contains numerous open space areas. Wildfire may adversely affect or destroy endangered species habitat, reduce air quality, increase erosion and risk of flash flooding, contribute to increased local temperatures, and disrupt other ecological functions.
- o Recreation activities throughout county and city parks may be unavailable and tourism can be unappealing for years following a large wildfire event, devastating directly related local businesses and negatively impacting economic recovery.
- o Persons, pets, and wildlife in the area at the time of the fire are at risk for injury or death from burns and/or smoke inhalation. First responders are at greater risk of physical injury when in close proximity to the hazard while extinguishing flames, protecting property, or evacuating residents in the area.
- o First responders can experience heart disease, respiratory problems, and other long-term related illnesses from prolonged exposure to smoke, chemicals, and heat.
- o Emergency services may be disrupted during a wildfire if facilities are impacted, roadways are inaccessible, or personnel are unable to report for duty.
- o Critical county and city departments may not be able to function and provide necessary services depending on the location of the fire and the structures or personnel impacted.
- o Non-critical businesses may be directly damaged, suffer loss of utility services, or be otherwise inaccessible, delaying normal operations and slowing the recovery process.
- o Displaced residents may not be able to immediately return to work, slowing economic recovery.
- o Roadways in or near the WUI could be damaged or closed due to smoke and limited visibility.
- o Older homes are generally exempt from modern building code requirements, which may require fire suppression equipment in the structure. An estimated 11 percent (approximately 25,704 structures) of homes in the planning area were built before 1980. Similarly, historic buildings may lack fire mitigation materials or measures due to their historic status. There are 75 historical sites listed on the National Register of Historic Places for Williamson County.
- o Some high-density neighborhoods feature small lots with structures close together, increasing the potential for fire to spread rapidly.
- o Air pollution from smoke may exacerbate respiratory problems of vulnerable residents.
- o Charred ground after a wildfire cannot easily absorb rainwater, increasing the risk of flooding and potential mudflows.
- o Wildlife may be displaced or destroyed.
- o Historical or cultural resources may be damaged or destroyed.
- o Tourism can be significantly disrupted, further delaying economic recovery for the area.
- o Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- o Fire suppression costs can be substantial, exhausting the financial resources of the community.

SECTION 16: WILDFIRE

- o Residential structures lost in a wildfire may not be rebuilt for years, reducing the tax base for the community.
- o Direct impacts to municipal water supply may occur through contamination of ash and debris during the fire, destruction of aboveground delivery lines, and soil erosion or debris deposits into waterways after the fire.

The economic and financial impacts of a wildfire event on local government will depend on the scale of the event, what is damaged, costs of repair or replacement, lost business days in impacted areas, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a wildfire event.

CLIMATE CHANGE CONSIDERATIONS

Wildfires require the alignment of a number of factors, including temperature, humidity, and the lack of moisture in fuels, such as trees, shrubs, grasses, and forest debris. All these factors have strong direct or indirect ties to climate variability and climate change. Research shows that changes in climate create warmer, drier conditions, leading to longer and more active fire seasons. Increases in temperatures and the thirst of the atmosphere due to human--caused climate change have increased aridity of forest fuels during the fire season.¹⁰

Vapor pressure deficit, an indicator of the ability of moisture to evaporate, is projected to increase as temperatures rise and carbon dioxide fertilization reduces transpiration, leading to both lower humidity and increased surface dryness. Overall, increased dryness should extend the wildfire season in places where the fire season is presently constrained by low levels of aridity, such as eastern Texas.¹¹

Additionally, it is projected that future changes to Williamson County will include increased temperatures, which according to the U.S. Climate Explorer, the planning area may experience a 6°F increase in the average extreme heat temperatures. Historically, extreme temperatures averaged 100°F in Williamson County, but between 2035 and 2064 the average will be 106°F, increasing the severity and frequency of extreme heat events, contributing to favorable wildfire conditions.

Extreme heat and extended periods of drought contribute to wildfire risk in the planning area. Extreme temperatures and periods of drought destroy vegetation in the area, contributing to available fuels that spread wildfires. Additional climate change impacts from drought and extreme heat are discussed in Sections 6 and 9 of this Plan. The projected increases in favorable wildfire conditions, including drought and extreme heat, indicate an increase in favorable wildfire conditions. Additional information and studies are needed to determine the degree and rate of any increased wildfire risk.

¹⁰ NOAA Wildfire Climate Connection, August 2022: wildfire-climate-connection.

¹¹ Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.



SECTION 17

WINTER STORM

SECTION 17: WINTER STORM

Hazard Description	1
Location	3
Extent.....	3
Historical Occurrences.....	5
Significant Events.....	8
Probability of Future Events.....	8
Vulnerability and Impact.....	9
Assessment of Impacts	12
Climate Change Considerations	13

HAZARD DESCRIPTION



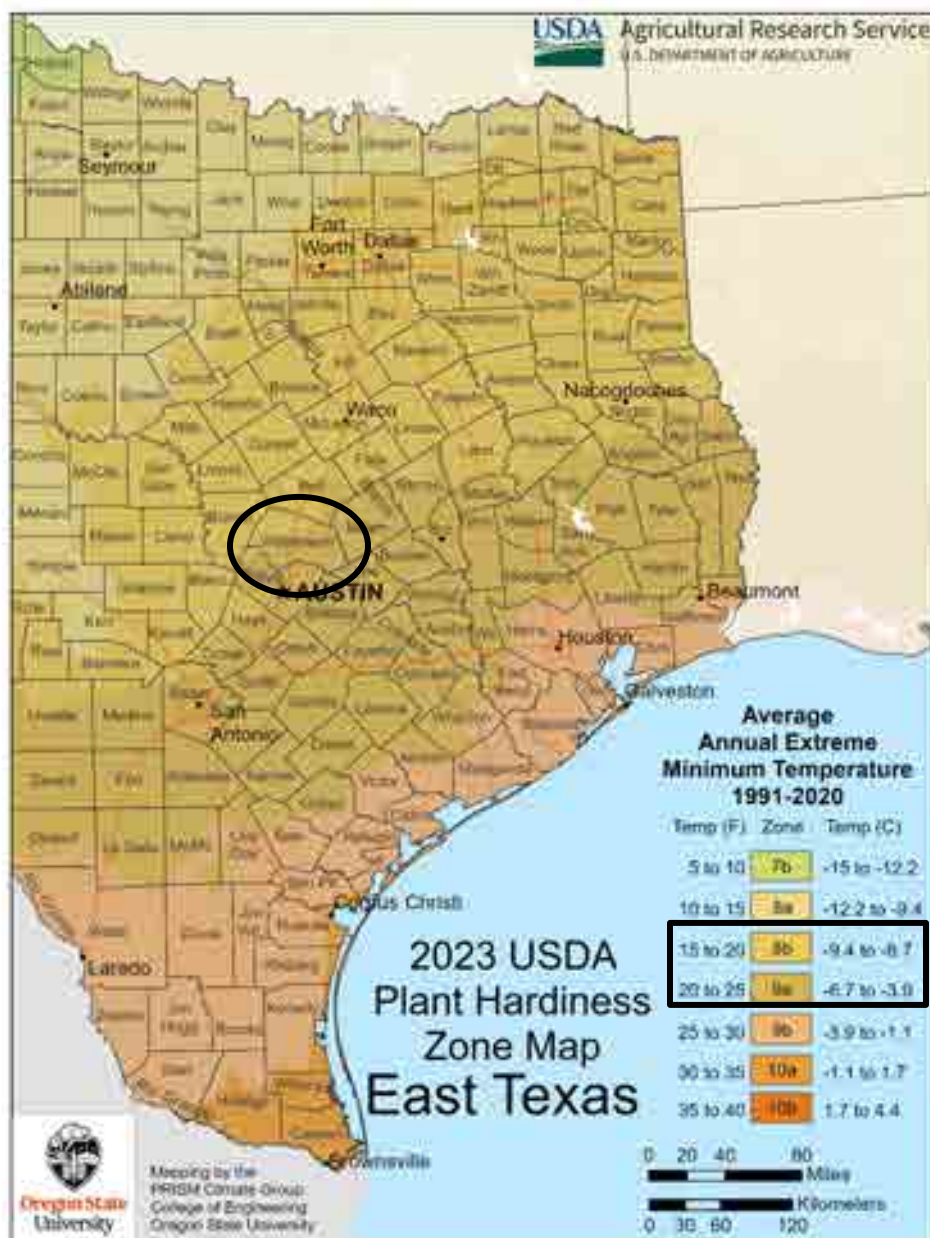
A severe winter storm event is identified as a storm with snow, ice, or freezing rain. This type of storm can cause significant problems for area residents. Winter storms are associated with freezing or frozen precipitation such as freezing rain, sleet, snow, and the combined effects of winter precipitation and strong winds. Wind chill is a function of temperature and wind. Low wind chill is a product of high winds and freezing temperatures.

Winter storms that threaten the Williamson County planning area usually begin as powerful cold fronts that push south from central Canada. Although the county is at risk of ice hazards, extremely cold temperatures, and snow, the effects and frequencies of winter storm events are generally mild and short-lived.

As indicated in Figure 17-1, the Williamson County planning area is located in USDA Hardiness Zones 8b and 9a, with annual minimum temperatures between 15°F and 25°F. During times of ice and snow accumulation, response times will increase until public works road crews are able to make major roads passable. Table 17-1 describes the types of winter weather possible to occur in the Williamson County planning area.

SECTION 17: WINTER STORM

Figure 17-1. Annual Minimum Temperature¹



¹ USDA

SECTION 17: WINTER STORM

Table 17-1. Types of Winter Weather

TYPE OF WINTER WEATHER	DESCRIPTION
Freezing Rain or Freezing Drizzle	Rain or drizzle is likely to freeze upon impact, resulting in a coating of ice glaze on roads and all other exposed objects.
Sleet	Small particles of ice usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.
Blizzard	Sustained wind speeds of at least 35 mph are accompanied by considerable falling or blowing snow. This alert is the most perilous winter storm with visibility dangerously restricted.
Frost/Freeze	Below freezing temperatures are expected and may cause significant damage to plants, crops, and fruit trees.
Wind Chill	A strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower in a calm atmosphere. The combined cooling power of the wind and temperature on exposed flesh is called the wind-chill factor.

LOCATION

Winter storm events are not confined to specific geographic boundaries. Therefore, all existing and future buildings, facilities, and populations in the Williamson County planning area, including participating jurisdictions, ISDs and schools, are vulnerable to a winter storm hazard and could potentially be impacted.

EXTENT

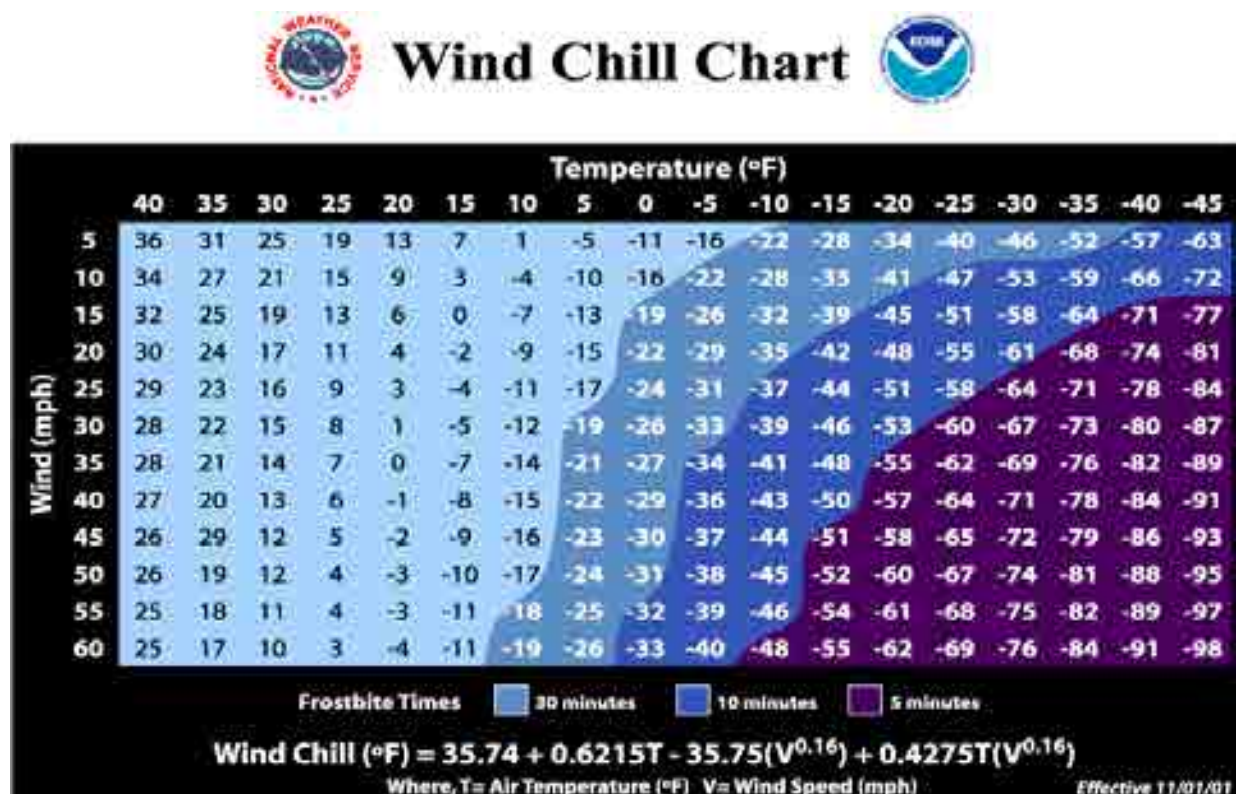
The extent or magnitude of a severe winter storm is measured in intensity based on the temperature and level of accumulations as shown in Table 17-2. Table 17-2 should be read in conjunction with the wind-chill factor described in Figure 17-2 to determine the intensity of a winter storm. The chart is not applicable when temperatures are over 50°F or winds are calm. This is an index developed by the National Weather Service.

Table 17-2. Magnitude of Severe Winter Storms

INTENSITY	TEMPERATURE RANGE (Fahrenheit)	EXTENT DESCRIPTION
Mild	40° – 50°	Winds less than 10 mph and freezing rain or light snow falling for short durations with little or no accumulations
Moderate	30° – 40°	Winds 10 – 15 mph and sleet and/or snow up to 4 inches
Significant	25° – 30°	Intense snow showers accompanied with strong gusty winds between 15 and 20 mph with significant accumulation
Extreme	20° – 25°	Wind driven snow that reduces visibility, heavy winds (between 20 to 30 mph), and sleet or ice up to 5 millimeters in diameter
Severe	Below 20°	Winds of 35 mph or more and snow and sleet greater than 4 inches

SECTION 17: WINTER STORM

Figure 17-2. Wind Chill Chart



Wind chill temperature is a measure of how cold the wind makes real air temperature feel to the human body. Since wind can dramatically accelerate heat loss from the body, a blustery 30°F day would feel just as cold as a calm day with 0°F temperatures. The Williamson County planning area has 40 previous occurrences recorded from 1996 through 2023 in the National Centers for Environmental Information (NCEI) Storm Events Database. The planning area has never experienced a blizzard, but it has been subject to winter storms and winter weather.

The average number of cold days is similar for the entire planning area. Therefore, the intensity or extent of a winter storm event to be mitigated for the area ranges from mild to moderate according to the definitions at Table 17-2. The Williamson County planning area can expect anywhere between 0.1 to 4.0 inches of ice and snow during a winter storm event, and temperatures between 15°F and 25°F with winds ranging from 0 to over 15 mph.

The National Weather Service issues a winter storm watch, advisory or warning in advance of an event in order to give people enough time to prepare for an event. Williamson County could be under any of these warning types in advance of a winter storm event. Table 17-3 describes when each warning type would be issued.

Table 17-3. Winter Storm Watch, Advisory, Warning Descriptions

TYPE OF WINTER WEATHER	DESCRIPTION
Winter Weather Advisory	This alert may be issued for a variety of severe conditions. Weather advisories may be announced for snow, blowing or drifting snow, freezing drizzle, freezing rain, or a combination of weather events.

SECTION 17: WINTER STORM

TYPE OF WINTER WEATHER	DESCRIPTION
Winter Storm Watch	Severe winter weather conditions may affect your area (freezing rain, sleet, or heavy snow may occur separately or in combination).
Winter Storm Warning	Severe winter weather conditions are imminent.
Freezing Rain or Freezing Drizzle	Rain or drizzle is likely to freeze upon impact, resulting in a coating of ice glaze on roads and all other exposed objects.
Sleet	Small particles of ice usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.
Blizzard	Sustained wind speeds of at least 35 mph are accompanied by considerable falling or blowing snow. This alert is the most perilous winter storm with visibility dangerously restricted.
Frost/Freeze	Below freezing temperatures are expected and may cause significant damage to plants, crops, and fruit trees.
Wind Chill	A strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower in a calm atmosphere. The combined cooling power of the wind and temperature on exposed flesh is called the wind-chill factor.

HISTORICAL OCCURRENCES

According to historical records and the best available data there have been 40 recorded winter storm events in Williamson County planning area, per the NCEI database. Historical winter storm information, as provided by the NCEI, identifies winter storm activity across a multi-county forecast area for each event. The appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event, when appropriate. Historical winter storm data for the planning area is provided on a County-wide basis per the NCEI database. Table 17-4 shows historical incident information for the planning area.

Historical winter storm data for the ISDs and school are provided within the Williamson County events, per the NCEI database, as they do not have events reported separate and apart from the reported county and jurisdiction events. Georgetown ISD, Hutto ISD, and Liberty Hill ISD reported sustaining previous winter storm damage. Liberty Hill ISD reported several previous damages to school facilities during freezing temperatures, including a fire riser line being broken, fire sprinklers breaking causing flooding in a gym, and a cooling tower freezing and bursting. Specific monetary damages or event summaries were not always available for previous impacts on these ISDs; where supplemental data was available, previous winter storm damages sustained by the ISDs are incorporated into 17-4 and 17-5 below.

SECTION 17: WINTER STORM

Table 17-4. Historical Winter Storm Events, 1996-2023²

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	2/1/1996	0	0	\$0	\$0
Williamson County	12/23/1998	0	0	\$0	\$0
Williamson County	12/12/2000	0	0	\$0	\$0
Williamson County	11/28/2001	0	0	\$0	\$0
Williamson County	2/24/2003	0	0	\$0	\$0
Williamson County	12/7/2005	0	0	\$0	\$0
Williamson County	1/15/2007	0	0	\$0	\$0
Williamson County	1/27/2009	0	0	\$0	\$0
Williamson County	2/23/2010	0	0	\$0	\$0
Williamson County	2/3/2011	0	0	\$0	\$0
Williamson County	2/9/2011	0	0	\$0	\$0
Liberty Hill ISD	2/11/2012	0	0	\$18,800	\$0
Williamson County	11/24/2013	0	0	\$0	\$0
Williamson County	11/25/2013	0	0	\$0	\$0
Williamson County	12/5/2013	0	0	\$0	\$0
Williamson County	12/7/2013	0	0	\$0	\$0
Williamson County	3/4/2014	0	0	\$0	\$0
Williamson County	1/23/2014	0	0	\$0	\$0
Williamson County	1/27/2014	0	0	\$0	\$0
Williamson County	2/7/2014	0	0	\$0	\$0
Williamson County	1/10/2015	0	0	\$0	\$0
Williamson County	2/16/2015	0	0	\$0	\$0
Williamson County	2/23/2015	0	0	\$0	\$0
Williamson County	2/27/2015	0	0	\$0	\$0
Williamson County	3/4/2015	0	0	\$0	\$0

² Values are in 2024 dollars.

SECTION 17: WINTER STORM

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Williamson County	12/28/2015	0	0	\$0	\$0
Williamson County	12/31/2017	0	0	\$0	\$0
Williamson County	12/7/2017	0	0	\$0	\$0
Williamson County	1/16/2018	0	0	\$0	\$0
Williamson County	11/11/2019	0	0	\$0	\$0
Williamson County	2/5/2020	0	0	\$0	\$0
Williamson County	2/13/2021	0	0	\$0	\$0
Williamson County	2/16/2021	0	0	\$0	\$0
Williamson County	2/11/2021	0	0	\$298,100	\$0
Williamson County	1/10/2021	0	0	\$0	\$0
Williamson County	1/11/2022	0	0	\$0	\$0
Williamson County	1/20/2022	0	0	\$0	\$0
Williamson County	2/3/2022	0	0	\$0	\$0
Williamson County	2/24/2022	0	0	\$0	\$0
Liberty Hill ISD	12/2/2022	0	0	\$22,000	\$0
Liberty Hill ISD	12/20/2022	0	0	\$205,500	\$0
Williamson County	1/30/2023	0	0	\$0	\$0
Williamson County	2/1/2023	0	0	\$23,554,700	\$0
TOTALS		0	0	\$24,099,100	

Table 17-5. Historical Winter Storm Events Summary, 1996-2023

JURISDICTION	NUMBER OF EVENTS	DEATHS	INJURIES	PROPERTY DAMAGES	CROP DAMAGES
Williamson County	40	0	0	\$23,852,800	\$0
City of Hutto	0	-	-	-	-
Georgetown ISD	0	-	-	-	-
Hutto ISD	0	-	-	-	-
Liberty Hill ISD	3	0	0	\$246,300	\$0
Meridian World School	0	-	-	-	-
TOTALS	43	0	0	\$24,099,100	\$0

SECTION 17: WINTER STORM

Based on the list of historical winter storm events for the Williamson County planning area, 22 of the events have occurred since the 2017 Plan.

SIGNIFICANT EVENTS

February 11, 2021 – Winter Storm Uri – Williamson County (DR-4586)

Winter Storm Uri was one of the most impactful winter events in the state's history. The winter storm event lasted a week and brought snow, sleet, and freezing rain to the Southeast region. The presence of the storm began on February 10, 2021, when a cold front brought a surge of cold air to the area. On February 11th, the winter storm hit the region, including Williamson County, and many areas were placed under a Winter Storm Warning. The storm and its impacts affected the Central Texas region through February 18th.

Fatalities across the state were attributed to hypothermia, vehicle accidents, carbon monoxide poisoning, and chronic medical conditions complicated by a lack of electricity over several days. Statewide, more than 69 percent of households lost power at some point during the event, with average disruptions lasting 42 hours, 21 of which were consecutive. Water service was also disrupted, with 49 percent of households losing running water with an average disruption of 52 hours.³

Broadcast media in the Williamson County area reported that many residents suffered during the power grid failure and experienced rolling power outages. Many roads across the planning area were snow packed, leading to significant transportation disruptions including a 26 vehicle pileup on the overpass at Highway 620 and Toll Road 45 due to ice on the roadway. Widespread tree damage was reported across the planning area including in the cities of Leander, Cedar Park, Brushy Creek, and Round Rock. Property damage in the Williamson County planning area is estimated at \$298,100 (2024 dollars).

February 1, 2023 - Williamson County

A cold front brought a shallow layer of cold air which met a warm, moist southeasterly flow above the cold air mass, producing freezing rain and freezing drizzle for several days within the planning area. The freezing rain began around 11am on January 30th and continued through February 2nd. Layers of ice up to half an inch thick accumulated across the planning area, resulting in dangerously icy roadways and many trees and tree branches being downed across Williamson County. These downed trees led to thousands of power outages within the planning area. Damages from this event are estimated at \$23,554,700 (2024 dollars).

PROBABILITY OF FUTURE EVENTS

According to historical records, the Williamson County planning area is expected to experience approximately one winter storm event each year. The probability of a future winter storm event affecting the Williamson County planning area is considered "Highly Likely", with a winter storm likely to occur within the next year.

³ Donald, Jess. "Winter Storm Uri. The Economic Impact of the Storm". October 2021. Fiscal Notes. Texas Comptroller of Public Accounts. <https://comptroller.texas.gov/economy/fiscal-notes/2021/oct/winter-storm-impact.php>

SECTION 17: WINTER STORM

VULNERABILITY AND IMPACT

During periods of extreme cold and freezing temperatures, water pipes can freeze and crack, and ice can build up on power lines, causing them to break under the weight or causing tree limbs to fall on the lines. These events can disrupt electric service for long periods.

An economic impact may occur due to increased consumption of heating fuel, which can lead to energy shortages and higher prices. House fires and resulting deaths tend to occur more frequently from increased and improper use of alternate heating sources. Fires during winter storms also present a greater danger because water supplies may freeze and impede firefighting efforts.

The Williamson County Planning Team identified the following critical facilities (Table 17-6) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by winter storm events. For a comprehensive list by each participating jurisdiction, please see Appendix C.

Table 17-6. Critical Facilities Vulnerable to Winter Storm Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	- Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. - Exposure to extreme cold can cause illnesses in first responders if exposed for a period of time. - Roads may become impassable due to snow and/or ice impacting response times by emergency services. - Extended power outages due to increased usage may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	- Power outages due to increased usage could disrupt critical care. - Backup power sources could be damaged. - Increased number of patients due to exposure to cold temperatures could lead to a strain on staff. - Water pipes can freeze and burst leading to flooding within facilities. - Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. - Essential supplies like medicines, water, food, and equipment deliveries may be delayed. - Economic disruption due to power outages negatively impact airport services as well as area businesses reliant on airport operations. - Exposure risks to outdoor workers.
Commercial Supplier (food, fuel, etc.)	- Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. - Essential supplies like medicines, water, food, and equipment deliveries may be delayed.

SECTION 17: WINTER STORM

CRITICAL FACILITIES	POTENTIAL IMPACTS
Utility Services and Infrastructure (electric, water, wastewater, communications)	- Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. - Roads may become impassable due to snow and/or ice impacting response times by emergency services. - Power outages due to increased usage could disrupt critical care. - Backup power sources could be damaged. - Water pipes can freeze and burst leading to flooding within facilities.

People and animals are subject to health risks from extended exposure to cold air (Table 17-7). Elderly people are at greater risk of death from hypothermia during these events, especially in the neighborhoods with older housing stock. According to the U.S. Center for Disease Control, every year hypothermia kills about 600 Americans, half of whom are 65 years of age or older.

Due to factors like limited mobility, communication difficulties, medical needs, sensitivity to cold temperatures, reliance on support services, transportation challenges, housing accessibility issues, and possible shortages in emergency shelter accommodations, people with disabilities are particularly vulnerable to winter storms. Inclusive measures are crucial to address these vulnerabilities and ensure their safety during severe weather events.

Populations living below the poverty level may not be able to afford to run heat on a regular basis or extend period of time. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

The population over 65 in the Williamson County planning area is estimated at 13 percent of the total population and children under the age of 5 are estimated at 6 percent. The population with a disability is estimated at 10 percent of the total population. An estimated 6 percent of the planning area population live below the poverty level and 22 percent of the populations speaks a language other than English.⁴

Table 17-7. Populations at Greater Risk by Jurisdiction

JURISDICTION	ELDERLY (over 65)	YOUTH (under 5)	WITH A DISABILITY	BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Williamson County	77,609	37,584	61,524	38,896	138,476
City of Hutto	1,830	2,155	2,658	2,301	7,141

Some participating ISDs and school also have vulnerable populations based on age or work location, such as employees that work outdoors and may be subject to severe weather conditions, or children under 5 who attend the participating schools (Table 17-8).

⁴ US Census Bureau, American Community Survey Five-Year Estimates

SECTION 17: WINTER STORM

Table 17-8. Populations at Greater Risk by Special District⁵

JURISDICTION	POPULATION UNDER 5	EMPLOYEES OPERATING OUTDOORS
Georgetown ISD	469	428
Hutto ISD	415	222
Liberty Hill ISD	240	300
Meridian World School	0	2

Older homes tend to be more vulnerable to the impacts of winter storm events. Approximately, 11 percent (an estimated 25,704 structures) of the housing units in the planning area were built before 1980. Tables 17-8 and 17-9 list the number of vulnerable structures in each participating jurisdiction, ISD and school.

Table 17-8. Structures at Greater Risk by Participating Jurisdiction

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980
Williamson County	25,704
City of Hutto	374

Table 17-9. Structures at Greater Risk by Participating Special District

JURISDICTION	STRUCTURES BUILT BEFORE 1980
Georgetown ISD	4
Hutto ISD	1
Liberty Hill ISD	6
Meridian World School	0

Winter Storms have been known to cause injury to humans and occasionally have been fatal. Overall, damages to property and crops in the planning area is estimated at \$44,000 over the 28-year reporting period with an average annualized loss of \$1,600. Based on historic loss and damages, the impact of winter storm damages on the Williamson County planning area, including participating jurisdictions ISDs and schools, can be considered “Limited” severity of impact, meaning minor quality of life lost, critical facilities and services shut down for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

⁵ ISD and school vulnerable populations data has been provided by participating Planning Team members.

SECTION 17: WINTER STORM

Table 17-10. Winter Storm Event Damage Totals, 1996-2023⁶

JURISDICTION	PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Williamson County	\$23,852,800	\$851,900
City of Hutto	-	-
Georgetown ISD	-	-
Hutto ISD	-	-
Liberty Hill ISD	\$246,300	\$8,800
Meridian World School	-	-
Total	\$24,099,100	\$860,700

ASSESSMENT OF IMPACTS

The greatest risk from a winter storm hazard is to public health and safety. The impact of climate change could produce longer, more intense winter storm events, exacerbating the current winter storm impacts. Worsening winter storm conditions can be frequently associated with a variety of impacts, including:

- o Vulnerable populations, particularly the elderly (13 percent of total population), children under 5 (6 percent of total population), and those with a disability (10 percent of total population), can face serious or life-threatening health problems from exposure to extreme cold including hypothermia and frostbite.
- o Loss of electric power or other heat source can result in increased potential for fire injuries or hazardous gas inhalation because residents burn candles for light or use fires or generators to stay warm.
- o Response personnel, including utility workers, public works personnel, debris removal staff, tow truck operators, and other first responders, are subject to injury or illness resulting from exposure to extreme cold temperatures.
- o Response personnel would be required to travel in potentially hazardous conditions, elevating the life safety risk due to accidents and potential contact with downed power lines.
- o Operations or service delivery may experience impacts from electricity blackouts due to winter storms.
- o Power outages are possible throughout the planning area due to downed trees and power lines and/or rolling blackouts.
- o Critical facilities without emergency backup power may not be operational during power outages.
- o Emergency response and service operations may be impacted by limitations on access and mobility if roadways are closed, unsafe, or obstructed.

⁶ Damage values are in 2024 dollars. Participating jurisdictions with no reported events show a “-” in table columns where damages would be otherwise reported.

SECTION 17: WINTER STORM

- o Hazardous road conditions will likely lead to increases in automobile accidents, further straining emergency response capabilities.
- o Depending on the severity and scale of damage caused by ice and snow events, damage to power transmission and distribution infrastructure can require days or weeks to repair.
- o Winter storms can reduce the efficacy of shaded fuel breaks for wildfire mitigation as treated areas were more likely to have downed trees and limbs than untreated areas.
- o Winter storms can result in damage to endangered species habitat and increased fuel loads within forested habitats.
- o Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to impacts of winter storm events. Approximately 11 percent of homes in the County were built before 1980. Similarly, historic buildings and sites are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There are 75 historical sites listed on the National Register of Historic Places for Williamson County.
- o Schools may be forced to shut early due to treacherous driving conditions.
- o Exposed water pipes may be damaged by severe or late season winter storms at both residential and commercial structures, causing significant damages.

The economic and financial impacts of winter weather on the community will depend on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses and citizens will also contribute to the overall economic and financial conditions in the aftermath of a winter storm event.

CLIMATE CHANGE CONSIDERATIONS

Climate change is expected to reduce the number of extreme cold events statewide but increase in the variability of events.⁷ Extreme cold events will continue to be possible but overall winters are becoming milder, and the frequency of extreme winter weather events are decreasing due to the warming of the Arctic and less extreme cold air coming from that region.⁸ A trend that is expected to continue with winter extremes estimated to be milder by 2036 compared to extremes in the historic record.⁹

⁷ Fourth National Climate Assessment. Chapter 23 Southern Great Plains. U.S. Global Change Program. 2018.

⁸ Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.

⁹ Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.



SECTION 18 **HAZARDOUS MATERIAL**

SECTION 18: HAZARDOUS MATERIALS

Hazard Description	1
Location	2
Extent.....	5
Historical Occurrences.....	6
Probability of Future Events.....	6
Vulnerability and Impact.....	6
Assessment of Impacts	8
Climate Change Considerations	9

HAZARD DESCRIPTION



Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. A hazardous material (HAZMAT) incident involves a substance outside normal safe containment in sufficient concentration to pose a threat to life, property, or the environment.

Chemicals are found everywhere. They purify drinking water, increase crop production, and simplify household chores. But chemicals also can be hazardous to humans or the environment if used or released improperly. Hazards can occur during production, storage, transportation, use, or disposal. You and your community are at risk if a chemical is used unsafely or released in harmful amounts into the environment where you live, work, or play.

In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. This profile focuses on fixed sites. Weather conditions will directly affect how the hazard develops.

The Toxics Release Inventory (TRI) is a publicly available database from the federal Environmental Protection Agency (EPA) which contains information on toxic chemical releases and other waste management activities that are reported annually by certain covered industry groups federal facilities. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and expanded by the Pollution Prevention Act of 1990. Each year, facilities that meet certain activity thresholds must report their releases and other waste management activities for listed toxic chemicals to the EPA and their state or tribal entity. A facility must report if it meets the following three criteria:

- o The facility falls within one of the following industrial categories: manufacturing; metal mining; coal mining; electric generating facilities that combust coal and/or oil; chemical wholesale distributors; petroleum terminals and bulk storage facilities; Resource Conservation and Recovery Act (RCRA) Subtitle C Treatment, Storage and Disposal (TSD) facilities; and solvent recovery services.
- o Have ten or more full-time employee equivalents.
- o Manufactures or processes more than 25,000 pounds or otherwise uses more than 10,000 pounds of any listed chemical during the calendar year. Persistent, Bio-accumulative and

SECTION 18: HAZARDOUS MATERIALS

Toxic (PBT) chemicals are subject to different thresholds of ten pounds, 100 pounds or 0.1 grams depending on the chemical.

Submission of a Tier II form is required under Section 312 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA). Under EPCRA, all facilities which store significant quantities of hazardous chemicals must share this information with state and local emergency responders and planners. Facilities in Texas share this information by filing annual hazardous chemical inventories with the Texas Department of State Health Services (DSHS), Local Emergency Planning Committees (LEPCs), and local fire departments. The Texas Tier II Report contains facility identification information and detailed chemical data about hazardous chemicals stored at the facility.

A facility must report if it meets the following criteria:

- o Any company using chemicals that could present a physical or health hazard must report them if the quantities of those chemicals exceed Tier II threshold limits.
- o If an industry has an Occupational Safety and Health Administration (OSHA) deemed hazardous chemical that exceeds the appropriate threshold at a certain point in time, then the chemical must be reported. These chemicals may be on the list of 355 Extremely Hazardous Substances (EHS) or could be one of the 650,000 reportable hazardous substances (not on the EHS list). This reporting format is for a "snapshot in time." EHS chemicals must be reported if the quantity is greater than 500 pounds or the Threshold Planning Quantity (TPQ) amount, if the TPQ is less than 500 pounds. Chemicals not considered to be EHS must be reported if their quantity is 10,000 pounds or greater.

LOCATION

A hazardous material spill occurring along railroad tracks and major highways near populated areas in the Williamson County planning area is of concern to the planning team. Trains and trucks can carry a variety of materials that would, in large quantity, threaten the health and safety of people and the natural environment in the vicinity of a spill.

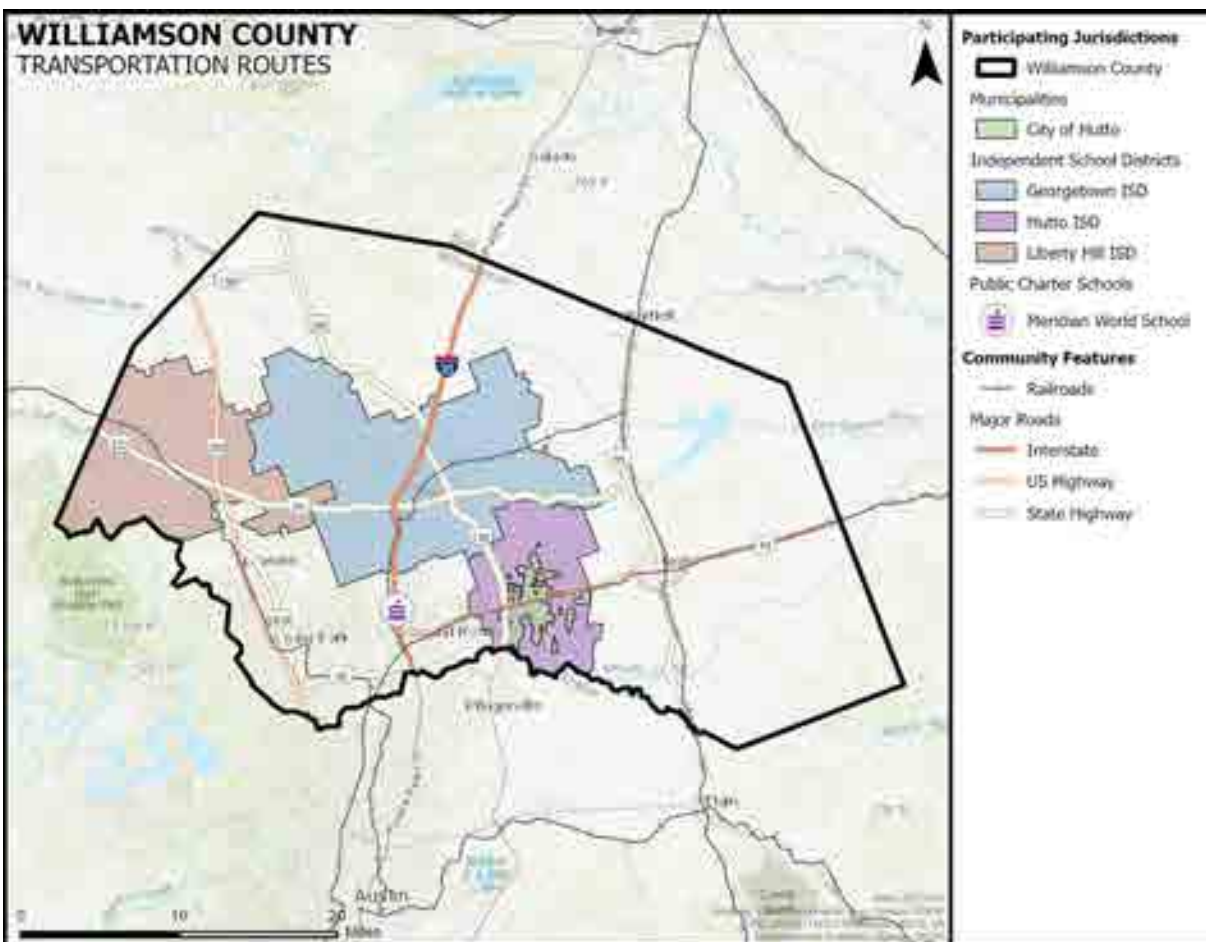
All major highways, railroads, and the surrounding areas are at risk of a HAZMAT incident. In the Williamson County planning area, the major highways include Interstate 35; U.S. Highways 79 and 183; and State Highways 29, 45, 95, and 130. Williamson County is also served by the several major railroads located throughout the planning area. Locations in the county where these rail lines run parallel to major roadways are particularly vulnerable to hazardous material spills that could impact both trains and motorists traveling through the area. Instances of highways in the planning area with parallel, close-proximity railroads include U.S. Highway 79, portions of Interstate 35, and portions of U.S. Highway 183.

All of the participating jurisdictions, ISDs and schools have one or more of these major roadways and railroads converging or running through them. These jurisdictions, ISDs and schools are particularly vulnerable to hazardous materials incidents as they are densely populated areas with higher likelihoods of hazardous materials being transported through them. The plan participants with increased vulnerability include the City of Hutto, Georgetown ISD, Hutto ISD, Liberty Hill ISD, and Meridian World School. Examples of these participants' close proximity to transportation routes include City of Hutto being bisected by Highway 79 and a rail line; Georgetown ISD containing portions of Interstate 35, State Highway 130, and State Highway 195; and Meridian

SECTION 18: HAZARDOUS MATERIALS

World School's facilities situated along Interstate 35. Figure 18-1 illustrates the Williamson County planning area, including participating jurisdictions, ISDs and schools, and the locations of major highways and railroads where hazardous materials may be transported.

Figure 18-1. Transportation Routes in Williamson County



The National Hazardous Materials Route Registry (NHMRR) lists, as reported by States and Tribal governments, all designated and restricted roads and preferred highway routes for transportation of highway route-controlled quantities of Class 7 radioactive materials and non-radioactive hazardous materials. According to NHMRR data, Williamson County does not contain any designated routes for the transportation of these hazardous materials.

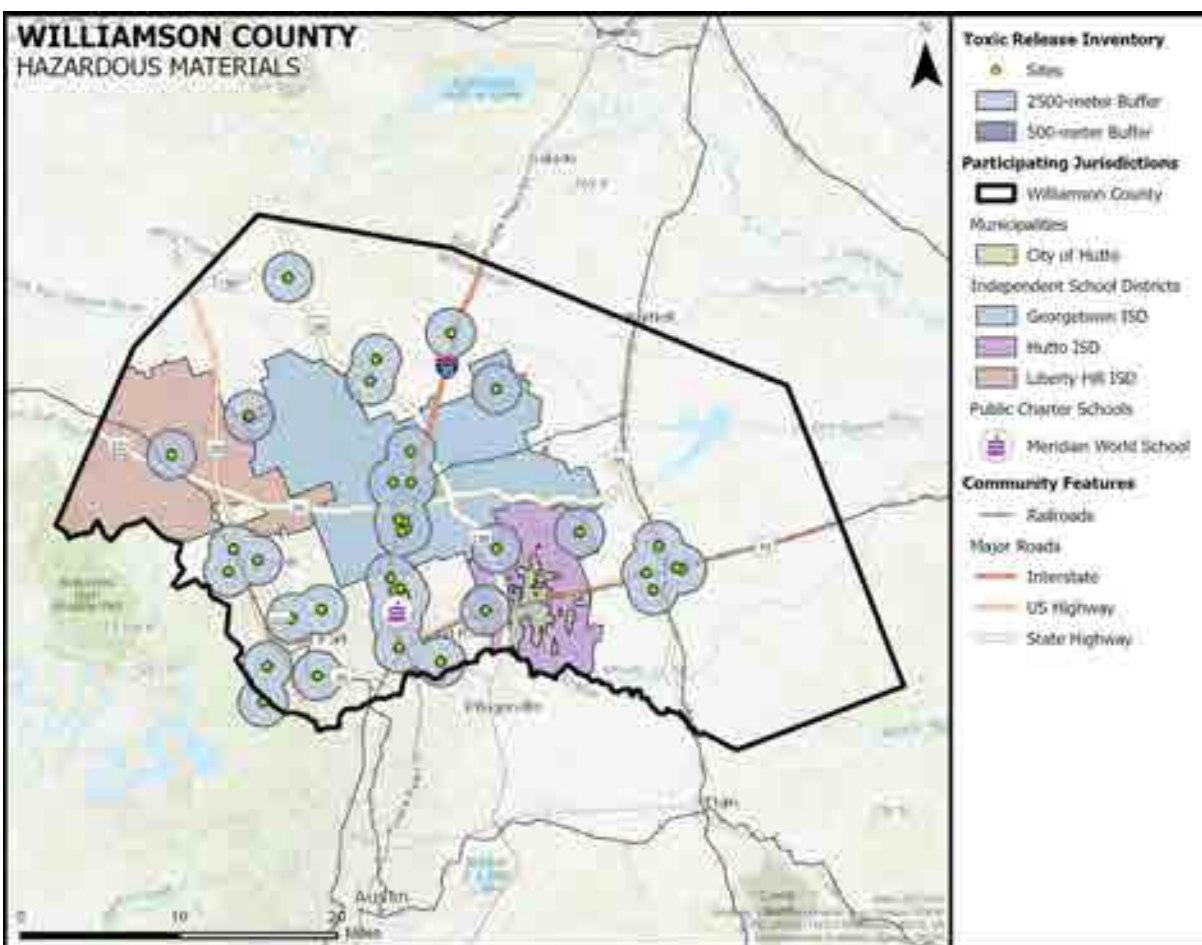
Under the Community Right-to-Know program laws upheld at the state and federal level, all facilities which store significant quantities of hazardous chemicals must share this information with state and local emergency responders and planners. Facilities in Texas share this information by filing annual hazardous chemical inventories with the state, with Local Emergency Planning Committees (LEPCs), and with local fire departments.

Figure 18-2 shows the locations of available georeferenced TRI toxic sites in and around the Williamson County planning area. Only toxic sites that have georeferenced data available were analyzed; 500-meter and 2500-meter circle buffers are also drawn around each hazardous material site.

SECTION 18: HAZARDOUS MATERIALS

There are 44 TRI toxic sites in the Williamson County planning area in total, with 40 sites reporting previous toxic releases between 1987 and 2023 according to the EPA's database. Of those, 17 sites had reporting available for chemicals released into the planning area in 2022, the most recent reporting year available. No toxic releases or waste was reported for 2 of the 27 sites, and Durcon Inc. accounted for the largest amount of chemicals (372.2 lbs.) released into the planning area in 2022, according to TRI data. All other facilities reported much smaller chemical releases in 2022, ranging from 0.02 lbs. up to 12.63 lbs. Table 18-1 lists the names, locations, and hazardous chemicals associated of available TRI toxic sites in and around the Williamson County planning area that reported toxic releases for 2022.

Figure 18-2. EPA 2022 Toxic Release Inventory (TRI) Facility Locations



¹ Only TRI sites with reported chemical releases for 2022 are listed. Source: <https://www.epa.gov/toxics-release-inventory-tri-program>

SECTION 18: HAZARDOUS MATERIALS

EXTENT

The extent of a hazardous material release will depend on whether it is from a mobile or fixed site and the size of impact. The range of intensity will vary greatly depending on the circumstances. These factors and conditions include the material, toxicity, duration of the release, and environmental conditions such as the wind and precipitation.

Hazardous materials or toxic releases can have a substantial impact on communities. Significant structural damages are typically limited to industrial facilities and transportation networks. In addition, such events can cause multiple deaths, require extensive evacuations and expensive remediation, and could lead to a complete shutdown of affected critical facilities for 30 days or more. In a hazardous materials incident, solid, liquid and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions would directly affect how the hazard develops. The micro-meteorological effects on buildings and terrain can alter travel patterns and duration of agents. Shielding in the form of permanent shelter can protect people from harmful effects. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features can substantially increase damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

SECTION 18: HAZARDOUS MATERIALS

HISTORICAL OCCURRENCES

Hazardous materials are substances that if released or misused can cause death, serious injury, long-lasting health effects, and damage to infrastructure and the environment. Many products containing hazardous chemicals are used and stored in homes routinely. These products are also shipped daily on the nation's highways, railroads, waterways, and pipelines.

A total of 322 spill incidents have been reported in Williamson County from 2003 through 2023 according to the Texas Commission on Environmental Quality (TCEQ) Emergency Response Spills database.² This includes chemical spills reported to and investigated by TCEQ. A large number of these incidents were related to relatively small diesel fuel and oil spills. Several of the largest spills in terms of amount of material spilled were related to sewage and wastewater, with an event in 2010 spilling 86,400 gallons of wastewater and another event 2009 resulting in 75,000 gallons of wastewater spilled. Damages, injuries, and fatalities are not reported in this database, and a spill's inclusion in this dataset does not necessarily indicate significant damage to public health, property, or the natural environment occurred. However, the frequency of these events does indicate a significant level of risk for the planning area.

PROBABILITY OF FUTURE EVENTS

Hazardous material spills are usually the result of human error and/or accidents, which cannot be predicted. However, given the amount of traffic through the planning area and its large network of transportation, it is probable that an incident will occur in any given year. Most spills will not lead to negative health or safety impacts and will not cause substantial negative impacts on the air, soil, or groundwater. The probability of a spill threatening the health of thousands and of having long-term negative environmental consequences is low, based on previous events in the planning area.

Based on the historic incident records and team input, the frequency of occurrence for typical hazardous material incidents would be considered highly likely. However, many of the previous spill incidents were minor and related to vehicle accidents resulting in fuel and oil spills. Based on the best available data, the prevalence of TRI toxic sites, and the network of major roadways and rail lines within the planning area, the frequency of occurrence for more significant hazardous material incidents is considered "Likely", meaning an event is probable in the next three years for the Williamson County planning area, including all participating jurisdictions, ISDs and schools.

VULNERABILITY AND IMPACT

Based on the prevalence and geographic proximity of major highways and railroads where hazardous materials may be transported, much of the Williamson County planning area, including all participating jurisdictions, ISDs and schools, is at least somewhat vulnerable to the impacts of a HAZMAT incident along these transportation arteries. Meridian World School sits along Interstate 35, the primary north-south highway in the planning area, and every other participating jurisdiction, school and ISD's boundary contains portions of multiple major highways and railroads.

² Source: https://data.texas.gov/dataset/Texas-Commission-on-Environmental-Quality-Emergency-Response-Spills/about_data

SECTION 18: HAZARDOUS MATERIALS

Public health and environmental impacts are the most common effects of a hazardous materials incident. The release of toxic chemicals can pose immediate health effects including respiratory problems, chemical burns, poisoning, and long-term illnesses such as cancer. Vulnerable populations including children and the elderly may be more susceptible to health impacts. The population over 65 and under the age of 5 in the Williamson County planning area is estimated at 19 percent of the total population or an estimated total of 115,193 potentially vulnerable residents in the planning area based on age.

In extreme cases, an evacuation may be ordered to remove people from the hazardous area. Evacuating areas affected by HAZMAT incidents can be difficult, especially for those who live below the poverty level and lack transportation and financial resources. An estimated 10 percent of the planning area population live below the poverty level. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures. An estimated 22 percent of the planning area speaks a language other than English.

Table 18-2. Populations at Greater Risk of HAZMAT Incidents³

JURISDICTION	ELDERLY (over 65)	YOUTH (under 5)	WITH A DISABILITY	BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Williamson County	77,609	37,584	61,524	38,896	138,476
City of Hutto	1,830	2,155	2,658	2,301	7,141

Some participating school and ISDs also have vulnerable populations based on age or work location, such as employees that work outdoors and could face immediate exposure to a hazardous materials spill, or children under 5 who attend school at the participating schools (Table 19-3).

Table 18-3. Populations at Greater Risk by Special District⁴

JURISDICTION	POPULATION UNDER 5	EMPLOYEES OPERATING OUTDOORS
Georgetown ISD	469	428
Hutto ISD	415	222
Liberty Hill ISD	240	300
Meridian World School	0	2

Hazardous materials can have significant and long-term environmental impacts due to the release of toxic chemicals into the environment. Spills or leaks of chemicals may contaminate the soil, making it unsuitable for agriculture, which is a significant industry in the Williamson County

³ U.S. Census Bureau, American Community Survey, 2022

⁴ School and ISD vulnerable populations data has been provided by participating Planning Team members.

SECTION 18: HAZARDOUS MATERIALS

planning area. Hazardous material incidents can also cause water pollution. The toxic substances can be carried by rainwater or runoff into nearby water bodies, which can harm aquatic life, disrupt ecosystems, and pose a public health risk if contamination occurs to drinking water sources. Gaseous releases can lead to air pollution, which can become widespread. HAZMAT incidents can also disrupt the local ecosystem, harming animals, and insects, leading to the displacement of native species.

While the best available data does not provide historical dollar loss amounts, hazardous material incidents can also be costly and impact the local economy. Emergency containment, clean up, and disposal may strain local resources and budgets. HAZMAT incidents can also lead to property damage, most commonly to industrial facilities and transportation networks. Based on best available data, the impact of hazardous materials incidents in Williamson County planning area, including all participating jurisdictions, ISDs and schools, is considered “Limited” meaning injuries and/or illnesses are treatable with first aid, shutdown of facilities and services for 24 hours or less, and less than 10 percent of property is destroyed or with major damage.

Critical facilities in the planning area are vulnerable to a range of direct and indirect impacts caused by HAZMAT incidents. Many of the impacts to critical facilities identified by the Williamson County Planning Team are similar to the impacts listed in Sections 5 through 17. For a comprehensive list by participating jurisdiction, please see Appendix C.

Several capabilities and planning mechanisms within the Williamson County planning area may help to reduce risk from a hazardous materials incident. The Williamson County Fire Marshal's Office operates the Hazardous Materials Response Team for Williamson County, which consists of 6 apparatus and 60 Texas Commission on Fire Protection (TCFP) certified hazardous materials technicians who are on duty 24 hours, 7 days a week. This Team responds to hazardous materials incidents throughout the planning area, including the locations of the participating jurisdictions, ISDs and Meridian World School. Other planning mechanisms, such as Georgetown ISD's Emergency Operations Plan's hazardous materials annex, serve to prepare and guide authorities in the event of a hazardous materials incident. For a comprehensive list of the capabilities already in place for each participating jurisdiction, ISD and school, please see Appendix F.

ASSESSMENT OF IMPACTS

HAZMAT incidents have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. HAZMAT incidents can be frequently associated with a variety of impacts, including:

- Vulnerable populations, particularly the elderly (13 percent of total population) and children under 5 (6 percent of total population), can face serious or life-threatening health problems from exposure to toxic chemicals.
- Transportation disruptions and road closures can result in emergency response vehicles being unable to access areas of the community.
- First responders are exposed to toxic chemicals, hazardous materials, and generally unsafe conditions, which could result in sickness and long-term health impacts.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- Evacuations, shelter in place orders, or the closure of transportation routes can lead to the disruption of critical facilities, businesses, and schools.

SECTION 18: HAZARDOUS MATERIALS

- o The environment may experience significant damage leading to air and water contamination, loss of wildfire, agriculture, and tourism.
- o Populations experiencing homelessness at the time of a hazmat event may not have the ability to relocate or find appropriate shelter to avoid exposure to toxic materials.

The economic and financial impacts of hazardous material incidents on the area will depend entirely on the scale of the event, where the event occurs, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any HAZMAT incident.

CLIMATE CHANGE CONSIDERATIONS

As a non-natural hazard, climate change has no direct impact on the future occurrences of hazardous material incidents. However, climate change is associated with an increase in severe weather. Severe weather events may cause damage to the storage of hazardous materials and can lead to an increase in chemical spills, leaks, or fires. Research and data regarding the impact of climate change on non-natural events is minimal and limited.



SECTION 19 **TRAIN DERAILMENT**

SECTION 19: TRAIN DERAILMENT

Hazard Description	1
Location	1
Extent.....	3
Historical Occurrences.....	4
Significant Events.....	5
Probability of Future Events.....	6
Vulnerability and Impact.....	6
Assessment of Impacts	7
Climate Change Considerations	8

HAZARD DESCRIPTION



A train derailment is an accident that occurs when a train comes off its track. Train derailments are caused by human error, broken tracks and infrastructure, mechanical failure (malfunctioning braking systems), and operation issues, such as loading too much cargo.

There are two main types of railways based on their function and ownership. The first is passenger railroads, which provide long-

distance travel services between cities. Amtrack is the primary provider of passenger rail travel in the United States.

The second type, freight railroads, are used to carry goods and cargo from one location to another and are privately owned. According to the U.S. Department of Transportation, 52 percent of rail freight train loads consist of bulk commodities such as agriculture and energy products, automobiles and components, construction materials, chemicals, food, metals, minerals, paper, and pulp. There are three classes of freight railroads. Class I railroads have a revenue of at least \$900 million. Class II and Class III railroads are known as short line railroads that operate shorter distances and have less revenue than Class I railroads.

The Association of American Railroads reports that a vast majority of train derailments occur in rail yards and not on mainline tracks. With rail yard derailments, injuries are rare, property damage is limited, and the impact on the local community is little to none. While derailments on mainline tracks are less common, they can have greater impacts on the community, with the release of hazardous materials of greatest concern.

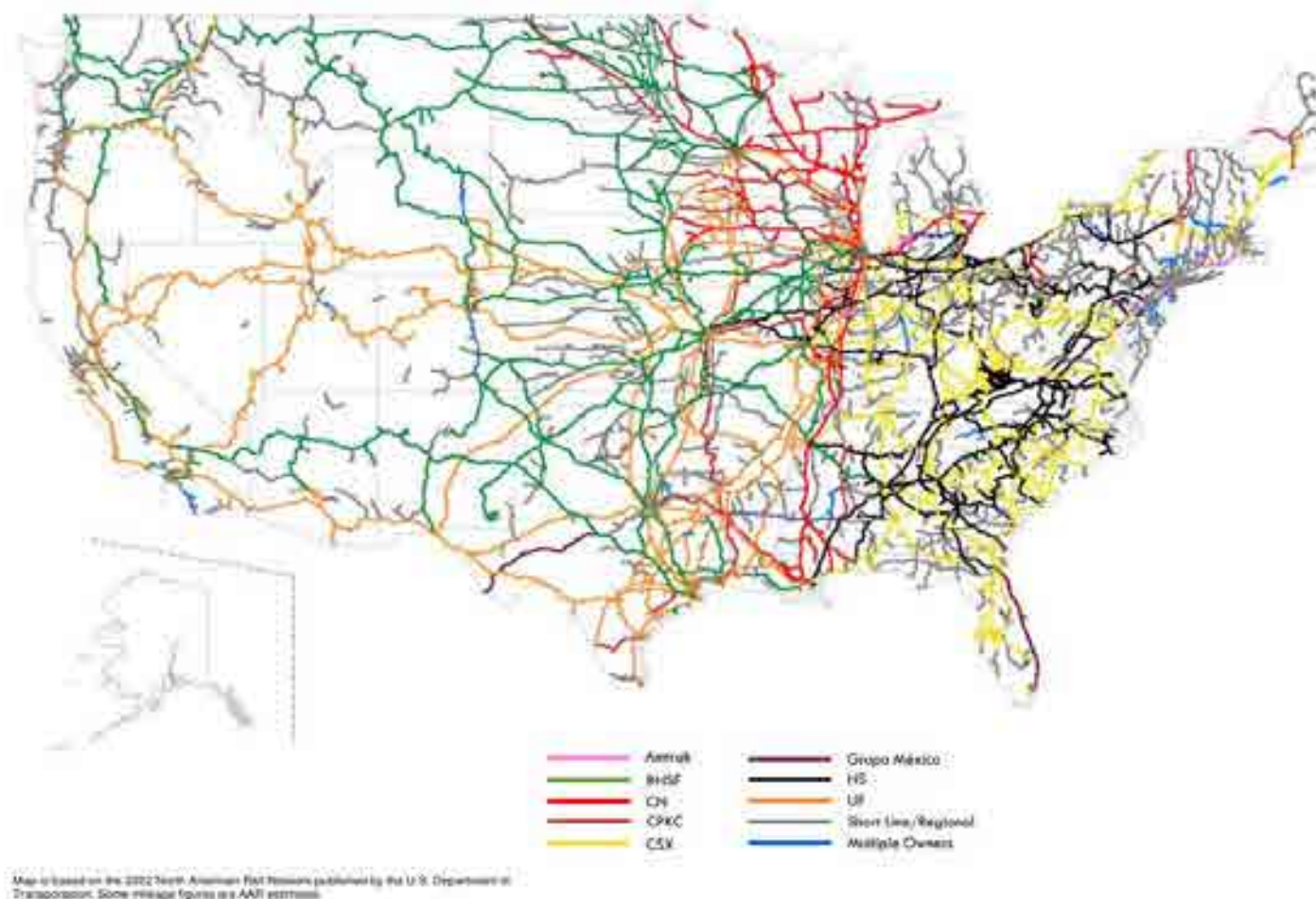
LOCATION

Railroads operate in 49 states and the District of Columbia. The freight railroad network is nearly 140,000 miles and accounts for around 40% of long-distance ton-miles, more than any other mode of transportation. There are six Class I railroads and approximately 615 short line railroads (Class II and III) across the United States. Class I railroads account for around 67% of freight rail

SECTION 19: TRAIN DERAILMENT

mileage.¹ Figure 19-1 shows the location freight railroads across the United States according to the U.S. Department of Transportation and the Association of American Railroads.²

Figure 19-1. Freight Railroads in the United States



The Texas Department of Transportation (TXDOT) created a Statewide Railroad Map showing the location of Class I freight railroads across the state. Figure 19-2 shows the location of these railroads in Williamson County, including all participating jurisdictions, ISDs and schools, based on the 2023 TXDOT Statewide Railroad Map.³ Areas nearest to these railroads within the Williamson County planning area would be the most vulnerable in the event of a train derailment incident. Class 1 railroads in Williamson County include Union Pacific (UP), Georgetown Railroad Company (GRR), and Austin Western Railroad (AWRR).

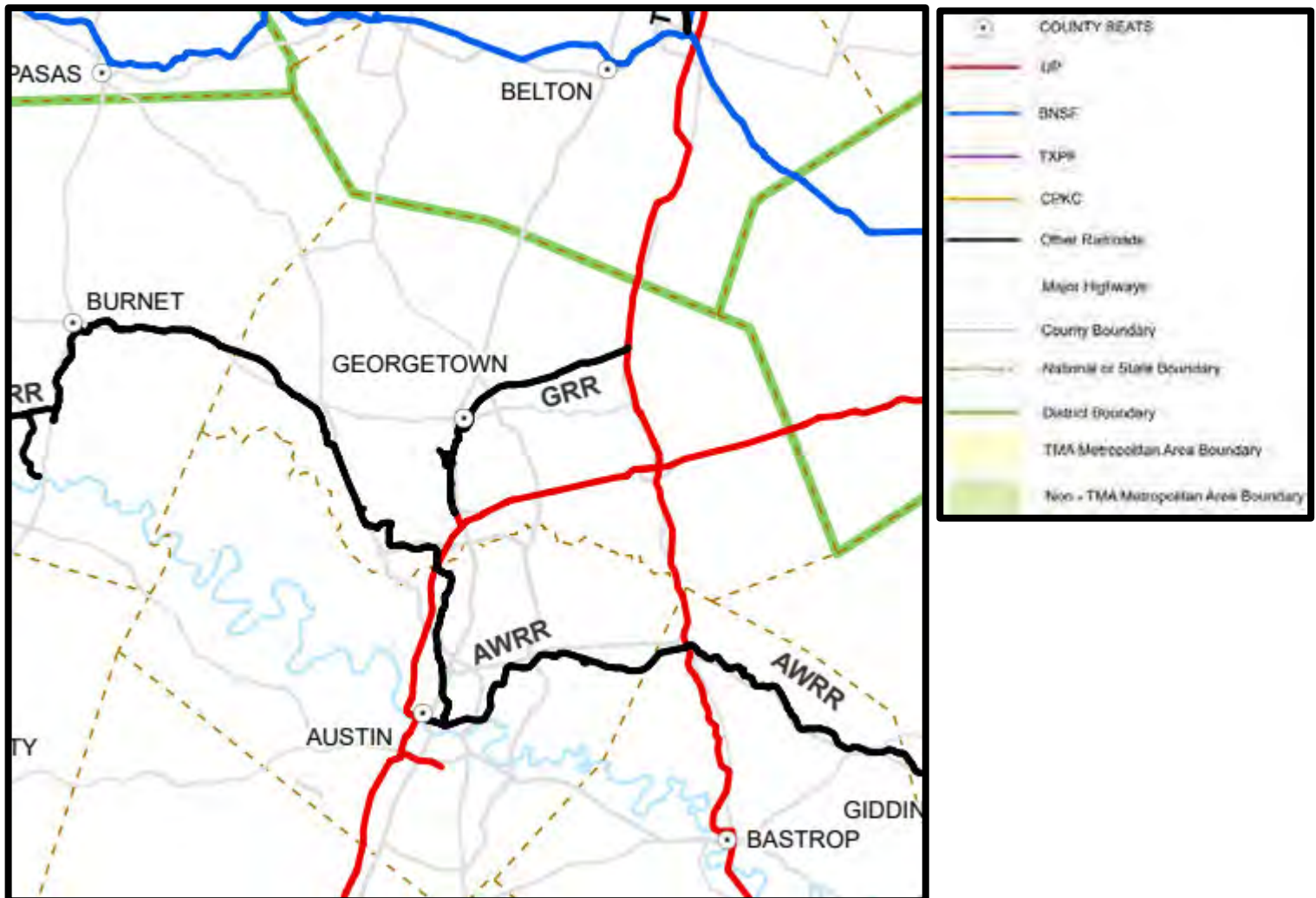
¹ Association of American Railroads. Data Center. <https://www.aar.org/data-center/>

² Association of American Railroads. United States Freight Rail 2021 Data. <https://www.aar.org/wp-content/uploads/2021/02/AAR-United-States-Fact-Sheet.pdf>

³ Texas Department of Transportation. Statewide Railroad Map 2023. <https://www.txdot.gov/content/dam/docs/maps/texas-railroad-map.pdf>

SECTION 19: TRAIN DERAILMENT

Figure 19-2. Class I Freight Railroads in Williamson County



EXTENT

A train derailment can either be a minor mishap that merely causes a delay in rail traffic, or a major incident that creates mass casualties, environmental damage, and results in evacuations. The extent of a train derailment incident will depend on the location and type of railroad. The range of intensity will vary greatly depending on the circumstances. These factors include the material, cargo, or number of passengers on the train and the cause of derailment.

Depending on the severity of the event, train derailments can have a substantial impact on communities. Such events can cause multiple injuries and fatalities and the complete shutdown of railway facilities for 30 days or more. Structural damages are typically limited to cargo, equipment and transportation rails with damage rarely occurring to homes or businesses located along railways. Remediation may be anticipated when a derailment involves hazardous materials. In a train derailment incident, various chemicals may be released from the train's cargo. Weather conditions will directly influence how the hazard develops, affecting the spread of these chemicals. Non-compliance with state and federal railway regulations, such as those outlined in

SECTION 19: TRAIN DERAILMENT

the Rail Safety Improvement Act of 2008 (RSIA), can substantially increase damages associated with train derailment incidents. The duration of a train derailment incident can range from hours to weeks. Warning time is minimal to none.

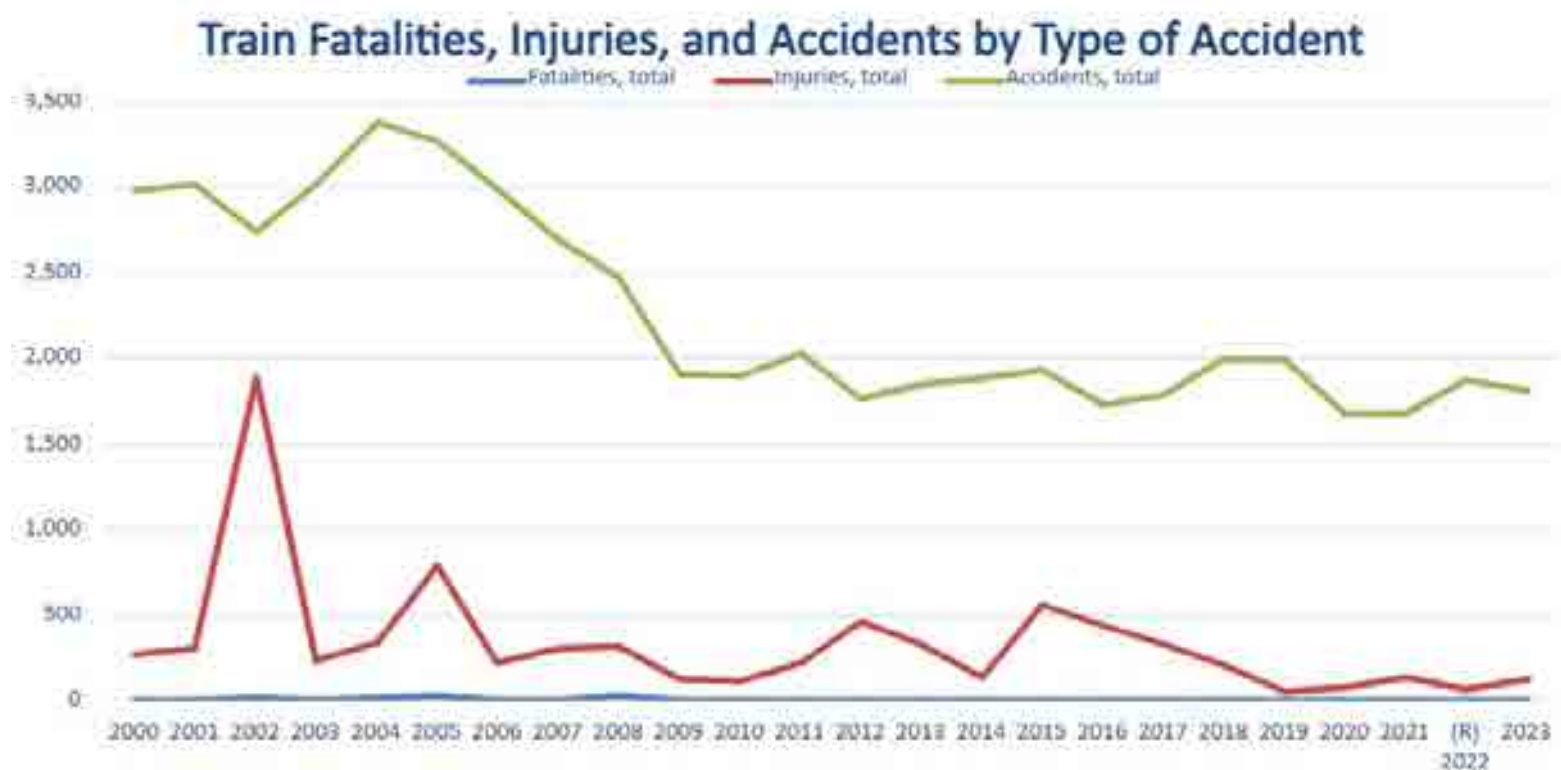
HISTORICAL OCCURRENCES

According to Federal Railroad Administration (FRA) data, for all of 2022, there were 952 Class I railroad train derailments, with 77 percent of incidents occurring in rail yards and 23 percent of incidents on the mainline tracks. Of that 23 percent, four derailments resulted in four injuries, while seven resulted in a hazmat release.⁴

The FRA reports that Class I mainline railroad incidents are down 49 percent since 2000. For all railroads, the incident rate has declined 44 percent since 2000. Per carload, the hazardous materials accident rate is down 78 percent since 2000.

Figure 19-3 below shows all reported train accidents across the United States between 1975 and 2023 as reported by the Bureau of Transportation Statistics. This graph includes information for both freight and passenger railroad operations. The number of train accidents and injuries has declined over the years.

Figure 19-3. Train Fatalities, Injuries, and Accidents⁵



⁴ Association of American Railroads. Freight Rail Train Derailments. <https://www.aar.org/issue/derailments/>

⁵ Bureau of Transportation Statistics. Train Fatalities, Injuries, and Accidents. <https://www.bts.gov/content/train-fatalities-injuries-and-accidents-type-accidenta>

SECTION 19: TRAIN DERAILMENT

The Federal Railroad Administration reports a total of 558 train derailment incidents in the State of Texas between 2020 and 2023.⁶ The leading cause was reported to be failure to control, and 321 cases were reported on Union Pacific railroads. Only 2 events were reported in Williamson County between 2020 and 2023, with both events occurring in 2022. In addition, according to local news sources, three additional incidents were recorded in the planning area since 2017.

SIGNIFICANT EVENTS

February 20, 2017 – Williamson County

A train derailment incident occurred between Thrall and Thorndale in Williamson County around 1:00am on February 20, 2017. A total of 11 cars were derailed but there were no reported injuries for this incident.

September 22, 2018 – Williamson County

A train carrying gravel derailed near 1200 County Road 201, just two miles north of Liberty Hill. All 20 train cars part of the Austin Western Railroad train derailed. It was reported that this derailment was caused by a washout. There were no reported injuries.

June 6, 2019 – Williamson County

Local news reported the derailment of a Union Pacific train on June 6, 2019. The train was carrying industrial sand through Williamson County and derailed in Taylor. There were two crew members on the train, but no one was injured. This incident caused some Amtrack trips using the same railroad to be canceled or delayed on that day.

Figure 19-4. Train Derailment Incident in Williamson County⁷



⁶ Federal Railroad Administration. Train Accidents and Rates.

<https://safetydata.fra.dot.gov/officeofSafety/publicsite/Query/TrainAccidentsFYCYWithRates.aspx>

⁷ Austin American-Statesman. Train Derails in Taylor. 2019.

<https://www.statesman.com/story/news/local/2019/06/06/union-pacific-freight-train-derails-in-taylor-none-injured-officials-say/4971331007/>

SECTION 19: TRAIN DERAILMENT

PROBABILITY OF FUTURE EVENTS

The Federal Highway Administration estimates that total U.S. freight train operations will increase from around 19.3 billion tons in 2020 to 25.1 billion tons by 2040. This indicates a future increase of 27 percent. According to historical incident data, a train derailment incident for the Williamson County planning area, including all participating jurisdictions, ISDs and schools, is considered “Highly Likely,” with an event probable in the next year.

VULNERABILITY AND IMPACT

Population trends and projections suggest the United States is becoming more urbanized. Urbanized areas will increasingly converge into larger metropolitan networks (called megaregions) as the population continues to grow. As a result, these areas will demand a higher volume of freight, which means greater traffic congestion, increased emissions, and more frequent infrastructure maintenance.⁸

Train derailments can cause injuries and fatalities, especially to passengers and crew members. If a passenger train derails and is carrying a large number of people, a mass casualty incident may occur and overwhelm local response capabilities. Passengers may face delays, cancellations, or the need to find alternative transportation when an incident occurs. Railroad tracks and surrounding infrastructure can be damaged, leading to expensive repairs and potential long-term disruptions.

Train derailments can release hazardous materials, which can greatly impact public health, safety, and the environment. In 2022, freight railroads moved 2.3 million carloads of plastics, fertilizers, and other chemicals (including ethanol).⁹ The release of toxic chemicals can pose immediate health effects including respiratory problems, chemical burns, poisoning, and long-term illnesses such as cancer. Vulnerable populations including children, and the elderly may be more susceptible to health impacts. The population over 65 in Williamson County is estimated at 11 percent of the total population and children under the age of 6 are estimated at 6 percent.

In extreme cases, an evacuation may be ordered to remove people from the incident area, as seen with the 2023 East Palestine, Ohio train derailment incident, which released toxic chemicals. Evacuating areas affected by train derailment incidents can be difficult, especially for people with disabilities or those who live below the poverty level and lack transportation and financial resources. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures. Individuals with a disability are estimated at 11 percent of the total population, an estimated 13 percent of the planning area population lives below the poverty level, and 22 percent of the populations speaks a language other than English.

⁸ Federal Railroad Administration. Freight Rail Overview. <https://railroads.dot.gov/rail-network-development/freight-rail-overview#:~:text=Heavy%20freight%20such%20as%20coal,truck%2C%20rail%2C%20and%20water.>

⁹ American Association of Railroads. Data Center. <https://www.aar.org/data-center/>

SECTION 19: TRAIN DERAILMENT

Table 19-1. Populations at Greater Risk of Train Derailment Incidents¹⁰

JURISDICTION	ELDERLY (over 65)	YOUTH (under 5)	WITH A DISABILITY	BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Williamson County	77,609	37,584	61,524	38,896	138,476
City of Hutto	1,830	2,155	2,658	2,301	7,141

Table 19-2. Populations at Greater Risk for Special Districts

JURISDICTION	POPULATION UNDER 5
Georgetown ISD	469
Hutto ISD	415
Liberty Hill ISD	240
Meridian World School	0

Train derailments that cause the release of hazardous materials can have significant and long-term environmental impacts. The toxic substances can be carried by rainwater or runoff into nearby water bodies, which can harm aquatic life, disrupt ecosystems, and pose a public health risk if contamination occurs to drinking water sources. Gaseous releases can lead to air pollution, which can become widespread.

While the best available data does not provide historical dollar loss amounts, train derailment incidents can also be costly and impact the local economy. Based on best available data, the impact of train derailment incidents for the Williamson County planning area, including all participating jurisdictions, ISDs and schools, is considered “Limited” meaning injuries and/or illnesses are treatable with first aid, shutdown of facilities and services for 24 hours or less, and less than 10 percent of property being destroyed or with major damage.

Critical facilities in the planning area are vulnerable to a range of direct and indirect impacts caused by train derailment incidents. Many of the impacts to critical facilities identified by the Williamson County Planning Team are similar to the impacts listed in Sections 5 through 18. For a comprehensive list of critical facilities, please see Appendix C.

ASSESSMENT OF IMPACTS

Train derailment incidents have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. Train derailment incidents can be frequently associated with a variety of impacts, including:

- Vulnerable populations, particularly the elderly (11 percent of total population) and children under 5 (6 percent of total population), can face serious or life-threatening health problems from exposure to toxic chemicals.

¹⁰ U.S. Census Bureau, American Community Survey, 2022

SECTION 19: TRAIN DERAILMENT

- o Transportation disruptions and road closures can result in emergency response vehicles being unable to access areas of the community. In addition, delays to transportation services greatly impact the general public.
- o Passenger train derailments can lead to mass casualty incidents, overwhelming local response capabilities and health services.
- o First responders are potentially exposed to toxic chemicals, hazardous materials, and generally unsafe conditions, which could result in sickness and long-term health impacts.
- o Derailments can disrupt the movement of goods, impacting local businesses, supply chains, and the overall economy, especially if key materials or products are delayed.
- o Evacuations, shelter in place orders, or the closure of transportation routes can lead to the disruption of critical facilities.
- o The environment may experience significant damage leading to air and water contamination, loss of wildfire, agriculture, and tourism.
- o Train derailments can cause significant damage to railways leading to costly repairs and extended service disruptions.

The economic and financial impacts of train derailment incidents on the area will depend entirely on the scale of the event, where the event occurs, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any train derailment incident.

CLIMATE CHANGE CONSIDERATIONS

As a non-natural hazard, climate change has no direct impact on the future occurrences of train derailment incidents. However, climate change is associated with an increase in severe weather. Severe weather events may cause damage to railroad infrastructure and can lead to an increase in accidents or derailments. Research and data regarding the impact of climate change on non-natural events is minimal and limited.



SECTION 20 **MITIGATION STRATEGY**

SECTION 20: MITIGATION STRATEGY

Mitigation Goals	1
Goal 1	1
Goal 2	1
Goal 3	2
Goal 4	2
Goal 5	2
Goal 6	2
Goal 7	3

MITIGATION GOALS

Based on the results of the risk and capability assessments, the Planning Team developed and prioritized the mitigation strategy. This involved utilizing the results of both assessments and reviewing the goals and objectives that were included in the previous 2017 Plan. At the Mitigation Workshop in July 2024, Planning Team members reviewed the mitigation strategy from the previous Plan. The consensus among all members present was that the strategy developed for the 2017 Plan required some changes including expanding on existing goals and the addition of a goal around equity and vulnerable populations.

GOAL 1

Protect public health and safety.

OBJECTIVE 1.1

Advise the public about health and safety precautions to guard against injury and loss of life from hazards.

OBJECTIVE 1.2

Maximize utilization of the latest technology to provide adequate warning, communication, and mitigation of hazard events.

OBJECTIVE 1.3

Reduce the danger to, and enhance protection of, high risk areas during hazard events.

OBJECTIVE 1.4

Protect critical facilities and services.

GOAL 2

Build and support local capacity and commitment to continuously become less vulnerable to hazards.

OBJECTIVE 2.1

Build and support local partnerships to continuously become less vulnerable to hazards.

OBJECTIVE 2.2

Build a cadre of committed volunteers to safeguard the community before, during, and after a disaster.

SECTION 20: MITIGATION STRATEGY

OBJECTIVE 2.3

Build hazard mitigation concerns into county, city, ISD and school planning and budgeting processes.

GOAL 3

Increase public understanding, support, and demand for hazard mitigation.

OBJECTIVE 3.1

Heighten public awareness regarding the full range of natural and man-made hazards the public may face.

OBJECTIVE 3.2

Educate the public on actions they can take to prevent or reduce the loss of life or property from all hazards and increase individual efforts to respond to potential hazards.

OBJECTIVE 3.3

Publicize and encourage the adoption of appropriate hazard mitigation measures.

GOAL 4

Protect new and existing properties.

OBJECTIVE 4.1

Reduce repetitive losses to the National Flood Insurance Program (NFIP).

OBJECTIVE 4.2

Use the most cost-effective approach to protect existing buildings and public infrastructure from hazards.

OBJECTIVE 4.3

Enact and enforce regulatory measures to ensure that future development will not put people in harm's way or increase threats to existing properties.

GOAL 5

Maximize the resources for investment in hazard mitigation.

OBJECTIVE 5.1

Maximize the use of outside sources of funding.

OBJECTIVE 5.2

Maximize participation of property owners in protecting their properties.

OBJECTIVE 5.3

Maximize insurance coverage to provide financial protection against hazard events.

OBJECTIVE 5.4

Prioritize mitigation projects, based on cost-effectiveness and sites facing the greatest threat to life, health, and property.

GOAL 6

Promote growth in a sustainable manner.

OBJECTIVE 6.1

Incorporate hazard mitigation activities into long-range planning and development activities.

SECTION 20: MITIGATION STRATEGY

OBJECTIVE 6.2

Promote beneficial uses of hazardous areas while expanding open space and recreational opportunities.

OBJECTIVE 6.3

Utilize regulatory approaches to prevent creation of future hazards to life and property.

GOAL 7

Promote equity and protect vulnerable populations and underserved communities through hazard mitigation activities.

OBJECTIVE 7.1

Allocate resources and funding to implement hazard mitigation activities that directly benefit vulnerable and underserved communities.

OBJECTIVE 7.2

Build and support local partnerships to leverage resources and expertise in addressing hazard related equity concerns.

OBJECTIVE 7.3

Establish internal decision-making processes that integrate equity into project selection.

OBJECTIVE 7.4

Monitor and evaluate the effectiveness of mitigation activities to ensure equitable outcomes and protection of vulnerable populations.



SECTION 21

PREVIOUS ACTIONS

SECTION 21: PREVIOUS ACTIONS

Summary.....	1
Williamson County	2
City of Hutto	17

SUMMARY

This section includes analysis from the 2017 Williamson County Hazard Mitigation Plan. Planning Team members were given copies of the previous mitigation actions submitted in the 2017 Williamson County Plan at the mitigation workshop. Each previously participating entity reviewed the previous actions and provided an analysis as to whether the action had been completed, should be deferred as an ongoing activity, or be deleted from the Plan Update. The actions from the 2017 Plans are included in this section as they were written in 2017, except for the “2024 Analysis” section. The following participating jurisdictions did not previously participate in a plan, therefore, they have no previous actions: Georgetown ISD, Hutto ISD, Liberty Hill ISD, and Meridian World School.

SECTION 21: PREVIOUS ACTIONS

WILLIAMSON COUNTY

Willamson County – Previous Action #1	
Proposed Action:	Purchase radios and disperse to residents to use for hazard events in the area.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Objectives Addressed:	G1
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam/Levee Failure, Drought, Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storms, Lightning, Tornado, Wildfire, Wind, Winter Weather
Priority (High, Moderate, Low):	Low – Rank 13
Estimated Cost:	Less than \$10,000
Potential Funding Sources:	General Budget, Donations/Sponsors
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	60 months

2024 ANALYSIS:
Completed.

SECTION 21: PREVIOUS ACTIONS

Willamson County – Previous Action #2	
Proposed Action:	Educate homeowners on how to mitigate their homes from these hazards on county website and public forums.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Objectives Addressed:	G1, G2
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam/Levee Failure, Drought, Earthquake, Expansive Soil, Extreme Heat, Flood, Hail, Hurricane/Tropical Storms, Lightning, Tornado, Wildfire, Wind, Winter Weather
Priority (High, Moderate, Low):	Low – Rank 14
Estimated Cost:	Less than \$10,000
Potential Funding Sources:	General Budget
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	48 months

2024 ANALYSIS:
Defer to plan update. On-going. Public Information releases are made throughout the year to address various hazards. This is a continuous effort. Amend action to say “Educate residents on how to mitigate their homes from these hazards on county website, public forums, and through public information releases. Consider adding appropriate signage (such as “Burn Ban” signs) in rural areas.”

SECTION 21: PREVIOUS ACTIONS

Willamson County – Previous Action #3	
Proposed Action:	Specify the use of calcium soil stabilizers as part of the County Engineer protocol for pavement subgrade work on county roads. This will make a durable permanent roadway layer and minimize damage from expansive soil issues.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Objectives Addressed:	G1
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Expansive Soil
Priority (High, Moderate, Low):	Low – Rank 15
Estimated Cost:	Less than \$10,000
Potential Funding Sources:	General Budget
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	24 months

2024 ANALYSIS:
Defer to plan update. On-going. Over the last several years the county has spent over \$100,000 annually on this action. It is an ongoing and continuous effort within the Road and Bridge department. Amend action to increase cost and change department.

SECTION 21: PREVIOUS ACTIONS

Willamson County – Previous Action #4	
Proposed Action:	Perform a THIRA on each property and develop a priority list of properties requiring mitigation actions. Following WHP assessments perform the fuels reduction and create shaded fuel breaks. Upon completion, prescribed burning should take place where appropriate to lower fuel loads.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Objectives Addressed:	G1, G2, G4, G5
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Local Plans and Regulations Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Priority (High, Moderate, Low):	Low – Rank 11
Estimated Cost:	Greater than \$100,000
Potential Funding Sources:	General Budget, FEMA Hazard Mitigation Funding, Private Donations, Volunteer Support
Lead Agency/Department Responsible:	Parks
Implementation Schedule:	48 months

2024 ANALYSIS:
Defer to plan update. Amend priority level to moderate.

SECTION 21: PREVIOUS ACTIONS

Willamson County – Previous Action #5	
Proposed Action:	A network of streamflow gauges and cameras needs to be installed throughout Williamson County. This data can then either be used in a real-time mapping solution or in a direct feed into the EOCs. This project is scalable to the available funding.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Objectives Addressed:	G1, G2, G4, G5
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane/Tropical Storm
Priority (High, Moderate, Low):	Medium – Rank 6
Estimated Cost:	Greater than \$100,000
Potential Funding Sources:	General Budget, FEMA Hazard Mitigation Funding, Private Donations.
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	60 months

2024 ANALYSIS:
Defer to plan update. In progress. The county has installed 5 gages and intends to install additional gages.

SECTION 21: PREVIOUS ACTIONS

Willamson County – Previous Action #6	
Proposed Action:	As a part of the County COOP planning process audit and map each facility relating to the potential risk to natural hazards. Develop a prioritization list and strategies for mitigating potential risks and hazards.
BACKGROUND INFORMATION	
Site and Location:	County COOP
Objectives Addressed:	G1, G2, G3, G4, G5
Type of Action: <i>(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)</i>	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam/Levee Failure, Drought, Earthquake, Expansive Soil, Extreme Heat, Flood, Hail, Hurricane/Tropical Storms, Lightning, Tornado, Wildfire, Wind, Winter Weather
Priority (High, Moderate, Low):	Medium – Rank 7
Estimated Cost:	Greater than \$100,000
Potential Funding Sources:	General Budget, FEMA Hazard Mitigation Funding, Bond Package
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	24 months

2024 ANALYSIS:
Defer to plan update. In progress. Amend action to say, “As a part of the County COOP planning process audit and map each facility relating to the potential risk to natural hazards. Develop a prioritization list and strategies for mitigating potential risks and hazards. Enhance GIS capabilities to obtain data and create a comprehensive all-hazards mapping solution.”

SECTION 21: PREVIOUS ACTIONS

Willamson County – Previous Action #7	
Proposed Action:	Collaborate with floodplain professionals, building contractors, and homeowners to identify repetitive flood loss properties/structures. Determine the most cost effective measures to implement to mitigate against continued flood losses including residential property buyouts.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Objectives Addressed:	G1, G2, G3, G4, G5
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Local Plans and Regulations, Structure and Infrastructure, Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam/Levee Failure, Flood, Hurricane/Tropical Storms
Priority (High, Moderate, Low):	High – Rank 4
Estimated Cost:	Greater than \$100,000
Potential Funding Sources:	General Budget, FEMA Mitigation Funding, Bond Packages
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	24 months

2024 ANALYSIS:
Completed. Currently, the county has 27 RLP within the unincorporated areas throughout the County. The County intends to utilize the Atlas 14 study and further insight from other professionals and residents on effective mitigation measures for these high-risk properties.

SECTION 21: PREVIOUS ACTIONS

Willamson County – Previous Action #8	
Proposed Action:	Collaborate with public safety professionals, traffic engineers, public information professionals and homeowner’s associations to develop comprehensive plans and messaging. Develop area-specific plans based upon local THIRA.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Objectives Addressed:	G1, G2, G3, G5
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam/Levee Failure, Flood, Hurricane/Tropical Storms, Wildfire
Priority (High, Moderate, Low):	Medium – Rank 8
Estimated Cost:	Less than \$10,000
Potential Funding Sources:	General Budget, FEMA Hazard Mitigation Funding, Donations/Sponsors
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	36 months

2024 ANALYSIS:
Completed. Evacuation and Population Protection Plan last updated in November of 2022.

SECTION 21: PREVIOUS ACTIONS

Willamson County – Previous Action #9	
Proposed Action:	Establish and train a core group of CERT instructors. Develop and implement a comprehensive CERT program to include training, continuing education, exercise program, and activation procedures.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Objectives Addressed:	G1, G2, G3
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Local Plans and Regulations, Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam/Levee Failure, Drought, Earthquake, Expansive Soil, Extreme Heat, Flood, Hail, Hurricane/Tropical Storms, Lightning, Tornado, Wildfire, Wind, Winter Weather
Priority (High, Moderate, Low):	Low – Rank 9
Estimated Cost:	Less than \$10,000
Potential Funding Sources:	General Budget, Homeland Security Funding, Donations/Sponsors
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	24 months

2024 ANALYSIS:
Defer to plan update.

SECTION 21: PREVIOUS ACTIONS

Willamson County – Previous Action #10	
Proposed Action:	Analyze past and potential future flood-related damages to road infrastructure. Develop a priority list based upon past damage, road/structure out of service time due to flooding, and potential or past history of flooding. Create and implement plans to mitigate identified structures.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Objectives Addressed:	G1, G4, G5
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Structure and Infrastructure, Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam/Levee Failure, Flood, Hurricane/Tropical Storm
Priority (High, Moderate, Low):	Low – Rank 10
Estimated Cost:	Greater than \$100,000
Potential Funding Sources:	Road Bonds, FEMA Hazard Mitigation Funding
Lead Agency/Department Responsible:	Road and Bridge
Implementation Schedule:	24 months

2024 ANALYSIS:
Defer to plan update. Ongoing. The County has approximately 4300 cross-culverts throughout the county. Approximately 10 culverts are assessed and upgraded / replaced each year. The County has a Long-Ranch Transportation Plan approved by the Court. Amend action to include, “Additional consideration would be given to the Long-Range Transportation Plan showing current and future roadway facilities to be considered as evacuation relief routes for flood, wildfire, or other major incidents.”

SECTION 21: PREVIOUS ACTIONS

Willamson County – Previous Action #11	
Proposed Action:	Collaborate with public safety professional, building associations, homeowner’s associations, forest service, and public information professionals to develop a comprehensive CWPP to include public education, fuels reduction, residential mitigation, and response recommendations.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Objectives Addressed:	G1, G2, G3, G4, G5
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Local Plans and Regulations, Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Priority (High, Moderate, Low):	High – Rank 2
Estimated Cost:	Greater than \$100,000
Potential Funding Sources:	General Budget, FEMA Hazard Mitigation Funding, Donations/Sponsorship
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	36 months

2024 ANALYSIS:
Defer to plan update. The CWPP was approved in 2015, however, due to rapid growth in the County a plan update is needed. Amend action to say, “to update the 2015 CWPP.”

SECTION 21: PREVIOUS ACTIONS

Williamson County – Previous Action #12	
Proposed Action:	Install “Burn Ban” or “Fire Danger” signs along major county roadways. Appropriate signage would be placed strategically through Williamson County, primarily in the rural areas, by County Road and Bridge personnel. During burn bans, the signs could be positioned by local fire departments and/or road and bridge personnel.
BACKGROUND INFORMATION	
Site and Location:	Major County Roadways
Objectives Addressed:	G1, G2, G4
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Structure and Infrastructure, Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Priority (High, Moderate, Low):	Low – Rank 12
Estimated Cost:	\$10,000 to \$100,000
Potential Funding Sources:	General Budget, FEMA Hazard Mitigation Funding, Donations/Sponsorship
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	24 months

2024 ANALYSIS:
Delete action. Combining this action with action #2.

SECTION 21: PREVIOUS ACTIONS

Willamson County – Previous Action #13	
Proposed Action:	Collaborate with public safety professionals, GIS, hazard-specific subject matter experts, private partners, and CIKR owner/operators to obtain data and create a comprehensive all-hazards mapping solution. Additional GIS tools may be required to facilitate use of the data.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Objectives Addressed:	G1, G3, G4
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam/Levee Failure, Earthquake, Expansive Soil, Flood, Hail, Lightning, Tornado, Wildfire
Priority (High, Moderate, Low):	High – Rank 1
Estimated Cost:	\$10,000 to \$100,000
Potential Funding Sources:	General Budget
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	24 months

2024 ANALYSIS:
Delete action. Combining with action #6.

SECTION 21: PREVIOUS ACTIONS

Willamson County – Previous Action #14	
Proposed Action:	Collaborate with public safety professional, building associations, homeowner's associations, floodplain professionals and public information professionals to develop a comprehensive Community Flood Protection Plan (CFPP) to include public education, infrastructure improvement/protection, residential mitigation, and response recommendations.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Objectives Addressed:	G1, G2, G3, G4, G5, G6
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Local Plans and Regulations, Natural Infrastructure, Structure and Infrastructure, Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam/Levee Failure, Flood, Hurricane/Tropical Storm
Priority (High, Moderate, Low):	High – Rank 3
Estimated Cost:	\$10,000 to \$100,000
Potential Funding Sources:	General Budget, FEMA Hazard Mitigation Funding, Donations/Sponsorship
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	36 months

2024 ANALYSIS:
Defer to Plan Update. In-progress. The County is in the process of working with consultants on the Atlas 14 Study which identifies areas and recommended mitigation concepts along with flood monitoring.

SECTION 21: PREVIOUS ACTIONS

Willamson County – Previous Action #15	
Proposed Action:	Install permanent structures with built automatic barriers to facilitate a more rapid closing of the road/structure. This shall include additional signage warning motorists of the flood potential prior to the barrier and attached to the barrier: “Turn Around Don’t Drown.”
BACKGROUND INFORMATION	
Site and Location:	Low Water Crossing – County-wide
Objectives Addressed:	G1, G2, G4, G5
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam/Levee Failure, Flood, Hurricane/Tropical Storms
Priority (High, Moderate, Low):	High – Rank 3
Estimated Cost:	Less than \$10,000
Potential Funding Sources:	Existing General Funds
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	12 months

2024 ANALYSIS:
Defer to plan update.

SECTION 21: PREVIOUS ACTIONS

CITY OF HUTTO

City of Hutto – Previous Action #1	
Proposed Action:	Establish an Agricultural Zoning District Ordinance to preserve open space of land in high-hazard areas.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Objective Addressed:	G3, G4
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Local Plans and Regulations, Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Flood, Wildfire
Priority (High, Moderate, Low):	Low – Rank 7
Estimated Cost:	Less than \$10,000
Potential Funding Sources:	City Funds
Lead Agency/Department Responsible:	Development Services
Implementation Schedule:	12 Months

2024 ANALYSIS:
Completed.

SECTION 21: PREVIOUS ACTIONS

City of Hutto – Previous Action #2	
Proposed Action:	Purchase NOAA All Hazard Radios to be used in city offices and residents.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Objective Addressed:	G1
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam/Levee Failure, Drought, Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storms, Lightning, Tornado, Wildfire, Wind, Winter Weather
Priority (High, Moderate, Low):	Low – Rank 8
Estimated Cost:	Less than \$10,000
Potential Funding Sources:	City Funds
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	12 months

2024 ANALYSIS:
Defer to plan update.

SECTION 21: PREVIOUS ACTIONS

City of Hutto – Previous Action #3	
Proposed Action:	Join the CRS of the NFIP, to incentivize new development to maintain existing 1 percent chance floodplain areas and to reward citizens who obtain flood insurance through the NFIP with lower premiums.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Objective Addressed:	G3, G5
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Local Plans and Regulations Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane/Tropical Storm
Priority (High, Moderate, Low):	Medium – Rank 4
Estimated Cost:	Less than \$10,000
Potential Funding Sources:	City Funds
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	24 Months

2024 ANALYSIS:
Defer to plan update.

SECTION 21: PREVIOUS ACTIONS

City of Hutto – Previous Action #4	
Proposed Action:	Provide public access to the local FIRMs and map ordering information through the City of Hutto website. A link to the FIRM map will be uploaded to the city's website, as well as instructions on how to order.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Objective Addressed:	G1, G2
Type of Action: <i>(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)</i>	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Priority (High, Moderate, Low):	Medium – Rank 5
Estimated Cost:	Less than \$10,000
Potential Funding Sources:	City Funds
Lead Agency/Department Responsible:	GIS
Implementation Schedule:	12 Months

2024 ANALYSIS:
Completed.

SECTION 21: PREVIOUS ACTIONS

City of Hutto – Previous Action #5	
Proposed Action:	Excavate a diversion channel on Cottonwood Creek to lower peak flows and associated flooding
BACKGROUND INFORMATION	
Site and Location:	Cottonwood Channel
Objective Addressed:	G1, G4
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane/Tropical Storm
Priority (High, Moderate, Low):	High – Rank 3
Estimated Cost:	Greater than \$100,000
Potential Funding Sources:	Needed
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	12 Months

2024 ANALYSIS:
Delete from plan update. The City no longer considers this a priority.

SECTION 21: PREVIOUS ACTIONS

City of Hutto – Previous Action #6	
Proposed Action:	Construct a new larger outlet structure on existing City Detention Pond.
BACKGROUND INFORMATION	
Site and Location:	Town West Outlet
Objective Addressed:	G1, G4
Type of Action: <i>(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)</i>	Structure and infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane/Tropical Storm
Priority (High, Moderate, Low):	High – Rank 2
Estimated Cost:	\$10,000 to \$100,000
Potential Funding Sources:	Needed
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	12 months

2024 ANALYSIS:
Delete from plan update. The City no longer considers this a priority.

SECTION 21: PREVIOUS ACTIONS

City of Hutto – Previous Action #7	
Proposed Action:	Educate homeowners of how to mitigate their homes from these hazards on city website and public forums.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Objective Addressed:	G1
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam/Levee Failure, Drought, Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storms, Lightning, Tornado, Wildfire, Wind, Winter Weather
Priority (High, Moderate, Low):	Medium – Rank 6
Estimated Cost:	Less than \$10,000
Potential Funding Sources:	City Funds
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	24 months

2024 ANALYSIS:
Ongoing. Defer to plan update.

SECTION 21: PREVIOUS ACTIONS

City of Hutto – Previous Action #8	
Proposed Action:	Safe routes will be identified for various emergency scenarios, and the designated emergency coordinator will publish these to the appropriate entities.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Objective Addressed:	G3, G4
Type of Action: (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>)	Local Plans and Regulations, Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam/Levee Failure, Flood, Hurricane/Tropical Storms, Wildfire
Priority (High, Moderate, Low):	High – Rank 1
Estimated Cost:	Less than \$10,000
Potential Funding Sources:	City Funds
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	36 months

2024 ANALYSIS:
Completed. This was achieved by identifying resources and deployment of resources during evacuation within the EOP and will further define in ESF 1.



SECTION 22 MITIGATION ACTIONS

SECTION 22: MITIGATION ACTIONS

Summary	1
Williamson County	3
City of Hutto	48
Georgetown ISD	61
Hutto ISD	68
Liberty Hill ISD	71
Meridian World School.....	76

SUMMARY

As discussed in Section 2, at the mitigation workshop the planning team and stakeholders met to develop mitigation actions for each of the natural hazards included in the Plan Update. Each of the actions in this section were prioritized based on FEMA's Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) criteria necessary for the implementation of each action.

As part of the economic evaluation of the STAPLEE analysis, jurisdictions analyzed each action in terms of the overall costs, measuring whether the potential benefit to be gained from the action outweighed costs associated with it. As a result of this exercise, priority was assigned to each mitigation action by marking them as High (H), Moderate (M), or Low (L). An action that is ranked as "High" indicates that the action will be implemented as soon as funding is received. A "Moderate" action is one that may not be implemented right away depending on the cost and number of citizens served by the action. Actions ranked as "Low" indicate that they will not be implemented without first seeking grant funding and after "High" and "Moderate" actions have been completed.

Within each mitigation action worksheet, the Planning Team considered all potential funding sources that could be utilized to implement the proposed project. To ensure all potential funding resources are considered and are not limited to those sources identified within the action worksheet, please see Appendix G for a list of all available State and Federal grant programs as of 2024. The Planning Team will continue to seek out other available funding sources during the 5-year cycle as notices of funding opportunity (NOFO) are released.

All mitigation actions created by Planning Team members are presented in this section in the form of Mitigation Action Worksheets. More than one hazard is sometimes listed for an action, if appropriate. Actions presented in this section represent a comprehensive range of mitigation actions per current State and FEMA Guidelines, including one action, per hazard, and at least two different types for each participating jurisdiction.

Williamson County and the City of Hutto are participants in the National Flood Insurance Program (NFIP). Flooding was identified as a significant risk for these communities therefore many of the mitigation actions were developed with flood mitigation in mind. Actions related to NFIP compliance include additional narrative when deemed appropriate.

SECTION 22: MITIGATION ACTIONS

Table 22-1. Williamson County Mitigation Action Matrix

TYPE OF ACTION	
Action #1 – Plans/Regulations (Blue)	Action #4 – Structural (Orange)
Action #2 – Education/Awareness (Red)	Action #5 – Preparedness/Response (Black)
Action #3 – Natural Systems Protections (Green)	

Jurisdiction	Dam Failure	Drought	Earthquake	Expansive Soils	Extreme Heat	Flood	Hail	Hurricane/ Tropical Storm	Lightning	Tornado	Wildfire	Thunderstorm Wind	Winter Storm	Hazardous Materials	Train Derailment
Williamson County	●●●	●●●	●●●	●●●	●●●	●●●●	●●●	●●●	●●●	●●●	●●●●	●●●	●●●	●●●	●●●
City of Hutto	N/A	●	●	●	●	●●●	●●	●●	●	●●	●	●●	●●	●	●●
Georgetown ISD	N/A	●●	●●	●●	●●●	●●	●●●	●●	●●●	●●	●●	●●	●●●	●●	●●
Hutto ISD	N/A	●●	●●	●●	●●●	●●	●●●	●●	●●●	●●	●●	●●	●●●	●●	●●
Liberty Hill ISD	N/A	●●	●●	●●	●●●	●●	●●●	●●	●●●	●●	●●	●●	●●●	●●	●●
Meridian World School	N/A	●●	●●	●●	●●●	●●	●●●	●●	●●●	●●	●●	●●	●●●	●●	●●

SECTION 22: MITIGATION ACTIONS

WILLIAMSON COUNTY

Williamson County – Action #1		
	Proposed Action:	Acquire and distribute NOAA weather radios.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to citizens through improved communications and early warning.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Storm, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #2	
Proposed Action:	Acquire and install generators with hard wired quick connections at all critical facilities.
BACKGROUND INFORMATION	
Site and Location:	County-wide; Expo Center
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Provide power for critical facilities during power outages and ensure continuity of critical services.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Earthquake, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Storm, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Energy (Power/Fuel)
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Helps ensure critical facilities continue to provide services during a power outage caused by unforeseen events.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #3	
Proposed Action:	Implement education and awareness program utilizing media, social media, bulletins, flyers, etc. to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and property damages. Include links to weather alerts and departmental phone listings with contact personnel for residents.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Promote hazard awareness and protect citizens from potential injuries and damages.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Storm, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #4		
	Proposed Action:	Harden/retrofit critical facilities to hazard-resistant levels.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce damages at critical facilities; Ensure continuity of critical services during and after event; Reduce risk of injury to emergency and critical personnel.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Storm, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan, Capital Improvement Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #5		
	Proposed Action:	Adopt and implement a routine tree trimming program that clears tree limbs near power lines and/or hanging in right-of-way; Remove dead trees from right-of way and drainage systems on a scheduled basis.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce damages to infrastructure; Ensure continuity of services during and after event; Reduce damages associated with power outages; Reduce risk of injuries or fatalities to vulnerable populations.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane / Tropical Storm, Flood, Thunderstorm Wind, Hail, Lightning, Tornado, Winter Storm, Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security, Energy (Power/Fuel)
Effect on New/Existing Buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$100,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents. Helps ensure critical facilities continue to provide services during a power outage caused by unforeseen events.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #6		
	Proposed Action:	Adopt on-site retention basin program in conjunction with development to address excessive stormwater / firefighting water source.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Requiring developers to implement on-site retention basin for new developments will prevent downstream impacts, reduce impacts to floodplain and provide additional potential water sources for firefighting uses.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Flood, Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #7	
Proposed Action:	Incorporate higher standards for hazard resistance in local application of the building code.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of damages to structures through improved construction techniques; Reduce recovery efforts for the community after an event.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Storm, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management, Road and Bridge Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Local Building Codes/Ordinances

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #8	
Proposed Action:	Develop / Provide additional means of access into single-entry neighborhoods; Update subdivision codes for a higher level of ingress and egress.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to residents through improved evacuation alternatives; improve firefighting capabilities through improved access alternatives.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Flood, Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$250,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management, Road and Bridge Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Local Building Codes/Ordinances, Capital Improvement Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #9		
	Proposed Action:	Raise electrical components of sewage lift stations above the Base Flood Elevation (BFE).
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of flood water contamination; Reduce risk of surface water infiltration and sewage backup; Ensure continuity of critical services.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Dam Failure
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security, Energy (Power/Fuel)
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$250,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #10	
Proposed Action:	Bury existing utility lines.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce damages to infrastructure; Ensure continuity of critical services during and after event; Reduce damages associated with power outages; Reduce risk of injuries or fatalities to vulnerable populations.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Winter Storm, Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security, Energy (Power/Fuel)
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Capital Improvement Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #11	
Proposed Action:	Evaluate access and road conditions for response vehicles. Develop and implement options to improve access and/or add redundant access routes in high-risk areas.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk and spread of wildfires through maintained and redundant access routes in high-risk areas; Improve response time for emergency services; Reduce risk of injury or damages; Provide additional ingress/egress routes through high-risk areas to prevent loss of life and avoid rescue efforts.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new or existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$500,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management, Road and Bridge Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	CWPP, Capital Improvement Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #12	
Proposed Action:	Adopt and implement a program for clearing debris from bridges, drains, and culverts.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce damages caused by flooding by maintaining or restoring drainage capacity.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000 (annually)
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management, Road and Bridge Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Local Building Codes/Ordinances

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #13	
Proposed Action:	Identify flood-prone and repetitive loss properties through the Texas Water Development Board. Identify and implement actions to reduce or eliminate flooding at identified properties.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of damages or injuries through flood mitigation at high-risk structures; Reduce the need for emergency response in high-risk areas; Reduce repetitive flood losses/claims; Reduce community recovery efforts and costs.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management, Road and Bridge Department
Implementation Schedule:	Within 24-36 months of plan adoption
Incorporation into Existing Plans:	Floodplain Management Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #14	
Proposed Action:	Undertake a comprehensive study of flood risk and reduction alternatives, with the assistance of the US Army Corps of Engineers. Implement feasible alternatives for flood reduction.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Improve risk assessment; Reduce risk of damages or injuries through drainage improvements; Reduce risk of damages and injuries.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication, Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24-36 months of plan adoption
Incorporation into Existing Plans:	Atlas 14 Study, Drainage Plan

COMMENTS:
The County is in the process of working with consultants on the Atlas 14 Study which identifies areas and recommended mitigation concepts along with flood monitoring.
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #15	
Proposed Action:	Join the Community Rating System program.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce flood insurance premiums for local residents; Reduce flood risk and build resiliency.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management, Road and Bridge Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Floodplain Management Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #16	
Proposed Action:	Develop a land acquisition program in flood hazard areas. Acquire and demolish repetitive loss properties. Acquire high risk vacant land and maintain as open space.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Eliminate risk of flood damages to high-risk structures and prevent future losses in high-risk flood hazard areas; Reduce downstream impacts associated with development in the floodplain; Reduce risk of injuries to citizens; Reduce burden on emergency services during and after a flood event. Acquire and preserve open spaces adjacent to floodplain areas.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure Natural Systems Protection (vacant land)

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management, Road and Bridge Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Floodplain Management Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #17	
Proposed Action:	Add thick vegetation on public lands along riverbanks. Retain and maintain natural vegetation in stormwater channels.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of erosion or scour due to flooding; Reduce damages to infrastructure including roadways, sidewalks, bridges, and culverts; Reduce demands on emergency response during high water events.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$20,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Flood Management Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #18	
Proposed Action:	Increase freeboard requirements for permitting structures in the SFHA; Adopt a “no-rise” in BFE in the 100-year floodplain; Update local flood ordinance to prohibit granting of variance in SFHA; Include “cumulative damage” provisions in local floodplain management ordinances.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce flood damages through development restrictions and improved construction requirements in flood-prone areas.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management, Road and Bridge Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Flood Damage Prevention Ordinance

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #19	
Proposed Action:	Undertake an initiative to increase the number of flood insurance policies. Implement a flood awareness program by providing FEMA/NFIP materials to mortgage lenders, real estate agents and insurance agents and place them in local libraries. Provide how-to information to residents for installing backflow valves to prevent reverse-flow floods.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce flood risk and build resiliency; Increase flood risk awareness; Reduce damage impact on residents after a flood event; Reduce the burden on state and federal resources.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Floodplain Management Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #20	
Proposed Action:	Repetitive flood loss properties - Collaborate with floodplain professionals, building contractors, and homeowners to identify repetitive flood loss properties / structures. Determine the most cost effective measures to implement to mitigate against continued flood losses including residential property buyouts.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of damages or injuries through flood mitigation at high-risk structures; Reduce the need for emergency response in high-risk areas; Reduce repetitive flood losses / claims; Reduce community recovery efforts and costs.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Floodplain Management Plan; Drainage Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #21		
	Proposed Action:	Increase drainage capacity; add stormwater detention and/or retention basins as deemed necessary to reduce flood risk.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce flood risk through improved drainage capacity; Reduce risk of damages and injuries; Reduce emergency response demands.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management, Road and Bridge Department
Implementation Schedule:	Within 24-48 months of plan adoption
Incorporation into Existing Plans:	Drainage Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #22	
Proposed Action:	Implement stream restoration / channelization program to ensure adequate drainage / diversion of stormwater.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of flood damages through improved drainage capacity/stormwater diversion; Reduce risk of injuries to citizens; Reduce burden on emergency services during and after a flood event.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Medium
Estimated Cost:	\$3,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management, Road and Bridge Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Drainage Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #23		
	Proposed Action:	Flood-proof sewage treatment plants in flood hazard / low-lying areas.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of flood water contamination; Reduce risk of surface water infiltration and sewage backup; Ensure continuity of critical services.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$250,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management, Road and Bridge Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Wastewater Management Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #24	
Proposed Action:	Conduct public education program on fire risks and wildland fire mitigation, with the assistance of the Texas Forest Service.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk and spread of wildfires through education and awareness programs; Reduce risk of damages and injuries.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	CWPP

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #25	
Proposed Action:	Work with state and local agencies to determine locations to reduce fuel on public and private lands. Implement fuels reduction program. Wildfire fuels reduction - Perform a fire break and fuels reduction analysis on each property and develop a priority list of properties requiring mitigation actions. Following WHP assessments, perform the fuels reduction and create shaded fuel breaks. Upon completion, prescribed burning should occur where appropriate to lower fuel loads.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of wildfires and the spread of wildfire through targeted fuels reduction programs.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$500,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	CWPP

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #26		
	Proposed Action:	Adopt and implement routine fire hydrant maintenance plan.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk and spread of wildfires through routine maintenance of fire hydrants; Reduce risk of injury or damages.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	CWPP

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #27		
	Proposed Action:	Cut firebreaks into public wooded areas according to risk factors.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of wildfires and the spread of wildfire through targeted firebreaks.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$500,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	CWPP

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #28	
Proposed Action:	Install fire danger rating / burn ban signs. Install warning signs at hazardous bridges and roadways subject to ice.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of damages and injuries on roadways and bridges during winter storm events through education and awareness programs; Reduce demand on emergency response during winter storms. Reduce risk of damages relating to wildfires.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	CWPP

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #29	
Proposed Action:	Implement a community education program regarding fire dangers for identified risk areas; Distribute pamphlets through neighborhood associations or insert flyers in water bills to make residents aware of wildfire hazard areas and fire protection measures for homes and yards.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk and spread of wildfires through education and awareness programs; Reduce risk of damages and injuries.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	CWPP

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #30	
Proposed Action:	Educate citizens on mitigation measures to prevent frozen pipes; Educate homeowners on carbon monoxide monitors / alarms.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of damages and injuries through mitigation education and awareness.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24-36 months of plan adoption
Incorporation into Existing Plans:	Drainage Plan

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #31	
Proposed Action:	Adopt and implement program to insulate outdoor pipes at critical and public buildings. Add building insulation to walls and attics and wrap / insulate pipes at critical and public facilities.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of damages at public buildings resulting from freezing temperatures; Reduce energy consumption and costs during extreme temperatures.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$250,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #32	
Proposed Action:	Upgrade critical facilities to include drought mitigation measures and expansive soils protection such as greywater reuse systems, drought tolerant landscaping, installation of a sprinkler system with regular watering schedule and installation of French drains where high plasticity soils are indicated.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce damages at critical facilities.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Expansive Soils
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$100,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Capital Improvement Plan

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #33		
	Proposed Action:	Installing outdoor warning systems to alert the public to imminent dangers and emergencies, including tornados and severe thunderstorms with high winds and hail.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of damages and injuries through mitigation education and awareness.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Tornado, Hurricane / Tropical Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #34	
Proposed Action:	Build safe room shelters throughout jurisdiction to include community centers and/or manufactured home parks so that all park residents can reach shelter in less than five minutes.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to citizens by providing shelter in high-risk areas during extreme weather events.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane / Tropical Storm, Tornado, Thunderstorm Wind
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$500,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan, Capital Improvement Plan

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #35	
Proposed Action:	Educate residents on how to mitigate their homes from these hazards on county website, public forums, and through public information releases. Consider adding appropriate signage (such as “Burn Ban” signs) in rural areas.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Promote hazard awareness and protect citizens from potential injuries and damages.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Weather, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$10,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #36		
	Proposed Action:	Specify the use of calcium soil stabilizers as part of the County Engineer protocol for pavement subgrade work on county roads. This will make a durable permanent roadway layer and minimize damage from expansive soil issues.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Minimize impacts of expansive soils; Reduce risk of damages to structures; Reduce recovery efforts for the community after an event.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Expansive Soils
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$100,000 (annually)
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Public Works, Road and Bridge Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #37	
Proposed Action:	Perform a THIRA on each property and develop a priority list of properties requiring mitigation actions. Following WHP assessments perform the fuels reduction and create shaded fuel breaks. Upon completion, prescribed burning should take place where appropriate to lower fuel loads.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of wildfires and the spread of wildfire through targeted fuels reduction programs.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$500,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Parks Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #38		
	Proposed Action:	A network of streamflow gauges and cameras needs to be installed throughout Williamson County. This data can then either be used in a real-time mapping solution or in a direct feed into the EOCs. This project is scalable to the available funding.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of injuries to citizens; Reduce burden on emergency services during and after a flood event.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane / Tropical Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$300,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 60 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #39	
Proposed Action:	As a part of the County COOP planning process, audit and map each facility relating to the potential risk to natural hazards. Develop a prioritization list and strategies for mitigating potential risks and hazards. Enhance GIS capabilities to obtain data and create a comprehensive all-hazards mapping solution.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Improve risk assessment; Reduce damages at critical facilities; Ensure continuity of critical services during and after event.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Weather
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$100,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #40	
Proposed Action:	Establish and train a core group of CERT instructors. Develop and implement a comprehensive CERT program to include training, continuing education, exercise program, and activation procedures.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to citizens by educating the public on how to prepare for hazards and disasters.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Weather, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$10,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #41	
Proposed Action:	Analyze past and potential future flood-related damages to road infrastructure. Develop a priority list based upon past damage, road / structure out of service time due to flooding, and potential or history of flooding. Create and implement plans to mitigate identified structures. Additional consideration would be given to the Long-Range Transportation Plan showing current and future roadway facilities to be considered as evacuation relief routes for flood, wildfire, or other major incidents. Upgrade undersized stormwater drains and culverts.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce damages at critical facilities; Ensure continuity of critical services during and after event; Reduce risk of injury to emergency and critical personnel; Reduce risk residents through improved evacuation alternatives and awareness efforts.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Flood, Hurricane / Tropical Storm, Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$1,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Long-Range Transportation Plan

SECTION 22: MITIGATION ACTIONS

COMMENTS:
The County has approximately 4300 cross-culverts throughout the county. Approximately 10 culverts are assessed and upgraded / replaced each year. The County has a Long-Ranch Transportation Plan approved by the Court.
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #42	
Proposed Action:	Collaborate with public safety professional, building associations, homeowner's associations, forest service, and public information professionals to update the 2015 CWPP and include new public education, fuels reduction, residential mitigation, and response recommendations.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk and spread of wildfires. Reduce risk of damages, and injuries.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$100,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	Existing CWPP

COMMENTS:
The CWPP was approved in 2015, however, due to rapid growth in the County a plan update is needed.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #43	
Proposed Action:	Collaborate with public safety professional, building associations, homeowner's associations, floodplain professionals and public information professionals to develop a comprehensive Community Flood Protection Plan (CFPP) to include public education, infrastructure improvement/protection, residential mitigation, and response recommendations.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of flood. Reduce risk of damages, and injuries.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$100,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Williamson County Office of Emergency Management
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	Atlas 14 Study

COMMENTS:
The County is in the process of working with consultants on the Atlas 14 Study which identifies areas and recommended mitigation concepts along with flood monitoring.
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

Williamson County – Action #44		
	Proposed Action:	Install permanent structures with built automatic barriers to facilitate a more rapid closing of the road / structure.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of injuries, fatalities and damages.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

CITY OF HUTTO

City of Hutto – Action #1		
	Proposed Action:	Implement education and awareness program utilizing media, social media, bulletins, flyers, etc. to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and property damages.
	BACKGROUND INFORMATION	
	Site and Location:	City-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Promote hazard awareness and protect citizens from potential injuries and damages.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Storm, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Less than \$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	City of Hutto Emergency Management
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	Emergency Operations Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

City of Hutto – Action #2		
	Proposed Action:	Enhance an area-wide telephone Emergency Notification System ("Reverse 911").
	BACKGROUND INFORMATION	
	Site and Location:	City-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to citizens through improved communication and early warning.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Storm, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$50,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	City of Hutto Emergency Management
Implementation Schedule:	Within 6 months of plan adoption
Incorporation into Existing Plans:	Emergency Operations Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

City of Hutto – Action #3		
	Proposed Action:	Develop alternative evacuation routes / plans and designate emergency thoroughfares, particularly in areas with limited capacity. Educate citizens on evacuation routes and procedures.
	BACKGROUND INFORMATION	
	Site and Location:	City-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk residents through improved evacuation alternatives and awareness efforts.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane/Tropical Storm, Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$50,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	City of Hutto Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	ESF 1

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

City of Hutto – Action #4	
Proposed Action:	Adopt smart growth initiatives. Incorporate a formal hazard mitigation plan in long-term community development planning activities.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk in high hazard areas by promoting and incentivizing development in low-risk areas; Build resiliency within the community; Reduce risk of damages through improved planning and construction practices.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Extreme Heat, Flood, Hurricane / Tropical Storm, Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$3,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	City of Hutto Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Hazard Mitigation Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

City of Hutto – Action #5	
Proposed Action:	Install warning signs at hazardous bridges and roadways subject to ice.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of damages and injuries on roadways and bridges during winter storm events through education and awareness programs; Reduce demand on emergency response during winter storms.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	City of Hutto Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Operations Plan

COMMENTS:

SECTION 22: MITIGATION ACTIONS

City of Hutto – Action #6		
	Proposed Action:	Educate citizens on mitigation measures to prevent frozen pipes; Educate homeowners on carbon monoxide monitors / alarms.
	BACKGROUND INFORMATION	
	Site and Location:	City-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of damages and injuries through mitigation education and awareness.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	City of Hutto Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	ESF 2

COMMENTS:

SECTION 22: MITIGATION ACTIONS

City of Hutto – Action #7	
Proposed Action:	Build safe room shelters throughout jurisdictional facilities so the occupants can reach shelter in less than five minutes.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to citizens by providing shelter in high-risk areas during extreme weather events.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Tornado, Hurricane / Tropical Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security, Food, Hydration, Shelter
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	City of Hutto Emergency Management
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

City of Hutto – Action #8	
Proposed Action:	Provide rebate program for individual safe rooms in single-family residences.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to citizens by providing in-home safe rooms in high-risk areas during extreme weather events.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Tornado, Hurricane / Tropical Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security, Food, Hydration, Shelter
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5,000 per safe room
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	City of Hutto Emergency Management
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

City of Hutto – Action #9		
	Proposed Action:	Implement technology for rail systems that communicates rail status to dispatch centers in order to route first responders efficiently through rail traffic.
	BACKGROUND INFORMATION	
	Site and Location:	City-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to first responders through improved communication and collaboration.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Transportation
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$100,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	City of Hutto Emergency Management
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	ESF 1

COMMENTS:

SECTION 22: MITIGATION ACTIONS

City of Hutto – Action #10	
Proposed Action:	Construct covered parking at city facilities to protect City assets from inclement weather.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to city assets and reduce costs of repair.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Thunderstorm Wind, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$750,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	City of Hutto Emergency Management
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

City of Hutto – Action #11	
Proposed Action:	Purchase NOAA All Hazard Radios to be used in city offices and residents.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to citizens through improved communications and early warning.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Less than \$10,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	City of Hutto Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	ESF 2

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

City of Hutto – Action #12		
	Proposed Action:	Join the CRS of the NFIP, to incentivize new development to maintain existing 1 percent chance floodplain areas and to reward citizens who obtain flood insurance through the NFIP with lower premiums.
	BACKGROUND INFORMATION	
	Site and Location:	City-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce flood insurance premiums for local residents; Reduce flood risk and build resiliency.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communications
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	City of Hutto Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

SECTION 22: MITIGATION ACTIONS

City of Hutto – Action #13		
	Proposed Action:	Educate homeowners of how to mitigate their homes from these hazards on city website and public forums.
	BACKGROUND INFORMATION	
	Site and Location:	City-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of damages and injuries through mitigation education and awareness.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Storm, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	City of Hutto Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

SECTION 22: MITIGATION ACTIONS

GEORGETOWN ISD

Georgetown ISD – Action #1	
Proposed Action:	Provide training and education, to include reunification training, to Georgetown ISD staff of hazards that can threaten the ISD and mitigation measures to reduce injuries, fatalities, and property damages.
BACKGROUND INFORMATION	
Site and Location:	ISD-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Promote hazard awareness and protect staff and students from potential injuries and damages.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$20,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	School Administration
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Georgetown ISD – Action #2	
Proposed Action:	Acquire and implement a hazard warning system, including a system that detects and provides warnings during lightning, severe thunderstorm, earthquake, extreme heat / cold, hail, hurricane / tropical storm, thunderstorm wind, flood, tornado, wildfire, and winter storm.
BACKGROUND INFORMATION	
Site and Location:	ISD-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk through improved communications and early warning.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$500,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	School Administration
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Georgetown ISD – Action #3		
	Proposed Action:	Construct covered awnings and walkways, and/or add tree canopies, throughout the campuses to protect students and staff from extreme heat and other hazard events.
	BACKGROUND INFORMATION	
	Site and Location:	ISD-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Protect staff and students from potential injuries and damages.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Hail, Lightning, Thunderstorm Wind
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$500,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	School Administration
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Georgetown ISD – Action #4	
Proposed Action:	Acquire and install generators with hard wired quick connections at all critical facilities.
BACKGROUND INFORMATION	
Site and Location:	ISD-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Provide power for critical facilities during power outages and ensure continuity of critical services.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Energy (Power/Fuel)
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	School Administration
Implementation Schedule:	Within 12-24 months of plan adoption
Incorporation into Existing Plans:	N/A
COMMENTS:	

SECTION 22: MITIGATION ACTIONS

Georgetown ISD – Action #5		
	Proposed Action:	Acquire and distribute emergency radios to enhance emergency communication between the ISD and law enforcement/first responders during hazard events.
	BACKGROUND INFORMATION	
	Site and Location:	ISD-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to citizens through improved education.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Communication

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$50,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	School Administration
Implementation Schedule:	Within 12-24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Georgetown ISD – Action #6		
	Proposed Action:	Install lightning protection systems on buildings to prevent damage from lightning strikes to buildings and critical systems.
	BACKGROUND INFORMATION	
	Site and Location:	ISD-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce loss of life and property.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Lightning
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	School Administration
Implementation Schedule:	Within 12-24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Georgetown ISD – Action #7	
Proposed Action:	Install/Implement redundancy in our network / communications systems and infrastructure to ensure business continuity and essential services during hazard events, natural disasters, etc.
BACKGROUND INFORMATION	
Site and Location:	ISD-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce loss of life and property. Increase communication and continuity of services during hazard events.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	School Administration
Implementation Schedule:	Within 12-24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

HUTTO ISD

Hutto ISD – Action #1	
Proposed Action:	Construct covered awnings and walkways, and/or add tree canopies, throughout the campuses to protect students and staff from extreme heat and other hazard events.
BACKGROUND INFORMATION	
Site and Location:	ISD-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Protect staff and students from potential injuries and damages.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Hail, Lightning, Thunderstorm Wind
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	School Administration
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Hutto ISD – Action #2	
Proposed Action:	Acquire and implement a hazard warning system, including a system that detects and provides warnings during lightning events.
BACKGROUND INFORMATION	
Site and Location:	ISD-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk through improved communications and early warning.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	School Administration
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Hutto ISD – Action #3		
	Proposed Action:	Provide training and education to Hutto ISD staff of hazards that can threaten the ISD and mitigation measures to reduce injuries, fatalities, and property damages.
	BACKGROUND INFORMATION	
	Site and Location:	ISD-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Promote hazard awareness and protect staff and students from potential injuries and damages.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	School Administration
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

LIBERTY HILL ISD

Liberty Hill ISD – Action #1	
Proposed Action:	Acquire and install generators with hard wired quick connections at all critical facilities.
BACKGROUND INFORMATION	
Site and Location:	ISD-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Maintaining power at critical facilities during outages will ensure continuity of essential services, potentially saving lives and reducing economic losses.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Earthquake, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Storm, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Energy (Power/Fuel)
Effect on New/Existing Buildings:	Existing critical facility buildings will be retrofitted with generator connections.
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Liberty ISD Safety & Security Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Emergency Operations Plan, Continuity of Operations Plan
COMMENTS:	
This action will significantly improve the school districts' resilience to power outages caused by various hazards. It will ensure that critical facilities can continue to operate during emergencies, providing essential services to the community.	

SECTION 22: MITIGATION ACTIONS

Liberty Hill ISD – Action #2	
Proposed Action:	Implement and provide education of safety measures for propane tanks at various LHISD facilities to mitigate risks from multiple hazards.
BACKGROUND INFORMATION	
Site and Location:	ISD-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reducing the risk of propane tank damage or explosion during hazard events, potentially avoiding property damage, injuries, and disruption to school operations. This action could prevent costly repairs, replacements, and potential liability issues.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure Education and Awareness
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Energy (Power/Fuel), Safety/Security, Hazardous Materials
Effect on New/Existing Buildings:	Reduce risk to existing structures with propane tank locations
Priority (High, Moderate, Low):	High
Estimated Cost:	\$100,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	LHISD Facilities and Maintenance Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Emergency Communications Plan, Emergency Operations Plan
COMMENTS:	
This action will address the safety of 11 propane tanks across various LHISD facilities, ranging from 1,000 to 6,000 gallons in capacity. Special attention should be given to larger tanks and those near critical facilities. Note that tanks #4 and #5 at the Junior High are currently out of service and may require different considerations.	

SECTION 22: MITIGATION ACTIONS

Liberty Hill ISD – Action #3	
Proposed Action:	Acquire and install a radio antenna to increase communication capabilities.
BACKGROUND INFORMATION	
Site and Location:	ISD-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Improved communication during disasters can lead to more effective emergency response, potentially saving lives and reducing property damage. It can also enhance coordination among first responders and emergency management personnel.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure Education and Awareness
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane/Tropical Storm, Lightning, Tornado, Wildfire, Thunderstorm Wind, Winter Storm, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	LHISD Facilities and Maintenance Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Emergency Communications Plan, Emergency Operations Plan
COMMENTS:	
This action will significantly improve the school districts' ability to maintain communication during various hazard events. Enhanced communication capabilities are crucial for effective emergency response, coordinating rescue efforts, and disseminating important information to the public during disasters.	

SECTION 22: MITIGATION ACTIONS

Liberty Hill ISD – Action #4	
Proposed Action:	Install safe rooms in flex classrooms that are being used as permanent classrooms.
BACKGROUND INFORMATION	
Site and Location:	Multiple school buildings with flex classrooms being used as permanent classrooms (specific locations to be determined).
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Protect staff and students from potential injuries and damage during flood events or other emergencies.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hail, Hurricane / Tropical Storm, Thunderstorm Wind
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security, Shelter
Effect on New/Existing Buildings:	Existing flex classrooms will be retrofitted with safe rooms.
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,500,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Liberty Hill ISD Facilities Management Department
Implementation Schedule:	Within 6-18 months of plan adoption
Incorporation into Existing Plans:	School Safety Plan, Emergency Communications Plan, Emergency Operations Plan
COMMENTS:	
This action will significantly improve the safety of students and staff in flex classrooms that are being used as permanent classrooms. The safe rooms will provide a secure shelter during severe weather events and other emergencies, aligning with best practices for school safety.	

SECTION 22: MITIGATION ACTIONS

Liberty Hill ISD – Action #5		
	Proposed Action:	Provide training and education, to include reunification training, to Liberty Hill ISD staff of hazards that can threaten the ISD and mitigation measures to reduce injuries, fatalities, and property damages.
	BACKGROUND INFORMATION	
	Site and Location:	ISD-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Promote hazard awareness and protect staff and students from potential injuries and damages.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$20,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	School Administration
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

MERIDIAN WORLD SCHOOL

Meridian World School– Action #1		
	Proposed Action:	Increase drainage capacity; add stormwater detention and/or retention basins as deemed necessary to reduce flood risk and ensure adequate drainage / diversion of stormwater.
	BACKGROUND INFORMATION	
	Site and Location:	School-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce flood risk through improved drainage capacity; Reduce risk of damages and injuries; Reduce emergency response demands.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane / Tropical Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Administration
Implementation Schedule:	Within 24-48 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
This is ongoing.

SECTION 22: MITIGATION ACTIONS

Meridian World School– Action #2	
Proposed Action:	Harden/retrofit critical facilities/critical buildings to hazard-resistant levels.
BACKGROUND INFORMATION	
Site and Location:	School-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce damages at critical facilities; Ensure continuity of critical services during and after event; Reduce risk of injury to emergency and critical personnel.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Administration
Implementation Schedule:	Within 12-24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Meridian World School– Action #3	
Proposed Action:	Construct covered areas, awnings, and walkways, throughout school to protect students and staff from extreme heat and other hazard events.
BACKGROUND INFORMATION	
Site and Location:	School-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of damages or injuries through improved building standards; reduce risk of damages and injuries
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$200,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Administration
Implementation Schedule:	Within 12-24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 22: MITIGATION ACTIONS

Meridian World School– Action #4	
Proposed Action:	Provide training and education to Meridian World School staff of hazards that can threaten the school and mitigation measures to reduce injuries, fatalities, and property damages.
BACKGROUND INFORMATION	
Site and Location:	School-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Promote hazard awareness and protect staff and students from potential injuries and damages.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm, Hazardous Materials, Train Derailment
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	ISD Budget, Staff time, Bonds, Tax Revenue; State Grants: GLO, TAMFS, TDA, TDEM, TWDB, TXDOT; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Administration
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

The background of the entire page features a silhouette of a longhorn with long, curved horns, facing forward. The background is a warm sunset or sunrise sky with orange and yellow hues. Overlaid on the lower half of the image are several concentric, semi-transparent blue circles. The text 'SECTION 23' is in a white, sans-serif font, and 'PLAN MAINTENANCE' is in a larger, bold, white, sans-serif font, both positioned on the left side of the lower half.

SECTION 23
**PLAN
MAINTENANCE**

SECTION 23: PLAN MAINTENANCE

Plan Maintenance Procedures.....	1
Incorporation	1
Process of Incorporation	1
Monitoring and Evaluation	5
Monitoring.....	5
Evaluation.....	5
Updating.....	6
Plan Revisions.....	6
Five (5) Year Review	6
Continued Public Involvement	7

PLAN MAINTENANCE PROCEDURES

The following is an explanation of how the participating jurisdictions within Williamson County, and the general public will be involved in implementing, evaluating, and enhancing the Plan over time. When the plan is discussed in all maintenance procedures it includes mitigation actions and hazard assessments. The sustained hazard mitigation planning process consists of four main parts:

- o Incorporation
- o Monitoring and Evaluation
- o Updating
- o Continued Public Involvement

INCORPORATION

Participating jurisdictions within Williamson County will be responsible for further development and implementation of mitigation actions. Each action has been assigned to a specific department within the participating jurisdictions. The following describes the process by which participating jurisdictions will incorporate elements of the mitigation plan into other planning mechanisms.

PROCESS OF INCORPORATION

Once the Plan Update is adopted, participating jurisdictions within Williamson County will implement actions based on priority and the availability of funding. The planning area currently implements policies and programs to reduce loss to life and property from hazards. The mitigation actions developed for this Plan Update enhance this ongoing effort and will be implemented through other program mechanisms where possible.

The potential funding sources listed for each identified action may be used when the jurisdiction seeks funds to implement actions. An implementation time period or a specific implementation date has been assigned to each action as an incentive for completing each task and gauging whether actions are implemented in a timely manner.

Participating jurisdictions within Williamson County will integrate implementation of their mitigation actions with other plans and policies such as construction standards and emergency management plans, and ensure that these actions, or proposed projects, are reflected in other planning efforts.

SECTION 23: PLAN MAINTENANCE

Coordinating and integrating components of other plans and policies into goals and objectives of the Plan Update will further maximize funding and provide possible cost-sharing of key projects, thereby reducing loss of lives and property and mitigating hazards affecting the area.

Upon formal adoption of the Plan Update, planning team members from each participating jurisdiction will work to integrate the hazard mitigation strategies into other plans and codes as they are developed. Participating team members will conduct periodic reviews of plans and policies, once per year at a minimum, and analyze the need for revisions in light of the approved Plan. The planning team will review all comprehensive land use plans (applicable jurisdictions only), capital improvement plans (applicable jurisdictions only), annual budget reviews, emergency operations or management plans (applicable jurisdictions only), and transportation plans (applicable jurisdictions only) to guide and control development. Participating jurisdictions will ensure that capital improvement planning (applicable jurisdictions only) in the future will also contribute to the goals of this hazard mitigation Plan Update to reduce the long-term risk to life and property from all hazards. Within one year of formal adoption of the hazard mitigation Plan Update, existing planning mechanisms will be reviewed by each jurisdiction.

Williamson County is committed to supporting the participating jurisdictions as they implement their mitigation actions. Planning team members will review and revise, as necessary, the long-range goals and objectives in strategic plan and budgets to ensure that they are consistent with this mitigation action plan. Additionally, the planning area will work to advance the goals of this hazard mitigation plan through its routine, ongoing, long-range planning, budgeting, and work processes.

Table 23-1 identifies types of planning mechanisms and examples of methods for incorporating the Plan Update into other planning efforts. The team members, listed in Table 23-2 below, will be responsible for the review of these planning mechanisms and their incorporation of the plan, with the exception of the Floodplain Management Plans; the jurisdictions who have a Floodplain Administrator on staff will be responsible for incorporating the plan when floodplain management plans are updated, or new plans are developed.

Table 23-1. Methods of Incorporation of the Plan

PLANNING MECHANISM	DEPARTMENT / TITLE RESPONSIBLE	INCORPORATION OF PLAN
Annual Budget Review	Williamson County – Emergency Management: Director Williamson County – Emergency Services: Project Manager II City of Hutto – Emergency Management: Deputy Director Georgetown ISD – Health and Safety Services: Director Hutto ISD – Safety and Emergency Management: Emergency Operations & Campus Safety Coordinator	Various departments and key personnel that participated in the planning process for participating jurisdictions within Williamson County will review the Plan and mitigation actions therein when conducting their annual budget review. Allowances will be made in accordance with grant applications sought, and mitigation actions that will be undertaken, according to the implementation schedule of the specific action.

SECTION 23: PLAN MAINTENANCE

PLANNING MECHANISM	DEPARTMENT / TITLE RESPONSIBLE	INCORPORATION OF PLAN
	Liberty Hill ISD - Administration: Chief of Schools Meridian World School: Chief Operations Officer	
Capital Improvement Plans	Williamson County – Emergency Management: Director Williamson County – Emergency Services: Project Manager II City of Hutto – Emergency Management: Deputy Director Georgetown ISD – Health and Safety Services: Director Hutto ISD – Safety and Emergency Management: Emergency Operations & Campus Safety Coordinator Meridian World School: Chief Operations Officer	Several participating jurisdictions within Williamson County have a Capital Improvement Plan (CIP) in place or under development. Prior to any revisions to the CIP, County, City, ISD, and school departments will review the risk assessment and mitigation strategy sections of the HMAP, as limiting public spending in hazardous zones is one of the most effective long-term mitigation actions available to local governments.
Community Wildfire Protection Plan	Williamson County – Emergency Management: Director Georgetown ISD – Health and Safety Services: Director	Currently, two participating jurisdictions within Williamson County have a Community Wildfire Protection Plan (CWPP). CWPPs include preventative and corrective actions to address a community's risk of damage from wildfire. Information found in Section 16 of this Plan Update discussing the people and property at risk to wildfire will be reviewed and revised when Williamson County and Georgetown ISD update their CWPP or develop new plans.
Comprehensive Plans	City of Hutto – Emergency Management: Deputy Director	One participating jurisdiction within Williamson County, the City of Hutto, has a Comprehensive Land Use Plan in place. Since comprehensive plans involve developing a unified vision for a community, the mitigation vision and goals of the Plan will be reviewed in the development or revision of a Comprehensive Plan.

SECTION 23: PLAN MAINTENANCE

PLANNING MECHANISM	DEPARTMENT / TITLE RESPONSIBLE	INCORPORATION OF PLAN
Floodplain Management Plans	Williamson County: Floodplain Administrator City of Hutto: Floodplain Administrator	Floodplain management plans include preventative and corrective actions to address the flood hazard. Therefore, the actions for flooding and information found in Section 10 of this Plan Update discussing the people and property at risk to flood will be reviewed and revised when Williamson County and the City of Hutto update their management plans or develops new plans.
Grant Applications	Williamson County – Emergency Management: Director Williamson County – Emergency Services: Project Manager II City of Hutto – Emergency Management: Deputy Director Georgetown ISD – Health and Safety Services: Director Hutto ISD – Safety and Emergency Management: Emergency Operations & Campus Safety Coordinator Liberty Hill ISD - Administration: Chief of Schools Meridian World School: Chief Operations Officer	The HMAP will be evaluated by participating jurisdictions within Williamson County when grant funding is sought for mitigation projects. If a project is not in the Plan Update, a Plan Revision may be necessary to include the action in the Plan.
Regulatory Plans	Williamson County – Emergency Management: Director Williamson County – Emergency Services: Project Manager II City of Hutto – Emergency Management: Deputy Director Georgetown ISD – Health and Safety Services: Director Hutto ISD – Safety and Emergency Management: Emergency Operations & Campus Safety Coordinator Liberty Hill ISD - Administration: Chief of Schools Meridian World School: Chief Operations Officer	Currently, several participating jurisdictions within Williamson County have regulatory plans in place, such as Emergency Operations Plans, Land Use Plans, and Evacuation Plans. The Plan Update will be consulted when County, City, ISD, and school departments review or revise their current regulatory planning mechanisms, or in the development of regulatory plans that are not currently in place.

SECTION 23: PLAN MAINTENANCE

MONITORING AND EVALUATION

Periodic revisions of the Plan are required to ensure that goals, objectives, and mitigation actions are kept current. When the plan is discussed in these sections it includes the risk assessment and mitigation actions as a part of the monitoring, evaluating, updating and review process. Revisions may be required to ensure the Plan is in compliance with federal and state statutes and regulations. This section outlines the procedures for completing Plan revisions, updates, and review. Table 23-2 indicates the department and title of the party responsible for Plan monitoring, evaluating, updating, and review of the Plan.

Table 23-2. Team Members Responsible for Plan Monitoring, Evaluating, Updating, and Review of the Plan

ORGANIZATION / DEPARTMENT	TITLE
Williamson County – Emergency Management	Director
Williamson County – Emergency Services	Project Manager II
City of Hutto – Emergency Management	Deputy Director
Georgetown ISD – Health and Safety Services	Director
Hutto ISD – Safety and Emergency Management	Emergency Operations & Campus Safety Coordinator
Liberty Hill ISD - Administration	Chief of Schools
Meridian World School	Chief Operations Officer

MONITORING

Designated Planning Team members are responsible for monitoring, evaluating, updating, and reviewing the Plan, as shown in Table 23-2. Individuals holding the title listed in Table 23-2 will be responsible for monitoring the Plan on an annual basis. Plan monitoring includes reviewing and incorporating into the Plan other existing planning mechanisms that relate or support goals and objectives of the Plan; monitoring the incorporation of the Plan into future updates of other existing planning mechanisms as appropriate; reviewing mitigation actions submitted and coordinating with various County, City, ISD and school departments to determine if mitigation actions need to be re-evaluated and updated; evaluating and updating the Plan as necessary; and monitoring plan maintenance to ensure that the process described is being followed, on an annual basis, throughout the planning process. The Planning Team will develop a brief report that identifies policies and actions in the plan that have been successfully implemented and any changes in the implementation process needed for continued success. A summary of meeting notes will report the particulars involved in developing an action into a project. In addition to the annual monitoring, the Plan will be similarly reviewed immediately after extreme weather events include but not limited to state and federally declared disasters.

EVALUATION

As part of the evaluation process, the Planning Team will assess changes in risk; determine whether the implementation of mitigation actions is on schedule; determine whether there are any implementation problems, such as technical, political, legal, or coordination issues; and identify

SECTION 23: PLAN MAINTENANCE

changes in land development or programs that affect mitigation priorities for each respective department or organization.

The Planning Team will meet on an annual basis to evaluate the Plan and identify any needed changes and assess the effectiveness of the plan achieving its stated purpose and goals. The team will evaluate the number of mitigation actions implemented along with the loss-reduction associated with each action. Actions that have not been implemented will be evaluated to determine if any social, political, or financial barriers are impeding implementation and if any changes are necessary to improve the viability of an action. The team will evaluate changes in land development and/or programs that affect mitigation priorities in their respective jurisdictions. The annual evaluation process will help to determine if any changes are necessary. In addition, the Plan will be similarly evaluated immediately after extreme weather events including but not limited to state and federally declared disasters.

UPDATING

PLAN REVISIONS

At any time, minor technical changes may be made to update the Williamson County Hazard Mitigation Action Plan Update 2025. Material changes to mitigation actions or major changes in the overall direction of the Plan or the policies contained within it, must be subject to formal adoption by the participating jurisdictions.

The participating jurisdictions within Williamson County will review proposed revisions and vote to accept, reject, or amend the proposed change. Upon ratification, the Revision will be transmitted to TDEM.

In determining whether to recommend approval or denial of a Plan Revision request, participating jurisdictions will consider the following factors:

- o Errors or omissions made in the identification of issues or needs during the preparation of the Plan Update;
- o New issues or needs that were not adequately addressed in the Plan Update; and
- o Changes in information, data, or assumptions from those on which the Plan Update was based.

FIVE (5) YEAR REVIEW

The Plan will be thoroughly reviewed by the Planning Team at the end of three years from the approval date, to determine whether there have been significant changes in the planning area that necessitate changes in the types of mitigation actions proposed. Factors that may affect the content of the Plan include new development in identified hazard areas, increased exposure to hazards, disaster declarations, increase or decrease in capability to address hazards, and changes to federal or state legislation.

The Plan review process provides the participating jurisdictions within Williamson County an opportunity to evaluate mitigation actions that have been successful, identify losses avoided due to the implementation of specific mitigation measures, and address mitigation actions that may not have been successfully implemented as assigned.

It is recommended that the full Executive and Advisory Planning Team (Section 2, Tables 2-1 and 2-2) meet to review the Plan at the end of three years because grant funds may be necessary for

SECTION 23: PLAN MAINTENANCE

the development of a five-year update. Reviewing planning grant options in advance of the five-year Plan update deadline is recommended considering the timelines for grant and planning cycles can be in excess of a year.

Following the Plan review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and Plan Revision process outlined herein. Upon completion of the review, update, and revision process the revised Plan will be submitted to TDEM for final review and approval in coordination with FEMA.

CONTINUED PUBLIC INVOLVEMENT

Public input was an integral part of the preparation of this Plan and will continue to be essential for Plan updates. The Public will be directly involved in the annual evaluation, monitoring, reviews, and cyclical updates. Changes or suggestions to improve or update the Plan will provide opportunities for additional public input.

The public can review the Plan on the participating jurisdictions' websites, where officials and the public are invited to provide ongoing feedback, via email.

The Planning Team may also designate voluntary citizens from the planning area or willing stakeholder members from the private sector businesses that were involved in the Plan's development to provide feedback on an annual basis. It is important that stakeholders and the immediate community maintain a vested interest in preserving the functionality of the planning area as it pertains to the overall goals of the mitigation plan. The Planning Team is responsible for notifying stakeholders and community members on an annual basis and maintaining the Plan.

Media, including local newspaper and radio stations, will be used to notify the public of any maintenance or periodic review activities during the implementation, monitoring, and evaluation phases. Additionally, local news media will be contacted to cover information regarding Plan updates, status of grant applications, and project implementation. Local and social media outlets, such as Facebook and X (formerly known as Twitter), will keep the public and stakeholders apprised of potential opportunities to fund and implement mitigation projects identified in the Plan.



APPENDIX A **PLANNING TEAM**

APPENDIX A: PLANNING TEAM

Planning Team Members.....	1
Stakeholders	3

PLANNING TEAM MEMBERS

The Williamson County Hazard Mitigation Action Plan Update 2025 was organized using a direct representative model. An Executive Planning Team from the participating jurisdictions, shown in Table A-1, was formed to coordinate planning efforts and request input and participation in the planning process. Table A-2 reflects the Advisory Planning Team, consisting of area organizations and departments that participated throughout the planning process. Table A-3 is comprised of stakeholders who were invited to provide Plan input. Public outreach efforts and meeting documentation is provided in Appendix E.

Table A-1. Executive Planning Team

ORGANIZATION / DEPARTMENT	TITLE
Williamson County – Emergency Management	Director
Williamson County – Emergency Services	Project Manager II
City of Hutto – Emergency Management	Deputy Director
Georgetown ISD - Health and Safety Services	Director
Hutto ISD – Safety and Emergency Management	Emergency Operations & Campus Safety Coordinator
Liberty Hill ISD – Administration	Chief of Schools
Meridian World School	Chief Operations Officer

Table A-2. Advisory Planning Team

ORGANIZATION / DEPARTMENT	TITLE
Williamson County – Conservation Foundation	Environmental Program Director
Williamson County – Conservation Foundation	Office Administrator
Williamson County – Emergency Management	Deputy Director
Williamson County – Emergency Management	Emergency Management Specialist
Williamson County – Emergency Management	Emergency Management Specialist ¹
Williamson County – Emergency Services	Senior Director

¹ Please note county representatives have the same title, and this is not a duplicate entry

APPENDIX A: PLANNING TEAM

ORGANIZATION / DEPARTMENT	TITLE
Williamson County – Development Services and Drainage	Floodplain Manager
Williamson County – Fire	Assistant Fire Marshal
Williamson County – Fire	Fire Marshal
Williamson County – Geographic Information Systems	GIS Analyst
Williamson County – Geographic Information Systems	GIS Manager
Williamson County – Geographic Information Systems	Public Safety GIS Analyst
Williamson County – Government	County Judge
Williamson County – Government	Precinct 1 Commissioner
Williamson County – Government	Precinct 4 Commissioner
Williamson County – Housing and Urban Development	Community Development Administrator
Williamson County – Infrastructure	County Engineer / Development & Drainage Division Director
Williamson County – Infrastructure	Senior Director of Infrastructure
Williamson County – Infrastructure	Deputy Director of Infrastructure / Director of Road and Bridge
Williamson County – Public Affairs	Communications and Media Relations Director
Williamson County – Public Affairs	Communications Specialist
Williamson County – Sheriff's Office	County Sheriff
Williamson County – Sheriff's Office	Lieutenant
City of Hutto - Administration	City Manager
City of Hutto - Administration	Mayor
City of Hutto – Emergency Management	Director
City of Hutto – Development Services	Code Compliance
City of Hutto – Development Services	Planning Representative
City of Hutto – Parks & Recreation	Director
City of Hutto – Police	Chief
City of Hutto – Public Works	Director

APPENDIX A: PLANNING TEAM

ORGANIZATION / DEPARTMENT	TITLE
Georgetown ISD – Campus and Learner Support	Assistant Superintendent
Georgetown ISD – Special and Federal Programs	Executive Director
Georgetown ISD – Support Services	Executive Director
Georgetown ISD – Support Services	Director of Maintenance
Hutto ISD – Administration	Superintendent
Hutto ISD – Maintenance and Operations	Operations Manager
Liberty Hill ISD – Administration	Superintendent
Liberty Hill ISD – Administration	Construction Director
Liberty Hill ISD – Administration	Safety and Security Coordinator
Liberty Hill ISD – Human Resources	Director
Liberty Hill ISD – Police	Chief
Liberty Hill ISD – Student Support Services	Executive Director
Meridian World School	CEO / Founder
Meridian World School	Director of Community Engagement

STAKEHOLDERS

The following groups listed in Table A-3 represent a list of organizations invited to stakeholder meetings, public meetings, and workshops throughout the planning process and include: members of community groups, non-profit organizations, private businesses, utility providers, neighboring counties, school and universities, and state and federal agencies. The public were also invited to participate via e-mail throughout the planning process. Many of the invited organizations and stakeholders participated and were integral to providing comments and data for the Plan. For a list of attendees at meetings, please see Appendix E².

Table A-3. Stakeholders

AGENCY	TITLE	STAKEHOLDER TYPE
A. Frank Smith Jr. Library Center (Southwestern University Library)	Associate Director	Community Organization
American Red Cross	Chief Executive Officer	Community Organization

² Information contained in Appendix E is exempt from public release under the Freedom of Information Act (FOIA).

APPENDIX A: PLANNING TEAM

AGENCY	TITLE	STAKEHOLDER TYPE
American Red Cross	Disaster Program Manager for Central Texas	Community Organization
American Red Cross	Senior Community Disaster Program Manager	Community Organization
Bastrop County	Emergency Management Coordinator	Neighboring Community
Baylor Scott and White Hospital - Round Rock	Chief Executive Officer	Healthcare Agency
Bell County	Emergency Management Coordinator	Neighboring Community
Brazos River Authority	Emergency Management	Community Organization / Utility Provider
Brazos River Authority	Service Manager	Community Organization / Utility Provider
Brookwood in Georgetown	Executive Organization	Community Organization
Burnet County	Emergency Management Coordinator	Neighboring Community
Brushy Creek MUD	District Engineer	Utility Provider
Capital Area Council of Governments	Homeland Security Director	Regional Agency
Capital Area Council of Governments	Regional Homeland Security Planner	Regional Agency
Cedar Park Library	Library Director	Community Organization
City of Bartlett	City Administrator	Neighboring Community
City of Cedar Park	Assistant Emergency Management Coordinator	Neighboring Community
City of Cedar Park	Emergency Management Coordinator	Neighboring Community
City of Coupland	Mayor	Neighboring Community
City of Florence	Building Services Director	Neighboring Community
City of Florence	Chief of Police	Neighboring Community
City of Florence	Mayor	Neighboring Community
City of Georgetown	Emergency Management Coordinator	Neighboring Community
City of Granger	Mayor	Neighboring Community
City of Jarrell	City Manager	Neighboring Community

APPENDIX A: PLANNING TEAM

AGENCY	TITLE	STAKEHOLDER TYPE
City of Jarrell	Emergency Management Coordinator	Neighboring Community
City of Leander	Assistant Emergency Management Coordinator	Neighboring Community
City of Leander	Emergency Management Coordinator	Neighboring Community
City of Liberty Hill	Mayor	Neighboring Community
City of Round Rock	Emergency Management Coordinator	Neighboring Community
City of Taylor	Assistant Fire Chief / Fire Marshal	Neighboring Community
City of Taylor	Emergency Management Coordinator	Neighboring Community
City of Taylor	Fire Chief	Neighboring Community
City of Thrall	Mayor	Neighboring Community
City of Weir	City Administrator	Neighboring Community
City of Weir	Mayor	Neighboring Community
City of Weir	Mayo Pro-Tem	Neighboring Community
Cornerstone Hospital - Austin - Round Rock	Chief Executive Officer	Healthcare Agency
Coupland ISD	Principal	Academia
Environmental Protection Agency (EPA) – Region 6	Deputy Regional Administration	Federal Agency
Environmental Protection Agency (EPA) – Region 6	Director of Superfund and Emergency Management Division	Federal Agency
Environmental Protection Agency (EPA) – Region 6	Regional Administration	Federal Agency
Eula Hunt Beck Florence Library	General Representative	Community Organization
Exxon Mobil	County Representative	Utility Provider
Florence ISD	Assistant Superintendent of Curriculum & Instruction	Academia
Florence ISD	Director of Information Systems & Safety	Academia
Florence ISD	Superintendent	Academia
Georgetown Airport	General Representative	Community Organization

APPENDIX A: PLANNING TEAM

AGENCY	TITLE	STAKEHOLDER TYPE
Georgetown Animal Shelter	General Representative	Community Organization
Georgetown Library	Library Director	Community Organization
Granger ISD	Safety Coordinator	Academia
Granger ISD	Superintendent	Academia
Habitat for Humanity	Media Coordinator	Non-Profit Organization
Halff	Atlas 14 Contractor	Private Organization
Halff	Atlas 14 Contractor	Private Organization
HEB	Emergency Preparedness Manager	Community Organization
HNTB	Atlas 14 Contractor	Private Organization
HNTB	Atlas 14 Contractor	Private Organization
Hutto Has a Heart	Pastor	Religious Organization
Hutto Historical Preservation Commission	Director	Community Organization
Hutto Public Library	Circulation Clerk	Community Organization
Jarrell ISD	DAEP Administrator	Academia
Jarrell ISD	Safety / DAEP Administrator	Academia
Jarrell ISD	ISD Chief of Police	Academia
Jarrell ISD	ISD Police Administrative Assistant	Academia
Leander ISD	Director of Emergency Management	Academia
Leander ISD	Risk Management Director	Academia
Leander ISD	Security Director	Academia
Leander Public Library	Library Director	Community Organization
Lee County	Emergency Management Coordinator / Grants Writer	Neighboring Community
Lower Brushy Creek WCID	General Manager	Utility Provider
Meal on Wheels	Director of Community Services	Non-Profit Organization
Milam County	Emergency Management Coordinator	Neighboring Community

APPENDIX A: PLANNING TEAM

AGENCY	TITLE	STAKEHOLDER TYPE
National Weather Services (NWS)	Austin/San Antonio Regional Contact	Federal Agency
Rifline	Atlas 14 Contractor	Private Organization
Samsung	Environmental Technician	Utility Provider
Samsung	Safety Specialist	Utility Provider
Samsung	SemiConductor	Utility Provider
Samsung	Senior Environmental Engineer	Utility Provider
St. David's Medical Center and Hospital - Georgetown	Chief Executive Officer	Healthcare Agency
State Legislature	House District 20	State Legislature
State Legislature	House District 52	State Legislature
State Legislature	House District 136	State Legislature
State Senate	Senate District 5	State Senate
State Senate	Senate District 24	State Senate
Taylor ISD	Assistant Superintendent of Teaching and Learning	Academia
Taylor ISD	Director of Elementary Schools and Federal Programs	Academia
Taylor ISD	Principal	Academia
Temple College - East Williamson County Higher Education Center	Chief of Operations	Academia
Texas A&M Agrilife Extension	District 8 Representative	State Agency
Texas A&M Forest Service	Mitigation and Prevention Program Coordinator for Williamson County	State Agency
Texas Commission on Environmental Quality (TCEQ) - Region 11	Executive Assistant	State Agency
Texas Commission on Environmental Quality (TCEQ) - Region 11	Regional Director	State Agency
Texas Department of Health and Human Services, Region 7	Deputy Regional Director	State Agency

APPENDIX A: PLANNING TEAM

AGENCY	TITLE	STAKEHOLDER TYPE
Texas Department of Health and Human Services, Region 7	Program Manager	State Agency
Texas Department of Health and Human Services, Region 7	Regional Director	State Agency
Texas Department of Housing and Community Affair	Director of Single-Family and Homeless Program	State Agency
Texas Department of Housing and Community Affair	Manager of Single-Family Program	State Agency
Texas Department of Transportation (TXDOT)	District Engineer	State Agency
Texas Division of Emergency Management (TDEM)	Administrative Associate V	State Agency
Texas Division of Emergency Management (TDEM)	County Liaison Officer	State Agency
Texas Division of Emergency Management (TDEM)	Regional Disaster Finance Coordinate	State Agency
Texas Floodplain Management Association, Region 5	Director	State Agency
Texas Parks and Wildlife	District Leader	State Agency
Texas State Technical College (TSTC)	Deputy Safety Officer	Academia
Texas State University – Round Rock Campus	Interim Vice President	Academia
Texas State University – Round Rock Campus	University Police Sergeant	Academia
Texas Water Development Board (TWDB)	Deputy Executive Administrative of the Planning Division	State Agency
Texas Windstorm Insurance Association	Chief Deputy Commissioner	State Agency
Travis County	Deputy Emergency Management Coordinator	Neighboring Community
United Way – Williamson County	Executive Director	Community Organization
University Village	General Representative	Residential Community - Vulnerable Populations
U.S. Army Corps of Engineers / Texas Silver Jackets	Regional Representative for Fort Worth/Galveston Office	Federal Agency

APPENDIX A: PLANNING TEAM

AGENCY	TITLE	STAKEHOLDER TYPE
U.S. Fish & Wildlife	Southwest Regional Representative	Federal Agency
Williamson County ARES	Director	Community Organization
Williamson County Cities Health District	Health District Representative I	Community Organization
Williamson County Cities Health District	Health District Representative II	Community Organization
Williamson County Cities Health District	Health District Representative III	Community Organization
Williamson County Cities Health District	Emergency Preparedness and Response Specialist	Community Organization
Williamson County Cities Health District	Emergency Preparedness and Response Specialist – Team Lead	Community Organization
Williamson County Cities Health District	Executive Director	Community Organization
Williamson County Conservation Foundation	Assistant to the Director	Community Organization
Williamson County Conservation Foundation	WCCF Board President	Community Organization
Williamson County ESD #6	Assistant Chief	Community Organization
Williamson County ESD #6	Chief	Community Organization
Williamson County Landfill	General Representative	Community Organization / Utility Provider
Williamson County Regional Animal Shelter	Animal Services Director	Community Organization
Williamson County Regional Animal Shelter	Community Programs Coordinator	Community Organization
Williamson County Veterans Services	County VSO	Community Organization
Williamson County WCID #3	Chief	Community Organization



APPENDIX B

PUBLIC SURVEY RESULTS

APPENDIX B: PUBLIC SURVEY RESULTS

Overview	1
Public Survey Results	2

OVERVIEW

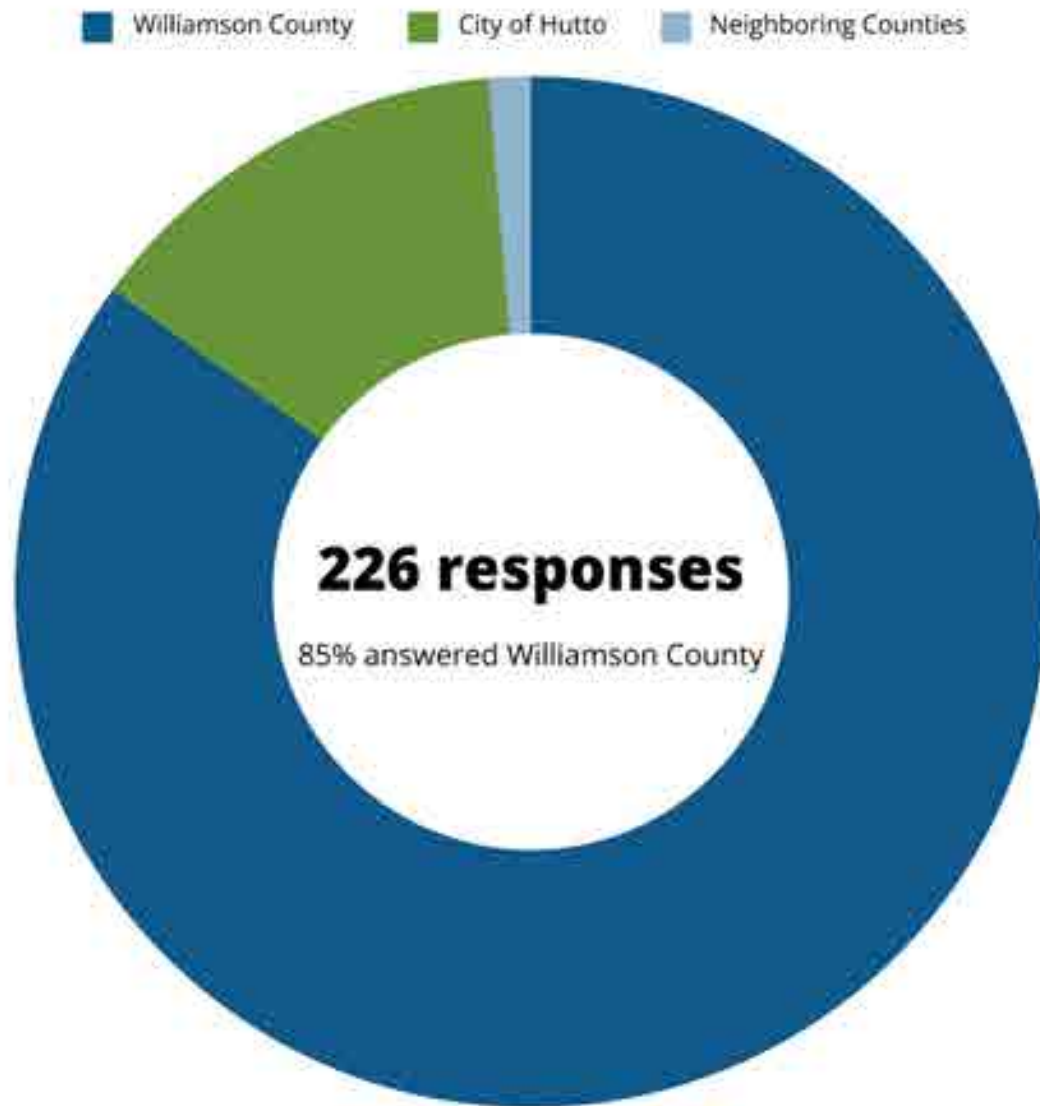
Williamson County prepared a public survey that requested public opinion on a wide range of questions relating to natural hazards. The survey was made available via the participating jurisdictions' and independent school districts' websites. This survey link was also distributed at public meetings and stakeholder events throughout the planning process.

A total of 226 surveys were collected, the results of which are analyzed in Appendix B. The purpose of the survey was twofold: 1) to solicit public input during the planning process, and 2) to help the jurisdictions identify any potential actions or problem areas.

All public survey results were discussed and shared with the Planning Team during the Mitigation Strategy Workshop. These results are also provided below. The survey results provide information regarding the public's experience with natural hazards, their perceived hazards of concern, recommended mitigation actions, and additional valuable insights. Overall, this survey enhances the mitigation planning process by ensuring the plan properly represents the community, is informed through local knowledge, and by promoting equity.

APPENDIX B: PUBLIC SURVEY RESULTS

PUBLIC SURVEY RESULTS



APPENDIX B: PUBLIC SURVEY RESULTS

Have you ever experienced or been impacted by a disaster?



**51%
Responded
'Yes'**

Personal experiences shared in survey responses included:

"The great snowmageddon. The power went out and was out for 3 days in our neighborhood. It got down to 34 in our home. If the roads had been plowed (Hutto town square-Behind the City hall) then going to a safe location would have been easier. As it was we struggled to get to Church street from Liberty Street we got stuck and a good Samaritan got us out."

"Cotton wood creek flooded Memorial Day weekend in 2017 flooding around 40-60 homes."

"Large Jarrell Tornado, Georgetown small Tornado, Snow in 1985, the large ice storm and several short lived ice storms."

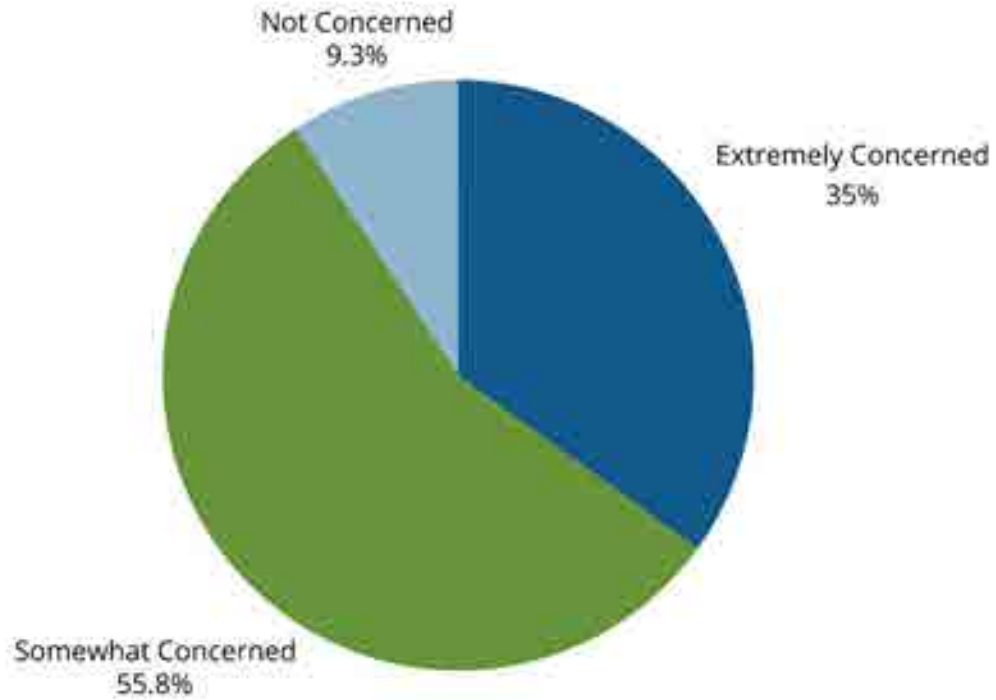
"Working for GISD when Hurricane Katrina hit and busloads of people from Louisiana brought to GHS for shelter and food. That was a disaster within a disaster. And dont forget the Jarrell tornado."

42% of those who have been impacted by a disaster mentioned winter storm(s) in their explanations.



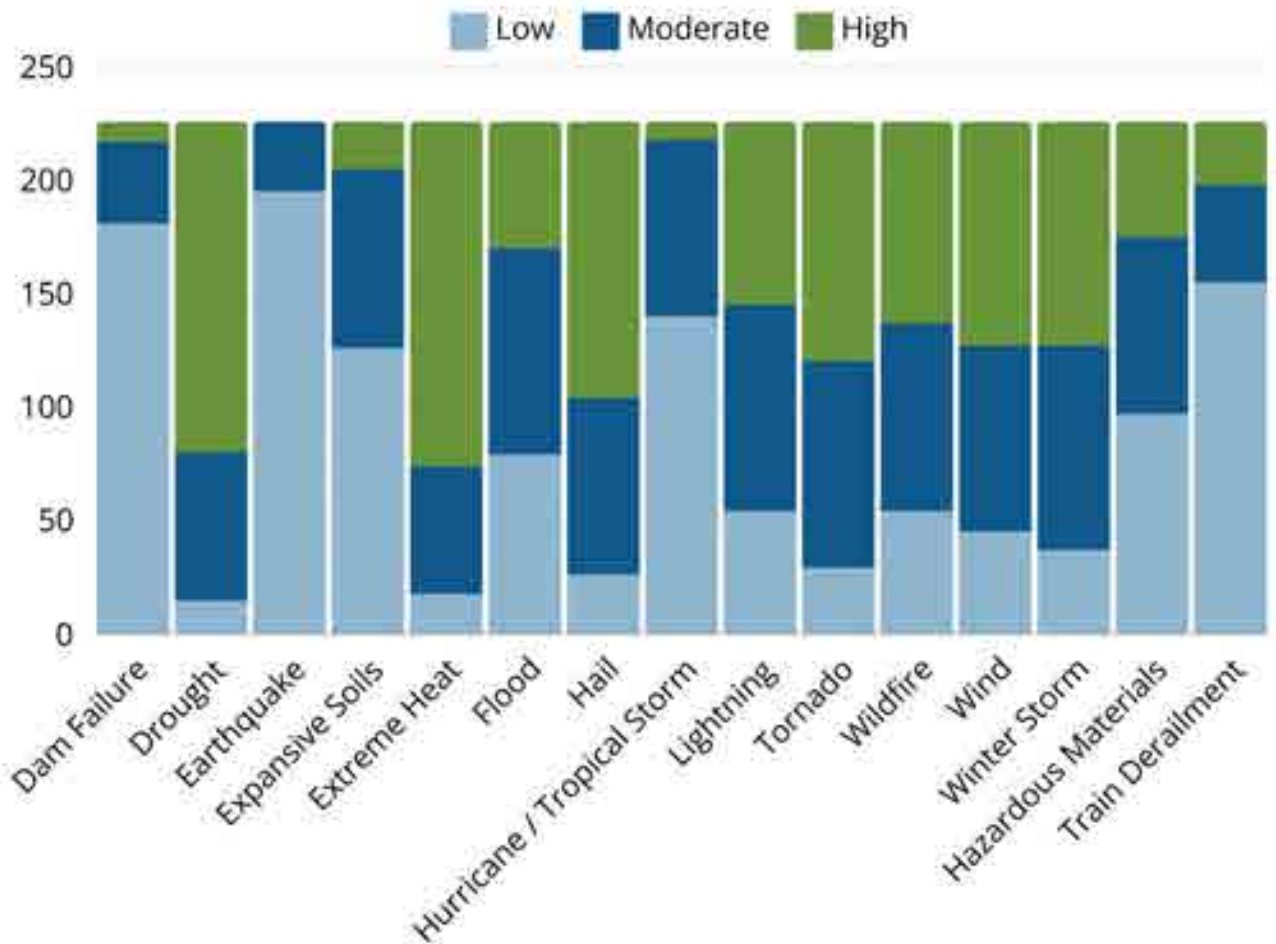
APPENDIX B: PUBLIC SURVEY RESULTS

Concern level for the possibility of their community being impacted by a disaster.



APPENDIX B: PUBLIC SURVEY RESULTS

With the consideration of frequency of occurrence and potential impact severity, please indicate your concern level for each of the following hazards:

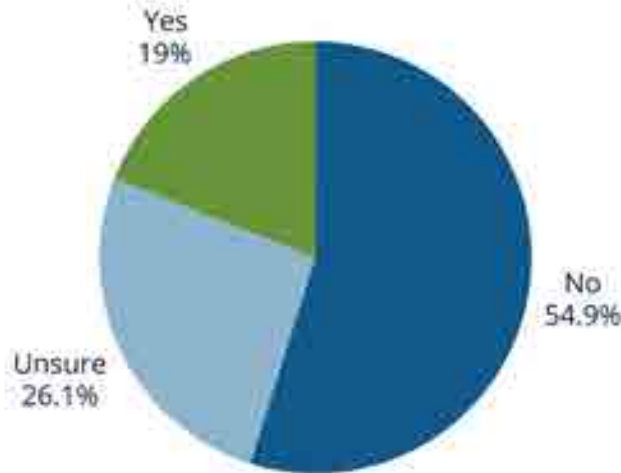


Is there another hazard not listed above that you think is a wide-scale threat to your neighborhood?

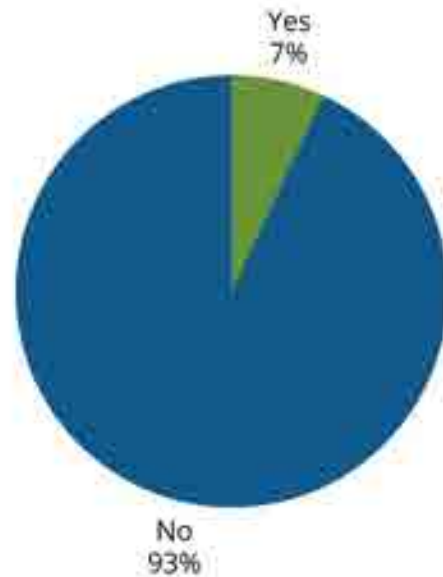


APPENDIX B: PUBLIC SURVEY RESULTS

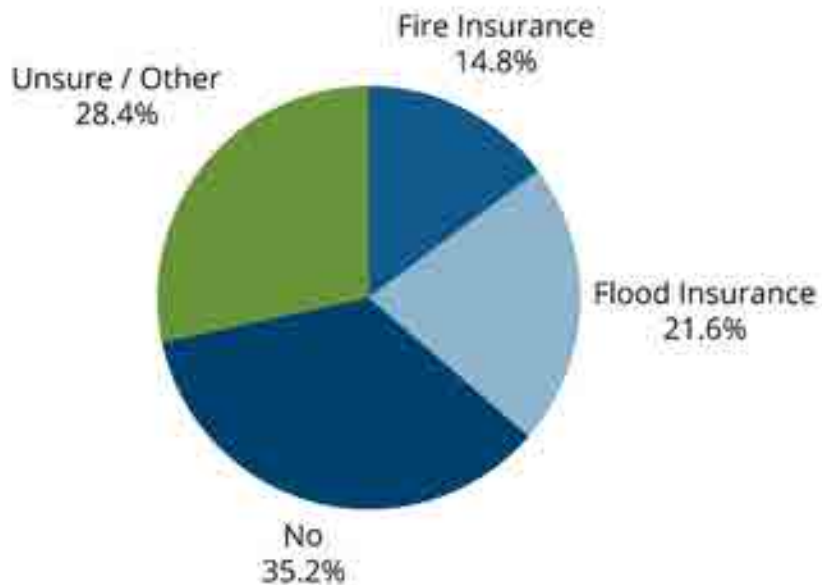
To your knowledge, is your home located in any high hazard risk zones?



Have you had any issues getting homeowners or renters insurance due to risks of hazardous events?



Do you have any hazard specific insurance? Why or why not?



APPENDIX B: PUBLIC SURVEY RESULTS

Have you taken any actions to make your home or neighborhood more resistant to hazards?



58%
Responded
'Yes'

64% of those who have taken action through tree removal/fuel reduction



41% of those have a secondary source of power



84% of survey responders are interested in making their homes or neighborhoods more resistant to hazards.



Actions taken included:

"Back up generator, cut down dead trees, drainage landscaping."

"Keeping grass and brush clear, purchased fire pump. Purchased and installed electric generator."

"I have fire extinguishers on each floor. We keep the trees, bushes and grass trimmed."

"Trim landscaping away from home so when it all turns crispy (due to lack of rain and strict watering limits) it will reduce fire hazard."

"Had many dead trees/limbs cut down after recent ice storms. We invested in a small generator in case of short-term power outages."

APPENDIX B: PUBLIC SURVEY RESULTS

Effectiveness of communication methods for receiving information about how to make your home and neighborhood more resistant to hazards



Official
Websites



Social Media

Additional communication methods recommended:



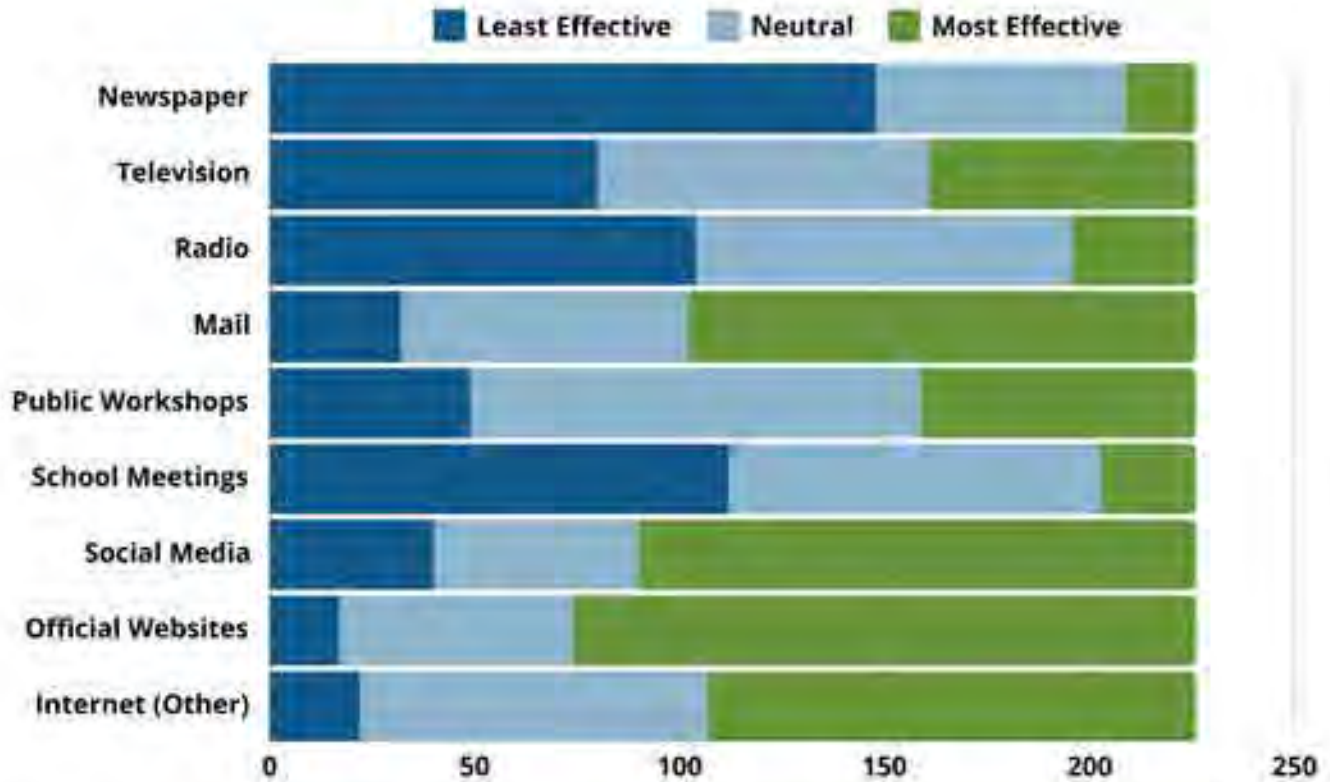
Texts / Alerts



Email

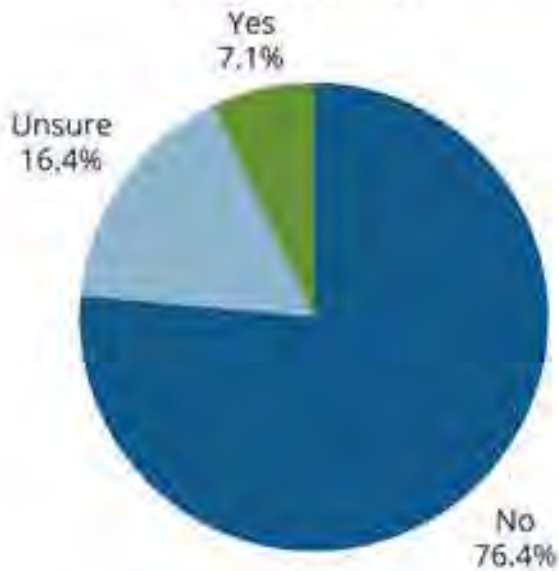
APPENDIX B: PUBLIC SURVEY RESULTS

What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?

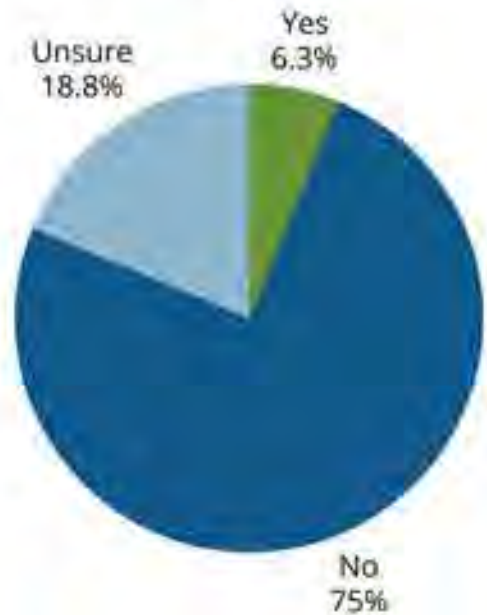


APPENDIX B: PUBLIC SURVEY RESULTS

Do you have any special access to functional needs (AFN) within your household that would require early warning or specialized response during disasters?

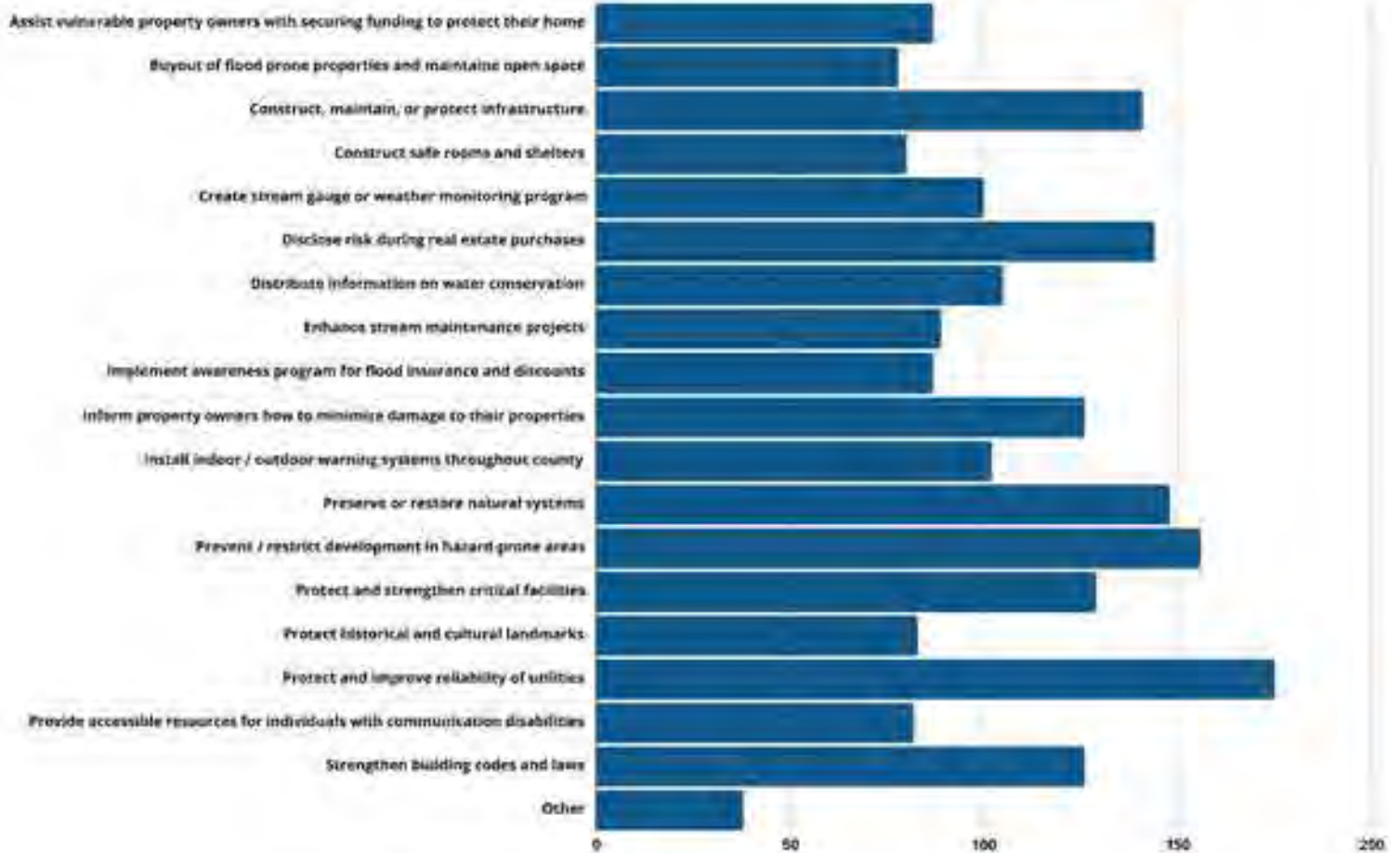


Are you or other members of your household enrolled in the State of Texas Emergency Assistance Registry (STEAR) Program?



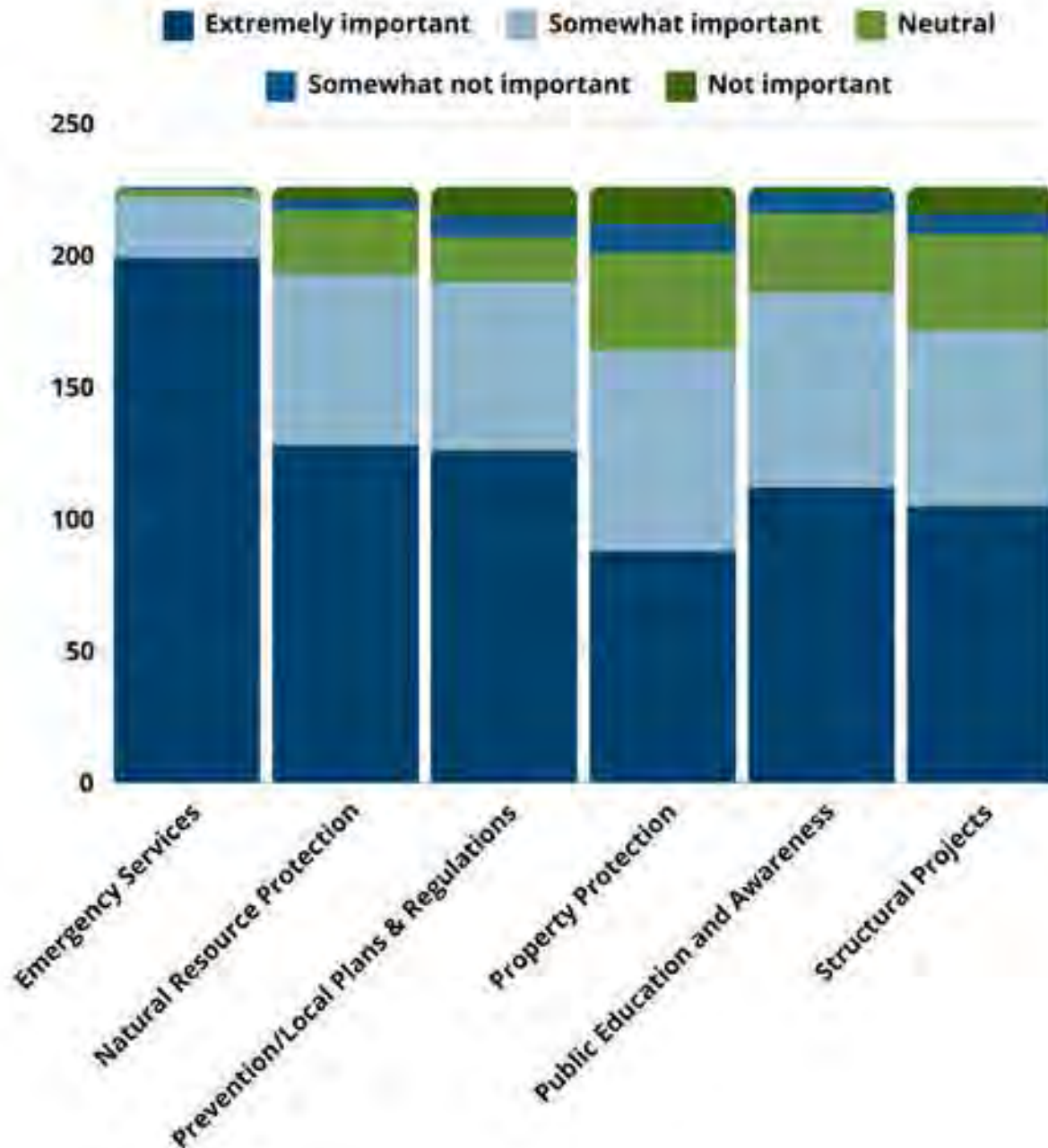
APPENDIX B: PUBLIC SURVEY RESULTS

In your opinion, please select steps your local government should prioritize to reduce or eliminate the risk of future hazard damages in your neighborhood.



APPENDIX B: PUBLIC SURVEY RESULTS

A number of community-wide activities can reduce our risk from hazards. In general, these activities fall into one of the following six broad categories. Please tell us how important you think each one is for your community to consider pursuing.



Emergency Services - Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical facilities or systems.

APPENDIX B: PUBLIC SURVEY RESULTS

Natural Resource Protection - Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.

Prevention / Local Plans & Regulations - Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.

Property Protection - Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.

Public Education and Awareness - Actions to inform citizens about hazards and techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials, and demonstration events.

Structural Projects - Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, seawalls detention / retention basins, channel modification, retaining walls, and storm sewers.



APPENDIX C

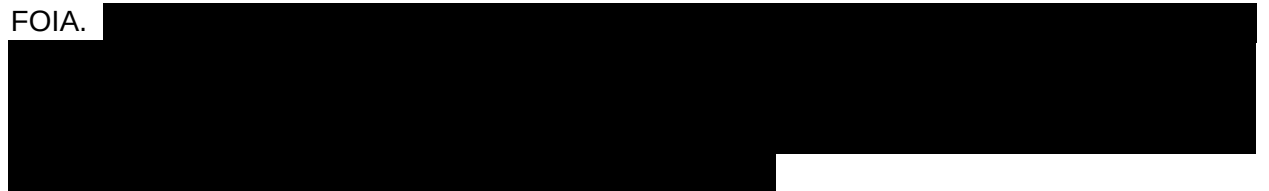
CRITICAL FACILITIES

APPENDIX C: CRITICAL FACILITIES

Overview	1
Critical Facilities	2

OVERVIEW

Appendix C is **For Official Use Only (FOUO)** and may be exempt from public release under FOIA.





APPENDIX D

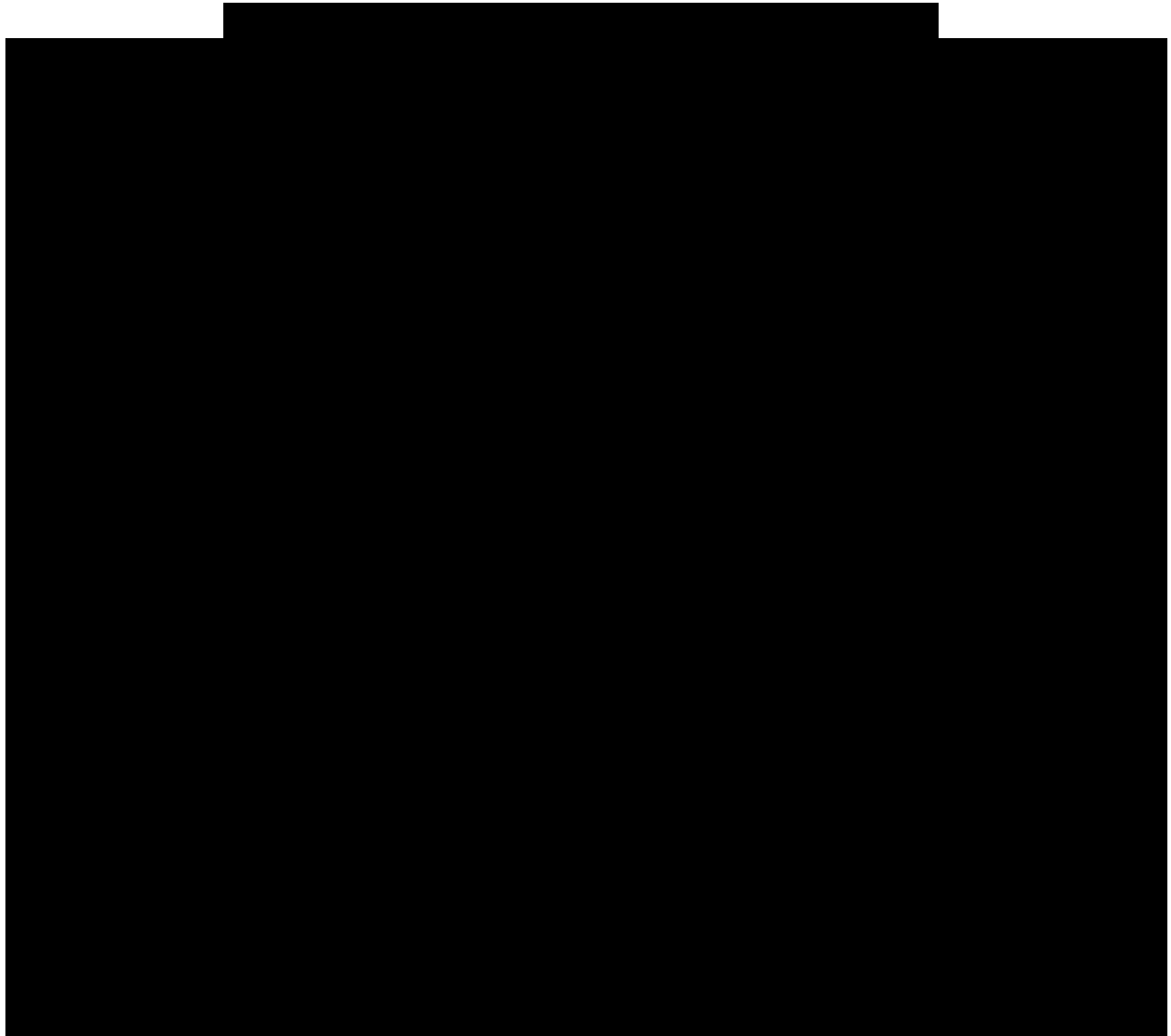
DAM LOCATIONS

APPENDIX D: DAM LOCATIONS

Overview	1
Dam Locations	1

OVERVIEW

Appendix D is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).





APPENDIX E **MEETING DOCUMENTATION**

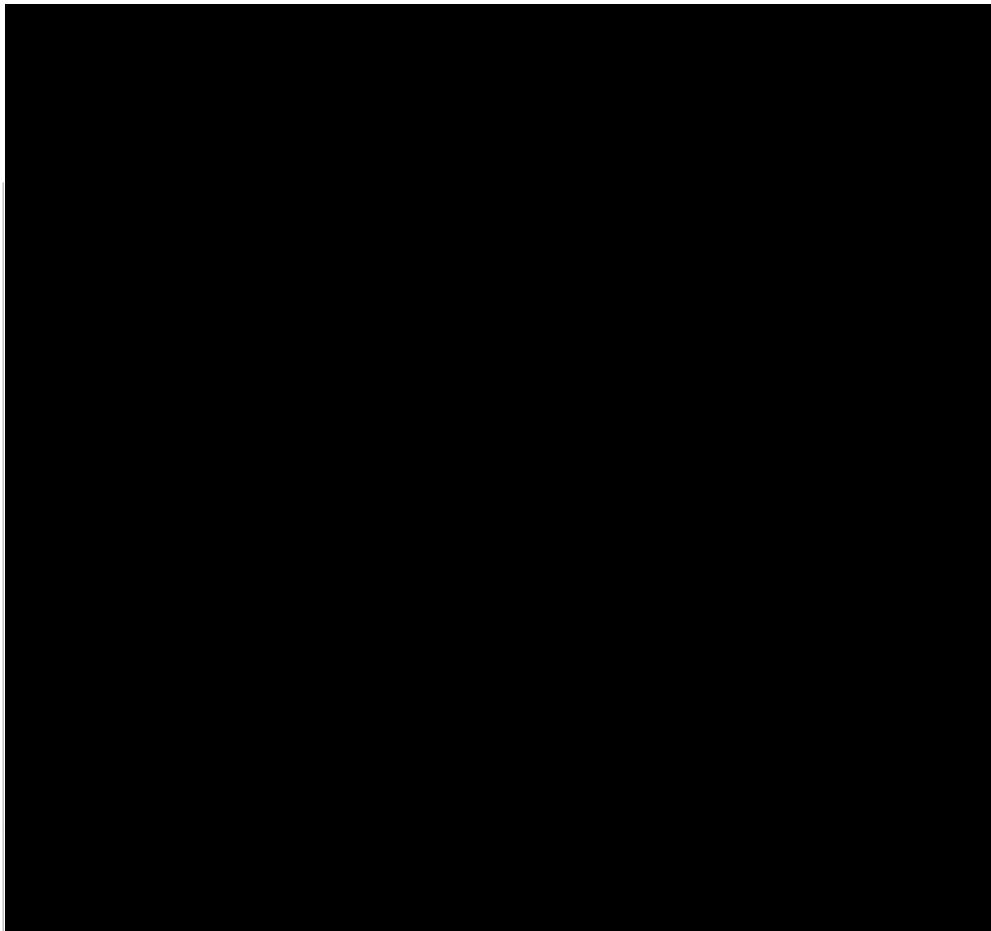
APPENDIX E: MEETING DOCUMENTATION

Workshop Documentation.....	1
Public Meeting Documentation	5
Public Notices	6

WORKSHOP DOCUMENTATION

Appendix E is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

Williamson County held a series of Planning Team workshops: a Kickoff Workshop on April 22, 2024, and a Risk Assessment Workshop and Mitigation Strategy Workshop on July 9, 2024. At each of these workshops members of the Planning Team were informed of the planning process, expressed opinions, and volunteered information. Williamson County hosted public meetings. The sign-in sheets for each workshop and public meeting are included below. For more details on the workshops and planning process, see Section 2. Throughout the planning process, the Consultant Team followed up directly with all participating jurisdictions to review information discussed and to gather documents that were collected during the workshops.

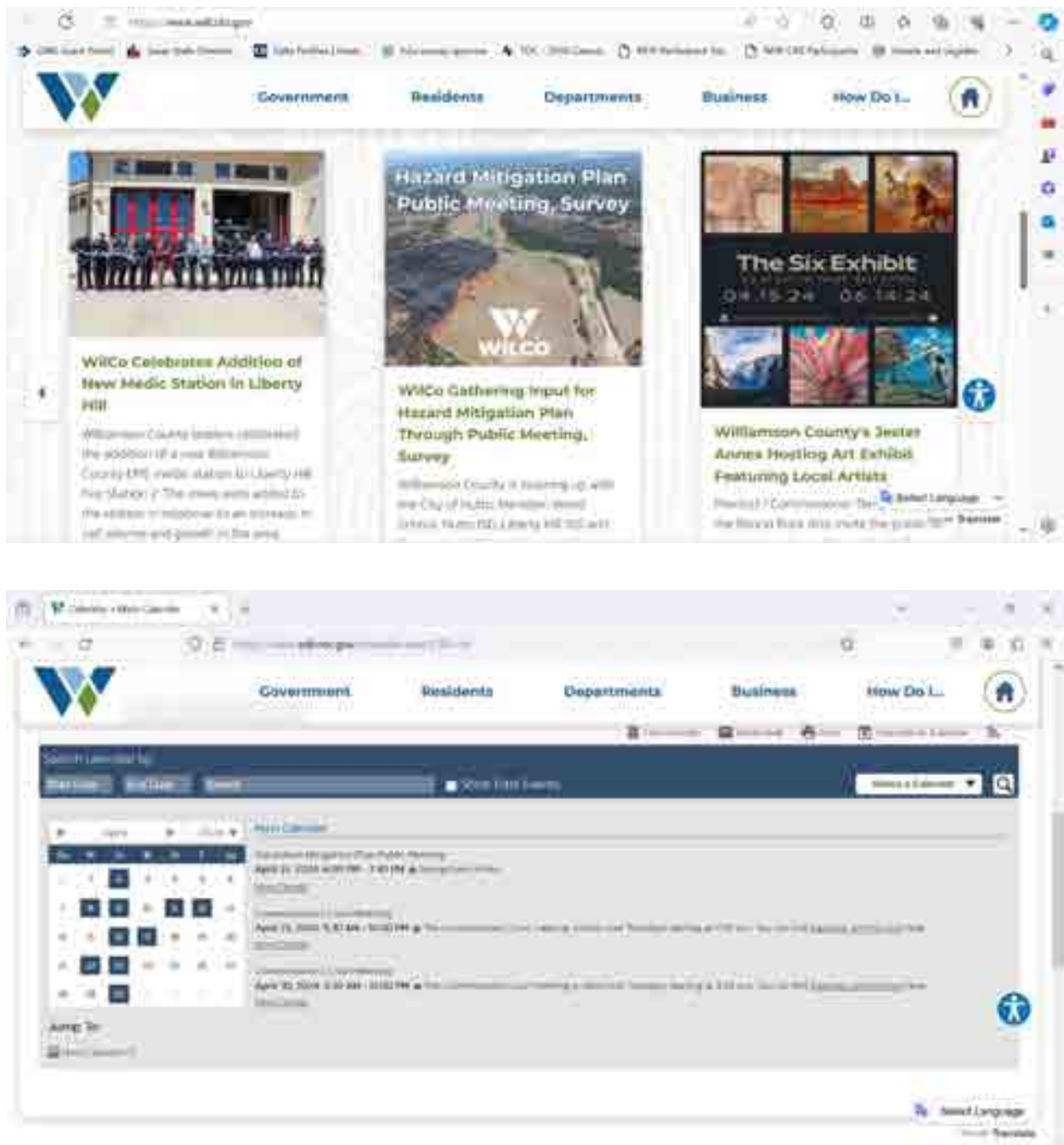


APPENDIX E: MEETING DOCUMENTATION

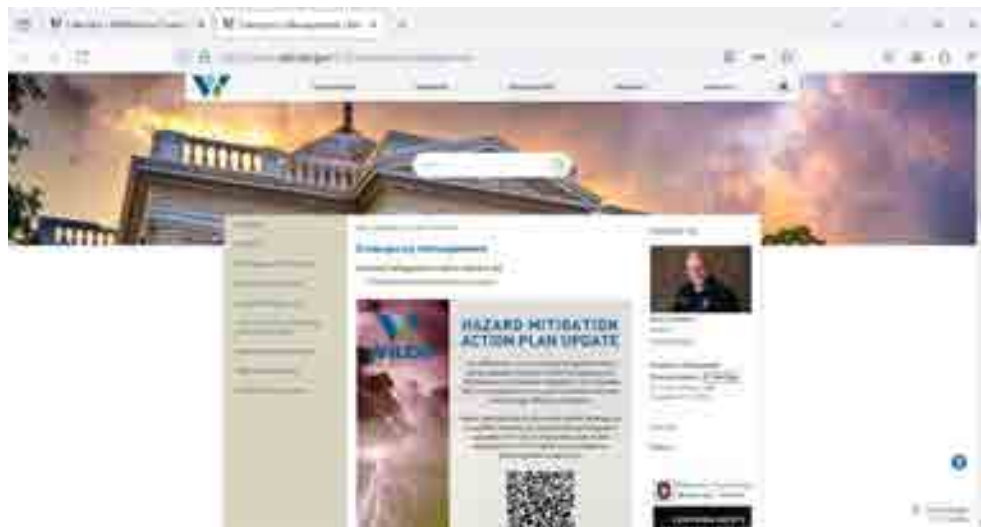
PUBLIC NOTICES

Public notices to announce Williamson County's participation in the Plan Update development process were posted on their website, on social media sources including Facebook and X (formerly known as Twitter), through the local media, and/or posting the information on bulletin boards in public facilities.

Figure E-5. Williamson County Public Notice, Public Meeting and Survey, County Website



APPENDIX E: MEETING DOCUMENTATION



APPENDIX E: MEETING DOCUMENTATION



Figure E-6. Williamson County Public Notice, Public Meeting and Survey, County Facebook



APPENDIX E: MEETING DOCUMENTATION



APPENDIX E: MEETING DOCUMENTATION

Williamson County, Texas - Government

Help us help you! Wilco is partnering with City of Hutto, TX - Municipal Government, Hutto ISD, Liberty Hill ISD, Georgetown ISD and Mandarin World School to update its Hazard Mitigation Plan to minimize or eliminate the long-term risk to life and property from known hazards like severe weather. Give us your feedback by participating in the survey!
<https://forms.office.com/Pages/ResponsePage.aspx>

Hazard Mitigation Plan Public Survey

WILCO
TEXAS

Williamson County, Texas - Government

We want to hear from you! Help Wilco update its Hazard Mitigation plan and best protect you, your loved ones and your property during emergencies. Join us at 5 p.m. on Tuesday, July 9, at the Georgetown Annex, 100 Wilco Way, in Georgetown.

WILCO TEXAS

HAZARD MITIGATION PLAN UPDATE PUBLIC NOTICE

The Williamson County Hazard Mitigation Plan is a comprehensive document describing the threats to our residents' lives and property from natural and man-made hazards. It also establishes specific actions and strategies to decrease or eliminate the impact of these threats. The plan is currently under revision and we are seeking public input for the update.

In consultation with Williamson County, the City of Hutto, Mandarin World School, and independent school districts Hutto, Liberty Hill, and Georgetown, a public hearing has been scheduled to solicit feedback from Williamson County business owners and all members of the Williamson County community. The county's consultant on the project, K2D Partners, Inc., will provide an overview of the project and solicit public feedback on the Plan. This input will help the project team identify potential hazards affecting residents and recommend actions to reduce their potential impact. Your feedback is essential to the county's hazard mitigation planning process.



ATTEND A PUBLIC MEETING

Tuesday July 9 @ 5pm
100 Wilco Way
Suite 220
Georgetown, TX 78626

PARTICIPATE IN THE SURVEY

 <https://forms.office.com/Pages/ResponsePage.aspx>

APPENDIX E: MEETING DOCUMENTATION



APPENDIX E: MEETING DOCUMENTATION

Figure E-7. Williamson County Public Notice, Public Meeting and Survey, County X



APPENDIX E: MEETING DOCUMENTATION



APPENDIX E: MEETING DOCUMENTATION

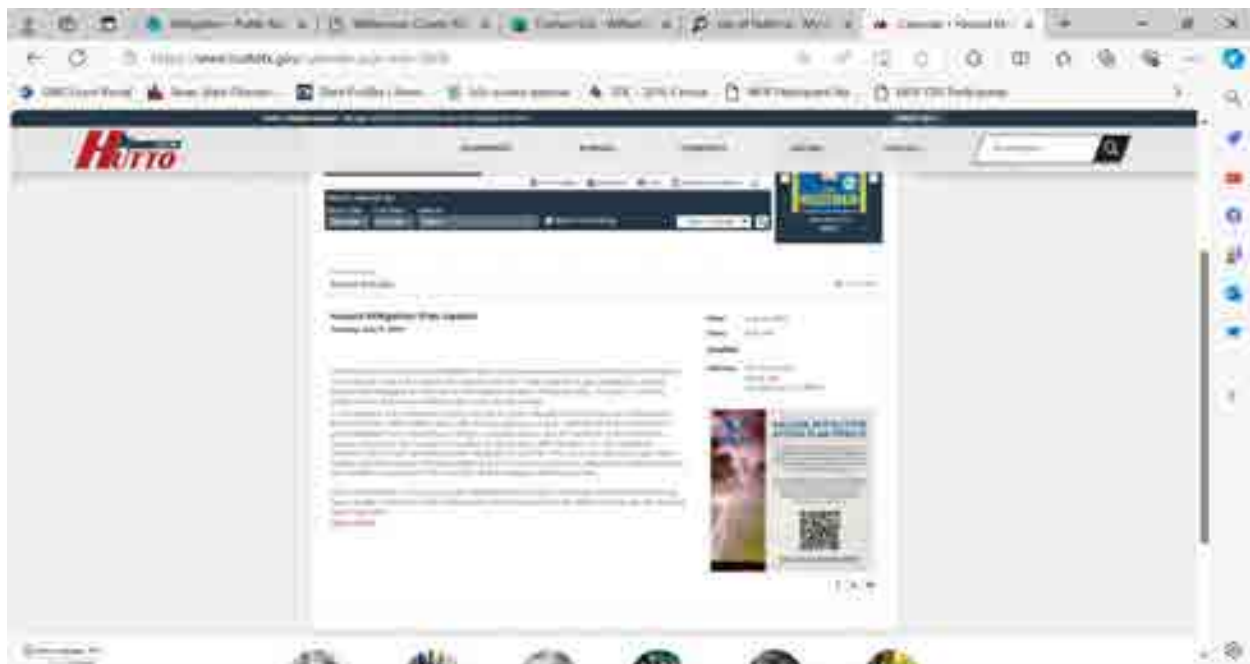
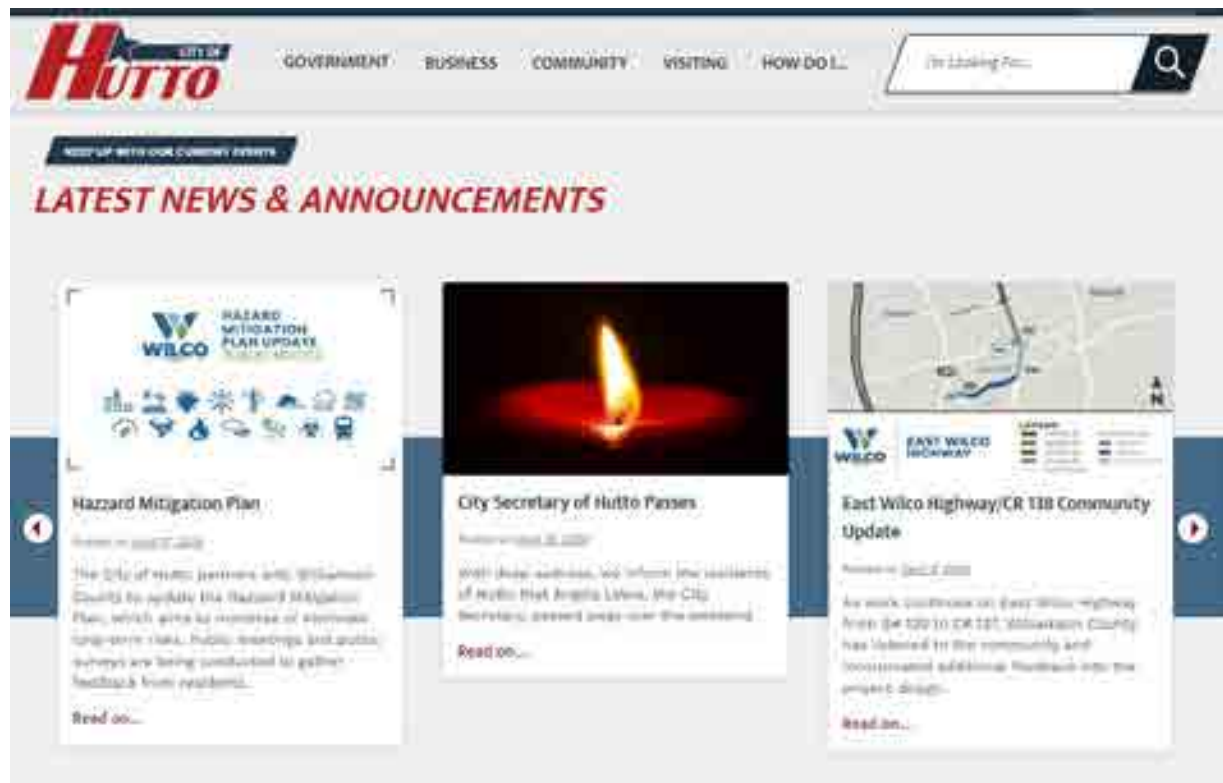


APPENDIX E: MEETING DOCUMENTATION



APPENDIX E: MEETING DOCUMENTATION

Figure E-8. City of Hutto Public Notice, Public Meeting and Survey, City Website

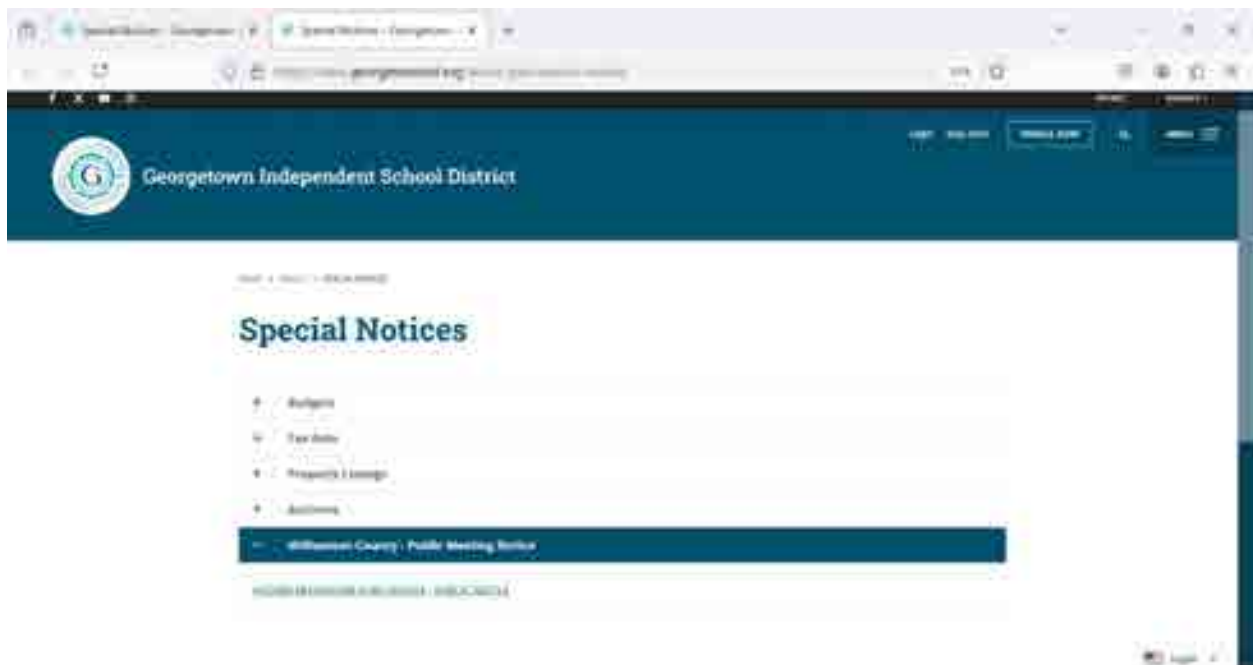


APPENDIX E: MEETING DOCUMENTATION

Figure E-9. City of Hutto Public Notice, Public Meeting and Survey, City Facebook



Figure E-10. Georgetown ISD Public Notice, Public Meeting and Survey, ISD Website

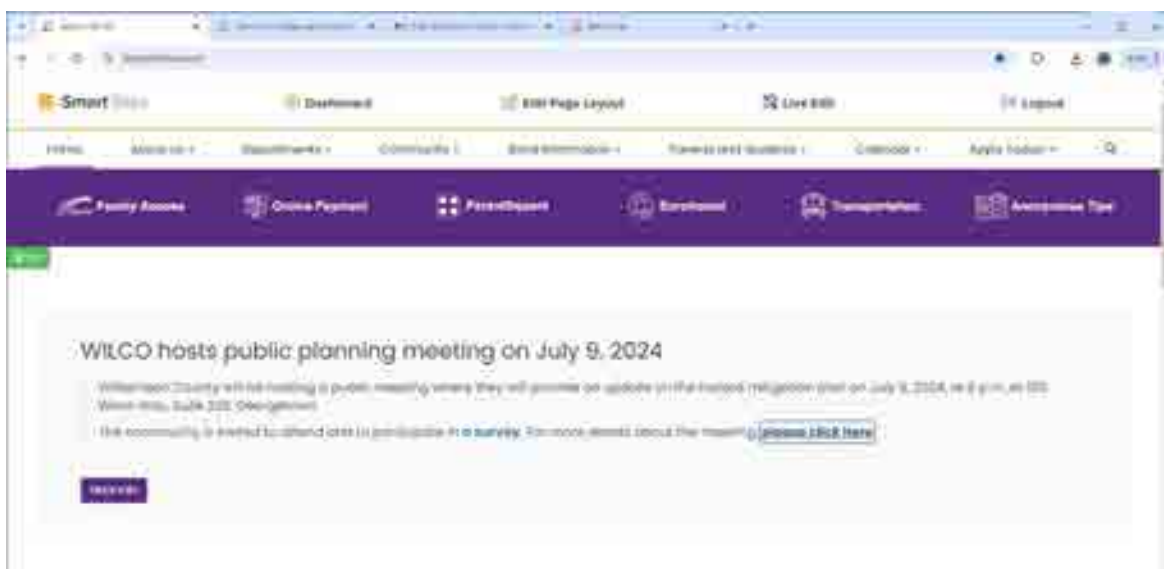


APPENDIX E: MEETING DOCUMENTATION

Figure E-11. Hutto ISD Public Notice, Public Meeting and Survey, ISD Facebook



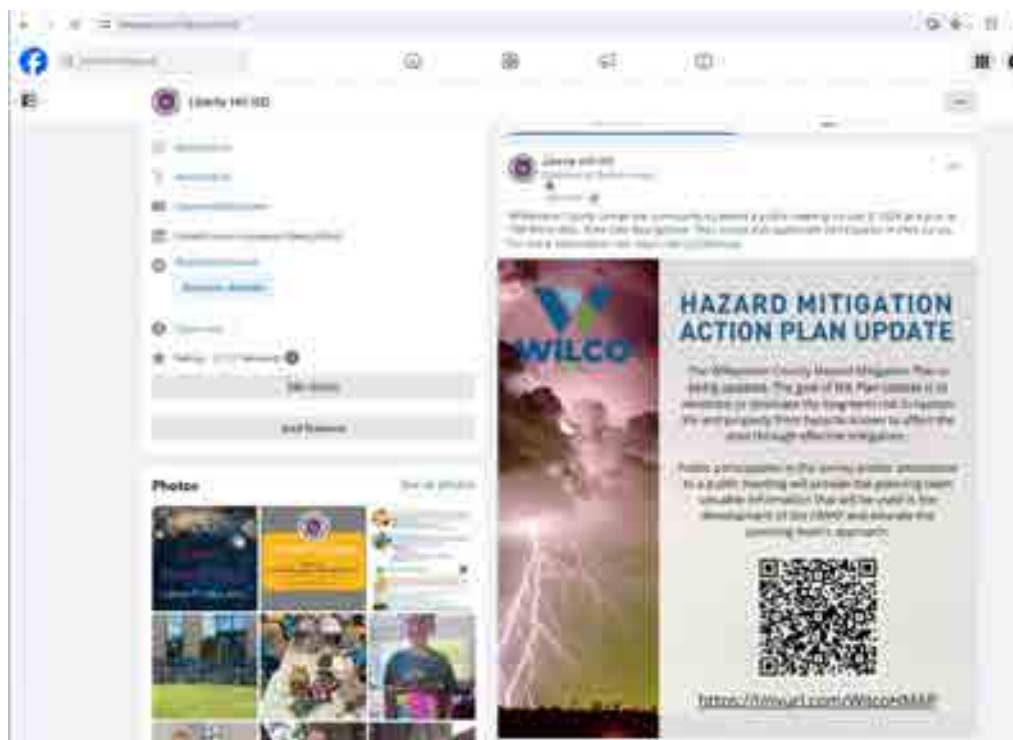
Figure E-12. Liberty Hill ISD Public Notice, Public Meeting and Survey, ISD Website



APPENDIX E: MEETING DOCUMENTATION



Figure E-13. Liberty Hill ISD Public Notice, Public Meeting and Survey, ISD Facebook

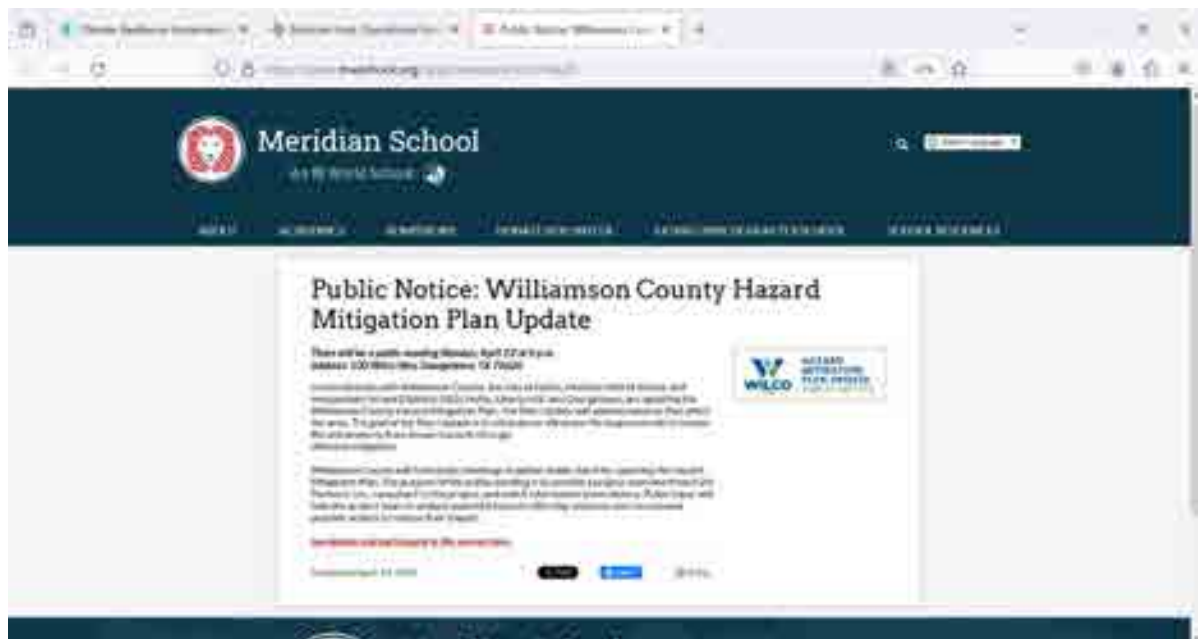


APPENDIX E: MEETING DOCUMENTATION

Figure E-14. Liberty Hill ISD Public Notice, Public Meeting and Survey, Public Bulletin



Figure E-15. Meridian World School Public Notice, Public Meeting and Survey, School Website



APPENDIX E: MEETING DOCUMENTATION

Figure E-16. KXAN, Public Notice, News Paper Media Outreach





APPENDIX F **CAPABILITY ASSESSMENT**

APPENDIX F: CAPABILITY ASSESSMENT

Overview	1
Community Capability Assessments.....	2

OVERVIEW

A Community Capability Assessment is an integral component of the Hazard Mitigation Planning Process. It is an invaluable tool in assessing a community's existing planning and regulatory capabilities to support implementation of mitigation strategy objectives.

Beginning on Page 2, a completed Capability Assessment Checklist provides information on existing policies, plans, and regulations in place for Planning Team members at the local level or that may be provided by the County on an as-needed basis. ***Participation is denoted with an "x" on the Checklist.***

APPENDIX F: CAPABILITY ASSESSMENT

COMMUNITY CAPABILITY ASSESSMENTS

COMMUNITY CAPABILITY CHECKLIST	<i>Williamson County</i>	<i>City of Hutto</i>	<i>Georgetown ISD</i>
PLANS			
Capital Improvements Plan	X	X	X
Climate Change Adaptation Plan			
Community Wildfire Protection Plan	X		X
Comprehensive / Master Plan / Land Use Plan		X	
Continuity of Operations Plan	X		
Drought Contingency Plan/Protocol on Water Restrictions		X	
Economic Development Plan	X	X	
Emergency Management Action Plan	X	X	X
Emergency Operations Plan	X	X	X
Evacuation Plan	X		X
Extreme Heat Protocol			X
Hazard Mitigation Plan	X	X	X
Stormwater Management Plan / Ordinance	X	X	
Transportation Plan	X		X
POLICIES / ORDINANCES			
Building Codes		X	
Fire Code	X	X	
Floodplain Ordinance	X	X	
Manufactured Home Restrictions	X	X	
Stormwater Ordinance	X	X	

APPENDIX F: CAPABILITY ASSESSMENT

COMMUNITY CAPABILITY CHECKLIST	Williamson County	City of Hutto	Georgetown ISD
Subdivision Regulations	X	X	
Wildfire Ordinance			
Zoning Ordinance/Land Use Restrictions	X	X	X
PROGRAMS			
Firewise Communities			
Floodplain Maps/Flood Insurance Studies	X	X	
Hydrologic/Hydraulic Studies	X		
Mutual Aid Agreement	X	X	
National Flood Insurance Program Participant	X	X	
NFIP Community Rating System Participant			
Property Acquisition Program	X		X
Public Education/Awareness Programs	X	X	
Storm Drainage Systems Maintenance Program	X	X	X
Stream Maintenance Program			
StormReady Communities	X	X	
Warning Systems/Services (reverse 911, outdoor warning sirens)	X	X	X
STAFF / DEPARTMENTS			
Building Code Official		X	
Emergency Manager	X	X	
Engineers	X	X	
Environmental Conservation Specialist	X		
Floodplain Administrator	X	X	

APPENDIX F: CAPABILITY ASSESSMENT

COMMUNITY CAPABILITY CHECKLIST	<i>Williamson County</i>	<i>City of Hutto</i>	<i>Georgetown ISD</i>
Geographic Information System (GIS) Coordinator	X	X	
Personnel with Hazard Knowledge	X	X	
Planners	X	X	
Public Information Official	X	X	X
Resource Development/Grant Writer	X	X	

APPENDIX F: CAPABILITY ASSESSMENT

COMMUNITY CAPABILITY CHECKLIST	Hutto ISD	Liberty Hill ISD	Meridian World School
PLANS			
Capital Improvements Plan	X		X
Climate Change Adaptation Plan			
Community Wildfire Protection Plan			
Comprehensive / Master Plan / Land Use Plan			
Continuity of Operations Plan	X	X	
Drought Contingency Plan / Protocol on Water Restrictions			
Economic Development Plan			
Emergency Management Action Plan	X	X	
Emergency Operations Plan	X	X	X
Evacuation Plan	X	X	X
Extreme Heat Protocol	X		
Hazard Mitigation Plan	X	X	X
Stormwater Management Plan / Ordinance			
Transportation Plan	X	X	
POLICIES / ORDINANCES			
Building Codes			X
Fire Code		X	X
Floodplain Ordinance			
Manufactured Home Restrictions			
Stormwater Ordinance			
Subdivision Regulations			

APPENDIX F: CAPABILITY ASSESSMENT

COMMUNITY CAPABILITY CHECKLIST	Hutto ISD	Liberty Hill ISD	Meridian World School
Wildfire Ordinance			
Zoning Ordinance/Land Use Restrictions			
PROGRAMS			
Firewise Communities			
Floodplain Maps/Flood Insurance Studies			
Hydrologic/Hydraulic Studies			
Mutual Aid Agreement			
National Flood Insurance Program Participant			
NFIP Community Rating System Participant			
Property Acquisition Program			
Public Education/Awareness Programs			X
Storm Drainage Systems Maintenance Program			
Stream Maintenance Program			
StormReady Communities			
Warning Systems/Services (reverse 911, outdoor warning sirens)	X		X
STAFF / DEPARTMENTS			
Building Code Official			
Emergency Manager	X	X	X
Engineers			
Environmental Conservation Specialist			
Floodplain Administrator			

APPENDIX F: CAPABILITY ASSESSMENT

COMMUNITY CAPABILITY CHECKLIST	<i>Hutto ISD</i>	<i>Liberty Hill ISD</i>	<i>Meridian World School</i>
Geographic Information System (GIS) Coordinator	X		
Personnel with Hazard Knowledge	X		X
Planners		X	
Public Information Official	X	X	X
Resource Development/Grant Writer			X



APPENDIX G **STATE AND FEDERAL FUNDING OPPORTUNITIES**

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

Overview	1

OVERVIEW

Texas utilizes state funds to improve statewide hazard mitigation capabilities and advance their hazard mitigation goals to help identify, understand, and manage various risks associated with natural hazards. State funds also provide funding for state facility and infrastructure upgrades, hazard mapping, mitigation planning, and other mitigation programmatic activities. Table G-1 describes a variety of loan and grant programs offered by state agencies for which mitigation activities may be eligible.

Table G-1. Summary of State Funded Mitigation Programs

AGENCY	FUNDING PROGRAM
Texas A&M Forest Service (TAMFS)	- o Community Fire Protection Program - o Community Wildfire Defense Grant - o Fire-Adapted Communities Program (FAC) - o Firewise USA Program - o Forest Land Enhancement Program - o Forest Legacy Program - o Mitigation Project Support Fund Prescribed Fire Grants - o Resilient Landscapes Program - o Rural Fire Assistance Grant - o State Fire Assistance for Mitigation (SFAM) - Mechanical Fuels Grants - o State Fire Assistance for Mitigation (SFAM) - Vegetative Fuel Break Grant - o Texas Longleaf Conservation Assistance Program - o Urban Tree Canopy Project (UTC)
Texas Commission on Environmental Quality (TCEQ)	- o Clean Water Act Section 319 Grants - o High Hazard Potential Dam Program (HHPD) - o Nonpoint Source Grant Program - o U.S.-Mexico Border Water Infrastructure Program
Texas Department of Agriculture (TDA)	- o Agricultural Management Assistance (AMA) - o Agricultural Water Enhancement Program (AWEP) - o Community Development Block Grant - o Community Development Block Grant for Rural Texas - o Conservation Innovation Grants (CIG) - o Environmental Quality Incentives Program (EQUIP)
Texas Department of Housing and Community Affairs (TDHCA)	o Texas HOME Disaster Relief
Texas Department of State Health Services (TXDSHS)	- o Hospital Preparedness Program (HPP) Cooperative Agreement - o Public Health Emergency Preparedness (PHEP) Cooperative Agreement

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

AGENCY	FUNDING PROGRAM
Texas Department of Transportation (TXDOT)	- o Bridge Preventative Maintenance Program - o Emergency Relief (ER) Program - o Highway Bridge Replacement and Rehabilitation Program - o Safe Rest Stops Program - o Transportation Enhancement Program
Texas Division of Emergency Management (TDEM)	- o Building Resilient Infrastructure & Communities (BRIC) - o Emergency Management Performance Grant (EMPG) - o Fire Management Assistance Grants (FMAG) - o Hazard Mitigation Planning Grants Program (HMGP) - o Homeland Security Grant Program (HSGP) - o Individual Assistance (IA) - o National Earthquake Hazard Reduction Program (NEHRP) - o Public Assistance (PA) Section 406 Funds
Texas Economic Development & Tourism (EDT)	o Economic Development Administration Grants and Investments
Texas General Land Office (TXGLO)	- o Beach Grants - o Beach Maintenance Reimbursement Fund - o Coastal Erosion Planning and Response Act (CEPRA) - o Coastal and Estuarine Land Conservation Program (CELCP) - o Coastal Management Program (CMP) - o Community Development Block Grant – Disaster Recovery (CDBG-DR) - o Community Development Block Grant – Mitigation (CDBG-MIT) - o Gulf of Mexico Energy Security Act (GOMESA) - o Hazard Mitigation Grant Program Supplemental -LHMPP
Texas Parks and Wildlife Department (TPWD)	- o Nation Resources Damage Assessment (NRDA) - o National Wildlife Wetland Refuge System - o North American Wetland Conservation Fund - o Partners for Fish and Wildlife - o Texas Farm and Ranch Lands Conservation Program (TFRLCP) - o Wildlife Habitat Incentive Program (WHIP)
Texas State Soil and Water Conservation Board (TSSWCB)	- o Clean Water Act Section 319 Grants - o Nonpoint Source Grant Program
Texas Water Development Board (TWDB)	- o Agricultural Water Conservation Grants - o Agricultural Water Conservation Loans - o Clean Water State Revolving Fund (SWSRF) - o Community Assistance Program (CAP) - o Drinking Water State Revolving Fund (DWSRF) - o Economically Distressed Areas Program - o Emergency Community Water Assistance Grants - o Flood Infrastructure Fund (FIF) - o Flood Mitigation Assistance (FMA) Program - o Flood Mitigation Assistance (FMA) Swift Program

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

AGENCY	FUNDING PROGRAM
TWDB (continued)	- o Flood Protection Planning Program - o Groundwater Conservation District Loan Program - o Planning Assistance to States - o Regional Facility Planning Grant Program - o Regional Water Planning Group Grants - o Research and Planning Fund and Fund Development Program - o Risk MAP Program - o Rural Development Grants - o Rural Water Assistance Fund - o Silver Jackets - o Small Flood Control Projects (USACE Section 205) - o State Participation Program – Regional Water and Wastewater Facilities - o State Water Implementation Fund for Texas (SWIFT) - o State Water Resources Research Act Program - o Texas Infrastructure Resiliency Fund (TIRF) - o Water Research Grant Program - o Water SMART - Drought Response Program - o Texas Water Development Fund (DFund)

In addition to State funded programs, many local jurisdictions benefit from federal mitigation funding opportunities. FEMA'S Hazard Mitigation Assistance is a primary source for the implementation of mitigation projects throughout the Nation. Table G-2 described additional Federal, State, Local, and Non-Profit mitigation funding sources specifically within the State of Texas.

Table G-2. Federal, State, Local and Non-Profit Mitigation Funding Sources in Texas

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Agricultural Management Assistance (AMA)	Federal	USDA, NRCS	TDA	Provides financial and technical assistance to agricultural producers to voluntarily address issues such as water management, water quality, and erosion control by incorporating conservation methods into their farming operations.
Agricultural Water Enhancement Program (AWEP)	Federal	USDA, NRCS	TDA	Voluntary conservation initiative that provides financial and technical assistance to agricultural producers to implement water enhancement activities on agricultural land to conserve surface and ground water and improve water quality.
Agricultural Water Conservation Grants	State	TWDB	TWDB	Provided to state agencies and political subdivisions for projects that support the implementation of conservation of water management strategies identified in state and regional water plans. Yearly applications. Up to

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
				\$1.2 million available annually. Grant categories vary from year to year.
Agricultural Water Conservation Loans	State	TWDB	TWDB	Agricultural water conservation loans to use either for improvements on facilities or as loan to individuals. Low-interest, fixed rates. Up to 10-year repayment terms. U.S. Iron and Steel requirements apply to certain projects. Eligible Loan applicants include political subdivisions.
AmeriCorps - Corporation for National & Community Service (CNCS)	Federal	AmeriCorps	N/A	Provides funding for volunteers to serve communities, including disaster prevention. AmeriCorps/Vista has assisted local communities with wildfire mitigation projects.
American Recovery and Reinvestment Act (ARRA)	Federal	DOT Federal Transit Administration	TDA	Nicknamed the Recovery Act was a stimulus package enacted by the 111th U.S. Congress and signed into law by President Barack Obama in February 2009. Developed in response to the Great Recession, the primary objective of this federal statute was to save existing jobs and create new ones as soon as possible. Other objectives were to provide temporary relief programs for those most affected by the recession and invest in infrastructure, education, health, and renewable energy.
Assistance to Firefighters program - Fire Prevention & Safety (FP&S) Grants	Federal	FEMA, AFG		Fire Prevention & Safety (FP&S) Grants support projects that enhance the safety of the public and firefighters from fire and related hazards.
Beach Grants	Federal	EPA	TXGLO	EPA awards grants under authority of the BEACH Act to eligible states, territories, and tribes with beaches on ocean and Great Lakes coasts to develop and implement programs to monitor their beaches and notify the public when it is not safe to swim.
Beach Maintenance Reimbursement Fund	State	GLO	TXGLO	Allocates approximately \$750,000 per year to help communities keep their beaches maintained. Applications are distributed to eligible participants in early fall and are due within a specified amount of time, no less than 30 days. Contracts are renewable annually.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Bridge Preventative Maintenance Program	State	TXDOT	TXDOT	A planned, cost-effective treatment that preserves, improves, or delays future deterioration of the condition of a bridge. To be eligible for the BMIP a bridge must have a condition rating of 5 or 6 for at least one of the following: deck, superstructure, substructure, culvert, or channel. Safety and improvement to the physical conditions of the State's on-system bridges are TxDOT's main goals in the prioritization of the bridges using BMIP funds. The Bridge Division develops an initial list each FY of eligible bridges in each district and distribute to the districts for the annual program call.
Building Resilient Infrastructure & Communities (BRIC)	Federal	FEMA	TDEM	Pre-disaster/annual cycle addressing all natural hazards, emphasis on infrastructure & lifelines.
Clean Water Act Section 319 Grants	Federal	EPA	TCEQ and TSSWCB	Provides grants for a wide variety of activities related to non-point source pollution runoff mitigation.
Clean Water State Revolving Fund (CWSRF)	Federal	EPA	TWDB	Providing low-cost financing for a wide range of wastewater, stormwater, reuse, and other pollution control projects.
Coastal Erosion Planning and Response Act (CEPRA)	State	GLO	TXGLO	Since 2000, the Texas General Land Office's Coastal Erosion Planning and Response Program has received more than \$62 million in state funding and more than \$62 million in matching funds, completing more than 200 coastal erosion projects and studies. The application process for non-emergency project funding requests opens every even year in February and closes in early June of that same year.
Coastal and Estuarine Land Conservation Program (CELCP)	Federal	NOAA	TXGLO	When NOAA provides funding for CELCP, the GLO provides coastal communities an opportunity to apply for up to three projects per year, with federal grants for any single project not to exceed \$3 million.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Coastal Management Program (CMP)	Federal	NOAA	TXGLO	Texas receives approximately \$2 million annually in grants from National Oceanic and Atmospheric Administration (NOAA) and 90% of the funds are passed through to local governments and entities to address environmental needs and promote sustainable economic development along the coast. Projects must improve the management of the state's coastal resources and ensure long-term ecological and economic productivity. Section 306 administrative funds can be used for non- construction, coastal planning and education, and research. Section 306A improvement funds can be utilized for construction and land acquisition projects and preservation and restoration. CMP funding categories include Coastal Natural Hazards Response, Critical Areas Enhancement, Public Access, Water/Sediment Quantity and Quality Improvements, Waterfront Revitalization and Ecotourism Development, Permit Streamlining/ Assistance, Governmental Coordination and Local Government Planning Assistance.
Community Assistance Program (CAP)	Federal	FEMA, NFIP	TWDB	Product-oriented financial assistance program directly related to the flood loss reduction objectives of the NFIP.
Community Development Block Grant (CDBG)	Federal	HUD	TDA	The primary objective is to develop viable communities by providing decent housing and suitable living environments and expanding economic opportunities principally for persons of low- to moderate- income. Eligible applicants are non-entitlement cities under 50,000 in population and non-entitlement counties that have a non-metropolitan population under 200,000 and are not eligible for direct CDBG funding from HUD may apply for funding through any of the Texas CDBG programs.
Community Development Block Grant for Rural Texas	State	TDA	TDA	TDA administers the Community Development Block Grant for Rural Texas. The primary objective of the CDBG is to develop viable communities by providing decent housing and suitable living environments and expanding economic opportunities principally for persons of low- to moderate-income. Eligible applicants are non-entitlement cities under 50,000 in population and non-entitlement counties that have a non-

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
				metropolitan population under 200,000 and are not eligible for direct CDBG funding from HUD may apply for funding through any of the Texas CDBG programs.
Community Development Block Grant – Disaster Recovery (CDBG-DR)	Federal	HUD	TXGLO	Often following a disaster, the state may receive a CDBG-DR Supplement intended for mitigation and disaster recovery projects in the affected areas. Funding can be used to acquire properties in hazard prone areas. Since CDBG funds lose their federal identify they can also be used to supplement state or local match requirements on other funds such as FEMA HMA grants. Funding also supports public facilities including water and wastewater.
Community Development Block Grant – Mitigation (CDBG-MIT)	Federal	HUD	TXGLO	Eligible grantees to use this assistance in areas impacted by recent disasters to carry out strategic and high-impact activities to mitigate disaster risks and reduce future losses. In February of 2018, Congress appropriated \$12 billion dollars in Community Development Block Grant (CDBG) funds specifically for mitigation activities for qualifying disasters in 2015, 2016, and 2017. HUD was able to allocate an additional \$3.9 billion, bringing the amount available for mitigation to nearly \$16 billion.
Community Fire Protection Program	Federal	USDA	TAMFS	Mitigation delivered via USDA Forest Service and Private Forestry Coop Fire Program.
Community Wildfire Defense Grant	Federal	USFS	TAMFS	Offers financial assistance to at-risk local communities with planning for and mitigating against the risk of catastrophic wildfire. This program is authorized in Public Law 117-58, the Infrastructure Investment and Jobs Act. Two primary objectives: The development and revision of Community Wildfire Protection Plans (CWPP), and the implementation of projects described in a CWPP that is less than ten years old. Prioritizes at-risk communities that are in an area identified as having high or very high wildfire hazard potential, are low-income, and/or have been impacted by a severe disaster. No minimum federal funding limit for projects.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Conservation Innovation Grants (CIG)	Federal	USDA, NRCS	TDA	Voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging federal investment in environmental enhancement and protection, in conjunction with agricultural production.
Drinking Water State Revolving Fund (DWSRF)	Federal	EPA	TWDB	Makes funds available to drinking water systems to finance infrastructure improvements. The program also emphasizes providing funds to small and disadvantaged communities and to programs that encourage pollution prevention as a tool for ensuring safe drinking water.
Economic Development Administration Grants and Investments	Federal	U.S. DOC, EDA	EDT	Invests and provides grants for community construction projects, including mitigation activities.
Economically Distressed Areas Program	State	TWDB	TWDB	Provides financial assistance for projects serving economically distressed areas where water or sewer services do not exist, or systems do not meet minimum state standards. Eligible EDAP applicants include cities, counties, water districts, nonprofit water supply corporations, and all other political subdivisions. The city or county where the project is located must adopt and enforce Model Subdivision Rules for the regulation of subdivisions prior to application for financial assistance. Projects must also be in an economically distressed area where the median household income is not greater than 75 percent of the median state household income.
Emergency Community Water Assistance Grants	Federal	USDA	TWDB	\$150,000 to \$500,000 available to rural communities with populations over 10,000 people with a median household income less than \$65,900. Aids communities who have experienced a decline in quantity or quality of drinking water as a result of an emergency including drought.
Emergency Management Performance Grant (EMPG)	Federal	FEMA	TDEM	The EMPG program provides a yearly allocation of funding to support state and local emergency management programs. This has included providing some funding for local mitigation plans, mitigation-oriented studies, and related activities.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Emergency Relief (ER) Program	Federal	US DOT - FHWA	TXDOT	Provides funds for roads and bridges on Federal-aid highways that are damaged as a direct result of a natural disaster or catastrophic failure from an external cause.
Emergency Watershed Protection (EWP)	Federal	USDA, NRCS	TWDB	Provides funding and technical assistance for emergency measures such as floodplain easements in impaired watersheds. Funding available through the Simplified Acquisition Procedures (SAP) ranges from \$25K to \$100K. Funded through contracts between project sponsors and the NRCS. There are no grants. The NRCS pays 75% of the costs.
Environmental Quality Incentives Program (EQUIP)	Federal	USDA, NRCS	TDA	Provides funding and technical assistance to farmers and ranchers to promote agricultural production and environmental quality as compatible goals.
Fire-Adapted Communities Program (FAC)	Federal	FEMA, USFA	TAMFS	Collaborates to identify its wildfire risk and works collectively on actionable steps to reduce its risk of loss. This work protects property and increases the safety of firefighters and residents.
Fire Management Assistance Grants (FMAG)	Federal	FEMA	TDEM	Provides fire suppression support to states when loss of life and property are imminent. Wildfire mitigation is also eligible under emergency protection if life is in imminent danger.
Firewise USA Program	Federal	USDA, DOI, NASFF, NFPA	TAMFS	The national Firewise USA® recognition program provides a collaborative framework to help neighbors in a geographic area get organized, find direction, and take action to increase the ignition resistance of their homes and community and to reduce wildfire risks at the local level.
Flood Infrastructure Fund (FIF)	State	TWDB	TWDB	Enacted through Senate Bill 7 to address needs identified following the flood disasters of 2015, 2016, and 2017. Senate Bill 500 appropriated \$793 million. The purpose is to provide loans and grants for flood activities and projects. Once the State Flood Plan is adopted, the account may only be used for projects included in the plan. The SWIFT Advisory Committee is the oversight entity.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Flood Mitigation Assistance Program (FMA)	Federal	FEMA	TWDB	Repetitive flood loss property reduction and projects that mitigate losses to NFIP insured properties.
Flood Protection Planning Program	State	TWDB	TWDB	Developed to evaluate solutions to flooding problems in the state of Texas. Planning activities eligible for this program may include:
Forest Land Enhancement Program	Federal	USDA, NRCS	TAMFS	Provides educational, technical, and financial assistance to help landowners implement sustainable forestry management objectives.
Forest Legacy Program	Federal	USFS	TAMFS	Program providing funding to protect private forest lands that are environmentally, economically, and socially critical. This program reduces development in the wildland-urban interface.
Hazard Mitigation Grant Program (HMGP)	Federal	FEMA	TDEM	Post-disaster multi-hazard mitigation funding for federally declared disasters. HMGP Post Fire funds are available for FMAG declarations.
Hazard Mitigation Grant Program Supplemental – Local Hazard Mitigation Plan Program (LHMPP)	Federal	FEMA	TXGLO	Local Hazard Mitigation Plan Program (LHMPP) assists eligible entities by providing grants to develop or update local hazard mitigation plans, or to provide cost share for hazard mitigation planning activities funded through other federal sources. Community Development Block Grant Mitigation (CDBG-MIT) funds allocated by the United States Department of Housing and Urban Development (HUD) and administered by the Texas General Land Office (GLO) fund these planning activities, and the Hazard Mitigation Plan development and approval oversight is administered by the Federal Emergency Management Agency (FEMA) and administered by the Texas Division of Emergency Management (TDEM Grant awards will range from \$20,000 – \$100,000.
High Hazard Potential Dam Program (HHPD)	Federal	FEMA	TCEQ	Pre-disaster/annual cycle, for non-federal high hazard dams rated Unsatisfactory. Local match is 35% for each of the four grant periods.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Highway Bridge Replacement and Rehabilitation Program	Federal	FHWA	TXDOT	Provides funding to enable states to improve the condition of highway bridges through replacement, rehabilitation, and systematic preventive maintenance. Also includes the National Historic Covered Bridge Preservation Program.
Homeland Security Grant Program (HSGP)	Federal	DHS	TDEM	Homeland security activities identified in the state and local strategic plans. Funding supports threat & hazard and risk identification for natural, technological, and human-caused hazards. Some prevention activities may be considered mitigation.
Hospital Preparedness Program (HPP) Cooperative Agreement	Federal	HHS	TXDSHS	HPP is the primary source of federal funding for health care system preparedness and response and, in collaboration with public health, prepares health care delivery systems to save lives through the development of health care coalitions (HCCs). Under the direction of the HPP providers, the HCCs develop plans and provide training, and coordinate regional exercises.
Hydrologic Research Grants	Federal	NOAA		Up to \$125,000 to conduct joint research and development on pressing surface water hydrology issues common to national, regional, local operational offices. Eligible applicants are federally recognized agencies of state or local governments, quasi-public institutions such as water supply or power companies, hydrologic consultants and companies involved in using and developing hydrologic forecasts.
Groundwater Conservation District Loan Program	State	TWDB	TWDB	Provides short-term loans to finance the start-up costs of Groundwater Conservation Districts. Funding is available for any Groundwater District or Authority with the authority to regulate the spacing of water wells, the production from water wells, or both. The program is authorized under Texas Water Code Chap. 36, Subchapter. L, and governed by TWDB rules in 31 Tex. Admin. Code Chap. 363, Subchapter. H.
Gulf of Mexico Energy Security Act (GOMESA)	Federal	DOI	TXGLO	GOMESA significantly enhances oil and gas leasing activities and creates revenue sharing provisions for the oil- and gas-producing states of Alabama, Louisiana, Mississippi, and Texas, and their coastal political subdivisions (CPSs). GOMESA funds are used for coastal

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
GOMESA (continued)				conservation, restoration, and hurricane protection. The second phase of GOMESA revenue sharing began in Fiscal Year 2017 and expands the definition of qualified Outer Continental Shelf revenues to include receipts from Gulf of Mexico leases subject to withdrawal or moratoria restrictions. A revenue-sharing cap of \$500 million per year for the four Gulf producing states, their CPSs and the Land and Water Conservation Fund applies from fiscal years 2016 through 2055.
Individual Assistance (IA)	Federal	FEMA	TDEM	Following a disaster, funds can be used to mitigate hazards when repairing individual and family homes.
In-Lieu Fee Program Mitigation Projects	Federal	USACE	Community Applicants	Restoration, establishment, enhancement, and/or preservation of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation requirements for Department of the Army permits.
Mitigation Banks	Federal	USACE	Community Applicants	Mitigation Banks are sites approved by the Corps to sell compensatory mitigation credits for projects resulting in unavoidable impacts to waters of the U.S. When a permit is issued that requires compensatory mitigation, the permit will specify how many credits are required to be purchased at an approved mitigation bank.
National Earthquake Hazards Reduction Program (NEHRP)	Federal	FEMA	TDEM	Provides money to support enhanced earthquake risk assessments in local hazard mitigation plans and other earthquake hazard mitigation and preparedness activities.
Natural Resources Damage Assessment (NRDA)	Federal	EPA	TPWD	ERAs evaluate the likelihood that adverse ecological effects are occurring or may occur as a result of exposure to physical stressors (e.g., cleanup activities) or chemical stressors (e.g., release of hazardous substances) at a site.
National Weather Service (NWS)	Federal	NOAA - NWS		NWS offers storm spotter training, along with weather and flooding safety guides. They can also sometimes provide funding to support severe weather signage in parks or other public places.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
National Wildlife Wetland Refuge System	Federal	USFWS	TPWD	Provides funding for the acquisition of lands into the federal wildlife refuge system.
Nonpoint Source Grant Program	Federal	EPA	TCEQ, TSSWCB	The federal Clean Water Act (CWA) requires States to develop a program to protect the quality of water resources from the adverse effects of nonpoint source (NPS) water pollution. TCEQ and TSSWCB administer federal grants for activities that prevent or reduce nonpoint source pollution (NPS).
North American Wetland Conservation Fund	Federal	USFWS	TPWD	Provides funding for wetland conservation projects.
NRCS Conservation Programs	Federal	USDA, NRCS	Community Applicants	Provides funding through several programs for the conservation of natural resources.
Partners for Fish and Wildlife	Federal	USFWS	TPWD	Provides financial and technical assistance to landowners for wetland restoration projects in "Focus Areas" of the state.
Planning Assistance to States	Federal	USACE	TWDB	Aids states in planning for the development, utilization, and conservation of water and related land resources.
Pre-Disaster Mitigation Loan Program	Federal	SBA		Provides low-interest loans to small businesses for mitigation projects.
Prescribed Fire Grants	State	TAMFS	TAMFS	TAMFS's Mitigation & Prevention Department annually implements four prescribed fire grants intended to protect local communities and restore ecosystems. (1) SFAM Plains Prescribed Fire Grant – aids communities that have been or may be threatened by wildland fire by funding prescribed burning to reduce hazardous fuels in or around communities. Treatment areas will be located adjacent to priority communities in Texas that are at the highest risk for loss during a Southern Plains Wildfire Outbreak event. (2) The Community Protection Program Grant aids reducing the hazard of high-risk fuels on private lands through the use of prescribed burning. The treatment area will be within 10 miles of a

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Prescribed Fire Grants (continued)				National Forest boundary. The grant's goal is to protect high-risk communities and associated forest resources by reducing the risk of catastrophic wildfire on private and public lands. (3) The State Fire Assistance for Mitigation Central & East Texas Grant provides assistance to communities that have been or may be threatened by wildfire by funding prescribed burning to reduce hazardous fuels in and around communities. Treatment areas will be private property in the 43 Counties in Central and East Texas that have a Community Wildfire Protection Plan within the county. The goal is to protect high-risk communities and aid in ecosystem restoration by utilizing prescribed fire to consume excess vegetation before it contributes to catastrophic wildfire. Priority will be given to treatments sites that are within a CWPP, located near a Firewise community, located near homes based on Texas Wildfire Risk Assessment Portal and contain ecosystems that will benefit from prescribed fire. (4) Neches River and Cypress Basin Watershed Restoration Program - Prescribed Fire Grant provides assistance to landowners in utilizing prescribed fire for ecological improvement to the Neches River and Cypress Basin watersheds. This program will benefit the public and natural resources through improvement of water quality and quantity, control of invasive species and enhancement of wildlife habitat. Treatment areas will be private property in the Neches River and Cypress Basin Watersheds. Priority will be given to prescribed burn treatments that promote native ecosystem restoration, are in priority watershed protection zones and near public land.
Public Assistance (PA) Section 406 Funds	Federal	FEMA	TDEM	Following a disaster, funds can be used to mitigate hazards when repairing damages to a public structure or infrastructure. Wildfire mitigation is also eligible under emergency protection if life is in imminent danger.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Public Health Emergency Preparedness (PHEP) Cooperative Agreement	Federal	CDC	TXDSHS	Helps health departments build and strengthen their abilities to effectively respond to a range of public health threats, including infectious diseases, natural disasters, and biological, chemical, nuclear, and radiological events. Preparedness activities funded by the PHEP cooperative agreement specifically target the development of emergency-ready public health departments that are flexible and adaptable.
Regional Facility Planning Grant Program	State	TWDB	TWDB	TWDB grants to political subdivisions of the State of Texas for studies and analyses to evaluate and determine the most feasible alternatives to meet regional water supply and wastewater facility needs, estimate the costs associated with implementing feasible regional water supply and wastewater facility alternatives, and identify institutional arrangements to provide regional water supply and wastewater services for areas in Texas.
Regional Water Planning Group Grants	State	TWDB	TWDB	Developed to guide and support planning of the state's water resources by administering and assisting in the development of the regional and state water plans. The department strives to improve the planning process each cycle by developing clear guidance for the program's stakeholders and utilizing best-available data, methodologies, and technical innovations.
Research and Planning Fund and Fund Development Program	State	TWDB	TWDB	Offers grants to eligible applicants for the development or revision of regional water plans. The proposed planning must be a plan, an amendment to an approved regional water plan developed by the regional water planning group for a regional water planning area pursuant to the Texas Water Code, §16.053 and Chapter 357, or other special studies approved by the TWDB which will enhance water planning efforts in the region. Activities eligible for funding are those related to the development, revision, or improvement of regional water plans including public meetings, hearings, and special studies.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Resilient Landscapes Program	Federal	USDA, USFS	TAMFS	The USFS is working with partners to restore healthy, resilient, fire-adapted ecosystems. Restoring ecosystems includes thinning crowded forests and using prescribed fire on two to three million acres each year, which can help prevent the buildup of flammable vegetation that feeds extreme wildfires.
Risk MAP Program	Federal	FEMA, NFIP	TWDB	Establishes or updates floodplain mapping and multi-hazard risk products.
Rural Development Grants	Federal	USDA-Rural Development	TWDB	Provides grants and loans for infrastructure and public safety development and enhancement in rural areas. Provides \$100,000 or 75% of the total project, whichever is less.
Rural Fire Assistance Grant	Federal	NIFC	TAMFS	Funds fire mitigation activities in rural communities.
Rural Utilities Service (RUS)	Federal	USDA-Rural Development		RUS administers programs that provide much-needed infrastructure or infrastructure improvements to rural communities. These include water and waste treatment, electric power, and telecommunications services.
Rural Water Assistance Fund	State	TWDB	TWDB	Designed to assist small rural utilities to obtain low-cost financing for water and wastewater projects. The RWAF offers tax-exempt equivalent interest rate loans with long-term finance options.
Safe Rest Stops Program	State	TXDOT	TXDOT	Texas has 21 major highways that serve as long distance travel corridors. Along each of these roadways, rest areas are an essential safety feature to reduce accidents caused by driver fatigue. These facilities give travelers a break from driving, and then return them to the road rested, refreshed and alert.
State Fire Assistance for Mitigation (SFAM) - Mechanical Fuels Grants	State	TAMFS	TAMFS	Provides financial assistance to reduce the hazard of high-risk fuels on private lands using hazardous fuel reduction. The grant's goal is protected high risk communities within the 32 high risk counties in Central Texas identified by Texas A&M Forest Service Mitigation and Prevention Department. Priority will be given to landowners that live with in the 32 high risk counties, are in a county or city that has an active Community Wildfire Protection plan or live with in a Firewise USA Site.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
State Fire Assistance for Mitigation (SFAM) - Vegetative Fuel Break Grant	State	TAMFS	TAMFS	Provides financial assistance for the creation of vegetative fuel breaks on private lands in Texas. Vegetative fuel breaks are trees and shrubs systematically planted adjacent to fields, homesteads, or feedlots to reduce or redirect the wind. Projects will be in the Texas High Plains. The goal of the grant is to protect high-risk communities by reducing the risk of catastrophic wildfire on private and public lands. Grant recipients will be reimbursed up to \$2,500 for actual costs associated with creating a green, vegetative fuel break, consisting of a minimum of 3 rows of trees and 400 feet in length.
Silver Jackets	Federal	USACE	TWDB	Can provide funding for flood related studies, public awareness, risk analysis, and flood response plans. Construction of small flood control projects.
Small Flood Control Projects (USACE Section 205)	Federal	USACE	TWDB	Authorizes use of USACE to do feasibility and construction of small flood control projects.
State Participation Program – Regional Water and Wastewater Facilities	State	TWDB	TWDB	The State Participation Program enables the TWDB to provide funding and assume a temporary ownership interest in a regional water, wastewater, or flood control project when the local sponsors are unable to assume debt for an optimally sized facility. The program is intended to encourage the optimum regional development of projects by funding excess capacity for future use where the benefits can be documented, and where such development is unaffordable without state participation. The goal is to allow for the "right sizing" of projects in consideration of future needs.
State Water Implementation Fund for Texas (SWIFT)	State	TWDB	TWDB	Passed by the Legislature and approved by Texas voters through a constitutional amendment, the SWIFT program helps communities develop and optimize water supplies at cost-effective rates. The program provides low-interest loans, extended repayment terms, deferral of loan repayments, and incremental repurchase terms for projects with state ownership aspects.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
State Water Resources Research Act Program	Federal	USGS	TWDB	USGS in cooperation with the National Institutes for Water Resources supports an annual call for proposals to focus on water problems and issues that are of a regional or interstate nature or relate to a specific program priority identified by the Secretary of the Interior and the Institutes.
Texas Farm and Ranch Lands Conservation Program (TFRLCP)	State	TPWD	TPWD	Maintains and enhances the ecological and agricultural productivity of these lands through Agricultural Conservation Easements. The TFRLCP supports responsible stewardship and conservation of working lands, water, fish and wildlife, and agricultural production through: - Generating interest and awareness in easement programs and other options for conserving working lands. - Leveraging available monies to fund as many high-quality projects as possible. Highlighting the ecological and economic value of working lands and the opportunities to conserve working lands for the future.
Texas HOME Disaster Relief	Federal	TDHCA	TDHCA	The Texas HOME Disaster Relief Program is a long-term housing program designed to help eligible organizations serve income eligible households impacted by disasters. Funds are available to assist with federal or state declared disasters, or other natural or man-made disasters that may occur. The Department's practice is to maintain a HOME Disaster Relief Fund balance of \$1 million whenever possible. These funds can be accessed to support impacted households not located in communities that receive HOME funds directly from the U.S. Department of Housing and Urban Development (HUD).
Texas Longleaf Conservation Assistance Program	Federal	National Fish and Wildlife Foundation (NFWF)	TAMFS	Provides eligible landowners with financial and technical assistance for establishing, enhancing, and managing longleaf pine. Landowners with property within ten East Texas counties which include Angelina, Hardin, Jasper, Nacogdoches, Newton, Polk, San Augustine, Sabine, San Jacinto, Trinity, and Tyler are eligible to apply. Approved participants may receive up to 50% payment not to exceed a standard cap rate for implementing approved conservation practices. Approved conservation practices include

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
				prescribed burning, reforestation, site preparation, and forest stand improvement.
Texas Infrastructure Resiliency Fund (TIRF)	State	TWDB	TWDB	Enacted through Senate Bill 7 to address needs identified following the flood disasters of 2015, 2016, and 2017. Senate Bill 500 appropriated \$685 million. Purpose is to provide loans, grants, and matching funds for flood projects through four separate accounts. Each account has different purposes. The oversight entity is the TIRF Advisory Board (SWIFT Advisory Committee and TDEM Director as non-voting member).
Texas Water Development Fund (DFund)	State	TWDB	TWDB	State funded loan program The DFund enables the Board to fund multiple eligible components in one loan to our borrowers, e.g., an application for funding of water and wastewater components can be processed in a single loan. Provide financial assistance for water supply projects, wastewater projects, and flood control projects (including structural and nonstructural flood protection improvements).
Transportation Enhancement Program	Federal	FHWA	TXDOT	Provides opportunities for non-traditional transportation related activities. Projects should go above and beyond standard transportation activities and be integrated into the surrounding environment in a sensitive and creative manner that contributes to the livelihood of the communities, promotes the quality of our environment, and enhances the aesthetics of our roadways. Projects undertaken with enhancement funds are eligible for reimbursement of up to 80 percent of allowable costs.
United States Geological Survey (USGS)	Federal	USGS		USGS issues competitive grants and cooperative agreements to support research in earthquake hazards, the physics of earthquakes, earthquake occurrence, and earthquake safety policy.
Urban Tree Canopy Project (UTC)	Federal	USDA, USFS	TAMFS	Urban tree canopy (UTC) is the layer of leaves, branches, and stems of trees that cover the ground when viewed from above. In urban areas, the UTC provides an important stormwater management function by intercepting rainfall that would otherwise run off of paved surfaces and be transported into local waters through the storm

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
UTC (continued)				drainage system, picking up various pollutants along the way. UTC also reduces the urban heat island effect, reduces heating/cooling costs, lowers air temperatures, reduces air pollution, increases property values, provides wildlife habitat, and provides aesthetic and community benefits such as improved quality of life.
U.S.-Mexico Border Water Infrastructure Program	Federal	EPA	TCEQ	Provides grant assistance to U.S. and Mexican communities located within 60 miles of the border for the development and construction of high-priority drinking water and wastewater facilities. The program furthers EPA's mission of protecting human health and the environment by providing critical resources for what is often an area's first drinking water and basic sanitation services.
Water Research Grant Program	State	TWDB	TWDB	TWDB funds a variety of water planning and water research studies and projects intended to assist and support regional water planning efforts or to answer regional water planning questions.
Water Conservation Field Services Program	Federal	HUD	Texas A&M AgriLife	Provides several grants related to safe housing initiatives.
Water2025 Challenge Grant Program for Western States	Federal	Bureau of Reclamation	TWDB	Up to \$25,000 for projects that improve water use efficiency and improve water management practices.
Watershed Processes and Water Resources	Federal	Bureau of Reclamation	TWDB	Up to \$250,000 for projects that can be completed within 24 months and that reduce conflicts through water conservation, efficiency, and markets.
Watershed Processes and Water Resources – National Research Initiative Standard Research (Part T)	Federal	USDA	TWDB	\$100,000 available. Sponsors research that addresses two areas: (1) understanding fundamental watershed processes; and (2) developing appropriate technology and management practices for improving the effective use of water (consumptive and non-consumptive) and protecting or improving water quality for agriculture and forestry production.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
WaterSMART – Drought Response Program	Federal	USDA	TWDB	\$500,000 available. Innovative research in understanding fundamental processes that affect the quality and quantity of water resources at diverse spatial and temporal scales, ways on improving water resource management in agriculture, forested, and rangeland watersheds, and developing appropriate technology to reach those goals.
Wildlife Habitat Incentive Program (WHIP)	Federal	USDA, NRCS	TPWD	Voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and tribal land.

The background of the slide is a blurred image of a wooden gavel and the scales of justice, symbolizing law and order. A blue circular graphic with concentric rings is overlaid on the bottom left.

ADOPTION RESOLUTIONS