CITY OF GEORGETOWN
HAZARD MITIGATION PLAN

City of Georgetown
Martin Luther King Jr. St.
Georgetown, Texas, 78626

Foster a Lifestyle of Preparedness
And Be a
Champion of Resiliency

EXECUTIVE SUMMARY

The City of Georgetown 2021 Hazard Mitigation Plan Update

The City of Georgetown has been affected by an array of natural, technological, and human caused hazards. This is not surprising since the State of Texas itself has received more federal disaster declarations (360) than the other 49 states. Williamson County, in which the City of Georgetown is located, received 22 declarations as a result of fire, hurricane, severe storms, infectious disease (pandemic), flood, and drought events. In addition, late in the 2021 HMP Update Planning process (February 2021), the State, including Williamson County, received both a federal Emergency Declaration (EM-3554-TX) and a Disaster Declaration for Severe Winter Storms (DR-4586-TX).

Considering the array of hazards impacting the City, its 2021 Hazard Mitigation Planning Team, comprised of Preparedness Committee members who regularly meet on a monthly basis, wanted to assess a range of natural hazards, and to integrate mitigation efforts with programs and plans propagated by a various City departments and stakeholder groups. This plan will address natural hazards in support of justification for potential grant applications.

> ***Mitigation***
>
> *is the thread that permeates national preparedness.*
>
> *National Mitigation Framework*, U.S. Department of Homeland Security

Disasters may occur anytime and in any place**.** They may cause death, damage buildings and infrastructure, and have devastating consequences for a community's economic, social, and environmental well-being. Nationwide, billions of dollars are paid annually to help communities, organizations, businesses, and individuals recover from disasters. These monies do not reflect the entire cost of disasters because it is difficult to ascertain all direct and indirect costs incurred by governmental entities, homeowners, businesses, insurance companies, and other private entities. Hazards may, however, be anticipated to some degree, allowing the community to implement mitigation efforts to reduce or eliminate the level of harm to people and damage to property and crops from a given hazard.

The 2021 City of Georgetown Hazard Mitigation Plan Update (HMP) coalesces risks and potential resilience efforts towards the goal of long-term vulnerability reduction for the City. and its Extra-territorial jurisdiction (ETJ).

This plan is driven not by the occurrence of incidents but by the potential for risk. **By fostering comprehensive risk considerations, HMP plan encourages behaviors and activities that will reduce the future exposure and vulnerability of persons and the built environment and enable the City to be more resilient.**

The hazard mitigation planning process benefits both the City and the community in many ways:

- It lays the foundation for identifying hazards and how they are addressed in **all phases** of disaster and emergency management programs – prevention, protection, response, recovery, and mitigation.
- The inclusive planning process builds partnerships by involving agencies, civic organizations, citizens, and businesses.
- The process increases communitywide education and awareness of threats and hazards, their impacts, consequences, and risks.
- The plan communicates needs and priorities to Federal and State officials and positions local jurisdictions to secure financial and technical assistance as needed.
- The plan provides for the most efficient and effective use of resources, financial and otherwise, to address risk reduction.
- The process provides opportunities to align local hazard risk reduction with other State and Local objectives.

Effective mitigation begins with identifying the threats and hazards faced by a community and determining the associated vulnerabilities and consequences. Comprehensive assessment requires risk information based on credible science, technology, and intelligence validated by first-hand experience. No single threat or hazard exists in isolation. For example, a severe thunderstorm can lead to flooding, dam failure, and hazardous material spills.

Understanding risks makes it possible to develop strategies and plans to manage them. Managing risks from threats and hazards requires decision making to accept, avoid, reduce, or transfer those risks. Avoiding and reducing is one way to reduce a community's long-term vulnerability and build individual and community resilience.[1]

Successful mitigation leads to a more resilient community in the face of future disasters. Resilient communities proactively protect themselves against hazards, build self-sufficiency, and become more sustainable. Resilience…involves technical, organizational, social, and economic dimensions. It is fostered not only by government, but also by individual, organization, and business actions.

-National Response Framework, U.S. Department of Homeland Security

[1]*National Response Framework*, U.S. Department of Homeland Security, July 2013, p. I

Record of Changes Since 2014 HMP Approval

Changes or additions incorporated into the 2021 Plan include the following:

- Section 1 - Introduction: Overview of major hazard events that occurred since the 2014 City of Georgetown Hazard Mitigation Plan (HMP) was written.
- Section 2 – Planning Process: Documentation of activities conducted throughout the 2021 Planning Process.
- Section 3 – City Profile: Updated demographic profile, information about local major businesses, and discussion of the City's current and future Water Supply.
- Section 4 – Hazard Identification and Risk Assessment: Several new Natural Hazards of Concern are included in the Plan Update, including Erosion (Riverine); High Winds, Space Weather (Geomagnetic Disturbance); and Infectious Disease (moved from 2014 Appendices to the 2021 Base Plan). The updated plan also removed Hurricane as a separate hazard, given the distance between the City of Georgetown and the hazard's primary area of impact along the Texas coast. The remnants of a Hurricane are addressed as the Severe Storm, Tornado, High Winds, and Flood hazards as relevant impacts to the planning area. Updated historic data and National Flood Insurance Program (NFIP) Statistics.
- Section 5 – Mitigation Strategy: Provided updates on all mitigation action items included in the 2014 Plan and incorporated new mitigation actions for the 2021 Update.
- Section 6 – Plan Maintenance: Updated how those tasked with overseeing Plan progress will monitor and maintain the plan.
- A number of Appendices have been developed with the aim of streamlining the readability of the Base Plan. Support documentation may be found in the Appendices.
- Moving forward, The City of Georgetown 2021 Hazard Mitigation Plan (HMP) is a dynamic document that will be under continual review. The document may be changed administratively under the authority granted by the City of Georgetown City Council.

Administrative changes include:

- Corrections or revisions that clarify context and readability.
- Updates that reflect adopted policy and/or procedures.
- Hazard data and risk information that enhances the current plan.
- Updates to current Mitigation Actions and new Actions approved by the Preparedness Committee (Planning Team) and incorporating Public input and City Council review.
- Other authorized changes identified by the Texas Division of Emergency Management and/or Region 6 of the Federal Emergency Management Agency.

It shall be the responsibility of the City of Georgetown Emergency Management Office to maintain the record of changes throughout the current five-year planning cycle.

Record of Changes Since 2021 HMP Update Approval

Section/Page	Description of Change	Authorized by	Date

SECTION 1: INTRODUCTION

Background

The City of Georgetown, Texas is the county seat of Williamson County, and located in one of the fastest growing areas of Central Texas. Georgetown is a Home Rule Charter City and operates under a Council - Manager form of government. A mayor, elected at large, and seven council members, elected from single member districts, serve staggered, three-year terms. Georgetown is located on Interstate 35 at the intersection of State Highway 130, along the major corridor between Dallas and San Antonio. Georgetown was founded in 1848 with a strong agricultural base in the heart of Williamson County, 26 miles north of Austin. According to 2018 figures provided by the U.S. Census Bureau, the City of Georgetown is ranked seventh on the list of fastest-growing cities in the country among those with a population of more than 50,000. Georgetown's growth rate from July 1, 2018 through July 1, 2019 was 7.2 percent, resulting in a current population estimate of 79,604.

Georgetown's economic development initiatives to expand jobs and the tax base are balanced with a focus on maintaining and expanding its status as a signature tourist destination. The award-winning historic downtown square, and the City's extensive range of nationally-recognized parks and river trail systems along the North and South San Gabriel Rivers and Lake Georgetown, have been leveraged to make the City one of the most attractive places to live and work. This unique character and small-town charm were key factors for Del Webb Corporation's decision to build its first Texas development in Georgetown with the 1995 construction of Sun City, Texas. Today, development includes 9,900 homes[1] and over 15,000[2] retirees call Sun City and Georgetown their home.

[1] Sun City Texas Community Association About Us Home (sctexas.org)
[2] Sun City Texas Del Webb Retirement Community | Sun City TX Community (55places.com)

Georgetown is also home to Southwestern University, which continues to receive national recognition. The school was named as one of the top 100 Liberal Arts institutions[3] by the organization College Consensus, which aggregates the results of reputable college ranking from reviews by publishers and students. With a student enrollment of 1,507 and over 500 employees, the University provides substantial economic and cultural contributions to Georgetown.

The overall focus of the FY2021 budget is to preserve and maintain City services in response to both continued growth and uncertainty surrounding the COVID-19 pandemic. It addresses these priorities through utility and transportation infrastructure development, public safety improvements, long-range planning initiatives, economic development achievements, and efforts to sustain City service levels. These endeavors include opening two fire stations in the next fiscal year.

In maintaining the City's commitment to safety and sustainability as a progressive, urban community, Georgetown has updated the Hazard Mitigation Plan (HMP or Plan) to reduce risks from natural hazards. This 2021 HMP Update offers a guide to the community's current hazard risks and jurisdictional vulnerabilities and makes recommendations about mitigation strategies and actions to address hazards of concern. The Federal Emergency Management Agency (FEMA) defines mitigation as "any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards."[4] Mitigation differs from emergency preparedness and protective measures, which focus on activities designed to make communities more ready to take appropriate action in a disaster with emergency response and equipment. Mitigation activities may involve everything from developing new policies and codes; to the alteration of physical environments to reduce risks and vulnerabilities from hazards and make it more cost-effective to respond to and recover from disasters.

The City of Georgetown is susceptible to a wide range of natural and human-caused hazards, including flooding, tornadoes, and wildfires. During the latter part of the HMP Planning Process, the entire State of Texas, including the City of Georgetown, was recovering from a Severe Winter Weather event that received a federal disaster declaration on February 19, 2021 as DR-4586-TX. The City also suffered severe damage from a major hail event in Spring 2020, although this event was not awarded a federal declaration. These and other life-threatening hazards can destroy property, disrupt the economy, and lower the overall quality of life for residents. On September 22, 2018, the San Gabriel River, which runs through downtown Georgetown, crested 15 feet over flood

[3] College Consensus, https://www.collegeconsensus.com/?s=top+liberal+arts+colleges
[4] FEMA, Local Mitigation Planning Handbook, March 2013.

stage after a heavy rain event. The community has also been affected by regional events, including flash flooding on September 7-8, 2010, when Tropical Storm Hermine drenched Central Texas, resulting in up to 16 inches of rain from central Williamson County south into northern Travis County. An RV park on Brushy Creek and numerous homes were evacuated, causing families seeking shelter as floodwaters rose.

While it is impossible to prevent a hazard event from occurring, hazard impacts to people and property can be lessened through effective hazard mitigation planning and implementation of mitigation actions (projects). This Plan outlines opportunities for the City to evaluate successful past mitigation actions and develop new initiatives to avoid future disaster loss.

Scope and Participation

The City of Georgetown (the City) is the sole plan "participating" jurisdiction and is managing the planning process under the leadership of the City's Office of Emergency Management. Other entities, including Williamson County, the Texas Division of Emergency Management, the Georgetown Independent School District, and others, participated as stakeholders. These and other stakeholders provided valuable input during the planning process.

The focus of the Plan is to mitigate hazards classified as "high" or "moderate" risk as determined through the hazard risk assessment conducted by the City. Hazards that pose a "low" risk will continue to be evaluated during future Plan updates, but they are a lower priority for mitigation than those for which the City is deemed to be at high or moderate risk. This approach enables the prioritization of mitigation actions based on hazards that are understood to pose the greatest risk to lives and property.

Purpose

This Plan was prepared by the City of Georgetown and its selected consulting firm IEM. The planning process offered an opportunity for the City of Georgetown, stakeholders, and the public to evaluate past and current successful mitigation actions and explore opportunities to develop new, cost-effective actions that would minimize future disaster losses.

In developing the Plan, the City of Georgetown identified and prioritized fourteen (14) natural hazards on which to focus. The goal of this Plan is to minimize or eliminate long-term risks to human life and property from known natural hazards by identifying and implementing cost-effective mitigation actions. Mitigation is defined by FEMA as sustained actions taken to reduce or eliminate long- term risk to people and property from hazards and their effects. As such, the Plan is part of a continuing effort to develop successful mitigation projects to bring together the City and its stakeholders in the effort

to reduce future risk of loss of life or property damage in the City of Georgetown. Through this process, planning process participants were asked to:

- Assess previous mitigation projects and develop unique mitigation strategies to meet future development and risks.
- Encourage improvements in floodplain management, and City participation in the National Flood Insurance Program (NFIP), which reduces flood insurance premiums for property owners;
- Devise solutions to strengthen the City's Emergency Management program by addressing moderate and high-risk natural hazards; and
- Develop and implement a comprehensive Hazard Mitigation Plan for the City of Georgetown.

Authority and Policies

FEMA Planning Requirement C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs?

The Hazard Mitigation Plan is tailored specifically for the City of Georgetown, Texas and as provided by state law, the plan shall follow the standards and criteria promulgated by the Texas Division of Emergency Management (TDEM) of the State of Texas. It will also comply with 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). It will also comply with FEMA's February 26, 2002 Interim Final Rule ("the Rule") at 44 CFR Part 201, which specifies the criteria for approval of mitigation plans required in Section 322 of the DMA 2000 and standards found in FEMA's "Local Mitigation Plan Review Guide" (October 2011), and the "Local Mitigation Planning Handbook" (March 2013).

In addition, mitigation activities will be conducted and coordinated in accordance with the City or Georgetown Code of Ordnances, Chapter 2.76 - Emergency Management; and Texas Statutes, Government Code, Title 4, Subtitle B, Law Enforcement and Public Protection, Chapter 418 Emergency Management.

Programs and Resources

The Emergency Management Coordinator and the Georgetown Office of Emergency Management works with an ongoing Preparedness Committee (PC), whose purpose is to ensure adequate capabilities exist to prevent, protect, respond, recover, and mitigate the increasing risk to the city and community from threats and hazards. The PC advises on current capabilities, assist with all-hazard threat assessment, provide resources in support of training, exercising, event and incident management. Additionally, they will provide subject matter expertise, recommendations, and resources for improvement actions for, all hazard risk reduction, emergency management capabilities enhancement, and program improvement. The PC served as the Hazard Mitigation Planning Team (Planning Team) during the HMP planning process.

The City is actively expanding capabilities to increase its capacity to develop plans of all types; hire additional staffing; and secure resources to implement mitigation actions and activities. The city intends to expand on the Firewise program for Wildland Urban Interface (WUI) areas and is increasing participation in a regionally recognized Mosquito Vector Control Group.

Specifically, the City will improve its level of capabilities to support development and updates to documents such as the Emergency Operations Plan (EOP); Continuity of Government and Operations Plan (COOP); developing a Training and Exercise Plan; and Incident-specific Threat Response Plans to include as Appendices to the EOP. The PC, in coordination with Emergency Support Function Coordinators and City Department Heads, also provide management and resources for projects management and implementation.

Additional authorities, policies, programs, resources, and policies are detailed in Appendix F – Capabilities Assessment.

Summary of Sections

Sections 1 and 2 of the Plan outline the purpose and activities of the Planning Process. Section 3 profiles the City and describes the population and economy.

Sections 4 presents a hazard overview and information about individual natural hazards. Hazards are presented alphabetically and for each hazard discussion includes a hazard description; a list of historical events; location (when applicable); extent, and future probability.

Section 5 outlines the community's mitigation goals and objectives and the mitigation strategy. A summary of previous and newly proposed mitigation actions is included in table format in this section, while Appendix G includes the complete Mitigation Action Worksheets Mitigation from the 2014 HMP and those proposed as new actions in the 2021 HMP Update.

Section 6 identifies the mechanism for ongoing plan maintenance and updates.

Appendices are included in the plan as follows:

- Appendix A – FEMA Approval Letter and Adoption Resolution
- Appendix B – Acronyms Used and List of Resources Cited
- Appendix C – Planning Participants
- Appendix D - Public Survey Tool and Survey Results
- Appendix E – Planning Process Documentation
- Appendix F – Capabilities Assessment
- Appendix G – Vulnerability Assessment
- Appendix H – Critical Facilities
- Appendix I – Mitigation Action Worksheets

SECTION 2: PLANNING PROCESS

FEMA REQUIREMENTS – Element A PLANNING PROCESS

A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))

A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))

A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))

A4. Does the Plan describe the review and **incorporation** of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))

FEMA REQUIREMENTS – Element E Plan Adoption

E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))

Overview of Hazard Mitigation Planning Process

Mitigation planning involves bringing together multiple components and players to create a more disaster-resistant community. This section provides an overview of the planning process, highlighting key steps and describing how stakeholders and the public were involved.

The City of Georgetown utilized general budget funds and city personnel to update the local Hazard Mitigation Plan. It solicited bids to assist with the hazard risk assessment and mitigation strategies development and hired the consultant team of IEM, Inc. to provide technical support. In developing the Plan, the City and consultant used the FEMA "Local Mitigation Plan Review Guide" (released Oct 1, 2011), and the "Local Mitigation Planning Handbook" (dated March 2013) to create the Plan in accordance with the process as shown in Figure 2-1 below.

Figure 2-1. Mitigation Planning Process

The City of Georgetown and the consultant team met in September 2020 to begin organizing resources by identifying Planning Team Members and discussing the project timetable.

Planning Team

The Planning Team was established using a direct representation model for the planning area, which covered the City of Georgetown and its Extra-territorial Jurisdiction. Under the leadership Core Planning Team, comprised of the City's Emergency Management Coordinator and Emergency Management Specialist, the Planning Team consisted of the members of the established Preparedness Committee, which was comprised using an Emergency Support Function (ESF) structure. The Emergency Management Specialist and ESF Core Team members reached out to the various city departments represented, as well as to stakeholders from the Texas Division of Emergency Management, FEMA Region VI, the US Army Corps of Engineers, and other stakeholders. City departments engaged in the planning process include, but were not limited to, GIS, Planning, Community Services, Utilities, the City Manager's Office, Parks and Recreation, the Fire Department, and others. Participants are listed in Appendix C – Planning Participants.

Among the tasks completed by the Planning Team included completing a capability assessment survey, identifying vulnerable community assets, providing input regarding the identification of hazards and the degree to which the planning area is at risk to each, identifying mitigation goals and objectives, and developing mitigation strategies.

Planning Process

The Plan update process included following the four major steps included as Figure 2-1 Mitigation Planning Process. After the Planning Team was organized, a kick-off meeting was held to discuss the overall planning process, types of input to be requested from participants, and potential hazards to be addressed in the plan.

Kickoff Meeting

The October 20, 2020 kickoff meeting provided an opportunity to inform city officials and key department personnel about how the planning process related to their areas of responsibility. Based on the City's exposure to various hazards and the list of vulnerable community assets, the group developed mitigation strategies and reviewed strategies included in the 2014 HMP to determine their relevance.

During monthly meetings of the Planning Team, the group looked at the following:

- The nature and magnitude of risks currently affecting the community,
- Mitigation goals to address current and expected conditions, whether current resources will be appropriate for implementing the Plan,
- Implementation problems, such as technical, political, legal or coordination issues that may hinder development,
- Anticipated outcomes,
- How the City, agencies and partners will participate in the implementation process, and
- A review of the draft 2021 Plan to secure feedback to be incorporated into the update.

Given the prevailing concerns about the widespread pandemic of COVID-19 that came to light in early

2020, Planning Team meetings were conducted using the online Microsoft Teams platform. Complete documentation for each meeting is included in Appendix E – Planning Process Documentation. This includes copies of the invitation to meeting participants, the meeting agenda, a PowerPoint presentation, meeting minutes, and meeting handouts.

Capabilities Assessment

The Planning Team met on November 17, 2020 to conduct a Capabilities Assessment, a copy of which was emailed to participants in advance of the meeting. A copy of this document, as well as the results of the Capabilities Assessment, is included in Appendix F – Capabilities Assessment.

The group was asked to consider assets and capabilities falling into categories, especially those that may be located in hazard-prone areas. Assets could be identified as part of the natural environment, economic, the population, the built environment, cultural and historic resources, and future development. Participants were also asked about capabilities falling into the following categories: planning and regulatory, administrative, and technical, safe growth, financial, and education and outreach.

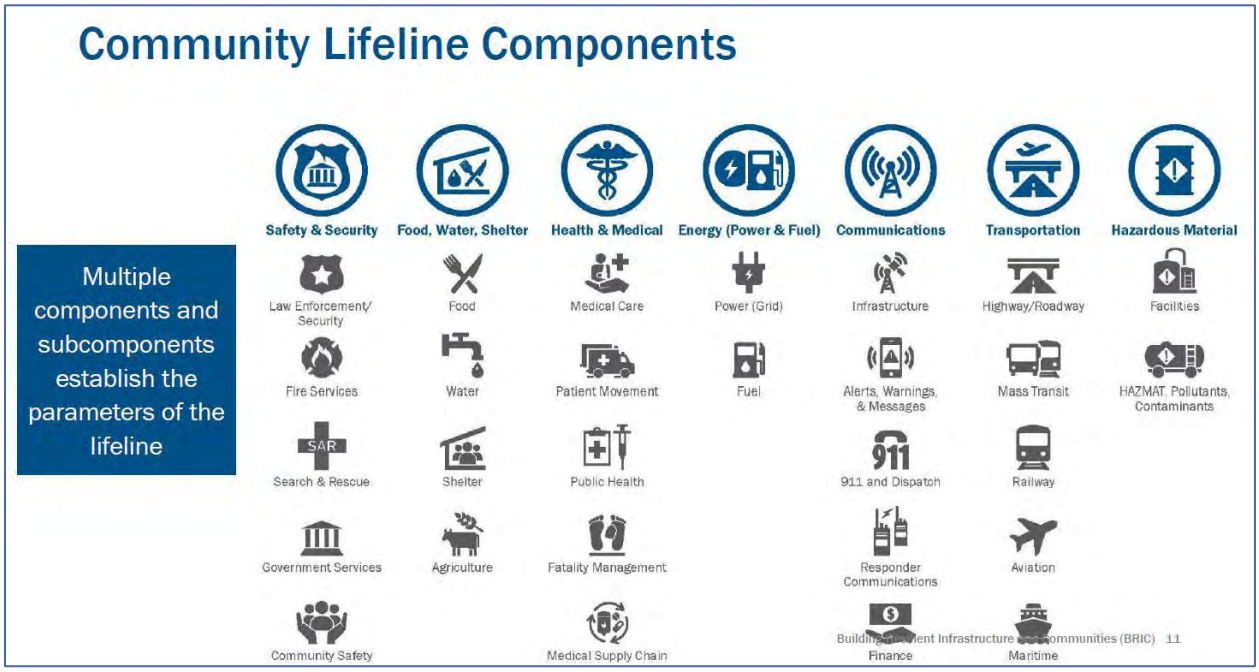
Vulnerability Assessment

On December 15, 2020, the Planning Team conducted a Vulnerability Assessment that answered the following questions:

A. What are the *most valuable assets* in your community?
B. What are the biggest challenges facing your community?
C. What is your vision of your community in 10 years?

The group was also asked to pay special attention to assets that fall into categories described as Community Lifeline Components to ensure consideration of the full range of critical services and assets that could be potentially at risk to one or more hazards. This need was driven home by the potential failure of all utilities services (water, electricity, sewer, wastewater treatment, et. al.), transportation, communications, and other systems on which life depends for everyday survival. These services are listed as Community Lifeline Components in the FEMA graphic included here in Figure 2.2.

Figure 2-2. FEMA Community Lifeline Components



Hazard Identification and Risk Assessment

On January 11, 2021, the Preparedness Committee meeting identified and ranked hazards of concern. A list of natural hazards was presented for consideration. Participants, as well as hazard-specific subject matter experts, provided input on the impacts of natural hazards discussed: Dam/Levee Failure, Drought, Erosion (Riverine) Extreme Heat, Flood, Hail, Extreme Heat, Flood, Hail, Flood, Hail, High Winds, Lightning, Severe Thunderstorm, Tornado, Winter Weather, and Wildfire.

A review of Impacts and Consequences from natural, technological, and human-caused hazards was reviewed, and participants were asked to identify how each hazard affected the community, a step that would lend itself to hazard ranking. A follow up survey using Survey Monkey was sent to each participant requesting additional specific hazard input based on the Risk Characteristics shown in Table 2-1.

Table 2.1. Ranking Hazards by Risk Characteristics

Risk Characteristic (Vulnerability)		Score
Area Impacted	Less than 25% of the jurisdiction impacted	1
	Less than 50% of the jurisdiction impacted	2
(The percentage of the Jurisdiction at risk to an impact from each hazard)	Less than 75% of the jurisdiction impacted	3
	Over 75% of the jurisdiction impacted	4
Health and Safety Consequences	No health and safety impact	1
	Few injuries or illnesses	2
(The health and safety consequences that can occur)	Few fatalities but many injuries or illnesses	3
	Numerous fatalities	4
Property Damage	Few properties destroyed or damaged	1
	Few destroyed but many damaged	2
(The amount of property damage that can occur	Few damaged but many destroyed	3
	Many properties destroyed and damaged	4
Environmental Damage	Little or no environmental damage	1
	Resources damaged with short term recovery	2
(The environmental damage that can occur)	resources damaged with long term recovery	3
	resources destroyed beyond recovery	4
Economic Damage	Low direct and/or indirect costs	1
	High direct and low indirect costs	2
(The economic disruption that can occur)	Low direct and high indirect costs	3
	High direct and high indirect costs	4
Future Occurrence		**Score**
Probability of Future Occurrence	(Very Low) 0-1 times in the next 5 years	1
	(Low) 2-3 times in the next 5 years	2
(Probability of a future occurrence)	(Medium) 4-5 times in the next 5 years	3
	(High) 6-7 times in the next 5 years	4
	(Very High) 8+ times in the next 5 years	5

The assessment was also used to establish priorities for mitigation based on potential dollar losses and loss of life. A hazard profile and vulnerability analysis for each of the hazards can be found in Section 4 of this Plan.

Review 2014 Goals and Objectives and Current and Proposed Mitigation Actions

The mitigation strategy development for the Plan involved reviewing the relevance of mitigation goals and objectives included in the 2014 Plan, providing status updates of actions included in the 2014 Plan, and developing new mitigation actions. A mitigation workshop was originally scheduled for February 16, 2021, but the City was in the middle of a Severe Winter Storm, for which it received a federal declaration, so this discussion was postponed until March 16, 2021.

While a more complete status update is provided starting on page 5-7, in general the terms, the City's annual budget process, as well as the 5-year capital improvement plan, and the most recent update to the comprehensive plan considered the hazard mitigation plan prior to adoption. Examples completed initiatives included in the 2014 mitigation strategy that were completed or are ongoing/in process include the City acquiring flood prone properties; supporting neighborhood Firewise programs; developing seasonal public health campaigns; implementing regular building code updates and increased code enforcement and building inspections staffing.

An inclusive and structured process was used to develop and prioritize new mitigation actions for this plan using the criteria outlined in the FEMA Local Mitigation Planning Guide. These criteria were thought to be more all-encompassing than the criteria used in developing the 2014 HMP. For new actions, the Planning Team members identified proposed actions, costs and benefits, the responsible organization(s), effects on new and existing buildings, implementation schedules, priorities, and potential funding sources.

Review of the Draft 2021 City of Georgetown, TX Hazard Mitigation Plan Update

On April 20, 2021, the Planning Team as a group reviewed and discussed the draft 2021 City of Georgetown, TX Hazard Mitigation Plan update. The Plan was sent to the group in advance of the meeting so member would have had a chance to present comments at the meeting, or to otherwise direct them to the Emergency Management Specialist. At the same time, it was posted for review on the City of Georgetown web site and widely promoted through City communications vehicles that the City requested feedback from its stakeholders and the broader community.

Posting of the Draft Plan for Public Comment

On April 30, 2021, plan was posted as stated above and the community was given 30 days, or until May 30, 2021, to provide feedback. All feedback was incorporated into the final Draft Plan submitted to TDEM, and later to FEMA, for agency feedback.

Review and Incorporation of Existing Plans

A cross-section of existing studies, plans, reports, and technical information were reviewed as part of the planning process. The first document reviewed was the 2014 City of Georgetown Hazard Mitigation Plan. As a result of plan review, the Planning Team decided to slightly revise the list of natural hazards included in the plan update. The Team reviewed the list of participants in the previous plan and identified

additional stakeholders to be encouraged to participate in the planning process of the plan update. Figures in the 2014 plan was also used as a jumping off point for researching changes in population and development, and to also fully document revisions incorporated into the 2021 HMP Update.

Other sources of information included in the plan updated were provided by FEMA Region VI, the United States Army Corps of Engineers (USACE), the U.S. Fire Administration, National Oceanic and Atmospheric Administration (NOAA) publications, the Texas Water Development Board (TWDB), the Texas Commission on Environmental Quality (TCEQ), the Texas Forest Service, the Texas Division of Emergency Management (TDEM), and local hazard assessments and plans. Additional plans consulted are listed in Appendix B: Acronyms Used and List of Resources Cited.

Material from these resources were integrated into the hazard profiles and considered while developing the mitigation strategy. Some of these documents, including those from FEMA, provided information on risk, existing mitigation actions currently underway, and ideas for possible future mitigation actions. Other resources, including those from NOAA, provided histories of disasters in the area. USACE studies were reviewed for their assessment of the risk to dam/levee failure and potential projects in the region. Materials from FEMA and TDEM were reviewed for guidance on plan development requirements. The community included actions from other plans, such as Floodplain Management Plans and developed actions to implement and incorporate other plans such as Stormwater Management Plans.

A Capability Assessment completed by key City departments also provided information about existing plans, policies, ordinances, and regulations in place that may be integrated into the goals and objectives of the Hazard Mitigation plan. The data was included in a master Capability Assessment which is included as Appendix F. Current projects and studies were utilized as a starting point for discussing mitigation actions among Team members. For example, the City has developed a Comprehensive Master Plan to assist in planning future growth initiatives and safe growth objectives for the community, quality land development for the future of Georgetown and preservation of the community's unique historic and environmental features. The Comprehensive Plan will incorporate considerations from the Hazard Mitigation Plan as it pertains to mitigating risk to natural disasters that impact transportation, existing and future development in floodplain areas, and educating residents on how to protect themselves and their property. As one of the fastest-growing communities in Central Texas, the City of Georgetown seeks to maintain a balance in preserving the life, safety, well-being, and property of all residents in the event of natural and human-caused disasters, while considering their limitations and vulnerabilities.

Previous hazard events, occurrences, and descriptions were identified through NOAA's National Center for Environmental Information (NCEI). Results of past hazard events were found by searching the NCEI database are included in Section 4 of this Plan. The City of Georgetown Planning Department was asked to review population projections included in Section 3 of the Plan. Information from the Texas Forest Service was used in discussing the wildfire hazard, and to help identify potential grant opportunities. The State of Texas Hazard Mitigation Plan developed by TDEM was used as a resource to identify hazards of concern to the planning area and potential funding opportunities to support mitigation projects.

Community Participation

Stakeholders and the public were invited to participate in the planning process. Community input was also requested by posting and widely advertising a Community Survey that was disseminated in both English and Spanish. Results from Preparedness Committee and community input showed overall community concern about flood projects, including storm water improvement, hail, winter storms, and other hazards. The results of this input are summarized in the Section 5 (Mitigation Strategy) and in the meeting minutes included as Appendix E (Planning Process Documentation). Both the community and the Committee provided recommendations for new actions based on their concern about local hazards.

An important component of mitigation planning is public participation and stakeholder involvement. Input from individual citizens and the community as a whole, provided the Planning Team with a greater understanding of local concerns, and increases the likelihood of successfully implemented 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 hazards present in their community and take steps to reduce their impact.

Public involvement in the development of the City of Georgetown Hazard Mitigation Plan was sought at the outset using English and Spanish language community surveys to obtain data and information from the residents of Georgetown on their concern about specific hazards and what the City should do to mitigate the hazards. Surveys were promoted by local officials, a link was made available for citizens to access the survey by visiting the City of Georgetown's website, and it was heavily promoted through various communications vehicles used by the City of Georgetown. Hard copies were made available in public areas for access by those who may not have access the internet. The City received a total of 348 responses to the English language survey and two from the Spanish language version. It was noted that many respondents to the English-language survey identified themselves as Hispanic. The survey and summary of survey findings are shown in Appendix D.

The Planning Committee invited public input on the draft plan, which was posted on City web sites, promoted through the City's multiple communications vehicles, and made available in hard copies placed in easily accessible public areas for review by who may not have internet access.

Stakeholder Involvement

Community planning partners were invited to the HMP kickoff meeting and civic and community leaders were encouraged to provide feedback as during the community survey process when the draft plan was posted for public review and feedback. The City Planning Department coordinated a one-on-one workshop with a City Councilmember, who represents the San Jose neighborhood , in which a large segment of the population Spanish is the primary language. The workshop was designed to address questions of the Councilmember and her constituents about flooding and other hazards occurring in the neighborhood. The City Emergency Management Specialist attended the meeting to provide report on the progress of the 2021 Hazard Mitigation Plan and discuss mitigation initiatives pertinent to the Councilmember's jurisdiction. As a result of this meeting, a new mitigation action was developed for the 2021 Plan update to address two needs of the Spanish-language community: review the current level of

outreach that includes material (print, electronic, verbal) disseminated in multiple languages and address hazards of concern to the Spanish-speaking community.

Plan Adoption

A final draft of the plan will incorporate all feedback received from the City Council, the Preparedness Committee, residents, stakeholders and any individual or entity that has shared constructive input on how the plan can be strengthened to ensure one of the plan's Goals (outlined in Section 5, Migration Strategy), to protect life and property. This version will be sent to TDEM and FEMA Region VI for approval. Upon approval, the City of Georgetown will receive a letter of from FEMA Region 6 stating that all required elements of the formal FEMA Mitigation Planning Process have been duly satisfied. The City of Georgetown City Council will pass an adoption resolution formalizing its acceptance of the plan. A draft copy of the Adoption Resolution is included in Appendix A.

SECTION 3 - CITY PROFILE

Overview

The City of Georgetown is located in, and is the county seat of, Williamson County. The City is located approximately 26 miles north of downtown Austin. Geographically, Georgetown lies across the Balcones Escarpment, which is a fault line on the northeastern edge of the Texas Hill Country, with Interstate 35 dividing Georgetown into east and west segments.

The City was named for land donor George Washington Glasscock, an early settler who provided 172 acres for use as the location of the County seat. He and other Georgetown settlers from the 1800s were attracted to the area's abundance of timber and high quality, clear water. The north and middle forks of the San Gabriel River run through the City, providing residents with over 30 miles of hiking and biking trails, as well as several parks and recreational areas that serve as a major attraction for residents and visitors.

In 2007, rains in western Williamson County and neighboring Burnet County fed into the San Gabriel River, raising water levels in the South Fork of the river to 31 feet. This transformed the normally gently flowing river into a raging torrent that carried away cars and prompted the need for multiple search and rescue efforts. Another major rain event occurred on September 22, 2018, which caused waters to rise over 26', significantly above the 9' Flood Stage level.

In addition to periodic flooding from the San Gabriel River, the City of Georgetown is subject to a host of other natural hazards, each of which is profiled in Section 4. This section looks at a general profile of the City and includes data covering the population and demographics, the economy and industry, land use, and development trends.

Figure 3-1 shows the general location of the City relative to the Interstate Highway 35 corridor; other communities within and adjacent to Williamson County; and the nearby State Capital of Austin. Figure 3-1 includes the boundaries of the City of Georgetown and Figure 3-2 shows the boundaries of the City and its Extraterritorial Jurisdiction, both of which comprise the Study Area. All areas of the City's corporate limits are covered in the risk assessment analysis of the Plan.

Figure 3-1. Location of the City of Georgetown as Part of the Austin Metropolitan Area

Source: City of Georgetown GIS Department

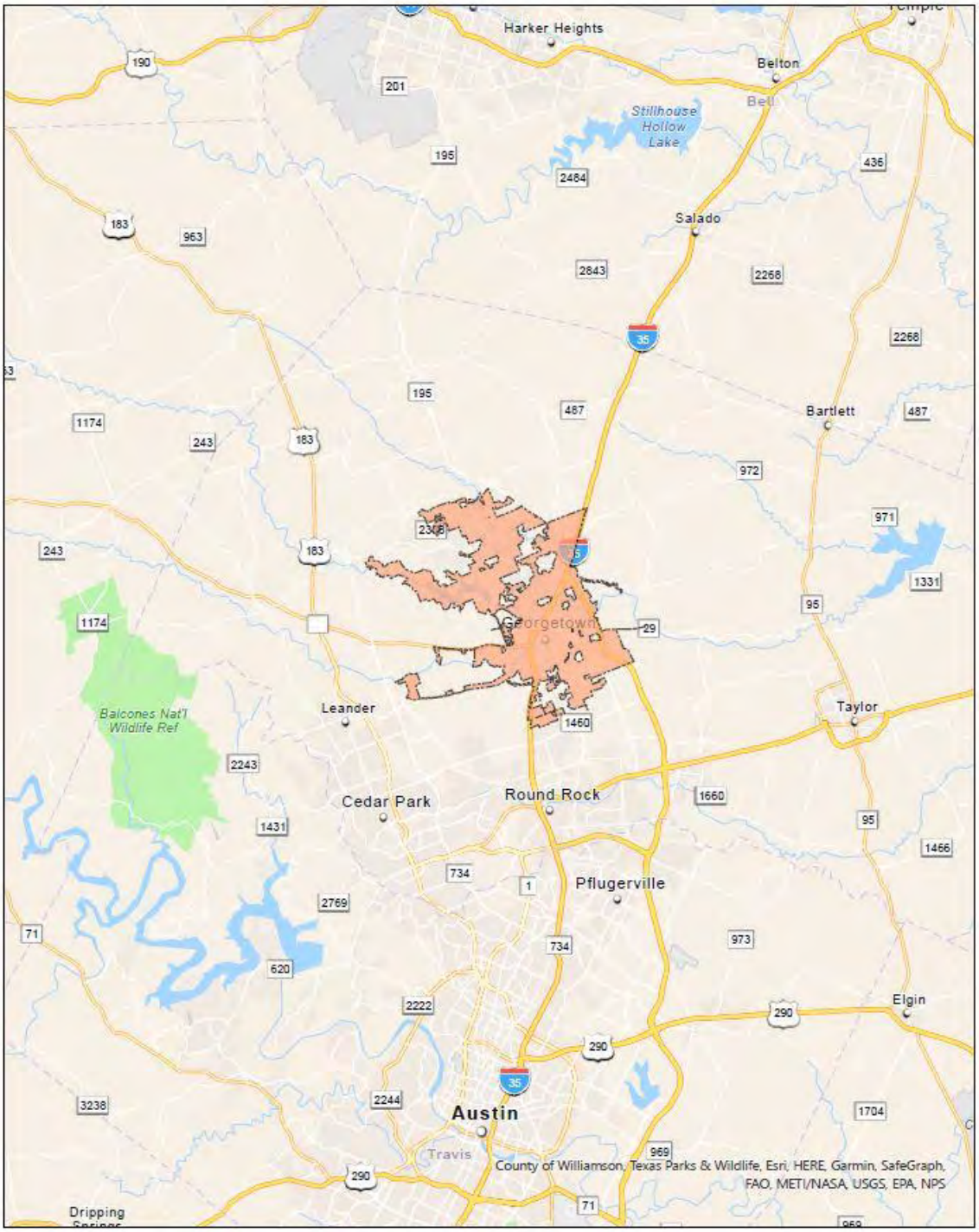
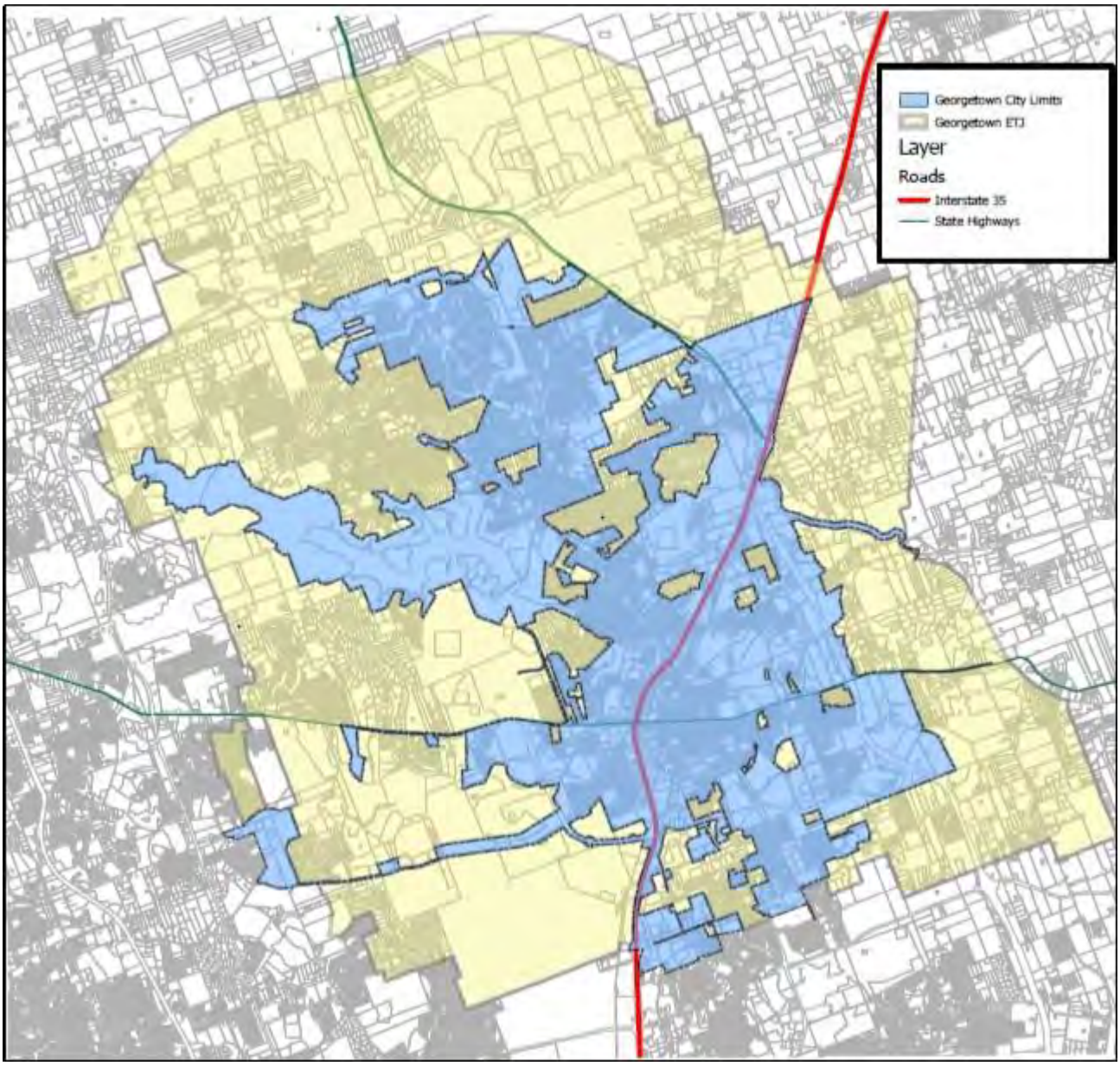


Figure 3-2. Georgetown Planning Area (includes ETJ)

Source: City of Georgetown GIS Department



Population and Demographics

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 there are many variables involved in achieving an accurate estimation of people living in a given area at a given time.

In the official U.S. Census population count as of April 1, 2018, Georgetown was home to 79,300 residents, and the estimated 2019 population estimate was 79,604. Given the City's 2010 reported population of 48,000, the City has experienced a 65.8% growth rate in the past decade. The number of new residential building permits increases every month as the population of Central Texas continues to increase. Table 3-1 highlights historically underserved or at-risk populations in Georgetown and Table 3-2 shows the community's racial breakdown.

Table 3-1. Population Characteristics of the City of Georgetown – Underserved Communities

Source: U.S. Census Bureau

Total 2019 Population Estimate	Elderly (Over 65) Number of Persons	Elderly % of Population	Below Poverty Level Number of Persons	Below Poverty Level % of Population
79,604	**23,165**	29.1%	**4,856**	6.9%

Table 3-2. Population Distribution for the City of Georgetown

Source: U.S. Census Bureau

Population by Race	Percentage
White	85.39%
Black/African American	3.39%
Two or more races	1.83%
Some other race	8.31%
Asian	0.67%
Native American	0.35%
Pacific Islander	0.05%

The 2019 U.S. Census estimates also provides information about housing composition in the City of Georgetown.

Table 3-3. Households by Household Type and size in the City of Georgetown

Source: U.S. Census Bureau

Population by Race	Percentage
Married-couple family households	56.20%
Male householder, no spouse present, family household	12.30%
Female householder, no spouse present, family household	27.80%
Average Family Size	**Number**
City of Georgetown, TX	3.21 +/- 0.21
State of Texas	3.46 +/- 0.01

The tables below show the change in population over time. Georgetown has undergone enormous growth since the 2000 Census, when the population count was 28,339. The official 2010 Georgetown population was 47,400 and the 2019 population estimate is 79,604. This is a 181% increase in population since 2000, and a 741% population growth since 1980.

The population of Georgetown is growing within the city limits as well as in the Extra-territorial Jurisdiction (ETJ). Table 3-3 shows growth rates within the City, and Table 3-4 shows current and project growth rates in the ETJ.

Table 3-4. Population Growth for the City of Georgetown, 1980-2019

Source: U.S. Census Bureau

1980	1990	2000	2010	2019	POP CHANGE 1980-2019	PERCENT OF CHANGE
9,468	14,842	28,339	47,400	79,604	70,136	741%

Table 3-5. Past and Projected Population Growth for the of City of Georgetown and its Extraterritorial Jurisdiction, 2000-2030

Source: City of Georgetown Planning Department

Year	POPULATION (or estimates)	Population Change	Percentage Change
2000	36,321	21,479	90.9%
2010	68,621	32,590	90.0%
2020	97,689	28,868	42.0%
2030	135,005	37,316	38.1%

Existing and Future Land Use and Development Trends

The City's population projections and estimated land density through the year 2030 area are shown in Table 3-6. The City includes a total land area of 22.8 square miles.

Table 3-6. Georgetown Population to Date and Projections

Source: U.S. Census Bureau and City of Georgetown Planning Department

LAND AREA	2010		2019		2020		2030	
	Population	Population Density	Population	Population Density	Population	Population Density	Population	Population Density
22.8	47,400	2,078.90	79,604	3,491.30	84,900	3,763.6	101,738	4,462.20

The City of Georgetown's Planning Department focuses on promoting future quality land development, as well as preserving the community's unique historic and environmental features. Georgetown's City Charter requires a Comprehensive Plan, designed to enhance and maintain the quality of life for Georgetown citizens by establishing policies for growth, development, and beautification covering both the properties within the City limits as well as in the Extraterritorial Jurisdiction (EJT).

Building Permits

Building permit data show the types of buildings are being constructed and their relative uses. Table 3-6 lists the number of residential building permits for the City of Georgetown granted between 1996 and 2020 (calendar year). The data includes all sizes of family homes for reported permits, as well as the construction costs to show the potential increase in vulnerability of structures to the various hazards discussed in the risk assessment. The increase in vulnerability can be attributed to the higher construction costs and number of structures that would be factored into repairing or replacing a structure using current market values. Permits are reported annually in September and data from 1996 to 2020 is shown to demonstrate ongoing community growth.

Table 3-7. City Residential Building Permits

Source: City of Georgetown Office of Building Inspections

Year	Buildings	Units	Construction Cost	Year	Buildings	Units	Construction Cost
1996	1,224	1,431	$167,913,741	2014	975	975	$169,701,966
2000	738	799	$116,488,239	2015	743	743	$175,239,407
2005	1,097	1,208	$221,588,308	2016	660	660	$197,959,403
2010	542	542	$132,173,505	2017	882	882	$203,554,226
2011	531	531	$134,905,785	2018	1225	1225	$288,218,77
2012	703	870	$189,587,603	2019	1472	1472	$340,498,035
2013	1034	1034	$260,045,718	2020	2189	2189	$573,913,485

Economy and Industry

During its settlement period, the economy of Georgetown was heavily dependent upon agriculture. U.S. Census Bureau records from 1850, 1860, and 1870 reveal that most early residents worked in farm-related jobs. These farms were usually small, growing staple crops of wheat and corn to guarantee their self-sufficiency. Following the Civil War, Georgetown experienced an era of rapid growth that helped to transform Georgetown economically, culturally, and architecturally. The small pioneer village with an estimated population of 320 in 1870 would explode to 2,790 residents by 1900, an increase of over 800 percent. Four economic sectors drove rapid population growth during this time: the cattle industry, the cotton industry, the railroad industry, and education.

Education is still a large economic sector for the region given the number of persons working for the Georgetown Independent School District (GISD) and locally-based Southwestern University. The Georgetown Chamber of Commerce reports that are currently over 2,900 businesses in the City. Of these, over 500 employ more than 10 people, and over 235 employ over 20 people. The Planning area's largest employers are shown in Table 3-7.

Table 3-8. Georgetown Companies with 50 or More Employees

Source: Georgetown Chamber of Commerce - Major Employers

AriBorn Inc	Hewlett Family of Dealerships	STI International, Inc.
Bench Tree	Lone Star Circle of Care	Suddenlink Communications
Berry Creek Country Club	Mac Haik Dodge Chrysler Jeep Ram	Sun City Texas Community Association
Burnett County Government	Manitex	TASUS Texas
Caring Home Health	Mercedes-Benz of Georgetown	Texas Crushed Stone
Champion Site Prep	Orenda Education	Texas Electric Cooperatives
Chatsworth Products Inc.	R&D Molders, Inc.	The Delaney at Georgetown Village
City of Georgetown	Rock Springs	The Home Depot
Family Eldercare	Rogers Construction Co., LTD	Thrive Mortgage
First Texas Bank	Schunk Xycarb Technology INC	Walmart Supercenter
FTWOODS Construction	Sheraton Austin Georgetown Hotel & Conference Center	Wesleyan Homes
Georgetown Independent School District	Southwestern University	Williamson County Government
Georgetown Rail Equipment Co. (GREX)	SportsClips, Inc.	YMCA of Greater Williamson Co.
HEB Food Stores #237 and #487	St. David's Georgetown Hospital	

Sun City

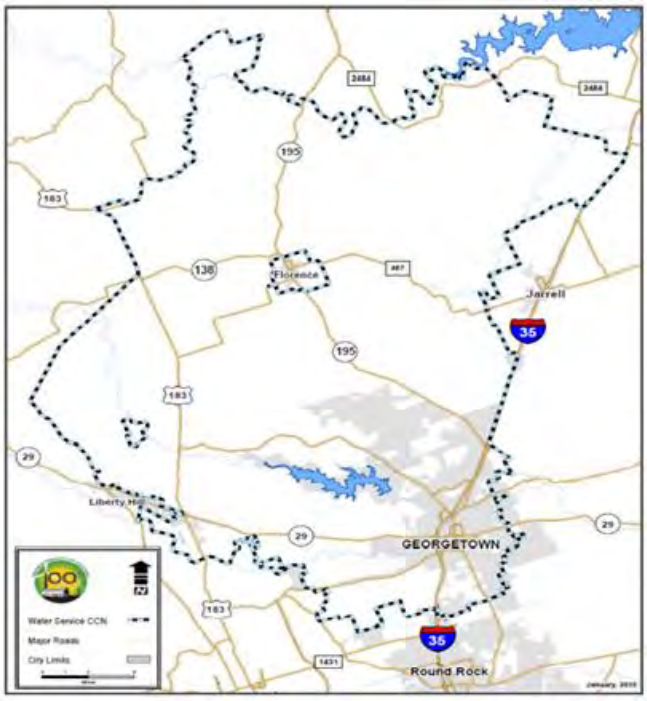
The second largest economic development activity in Georgetown history was the selection in 1995 of Georgetown as the site for the first-ever Sun City location in Texas. Originally called Sun City Georgetown, the community today is called Sun City Texas due to its size and the fact that it draws residents from all over the state. The community, which opened in 1996, first offered 522 homes and had 940 residents. By 2021, that grew to 8,488 homes and 15,700 residents. This represents a growth rate of more than 1,520% for both the number of homes and residents. Sun City makes up 20 percent of the population in Georgetown (2020) and is an age-focused community, Sun City accounts for approximately 94 percent of Georgetown's elderly population. It is generally agreed that the community's economic stimulus, creation of sales tax, banking and investment, and high level of community support and volunteerism have had an enormous effect on the City of Georgetown. Residents of Sun City represent the largest group of voters in City elections and residents are vocal on issues such as comprehensive planning objectives, development trends, planned Capital Improvement Projects, and other city improvement plans.

Sun City is exposed to numerous hazards and threats that have the potential to significantly disrupt the community. These could cause casualties and damage or destroy private and public property. This aging population is uniquely affected by disasters that result in evacuation and post-disaster or shelter-in-place orders. Important considerations must be made for those who are non-ambulatory, disabled, sick, and those with other special needs. The population has focused on planning initiatives to mitigate risk associated with potential natural and man-caused disasters, streamlined evacuation procedures and routes, and identified specific shelter locations. The Sun City Community Association serves as Emergency Management Coordinator for the Sun City Texas Emergency Management Plan, adopted in May 2011 as part of the Sun City Texas Emergency Management Program. The Sun City community is working on ensuring that each of the individual neighborhoods located in Sun City has a designated resident that is able to take the lead in executing plan preparedness and response actions for their neighborhood.

Current and Future Water Supply

Lake Georgetown includes 247 square miles of drainage and a total capacity of 124,610 acre-feet. Figure 3-3 shows the City limits in gray shading, but the blue dotted border shows the outline of a much larger region for which the City provides water services.

Figure 3-3. City of Georgetown Water Service Area
Source: City of Georgetown Utilities Department



At normal levels, this capacity is equivalent to more than 40 billion gallons of water. The surface area of the Lake Georgetown is 1,310 acres, which is situated approximately 423 miles from the Gulf of Mexico. Lake Georgetown is in the Brazos River Basin. Since 2004, the Cities of Georgetown and Round Rock, and Brushy Creek Municipal Utility District (MUD) have collectively developed a 26-mile pipeline from Stillhouse Hollow Lake in Bell County, a much deeper lake on the Brazos River, to Lake Georgetown in Williamson County. The Brazos River Authority (BRA) operates the two reservoirs as one system, moving water to Lake Georgetown for the four entities.

In May 2011, the BRA installed two new high-volume pumps at Stillhouse Hollow Lake to help keep water levels at Lake Georgetown from becoming low. The additional pumps brought the total of pumps to four pumps available to move water from Lake Stillhouse Hollow to Lake Georgetown. The new pumps were created through a collaborative effort by all four entities and coordinated by the BRA. When Lake Georgetown reaches pre-determined water levels, it triggers the use of the two new pumps in Lake Stillhouse Hollow.

Maintaining Future Water Supplies

Williamson County's demand for water is projected to grow significantly according to the 2019 City of Georgetown Utility Systems Water Conservation Plan. Much of the material included therein is based on a 2004 Texas Water Development Board publication called "Water Conservation Best Management Practices Guide." The City developed its own plan as a tool to improve operational water efficiency, as well as the efficient use of water by customers. The City of Georgetown incorporated these best management practices (BMP) during the development of its Water Conservation Plan. Given the county's fast-paced growth, and to ensure ample water supplies in the future, the Planning Team drafted a mitigation action to explore alternate water resources during the previous five-year HMP cycle and will bring this action forward as a continuing mitigation strategy.

As part of its effort to judiciously use water resources and educate the community in how to do so, the Utilities Department outlined in its 2019 Utility Systems Water Conservation Plan Best Management Practices to govern staff options and for use in community education and outreach about water conservation. BPMs currently used, as well as those to be implemented, are shown in Figure 3-4.

Figure 3-4. City of Georgetown Water Services Best Management Practices
Source: City of Georgetown Utilities Department

BMP Area	Individual BMP				
1) Conservation Analysis and Planning	Conservation Coordinator	Cost Effective Analysis	Water Survey for SF and MF Customers		
2) Financial	Water Conservation Pricing	Wholesale Agency Assistance Programs			
3) System Operations	Metering of all Connections	System Water Audit and Loss Control			
4) Landscaping	Athletic Field Conservation	Golf Course Conservation	Landscape Irrigation Conservation and Incentives	Park Conservation	Residential Landscape Irrigation Evaluation
5) Education and Public Awareness	Public Education	School Education	Small Utility Outreach and Education	Partnerships with Nonprofit Organizations	
6) Rebate, Retrofit, and Incentive Programs	Conservation for ICI Customers	Residential Clothes Washer Incentives	Residential Toilet Replacement	Showerhead, Aerator, Toilet Flapper Retrofit	WaterWise Landscape Design and Conversion Programs
7) Conservation Technology	New Construction Graywater	Rainwater Harvesting and Condensate Reuse	Water Reuse		
8) Regulatory and Enforcement	Prohibiting Wasting Water	Conservation Ordinance Planning and Development			

- Current BMP's Implemented - Proposed BMP's

SECTION 4: HAZARD INDENTIFICATION AND RISK ASSESSMENT

Overview

Overview

FEMA Element B: HAZARD IDENTIFICATION AND RISK ASSESSMENT

B1. Does the Plan include a description of the type, location, and extent of natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))

B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))

Identifying Hazards of Concern

Photo 1 Severe Weather Threat Map Central Texas, May 27, 2020

Throughout the planning process, the City of Georgetown Planning Team (comprised of its standing Preparedness Committee members and others) made every effort to secure input on how stakeholders viewed hazards of concern and their impacts. At its October 20, 2020 Kickoff Meeting, and at each subsequent planning process meeting, participants discussed various elements of each hazards to which the City of Georgetown is at risk. In December 2020, the public provided input during a month-long Community Survey designed to identify hazards that affected households and businesses. English and Spanish language versions of the survey were posted through January 17, 2021 and yielded 364 responses.

On January 11, 2021, the Planning Team conducted a hazard ranking exercise to identify hazards of concern and provided input on the impacts of each hazard on the population, infrastructure, and City assets. This meeting was followed by a survey sent to all Committee members directing them to SurveyMonkey, where they could complete short questionnaires about each hazard.

At the end of the hazard identification process, the Planning Team identified 14 natural hazards to be addressed in this plan update. These hazards were identified through an extensive process utilizing input from Planning Team, research of past disaster declarations, and a review of the current State of Texas Hazard Mitigation Plan ("State Plan"). Readily available online information from reputable sources such as federal and state agencies was also evaluated to supplement information as needed. Natural hazards are profiled in this section of the Plan.

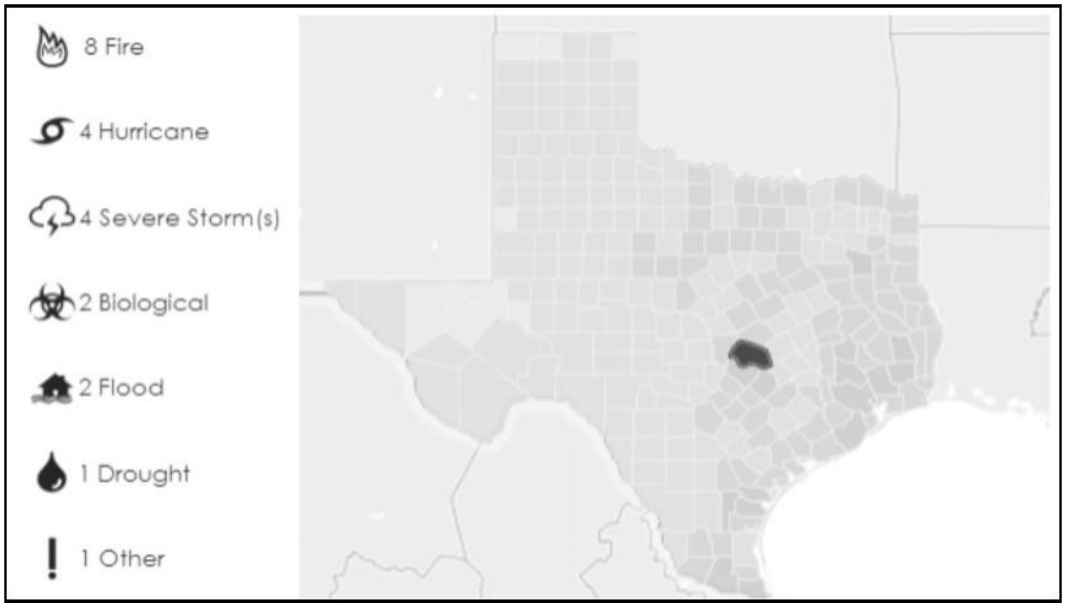
The State of Texas claims the highest number of disaster declarations, at 318, for any state or territory from 1953 to 2021. From 2000 to 2020, the state experienced 16 declared disasters, including Hurricanes Dolly and Ike. In 2008 alone the state suffered 36 fatalities, 103 injuries and over $15 million worth of property damage.

Figure 4-1 and Table 4-1 respectively show the number of disaster declarations awarded to Williamson County, and the list of events for which a declaration was awarded. It should be noted that as of research conducted in late March 2021, the Severe Winter Storm declaration was not yet included in the list of events recorded on the FEMA Data Visualizations Site.

Note: Declarations for Williamson County may be related to sheltering operations in support of Hurricanes that impacted the Texas coast, but there were no direct consequences locally from the hazard. Hurricane impacts are addressed under the effects of other hazards in this plan - as the local impacts from one or more of the following hazards: Flood, High Winds, Lightning, Severe Thunderstorm, and Tornado.

Figure 4.1 - FEMA Declarations by Hazard Type for Williamson County, TX

Source: FEMA Data Visualizations Page as of December 20, 2020



Disasters for one event can be declared multiple times since they impact people and assets. For example, DR-4223-TX was declared for several hazards: Severe Thunderstorms, Tornadoes, Straight-line Winds and Flooding. When Public Assistance (PA-B) Emergency Work is declared for State, local, tribal, and territorial governments and certain private-non-profit organizations, these entities are eligible for assistance for emergency work and the repair or replacement of disaster-damaged facilities.

Individual Assistance (IA) - Individuals and households in these designated counties are eligible to apply for financial and direct services. Individual Assistance limited to the Crisis Counseling Program and COVID-19 Funeral Assistance under Other Needs Assistance in all areas in the State of Texas.

Table 4.1 - FEMA Declarations listed for Williamson County, TX as of February 2021

Source: FEMA Data Visualizations Page

Year of Declaration	Declaration Title	Disaster Number
1974	Severe Thunderstorms and Flooding	454
1989	Severe Thunderstorms, Tornadoes and Flooding	828
1991	Severe Thunderstorms	930
1993	Extreme Fire Hazard	3113
1998	Tropical Storm Charley	1239
1000	Extreme Fire Hazards	3143
2003	Loss of the Space Shuttle Columbia	3171
2005	Hurricane Katrina Evacuation	3216
2005	Hurricane Rita	1606
2006	Extreme Wildfire Threat	1624
2007	Severe Thunderstorms, Tornadoes and Flooding	1709
2008	Florence Fire	2785
2008	Wildfires	3284
2008	Hurricane Ike	3294
2011	Grand Mesa Fire	2922
2011	Horseshow Fire	2949
2011	Moonglow Fire	2962
2011	Wildfires	4029
2015	Severe Thunderstorms, Tornadoes, Straight-line Winds and Flooding	4223
2020	Coronavirus Disease 2019 (Covid-19) (PA-B 3/13/2020)	3458
2020	Coronavirus Disease 2019 (Covid-19) (PA-B and IA 3/25/2020)	4485
2021	Severe Winter Storms	4586

State Plan Review and Local Hazard Event Data

The City of Georgetown is exposed to many small-scale hazards, including the previously mentioned severe flood event of September 22, 2018. On May 27, 2020, a severe hail event caused widespread communitywide damage, as well as heavy damage to City assets. Damaged caused by Tropical Storm Hermine in September 2010 was extensive. Hurricane Hermine dumped heavy rains throughout its slow

crawl through Texas, causing power outages and flooding in Georgetown and Williamson County. Each of these events are discussed in the hazard sections addressing flood, hail, and severe thunderstorms. Incidents such as these threaten public safety and can cost City government, businesses, and residents millions of dollars in direct and indirect damage costs.

The identification process included an evaluation of hazards listed in the State Plan and also considered data from federal and state resources. Table 4-2 lists the full range of natural hazards referenced in the State Plan that were initially considered for the City of Georgetown 2021 HMP Update. The table documents the evaluation process used for determining the significance of each hazard as it affects the planning area. Only hazards identified as significant were included in this Plan. Hazards not identified for inclusion at this time may be addressed during future evaluations and updates.

Table 4.2 - Natural Hazards Included in Texas State Plan

Source: TDEM 2018 State Hazard Mitigation Plan

HAZARD	CAN IMPACT THE PLANNING AREA	REASON FOR CONSIDERATION
Dam Failure	YES	Included in the State Plan. While the risk of failure is low, there is one dam located within the City that could potentially cause impact.
Drought	YES	Included in the State Plan. Drought can occur throughout the state and Georgetown experienced periods of extreme drought in 2009, 2011, 2012 and 2013.
Earthquake	NO	According to the State Plan, an earthquake occurrence is considered rare There is no history of Earthquake that has impacted critical assets/people in the planning area, and no indications that it is likely to.
Expansive Soils	NO	The occurrence is unlikely according to the State Plan. There is no history of Expansive Soils that has impacted critical assets/people in the planning area, and no indications that it is likely to.
Extreme Temperatures	YES	Included in the State Plan; high frequency of occurrence.
Flood	YES	Included in the State Plan; high frequency of occurrence.
Hail	YES	Included in the State Plan; high frequency of occurrence.
Hurricane Wind	NO	Hurricane affects are discussed as the local impacts from one or more of the following hazards: Flood, High Winds, Lightning, Severe Thunderstorm, Tornado.
Land Subsidence	NO	The planning area is mostly rock. There is no history of Land Subsidence that has impacted critical assets/people in the planning area, and no indications that it is likely to.
Thunderstorm	YES	Included in the State Plan; high frequency of occurrence.
Tornado	YES	Included in the State Plan; high frequency of occurrence.
Winter Storm	YES	Review of the State Plan and the NOAA National Center for

HAZARD	CAN IMPACT THE PLANNING AREA	REASON FOR CONSIDERATION
		Environmental Data inputs show that winter storms are a significant threat.
Wildfire	YES	Included in the State Plan; high probability of occurrence.
Windstorm	NO	The NCDC does not list a historical hazard windstorm event specifically for the region, separate from hurricane winds or winds associated with severe thunderstorms. This threat is covered under High Winds in the 2021 plan update.

Hazard identification Summary

Upon a review of the full range of hazards suggested under FEMA planning guidance, the Planning Team identified 14 Natural Hazards to be addressed in the 2021 Plan update. The hazard identification process utilized input from Planning Team members, research of past disaster declarations, and a review of the current State Plan. Readily available online information from reputable sources such as federal and state agencies was also evaluated to supplement information as needed. Natural hazards are profiled in this section.

After reviewing the full range of potential hazards, the planning team determined that it would further research the following hazards for inclusion in the 2021 Plan Update. Natural hazards covered by this plan update are fully profiled in this section. All of these hazards can impact the entire planning area, with the exception of Dam Failure, Flood, and Wildfire.

Table 4.3 - Descriptions of Hazards Included in 2021 City of Georgetown Plan

HAZARD	DESCRIPTION
Dam Failure	A systematic failure of the dam structure resulting in the uncontrolled release of water, often resulting in floods that could exceed the 100-year flood plain boundaries.
Drought	A period of time without substantial rainfall that persists from one year to the next. A normal part of all climatic regions, including areas with high and low average rainfall. Drought is classified as meteorological, hydrologic, agricultural, or socioeconomic.
Erosion (Riverine)	The action or process of eroding, the state of being eroded, an instance or product of erosion along a riverbank.
Extreme Heat	A long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees.

HAZARD	DESCRIPTION
Flood	The accumulation of water within a water body, which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream, ocean, lake or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: coastal, riverine, or shallow flooding.
Hail	Any storm that produces hailstones that fall to the ground; usually used when the amount or size of the hail is considered significant. Lightning, severe thunderstorms, and tornadoes may also be associated with a hailstorm.
High Winds	High Winds are sustained winds of 40 mph or higher for one hour or more, or wind gusts of 58 mph or higher for any duration. High winds may be the result of downdrafts from a thunderstorm or straight-line winds in front of a storm system. High Winds may also be classified as a Derecho, Straight-line, Microburst, or Down Draft.
Infectious Disease	A clinically evident disease resulting from the presence of pathogenic microbial agents that may be transmitted through liquids, food, bodily fluids, contaminated objects, airborne inhalation, or through vector- borne dissemination.
Lightning	The atmospheric discharge of electricity. Lightning occurs as a natural electrical discharge or “pulse” of very short duration and high voltage, between a cloud and the ground or within a cloud, accompanied by a bright flash and thunder. The lightning pulses are classified as Cloud-to-Ground (CG) or In-cloud (IC). Lightning forms when electricity occurs between areas of opposite electrical charge.
Severe Thunderstorm	A Severe Thunderstorm is a storm that produces a tornado, or winds of at least 58 mph (50 knots), and/or hail at least ¾" in diameter. A severe thunderstorm is occurring when an observer hears thunder.
Space Weather (Geomagnetic Disturbance)	The variable conditions from space and the sun that can produce electromagnetic fields that influence the performance of technology or other critical infrastructure.
Tornado	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.

HAZARD	DESCRIPTION
Wildfire	An uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low 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.
Winter Storm	Severe winter storms may include snow, sleet, freezing rain, or a mix of wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 miles per hour, 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.

Hazard Analysis Overview

This risk assessment was conducted using two methodologies: utilizing GIS-based analysis and statistical risk assessment; and input from the Planning Team, stakeholders, and residents. Each approach provides estimates for the potential impact of hazards by using a common, systematic framework for evaluation, including historical occurrence information. A risk assessment of natural hazards was conducted at the January 11, 2021 Planning Team meeting. The Committee discussed the impact of each natural hazard on the population and local assets and provided additional information through a SurveyMonkey tool sent to participants following the meeting.

Records retrieved from National Center for Environmental Information (NCEI) are reported for Williamson County and the City of Georgetown and, where available, were considered in the total for events and maximum recorded magnitude of event. The risk assessment includes four general parameters that are described for each hazard: frequency of return, approximate annualized losses, a description of general vulnerability, hazard impact, and probability of future occurrence.

Each of the hazard profiles includes a description of a general vulnerability assessment. Vulnerability is the total of assets that are subject to damages from a hazard based on historic recorded damages. Assets in the region were inventoried and defined in hazard zones where appropriate. The amount of damages for each hazard is assessed and combined with the probability of future occurrences to determine the comparative risk of each hazard for the community. Total damages considered include impacts to health and safety, the area of impact, environmental and economic damage. Probability is the likelihood of occurrence for the planning area based on historical frequency and indications of potential.

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. Probability of occurrence and impact statements are in Table 4.4.

Table 4.4 - Tool for Planning Team to Rank Hazards

Risk Characteristic (Vulnerability)		Score
Area Impacted	Less than 25% of the jurisdiction impacted	1
	Less than 50% of the jurisdiction impacted	2
(The percentage of the Jurisdiction at risk to an impact from each hazard)	Less than 75% of the jurisdiction impacted	3
	Over 75% of the jurisdiction impacted	4
Health and Safety Consequences	No to little health and safety impact	1
	Few injuries or illnesses	2
(The health and safety consequences that can occur)	Few fatalities but many injuries or illnesses	3
	Numerous fatalities	4
Property Damage	None to few properties destroyed or damaged	1
	Few destroyed but many damaged	2
(The amount of property damage that can occur	Few damaged and many destroyed	3
	Many properties destroyed and damaged	4
Environmental Damage	None to little environmental damage	1
	Resources damaged with short term recovery	2
(The environmental damage that can occur)	Resources damaged with long term recovery	3
	Resources destroyed beyond recovery	4
Economic Damage	Low direct and/or indirect costs	1
	High direct and low indirect costs	2
(The economic disruption that can occur)	Low direct and high indirect costs	3
	High direct and high indirect costs	4
Future Occurrence		**Score**
Probability of Future Occurrence	(Very Low) 0 - 1 times in the next 5 years	1
	(Low) 2 - 3 times in the next 5 years	2
(Probability of a future occurrence)	(Medium) 4 - 5 times in the next 5 years	3
	(High) 6 - 7 times in the next 5 years	4
	(Very High) 8 + times in the next 5 years	5

Hazard Profiles

Dam Failure

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:

Photo 2 San Gabriel Park Dam

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

Dams require ongoing maintenance, monitoring, safety inspections, and sometimes even rehabilitation to continue safe service. Benefits provided by dams include water supplies for drinking, irrigation, and industrial uses, flood control, hydroelectric power, recreation, and navigation.

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 great property damage. A devastating effect on water supply and power generation could be expected as well.

One major issue with the safety of dams is their age. The 2017 American Society of Civil Engineers (ASCE) national 2017 Infrastructure Report Card showed that the average age of the 90,580 dams is

56 years[1]. The ASCE 2021 State of Texas Infrastructure Report Card cited Association of State Dam Safety 0fficials (ASDSO) 2019 figures estimating the cost to rehabilitate all non-federal dams in the state would cost $5 billion. The Texas State Soil and Conservation Board was also cited as estimating a need for $2.1 billion to repair or rehabilitate dams included in the Small Watershed Programs.[2]

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. The current maintenance budget does not match the scale of America's long-term modifications of its watersheds. Worse still, more people are moving into risky areas. As the American population grows, dams that once could have failed without major repercussions are now upstream of cities and development.

Location

There are 7,413 dams in the State of Texas regulated by the Texas Commission on Environmental Quality (TCEQ). Of these, 1,409 are considered "high-hazard," 335 are considered "significant-hazard," and 2,270 are considered "low-hazard."[3] Figure 4-1 (next page) identifies the location and condition of area dams and shows that the dam of greatest concern to the City is Lake Georgetown Dam, is identified by a red dot in the middle of the map and shown in the map legend as being good condition. Figure 4-2, on the subsequent page, also shows all dam locations, with the Lake Georgetown Dam highlighted by a red star in the middle of the map. This map also shows the sites of other area dams, but they are all located in Williamson County and not in the City of Georgetown.

Lake Georgetown Dam is on the North Fork of the San Gabriel River. It is used for water supply, flood control, and recreational purposes. It is owned by the United States Government and maintained and operated by the U.S. Army Corps of Engineers (USACE), Fort Worth District. The construction of the dam was completed in 1979 and controls a drainage area of approximately 246 square miles. The extent classification is considered high as the area located near the dam is populated with residential housing. A dam failure could cause power outages and disrupt utilities systems and populations in the plan area would be vulnerable. If there is a breach, it is estimated the average breach width would be 734.1 ft. with a maximum breach flow of 4,644,995 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation.

[1] American Society of Civil Engineers, Report Card For America's Report Card, Category – Dams https://www.infrastructurereportcard.org/cat-item/dams/
[2] Ibid
[3] Texas Division of Environmental Quality, Dam Safety Program

Figure 4.2 - Dam Locations in the City of Georgetown Region and Condition of Each

Source: City of Georgetown GIS Department

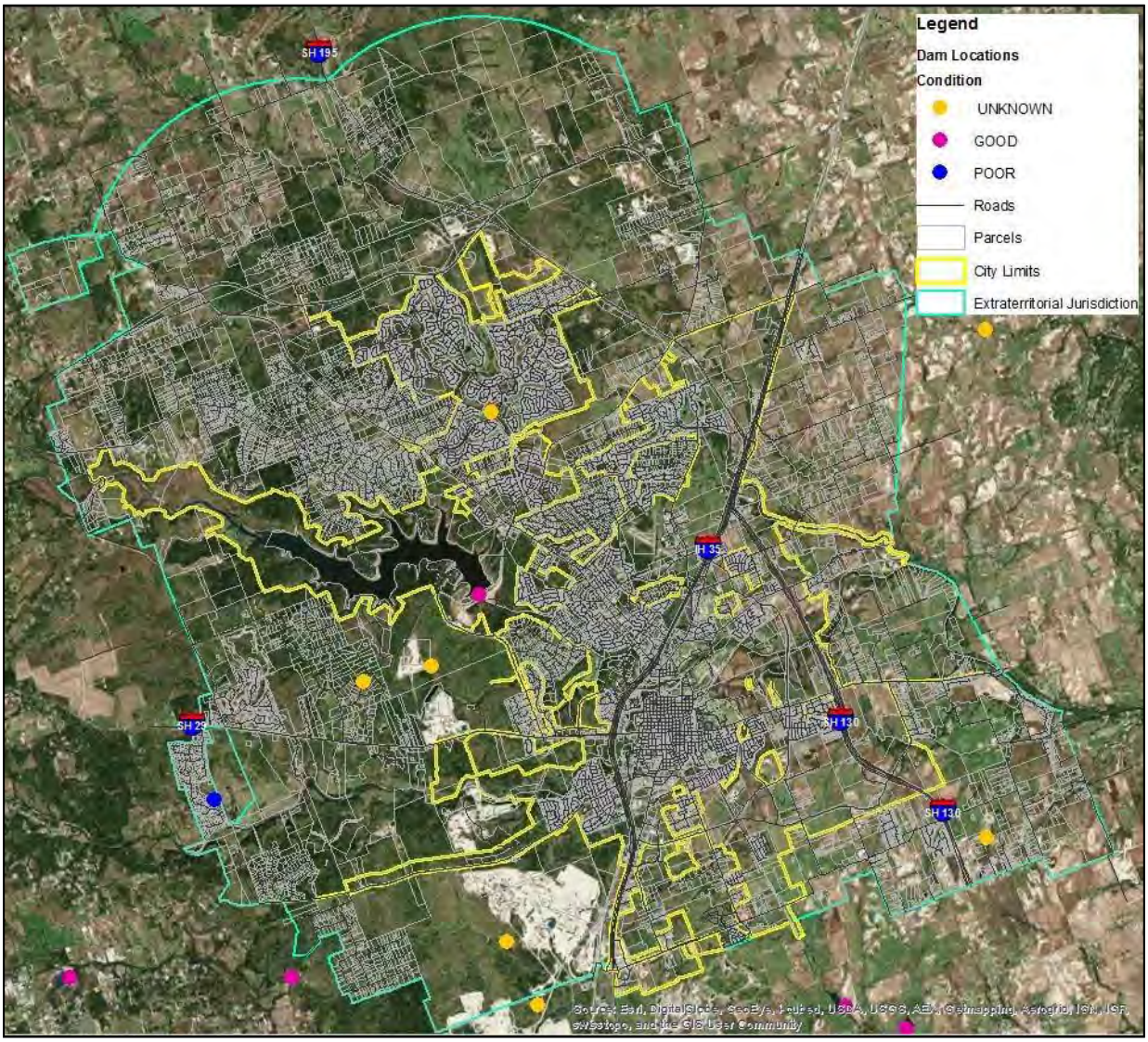


Figure 4.3 - Location of the Lake Georgetown Dam and Dams Located in Williamson County

Source: City of Georgetown GIS Department

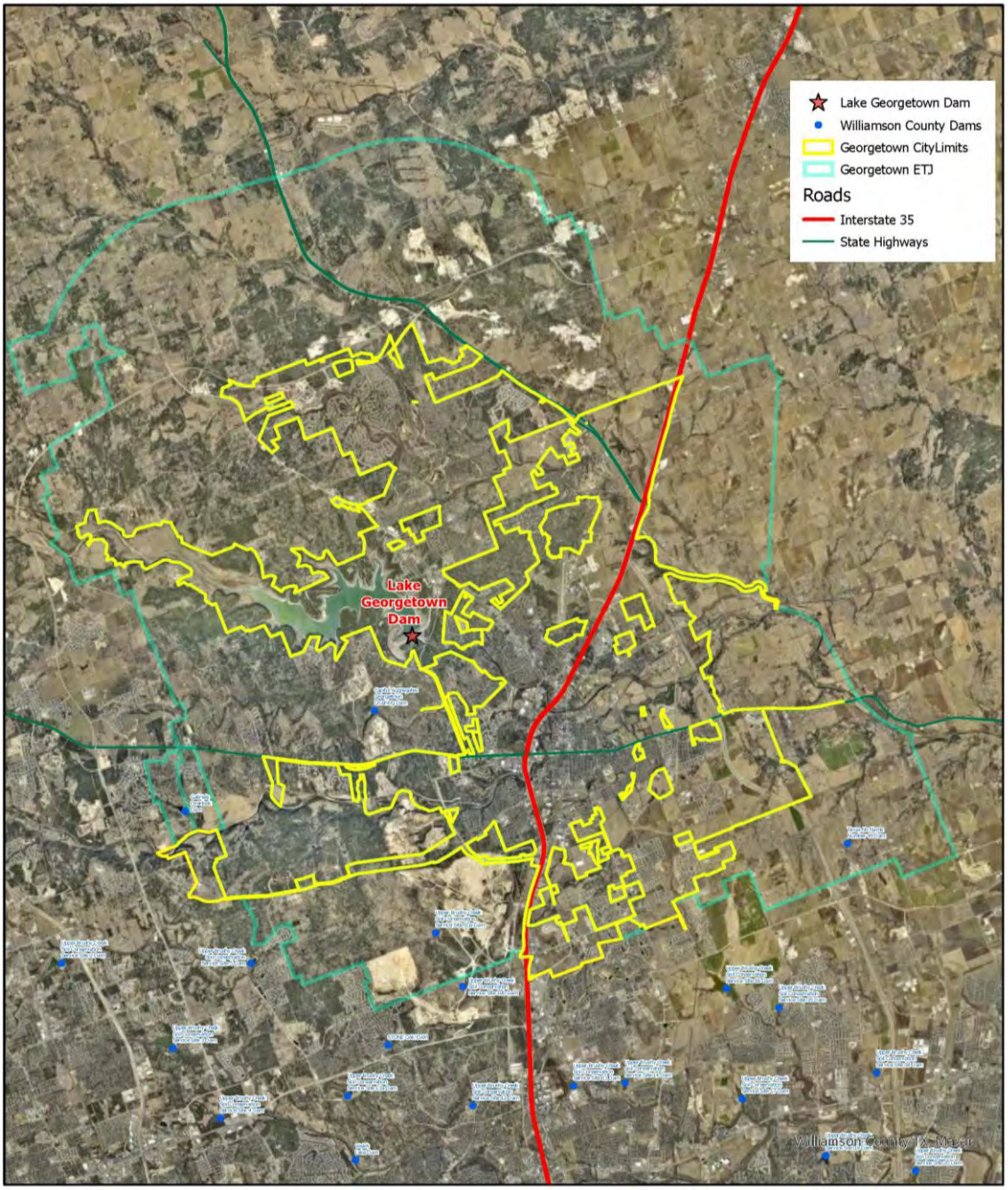


Table 4.5 lists the name of each dam located in the greater Georgetown region, and for each structures includes the name, height, storage volume, and potential hazard classification. The Lake Georgetown Dam is the only structure located within the City limits.

Table 4.5 - Survey of Dam Structures in the City of Georgetown Region

Source: City of Georgetown GIS Department

DAM NAME	HEIGHT (Ft.)	STORAGE (Acre Ft.)	POTENTIAL HAZARD CLASSIFICATION
Upper Brushy Creek 10A	42	1,872	Low
TX No Name No. 48 Dam	23	155	Low
Capitol Aggregates Georgetown Crushing Dam	22	225	Low
Gabriel's Overlook Dam	25	114	Low
Lake Georgetown Dam	162	220,100	High
Logan Melton Dam	8	20	Low
Berry Creek Dam	8	40	Low

Extent

The extent or magnitude of a dam failure event is described in terms of the classification of damages that could result from a dam's failure, not the probability of failure. The National Interagency Committee on Dam Safety defines high hazard dams as those where failure or mis-operation would cause loss of human life. Prior to 2009, high hazard dams were defined as those at which failure or mis-operation would probably cause loss of human life. Dams classified as "significant" were those at which failure or mis-operation probably would not result in loss of human life but could cause economic loss, environmental damage, disruption of lifeline facilities or other significant damage. Low hazard potential dams are those at which failure or mis-operation probably would not result in loss of human life but would cause limited economic and/or environmental losses. Losses would be limited mainly to the owner's property. Classifications for extent after 2009 are found in Table 4.6.

Table 4.6 - Extent Classifications

HAZARD POTENTIAL CLASSIFICATION	LOSS OF HUMAN LIFE	DAM STORAGE CAPACITY
Low	None Expected	Less than 10,000 acre-feet
Significant	Probable (1 to 6)	Between 10,000 and 100,000 acre-feet
High	Loss of Life Expected (7 or More)	100,000 acre-feet or more

Several maps included in this section show the inundation area for the Lake Georgetown Dam. A table following the maps identifies assets in the inundation areas.

Figure 4.4 - Lake Georgetown Dam Inundation Risk Area

Source: FEMA National Flood Hazard Layer

The map included as Figure 4.5 is a FIRMette showing roughly the same area as that shown in Figure 1.4 but as a FEMA FIRMette (mini-Flood Insurance rate map) identifying areas of greater or lesser vulnerability to flooding.

Figure 4.6 and Figure 4.7 are included in the USACE 2019 Emergency Action Plan and show the inundation areas for dam failure and non-dam failure (overtopping).

Figure 4.5 - FEMA National Flood Hazard Layer FIRMette

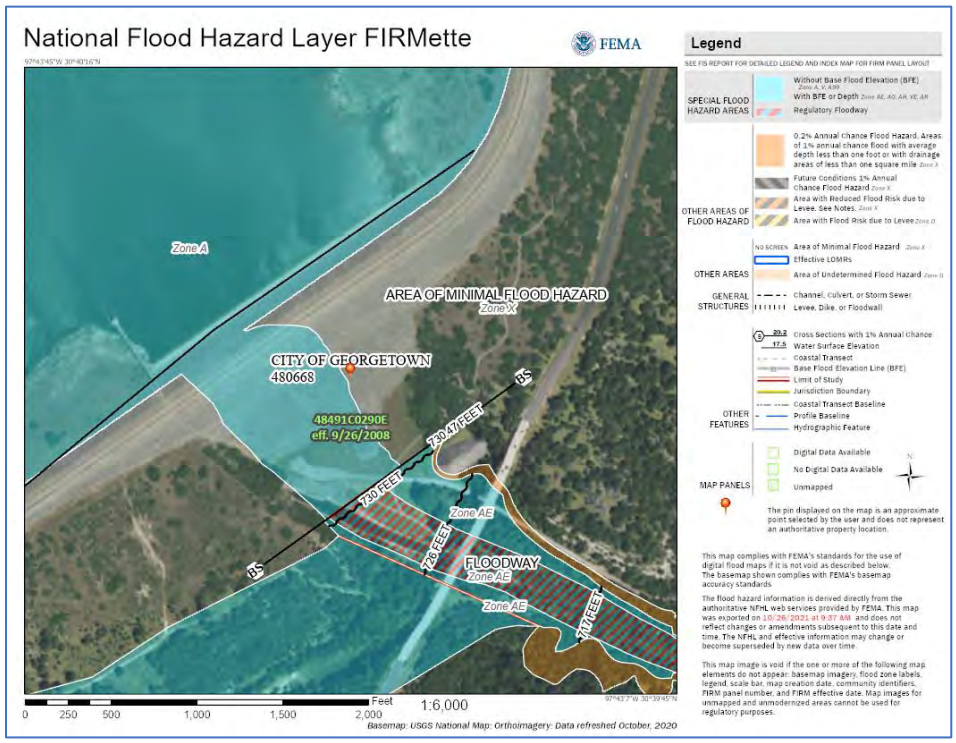


Figure 4.6 - Limit of Inundation from Dam Failure

Source: USACE 2019 Emergency Action Plan

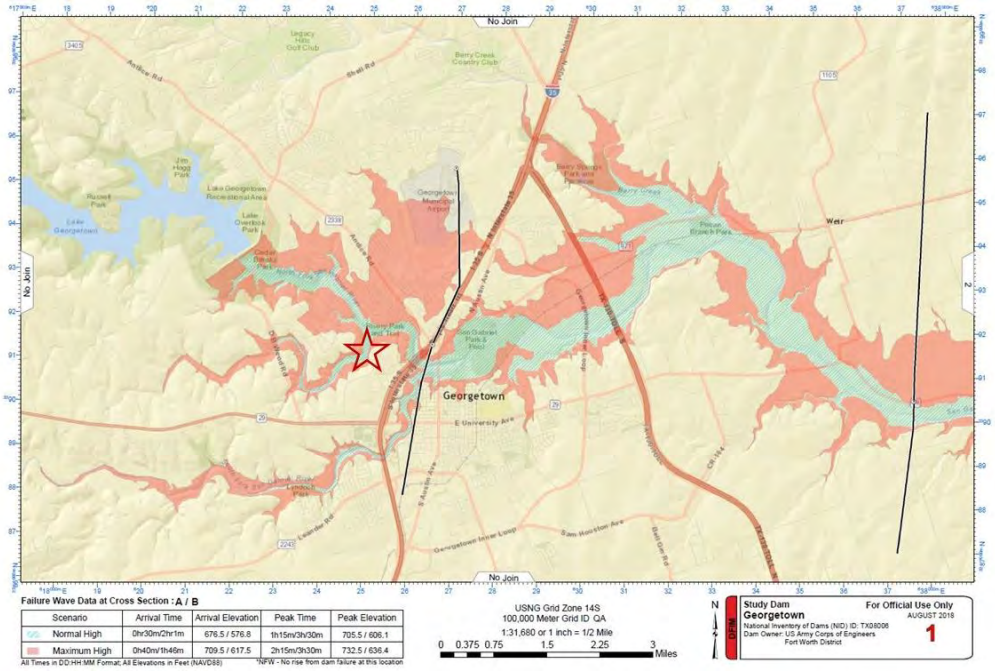
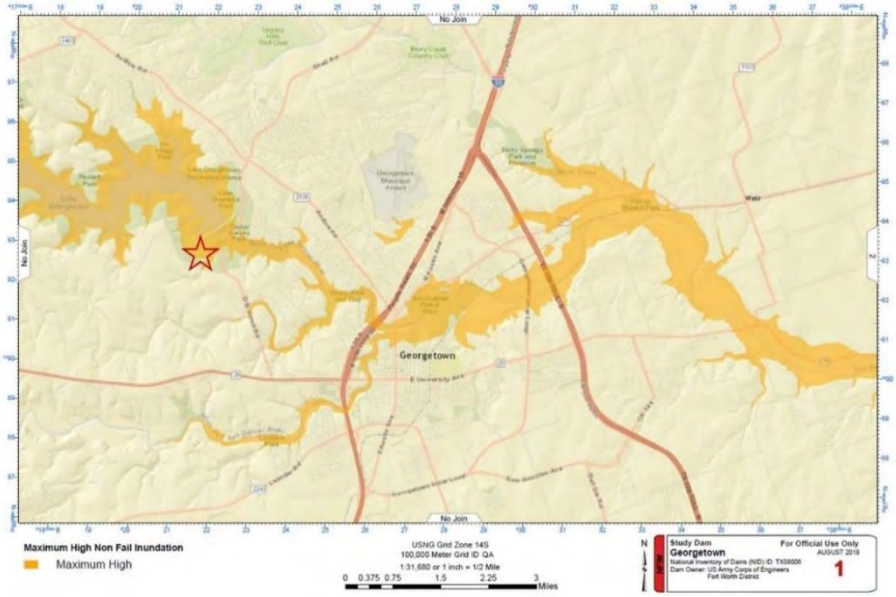


Figure 4.7 - Limit of Inundation from Non-Dam Failure

Source: USACE 2019 Emergency Action Plan



The extent or average magnitude of a dam failure event that could be expected for the City of Georgetown based on the data shown previously in Table 4.6. The extent classification was determined by taking the average of dams in the region and weighing low hazard dams as a 1, significant hazard dams as a 2, and high hazard dams as a 3 based on the potential severity, warning time, and duration. While the extent of dam failure for structure is considered Significant due to the size of the lake associated with the dam, USACE stated the following under Dam Facts (included on page 67) of its 2019 Georgetown Lake Dam Emergency Action Plan:

> ***Risk associated with Georgetown Lake Dam:*** *Based upon the most recent risk assessment of Georgetown Lake Dam in 2015, USACE considers this dam to be a low-risk dam among its more than 700 dams. The risk for this dam is associated with embankment and erosion of the toe, surface and crest that may be inadequate under an extreme event. USACE has implemented interim risk reduction measures and/or long-term risk reduction measures to reduce this risk.*

Vulnerability

There are seven dams in and around the City of Georgetown planning area, of which six are considered low hazard dams and one is considered a high-hazard dam based on their storage capacity. Only the Lake Georgetown Dam is located in the planning area. Flooding is the most prominent effect of dam failure. If the dam failure is severe, a large amount of water would enter the downstream waterways forcing it out beyond the banks. There may be significant environmental effects, resulting in flooding that could disperse debris and hazardous materials downstream and damage local ecosystems.

Annualized loss estimates for dam failure are not available, nor is a breakdown of potential dollar losses due to critical facilities, infrastructure, lifelines, or hazardous-materials facilities failures. If a major dam should fail however, the severity of impact could be substantial. A dam breach could result in deaths, cause facilities to be shut down, and more than 50 percent of property in the inundation area, destroyed or damaged. For these reasons, creating mitigations actions to remove or evacuate people and structures from the path of destruction is prudent in order to minimize impact from dam failure. Critical facilities identified as vulnerable assets potentially subject to flooding from a Dam Failure or Non-Dam Failure scenario are identified in Table 4.7.

Table 4.7 - Assets at Risk to Flooding from Lake Georgetown Dam Failure or Non-Dam Failure Scenarios

Source: City of Georgetown GIS Department

FACILITY NAME	FACILITY TYPE	ADDRESS	DAM FAILURE	DAM NON-FAILURE
Mary Bailey Head Start	Child Care	601 N College St	X	X
Rawleigh Elliott Head Start Center	Child Care	103 S Holly St	X	X
2028 FM 971	Group Home	2028 FM 971	X	X
121 FM 971	Group Home	121 FM 971	X	X
215 Rock St	Group Home	215 Rock St	X	X
903 N Myrtle St	Group Home	903 N Myrtle St	X	X
Pecan Branch Treatment Facility	Wastewater Treatment Plant	3502 FM 971	X	X
San Gabriel Treatment Facility	Wastewater Treatment Plant	1107 N College St	X	X
Police Station DB Wood Boulevard (also known as the Public Safety and Operations Training Center)	Police Station	3500 DB Wood Blvd	X	
Fire Station 5	Fire Station	3600 DB Wood Blvd	X	
USACE Lake Georgetown Office	Lake Management Facility	500 Lake Overlook Drive	x	
Pat Cooper Elementary School	Schools	1921 NE Inner Loop	X	
Charles A Forbes Middle School	Schools	1911 NE Inner Loop	X	
Douglas Benold Middle School	Schools	3407 Northwest Blvd	X	
Frost Elementary School	Schools	711 Lakeway Dr	X	
GISD Tech Center	Schools	603 Lakeway Dr	X	
YMCA Cooper Elementary	Child Care	1921 NE Inner Loop	X	
Park Treatment Plant	Water Treatment Plant	301 W L Walden Dr	X	

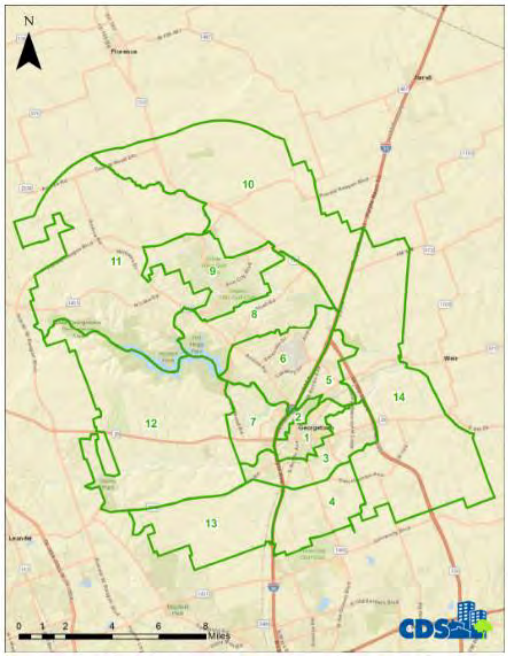
The cost to repair one or more of these structures depends on the extent damage stemming from dam incident severity. The population affected by potential dam inundation can be inferred from City of Georgetown Planning Department data discussed in the Impact section.

Impact

While USACE is confident of the dam's structural soundness and deems dam failure to be an unlikely occurrence, the City provided a worst case analysis in a scenario wherein a significant number of properties were affected. In the Spring of 2018, the City of Georgetown began an update to the Land Use and Housing Elements of the 2030 Comprehensive Plan. In updating the Housing Element, the City completed an inventory of housing units within the City limits and the Extraterritorial Jurisdiction (ETJ), collectively referred to as the Planning Area. The resulting data for the Planning Area was used to develop areawide populations totals, and to also develop tallies for each subarea potentially affected by Dam Failure. Figure 4-8 shows is a map of these subareas.

Figure 4.8 - Housing Element Subarea Map

Source: City of Georgetown Planning Department



The residential areas determined to be potentially affected by dam inundation as shown in Figure 4.8 include subareas 1, 2, 3, 5, 6,7, and 14. Although these areas are larger in geographic scope than the potential impact zone of a dam failure, the figures are useful in identifying the high end of property damage in a worst case scenario. Subarea population figures are included in Table 4.9.

Table 4.8. - Estimate of Population and Properties Affected by Dam Failure

Source: City of Georgetown Planning Department

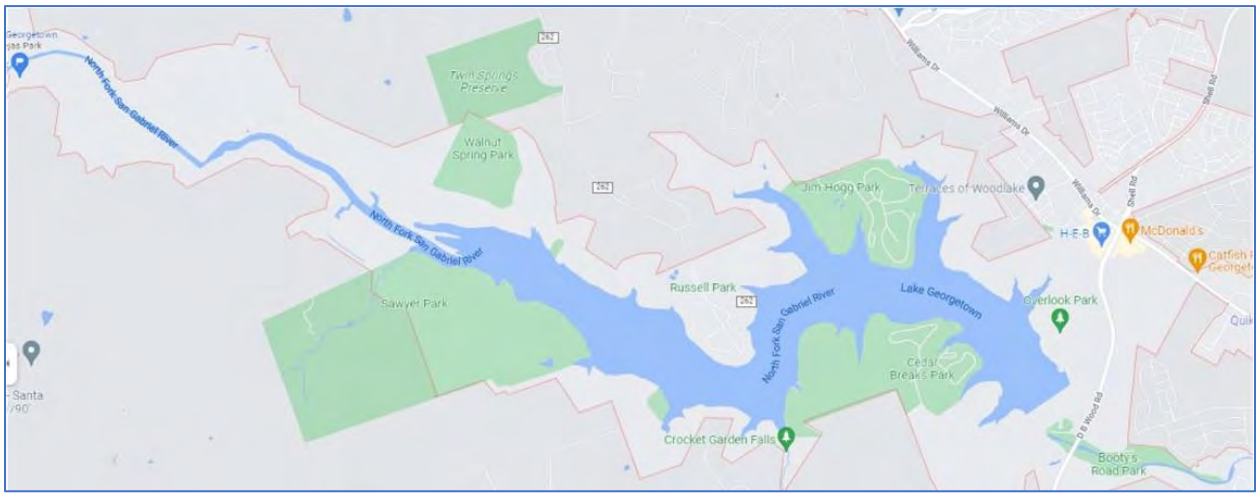
SUBAREA	2018 POPULATION ESTIMATE (NIELSEN/CLARITAS 2018 VÍA CENSUS)	HOUSING UNITS (WCAD)	OWNER OCCUPIED AVG. VALUE (WCAD)	TOTAL SUBAREA HOUSING VALUE (WCAD)
1	8,123	2,185	$214,741	$469,209,085
2	1,223	454	$189,135	$85,867,290
3	14,103	4,685	$226,724	$1,062,201,940
5	4,587	1,506	$190,337	$286,647,522
6	11,423	4,364	$264,907	$1,156,054,148
7	2,506	1,311	$396,797	$520,200,867
14	4,458	1,099	$244,405	$268,601,095
Total	46,423	15,604	$246,721	$3,849,832,255
WCAD: Williamson Central Appraisal District *** Total of Owner Occupied Average Value**				

The figures show that an estimated $3.8 billion in residential property values is the upper limit of potential damage should a dam failure occur.

Dam inundation may affect several environmental areas in a City that treasures the beauty and accessibility of its outdoor amenities. Parks located on or near the Lake Georgetown Dam include are identified in Figure 4. 9.

Figure 4.9 – Outdoor Amenities Potentially Affected by Dam Failure or Non-Dam Failure Inundation

Source: Google Maps



Environmental assets located near the dam include Booty's Boat Park, Crockett Garden Falls, Russell Park, Overlook Parke, Jim Hogg Park, Sawyer Park, Walnut Spring Park, and Twin Springs Preserve.

Historical Occurrences

The FEMA Dam Safety Program reports that there are currently about 91,457 dams in the United States. Catastrophic dam failures have occurred frequently throughout the past century. Between 1918 and 1958, 33 major U.S. dam failures caused 1,680 deaths. From 1959 to 1965, nine major dams failed worldwide, and some of the largest U.S. disasters resulted from dam failure. More than 520 dam incidents, including 21 dam failures, were reported in the past two years to the National Performance of Dams Program, which collects and archives information on dam performance from state and federal regulatory agencies and dam owners.

The State of Texas has not experienced loss of life or extensive economic damage due to a dam failure since the first half of the twentieth century. There have been no historical occurrences for dam failure in the City of Georgetown. The Stanford University National Performance of Dams Program (NDPD) has recorded no incidents associated with the Lake Georgetown Dam.[4]

Probability of Future Events

The condition of the dam is monitored closely even though there is no history of dam failure or leaks. Given that federal inspection authorities, USACE, identify no indication of potential failure, the probability of a future event is unlikely. This means that an event may occur in the next fifteen years. It is listed as a potential hazard only because the possibility of failure exists. Based on information cited in the USACE 2019 EAP, dam failure at the Lake Georgetown Dam can identified as being a high hazard low probability event.

[4] Stanford University, National Performance of Dams Program (NPDP) Dam Incident Database, http://npdp.stanford.edu/dam_incidents, accessed 10/29/2021.

Drought

Hazard Description

Drought is a long period 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.

Photo 3 Good Water Trail, Georgetown Texas

Table 4.9 - Drought Classification Definitions

Source: Multi-Hazard Identification and Risk Assessment: FEMA National Mitigation Strategy

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

Location

Droughts occur regularly throughout Texas, but they can vary greatly in their intensity and duration. Drought is not a location-specific hazard so it can equally affect all areas of the City of Georgetown.

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 4-9 depicts drought magnitude while Table 4-10 describes drought classifications.

Table 4.10 - Palmer Drought Index
Source: National Drought Mitigation Center

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 & 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 4.11 - Palmer Drought Category Descriptions
Source: National Drought Mitigation Center

CATEGORY	DESCRIPTION	POTENTIAL 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 and 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

Drought is monitored nationwide by the National Drought Mitigation Center (NDMC). Indicators are used to describe broad scale drought conditions across the U.S. Indicators correspond to the intensity of drought. Based on the historical occurrences for drought and the location of the City of Georgetown in

the Blackland Prairie and the Texas Hill Country, the planning area can anticipate a range of drought from abnormally dry or DO to exceptional or D4 based on the Palmer Drought Category.

Historical Occurrences

Droughts are one of the most complex of natural hazards because it is difficult to determine their precise beginning or end. In addition, droughts can lead to other hazards such as extreme heat and wildfires, because dying vegetation serves as a prime ignition source. A heat wave combined with a drought can be very dangerous.

Table 4-12 lists historical events that have occurred in Williamson County as reported in the National Center for Environmental Information (NCEI).

Table 4.12 - Years of Drought Recorded for Williamson County

Source: NCEI

DROUGHT YEAR		
1996	2011	2018
2000	2012	2019
2011	2015	2020
9 drought years		

Significant Past Events

February 1, 2020 – Williamson County, Georgetown

The northern half of South-Central Texas experienced above normal precipitation during the month February. Parts of this region received 125% to 200% of normal. This led to Blanco, Burnet, Comal, Hays, Llano, and Williamson Counties improving to better than Severe (D2) drought category.

August 1, 2018 – Williamson County, Georgetown

Much South-Central Texas received 50% or less of normal, leading to worsening drought conditions in Maverick (Exceptional D4), Zavala (D4), Caldwell (Severe D2), Comal (D2), Guadalupe (D2), Hays (D2), Kendall (D2), Real (D2), and Williamson (D2) Counties. Gillespie, Kinney, Llano, and Uvalde Counties remained in Extreme (D3) drought and Blanco, Burnet, Edwards, Kerr, and Val Verde were still in D2. Dimmit (D2) County saw some improvement. Fire danger at the end of the month was moderate. All the counties in D2 or worse drought had outdoor burn bans in effect. The seven-day stream flow averages for the Pecos, Frio, Upper Guadalupe, and the Upper Colorado Rivers were below normal (< 10%). The Rio Grande, Devils, and Nueces basins were below normal (10-24%). Llano was in Stage 5 water restrictions, Fredericksburg was in Stage 3, and Uvalde and Kerrville were in Stage **1.**

September 1, 2015 – Williamson County, Georgetown

Most of South-Central Texas had less than normal precipitation in September with many counties getting less than 25% of normal. The result of this dryness was Burnet, Gillespie, Kendall, Llano, Williamson, Wilson, and Zavala Counties went into severe drought category (Stage D2) and Guadalupe County went into extreme drought category (Stage D3). Bastrop, Blanco, and Caldwell Counties remained in Stage D2. Of the counties in Stage D2 or worse all had burn bans in effect at the end of the month except Zavala. The Texas Crop and Weather Report issued by Texas A&M indicated grasses were becoming dry and some ranchers were feeding hay due to poor grazing conditions. The seven-day stream flow average at the end of the month was much below normal (less than 10 percent) in the Colorado and Lower Nueces River basins and below normal (10-24 percent) in the Lower Guadalupe basin. The Edwards Aquifer fell during the month and was at 645.2 feet. This was 14.6 feet higher than at the end of September 2014, but 18.1 feet below average. The Barton Springs Edwards Aquifer Conservation District was in Stage 1 (10 percent reduction) drought status. Area lakes and reservoirs continued below normal pool elevations. Lake Buchanan was 14.3 feet below normal, and Lake Georgetown was 9.2 feet below normal. Fredericksburg remained in stage 3 water restrictions.

March 1, 2013 – Williamson County, Georgetown

March was another dry month across South Central Texas. Most of the region received less than normal rainfall with most of the southern and western areas getting less than 25 percent of normal. In addition to the dry month, March ended a dry six-month period from October 2012 through March 2013. These six months ranked in the ten driest October to March periods at Del Rio, Austin Camp Mabry, and Austin Bergstrom International Airport. As a result, the drought worsened in 13 counties and only Atascosa and Frio Counties remained in better than severe category (D2) drought. Maverick County moved into the exceptional category (Stage D4), Bastrop, Caldwell, Dimmit, Fayette, Gonzales, Guadalupe, Williamson, and Zavala to extreme (D3), and Bexar, Lavaca, Medina, and Wilson to severe (D2). Fire danger at the end of the month was low to moderate due to rain toward the end of March. Area lakes and reservoirs continued below normal pool elevations with Lake Amistad around 52 feet below normal, Lake Travis 50 feet below normal, and Medina Lake nearly 80 feet below normal which left it at 6.5 percent of capacity. The Edwards Aquifer was 19.9 feet below normal, and 4.7 feet below the level at the end of March 2013.

June 1, 2012 – Williamson County, Georgetown

A lack of rainfall resulted in 21 counties in South Central Texas going back into severe or extreme drought conditions. Most of these counties received one half inch or less of rain during the month. Williamson County moved into extreme drought category (State D3) while the other counties went to severe category (Stage D2). Eleven counties had burn bans in effect, and fire danger at the end of the month was moderate to high. The Texas crop and weather report issued by Texas A&M Agricultural indicated conditions were very dry, and grasshopper pressure was high. Brush was showing signs of heat and water stress and was

losing color. Pastures deteriorated, and row crops began to show moisture stress. Area lakes and reservoirs started to fall again and were generally well below normal pool elevations with Lake Travis around 40 feet below normal and Medina Lake 55 feet below. The seven-day stream flow average over most of the region was in the below normal range, but the Upper Guadalupe and Lower Colorado basins were much below normal. The Edwards Aquifer was 22 feet below normal.

May 1, 2011 – Williamson County, Georgetown

The drought continued over South-Central Texas and worsened in some counties. Most of the area was in exceptional drought conditions (Stage D4). Lack of rain this month moved Bandera, Bexar, Blanco, Caldwell, Comal, Frio, Gillespie, Gonzales, Guadalupe, Hays, Kendall, Medina, Travis, and Williamson counties into this stage and De Witt and Karnes counties into extreme drought conditions (Stage D3). This means all of South-Central Texas was in either extreme or exceptional drought conditions. Fire danger in South Central Texas remained moderate to high and burn bans were in effect for all of the counties except Llano. At the end of the month the seven-day stream flow average remained in the below or much below normal range for basins across South Central Texas and the Rio Grande Plains. The Rio Grande was in normal stream flow. Area lakes and reservoirs remained below normal pool elevations with Lake Travis around 32 feet below normal and Medina Lake near 27 feet below. The Edwards Aquifer was 20.4 feet below normal and 29.3 feet below the level from one year ago. The San Antonio Water System (SAWS) moved into Stage 2 water restrictions, the City of Kerrville was in Stage 3, the City of San Marcos in Stage 2, and the City of Austin in Stage 1. Many other communities across South Central Texas continued with some level of water restrictions.

Probability of Future Events

Available information enables us to calculate probability based on events during the period of recorded drought since 1996. Nine events are recorded as having occurred in 26-year reporting period, so it is possible that a drought episode will occur once in the next five years.

Vulnerability and Impact

Drought impacts large areas and crosses jurisdictional boundaries. 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 and crop/livestock losses on agricultural lands and may affect ground stability under foundations for buildings. It also impacts aesthetics of parks, public, and private property. The economic impact of drought can be significant as they effect many sectors of the economy and reach well beyond the area experiencing physical drought. This complexity exists because water is integral to the City's ability to produce goods and provide services. If droughts extend over several years, the direct and indirect economic impact can be significant. Based on the nine years in which drought was reported and potential exposure for the hazard, the potential severity of impact of droughts is "Limited" with less than 10% of property destroyed and has resulted in no injuries or fatalities.

Erosion (Riverine)

Photo 4 San Gabriel Park Trail and retaining wall

Hazard Description

Riverine erosion is the collapse, undermining, or subsidence of land along the shore of a lake or other river. Erosion is typically considered a coastal threat, but for the City of Georgetown, it can be a very damaging hazard along the banks of rivers, especially during times of rushing flood waters.

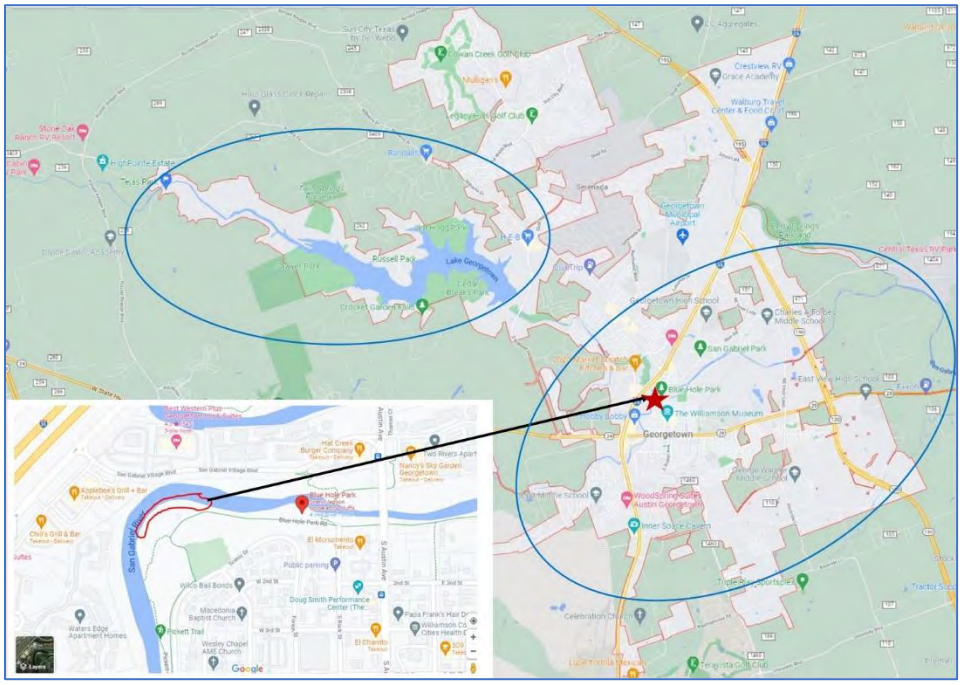
Location

Erosion may occur along riverbanks and lake shorelines when water becomes too high and compromises the soil along the banks. Figure 4-10 (next page) identifies within large circles the rivers located in the City of Georgetown: the San Gabriel River its tributaries, as well as Lake Georgetown. The place most subject to erosion is along segment of the San Gabriel River that runs through the downtown area and adjacent to Blue Hole Park. The area subject to erosion is near the Park, where the river bends. The Park is identified on the larger map by a red star, and the inset map shows the area that is vulnerable to erosion because there is no retaining bank along the south side of the river.

Extent

Extent is measured by feet of erosion. A 1,700-foot retaining wall was constructed and tied into an existing wall to stop the erosion in the Park. Storms may that cause flooding, increases the can also cause this to happen when rushing waters wash against the banks and create soil loss and seepage down into the water. Hazard extent may vary depending on structures or assets that are located on the riverbank that is affected, however at least 20 feet of embankment was impacted by erosion. Based on past events, the City can expect to see up to 20’ of erosion on the San Gabriel River during a flood event.

Figure 4.10 - Location of Area with the Highest Probability of Riverine Erosion



Historical Occurrence

One recent significant event took place in 2018 between September 22 and to and September 26. Complete details are included in the Flood section describing how the area received ten inches of rain within hours and caused rivers to crest and overflow into the streets.

Probability of Future Occurrence:

Because the City includes a long river shoreline, it is likely that slow minor erosion will continue over time. The rate and severity would be dependent hydrological and climatological forces fostering erosion. It is expected the erosion can occur continuously or every year but especially in the Spring and Fall when there are more frequent storms. Erosion has been observed every year for the past ten years and the City continues to monitor the hazard with the expectation that it will continue to occur annually.

Vulnerability and Impact:

The San Gabriel Park has lost at least 20' of embankment along the river, and the City has had to invest in a retaining wall to mitigate the erosion effects. Erosion may also cause damage over time to the stability of nearby structures like roads, could be compromised the further erosion occurs. San Gabriel Park is appreciated by the families and residents of the area, and a very important asset to the community. Trash and debris have also piled up into the park when the river spills over due to flood. Frequent storms that affect riverine overtopping may increase the rate of erosion.

Extreme Heat

Hazard Description

Extreme heat is a period of high heat and humidity with temperatures above 90 degrees for at least two to three days. In extreme heat, the body works extra hard to maintain a normal temperature, which can lead to death. In fact, extreme heat is responsible for the highest number of annual deaths among all weather-related hazards.

Photo 5 Excessive Heat Warning Jun 17, 2019

Location

There is no specific geographic scope or location for this hazard, so Extreme Heat occurs across the City of Georgetown and throughout Williamson County. Heat-related data is reported by WCCHD on a countywide basis.

Extent

The extent scale in Figure 4-4 displays varying degrees 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 level of intensity where fatigue due to heat exposure is possible. “Extreme Caution” indicates that sunstroke, muscle cramps, or heat exhaustion are possible. “Danger” level means that these symptoms are likely. “Extreme Danger” indicates that heat stroke is likely.

Figure 4.11 - Extent Scale for Extreme Summer Heat

Source: NOAA

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	126	130					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Streuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

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 Table 4.13. This index measures how hot it feels outside when humidity is combined with high temperatures.

Table 4.13 - Heat Index and Warnings

Category	Heat Index	Possible heat disorders	Warning
Extreme Danger	130° F & higher	Heat stroke or sun stroke likely.	A heat advisory will be issued to warn that the Heat Index may exceed 105° F.
Danger	105 – 129° F	Sunstroke, muscle cramps, and/or heat exhaustion are likely. Heatstroke possible with prolonged exposure and/or physical activity.	
Extreme Caution	90 – 105° F	Sunstroke, muscle cramps, and/or heat exhaustion 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.
Caution	80 – 90° F	Fatigue is possible with prolonged exposure and/or physical activity.	

Table 4.13a captures a handlful of the highest head index readings (those over 100 degrees) recorded at the Georgetown Muncipal Airport during the months of June, July and August for the years 2020 and 2021. In some instances, there are several recorded readings for a given day.

Table 4.13a: High Heat Indexes Recorded for the City of Georgetown, 2020-2021

Source: Iowa State University, Iowa Environmental Menoset

2020 Dates	Heat Index Recordings	2021 Dates	Heat Index Recordings
6-21-2020	100.20	6-24 20:56,	101.25, 102.11,102.17
6-22-2020	100.53	6-25 20:56	101.25
7-1-2020	103.15	7-01-2021	100.13, 101.25
7-2-2020	101.17	7-29 20	105.42
7-4-2020	101.37, 102.82, 103.60	7-30 22:56	101.73, 102.09
7-5-2020	102.25, 105.42	7-31 18:56,	103.26
7-8-2020	101.25, 103.26 103.55, 104.66	8-01-2021	105.40
7-9-2020	102.62, 103.20, 104.00	8-08-2021	100.74
7-10-2020	102.11, 105.73, 106.53	8-09 21	100.20, 102.62
7-11-2020	104.84, 105.86	8-18-2021	102.62
7-12-2021	102.86, 104.46, 106.96	8-19-2021	100.74
7-13-2020	102.95	8-20 2021	100.20, 101.55
7-14-2020	102.95, 104.33 105.09, 107.80	08-21-2021	100.205, 104.57, 102.09
7-15-2020	101.37	08-26-2021	101.52
7-16-2020	101.37, 103.60	8-31-2021	100.74
7-23-2020	101.24, 101.27, 103.60		
7-24-2020	101.55		
9-2-2020	101.83, 101.69, 101.15		

Heat index history indicates that a reading of 107.80 (7-14-2020) is the highest for the City of Georgetown in the past two years. This indicates that on days on which a very extreme heat index may occur reach a high of nearly 108. However, the data also showed many readings in the upper 90s, clearly showing that, even on days with lower heat indexes, the Offices of Emergency Management and Community Affairs should issue advisories that people take precautions during should take precautions, and the City should prepare to open cooling stations as they deem it necessary.

***Historical Occurrences**

Every summer, the hazard of heat-related illness becomes a significant public health issue throughout much of the U.S. Mortality increases during heat waves, and excessive heat is an important contributing factor to deaths from other causes, particularly among the elderly. Data from the Williamson County and City Health Department retrieved from the Centers for Disease Control and Prevention shows that ten heat-related deaths occurred in the County between 1999 and 2019. The results of a query from the web site CDC Wonder (https://wonder.cdc.gov/mcd-icd10.html) is shown in Figure 4-5

Figure 4.14 - Extreme Heat-Related Deaths in Williamson County

County	Year	Deaths
Williamson County, TX (48491)	Total	10
Total		10

Significant Past Events

July 19, 2018 – City of Georgetown

A strong high pressure settled over South-Central Texas and temperatures soared to record levels. The heat wave started on the 19th in Burnet, Frio, Llano, Medina, Travis, and Williamson Counties with high temperatures reaching 105 and higher. The hot temperatures spread across the region reaching its greatest extent on the 23rd. During this time Austin Bergstrom International Airport had record highs each day from the 20th through the 23rd, Austin Camp Mabry 21-23, and San Antonio 22-23. Both Austin sites set the all-time record high for the month on the 23rd, Bergstrom 109 and Camp Mabry 110. The extreme heat broke on the 24th when highs dropped down closer to 100.

January – August 2020 – Austin Area

As of Dec. 28, the average temperature for the year at Austin's main weather station at Camp Mabry was 71.7 degrees, which would match the average for 1904 as the city's third-warmest year on record.
The year's weather produced some of Austin's warmest months ever:

- January's average temperature was 57.5 degrees, which was 6 degrees above normal, making it the seventh-hottest January on record.
- March's average temperature was 68.7 degrees, which was 7 degrees above normal, making it the second-hottest March.
- July's average temperature was 88.9 degrees, or about 4 degrees above normal, making it the third-hottest July.
- August's average temperature was 89.5 degrees, more than 3 degrees above normal, making it the third-hottest August.

The historic level of heat in the summer of 2020 — the calendar months of June, July, and August —

produced an average temperature of 87.2 degrees, about 3 degrees more than normal, making the season the fourth-hottest summer on record.[5]

The WCCHD produced a report titled the *Heat-Related Illness and Mortality Surveillance* for a monitoring period between May 1, 2020 and October 31, 2020, statistics from which are shown.

Williamson County and Cities Health District

Public Health Emergency Preparedness

HEAT-RELATED ILLNESS AND MORTALITY SURVEILLANCE

Summary

Williamson County and Cities Health District conducted heat-related illness analysis retroactively for May 1, 2020, through October 31, 2020. The primary data sources are: (1) emergency department (ED) chief complaint data from seven Williamson County Area hospitals and (2) Texas DSHS mortality records. One source was utilized for daily temperatures: the Iowa Environmental Mesonet at Iowa State University. This report provides summary findings for this data. In addition to the ED chief complaint data, two additional ESSENCE queries were pulled for this report: (1) triage notes and (2) discharge diagnosis. Please note that all queries are final for this reporting period. For additional details regarding methodology or incident definitions, please contact Orin Heintschel orin.heintschel@wilco.org

Monitoring Period Summary May 1, 2020 – October 31, 2020	
Heat Advisory/Warning	9 Heat Advisory, 2 Excessive Heat Warning
Heat-Related Deaths	0
Heat-Related Illness	129 including dehydration, 116 excluding dehydration
Drowning Information	< 5 deaths, < 10 related ED visits

Table 1

Count of Heat-Related ED Visits by Zip Code of Residence in Williamson County (6+ visits shown)	
76574	6
78626	11
78628	6
78641	12
78660	7
78664	13

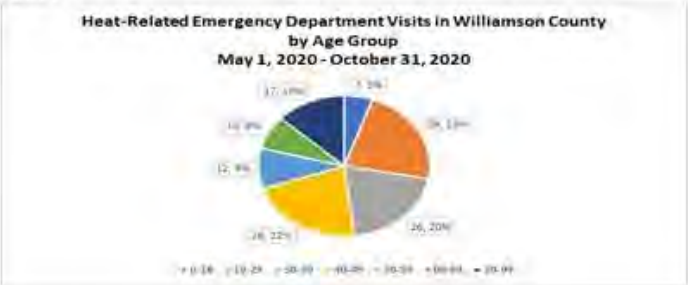
Table 2

ED visits in Williamson County by County of Residence	
County of Residence	Number of ED visits
Williamson	64
Travis	33
Other	32
Total	129

Table 3

Count of Heat-Related ED Visits by Gender in Williamson County		
Female	32	24.8%
Male	97	75.2%
Total	129	100.0%

Figure 1



[5] https://www.statesman.com/story/weather/2020/12/29/5-things-worth-remembering-austin-weather-2020-it-crazy/3910775001/

Probability of Future Events

Older historical data indicated that Williamson County, including the City of Georgetown, experienced one extreme heat event every fifteen years. However, more recent data cited above and reported countywide, shows that there have been more instances of persons seeking medical assistance during the hottest months of the year. The City is highly likely to continue to annually experience extreme heat during the summer months. Due to its geography, and its warm humid temperate climate with hot summers, the planning area can expect extreme heat events categorized at least into the "Danger" area multiple times each summer, or eight times in the next five years.

Vulnerability and Impact

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 severe summer 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. The potential impact of excessive summer heat is considered "Minor" as injuries and/or illnesses do not result in permanent disability.

In terms of vulnerability to structures, the impact from extreme heat would be negligible. It is possible that critical facilities and infrastructure could be shut down for 24 hours if cooling units are run constantly, leading to a temporary power outage. Less than 10 percent of residential and commercial property could be damaged if extreme heat events lead to structure fires. On a related note, the Energy Reliability Council of Texas (ERCOT) reported in October 2020 on year-to-date power usage. For Summer 2020, peak demand occurred in late afternoon on August 13, but figures show that the highest 2020 usage was lower than that of a record set in August 2019.[6]

Historical losses due to extreme heat for the City of Georgetown are negligible. Based on historic losses and damages, the impact of extreme heat damages on the City of Georgetown can be considered "Limited," indicating that less than 10 percent of property can be expected to be destroyed, and injuries are treatable with first aid, minor quality of life is lost, and facilities shut down for 24 hours or less.

A secondary consequence of extreme heat is the extraordinary use of electricity. The high use by the planning area and entire surrounding area, can create the need for planned outages and area shutdown of electrical supply to the community and critical infrastructure. It may also cause unplanned interruptions in power.

[6] Electrical Reliability Council of Texas, Summer 2020 Review, October 13, 2020, http://www.ercot.org/content/wcm/lists/197392/2020_Summer_Review_FINAL.pdf

Flood

Hazard Description

Floods generally result from excessive precipitation, and the severity of a flooding event is typically determined by a combination of several major factors. These factors include stream and river basin topography and physiography, precipitation and weather patterns, recent soil moisture conditions, and the degree of vegetative clearing and impervious surface. Generally, floods are long-term events that may last for several days.

Photo 6 San Gabriel Park Foot Bridge during flooding

Due to The City of Georgetown's inland location, only inland flooding is profiled in this section. Inland or riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. It is natural and inevitable as it is the overbank flooding of rivers and streams, typically resulting from large- scale weather systems that generate prolonged rainfall over a wide geographic area. 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.

Location

Maps provided by the City of Georgetown GIS Department identify the City's flood-prone areas. The locations of flood zones are based on the Digital Flood Insurance Rate Map (DFIRM) from FEMA as follows:

- 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 base flood elevations are provided. AE zones are now used on new format FIRMs instead of A1-30 zones.
- 0.2% Annual Chance Flood Hazard: Area of minimal flood hazard, which are the areas outside the Special Flood Hazard Areas and higher than the elevation of the 0.2-percent-annual-chance flood, also known as the 500-year flood level.

Figure 4.12 - Parcels Vulnerable to Flooding
Source: City of Georgetown GIS Department

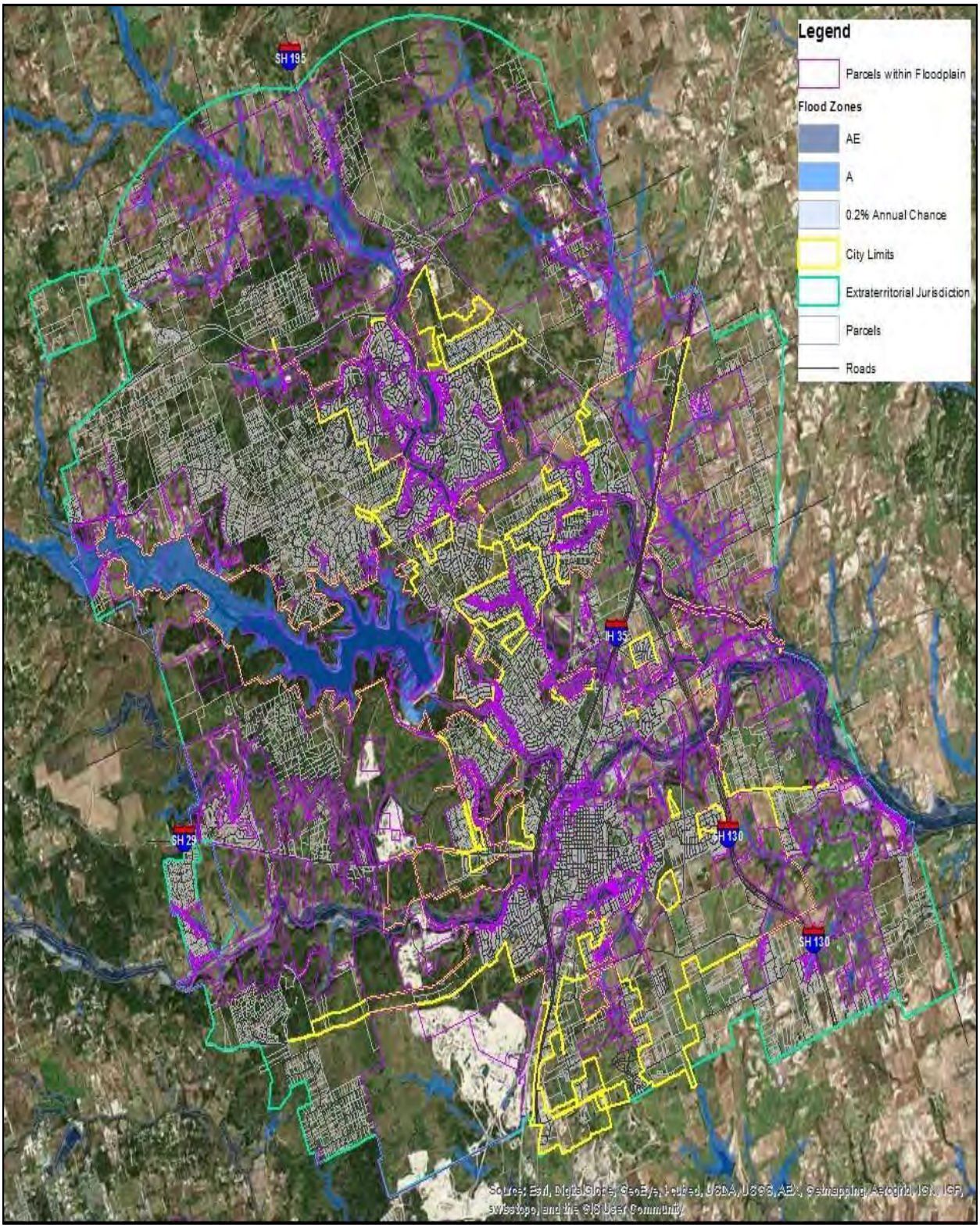


Figure 4.13 - Flood Zones in the City of Georgetown

Source: City of Georgetown GIS Department

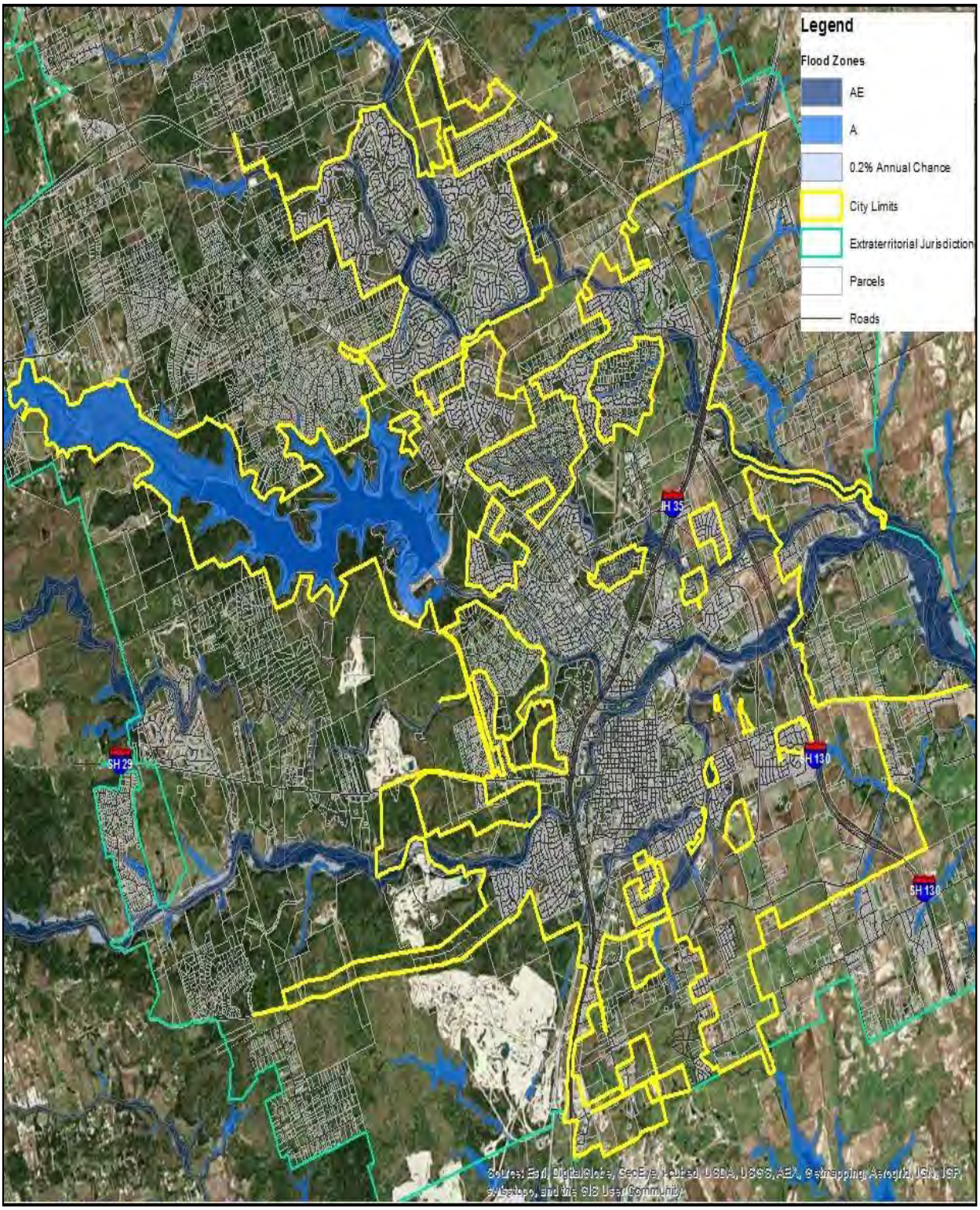


Figure 4.14 - Flood Zones in the ETJ

Source: City of Georgetown GIS Department

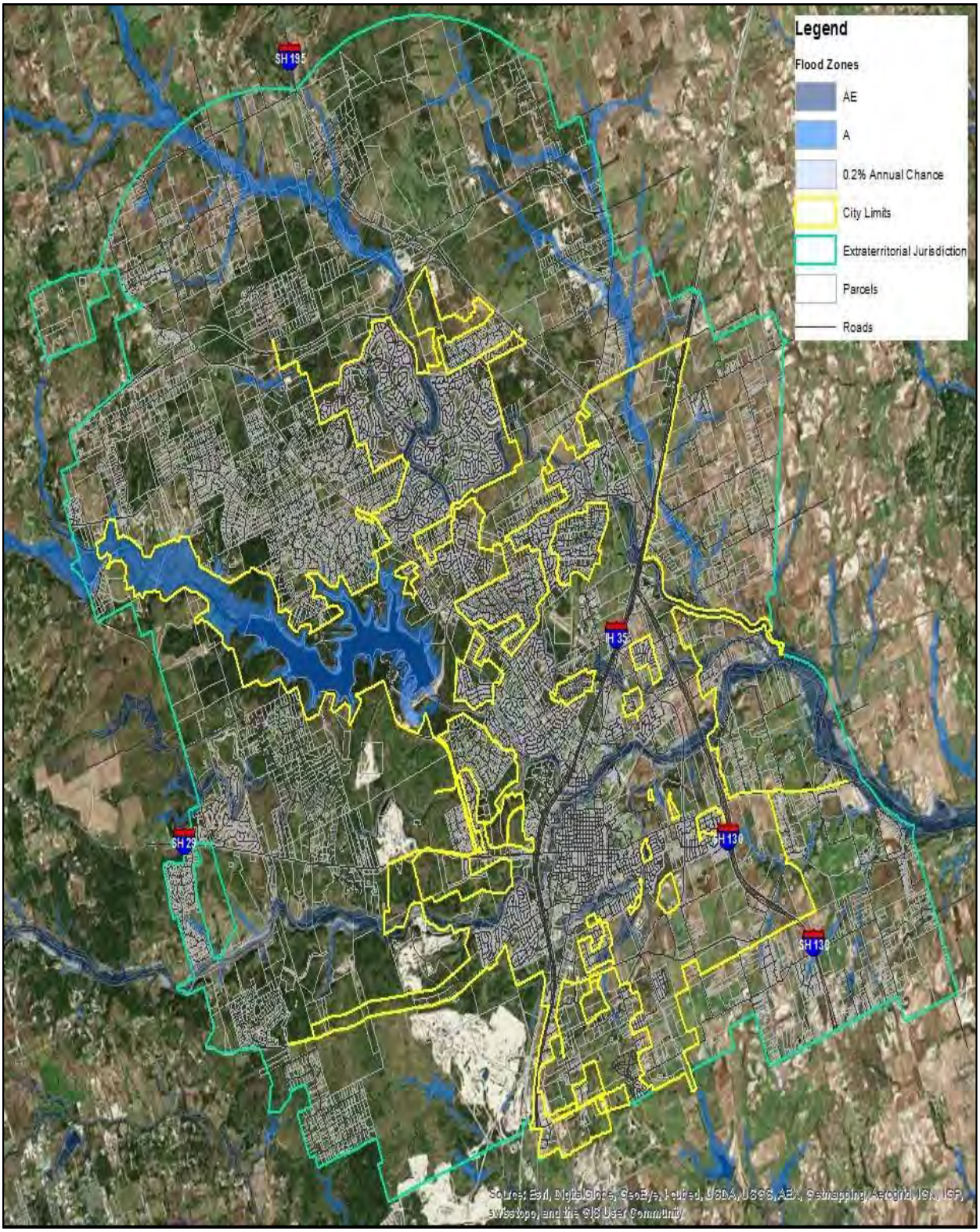


Figure 4.15 - Flood Zones in the North City of Georgetown

Source: City of Georgetown GIS Department

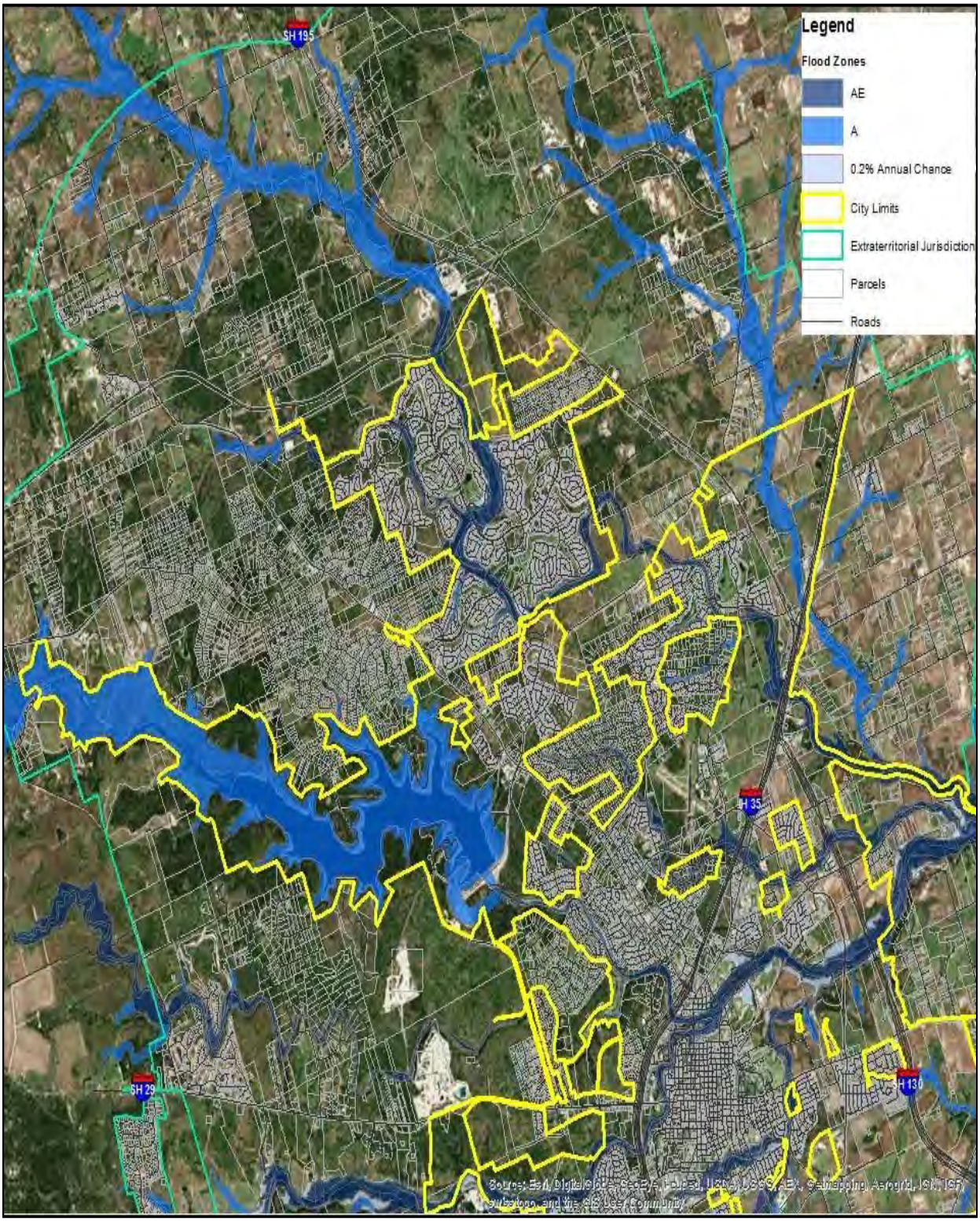
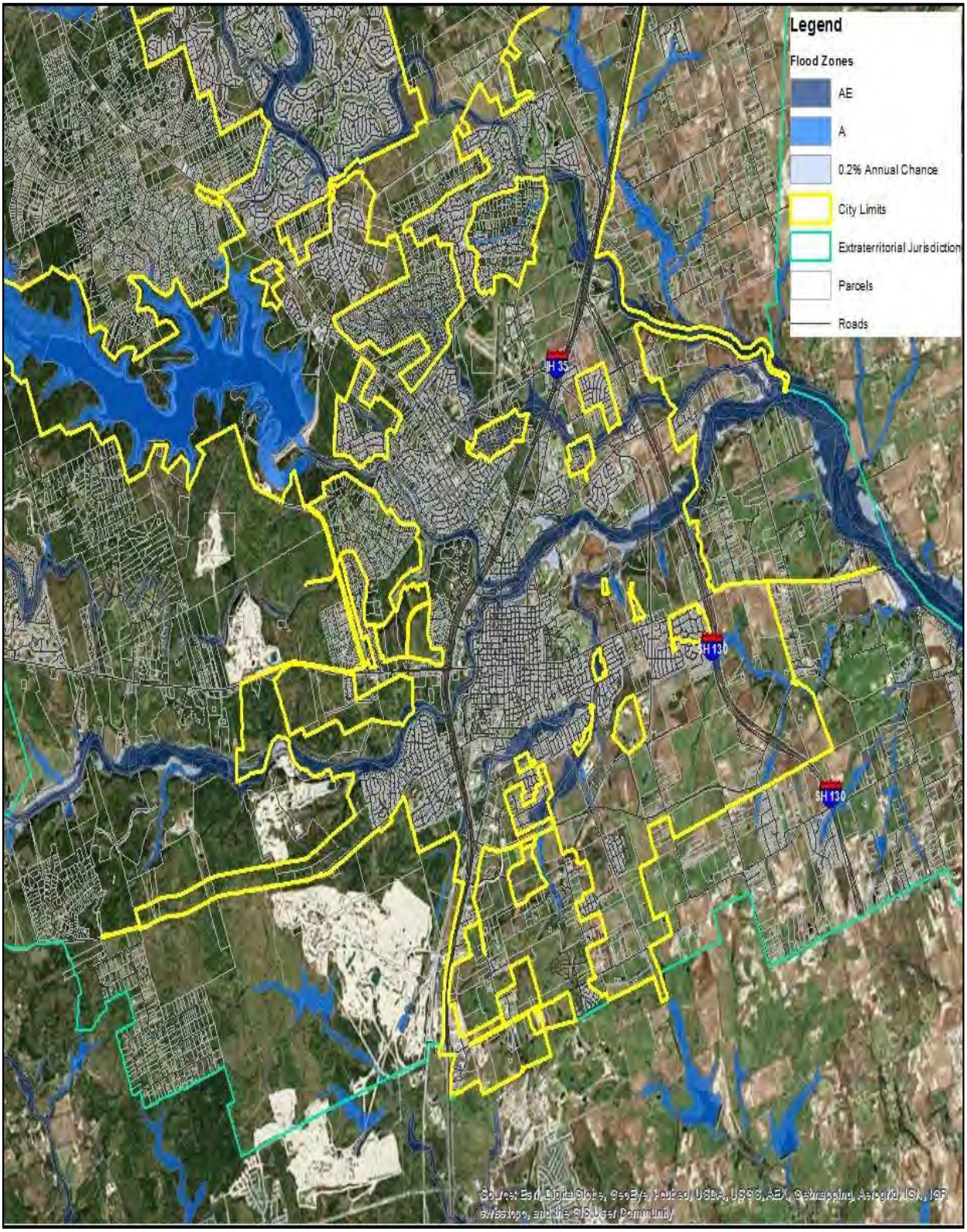


Figure 4.16 - Flood Zones in the South City of Georgetown

Source: City of Georgetown GIS Department



The Williamson County Interjurisdictional Community Flood Protection Plan also includes a map of City's flood zone locations and critical facilities located therein. These are included in the plan's Annex 6 | Georgetown.

Figure 4.16a - Locations at Risk in the City of Georgetown

Source: Williamson County Interjurisdictional Community Flood Protection Plan

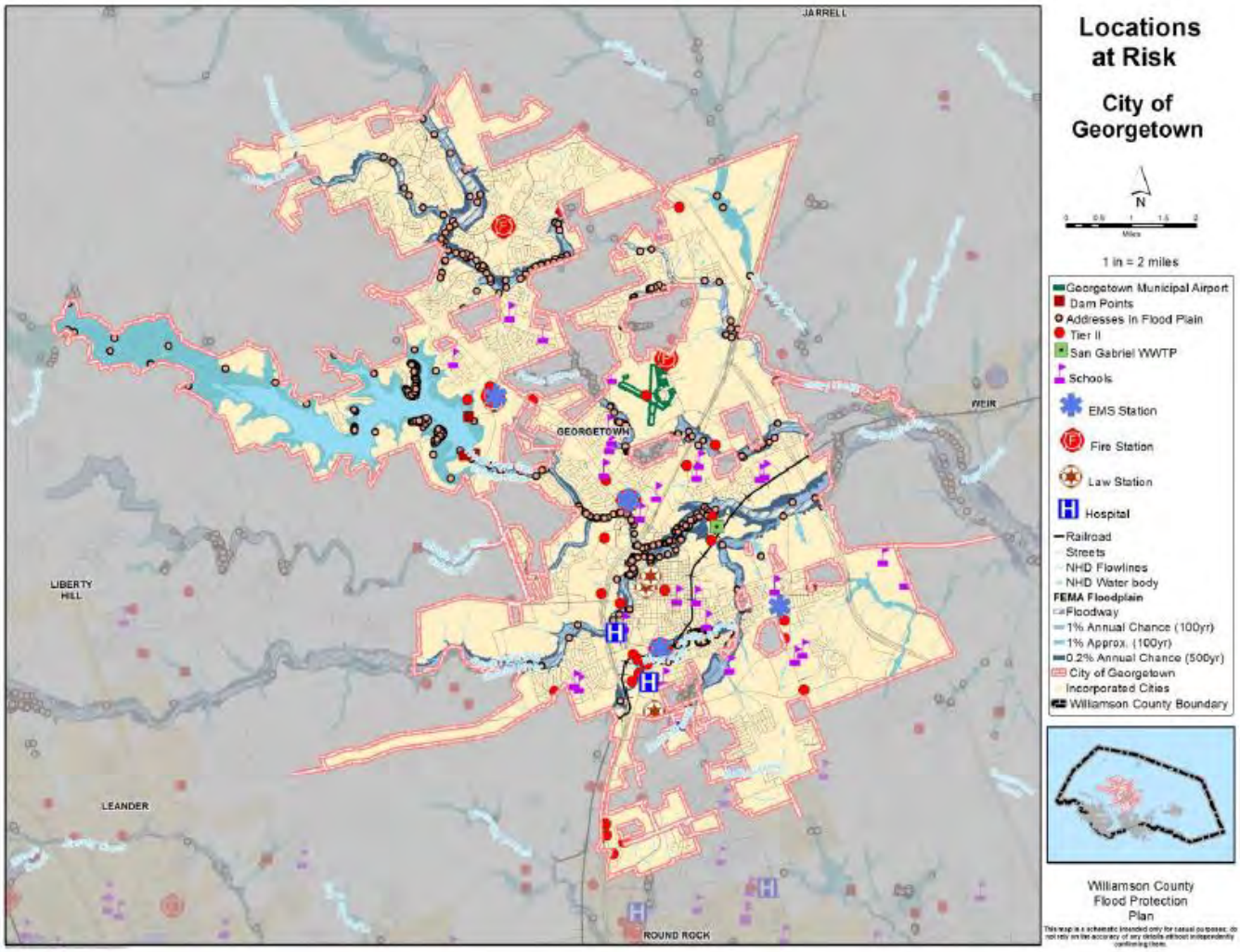


Table 4.15 - City-identified Flood-prone Community Locations
Source: City of Georgetown

Location/Address	Jurisdiction	Status	ATX Floods	Gates Recommended?	Drainage Study Recommended?	Prone to flooding	Notes
Legend: **COG - City of Georgetown Willco: Williamson County TXDOT: TX Department of Transportation**							
CR 152 @ Lonnie Thomas	COG	Open	Y				GPD Reported Water Over Road, Barricades Placed
118 N Austin Ave	COG	Open	Y				
Pine St. at Coffee St., 2100 Pine St	COG	Open	Y	x		x	Road closures due to flooding from Smith Branch. Possible location for automated gates.
DB Wood Rd At Mid Fork SG	COG	Open	Y				
Stadium Dr At Pecan Branch	COG	Open	Y		x	x	Road closures due to flooding of Stadium Dr. draining study recommended.
Lakeway Dr At Pecan Branch E	COG	Open	Y				
E 5th St At Ash St	COG	Open	Y				
E Morrow St (Lower)	COG	Open	Y	x			Road closures due to flooding of Morrow St. possible location for automated gates.
Greenbranch Dr At Trails End Dr	COG	Open	Y				
Patriot Way At Mankins Branch	COG	Open	Y				Patriot Way between Toll Road 130 and Brookstone Farm Equestrian Center to the northeast
Lakeway Dr At Pecan Branch W	COG	Open	Y				
Golf Cart Path SW Of Oak Tree Dr/Berry Creek Dr	COG	Open	Y				
111 N College St	COG	Open	Y				N College between WL Waldon and the bridge to the north
Spring Valley Rd At Starview Dr	COG	Open	Y				Spring Valley Rd between Skyview Dr and Country Club Road
NE Inner Loop At Pecan Branch	COG	Open	Y				

Location/Address	Jurisdiction	Status	ATX Floods	Gates Recommended?	Drainage Study Recommended?	Prone to flooding	Notes
Legend: **COG - City of Georgetown Willco: Williamson County TXDOT: TX Department of Transportation**							
Country Club Rd At North Fork San Gabriel	COG	Open	Y	x			Road closures due to San Gabriel River flooding, possible location for automated gates.
Maple St At West Fork Smith Branch	COG	Open	Y				
Greenbranch Dr At Hunters Glen Dr	COG	Open	Y				
S Austin Ave At Tasus Way	TXDOT	Open	Y				
Flume At N Fork SG River	COG	Open	Y				
Old Bridge At SG Park	COG	Open	Y				
Golf Cart Path	COG	Open	Y				Country Club Rd At North Fork San Gabriel
Pine St Near San Jose St	COG	Open	Y			x	
Quail Valley Dr At W Fork Smith Branch	COG	Open	Y	x			Road closures of Quail Valley Dr. due to flooding from Smith Branch. Possible location for automated gates, drainage study also recommended.
N Austin Ave At Pecan Branch	TXDOT	Open	Y				
E 6th St At Ash St	COG	Open	Y				
N College St At WL Walden Dr	COG	Open	Y				
Pedestrian Bridge At SG Park	COG	Open	Y				
Airport Rd At Pecan Branch, between Lakeway and the south service road	COG	Open	Y	x		x	Road closures due to flooding of Airport Rd. possible location for automated gates.
Northwest Blvd At Pecan Branch	COG	Open	Y				Northwest Blvd between Janis and IH35 service road
E 21st St At Church St, 2200 Church St.	COG	Open	Y		x		Road closures due to flooding at Church St and 21st St. a previous drainage study may have been completed resulting in a project design scope. (Steger & Bizel).

Location/Address	Jurisdiction	Status	ATX Floods	Gates Recommended?	Drainage Study Recommended?	Prone to flooding	Notes
Legend: **COG - City of Georgetown Willco: Williamson County TXDOT: TX Department of Transportation**							
Greenbranch Dr At Quail Meadow Dr	COG	Open	Y				
Patriot Way At Mankins Branch 2	COG	Open	Y				
Northwest Blvd North Of Hedgewood Dr	COG	Open	Y				Northwest Blvd between Serenada and Canyon Road
Luna Trl At Logan Ranch Rd	COG	Open	Y				
Blue Hole Park Rd East	COG	Open	Y			x	
811 Shady Hollow Dr - NW Side (at Pecan Branch Creek)	Wilco	Open	Y				
608 Golden Oaks Rd - SE Side (Pecan Branch Creek)	Wilco	Open	Y				
River Trail Bridge Under IH35	COG	Open	Y				
610 Shady Hollow Dr - SW Side	Wilco	Open	Y				
Lower Park Rd At Chamber Way	COG	Open	Y				
River Trail Bridge MM3.3	COG	Open	Y				
709 Golden Oaks Rd	Wilco	Open	Y				
COG - Industrial Ave, 300 Industrial Ave	COG	Open	Y		x	x	Road closures due to lack of pond capacity, close proximity to Fire Station and GUS make this a high priority. Drainage study recommended.
St Andrews Low Area, 30312 - 30401 St. Andrews Dr.	COG	Open	Y	x		x	Road closures at low water crossing, possible location for automated gates.
Blue Hole Park Pedestrian Bridge	COG	Open	Y			x	
Lower Park Rd At Chamber Way	COG	Open	Y				
Blue Hole Park Rd West	COG	Open	Y			x	
E Morrow St At Chamber Way	COG	Open	Y				
E 10th at Elm St	COG	Open	N		x		Road closures due to flooding of intersection, possible undersized storm

Location/Address	Jurisdiction	Status	ATX Floods	Gates Recommended?	Drainage Study Recommended?	Prone to flooding	Notes
Legend: **COG - City of Georgetown Willco: Williamson County TXDOT: TX Department of Transportation**							
							drain system, drainage study recommended.
505 Thornton Ln	COG	Open	N		x		Road closures required drainage flume at 505 Thornton undersized. A drainage study is recommended.
2000 Leander St	COG	Open	N		x		Road closures due to flooding, U-Haul Dealer experiences standing water in the facility. Improvement of adjacent storm drain structure is recommended.
Berry Creek Dr. (Airport Road between Diamond Dove Trail and Hwy 195)	COG	Open	N			x	Road closures due to flooding of Berry Creek Dr. / Airport Rd. Undersized culvert crossing and deteriorating catch basin structure.
CR 152	Wilco	Open	N				Road closures on CR 152 due to undersized culverts. This water crossing is owned by Williamson County however all Rights of Way north and south are City of Georgetown. Between Georgetown Memorial Cemetery and Lonnie Thomas Dr.; just south of Berry Creek bridge to the northeast side of the creek just north of Berry Springs Park
Dunman Dr.	COG	Open	N		x		Road closures due to flooding may be related to an undersized drainage flume. A drainage study is recommended.
E 20th St / College to Church St	COG	Open	N		x		Road closures due to flooding, a drainage study is recommended.
Hart St / W 17th to W 14th	COG	Open	N		x		Road closures due to flooding of Hart St, a drainage study recommended.

Location/Address	Jurisdiction	Status	ATX Floods	Gates Recommended?	Drainage Study Recommended?	Prone to flooding	Notes
Legend: **COG - City of Georgetown Willco: Williamson County TXDOT: TX Department of Transportation**							
River Rd	COG	Open	N		x		Road closures due to flooding from San Gabriel River, drainage study is recommended.
Southwestern Blvd. between University Park and Raintree (West Fork of Smith Branch)	COG	Open	N	x			Road closures due to flooding from Smith Branch. Possible location for automatic gates.
Town Square ADA Curb Ramps	COG	Open	N		x		ADA accessible curb ramps in town square are holding water following rain events which limit pedestrian movement. A drainage study is recommended.
W 16th / Hart St to Forest St	COG	Open	N		x		Road closures due to flooding on W 16th St, drainage study recommended.
Whisper Oaks Ln	COG	Open	N	x			Whisper Oaks Ln between Lakeway and Northwest Blvd.; Road closures due to flooding of Whisper Oaks Ln. Possible location for automatic gates.
22nd St between San Jose and Maple	COG	Open	N			x	
Morrow St. between N Myrtle St. and the traffic circle	COG	Open	N				
Commerce Drive	COG	Open	N				
Luther Dr. between Thousand Oaks Blvd. and Susana Dr.	COG	Open	N				
Williams Dr between Ranch Road and Rivery	COG	Open	N				
South IH35 Service Road at Pecan Branch creek	TXDOT	Open	N				
Airport Rd over Berry Creek	COG	Open	N				

Extent

The severity of a flood event is typically determined by a combination of several factors including stream and river basin topography and physiography, precipitation and weather patterns, recent soil moisture conditions, and the degree of vegetative clearing and impervious surface. Flooding may last one, up to four 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 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 Flood Insurance Rate Maps. Table 4-16 provides a description of FEMA flood zones and the flood impact in terms of severity or potential harm; Flood Zone A and AE are the only hazard areas mapped in the planning area.

Table 4.16 - Flood Zones

Source: FEMA

INTENSITY	ZONE	DESCRIPTION
HIGH	ZONE A	Areas with a 1% annual chance of flooding and a 26% 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 Flood Insurance Rate Map (FIRM) shows a Base Flood Elevation (BFE). A FIRM identifies the various flood zones on a map, and the BFE The elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year.
	ZONE AE	The base floodplain where base flood elevations 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% or greater chance 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% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.

INTENSITY	ZONE	DESCRIPTION
	ZONE AH	Areas with a 1% 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% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
	ZONE A99	Areas with a 1% annual chance of flooding that will be protected by a federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations 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). 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 a 500-year flood; area inundated by 100-year flooding with average depths of <1 foot or with drainage areas less than 1 square mile; or an area protected by levees from a 100-year flood.

Zone A is interchangeably referred to as the 100-year flood, the one percent-annual chance flood, or the Special Flood Hazard Area (SFHA), or more commonly, the base flood. By any name, it is the area that will convey the base flood. This area constitutes a threat to the planning area.

Table 4.17 - Extent Scale – Water Depth (Mean Sea Level, MSL)

SEVERITY	MSL (in feet)	DESCRIPTION
BELOW FLOOD STAGE	0 to 15	Water begins to exceed low sections of banks and the lowest sections of the floodplain.
ACTION STAGE	16 to 23	Flow is well into the floodplain; minor lowland flooding reaches low areas of the floodplain. Livestock should be moved from low lying areas.
FLOOD STAGE	24 to 28	Homes are threatened and properties downstream of river flows or in low lying areas begin to flood.

SEVERITY	MSL (in feet)	DESCRIPTION
MODERATE FLOOD STAGE	29 to 32	At this stage, the lowest homes downstream flood. Roads and bridges in the floodplain flood severely and are dangerous to motorists.
MAJOR FLOOD STAGE	33 and above	Major flooding approaches homes in the floodplain. Primary and secondary roads and bridges are severely flooded and very dangerous. Major flooding extends well into the floodplain, destroying property, equipment, and livestock.

The range of intensity that the City can experience is high. Based on reporting from the USGS peak MSL data, the average flood event places the City at the extent of "Below Action Stage" as shown in Tables x-x and x-x. However, the City of Georgetown has experienced flood waters in the San Gabriel River reaching 33 feet.

Reading the following data in the tables and figures provided, and historical occurrences for the area provide estimated and potential magnitude and severity for the City of Georgetown. The City may experience a range of flooding events from below 15 feet up to 33 feet or from "Below Flood Stage" and up to "Major Flood Stage."

Historical Occurrences

Recorded historical evidence shows that areas all areas of Williamson County are susceptible to flooding, especially to flash flooding. It is important to note that only reported flood events that have been reported have been factored into this risk assessment. NCEI documented 147 flood or flash flood events as having taken place in Williamson County between 1/1/1950, when the database was first created, and 12/31/2020, the dates for which risk assessment data was identified during the mitigation planning process. The first occurrence is listed as being on 8/31/1996, and the last listing is from 6/23/2020. It is likely that additional flood occurrences have gone unreported before and during this recording period. Specific to the City of Georgetown, NCEI data recorded 15 historical flood events, and these are shown in Table 4.18. The sparse data reported to the NCEI is not all-inclusive. For example, it does not record an incident that occurred in Georgetown on September 22, 2018 that received area news coverage. The time period shown in the table below is for that included in NCEI research for all available hazards, not an event might not occur every year during this period.

Table 4.18 - Historical Flood Events Occurring in the City of Georgetown, 1950-2020

Source: NCEI

LOCATION	DATE	TIME	TYPE	DEATHS	INJURIES	PROPERTY DAMATE	CROP DAMAGE
Georgetown	6/13/1999	1430	Flash Flood	0	0	$ 3,000.00	$ 0.00
Georgetown	10/10/2006	830	Flash Flood	0	0	$ 0.00	$ 0.00
Georgetown	3/12/2007	24	Flash Flood	0	0	$ 0.00	$ 0.00
Georgetown	6/27/2007	130	Flood	0	0	$ 0.00	$ 0.00

Georgetown	9/8/2010	47	Flash Flood	0	0	$ 0.00	$ 0.00
Georgetown	9/13/2012	1759	Flash Flood	0	0	$ 0.00	$ 0.00
Georgetown	5/19/2016	1040	Flash Flood	0	0	$ 0.00	$ 0.00
Georgetown	6/2/2016	836	Flash Flood	0	0	$ 0.00	$ 0.00
Georgetown Muni Arpt.	9/11/2009	1331	Flash Flood	0	0	$ 0.00	$ 0.00
Georgetown Muni Arpt.	9/12/2009	1452	Flood	0	0	$ 0.00	$ 0.00
Georgetown Muni Arpt.	9/7/2010	2128	Flash Flood	0	0	$ 0.00	$ 0.00
Georgetown Muni Arpt.	9/8/2010	139	Flash Flood	1	0	$ 0.00	$ 0.00
Georgetown Muni Arpt.	9/8/2010	630	Flash Flood	0	0	$ 0.00	$ 0.00
Georgetown Muni Arpt.	8/18/2012	2200	Flash Flood	0	0	$ 0.00	$ 0.00
Georgetown Muni Arpt.	6/17/2015	1700	Flash Flood	0	0	$ 0.00	$ 0.00
Total				**1**	**0**	**$ 3,000.00**	**$ 0.00**

Significant Events

September 22 to 26, 2018 – Reported by Williamson County

Thunderstorms hammered central Texas, dropping nearly 10 inches of rain in some spots, and causing flash floods, road closures and power outages. Approximately 90 people were forced to evacuate a wedding venue in Liberty Hill as waters rose to dangerous levels. Almost 30 were able to escape the building on their own, but at least 50 people needed to be rescued by local authorities after water trapped them inside. The San Gabriel River overflowed into the streets of Georgetown, cresting at 24.2 feet (compared to 3 feet typically). Limestone blocks of a San Gabriel Park retaining wall were pushed over, and railings and a retaining wall and a power line were damaged at Blue Hole Park. Sections of a pedestrian crossing near the confluence of the North and South Forks of the San Gabriel River were torn apart. Officials said the river rose to moderate flood levels before receding Saturday afternoon as flood warnings were canceled in the area. Officials reported to the Austin American Statesman that the storms knocked out power for hundreds of residents in the area. Oncor Electric reported 212 customers without power in Round Rock and other areas in Williamson County on Saturday morning, because of the storm.

The Williamson County Sheriff's Office issued evacuation orders Saturday morning for people living on McShepherd Road along the San Gabriel River near Georgetown and on County Road 129 and County Road 123 along Brushy Creek. More than 16 trailer homes also were evacuated in the Shady Oaks RV Park off State Highway 29, east of Interstate 35 near Georgetown along the river.

Flash Flood on September 13, 2012 – Reported at Georgetown Municipal Airport

Heavy rain from Tropical storm Bill caused flash flooding sending Berry Creek over the road near Sun City. Tropical storm Bill moved onshore over Matagorda Island on the morning of June 16th. The center of Bill moved through Lavaca, Fayette, and Lee Counties on the 17th. The strongest recorded wind gust was 47 m.p.h.

Flash Flood on September 13, 2012 – City of Georgetown

Southeasterly flow in the boundary layer brought deep moisture from the Gulf of Mexico into South Central Texas. An upper trough pushed a cold front into this airmass and produced heavy rain that led

to flash flooding. There was also an isolated thunderstorm that produced damaging wind gusts. Thunderstorms produced heavy rain that caused flash flooding closing several streets in Georgetown.

Flash Flood on September 8, 2010 – City of Georgetown

Tropical storm Hermine made landfall near the Texas/Mexico border on the night of September 6. The storm moved northward through South Texas into South Central Texas. Strong winds and flooding rain began in South Central Texas on September 7. On September 8, the winds subsided, but the flooding rain continued as the remnants of Hermine moved northward into Oklahoma. South Central Texas 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 area was north Austin, Round Rock, Cedar Park, and Georgetown. Sixteen inches of rain fell in Georgetown, with the Georgetown Co-op observer reporting 16.37 inches for the 2-day rain event. Williamson County reported 637 homes having been damaged by flood waters, with most having minor to major damage. Heavy rain from Tropical Storm Hermine produced flash flooding which closed I-35 in both directions in Georgetown which caused one death. A man was found dead in a drainage field on September 14th. Police believe on September 8th at around 2am he was forced to stop his car because I-35 was closed with several feet of water over the highway. He pulled off on an exit ramp and discovered it was also flooded. Relatives said that he called them and said he could not get home but was going to check the depth of the water. He got out of his vehicle and tried to walk through the flooded water to determine its depth and apparently was sucked down through a drainage culvert. The flooding also caused the evacuation of approximately 100 homes along Brushy Creek near Round Rock.

Flood and Flash Flood on June 27, 2007 – City of Georgetown

The South Fork of the San Gabriel River at Georgetown crested at 31.2 feet at 7:15 a.m. CST on June 27, where flood stage is 9 feet. A thunderstorm outflow boundary from storms in the Dallas area moved southward into South Central Texas as a second outflow boundary from thunderstorms in the Abilene area moved southeastward. The two boundaries collided near Marble Falls shortly after midnight on June 26 and produced sustained periods of very heavy rainfall across several counties.

Probability of Future Events

Based on recorded historical occurrences and recorded extent, flooding is a likely hazard for the planning area. There is limited data on the NCEI reports and should not be the primary consideration for estimating the actual frequency of flood events. Considering 27 flood and flash flood events listed during a 10-year period, and actual recent flooding in 2018, it is possible that two to three events may occur every year.

Vulnerability and Impact

Moving flood water exerts pressure on everything in its path and causes erosion of soil and solid objects. Utility systems, such as heating, ventilation, air conditioning, fuel, electrical systems, sewage maintenance systems and water systems, if not elevated above base flood elevation, may also be damaged. A property's vulnerability to a flood depends on its location in, or in proximity, to the floodplain. Structures that lie along banks of a waterway are the most vulnerable and are often repetitive loss structures. The City of Georgetown has experienced high growth which means that there could in the future be greater flood losses due to extensive development in this area. However, due to the generally flat terrain of this Central

Texas County, homes and businesses in the floodplain remain at risk of flash flooding. During periods of heavy rainfall, homes and businesses located in some areas of the City experience rapid runoff and are vulnerable to flooding from the San Gabriel River, Berry Creek, and other minor waterways. Although the City only allows development outside of the floodplain, flood impacts for the City could result in the evacuations of residents, and the potential shutdown of facilities, depending on the scale of the storm and extent of flooding.

NFIP Repetitive Loss Properties

The Severe Repetitive Loss (SRL) 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 severe repetitive loss residential structures insured under the NFIP. The Texas Water Development Board (TWDB) administers the SRL grant program for the State of Texas.

Repetitive Loss properties: Those for which two or more losses of at least $1,000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978.

Severe Repetitive Loss properties: Covered under the NFIP and have at least four flood related damage claim payments (building and contents) over $5,000.00 each, and the cumulative amount of claims payments exceed $20,000; or submit at least two separate claim payments must have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building. In either SRL scenario, at least two of the claims must have occurred within any ten-year period and must be greater than 10 days apart. Table 5-6 shows repetitive loss repetitive loss properties as recorded with FEMA, within the City of Georgetown. That 2014 plan included an action item to remove some of the at risk properties, and two of three of those listed have been removed.

Table 4.19 - Repetitive Loss and Severe Repetitive Loss Properties

Source: Texas Water Development Board – 2021 Data

JURISDICTION	INSURED	BUILDING TYPE	LOSSES	TOTAL PAID
City of Georgetown	Yes	Single family residence	3	$48,288.08
City of Georgetown	Yes	Single family residence	2	$79,553.92
City of Georgetown	Yes	2-4 family residence	2	$5,056.54

.

The City of Georgetown currently has one Repetitive Loss Property that is classified as Residential, and zero Severe Repetitive Loss Properties. The one remaining repetitive loss property had one claim in 2004, and one claim in 2010. There have been no other claims for this property since 2010, and there is no justification for removal at this time. Street drainage improvements may have mitigated the issue.

According to the Texas Water Development Board, while all three structures are still on FEMA's "official" RL list, the plan should note that two have been "mitigated" and removed, and the third has had external factors and city improvements reduce the risk of flooding. They will remain on the FEMA's RL list, while actions to ensure all NFIP reporting are made, and adequate wait time allowed for FEMA to remove them.

Hail

Hazard Description

Hail is created when ice crystals that 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. Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, frozen droplets gradually accumulate into ice crystals, until they fall as precipitation that is round or irregularly shaped masses of ice 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 keep hail in suspension in thunderclouds. The strength of the updraft is a byproduct of heating on the Earth's surface. Higher temperature gradients above Earth's surface result in increased suspension time and hailstone size.

Photo 7 Hail Georgetown, Tx May 28, 2020

Location

Hailstorms are not confined to any specific geographic location, and can vary greatly in terms of size, location, intensity, and duration. All planning areas are equally exposed to this hazard.

Extent

The National Weather Service (NWS) classifies a storm as severe if hail of three-quarters of an inch in diameter (approximately the size of a penny) or greater is present, based on radar intensity or seen by observers. The intensity category of a hailstorm depends on its size and the potential damage it could cause, as depicted in the NCDC Intensity Scale in Table 4-18 The scale shows that hail events range from descriptors H0 to H10, with increments of intensity or damage potential related to hail size (distribution and maximum), texture, fall speed, speed of storm translation, and accompanying wind strength. The City of Georgetown planning area has experienced hailstorms ranging from an H0 to H10 and could experience another with base-ball size hail.

Table 4.20 - Hail Intensity and Magnitude

Source: NCEI Intensity Scale, based on the TORRO Hailstorm Intensity Scale

SIZE CODE	INTENSITY CATEGORY	SIZE (Diameter Inches)	DESCRIPTIVE TERM (Size)	TYPICAL DAMAGE
H0	Hard Hail	Up to 0.33	Pea	No damage

SIZE CODE	INTENSITY CATEGORY	SIZE (Diameter Inches)	DESCRIPTIVE TERM (Size)	TYPICAL 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

Historical Occurrences

Historical evidence indicates that the planning area is vulnerable to hail events. NCEI data shows that 295 events occurred in Williamson County between 1950 and 2020. This is the time period shown in the table below because NCEI research used this date range for all available hazards. That being said, a hail event did not occur every year during this period.

The 33 hail events recorded in the NCEI database as specifically impacting the City of Georgetown between 1950 and 2020 are shown in Table 4.21. The City can mitigate against a storm from low risk or hard hail to a severe, destructive hail that can lead to severe roof damage and risk of serious injuries.

Table 4.21 - City of Georgetown-specific Historical Hail Events, 1950-2020
Source: National Center for Environmental Information

DATE	TIME	MAGNITUTE	DAMAGE REPORTED TO NCEI	INJURIES
5/18/1993	11:01 a.m.	0.75	0	0
4/20/1995	7:29 a.m.	0.75	0	0
9/19/1996	10:30 p.m.	1.5	0	0

DATE	TIME	MAGNITUTE	DAMAGE REPORTED TO NCEI	INJURIES
6/5/1998	3:00 p.m.	0.75	0	0
6/5/1998	4:35 p.m.	0.75	0	0
3/16/2000	4:40 p.m.	1.75	0	0
5/27/2002	9:15 p.m.	1	0	0
6/26/2002	5:55 p.m.	2	0	0
6/26/2002	8:20 p.m.	1.75	0	0
12/30/2002	4:10 p.m.	0.75	0	0
11/23/2004	4:24 p.m.	2.5	0	0
3/19/2005	5:10 p.m.	1	0	0
4/5/2005	7:15 p.m.	0.75	0	0
10/31/2005	1:20 p.m.	0.75	0	0
5/2/2007	7:25 p.m.	2.75	0	0
4/4/2008	5:15 a.m.	1	0	0
4/4/2008	5:05 a.m.	0.88	0	0
4/4/2008	5:10 a.m.	1	0	0
3/25/2009	4:45 p.m.	0.75	0	0
6/11/2009	7:18 p.m.	0.75	0	0
3/19/2013	10:14 p.m.	1	0	0
3/19/2013	10:10 p.m.	0.88	0	0
4/2/2017	8:56 a.m.	1	0	0
4/2/2017	9:02 a.m.	0.75	0	0
4/13/2018	9:11 p.m.	1	0	0
6/16/2019	7:56 p.m.	1.25	0	0
6/16/2019	8:00 p.m.	0.88	0	0
10/15/2019	5:40 p.m.	1.75	0	0
10/15/2019	5:41 p.m.	1	0	0
1/10/2020	8:12 p.m.	0.75	0	0
5/27/2020	11:10 p.m.	2.5	0	0
5/27/2020	11:16 p.m.	1	0	0
5/27/2020	11:19 p.m.	2.75	0	0
Total			0	0

While no dollar values are recorded by NCEI for damage resulting from a hail storm on May 27, 2020, the Georgetown Office of Emergency Services received damage data from the City's Fleet Services Department. That department damage reported a damage total of $487,724.54, which includes both insurance deductibles and insurance payouts. This figure does not include vehicles deemed to be a total loss, nor does it include other types of damage sustained either by the City or other entities. As such, we know that not all events were reported to the NWS, and we also know the damage amount for each event may not be accurate.

Significant Past Events

May 27, 2020 - City of Georgetown

Georgetown experienced a severe storm overnight that produced hail up to 3 inches in size. The major impacts were experienced along the Williams Drive corridor between Jim Hogg Rd. and DB Wood Rd. The Police and Fire departments did not have any calls for services related to the storm. There was damage to City and employee vehicles at the public safety building, water treatment plant, and fire stations No. 2 and 5. There was no significant impact to the electric utility system. The City only had one outage where less than 60 customers were without power for more than 30 minutes. The Sign and Signal Technicians inspected all traffic signals and notice only small amount of damage at DB Woods and Williams, but not enough to effect operation of the signals. The only other impact was to protective covering for some pumps at the water treatment plant. Staff handled repairs and expected all repairs to be complete within a week.

October 15, 2019 – City of Georgetown

A thunderstorm produced golf ball size hail in Georgetown. A cold front moved into an unusually warm, moist airmass and generated thunderstorms. Some of these storms produced large hail and damaging wind gusts.

March 19, 2013 – City of Georgetown

An upper-level trough moving across Central Texas pushed a cold front across the Hill Country and South-Central Texas. Scattered showers and thunderstorms developed, some of which became severe. One of the severe thunderstorms moved across the Austin Metro area.

April 4, 2008 – City of Georgetown

The combination of a cold front, jet streak, and an upper-level low pressure are to our north led to a severe weather outbreak across the county warning area. Thunderstorms formed over Val Verde County around 12:15 to 12:30 a.m. The storms intensified as they moved east. This was associated with a low amplitude mid- to high- tropospheric trough coming from the west, from 700 to 200 mb. The storms continued east across the hill country to the Austin and Georgetown areas. As a cold front moved south around 7:30 to 8:00 a.m., the storms intensified over Williamson, Travis, and Northern Bastrop Counties.

May 2, 2007 – City of Georgetown

Thunderstorms developed in the early evening across South Central Texas, producing large hail, damaging winds, and flash flooding.

April 20, 1995 – City of Georgetown

Hail up to the size of golf balls were reported by the public near sunrise. Widespread damage was reported to roofs and windows of homes across the city.

Probability of Future Events

Based on the 33 events over the last 27 years (1993–2020), a hail event is a likely occurrence recorded as happening at least once every year. However, the reality is that hail is experienced multiple times each year in the planning area. Most hailstorms occur during the spring and in the fall during the month of September. There is generally little to no warning for an approaching hailstorm, although residents should watch for the hazard any time a severe thunderstorm is predicted Because hail is a product of Thunderstorms, which are frequent, the planning area can expect to experience hail 10 times in the next five years.

Vulnerability and Impact

Damage from hail approaches $1 billion in the US each year. 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, building and home roofs, and landscaping are the other things most damaged by hail. Hail has been known to cause injury to humans, and occasionally has been fatal. Due to the lower level of risk for hail for the City of Georgetown and previous damages, health impact for hail is "Limited", meaning injuries are treatable with first aid, minor quality of life is lost, facilities shut down for 24 hours or less, and less than 10% of property is destroyed. However, recent events have been extreme exceptions with greater roof damage, some impacts to water infrastructure, and service vehicles.

As a non-geo-specific hazard, hail events may occur anywhere in the planning area. Structures, including critical facilities, located anywhere in the community are vulnerable to the hazard. As was discussed under Significant Past Events, damage amounts are not listed in the NWS Storm Events Database for the May 27, 2020 hail event. To reiterate reported facts, known impacts include damage to assets belonging to the City's Fleet Services Department totaled $487,724.54, including both insurance deductibles and insurance payouts. This figure does not include vehicles deemed to be a total loss, nor does it include other types of damage sustained either by the City or other entities. As such, we know that not all events were reported to the NWS, and we also know the damage amount for each event may not be accurate. If all City vulnerable critical facilities had been affected by this event, Table 4.22 shows the number vulnerable to hail damage.

Table 4.22. Georgetown Critical Facilities Enumerated by Type

Source: City of Georgetown

FACILITY TYPE	NUMBER
Fire Stations	10
Police Stations	1
Hospitals	1
Schools	24
Child Care Facilities	18
Group Homes	78
Electrical Substations	7
Water Treatment Plants	3
Wastewater Treatment Plants	5

High Winds

Hazard Description

The High Winds hazard are sustained winds of 40 mph or higher for one hour or more, or wind gusts of 58 mph or higher for any duration. High winds may be the result of downdrafts from a thunderstorm or straight-line winds in front of a storm system. High Winds may also be classified as a Derecho, Straight-line Winds, or Microburst.

Photo 8 High Speed Wind Damage Waxahachie, TX. January 11, 2020

Location

High wind events are not a geographic-specific may occur anywhere in the planning area.

Extent

The extent of this hazard depends on the assets affected when a high wind event strikes the planning area, as well as the strength of the storm that may precipitate high winds. Events may cause damage as slight as toppling patio chairs or significant damage by uprooting large trees or removing structural roofing.

Force levels six through 12 on the Beaufort Wind Scale shown below best describe extent of impact in how high winds affect the natural and built environment. The city has experienced 75 mile per hour (mph) winds and may experience 85 mph wind gusts.

Table 4.23 - Beaufort Wind Scale Using the World Meteorological Organization Classification

Source: NOAA

FORCE	WIND (KNOTS)	WMO CLASSIFICATION	APPEARANCE OF WIND EFFECTS
0	< 1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4-7	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	13-18	Moderate Breeze	Dust, leaves, and loose paper lifted; small tree branches move
5	19-24	Fresh Breeze	Small trees in leaf begin to sway
6	25-31	Strong Breeze	Larger tree branches moving, whistling in wires

FORCE	WIND (KNOTS)	WMO CLASSIFICATION	APPEARANCE OF WIND EFFECTS
7	**32-38**	**Near Gale**	Whole trees moving, resistance felt walking against wind
8	**39-46**	**Gale**	Whole trees in motion, resistance felt walking against wind
9	**47-54**	**Strong Gale**	Slight structural damage occurs, slate blows off roofs
10	**55-63**	**Storm**	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	**64-72**	**Violent Storm**	If experienced on land, widespread damage
12	**73+**	**Hurricane**	Violence and destruction

Historical Occurrences

Four countywide events described as Strong Wind or High Wind incidents have been recorded by the National Weather Service, several on the same day but in different locations within the planning area.

Table 4.24 - High Wind Events in the City of Georgetown (1950–2020)

Source: National Center for Environmental Information (NCEI)

DATE	TIME	MAGNITUDE (mph)	DEATHS	INJURIES	DAMAGE PROPERTY	DAMAGE CROPS
1/31/2008	12:00 p.m.	34	0	0	10000	0
2/25/2013	1:57 p.m.	50	0	0	0	0
2/25/2013	2:20 p.m.	50	0	0	0	0
2/25/2013	3:45 p.m.	50	0	0	0	0
Totals			**0**	**0**	**$ 10,000.00**	**$ 0.00**

Significant Past Events

March 22, 2021 - City of Georgetown

The NWS Austin/San Antonio released the following Public Information Statement following a damage survey from a Thunderstorm Wind Event # 032421 that affected the City of Georgetown.

PEAK WIND	From the East at 75 MPH
PATH LENGTH /STATUTE	1.10 miles
PATH WIDTH /MAXIMUM/	200 Yards
START DATE and Time	03/22/2021, 09:55 PM CDT
START LOCATION and START LAT/LON	Bertram/Burnett County, TX: 30.7450/98.0580
END LOCATION and Ending Lat/Long	Bertram/Burnett County, TX: 30.7380 /98.0430
END DATE and Time	03/22/2021 10:00 PM CDT

A national weather service damage survey of the Bertram area, as well as areas in western Williamson County, has concluded that the observed wind damage was caused by strong microburst winds. Building damage in Bertram occurred right Along highway 29 in between FM 243 and North East Street. Roof damage was observed at several businesses, as well as roof/wall failures of 2 buildings near the Highway 29 and North Grange Street intersection. Damage was blown generally west to east with estimated winds at 75 mph. The damage was highly concentrated in this area of Bertram and contributed to high winds.

Flying debris caused additional damage, including broken windows at the Bertram Library. As the severe thunderstorm moved East along highway 29, additional roof damage was observed near Reed Circle.
The severe storm continued east and moved into western Williamson county. Tree and roof damage were observed just east of highway 183 on live oak trail. This area of wind damage matched up with an area of severe winds seen on the KGRK radar. The City of Georgetown reported that some of its warning sirens were activated by the event due to an issued Tornado Warning, and that the Office of Emergency Management activated additional sirens ahead of the storm manually to warn the community of danger.

February 25, 2013 - City of Georgetown

High winds destroyed a hangar door at the Georgetown Municipal Airport. A deep upper-level area of low pressure moved out of the Rockies into the southern plains and brought a surface low pressure system with a cold front through Texas. The pressure gradient tightened behind this front and produced strong gusty winds across South Central Texas.

January 31, 2008 - City of Georgetown

The porch roof peeled off a mobile home which then caused the main roof of the home to peel back as well. The home was located on Baker Lane just outside of Leander. There was also a large grass fire which started just after noon near FM 1431 and Sam Bass Road causing the closure of eastbound FM 1431 at Raley Road. A cold front moved through South Central Texas on January 31, 2008 causing strong, gusty winds during the day. Several locations incurred damage from these winds.

Probability of Future Events

It is conceivable that not all high wind events are reported to the National Weather Service as events on record. Since high winds occur because of various types of weather events, they are highly likely to occur at least twice per year, approximately ten times in the next five years.

Vulnerability and Impact

Preparedness Committee members identified assets vulnerable to high wind and ways the hazard may affect such assets. Committee members discussed the fact that High Winds have been known to topple trees, streetlights, and power poles, and to damage fabric shelters set up in Georgetown's many parks or installed for special events. Electric outages have been caused by falling limbs, trees, and poles, by power lines slapping together, and by flying debris. Extensive roof and vehicle damage has been reported, as well as impacts to temporary tents and stages erected to accommodate special events that drive some of the City's economic engine, such as the Red Poppy Festival and the annual downtown Christmas Stroll.

It is conceivable that not all high wind events are reported to the National Weather Service as events on record. Since high winds occur because of various types of weather events, they are highly likely to occur at least twice per year, approximately ten times in the next five years.

Planning Team members identified assets vulnerable to high wind and ways the hazard may affect such assets. High Winds have been known to topple trees, streetlights, and power poles and damage fabric shelters set up in Georgetown's many parks. Electric outages have been caused by falling limbs, trees, and poles, by power lines slapping together, and by flying debris. Extensive roof and vehicle damage has been reported, as well as impacts to temporary tents and stages erected to accommodate special events that drive some of the City's economic engine, such as the Red Poppy Festival and the annual downtown Christmas Stroll.

Exposure of critical facilities to the wind hazard mirrors that of their risk to hail, as was discussed in the previous section. Like hail, wind is not a geospecific hazard and a wind event often occurs throughout the planning area. As such, critical facilities located anywhere in the City and EJT are equally at risk to damage from High Winds. For the sake of easy reference, a table from Appendix H – Critical Facilities is repeated here to show the total number of critical facilities by type.

Table 4.25 Georgetown Critical Facilities Enumerated by Type

FACILITY TYPE	NUMBER
Fire Stations	10
Police Stations	1
Hospitals	1
Schools	24
Child Care Facilities	18
Group Homes	78
Electrical Substations	7
Water Treatment Plants	3
Wastewater Treatment Plants	5

Appendix H also includes a map for each facility type and identifies the location of all the facilities in that category: i.e., one map shows the location of all fire stations, another showing all police stations, and so forth.

Notably, during and after the Severe Winter Storm resulting in FEMA Presidential Declaration DR-4586-TX, high wind was, in part, responsible for loss of power to two critical facilities: the power and water systems, both of which serve a broad region outside the City of Georgetown. High winds, along with a heavy snow load, caused downed trees to fall on electrical wires and other functional elements of these critical assets.

Infectious Disease

Hazard Description

An infectious disease is defined as a clinically evident disease resulting from the presence of pathogenic microbial agents. According to FEMA, infectious diseases are a major threat around the world, killing millions globally each year. Transmission of an infectious disease may occur through one or more means including physical contact with infected individuals. These infecting agents may also be transmitted through liquids, food, bodily fluids, contaminated objects, airborne inhalation, or through vector-borne dissemination.

Three terms are commonly used to classify disease impacts: endemic, epidemic, and pandemic. An endemic is always present at a low frequency (e.g., chicken pox in the United States). An epidemic is a sudden severe outbreak of disease (e.g., the bubonic plague during Medieval times). A pandemic is an epidemic that becomes very widespread and affects a whole region, a continent, or the world (e.g., the 1957 flu pandemic caused at least 70,000 deaths in the United States and 1-2 million deaths worldwide). Fears of pandemic spread have risen in recent years as our globalized economy and growing population fosters large scale international travel and trade. Growing populations increase the vulnerability of all areas to disease as it can travel more quickly and creates difficulty in preventing the spread of infection.

The top 11 infectious disease mortality causes, according to the most recently available report from the World Health Organization based upon number of deaths worldwide are presented in Table 4.26.

Table 4-26 - Worldwide Mortality Due to Infectious Disease
Source: World Health Organization

RANK	CAUSE OF DEATH	2008 APPROXIMATE WORLDWIDE DEATHS	PERCENTAGE OF ALL DEATHS WORLDWIDE
1	Lower Respiratory Infections	3.5 million	6.1%
2	Diarrheal diseases	2.5 million	4.3%
3	HIV/AIDS	1.8 million	3.1%
4	Tuberculosis (TB)	1.3 million	2.4%
5	Malaria	827,000	1.5%
6	Meningitis	340,000	0.6%
7	Pertussis	195,000	0.3%
8	Measles	155,000	0.3%
9	Hepatitis B	128,000	0.2%
10	Syphilis	100,000	0.2%
11	Tetanus	88,000	0.2%

Location

Pandemics occur randomly, with several occurring each century. Regardless of the origin, the disease has a global impact, and all areas are vulnerable. Developing countries have fewer resources to fight disease and may be more vulnerable than industrialized nations. The public health system works at the federal, state, and local levels to monitor diseases, plan, and prepare for outbreaks, and prevent epidemics to the degree possible. However, given the level of air travel among populations worldwide, as well as the level of worldwide shipping of products, it has become increasingly difficult to contain localized outbreaks. Infectious Disease can happen anywhere in the planning area.

Extent

The costs to the public health sector in terms of responding to an outbreak, as well as impact to overall community health, can be "Substantial" (see table below). Multiple deaths could occur, and facilities could be shut down for 30 days or more. While indirect, it is possible that property damage would results from the high absenteeism of persons responsible for property or infrastructure management. Impact statements are defined in Table 4.27.

Table 4.27 - Extent Descriptions

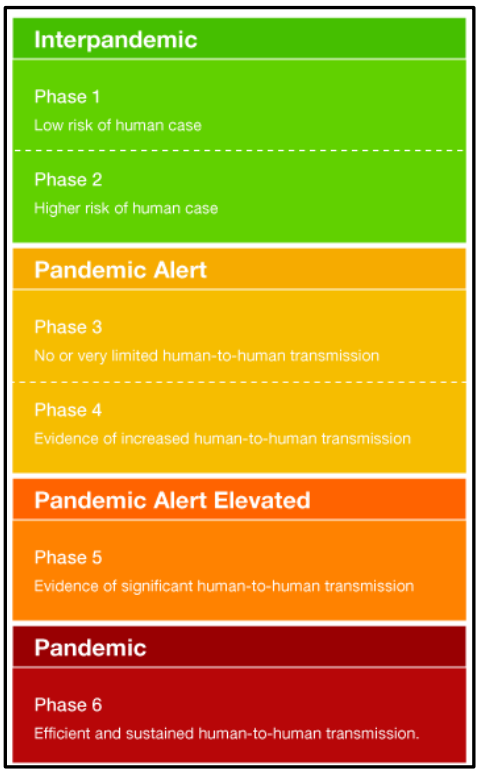
Potential Severity	Description
Substantial	Multiple deaths. Complete shutdown of facilities for 30 days or more. More than 50 percent of property destroyed or with major damage.
Major	Injuries and/or illnesses result in permanent disability. Complete shutdown of critical facilities for at least two weeks. More than 25 percent of property destroyed or with major damage.
Minor	Injuries and/or illnesses do not result in permanent disability. Complete shutdown of critical facilities for more than one week. More than 10 percent of property destroyed or with major damage.
Limited	Injuries and/or illnesses are treatable with first aid. Minor quality of life lost. Shutdown of critical facilities and services for 24 hours or less. Less than 10 percent of property destroyed or with major damage.

The pandemic virus severity can be evaluated on two levels: the number of individuals infected, and the population – that is, how many complications and deaths might be expected. Measuring severity from either perspective in real time is a major challenge. The most common measure of severity is the case-fatality rate (CFR) as depicted in Figure 4.17.

Figure 4.17 - Case-Fatality Rate for Severity
Source: World Health Organization

The magnitude of a pandemic event is also evaluated from the population level in terms of warnings. Figure 4.18 illustrates the various warning levels for pandemic. The planning area has been impacted by pandemic infection rates and uncontrolled community spread of the COVID-19 virus.

Figure 4.18 - Risk levels for Pandemic
Source: World Health Organization



Previous Occurrences

Statewide, outbreaks of infectious diseases are recorded by the Texas Department of State Health Services, Infectious Disease Control Unit (ICDU). The IDCU tracks reported cases of all non-genetic diseases. Table 4.28 shows the level of infectious disease outbreaks in the State between over 2008 and 2017. This extensive list of diseases shown indicates that there is a likelihood, however remote, that diseases considered as esoteric for the planning area may, in fact, occur locally.

Table 4.28 - Infectious Disease Cases in the State of Texas 2008-2017

Source: Texas Department of State Health and Human Services, Infectious Disease Control Unit

DISEASE	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
AMEBIASIS	147	190	206	189	183	148	112	200	244	336
AMEBIC CNS2	0	3	3	1	1	1	0	2	0	1
ANTHRAX	0	0	0	0	0	0	0	0	0	0
ANCYLOSTOMIASIS (HOOKWORM) 3	10	16	NR	NR	NR	NR	NR	NR	NR	NR
ASCARIASIS3	75	56	NR	NR	NR	NR	NR	NR	NR	NR
BABESIOSIS	0	1	1	1	1	NR	NR	NR	NR	NR
BOTULISM, FOODBORNE	0	1	0	0	4	0	0	0	0	0
BOTULISM, INFANT5	8	7	7	7	7	1	4	8	4	8
BOTULISM, OTHER	0	0	1	0	0	0	0	0	0	1
BOTULISM, WOUND	0	1	1	1	2	1	1	0	0	1
BRUCELLOSIS	26	43	23	15	11	18	11	21	12	9
CALIFORNIA ENCEPHALITIS VIRUS6 7	0	0	0	0	0	3	0	1	0	0
CAMPYLOBACTERIOSIS	5,449	4,667	3,994	2,589	2,640	2,390	1,741	2,001	1,617	1,441
CARBAPENEM-RESISTANT ENTEROBACTERIACEAE (CRE)	1,139	1,240	875	NA	NR	NR	NR	NR	NR	NR
CHAGAS	33	27	25	20	19	NR	NR	NR	NR	NR
CHICKENPOX (VARICELLA)	1,146	1,341	1,491	1,647	1,874	2,410	2,558	2,760	4,445	7,839
CHIKUNGUNYA6	15	20	55	114	NR	NR	NR	NR	NR	NR
CHOLERA	0	0	0	0	0	0	1	2	2	1
CONTAMINATED SHARPS INJURY	NA	NA9	1,137	1,292	1,447	1,263	NA	1,309	1,241	1,652
CRYPTOSPORIDIOSIS	1,157	735	740	416	412	302	504	359	419	3,342
CYCLOSPORIASIS	319	148	316	200	351	44	14	9	10	6
CYSTICERCOSIS	10	16	14	16	7	10	9	6	9	5
DENGUE	43	45	32	34	95	16	7	19	14	22
DIPHTHERIA10	0	0	0	0	0	0	0	0	0	0
EASTERN EQUINE ENCEPHALITIS VIRUS6	0	0	0	0	0	0	0	0	0	0
ECHINOCOCCOSIS 3	0	2	NR	NR	NR	NR	NR	NR	NR	NR
EHRLICHIOSIS/ANAPLASMOSIS	19	17	11	15	8	5	6	7	7	29
ENCEPHALITIS, NONARBOVIRAL	0	NR	NR	NR	NR	31	17	17	4	15

DISEASE	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
ESCHERICHIACOLI, SHIGATOXIN-PRODUCING (STEC)	1,131	1,015	610	612	606	499	486	351	247	332
FASCIOLIASIS3	0	0	NR	NR	NR	NR	NR	NR	NR	NR
HAEMOPHILUS INFLUENZAE, INVASIVE	403	31711	11	12	5	3	2	12	7	11
HANTAVIRUS INFECTION	0	0	0	0	0	0	0	0	0	1
HANTAVIRUS PULMONARY SYNDROME	2	0	2	5	1	0	0	1	0	0
HEMOLYTIC UREMIC SYNDROME	24	14	14	6	20	13	22	19	6	12
HEPATITIS A, ACUTE	129	139	147	123	109	134	138	139	184	259
HEPATITIS B, ACUTE	106	156	159	122	142	170	204	394	420	562
HEPATITIS B, PERINATAL12	2	2	1	3	2	4	4	2	1	8
HEPATITIS C, ACUTE	56	40	48	47	28	44	37	35	36	59
HEPATITIS D, ACUTE	NR	NR	NR	NR	NR	0	0	1	0	1
HEPATITIS E, ACUTE13	20	22	15	17	7	9	14	0	1	0
INFLUENZA, NOVEL A	1	0	0	0	0	0	0	0	1	1
INFLUENZA-ASSOCIATED PEDIATRIC MORTALITY15	12	7	12	23	17	12	11	7	54	9
JAPANESE ENCEPHALITIS VIRUS7	0	0	0	0	0	0	1	1	0	0
LEGIONELLOSIS	327	270	292	256	168	158	111	136	115	81
LEISHMANIASIS	8	13	6	12	11	6	4	0	2	0
LISTERIOSIS	42	34	41	19	28	28	51	53	27	37
LYME DISEASE	66	71	54	40	82	75	74	142	276	153
MALARIA	158	159	99	106	90	102	102	98	87	87
MEASLES	1	1	1	10	27	0	6	0	1	0
MENINGITIS, ASEPTIC	NR	NR	NR	NR	NR	1,169	1,294	1,663	1,858	1,747
MENINGITIS, BACTERIAL/OTHER16	NR	NR	NR	NR	NR	387	422	457	428	509
MENINGOCOCCAL INFECTION17	17	23	30	22	30	37	30	59	53	70
MULTIDRUG-RESISTANT ACINETOBACTER (MDR-A)	1,144	1,006	978	NA8	NR	NR	NR	NR	NR	NR
MUMPS	470	191	20	15	13	15	68	121	40	20
NOVEL CORONAVIRUS18	0	0	0	0	0	0	0	0	0	0
PARAGONIMIASIS3	0	0	NR	NR	NR	NR	NR	NR	NR	NR
PERTUSSIS	1,765	1,286	1,504	2,576	3,985	2,218	961	2,848	3,358	2,046
PLAGUE	0	0	0	0	0	0	0	0	0	0
POLIOMYELITIS19	0	0	0	0	1	0	0	0	0	0
PRION DISEASE20	25	33	20	27	14	22	18	28	20	19
Q FEVER	20	19	13	12	20	12	19	12	13	24
RABIES, HUMAN	0	0	0	0	0	0	0	0	1	0
RELAPSING FEVER	NR	NR	1	0	0	0	0	0	0	0
RICKETTSIA, UNSPECIFIED21	9	13	4	NA9	NA9	NA9	NA9	NA9	NA9	NA9
RUBELLA	1	0	2	0	0	0	0	0	0	0

DISEASE	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
RUBELLA, CONGENITAL SYNDROME22	2	0	0	0	0	0	0	0	0	0
SALMONELLOSIS	5,113	5,901	5,727	5,145	4,946	4,990	5,218	4,929	3,964	5,583
SHIGELLOSIS	1,522	4,386	5,623	2,743	2,386	1,926	2,539	2,626	2,295	4,665
SMALLPOX23	0	0	0	0	0	0	0	0	0	0
SPOTTED FEVER RICKETTSIOSES	106	87	61	94	83	77	52	34	36	62
ST LOUIS ENCEPHALITIS VIRUS6	0	0	0	4	1	3	0	3	4	0
STREPTOCOCCUS PNEUMONIAE	1,798	1,737	1,693	1,562	1,715	1,535	1,603	1,912	1,952	1,886
STREPTOCOCCUS, GROUP A	851	706	729	601	419	333	427	355	326	426
STREPTOCOCCUS, GROUP B	1,929	1,761	1,703	1,356	1,050	1,020	903	825	658	583
TAENIASIS	1	2	6	1	0	1	1	1	2	0
TETANUS	1	2	2	4	2	3	2	0	1	3
TRICHINOSIS	0	4	4	2	0	1	2	0	0	0
TRICHURIASIS3	12	21	NR	NR	NR	NR	NR	NR	NR	NR
TULAREMIA	1	3	1	0	1	0	0	1	0	0
TYPHOID FEVER	27	37	24	20	13	29	26	32	23	31
TYPHUS, MURINE	519	364	324	308	222	263	286	135	191	157
VENEZUELAN EQUINE ENCEPHALITIS VIRUS6	0	0	0	0	0	0	0	0	0	0
VIBRIO PARAHAEMOLYTICUS	30	23	22	17	22	16	29	17	13	12
VIBRIO VULNIFICUS	34	36	35	16	22	15	17	32	19	17
VIBRIO, OTHER/UNSPECIFIED	119	42	45	44	40	35	33	30	36	28
VIRAL HEMORRHAGIC FEVER24	0	0	0	3	0	0	0	0	0	0
VISA25	3	13	9	5	8	23	6	10	4	2
VRSA26	0	0	0	0	0	0	0	0	0	0
WESTERN EQUINE ENCEPHALITIS VIRUS6	0	0	0	0	0	0	0	0	0	0
WEST NILE FEVER	48	118	79	126	70	1,024	7	12	22	24
WEST NILE NEUROINVASIVE DISEASE	87	252	196	253	113	844	20	77	93	40
YELLOW FEVER	0	0	0	0	0	0	0	0	0	0
YERSINIOSIS	46	58	44	26	35	22	18	19	17	14
ZIKA VIRUS DISEASE	55	315	8	NR	NR	NR	NR	NR	NR	NR

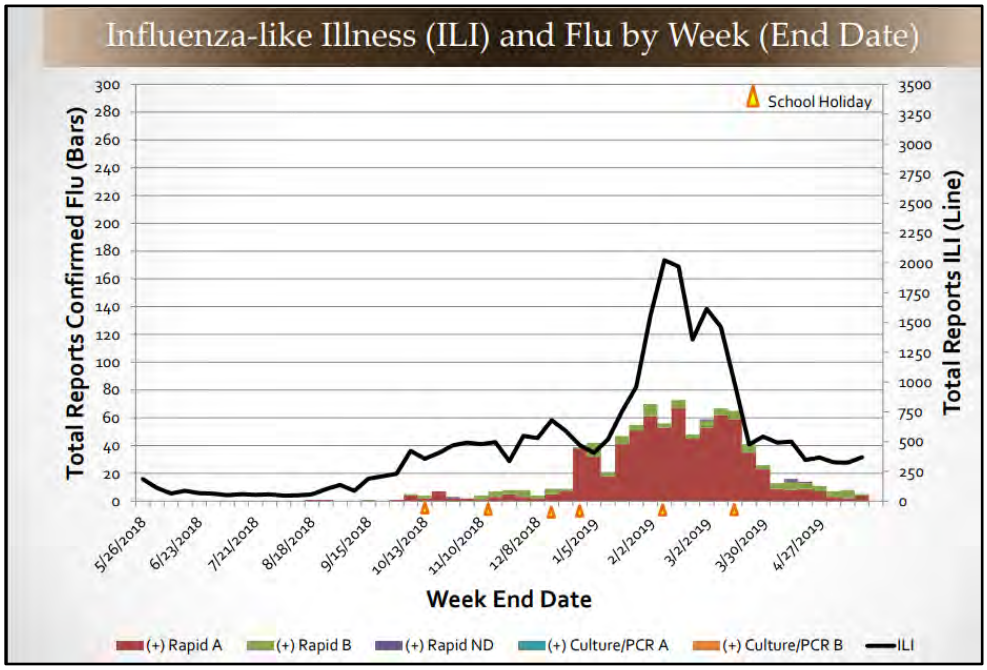
In March of 2009, a novel strain of Influenza A (H1N1 or "Swine Flu") virus was detected in Mexico and the United States. The virus has since spread. As of September 27, 2009, more than 340,000 cases of Swine Flu have been confirmed worldwide and approximately 4,100 deaths have been reported.[7] The most commonly reported influenza symptoms include cough, fever, sore throat, and gastrointestinal symptoms such as vomiting and diarrhea. Most cases with H1N1 did not require hospitalization and had symptoms that lasted four days.

[7] World Health Organization

Significant Past Events

Figure 4.19 illustrates influenza and influenza-type symptoms experienced in 2018-2019 as reported by the Williamson County Cities and Health District (WCCHD). Its flu surveillance system does not attempt to capture all cases of influenza or influenza-like illness (ILI). The number of reporters sending in ILI and flu reports may vary from week to week. These data should be used to look for trends over time rather than for estimating the total number of cases.

Figure 4.19 - Williamson County Influenza Surveillance 2018–2019
Source: WCCHD

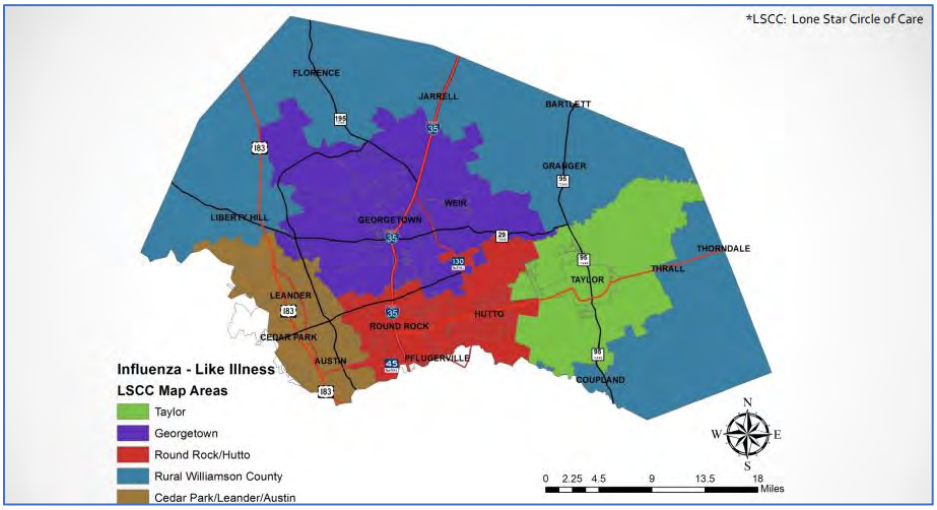


Rapid ND: Flu types are “not differentiated”

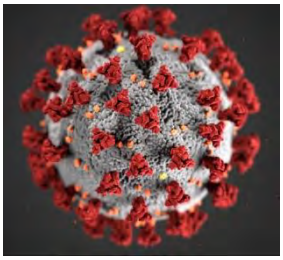
Figure 4.20 shows the geographic breakdown by Williamson County residents treated by Lone Star Circle of Care health providers. Patient residence is self-reported by zip code, and zip codes are grouped into four areas: Georgetown; Leander/Cedar Park/Austin; Round Rock/Hutto and Taylor; and one area for remaining rural Williamson County.

Figure 4.20 - Residence Area of Lone Star Circle of Care Patients

Source: WCCHD



In addition to the pandemic types described above, a new pandemic occurred worldwide based on an identified virus named Coronavirus Disease-2019 (COVID-19). In addition to the pandemic types described above, like all communities in the nation, the City of Georgetown was directly affected by COVID-19.



According to the WHO, the most common symptoms of COVID-19 include fever, dry cough, and fatigue. Less common symptoms include aches and pains, sore throat, diarrhea, conjunctivitis, headache, loss of taste or smell, and a rash on skin, or discoloration of fingers or toes. Among the more serious symptoms are difficulty breathing or shortness of breath, chest pain or pressure, and loss of speech or movement.

The 2020 year-end report of active and recovered cases for COVID-19 in Williamson County and Georgetown shows the impact of the virus both countywide and locally.

Table 4.29 - Total Cases Reported in Williamson County and the City of Georgetown in 2020
Source: Williamson County and Cities Health Department (WCCHD)

Jurisdiction	Total Cases	Persons Recovered	Deaths	Active Cases
Williamson County	20,411	18,905	203	1,303
City of Georgetown	4,162	3,827	40	335

As of March 2021, the Williamson County and Cities Health Department recorded a total of more than 35,000 cases in Williamson County and more than 7,000 in the City of Georgetown alone, along with more

than 400 COVID-19-related deaths in Williamson County and more than 100 of those fatalities in Georgetown. To date, more than 100 City of Georgetown employees reported contracting the virus.

The City declared a local disaster in March 2020, and which expired in February 2021, when preemption efforts by the State negated the need for local orders. Throughout that time, the City of Georgetown organized its first virtual Emergency Operations Center, as well as began hosting public and internal meetings virtually. Additionally, limits were placed on building occupancies, employees were provided with accommodations to work from home, and new social distancing, masking, hygiene, and health screening policies were adopted for the City to mitigate the spread of the virus.

The City also issued several local orders to mitigate the spread, including orders around masking and outdoor gatherings. Staff quarantine sites were set-up and utilized early in the pandemic response and large inventories of personal protective equipment were acquired, including procedural masks, gloves, and hand sanitizer.

The City partnered with both Williamson County and the Williamson County and Cities Health District to provide no-cost testing in the Georgetown Library parking lot, as well as several pop-up testing events at the Georgetown Community Center. Additionally, Georgetown High School is hosting a vaccination site at the football stadium parking lot.

Figure 4.21 - Public Communications Manager Keith Hutchinson utilizing the COVID-19 testing site at the Georgetown Public Library. Source: City of Georgetown

Probability of Future Occurrences

The probability of a substantial infectious disease outbreak in the City of Georgetown was previously understood by most to be rare, but the widespread impact of COVID shows that all communities must be vigilant in monitoring disease occurrence. Overall, such widespread events are typically unlikely, however there is the possibility of continued and/or reoccurrence of one or more infectious diseases every year.

Vulnerability and Impact

Even though a pandemic event affects mainly the health of people, critical infrastructure services, such as emergency services, utility services, water services and telecommunications can be limited by an event. With viruses, most of the people affected have mild illness and not require hospitalization. There are certain populations of people that are at higher risk for developing complications from diseases. For example, H1N1 vulnerable populations includes children younger than 5, adults 65 year of age and older, and pregnant women. People who have medical conditions such as asthma, heart disease, chronic lung disease, blood, endocrine, kidney, liver, or metabolic disorders, or a weakened immune system can experience a worsening of existing conditions if they contract the H1N1 virus. There is also ongoing research being conducted as to the longer-term physical, mental and sociological impacts of the COVID-19 Disease.

The City's recent need to develop a response to the COVID-19 has enabled the City and WCCHD to cooperatively strengthen core public health infrastructure by increasing situational awareness from surveillance and monitoring. This hazard demonstrates the need to ensure that response plans are coordinated among multiple agencies and disciplines and focused on maintenance of public health and medical system sustainment, and on developing contingency plans to address surge capacity.

Lightning

Hazard Description

Lightning occurs as a natural electrical discharge or "pulse" of very short duration and high voltage, between a cloud and the ground or within a cloud, accompanied by a bright flash and thunder. The lightning pulses are classified as Cloud-to-Ground (CG) or In-cloud (IC).

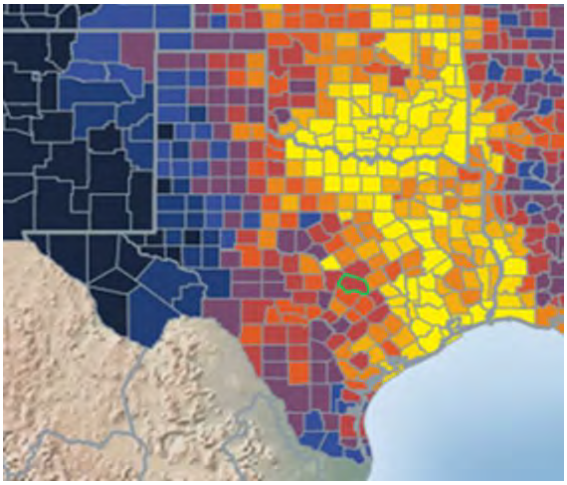
Location

Lightning may occur near or where a severe storm occurs, which may happen with equal possibility across the entire planning area.

Extent

Figure 4.22 – Measure of Lightning Pulse Density

Source: Earth Networks, The 2020 Lightning Project



The extent of a lightning strike can be measured in "Pulse Density" or the combination of CG and IC pulses. Williamson County is highlighted in green in Figure 4.21, a state map. The accompanying legend below the map identifies the meaning of density pulse levels. The City of Georgetown planning area experienced 200 lightning pulses per square mile in 2020[8]. This number could be greatly increased during a heavy thunderstorm and ramp up to many thousands of pulses during a significant event. Most lightning, approximately 93%, is "in-cloud," and stays within the cloud itself. The other 7% "cloud-to-ground" has an "opposite charge" of electricity, which is of concern to persons, structures, and assets at risk. When the attraction between positive and negative charges becomes strong enough to overcome the air's resistance, lightning flashes.

To express lightning activity in the simplest terms, The NWS has also developed a scale called the Lightning Activity Level (LAL), shown in Figure 4.23 as using a rating from one to six to describe the degrees and types of lightning activity. **The City of Georgetown has experienced lighting at every LAL level, from heat lightning that is not accompanied by a storm, to LAL 5 during severe thunderstorms. LAL 6 is associated with conditions that may precipitate wildfires, which are a hazard of concern and represent the highest LAL the area may experience.**

[8] https://get.earthnetworks.com/hubfs/Lightning_Report_2020_final.pdf

Figure 4.23 – Lightning Activity Level (LAL) Scale

Source: The National Weather Service

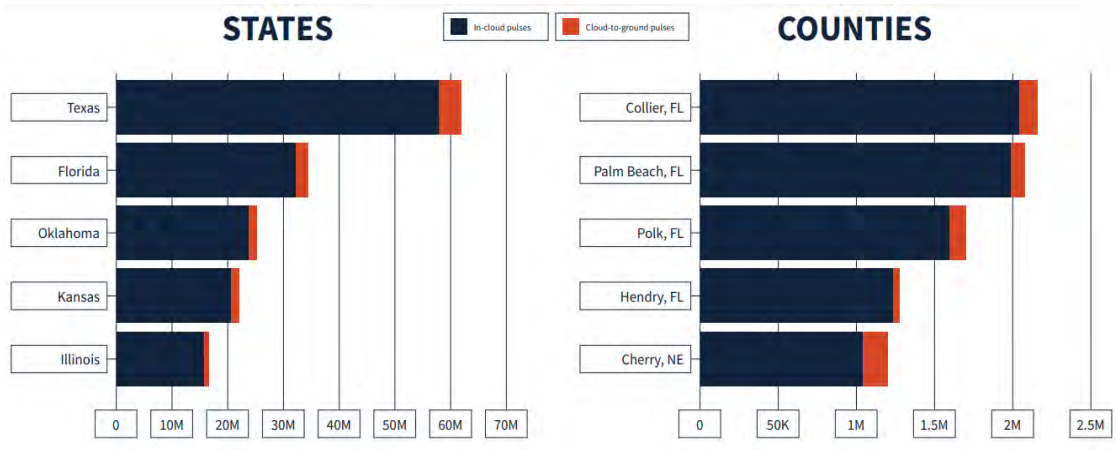
Lightning Activity Level (LAL)	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period.
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5 minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced Lightning is frequent, 11 to 15 cloud to ground strikes in a 5 minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a 5 minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning

Historical Occurrences

The NWS reports According to the National Weather Service, most lightning flashes occur between May 28 and June 3 in Williamson County, Texas[9]. Primarily mostly due to its size, Texas had the most lightning pulses by far in the year 2020, with over 60 million[10]. This is illustrated in Figure 4.23.

Figure 4.24 – States with High Measures of Lightning Pulse Density

Source: The National Weather Service



[9] https://www.wrh.noaa.gov/mfr/lightning/heatmap/totals/display.php?cwa=EWX&id=Williamson&state=TX
[10] https://get.earthnetworks.com/hubfs/Lightning_Report_2020_final.pdf

The National Center for Environmental Information (NCEI) recorded one harmful lightning event between 1950 and 2020, for the city. On June 19, 1998, a Georgetown resident was struck by lightning as he was cleaning his pool.

Probability of Future Occurrences

While lightning may occur during any severe storm, history shows that it is infrequently recorded as a significant harmful incident. However, the National Weather Service has reported 162 cloud to ground lightning flashes on average, between the hours of 3 p.m. and 4 p.m., in Williamson County, to include time with or without a storm. Frequent lightning periods are likely to occur with every storm and at least five times in the next year.

Vulnerability and Impact

All assets and persons are vulnerable to lightning, especially tall objects such as buildings or the many trees in Georgetown's beautiful parks. Ground lightning has the potential to ignite a fire. If a structure is struck by lightning, a fire or explosion may occur, should an ignited fire reach a gas line or electrical box. People who seek shelter or safe refuge from the storm will be minimally impacted. Lightning has damaged electrical transformers, created electrical outages, damaged audio/video equipment in the Emergency Operations Center, and caused house fires within the city.

Severe Thunderstorm

Hazard Description

A Severe Thunderstorm is a storm that produces a tornado, and/or winds of at least 58 mph (50 knots), and/or hail at least ¾" in diameter. A Severe Thunderstorm is a transient, sometimes violent storm that produces thunder and lightning, and is frequently accompanied by rain and/or hail. Devastating storm losses may occur as a result of storm components: hail, high winds, lightning, tornadoes, and heavy rain that may result in flooding.

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. High wind events are discussed separately in this plan, but they are also described as a component of severe thunderstorms.

Location

Severe Thunderstorms are not a location-specific hazard. All areas of Williamson County, including the City of Georgetown, are vulnerable to Severe Thunderstorms. NCEI data documents event locations as countywide and in specific jurisdictions within the county, including the City of Georgetown. The conditions for Severe Thunderstorms are common in the south of the United States, because of the atmospheric conditions. They occur in all parts of the planning area.

Extent

The extent of a given event depends on its magnitude, including wind force. Thunderstorm winds are the category used in NCEI records to record severe storm events, so all events listed under Historical Occurrence fall into this category. Those occurring in the City of Georgetown are discussed below, and the magnitude for each event is listed. Documented wind speeds associated with the most severe storm reached a magnitude of 63 miles per hour, with other Severe Thunderstorms producing “tennis-ball” size hail.

Historical Occurrence:

NCEI recorded 17 events as having occurred in the City of Georgetown between 1950 and 2020.

Table 4.30 - Severe Storm Events Recorded for the City of Georgetown 1950-2020

Source: NCEI

DATE	TIME	MAGNITUDE (mph)	DEATHS DIRECT	INJURIES DIRECT	PROPERTY DAMAGE	CROP DAMAGE
9/19/1996	2315		0	0	3,000	0
11/7/1996	100		0	0	30,000	0
4/4/1997	45		0	0	0	0
2/25/1998	2145		0	0	100,000	20,000
2/25/1998	2145	53	0	0	0	0
2/25/1998	2136	63	0	0	0	0
3/18/1999	1850		0	0	80,000	0
6/26/2002	1806	55	0	0	150,000	0
7/7/2005	1810	60	0	0	0	0
4/20/2006	1830	60	0	0	0	0
7/22/2006	1500	60	0	0	30,000	0
8/13/2012	1615	35	0	0	500	0
10/2/2014	2013	52	0	0	0	0
7/9/2016	2345	52	0	0	0	0
4/2/2017	915	52	0	0	0	0
4/24/2019	1420	52	0	0	0	0
4/24/2019	1420	52	0	0	0	0
Totals			**0**	**0**	**$ 393,500**	**$ 20,000**

Probability of Future Events:

There is a high degree of probability that one or more severe storm events will occur each year. The events listed above were recorded as "originating" in the City of Georgetown, but a total of 61 additional events were recorded as having occurred countywide, during the same time period, and the planning area was likely affected by the majority of these events. It is likely that at least five events will occur annually.

Vulnerability and Impact:

The components of Severe Thunderstorms (high winds, lightning, tornadoes, heavy rain, and hail) may cause debris to strike people, animals, buildings, and property, which in may produce injuries, fatalities, and property damage. Property damage associated with Severe Thunderstorms may include structural fires, broken glass, dented automobiles or siding, and personal injuries or even death. Wind damages typically include broken branches, uprooted trees, torn roofs, and walls, or destroyed small structures. All critical facilities are vulnerable and should maintain a backup source of electricity in the event of a power outage. Manufactured homes are particularly susceptible wind events. The City of Georgetown is fortunate that the level of property and crop damage shown in Table 4.30 is relatively low for a 70-year period.

Space Weather (Geomagnetic Disturbance)

Space weather, or a Geomagnetic Disturbance, is the variable conditions from space and the sun that can produce electromagnetic fields that can influence technology performance.[11]

Extent

During periods of high solar activity, the Sun can launch several Coronal mass ejections (CME) towards Earth that can produce a more complex pattern of interplanetary magnetic field (IMF) changes, driving a longer series of substorms and a longer, more intense geomagnetic storm. A Geomagnetic storm contains a series of a substorms, so many of the effects will come in a series of pulses and not as a continuous period of high activity. Extent is the same for both event participants.

Location

Because Space Weather events are atmospherically based, they begin in the sky and affect areas of the earth or other parts of the solar system depending on the size of the event. The entire planning area is subject to the effects of space weather.

Historical Occurrences

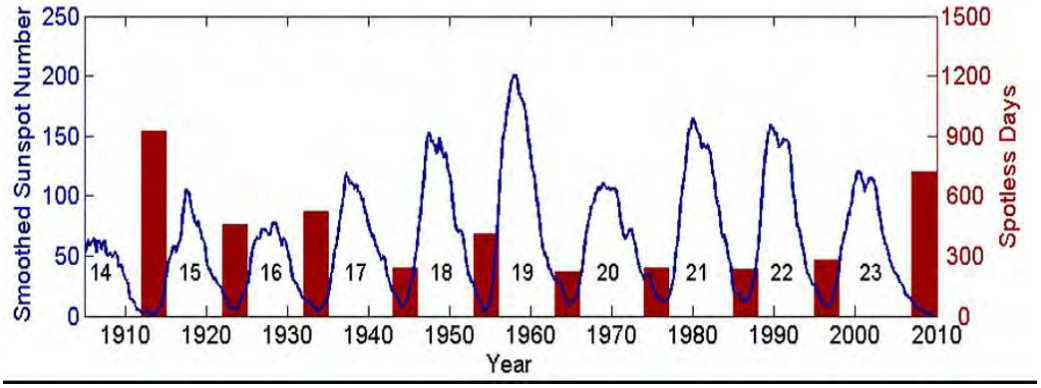
Geomagnetic Disturbances caused by space weather exhibit a climatology which varies over timescales ranging from days to the 11-year solar cycle and longer periods such as grand solar maxima and minima.[12] Minor solar storms are relatively common events. In contrast, extremely large

[11] https://www.ready.gov/space-weather

[12] Lockwood, M., M. J. Owens, L. Barnard, C. J. Davis, and S. Thomas (2012), Solar Cycle 24: what is the Sun up to?, Astronomy & Geophysics, 53, 3.9-3.15

events, like superstorms, occur very occasionally – perhaps once every century or two. Figure 4.25 shows frequency of reoccurrence between the years 1900 and 2010.

Figure 4.25 - Occurrences of Space Weather (Geomagnetic Disturbance) 1900-2010



Probability of Future Events

The area is likely to experience a high solar activity event once in the next five years, which is dependent upon a combination of time and intensity of substorms over period of time.

Vulnerability and Impact

Geomagnetic Disturbances produce electromagnetic fields that induce extreme currents in wires, disrupting power lines, and even causing wide-spread blackouts. Severe space weather also produces solar energetic particles, which can damage satellites used for commercial communications, global positioning, intelligence gathering, and weather forecasting. Rapid time variations in these external electrical current systems induce surface electric fields in the Earth that can drive geomagnetically induced currents (GIC) through grounded conducting networks -- electricity, pipeline, and railway grids.[13]

[13] https://www.raeng.org.uk/publications/reports/space-weather-full-report.

Tornado

Hazard Description

Tornadoes are among the most violent storms on the planet. A tornado is a violently 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, with wind speeds of 250 miles per hour or more. In extreme cases, winds may approach 300 miles per hour. Damage paths can be in excess of one mile wide and 50 miles long.

Photo 9 Tornado Sighting Georgetown, Tx. May 28, 2020

The most powerful tornadoes are produced by super-cell thunderstorms. Super-cell 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.

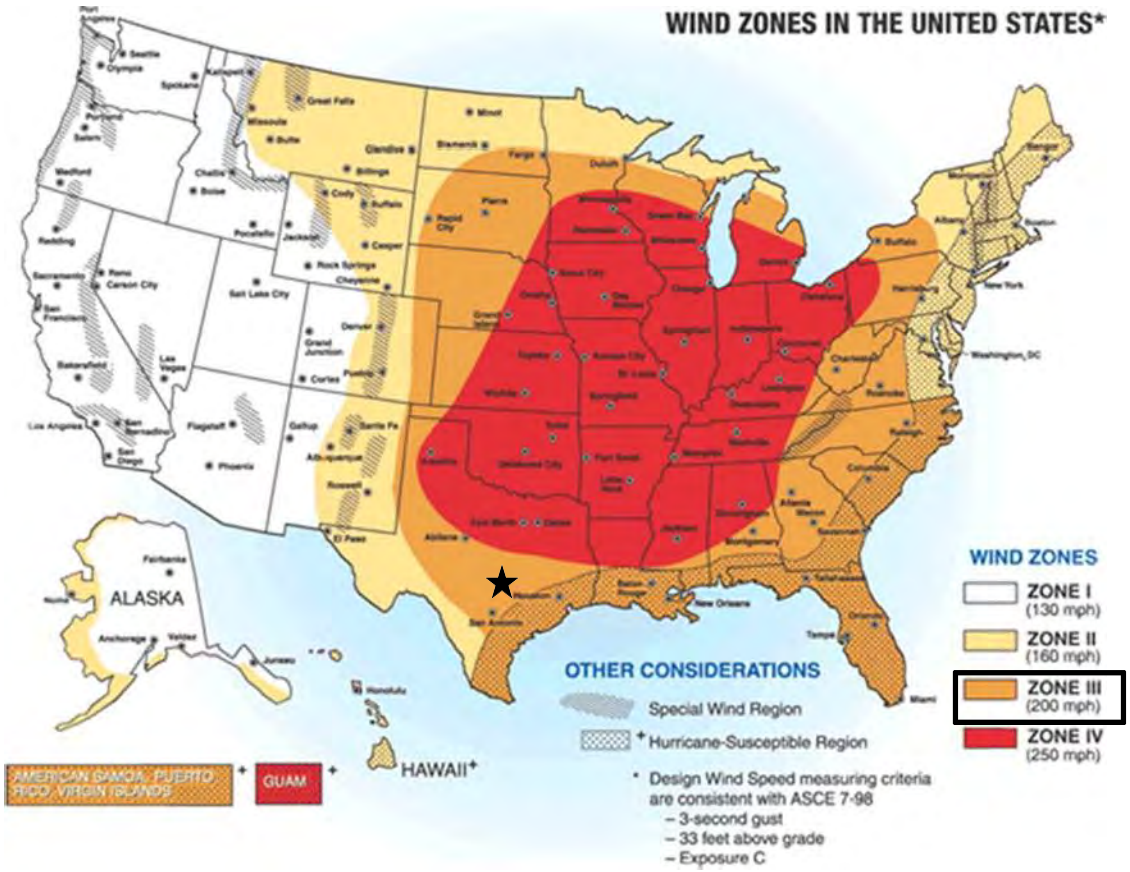
Table 4.31 - Variations Among Tornadoes

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

Location

As is the case with thunderstorms, tornadoes do not have any specific geographic boundary and can occur throughout the City uniformly. It is assumed that the entire City of Georgetown is uniformly at risk to tornado activity. The City of Georgetown located in Wind Zone III, meaning tornado winds can be as high as 200 mph.

Figure 4.26 - FEMA Wind Zones in the United States
(The City of Georgetown is indicated by the star.)



Extent

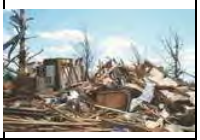
The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, such as residential homes, particularly mobile homes. Additionally, it should be noted that tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita Scale Table 4.32), because since February 2007, the Fujita Scale has been replaced by the *Enhanced* Fujita Scale (Table 4.33), which retains the same basic design as its predecessor with six strength categories. The newer scale reflects more refined assessments of tornado damage surveys, standardization, and damage to a wider range of structures. Both scales are included here to show the difference in how events were described according either scale.

Table 4.32 – Categories of the Fujita Scale (F-Scale)
Source: NOAA

FUJITA SCALE DEVELOPED IN 1971 AND USED UNTIL 2007		
STORM CATEGORY	WIND SPEED (MPH)	POTENTIAL DAMAGE
F0	< 73	**Light damage.** Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	**Moderate damage.** Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	**Considerable damage.** Roofs torn from frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	**Severe damage.** Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy lifted and thrown.
F4	207-260	**Devastating damage.** Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown, and large missiles generated.
F5	261-318	**Incredible damage.** Strong framed 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.

Table 4-33. Enhanced Fujita Scale for Tornadoes (EF Scale)
Source: NOAA

STORM CATEGORY	DAMAGE LEVEL	3 SECOND GUST (MPH)	DESCRIPTION OF DAMAGES	PHOTO EXAMPLE
EF0	**Gale**	65 – 85	Some damage to chimneys, tree branches break, topples shallow-rooted trees, signs damaged	
EF1	**Weak**	86 – 110	The lower limit is the beginning of hurricane wind speed, peels surface off roofs, mobile homes pushed off foundations/overturned, moving autos pushed off roads, attached garages may be destroyed.	

STORM CATEGORY	DAMAGE LEVEL	3 SECOND GUST (MPH)	DESCRIPTION OF DAMAGES	PHOTO EXAMPLE
EF2	**Strong**	111 – 135	Considerable damage, roofs torn off frame houses, mobile homes demolished, boxcars pushed over, large trees snapped or are uprooted, light object missiles generated.	
EF3	**Severe**	136 – 165	Roof and some walls torn off well-constructed houses, trains overturned, most trees uprooted.	
EF4	**Devastating**	166 – 200	Well-constructed homes leveled, structures with weak foundations blown off some distance, cars thrown, and large missiles generated.	
EF5	**Incredible**	200+	Strong frame houses lifted off foundations and carried considerable distances to disintegrate, automobile sized missiles flying through the air in excess of 330 yards, trees debarked, steel reinforced concrete badly damaged.	

Both the Fujita Scale and Enhanced Fujita Scale should be referenced in reviewing previous occurrences as tornado events prior to 2007 will follow the original Fujita Scale. This is so that a comparative history can be evaluated of similar strength tornadoes, from two different scales. The largest magnitude reported within the City of Georgetown planning area is F2 Fujita Scale -- a significant event. NCEI data shows that the planning region could experience an event in the range of EF0 t0 EF3 depending on the wind speed. Although the City has experienced tornadoes as severe as an F2 on the Fujita Scale, most only occur at a level between EF0 and EF1 (Table 4.33). Therefore, the range of intensity that the City of Georgetown planning area would be expected to mitigate for a tornado event would be a low to moderate risk, or an EF0 to an EF3. The planning most serious event the area is expected to experience is an EF3 Tornado.

Historical Occurrences

It is important to note that only reported tornadoes were factored into the risk assessment and that many other of occurrences have gone unreported over the past 70 years. Table 4-27 shows previous occurrences in the planning area reported to the National Weather service between 1950 and 2020. Four events were documented as having occurred in the City of Georgetown, all of low magnitude.

Table 4.34 - Historical Tornado Events, 1950-2020
Source: National Center for Environmental Information (NCEI)

DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
5/13/19	12:05 p.m.	EF0	0	0	$5,000	$5,000
3/16/20	4:20 p.m.	EF0	0	0	$0	$0
5/27/20	1:45 p.m.	EF1	0	0	$50,000	$0
7/15/20	3:15 p.m.	EF0	0	0	$100,000	$5,000
Total			0	0	$ 155,000	$10,000

Significant Past Events

July 15, 2017 – City of Georgetown

An NWS survey, along with eyewitness account, concluded that a weak EF0 tornado developed and produced minor damage to 6-8 homes off Teravista Club Drive as well as Caldwell Palm Circle. A few small sections of roof were peeled off a couple of residences as well as a trampoline tossed from a backyard onto the street. It appears that the tornado may have formed along a gust front boundary. Roof damage was limited to a few houses. An upper-level trough moved into Texas from the Gulf of Mexico and generated thunderstorms. Some of these storms produced damaging wind gusts and an isolated tornado.

May 25, 2015 – City of Georgetown

Williamson County Emergency Management assisted in performing a damage survey on a private residence and ranch. Several large oak trees were uprooted and damaged. Minor roof damage was observed on the main ranch house including the chimney which was destroyed. A small garage was severely damaged as the roof was lifted off and thrown approximately 100 yards. A resident on the ranch witnessed the tornado and sheltered in the small garage until the roof was lifted off. An upper-level shortwave trough moved around the longwave low over the Four Corners region. This upper disturbance interacted with a surface boundary moving northward as a warm front from South Texas into a very moist airmass. This combination led to thunderstorms that produced heavy rain and isolated severe weather. A historic flash flood occurred on the Blanco River late Saturday night into Sunday. Hundreds of homes were destroyed along the river from the City of Blanco down into Wimberley and San Marcos. The flood wave continued downstream for days affecting residents and homes along the San Marcos and Guadalupe Rivers. Early estimates show damages in excess of 100 million dollars. Several people lost their lives due to flash flooding. A large tornado outbreak occurred this Saturday night producing numerous small brief tornadoes.

March 16, 2000 – City of Georgetown

A small and short-lived tornado was observed by an Amateur Radio spotter.

May 13, 1994 – City of Georgetown

A tornado was reported along Interstate 35 in Georgetown by a Ham radio operator.

Probability of Future Events

Tornadic events may 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 typically smaller, high frequency period can emerge in the fall during the brief transition between the warm and cold seasons. According to historical records, the City of Georgetown experiences a tornado touchdown every five to seven years. Although, there are frequent storms that can create a Tornado, it is only considered a tornado if it touches the ground. The probability of future tornadoes occurring in the City of Georgetown planning area is likely and may occur twice in the next five years.

Vulnerability and Impact

Table 4.34 shows that the highest level of property damage recorded for a single recent tornadic event was $100,000 for property damage and $5,000 for crop damage, so both structural and agricultural assets alike are at risk to the hazard. Tornadoes are not geographic-specific hazards and may affect any part of the City. Tornadoes may begin in one location and travel a distance to another location and cause damage at any point along the way.

As such, all residential, commercial, governmental, agricultural, and environmental assets are vulnerable to tornado damage. While environmental assets are no more or less important than other assets, the City of Georgetown is renowned for its beautiful trees, parks, other nature areas, and outdoor events taking place in many parts of the community. The City of Georgetown will continue is regular maintenance of all assets and ongoing program of community awareness about what to do in the event of a tornado

Wildfire

Hazard Description

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 can start as a slow burning along the forest floor, killing and damaging trees. They often spread more rapidly as they reach the tops of trees, with wind carrying the flames from tree to tree. Usually, dense smoke is the first indication of a fire.

Photo 10 Georgetown Firefighters extinguish Ten Acre Brush/Wildfire October 4, 2015

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

Location and Historical Occurrences

Wildfires can be a potentially damaging outgrowth of drought. While they are not confined to any specific geographic location, and can vary greatly in terms of size, location, intensity ,and duration, and they are most likely to occur in open grasslands. The threat to people and property is greater in the fringe areas where developed areas meet open grass lands in areas known as the Wildland Urban Interface (WUI). This interface is where an estimated that 71% of the total population in the City of Georgetown live, so they are most at risk to the wildfire hazard. WUI areas are shown in Figure 4-27 (next page). The NWS National Center for Environmental Information recorded two wildfire events as occurring n Williamson County between 1950 and 2020 as shown in Table 4.35.

Table 4.35 - Historical Williamson County Wildfire Events, 1950-2020
Source: National Center for Environmental Information (NCEI)

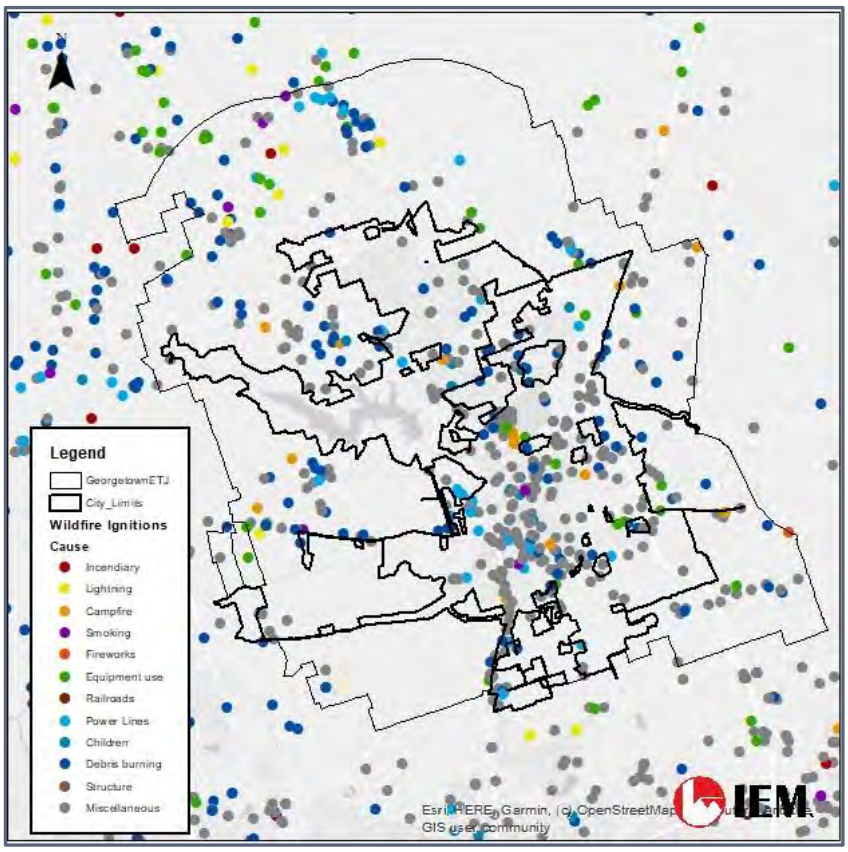
DATE	TIME	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
8/15/2011	3:00 p.m.	0	0	$ 500,000	$0
9/5/2011	12:00 p.m.	0	0	$ 1,700,000	$0
Total		0	0	$ 2,200,000	$0

The Texas Wildfire Assessment Portal Shows the number and different types of fire that have been recorded in the City, Williamson County and Surrounding jurisdictions. The legend to the right of the map corresponds to the color of dots indicating the types of fire on record

Figure 4.27 - Georgetown, TX Location and History of Fire Events - Shown by Fire Cause/Type

Source: Texas Wildfire Risk Assessment Portal

Data as of 3/31/2021



Georgetown has been fortunate in that no significant wildfires have occurred within the City borders. Although events have occurred in other parts of the county and in neighboring counties. These are worth noting these because the City of Georgetown Fire Department maintains mutual aid agreements to help fight fires that occur outside the planning area as needed. As is shown by the legend illustrating the size of each wildfire, most events in this area of been relatively small and were easily contained.

Significant Past Events

September 5, 2011 – Williamson County

The Moonglow Wildfire started in Leander on September 5 behind a cold front that brought strong northerly winds to South Central Texas. The fire burned 300 acres and destroyed 11 homes and damaged 9 others.

August 15, 2011 – Williamson County

Hot and dry conditions throughout South Central Texas were perfect fuel for a quick moving grass fire in Leander that burned 30 acres. A grassfire developed on Horseshoe Drive in Leander and quickly spread through a mobile home park. The fire destroyed 15 mobile homes and damaged 5 others; 19 vehicles were also destroyed and a total of 30 acres burned.

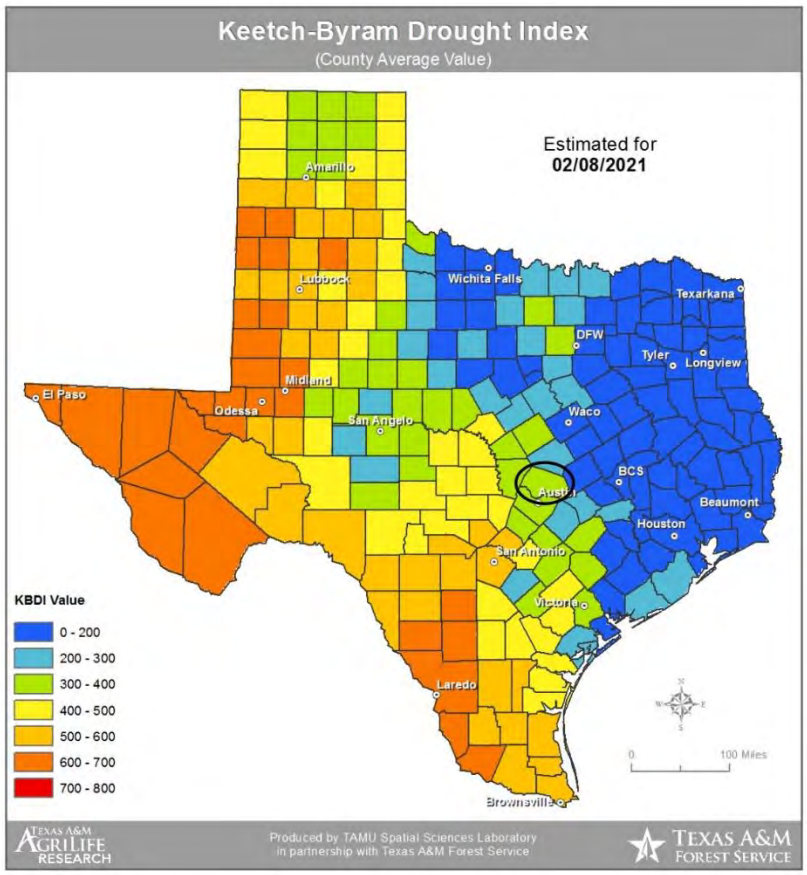
Extent

Fire risk is measured in terms of magnitude and intensity using the Keetch Byram Drought Index (KBDI – Figure 4.27, next page), 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, where a drought factor is balanced 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 on the map represents the drought index at that location. The drought index ranges from 0 to 800, where a drought index of 0 represents no moisture depletion, and an index of 800 represents absolutely dry conditions. The planning area may experience a wildfire of KBDI 700 in the next five years.

Figure 4.28 - KBDI for the State of Texas, 02/02/2021

(Black Circle shows location Georgetown, TX, in Williamson County, north of Austin, TX)



Fire behavior can be categorized at four distinct levels:

- **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 still not readily ignite and burn. Expect smoldering and the resulting smoke to carry into and possibly through the night.
- **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.
- **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.

Using the KBDI index is a good measure of the readiness of fuels for wildland fire. Caution should be exercised in dryer, hotter conditions, and the KBDI should be referenced as the area experiences changes in precipitation and soil moisture.

The range for intensity for the City of Georgetown is within 500 to 600. The average extent to be mitigated for the City of Georgetown planning area is a KBDI index of 582. At this level fires intensity begins to significantly increase and fires readily burn exposing mineral soils in some locations. Figure 4.30 identifies the wildfire intensity for the City of Georgetown.

Figure 4.29 - Wildland Urban Interface Map – City of Georgetown
Source: Texas Wildfire Risk Assessment Portal
Data as of 3/31/2021

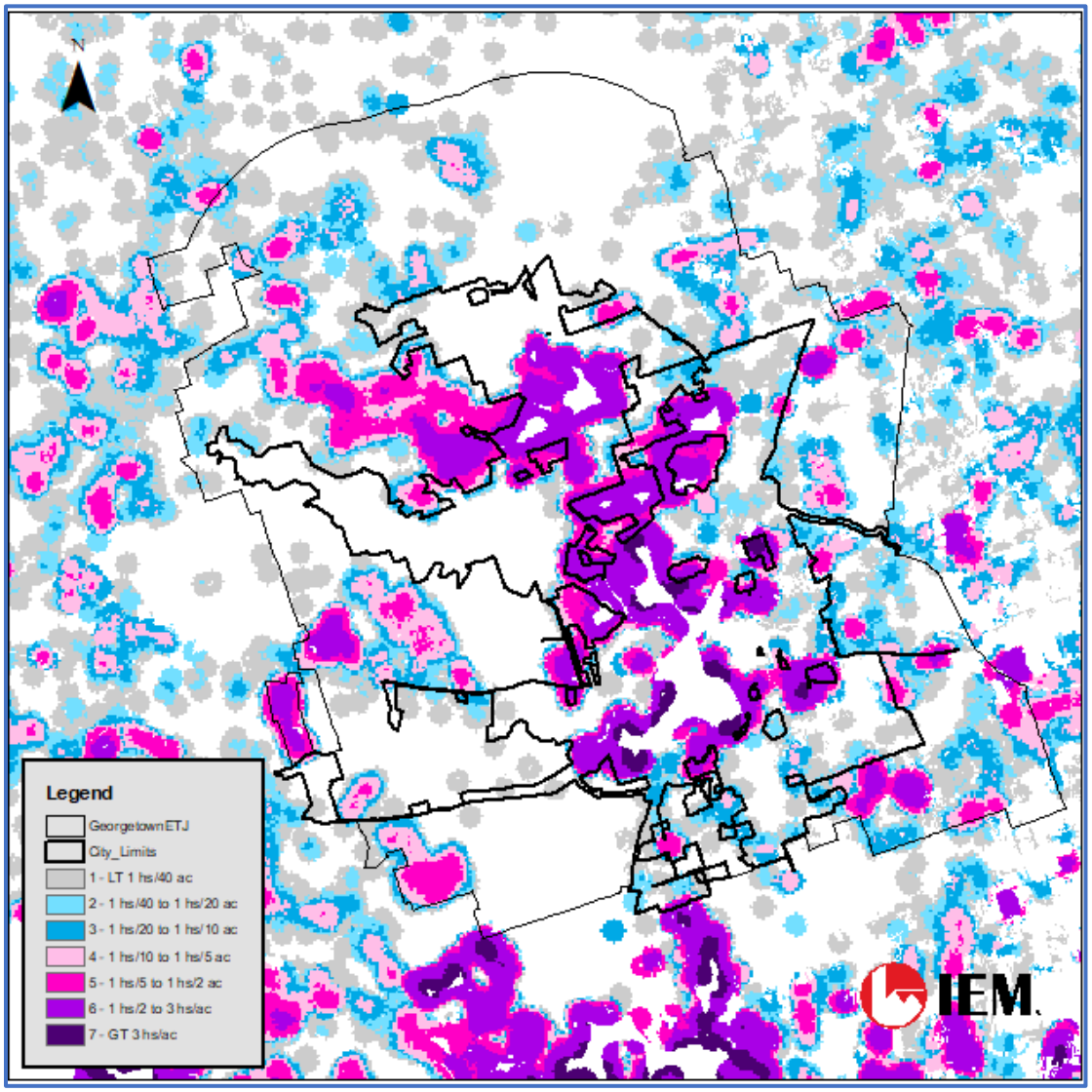
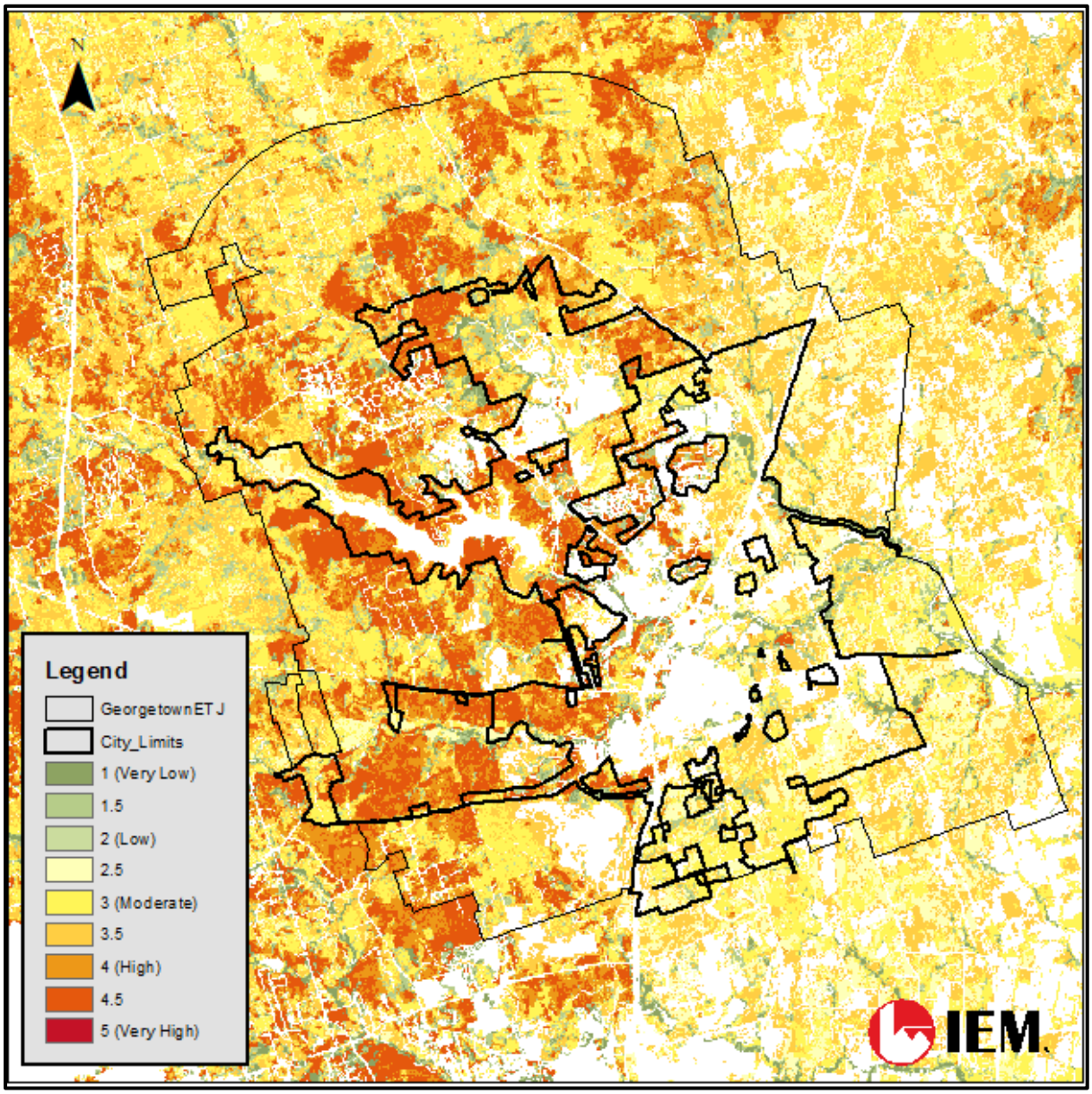


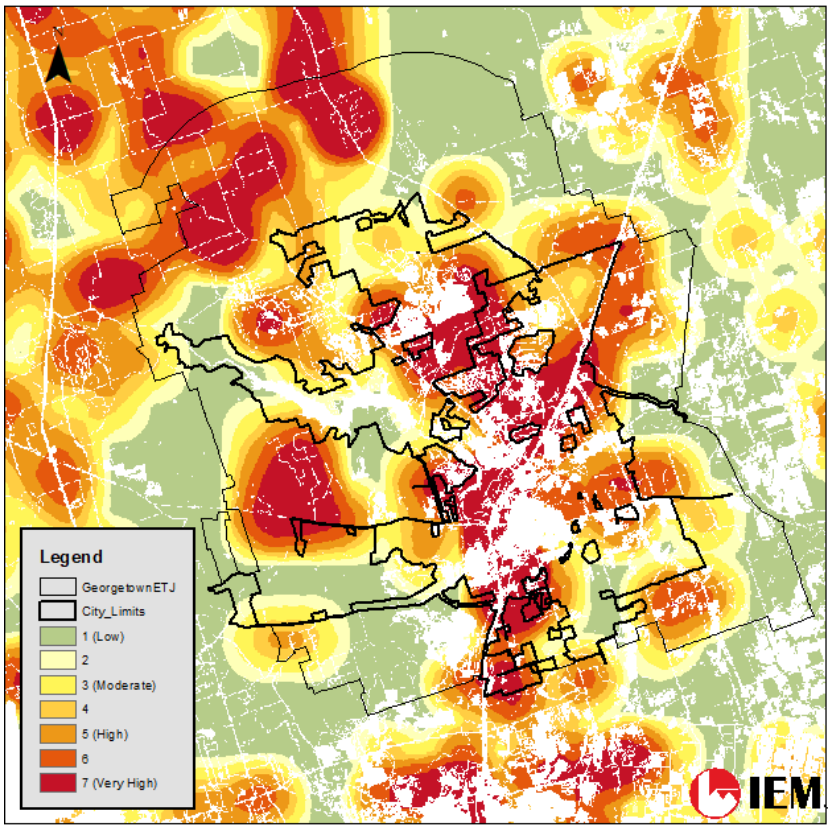
Figure 4.30 - Fire Intensity Scale Map – City of Georgetown
Source: Texas Wildfire Risk Assessment Portal
Data as of 3/31/2021



Probability of Future Events

Wildfires can occur at any time of the year. As the city expands into land currently designated as wildland, the potential area of occurrence of wildfire increases. With 198 events in a 7-year period, an event within the City of Georgetown is highly likely, meaning an event is probable within the next year. Figure 4-31 shows the likely level of Wildfire ignition intensity for City geographic segments.

Figure 4.31 - Likelihood of Wildfire Starting – City of Georgetown
Source: Texas Wildfire Risk Assessment Portal
Data as of 3/31/2021



Vulnerability and Impact

Periods of drought, dry conditions, high temperatures, and low humidity set the stage for wildfires. Areas along railroads and people whose homes are in woodland settings have an increased risk of being affected by wildfire. The heavily populated, urban areas of the City of Georgetown are not likely to experience large, sweeping fires. Areas outside of the city in the unincorporated areas of the county are vulnerable. 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 mostly along the perimeter of the study area where wildland and urban areas interface.

Diminished air quality may be a result of wildfire. The smoke plumes from wildfires can contain potentially carcinogenic matter. Fine particles of invisible soot and ash that too small for the respiratory system to

filter can cause immediate and possibly long-term effects. The elderly or those individuals with compromised respiratory systems may be more vulnerable to these effects. 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 these types of fires. The intensity of fires and the rate at which they spread are directly related to wind speed, temperature, and relative humidity.

The severity of impact of major wildfire events can be substantial. Such events can cause multiple deaths, completely shut down facilities for thirty days or more, and cause more than fifty percent of affected properties to be destroyed or suffer major damage. Severity of impact is gauged by acreage burned, homes and structures lost, and injuries and fatalities. For the City of Georgetown, the impact can be considered to be "Minor", or injuries are possible but do not result in permanent disability, complete shutdown of critical facilities for more than one week, and more than 10 percent of property destroyed or with major damage.

Countering the Risk

Williamson County and Sun City Firewise Community Initiatives

The City of Georgetown has partnered work with two jurisdictions to advance community wildfire mitigation: Williamson County and the Sun City Community.

Williamson County Wildfire Protection Plan (WCWPP)

The Williamson County Interjurisdictional Community Wildfire Protection Plan aims to provide a comprehensive overview view of the wildfire risk within Williamson County. The document includes several annexes, one being Annex 6: Georgetown Fire Department (GFD. Annex 6 outlines the location of GFD resources, education and outreach efforts, and the location of critical facilities. The plan also discusses current/historical mitigation actions and programs, which include goals to:

- Develop or update an urban forest master plan
- Identify critical forest areas and consider preservation options
- Review and strengthen tree ordinances Promote public education and awareness
- Assess species suitability with regards to xeriscaping Plant trees

GFD also conducts public education and outreach programs to the public in all areas of fire safety and include conducting classes in fire extinguisher training and on the National Fire Protection Association's (NFPA) Remembering When program for the aging. The Georgetown Fire Department maintains Facebook pages to use as an effective tool to communicate with residents to post updates on fires, accidents, and rescue incidents; share public service announcements; and inform people of upcoming events. The Department also maintains a website that provides information about the Department, services they provide, and public education information.

Sun City Wildfire Protection Plan

The community of Sun City includes an active group of citizens dedicated to promoting community safety

through wildfire mitigation. The Sun City Community Association hosts a Firewise Group web site that includes education information and discussion of initiatives residents can take to prevent wildfire. Posted on the Firewise Group page are resources such as:

- What is Firewise?
- Sun City and Firewise Ignition Zones
- Being Firewise around your home
- Firewise Tree Trimming Guides
- Prepare Your Home for Wildfires
- Landscape Service Providers
- Understanding Ashe Juniper (Cedar) in Sun City
- SCT Firewise Plant List
- Ready Set Go - Texas

The 2014 City of Georgetown Hazard Mitigation Plan included a mitigation strategy to build on the groundwork and successes of the Sun City's Firewise efforts with a goal of expanding such initiatives in other areas of the City. This action item has been moved forward and included in the 2021 HMP Update.

Winter Weather

Hazard Description

A Winter Weather event is a winter storm with snow, ice, or freezing rain. Winter weather is typically associated with freezing or frozen precipitation, such as freezing rain, sleet, snow, and/or the combined effects of winter precipitation and strong winds. Table 4-29 describes the types of winter weather storms.

Photo 11 Backyard Frosted Tree January 10, 2021

Table 4.36 - Types of Winter Weather Storms
Source: NOAA

STORM NAMES	DESCRIPTION
Winter Weather Advisory	Weather advisories may be announced for snow, blowing, or drifting snow, freezing drizzle, freezing rain, or a combination of weather events.
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.
Blizzard Warning	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 Warning	Below freezing temperatures are expected and may cause significant damage to plants, crops, and fruit trees.
Wind Chill	The combined cooling power of the wind and temperature on exposed flesh is called the wind-chill factor.

Location

Because winter storm events are not confined to specific geographic boundaries, all existing and future buildings, facilities, and people, in all areas for the planning area are at risk to the hazard and could be impacted by the effects.

Extent

The extent or magnitude of severe winter storms is measured in intensity based on the temperature and level of accumulations as shown in Table 4-37. This chart can be read in conjunction with the wind-chill factor described in Figure 4.32, which is an index developed by the National Weather Service. It should be noted that the chart is not applicable when temperatures are over 50° or winds are calm.

Table 4-37 Magnitude of Intensity of Winter Storms

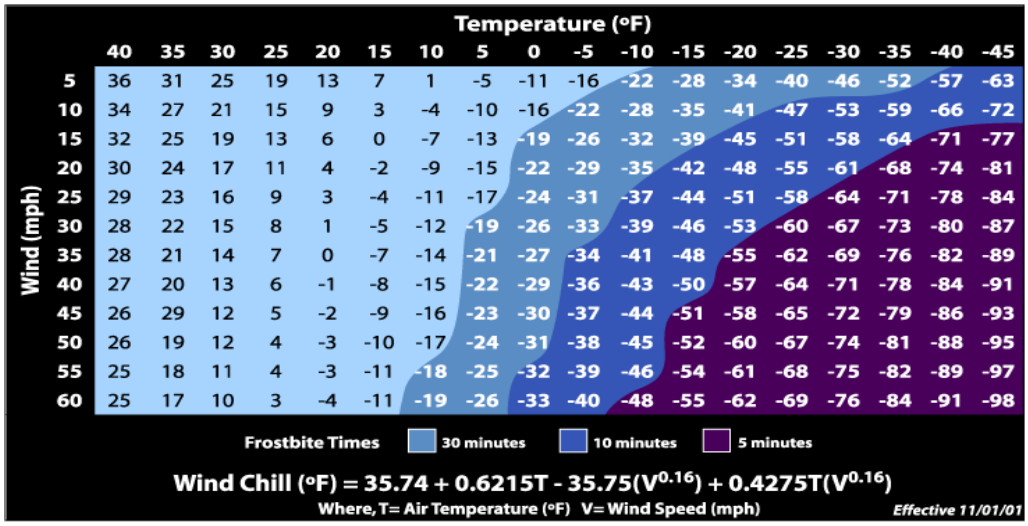
Source: NOAA

INTENSITY	TEMPERATURE RANGE	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 four inches
Significant	25° – 30°	Intense snow showers accompanied with strong wind gusts between 15 and 20 mph and 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

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° day would feel just as cold as a calm day with 0° temperatures. There have been 29 previous occurrences, recorded from 1950 to 2020, for Williamson County having winter storm watches, warnings, freezing rain, sleet, snow, and wind chill.

Data suggests that the average event to mitigate would be a mild to moderate winter storm. The City can typically expect anywhere between 0.1 to 3.0 inches of ice and snow during such an event, and temperatures between 30 and 50 degrees with winds ranging from 0 to 15 mph. However, during a recent winter weather storm, the severity exceeded “Severe” intensity with sub-zero temperatures combined with freezing rain and blistery conditions and Federal, State and Local Disasters were declared. It is possible for the planning area to experience a Severe Winter Weather event again.

Figure 4.32 - NOAA Wind Chill Chart



Wind (mph)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	29	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Historical Occurrences

Table 4.38 shows 29 historical occurrences for Williamson County between 1950 to 2020 according to NCEI. This historical winter storm information shows 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. The events are listed in the database either as Winter Storm or Winter Weather. Please note that this does not include the recent 2021 Severe Winter Weather disaster.

Table 4.38 - Historical Winter Storm Events, 1950-2020

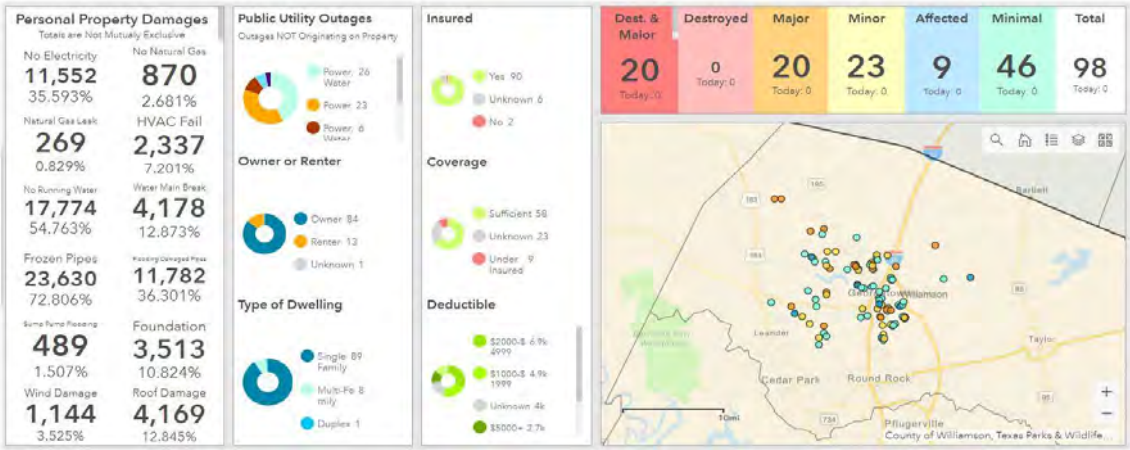
Source: NCEI

DATE	TIME	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
2/1/1996	140	0	0	0	0
12/23/1998	400	0	0	0	0
12/12/2000	1400	0	0	0	0
11/28/2001	1800	0	0	0	0
2/24/2003	1900	0	0	0	0
12/7/2005	2100	0	0	0	0
1/15/2007	500	0	0	0	0
1/27/2009	1800	0	0	0	0
2/3/2011	2000	0	0	0	0
1/10/2015	500	0	0	0	0
2/27/2015	1845	0	0	0	0
1/16/2018	157	0	0	0	0
2/9/2011	538	0	0	0	0

DATE	TIME	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
11/24/2013	2153	0	0	0	0
11/25/2013	629	0	0	0	0
12/5/2013	2136	0	0	0	0
12/7/2013	2030	0	0	0	0
1/23/2014	1600	0	0	0	0
1/27/2014	2124	0	0	0	0
2/7/2014	1025	0	0	0	0
3/4/2014	40	0	0	0	0
2/16/2015	1755	0	0	0	0
2/23/2015	429	0	0	0	0
3/4/2015	2155	0	0	0	0
12/28/2015	107	0	0	0	0
12/7/2017	1700	0	0	0	0
12/31/2017	2200	0	0	0	0
11/11/2019	1830	0	0	0	0
2/5/2020	840	0	0	0	0
Total		**0**	**0**	**0**	**0**

During the development of this 2021 Hazard Mitigation Plan Update, a Severe Winter Storm affected the entire state of Texas, including Williamson County. All 254 counties across the state received a Presidential Declaration, DR-4586-TX – Severe Winter Storms. The Incident period was February 11 - February 21, 2021 and the declaration was awarded on February 19, 2021. The Texas Division of Emergency Management collected individual, business, and public impact reports. The city sent a record number of messages to the community via social networks and the Regional Notification System to keep the community apprised of protection actions, response, and recovery information. Damage summaries for the community, as they were known, are portrayed in Figure 4.38 as of March 17, 2021.

Figure 4.33 - Damage Estimates from DR-4586-TX – Severe Winter Storm as of March 17, 2021
Source: Texas Division of Emergency Management Recovery Program



Significant Past Events

February 11, 2021 – State of Texas, including Williamson County and the City of Georgetown

The table above and its preceding paragraph describe how the City was affected by a severe winter storm that led to a Federal disaster declaration for the entire state.

February 2, 2020 – Williamson County

A strong cold front brought freezing temperatures and scattered precipitation that was a mix of rain, sleet, and snow. Sleet and snow were reported in Hays, Travis, and Williamson Counties. In Williamson County Weir, Taylor, and Georgetown had 1/4 of snow and Round Rock and Serenada had 0.2. In Travis County Pflugerville saw 1/2 of snow, parts of Austin had 1/4 to 0.4, Jollyville, Sunset Valley, Lost Creek, and West Lake Hills had 0.2, and Jollyville and San Leanna had 0.1. Camp Swift in Bastrop County had 1/4 of snow. In Hays County Wimberley had 0.1 of snow and in Comal County New Braunfels saw 0.1 foot of snow. Given the minor accumulations recorded, it is fair to say there were minimal impacts from this event.

November 11, 2019

A cold front brought a shallow layer of cold air to South Central Texas. Precipitation changed to sleet, freezing rain, and snow behind the front. There were minor accumulations of ice on elevated surfaces and some roads in Williamson, Travis, Bexar, Gillespie, Kerr, Kendall, Bandera, Medina, Edwards, and Val Verde Counties. In northern San Antonio, westbound Loop 1604 was closed at La Cantera Parkway due to an accident. I-10 near Center Point in Kerr County was closed when a tractor-trailer overturned. There was a minor accident on Wharton's Dock Rd. in Lake Medina Shores in Bandera County.

February 23, 2015 – Williamson County

A cold front brought below freezing temperatures and light precipitation. Precipitation was a mix of sleet and freezing drizzle. Sleet was first reported in Travis County and spread to Kerr and Williamson. There was some light icing on elevated surfaces.

February 3, 2011 – Williamson County

An upper-level storm approached the area the evening of February 3rd and produced light freezing drizzle which quickly formed a thin layer of ice on all exposed surfaces, making travel very dangerous. The greatest ice accumulation was one quarter of an inch in DeWitt County. The precipitation later turned mostly to light snow along with a few reports of sleet. The greatest snow amounts were from 1 to 2 inches, mainly across portions of Travis and Williamson Counties with generally less than one inch, across the Hill Country, portions of San Antonio, and areas east of I-35. There were over 500 traffic accidents reported in San Antonio and Austin during the overnight hours as well as others in most of the other counties. The icy roads forced all of the major highways in San Antonio to close during the night. For a time, I-35 was closed from San Marcos through San Antonio into Atascosa County, a stretch of nearly 100 miles. Many other highways were closed across the area including parts of I-10, US Hwy 90, US Hwy 77, and US Hwy 290. Most area schools were closed February 4th.

February 23, 2010 – Williamson County

A potent upper-level trough moved east into Central Texas over a cold airmass causing widespread precipitation. Rain mixed with sleet and eventually turned over to snow across the northern half of county warning area. The area hardest hit by snow was generally north of Highway 71 in the northern Hill Country. Storm total snowfall amounts near 4 inches were reported in northern Burnet and Williamson County.

January 27, 2009 – Williamson County

An arctic airmass came through all of central and South-Central Texas before an upper-level disturbance and strong jet stream moved overhead during the overnight hours on January 27th, and the early morning of January 28th. Freezing rain was reported across much of the hill country and the Interstate 35 corridor from New Braunfels up through Georgetown and Williamson County. Many traffic accidents were reported with ice buildup from one tenth of an inch up to one quarter of an inch. Heaviest ice was up through Williamson County where major impacts on roads and bridges were observed. Elsewhere, bridges were iced and dangerous with ice accumulation on outside surfaces.

Probability of Future Events

NCEI has recorded 29 historical occurrences for Williamson County between 1950 to 2020, suggesting the City may experience one winter storm event every three years. However, the probability of a future winter storm event affecting the city planning area is likely given the Federal declaration received in 2021 for severe winter weather. This suggests that an event is likely to occur twice within the next five years.

Vulnerability and Impact

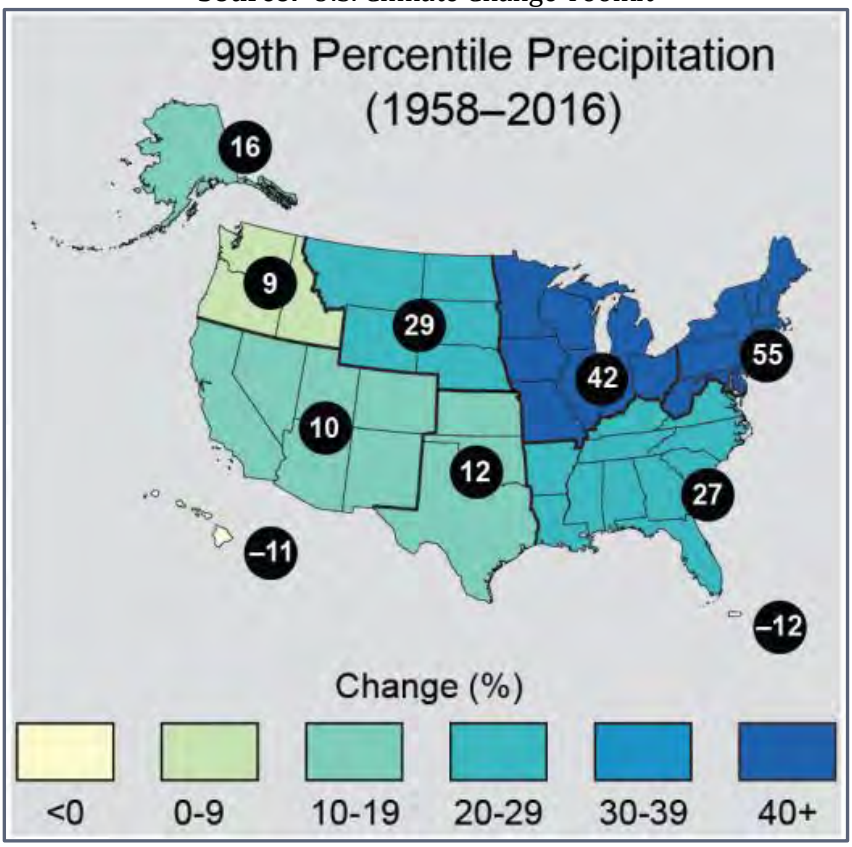
During periods of extreme cold and freezing temperatures, water pipes can freeze and crack; and ice may build up on power lines, causing them to break under the weight or causing limbs to fall on the lines, which may disrupt electric service for long periods. Economic impact may be felt by increased 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 when water supplies freeze and impede firefighting efforts.

All City populations, buildings, critical facilities, and infrastructure are vulnerable to severe winter events. People and animals are subject to health risks from extended exposure to cold air. Elderly people are at greater risk of death from hypothermia, especially in rural areas, where populations are sparse, icy roads may impede travel, and there are fewer neighbors to check in on the elderly. According to the U.S. Center for Disease Control, hypothermia kills about 600 Americans annually, half of whom are 65 years of age or older. Despite the potential harm from a winter storm event, the level of risk and historical occurrences for winter storms in the City, the impact for winter storm is "Limited'. Historic loss in damages over the 62-year recording period is considered negligible, with no damages being recorded. The consequences of the 2021 DR-4586-TX – Severe Winter Storm have still not yet been fully reported and calculated. However, as of April 20, 2021, however the total summation to date on the city government itself exceeds $3,036,750. All categories of infrastructure, businesses, and residences were affected across the community.

Impact of Climate Change on Hazards that Affect the Planning Area

Given its history of concern about climate change, impacts to the area as reported by NOAA, the U.S. Environmental Protection Agency (EPA), and in the U.S. Climate Change Toolkit created by the U.S. Global Change Research Program. The Toolkit includes a map shown here as Figure 4.34 indicating the percent increases in in the observed change in heavy precipitation amount of precipitation falling in heavy events during the period 1958 to 2016. The map shows that the south-central portion of the United States, including Texas, has seen a 20%-29% increase in heavy precipitation events over this period. (https://toolkit.climate.gov/image/2712)

Figure 4.34 - Observed Change in Heavy Precipitation
Source: U.S. Climate Change Toolkit



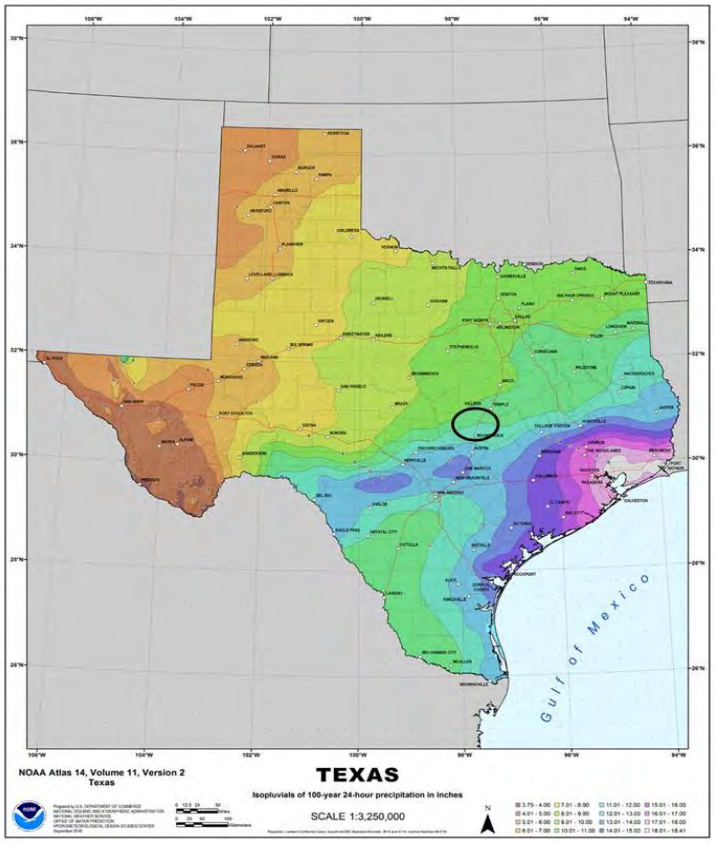
Likewise, a September 2018 analysis conducted by the National Oceanic and Atmospheric Administration (NOAA) showed higher rainfall frequency values in parts of Texas, redefining the amount of rainfall it takes to qualify as a 100-year or 1,000-year event. The study, published as NOAA Atlas 14, Volume 11 Precipitation-Frequency Atlas of the United States, Texas, found increased values in parts of Texas, including larger cities such as Austin and Houston, which will result in changes to the rainfall amounts that define 100-year events.[14] Such events, on average, occur, every 100 years or have a one percent chance of happening in any given year.

[14] NOAA, Source: https://www.noaa.gov/media-release/noaa-updates-texas-rainfall-frequency-values

NOAA reported that in the nearby city of Austin, for example, 100-year rainfall amounts for 24 hours increased as much as 3 inches up to 13 inches. The 100-year estimates around Houston increased from 13 inches to 18 inches and values previously classified as 100-year events are now much more frequent 25-year events. The isopluvial map, shows areas of Texas that share the same level or rainfall.

Figure 4.35 – Rainfall Levels in the State of Texas

Source: NOAA Atlas 14, Volume 11 Precipitation-Frequency Atlas, Texas
(Black Circle shows location of the City of Georgetown)



Similar information reported by the EPA substantiates findings presented by NOAA and in the Climate Change Toolkit. In its report 2016 report titled *What Climate Change Means for Texas*, the EPA identified a number of climate trends that have implications for hazards affecting the City of Georgetown.[15]

- Most of the state has warmed between 1 to 1 ½ degrees in the past century.
- In the eastern two thirds, where Georgetown is located, the average annual rainfall is increasing but the soil is becoming drier.
- Storms are likely to become more severe.

[15] EPA, What Climate Change Means for Texas, Publication EPA 430-F-16-045

- Deserts may expand and summers are likely to become increasingly hot and dry.
- Inland flooding is likely to increase as a result of the level of increased rainfall dropped during the wettest days of the year.
- Warmer temperatures increase water evaporation, leading to drier soils.
- Drier soils may increase the need for agricultural irrigation, so communities need to assure that there are adequate water supplies for household and farm uses.
- Wind shear generally increases when there is a rising concentration of greenhouse gasses, causing an increase in humidity and resulting atmospheric instability. Such conditions generally foster tornado development, but the EPA suggests that wind shear may decrease, thus discouraging tornadoes. The agency is still researching whether tornadoes will be more or less frequent in the future.
- Higher temperatures may cause an increase in drought conditions that may raise the likelihood of wildfire occurrence.

Climate change impact on City of Georgetown Hazards of Concern

Extrapolating from the above cited reports from the EPA, NOAA, and U.S. Global Change Research Program, climate change is likely to affect some of the City natural hazards of concern in specific ways.

Dam Failure

As global temperatures change, excessive rainfall events associated with severe thunderstorms may potentially increase the vulnerability of dam and levee structures due to higher water levels. Dam design is based on assumptions about the flow or behavior of a river or water body. Changing weather patterns and increased rainfall levels may affect the margin of safety initially included in dam design. This, in turn, may increase the chance of floodwater overtopping the dam or create loads and lead to dam failure.

Drought

The cited EPA report included concern about the community's ability to maintain adequate water supplies for household and commercial use. Those who operate farms or ranches may feel an economic impact. One effect of drought cited by the EPA is the impact on animals used for agricultural purposes. In hot weather, animal health is affected because cows eat less, grow at slower rates, and produce less milk. The EPA estimates that farm yields may decline by up to 50% in fields that can no longer be irrigated.[16]

Extreme Heat

Extremely hot days are not only uncomfortable for the general population, but they can also be dangerous. High air temperatures can affect the population by causing heat stroke and dehydration, which affect a person's cardiovascular and nervous systems. Populations especially vulnerable to extreme heat include children; the elderly; those in frail health; and those with few financial resources who may not be able to afford air conditioning. Extreme heat also affects those who work outdoors, including persons working in the agricultural and construction industries.

Flood

Flooding may occur in the City of Georgetown even though it is not a coastal community. Increased rainfall may affect water levels in local rivers and dams and contribute to stormwater-related street flooding. While only one dam in the planning area is considered a high hazard structure given its location to more

[16] Ibid.

developed population areas, the City wisely monitors the water levels of all dams to ensure overall community safety.

Infectious Diseases

The World Health Organization points out that there is a great deal of variation in size and mode of transmission of infectious agents, including viruses, bacteria, protozoa, and multicellularparasites. Over the centuries, many have evolutionarily adapted to their human hosts. Indirectly transmitted, vector- borne diseases include Lyme disease, malaria,dengue fever, yellow fever, and bubonic plague, which survive and reproduce when allowed a range of optimal climatic conditions, including temperature, precipitation, and duration of daylight. Rainfall can influence the transport (by water) and dissemination of infectious agents, while temperature affects their growth and survival. As such, an increase in the number of hot days and periods of excessive rainfall may potentially influence the development and spread of disease among the human population, which may cause a pandemic.[17]

Severe Thunderstorms (including high winds, lightning, tornado, and hail events)

Increased global temperatures may impact the development and extent of severe storm events. Thunderstorms, high winds, lightning, and hail events may be more severe. An increase in the number of storms or their intensity may affect travel conditions, thus impact economic industries for which the transport of goods is essential, as well as the general safety of motorists otherwise.

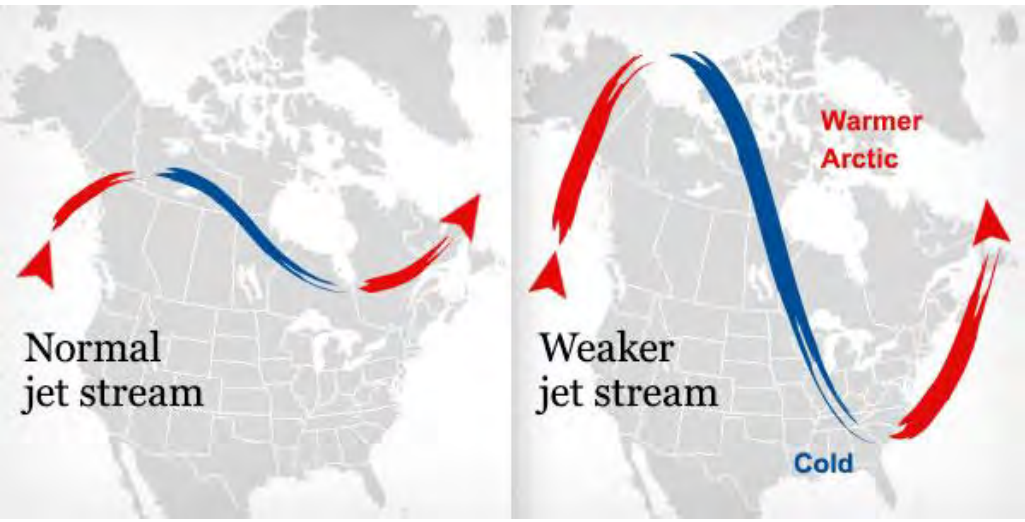
Winter Weather

A study conducted by the Environmental Defense Fund (EDF) identified several ways climate change affects the winter weather hazard. Increased precipitation not only occurs in warm weather, but during cold weather this increase may result in higher levels of snowfall and massive winter storms.[18] The agency presents a theory connecting the warming polar regions often discussed – often in term of glacial melting – and worsening cold snaps in the United States. While scientists have not fully confirmed their theory, they suspect that melting sea ice in the Arctic can weaken the jet stream, allowing for frigid polar air to penetrate farther south than normal. The two maps below show the average path of a normal jet stream, which generally flows through the Canadian provinces; and a jet stream weakened by climate change that flows through the U.S. southern states.

[17] WHO, Climate Change and Infectious Diseases, Risk and Responses, https://www.who.int/globalchange/climate/en/chapter6.pdf

[18] Environmental Defense Fund, Climate Change is Still Happening Despite Cold Weather, https://www.edf.org/card/4-reasons-climate-change-still-happening-despite-cold-weather?card=1, accessed 2/16/2021

Figure 4.36 – Climate Change Impact on the Jet Stream
Source: The Environmental Defense Fund



Wildfire

The City of Georgetown is fortunate to include among its assets numerous, heavily utilized parks and recreational assets within the City and EJT. These areas comprise the Wildfire Urban Interface (WUI), described by the U.S. Fire Administration as community segments serving as transitional zones between zone of transition between unoccupied land and human development. In other words, WUIs are areas where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.[19]

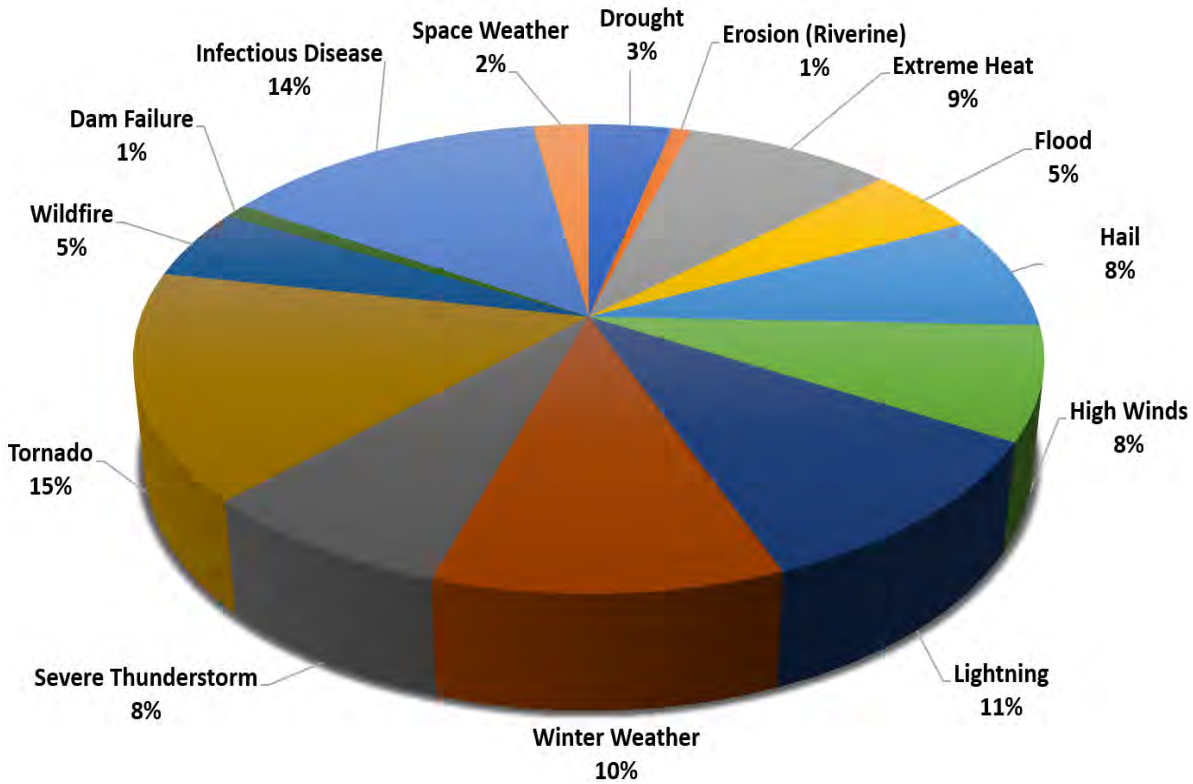
[19] U.S. Fire Administration (USFA), https://www.usfa.fema.gov/wui. Accessed 02/16/2021.

Risk Comparison and Summary

Hazards associated with Severe Thunderstorms are the greatest risk to the community and planning area. Combined they compose roughly half the total risk (50%). Flood adds another five percent (55%).

- Severe Thunderstorm
- Lightning
- Hail
- High Winds

Figure 4.37 – Hazards of Concern by Comparative Percentage of Risk



Infectious Disease and Winter Weather have had tremendous impacts recently and have increased in risk. Hurricane was taken off the hazard list, but the remaining effects of degrading storms are still significant and addressed with other hazards. Erosion on the river has caused damage to public property and it, along with Space Weather, are new hazards in this plan. Space Weather has shown an increased potential to cause harm to infrastructure.

Adjustments in climate temperatures are impacting global weather patterns, that result in increased frequencies of meteorological storms to the region, as well as affecting the typical severity and duration of local storms. The hazards risk analysis was conducted using a holistic approach to input considerations from the community, stakeholders, subject matter experts, and data research, and provides a comprehensive, yet logical interpretation of natural risk hazard to the City of Georgetown, and the communities.

SECTION 5: MITIGATION STRATEGY

This page is intentionally blank

FEMA ELEMENT C. MITIGATION STRATEGY

C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)()(i)) 3

C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))

C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))

Mitigation Goals and Objectives

Based on the results of the risk and capability assessments, the Planning Team was able to develop and prioritize the initiatives included mitigation strategy. At the mitigation strategy workshop held March 15, 2021, Planning Team members agreed that the mitigation goals and objectives included in the 2014 HMP were equally appropriate to include in the 2021 Update. However, Team members agreed that the community's primary concern is to reduce and eliminate the long-term risk of loss of life and property damage from the full range of disasters.

Goal 1. Protect public health and safety.

Objective 1.1. Maintain critical facilities.

Objective 1.2.Maximize the 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. Protect new and existing properties.

Objective 2.1. Reduce repetitive losses to the National Flood Insurance Program (NFIP).

Objective 2.2. Use the most cost-effective approach to protect existing buildings and public infrastructure from hazards.

Objective 2.3. Enact and enforce regulatory measures to ensure that development will not put people in harm's way or increase threats to existing properties.

Goal 3. Build and support partnerships to enhance mitigation to continuously become less vulnerable to hazards.

Objective 3.1. Build and support local partnerships to continuously become less vulnerable to hazards.

Objective 3.2. Expand the cadre of committed volunteers to safeguard the community before, during, and after a disaster.

Objective 3.3. Build hazard mitigation concerns into the City planning and budgeting processes.

Goal 4. Invest in Hazard Mitigation

Objective 4.1. Maximize the use of outside sources of funding.

Objective 4.2. Maximize participation of property owners in protecting their properties.

Objective 4.3. Maximize insurance coverage to provide financial protection against hazard events.

Objective 4.4. Prioritize mitigation projects based on cost-effectiveness and starting with those sites facing the greatest threat to life, health, and property.

Goal 5. Increase the understanding of City staff, stakeholders, and residents of the need for mitigation actions they can take to protect people and property.

Objective 5.1. Educate City personnel and stakeholders on actions they can take to prevent or reduce the loss of life or property from all hazards, including incident response and communications training in accordance with the Emergency Operations Plan and the National Incident Management System.

Objective 5.2. Heighten public awareness of staff, stakeholders, and the public on the full range of natural and human-caused hazards through efforts such as community outreach and preparedness exercises, to include expanded efforts to improve multilanguage outreach and streamlined communication to ensure real-time notice.

Objective 5.3. Publicize, encourage, and share opportunities about hazard mitigation measures the public, to include businesses and homeowners, can take to implement mitigation measures.

In reviewing the goals and objectives to ascertain their relevancy for inclusion in the 2021 Plan, other Planning Team initiatives completed in tandem with the review of the goals and objectives included: completing a capability assessment survey, identifying vulnerable community assets, providing input regarding the identification of hazards and the degree to which the planning area is at risk to each, identifying mitigation goals and objectives, and developing mitigation strategies.

Mitigation approach

In developing and ranking the 2021 mitigation actions, the City applied the ranking criteria recommendations outlined in the FEMA Local Mitigation Planning Handbook (March 2013). Each criterion is shown below.

Table 5-1. Revised Mitigation Ranking Criteria

Source: FEMA Local Hazard Mitigation Planning Guide

FEMA Local Hazard Mitigation Planning Guide Mitigation Action Ranking Criteria Used in the 2021 City of Georgetown Hazard Mitigation Planning Process	
Criterion	**Description**
Life Safety	How effective will the action be at protecting lives and preventing injuries?
Property Protection	How significant will the action be at eliminating or reducing damage to structures and infrastructure?
Technical	Is the mitigation action technically feasible? Is it a long-term solution? Eliminate actions that, from a technical standpoint, will not meet the goals.
Political	Is there overall public support for the mitigation action? Is there the political will to support it?
Legal	Does the community have the authority to implement the action?
Environmental	What are the potential environmental impacts of the action? Will it comply with environmental regulations?
Social	Will the proposed action adversely affect one segment of the population? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?
Administrative	Does the community have the personnel and administrative capabilities to implement the action and maintain it or will outside help be necessary?
Local Champion	Is there a strong advocate for the action or project among local departments and agencies that will support the action's implementation?
Other Community Objectives	Does the action advance other community objectives, such as capital improvements, economic development, environmental quality, or open space preservation? Does it support the policies of the comprehensive plan?

Current and proposed mitigation action items

As part of the economic evaluation of each mitigation action, participants analyzed actions in terms of the overall costs, measuring whether the potential benefit to be gained from the action outweighed all costs associated with implementing the initiative. As a result of this exercise, priority was assigned to each mitigation action by marking them as High, Medium (Med), or Low. For example, an action that is ranked as "High" indicates that the action will be implemented as soon as feasible, when and if funding and other resources are available. A "Medium" action may not be implemented depending on the cost and number of citizens served by the action and/or other opportunities available. Actions ranked as "Low" will not be implemented until "High" and "Medium" actions have been considered for funding, unless an opportunity presents itself to be favorable to implement faster rather than later, or a future disaster occurs that moves the ranking of the action to a higher priority.

Actions presented in this section represent a comprehensive range of mitigation actions per current State and FEMA Guidelines, including at least two actions per hazard, and includes actions that address both future development and construction as well as present infrastructure.

Tables 5.2 shows the status of mitigation actions included in the 2014 Plan. Actions from the 2014 plan that are to "move-forward" into the 2021 Actions Table will be identified by the letter "M". New actions developed for inclusion in the 2021 HMP Update will be reflected in Table 5.3, and include relevant actions carried over. The Planning Team agreed to include actions that may also benefit preparedness and response, as well as enhance the community's overall resiliency. The cost/benefit of each hazard mitigation action was considered as part of the actions identification process to ensure a risk reduction benefit. All actions are considered optional and to be used as a guide for consideration, and the city or community is not bound to the completion of the actions. The actions are beneficial proposals to reduce risk and will be implemented on a case-by-case basis and in consideration of funding, resources, and existing capabilities.

Prioritization of actions was performed holistically, with broad input, and criteria based on recommendations listed in the FEMA Local Mitigation Planning Handbook. Additionally, hazards impacting the planning area to a higher degree that increases the consequences, causes a disaster, or otherwise increases risk, may cause a change in action priority over time. Priority ranking will be categorized as Low, Med (Med), or High, in the mitigation actions table.

Table 5.2. Status Summary of 2014 Mitigation Actions

Status and Relevancy of Mitigation Actions Included in the 2014 City of Georgetown Hazard Mitigation Plan
Status Updates: C=Completed; I=In progress; NR = No longer relevant, M-Move forward for inclusion in the 2021 Hazard Mitigation Plan

Action #	Proposed Action	Risk Reduction Benefit	Hazard(s) Addressed	Cost Estimate	Agency/ Department Managing	2021 Status Update	Implementation Timeframe (in months)	Priority Ranking	Potential Funding Source(s)
1	Adopt and enforce new building codes for new construction and reconstruction as they are updated.	Protect public buildings, strengthen new residential and commercial construction, and reduce risk to public health, safety, and welfare.	Flood, Tornado, High Winds	$25,000	Building and Permitting Systems Engineering/ Floodplain Management	**C/I/M** Adopted 2015 ICC and 2017 NEC with amendment.	Estimated 2014	Low	General Fund Revenue
2	Upgrade culverts to an increase size at specific locations in City to adequately convey storm water	Reduce damage to critical infrastructure (streets/drainage system), reduced risk to public health, safety, and welfare (eliminate roadway inundation).	Flood, Thunderstorm, Winter Storm	$2,311,000	Transportation Department	**M**	Ongoing	High	Storm Water Fee
3	Implement Community Rating System program requirements to reduce risk and flood insurance premiums to residents	Improved education, awareness, and risk reduction through program efforts and offer discounted rates for flood insurance policy holders	Flood	$100,000	City Floodplain Manager	**NR** After reviewing cost-benefit, the project was determined to be no longer cost beneficial.	Estimated 2015	High	None Identified
4	Implement NFIP public education program to increase the number of property owner insurance policies.	Improved education, awareness, and risk reduction through additional insurance participants, especially those eligible for Preferred Risk policy.	Flood	$50,000	Floodplain Manager	**M** No overall public education plan. Competing on a case-by-case basis. Roll action into city's overall community education and outreach.	Estimated 2015	High	None Identified
5	Stabilize channel at Inner Loop culverts to reduce minor flooding of roadway and improve drainage	Reduced damage streets/ drainage (critical infrastructure (system), lessens risk to public health, safety, and welfare (eliminate roadway inundation.	Flood, Thunderstorm, Winter Storm	$1,200,000	Floodplain Manager Transportation Department County support	**C/NR** No action to date. Coordinate with County, which owns culverts maintained by City.	TBD	High	None Identified- Storm water revenue insufficient
6	Acquire, demolish, or relocate existing flood-prone structures and RL/SRL properties.	Reduce risk and remove repetitive loss properties from NFIP policy base	Flood	$250,000/ structure (estimated)	Floodplain Manager	**C/NR** All existing RL/SRL structures have been removed and there are currently none in the City.	TBD	High	Federal Grants
7	Flood proof existing city lift stations and manholes located in SFHA (floodway)	Reduce damage to critical infrastructure, reduced risk to public health, safety, and welfare	Flood, Thunderstorm	$2,000,000	Floodplain Manager	**M** Have not addressed issue but will ensure that all sensors are located away from the floodplain or, if not, take action to protect or re-locate.	Ongoing	High	Annual lift station program in place with insufficient funding
8	Stabilize channel at River Oaks culverts to reduce minor flooding of roadway and improve drainage	Reduced damage to critical infrastructure (streets and drainage system) adjacent to IH35, reduced risk to public health, safety, and welfare (eliminate roadway inundation), and stabilize channel	Flood, Thunderstorm	$1,000,000	Floodplain Manager	**M** Have not initiated but project is still relevant.	TBD	High	None Identified- storm water revere insufficient
9	Enhance storm water management program to include improving channels, drainage inventory records	Improved education and outreach. Improved channel, stream, and drainage inventory maintenance	Flood, Thunderstorm	$2,000	Drainage Department	**M** Department has done a great deal of outreach addressing	TBD	High	Storm Water Fee

Status and Relevancy of Mitigation Actions Included in the 2014 City of Georgetown Hazard Mitigation Plan
Status Updates: C=Completed; I=In progress; NR = No longer relevant, M-Move forward for inclusion in the 2021 Hazard Mitigation Plan

Action #	Proposed Action	Risk Reduction Benefit	Hazard(s) Addressed	Cost Estimate	Agency/ Department Managing	2021 Status Update	Implementation Timeframe (in months)	Priority Ranking	Potential Funding Source(s)
						storm water and drainage best practices and will continue.			
10	Implement public education program to: prevent storm water runoff into waterways containing grass clippings, disposal of household chemicals, encourage tree-planting to reduce runoff, limit impervious cover in conjunction with new construction.	Reduce storm water runoff into area watersheds, improve water quality, maintain quality of life for residents	Flood, Thunderstorm	$10,000 annually	Drainage Department Stormwater	**M** This is an ongoing program of the Department. The action will move forward.	2014 and ongoing	Med	Storm Water Fee
11	Enhance code enforcement and inspection services by hiring 2 additional building inspectors.	Improve oversight and code compliance of construction for commercial and residential structures and infrastructures.	All	$120,000/yr	Inspection Department Code Enforcement	**C/NR** City Council hired two additional building inspectors. But reviews staffing needs as region continues to grow.	TBD	High	General Fund
12	Replace the "Outdoor Warning Siren System" with a new state of the art I-Info system or other alert system (see Appendix H for system features)	Reduce the number of serious injuries and loss of life associated with natural hazard disasters, weather-related events, and airborne contaminants	Flood, Tornado, High Winds, Winter Storm, Thunderstorm, Flood, Infectious Disease, Drought, Dam Failure, Extreme Heat, Hail	$500,000	City, Fire Dept., OEM, ESD #8	**C/M** Partially complete (certain City sections), moving forward to complete in other areas.	Upon Funding	High	Grants, local reserve, partner with ESD #8
13	Develop and implement a public education program regarding hazard risk, and publicizing instructions on responding to system alerts, including evacuation procedures	Improve response and evacuation time of residents during a disaster, reduce loss of lives by better preparedness	Flood, Tornado, High Winds, Winter Storm, Thunderstorm, Flood, Infectious Disease, Drought, Dam Failure, Extreme Heat, Hail	$25,000	City, Fire Department, OEM, ESD #8	**C/M** First Responders conduct education programs as opportunities arise and will continue.	Upon Funding	High	Grants, local reserve, partner with ESD #8
14	Cut firebreaks into public wooden parkland according to risk factors	Natural landform protection and reduced risk of loss of property and life	Wildfire	$25,000	Parks and Recreation Texas Forest Service, Fire Prevention Grant	**M** Not yet completed due to lack of funding but moving forward	Upon Funding	Med	Texas Forest Service, Fire Mitigation Grant
15	Remove downed trees, decreasing fire fuels in undeveloped and remote parkland per co. Wildfire Protection Plan and local Firewise Community program	Natural landform protection and reduced risk of loss of property and life	Wildfire, Drought, Extreme Heat	$25,000	Parks and Recreation, Public Works Utilities, TFS Fire Prevention Grant	**C/M** Some areas complete in the ETJ, but ongoing. A good action to move forward as a valuable action in the plan update.	Upon Funding	Med	Texas Forest Service, Fire Mitigation Grant
16	Implement a tree trimming program to reduce risk of downed power lines associated with severe weather events	Reduce risk to residents associated with live electric downed power lines and reduced risk of fires and other hazards to property during severe weather events	Thunderstorm, Winter Storm, High Winds, Tornado, Wildfire, Hail	$25,000 annually	Parks and Recreation, Public Works, Electric Utilities	**C/NR** Have been tree trimming over the last 5 years, project ongoing and will be moved forward.	2014 and ongoing	Med	Federal Grants

Status and Relevancy of Mitigation Actions Included in the 2014 City of Georgetown Hazard Mitigation Plan
Status Updates: C=Completed; I=In progress; NR = No longer relevant, M-Move forward for inclusion in the 2021 Hazard Mitigation Plan

Action #	Proposed Action	Risk Reduction Benefit	Hazard(s) Addressed	Cost Estimate	Agency/ Department Managing	2021 Status Update	Implementation Timeframe (in months)	Priority Ranking	Potential Funding Source(s)
17	Develop and implement a Community Wildfire Protection Program and promote FIREWISE community actions.	Reduce risk of loss of property and life and reduce fire premiums	Wildfire, Extreme Heat, Drought	$10,000	Texas Forest Service, Fire Prevention Grant	**C/M** Complete (Sun City). Move forward as a valuable action for other vulnerable areas of the community.	Upon Funding	Med	Texas Forest Service, Fire Prevention Grant
18	Create detention ponds with filtration systems as an alternate water source as part of future smart growth initiatives	Ensure continued quality of life and adequate future supply of water for residents	Extreme Heat, Drought, Wildfire	$250,000	Public Works	**M** Project not initiated to date, but water quality ponds are being constructed for various purposes.	Upon Funding	Med	HMGP
19	Adopt and integrate health and safety policies into existing Emergency Response plan to protect City staff and residents from infectious disease	Reduce response time and save lives in the event of outbreak of infectious disease	Infectious Disease including seasonal Influenza, West Nile Virus, Rabies	$10,000	OEM, Williamson County and Cities Health District	**C/M** General procedures have been included in the EOP update. Ongoing, the city has created and modified policies. Will creating specific policies and vaccination plans and procedures moving forward.	Upon Funding	Med	Local city funds, Williamson County & Cities Health District, Public Health Emergency Preparedness Grant, HMGP
20	Implement electronic vaccine record system for City 1st responders	Provide timely monitoring of influenza-like illness (ILI) trends, detect, and respond to outbreaks and local hot spots, guide resource allocation, including employee vaccine coverage and safety	Infectious Disease including seasonal Influenza, COVID-19, West Nile Virus, Rabies	$10,000	Fire Department, Williamson County and Cities Health District	**C/M** First responders are currently using the system and will expand usage for additional viral strains and vectors, including the recently arrived Coronavirus Disease 2019.	Ongoing	Med	Local city funds, WCCHD, Preparedness Grant, HMGP
21	Conduct public education and awareness campaigns for protecting against seasonal Influenza, West Nile Virus, and Rabies	Improved response initiatives through training and exercises in the event of flu of influenza outbreak and educate public on protection initiatives in the event of outbreaks	Infectious Disease including Seasonal Influenza, West Nile Virus, Rabies	$10,000	EOM, Williamson County and Cities Health District	**C/M** Initiated and will move forward with additional measures. Supporting the WCCHD in ongoing joint Vector Management Program. GOEM completed with Sun City and WCCHD.	Upon Funding	Med	Local city funds, Williamson County & Cities Health District, Public Health Emergency Preparedness Grant, HMGP
22	Remove accumulated debris/other materials from banks of area low-water dams and Lake Georgetown Dam	Increase safety of area dams that can be potentially compromised by debris and other materials deposited adjacent to structures	Dam Failure	$50,000	Public Works	**M** Current debris clean ups are not specifically dam-related but moving forward can include this element.	Upon Funding	Med	HMGP
23	Locate, map, and publicize evacuation routes in the event of failure or breach of low-water dams	Reduce potential loss of lives in the event of dam failure	Dam Failure	$50,000	Williamson County and Cities Health District	**M** Not started, Move forward in the 2021 plan update.	Upon Funding	Med	HMGP and local revenue

Status and Relevancy of Mitigation Actions Included in the 2014 City of Georgetown Hazard Mitigation Plan
Status Updates: C=Completed; I=In progress; NR = No longer relevant, M-Move forward for inclusion in the 2021 Hazard Mitigation Plan

Action #	Proposed Action	Risk Reduction Benefit	Hazard(s) Addressed	Cost Estimate	Agency/ Department Managing	2021 Status Update	Implementation Timeframe (in months)	Priority Ranking	Potential Funding Source(s)
24	Acquire undeveloped flood prone land as open space	Reduce flood risk by dedicating acquired land as open space to prevent further development within the flood hazard area	Flood	$250,000 per structure (estimated)	Floodplain Manager, Facilities, Parks and Recreation	C/NR	2014-2015	High	Federal Grants
25	Conduct public education program to promote hazard mitigation activities identified in Firewise community program	Conserve water use during times of drought and extreme heat	Drought, Extreme Heat	$25,000 (estimated)	Community Engagement	C/M City manages a good outreach program to education the community about water conservation and will continue.	2014-2015	High	Federal Grants
26	Install hail guards for HVAC systems on critical facilities (fire stations, etc.) and support efforts for non-City structures (nursing homes, hospitals, courthouses	Increase efficiency of HVAC units by minimizing damage, reduce electrical costs, and prevent overheating units unable to properly cool critical facilities	Hail	$40,000 (estimated)	Facilities	M Move forward to address needs of critical facilities	2014-2015	Low	Federal Grants

Table 5.3. Proposed New Mitigation Actions

Actions for the 2021 Plan Update – Includes relevant actions moved (M) forward from the 2014 plan and new (N) actions identified								
Action #	**Proposed Action**	**Risk Reduction Benefit**	**Hazard(s) Addressed**	**Cost Estimate**	**Agency and/or Department Managing**	**Implementation Timeframe (in months)**	**Priority**	**Potential Funding Source(s)**
M-1	Adopt and implement program and projects to include enforcement of updated building codes for new construction and qualifying reconstruction	Protect public buildings, strengthen new residential and commercial construction, and reduce risk to public health, and increase safety, and welfare	Dam Failure, Drought, Erosion, Flood, Hail, High Winds, Infectious Disease, Lightning, Tornado, Severe Thunderstorms, Space Weather	$25,000	Building Inspections, Code Compliance, Fire Department, City Attorney	4	Med	General Fund
M-2	Upgrade culverts to an increase size at specific locations in City to adequately convey storm water	Reduce damage to critical infrastructure (streets/drainage system), reduced risk to public health, safety, and welfare (eliminate roadway inundation)	Erosion, Flood, Severe Thunderstorm, Winter Storm	$2,311,000	Public Works - Stormwater	14	High	Storm Water Fee, Hazard and Flood Mitigation Assistance Grants
M-3	Implement NFIP public education program to increase the number of property owner insurance policies	Improved education, awareness, and risk reduction through additional insurance participants, especially those eligible for Preferred Risk policy	Flood	$50,000	Systems Engineering	12	Low	General Fund
M-4	Flood proof existing city lift stations and manholes located in SFHA (floodway)	Reduce damage to critical infrastructure, reduced risk to public health, safety, and welfare	Flood, Severe Thunderstorm	$2,000,000	Water Department, Systems Engineering	24	Med	Storm Water Fee, Hazard and Flood Mitigation Assistance Grants
M-5	Stabilize channel at River Oaks culverts to reduce minor flooding of roadway and improve drainage	Reduced damage to critical infrastructure (streets and drainage system) adjacent to IH35, reduced risk to public health, safety, and welfare (eliminate roadway inundation), and stabilize channel	Erosion, Flood, Severe Thunderstorm	$1,000,000	Public Works - Stormwater	12	High	Storm Water Fee, Hazard and Flood Mitigation and Flood Assistance Grants
M-6	Enhance storm water management program to include improving channels, drainage inventory records, river and low-water crossing surveillance, as well as improving technology to alert the public regarding low water crossing impacts	Improved education and outreach. Improved channel, stream, and drainage inventory maintenance	Erosion, Flood, Severe Thunderstorm	$100,000	Public Works - Stormwater	2	High	Storm Water Fee, Hazard and Flood Mitigation Assistance Grants
M-7	Implement public education program to: prevent storm water runoff into waterways containing grass clippings, disposal of household chemicals, encourage tree-planting to reduce runoff, limit impervious cover in conjunction with new construction	Reduce storm water runoff into area watersheds, improve water quality, maintain quality of life for residents	Erosion, Flood, High Winds, Severe Thunderstorm	$10,000/yr	Public Works - Stormwater	2	Med	Storm Water Fee, Hazard and Flood Mitigation Assistance Grants
M-8	Install Outdoor Warning Sirens at city parks, large gathering areas, annexed areas of the city, and other areas deemed appropriate	Reduce the number of serious injuries and loss of life associated with natural hazard disasters, weather-related events, and airborne contaminants, and other hazards	Dam Failure, Extreme Heat, Flood, Hail, High Winds, Lightning, Severe Thunderstorm, Tornado Wildfire	$500,000.00	Emergency Management	12	High	Hazard Mitigation Assistance Grants, General Fund
M-9	Develop and implement a public education program regarding hazard risk mitigation, and publicizing instructions on responding to system alerts, including evacuation procedures	Improve response and evacuation time of residents during a disaster, reduce loss of lives by better preparedness	Dam Failure, Drought, Extreme Heat, Flood, Hail, High Winds, Infectious Disease, Lightning, Severe Thunderstorm, Space Weather, Tornado Wildfire, Winter Weather	$25,000	Communications and Public Engagement	12	High	Hazard Mitigation Assistance Grants, General Fund, Volunteer Assistance

Actions for the 2021 Plan Update – Includes relevant actions moved (M) forward from the 2014 plan and new (N) actions identified								
Action #	**Proposed Action**	**Risk Reduction Benefit**	**Hazard(s) Addressed**	**Cost Estimate**	**Agency and/or Department Managing**	**Implementation Timeframe (in months)**	**Priority**	**Potential Funding Source(s)**
M-10	Create Firebreaks into public wooden parkland according to risk factors and assessments	Natural landform protection and reduced risk of loss of property and life	Drought, Extreme Heat, Wildfire	$250,000	Parks and Recreation, Fire Department	36	Med	Texas Forest Service Assistance, Fire Mitigation Grant, Hazard Mitigation Assistance Grants, General Fund, Volunteer Assistance
M-11	Remove downed trees and brush, decreasing fire fuels in undeveloped and remote parkland per Community Wildfire Protection Plan or Fire Department/Parks risk reduction recommendations	Natural landform protection and reduced risk of loss of property and life	Drought, Extreme Heat, Flood, Hail, High Winds, Severe Thunderstorm, Tornado, Wildfire, Winter Weather	$150,000	Parks and Recreation, Fire Department	36	Med	Texas Forest Service Assistance, Fire Mitigation Grant, Hazard Mitigation Assistance Grants, General Fund, Volunteer Assistance
M-12	Develop, promote, and implement a new FIREWISE community program in neighborhoods located in the Wildland Urban Interface (WUI)	Reduce risk of loss of property and life and reduce fire premiums if eligible	Drought, Extreme Heat, Wildfire	$60,000	Fire Department	12	Med	Texas Forest Service, Fire Prevention Grant, General Fund, Hazard Mitigation Grant, Volunteer Assistance
M-13	Create detention ponds with filtration systems as an alternate water source as part of future smart growth initiatives	Ensure continued quality of life and adequate future supply of water for residents, reduce consequences of drought and times with low water availability	Extreme Heat, Drought, Wildfire, Winter Weather	$250,000	Public Works	36	Med	General Fund, Hazard and Flood Mitigation Grants, Building Resilient Infrastructure and Communities (BRIC)
M-14	Adopt and integrate health and safety policies into Continuity of Operations, Incident Specific Response, and/or Point of Dispersal, or Vaccination plans as appropriate and needed to include mitigation protocols and protect residents and City staff from infectious disease	Enhance mitigation actions and efforts, reduce response time, and save lives in the event of outbreak of infectious disease including but not limited to seasonal Influenza, COVID-19, West Nile Virus, Rabies	Infectious Disease	$90,000	Emergency Management	24	High	General Fund, Hazard Mitigation Assistance Grants, Disaster Response and Recovery Grants, Williamson County & Cities Health District, Public Health Emergency Preparedness Grant
M-15	Implement electronic vaccine record system and mitigation actions for City 1st responders and essential employees if applicable	Provide timely monitoring and mitigation actions for infectious disease, including seasonal Influenza, COVID-19, West Nile Virus, Rabies influenza-like illness (ILI) Monitor trends, detect, and respond to outbreaks and local hot spots, guide resource allocation, including employee vaccine coverage and safety	Infectious Disease	$20,000	Fire Department	6	Med	General Fund, WCCHD, Preparedness Grant, Building Resilient Infrastructure and Communities (BRIC)
M-17	Conduct public education and awareness campaigns for protecting against seasonal Influenza, West Nile Virus, and Rabies or other infectious diseases	Improved response initiatives through training and exercises in the event of flu of influenza outbreak and educate public on protection initiatives in the event of outbreaks	Infectious Disease	$10,000	Emergency Management, Communications and Public Engagement	6	Med	General Fund, Williamson County & Cities Health District, Public Health Emergency Preparedness Grant
M-16	Locate, map, and publicize evacuation routes in the event of failure or breach of low-water dams	Reduce potential loss of lives in the event of dam failure or flood	Dam Failure, Flood	$50,000	Emergency Management, Communications and Public Engagement	6	Med	General Fund, Hazard Mitigation Grant
M-17	Conduct public education program to promote hazard mitigation activities identified outlined within the Drought Contingency Plan	Conserve water use during times of drought and extreme heat	Drought, Extreme Heat	$25,000	Communications and Public Engagement	6	High	General Fund, Hazard Mitigation Grant
M-18	Install hail guards for HVAC systems on critical facilities (fire stations, etc.) and support such efforts for non-City structures (nursing homes, hospitals, courthouses	Protect HVAC units by minimizing damage, reduce electrical costs, and prevent overheating units unable to properly cool critical facilities, and assure adequate air filtration and flow	Infectious Disease, Extreme Heat, Hail, High Winds, Lightning, Severe Storm, Tornado, Winter Weather	$40,000	Facilities, Fleet Services, Water	18	Low	General Fund, Hazard Mitigation Grant

Actions for the 2021 Plan Update – Includes relevant actions moved (M) forward from the 2014 plan and new (N) actions identified

Action #	Proposed Action	Risk Reduction Benefit	Hazard(s) Addressed	Cost Estimate	Agency and/or Department Managing	Implementation Timeframe (in months)	Priority	Potential Funding Source(s)
N-1	Purchase and deliver NOAA All-Hazard Radios to critical facilities		Dam Failure, Drought, Extreme Heat, Flood, Hail, High Winds, Lightning, Severe Thunderstorm, Tornado Wildfire, Winter Weather	$10,000	Emergency Management	8	Med	General Fund, Hazard Mitigation Grant
N-2	Purchase and deliver NOAA All-Hazard Radios that may include attachments to notify persons with vision or hearing impairments, or other notification needs, to vulnerable community members and stakeholders		Dam Failure, Extreme Heat, Flood, Hail, High Winds, Lightning, Severe Thunderstorm, Tornado Wildfire, Winter Weather	$20,000	Emergency Management	8	Med	General Fund, Hazard Mitigation Grant
N-3	Implement Syndromic Surveillance and Extreme Heat Mitigation Program	Reduce heat-related casualties/illness/injury during especially during summer months (May-October) and use the data to drive heat mitigation recommendations and actions, including opening cooling shelters, or providing fans to homes, etc.	Drought, Extreme Heat	$20,000	Emergency Management	8	Low	General Fund, Williamson County & Cities Health District, Public Health Emergency Preparedness Grant, Volunteer Assistance
N-4	Public Education Initiative to improve multi-language community education and outreach to mitigate and prepare for all hazards	Review and augment current initiatives used to reach out to persons for whom English is not their primary language.	Dam Failure, Drought, Extreme Heat, Flood, Hail, High Winds, Lightning, Severe Thunderstorm, Tornado Wildfire, Winter Weather	$3,000	Communications and Public Engagement, Planning, Emergency Management	6	High	General Fund, Hazard Mitigation Grant
N-5	Vehicle Protection for Hail and other extreme weather events	Protect vehicles and electronic systems, from damage and destruction, reduce impacts to services, and repair and/or replacement costs	Extreme Heat, Hail, High Winds, Lightning, Severe Storm, Tornado, Winter Weather	$200,000	Facilities, Fleet Services	10	High	General Fund, Hazard Mitigation Grant
N-6	Improve the City's and community's level of preparedness to extreme weather events with Community Engagement and Exercises	Lessen impact to residents, structures, and government such as those seen during the Severe Winter Storm 2021 and enhance resiliency.	Dam Failure, Drought, Extreme Heat, Flood, Hail, High Winds, Infectious Disease, Lightning, Severe Thunderstorm, Space Weather, Tornado	$25,000	City Manager's Office, Emergency Management	8	Med	General Fund, Hazard Mitigation Grant, Volunteer Assistance
N-7	Public Education and participation in point of dispersal flu vaccine (or water distribution) exercise with Williamson County and Cities Health District (WCCHD)	Benefits disease and/or water supply issues by practicing point of dispersal (POD) exercises and help the community to understand how to mitigate the risk of transmittable disease and infections, conserve water, and to take precaution measures to protect their family and the greater community.	Infectious Disease, Drought	$5,000	Emergency Management, Communications and Public Engagement	6	Low	General Fund, Hazard Mitigation Grant, Volunteer Assistance
N-8	Update city plans and procedures, in the EOP and Appendices, to disseminate timely and accurate warning to the public and government officials in the event of an emergency, to include, but not limited to expanded efforts to improve multilanguage outreach	Proficiency in all phases of Emergency Management is necessary to become more resilient. Expanding emphasis on multi-lingual outreach that includes "streamlining" of communications to ensure real-time notice, especially during an emergency, will enhance the opportunity to save lives and protect property.	Dam Failure, Drought, Extreme Heat, Flood, Hail, High Winds, Infectious Disease, Lightning, Winter Weather, Severe Thunderstorm, Tornado, Wildfire, Space Weather	$50,000	Emergency Management	8	High	General Fund, Hazard Mitigation Grant, Volunteer Assistance

Actions for the 2021 Plan Update – Includes relevant actions moved (M) forward from the 2014 plan and new (N) actions identified								
Action #	**Proposed Action**	**Risk Reduction Benefit**	**Hazard(s) Addressed**	**Cost Estimate**	**Agency and/or Department Managing**	**Implementation Timeframe (in months)**	**Priority**	**Potential Funding Source(s)**
N-9	Identify challenges to living close to wildlife	The City faces animal-related hazards resulting from its location near parks and forests, including invasive species (zebra mussels in Lake Georgetown) and overgrowth in the deer population.	Drought, Extreme Heat, Flood, Hail, High Winds, Infectious Disease, Lightning, Winter Weather, Severe Thunderstorm, Tornado, Wildfire, Vegetation Issues	$25,000	Parks and Recreation, USDA, and City Planning	10	Medium	General Fund, Volunteer Assistance, Wildlife Conservation grants, US Department of Agriculture, Texas Forest Service, Federal grants such as FEMA.
N-10	Strategic undergrounding	Identify critical overhead distribution feeders to improve grid reliability and system resiliency.	High winds, Icing, Vegetation issues.	$500,000/Year	Electric Engineering	Ongoing	High	CIP/Federal Grants/Revenues
N-11	Distribution System hardening /structural upgrades	Use of stronger materials and heavier overhead construction. Replace traditional wooden poles with concrete or composite materials	High winds, Icing, Vegetation issues.	TBD	Electric Engineering	Ongoing	High	CIP/Federal Grants/Revenues
N-12	Smart Grid/ Self-Healing Grid	Smartening the distribution system by investing in industry-leading distribution automation technologies such as Fault Location, Isolation, and Service Restoration (FLISR) technology.	Vulnerability due to electricity supply interruptions, extreme weather event and outages	$500,000/Year	Electric Engineering	Ongoing	Med	CIP/Federal Grants/Revenues
N-13	Utility Communication Network Hardening	Plan, Install and test redundant Information and Communication Technologies (ICT) used to monitor and Control Key Points on the electric distribution system.	Vulnerability due to electricity supply interruptions, extreme weather event and outages.	TBD	Electric Engineering	Ongoing	Med	CIP/Federal Grants/Revenues
N-14	Install netting around Substations	Install netting around substations to mitigate against birds flying into the structures. For what it's worth, other animal-like hazards the city is challenged with also include over abundant deer and zebra mussels in Lake Georgetown.	Vulnerability due to electricity supply interruptions, extreme weather event and outages.	TBD	Electric Engineering	Ongoing	Med	CIP/Federal Grants/Revenues
N-15	Microgrids with Storage	Identify critical areas of the distribution system and implement/install Microgrids to enhance resilience of electric infrastructure serving critical loads.	Vulnerability due to electricity supply interruptions, extreme weather event and outages.	TBD	Electric Engineering	Ongoing	Low	CIP/Federal Grants/Revenues

Potential funding sources

In addition to funding that may be provided by through City of Georgetown budget appropriations, resources listed in this section show funding available to support mitigation projects. Local jurisdictions may be able to access federal programs available to states by working in partnership with State entities on program design and implementation. While the City of Georgetown per se may not be eligible for all programs listed, the jurisdiction may participate in a regional partnership whereby it supports the cooperative efforts of other communities to create programs with broad geographic impact.

Federal government mitigation funding sources

Federal Emergency Management Agency (FEMA)

Program	Details
Flood Mitigation Assistance Program (FMA)	Provides funding to implement measures to reduce or eliminate the long-term risk of flood damage http://www.fema.gov/government/grant/fma/index.shtm
Hazard Mitigation Grant Program (HMGP)	Provides grants to implement long-term hazard mitigation measures after a major disaster declaration. http://www.fema.gov/government/grant/hmgp/index.shtm
National Flood Insurance Program (NFIP)	Enables property owners to purchase insurance as a protection against flood losses in exchange for state and community floodplain management regulations that reduce future flood damages http://www.fema.gov/business/nfip/
Fire Management Assistance Grants Program (FMAG)	Provides equipment and supplies purchases, overtime labor costs, temporary repairs of damage from firefighting activities, emergency work, evacuations and sheltering, search and rescue, mobilization, and demobilization.
Building Resilient Infrastructure and Communities (BRIC)	Building Resilient Infrastructure and Communities (BRIC) will support states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. BRIC is a new FEMA pre-disaster hazard mitigation program that replaces the existing Pre-Disaster Mitigation (PDM) program. https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities
Emergency Management Performance Grant (EMPG)	Helps communities program implement the National Preparedness System by supporting the building, sustainment, and delivery of core capabilities essential to achieving the National Preparedness with an overall goal of securing and creating a resilient nation. https://www.in.gov/dhs/emergency-response-and-recovery/emergency-management-performance-grant

Environmental Protection Agency (EPA)

The EPA awards funding for water management and wetlands protection programs that mitigate against future costs associated with hazard damage.

Program	Details	Notes
Clean Water Act Section 319 Grants	Grants for water source management programs including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and regulation. http://www.epa.gov/OWOW/NPS/cwact.html	Funds are provided only to designated state and tribal agencies
Clean Water State Revolving Funds	State grants to capitalize loan funds. States make loans to communities, individuals, and others for high-priority water-quality activities. http://www.epa.gov/owow/wetlands/initiative/srf.html	States and Puerto Rico
Wetland Program Development Grants	Funds for projects that promote research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution. http://www.epa.gov/owow/wetlands/initiative/#financial	
Targeted Watersheds Grants Program	Established in 2003, the Targeted Watersheds Grant program is designed to encourage successful community-based approaches and management techniques to protect and restore the nation's watersheds. https://www.epa.gov/nps/funding-resources-watershed-protection-and-restoration#Resources	

National Oceanic and Atmosphere Administration (NOAA)

NOAA is the major source for mitigation funding related to coastal zone management and other coastal protection projects. While the City of Georgetown is located inland, the jurisdiction may be able to participate in regional programs that include coastal areas and qualify for the resources shown here.

Program	Details	Notes
Coastal Services Center Cooperative Agreements	Funds for coastal wetlands management and protection, natural hazards management, public access improvement, reduction of marine debris, special area management planning, and ocean resource planning. http://www.csc.noaa.gov/funding/	May only be used to implement and enhance the states' approved Coastal Zone Management programs
Coastal Services Center Grant Opportunities	Formula and program enhancement grants for implementing and enhancing Coastal Zone Management programs that have been approved by the Secretary of Commerce. http://www.csc.noaa.gov/funding/	Formula grants require non- federal match
Coastal Zone Management Program	The Office of Ocean and Coastal Resource Management (OCRM) provides federal funding and technical assistance to better manage our coastal resources. http://coastalmanagement.noaa.gov/funding/welcome .ht ml	Funding is reserved for the nation's 34 state and territory Coastal Zone Management Programs
Marine and Coastal Habitat Restoration	Funding for habitat restoration, including wetland restoration and dam removal. http://www.nmfs.noaa.gov/habitat/recovery/	Funding available for state, local and tribal governments and for- and non-profit organizations.

Floodplain, Wetland and Watershed Protection Programs

USACE and the U.S. Fish and Wildlife Service offer funding and technical support for programs designed to protect floodplains, wetlands, and watersheds.

Program	Details	Notes
USACE Planning Assistance to States (PAS)	Fund plans for the development and conservation of water resources, dam safety, flood damage reduction and floodplain management. http://www.lre.usace.army.mil/planning/assist.html	50 percent non- federal match
USACE Flood Plain Management Services (FPMS)	Technical support for effective floodplain management. http://www.lrl.usace.army.mil/p3md-o/article.asp?id=9&MyCategory=126	

Program	Details	Notes
Texas Silver Jackets	Under National Flood Risk Management Program, promotes agency collaboration and coordination with interagency, state-led flood risk and multiple hazard management teams. Provides resources/tools for to support information sharing and networking, and to promotes flood risk awareness efforts. actions to reduce risk. http://silverjackets.nfrmp.us/	Under the auspices of, and in partnership with, the State of Texas Water Development Board
USACE Environmental Laboratory	Guidance for implementing environmental programs such as ecosystem restoration and reuse of dredged materials. http://el.erdc.usace.army.mil/index.cfm	
U.S. Fish & Wildlife Service Coastal Wetlands Conservation Grant Program	Matching grants to states for acquisition, restoration, management, or enhancement of coastal wetlands. http://ecos.fws.gov/coastal_grants/viewContent.do?view Page=home	
U.S. Fish & Wildlife Service Partners for Fish and Wildlife Program	Program that provides financial and technical assistance to private landowners interested in restoring degraded wildlife habitat. http://ecos.fws.gov/partners/viewContent.do?viewPage= home	Funding for volunteer-based programs

Office of Housing and Urban Development (HUD)

The Community Development Block Grants (CDBG) administered by HUD can be used to fund hazard mitigation projects.

Program	Details	Notes
Community Development Block Grants (CDBG) - DR	Grants to develop viable communities, principally for low- and moderate-income persons. CDBG funds available through Disaster Recovery Initiative. http://www.hud.gov/offices/cpd/communitydevelopment /programs/	Disaster funds contingent upon Presidential disaster declaration
Community Development Block Grants (CDBG) – Mitigation (MIT)	This unique program represents a significant opportunity for eligible grantees – those affected by recent disasters -- to carry out strategic and high-impact activities to mitigate disaster risks and reduce future losses by increasing resilience to disasters; and reducing or eliminating the long-term risk of loss of life, injury, damage to and loss of property, and suffering and hardship by lessening the impact of future disasters. https://www.hudexchange.info/programs/cdbg-mit/	For the initial appropriation, only Hidalgo County, TX is a qualified recipient

Disaster Recovery Assistance	Disaster relief and recovery assistance in the form of special mortgage financing for rehabilitation of impacted homes. http://www.hud.gov/offices/cpd/communitydevelopment /programs/dri/assistance.cfm	Individuals
Neighborhood Stabilization Program	Funding for the purchase and rehabilitation of foreclosed and vacant property in order to renew neighborhoods devastated by the economic crisis. http://www.hud.gov/offices/cpd/communitydevelopment/programs/neighborhoodspg/	State and local governments and non-profits

Bureau of Land Management (BLM)

Two Bureau of Land Management (BLM) technical assistance programs focus on community-based fire mitigation.

Program	Details
Community Assistance and Protection Program	Focuses on mitigation/prevention, education, and outreach. National Fire Prevention and Education teams are sent to areas across the country at-risk for wildland fire to work with local residents. http://www.blm.gov/nifc/st/en/prog/fire/community_assi stance.html
Firewise Communities Program	Effort to involve homeowners, community leaders, planners, developers, and others in the effort to protect people, property, and natural resources from the risk of wildland fire before a fire starts. http://www.firewise.org/

U.S. Department of Agriculture (USDA)

There are multiple mitigation funding and technical assistance opportunities available from the USDA and its various sub-agencies: The Farm Service Agency, Forest Service, and Natural Resources Conservation Service.

Program	Details	Notes
USDA Smith-Lever Special Needs Funding	Grants to State Extension Services at 1862 Land-Grant Institutions to support education-based approaches to addressing emergency preparedness and disasters. http://www.csrees.usda.gov/funding/rfas/smith_lever.htm	Population under 20,000
USDA Community Facilities Guaranteed Loan Program	Povides an incentive for commercial lending that will develop essential community facilities, such as fire stations, police stations, and other public buildings. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population under 20,000
USDA Community Facilities Direct Loans	Loans for essential community facilities. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population of less than 20,000

Program	Details	Notes
USDA Community Facilities Direct Grants	Grants to develop essential community facilities. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population of less than 20,000
USDA Farm Service Agency Disaster Assistance Programs	Emergency funding and technical assistance for farmers and ranchers to rehabilitate farmland and livestock damaged by natural disasters. http://www.fsa.usda.gov/	Farmers and ranchers
USDA Forest Service National Fire Plan	Funding for organizing, training, and equipping fire districts through Volunteer, State and Rural Fire Assistance programs. Technical assistance for fire related mitigation. http://www.forestsandrangelands.gov/	
USDA Forest Service Economic Action Program	Funds for preparation of Fire Safe plans to reduce fire hazards and utilize byproducts of fuels management activities in a value-added fashion. http://www.fs.fed.us/spf/coop/programs/eap/	80% of total cost of project may be covered
USDA Natural Resources Conservation Service Emergency Watershed Protection Support	Funds for implementing emergency measures in watersheds in order to relieve imminent hazards to life and property created by a natural disaster. http://www.nrcs.usda.gov/programs/ewp/	
USDA Natural Resources Conservation Service Watershed Protection and Flood Prevention	This program provides for cooperation between the Federal government and the states and their political subdivisions to work together to prevent erosion, floodwater and sediment damage, to further the conservation development, use and disposal of water, and to further the conservation and proper use of land in authorized watersheds. https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/wfpo/	
USDA Conservation Innovation Grants (CIG)	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. https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig/	
USDA Environmental Quality Incentives Program (EQIP)	Voluntary program that provides financial and technical assistance to agricultural producers through contracts up to a maximum term of ten years https://www.nrcs.usda.gov/wps/portal/nrcs/main/tx/programs/financial/eqip/	

Health and Economic Agencies

Alternative mitigation programs may be secured from health and economic agencies that provide loans and grants aimed primarily as disaster relief.

Program	Details	Notes
Department of Health & Human Services Disaster Assistance for State Units on Aging (SUAs)	Provide disaster relief funds to those SUAs and tribal organizations who are currently receiving a grant under Title VI of the Older Americans Act. http://www.aoa.gov/doingbus/fundopp/fundopp.asp	Areas designated in a Disaster Declaration issued by the President
Economic Development Administration (EDA) Economic Development Administration Investment Programs	Grants that support public works, economic adjustment assistance, and planning. Certain funds allocated for locations recently hit by major disasters. http://www.eda.gov/AboutEDA/Programs.xml	The maximum investment rate shall not exceed 50 percent of the project cost
U.S. Small Business Administration Small Business Administration Loan Program	Low-interest, fixed rate loans to small businesses for the purpose of implementing mitigation measures. Also available for disaster damaged property. http://www.sba.gov/services/financialassistance/index .ht ml	Must meet SBA approved credit rating

Corporation for National and Community Service (CNCS)

Program	Details
AmeriCorps Senior Corps Social Innovation Fund Volunteer Generation Fund	The nation's largest grant-maker for service and volunteering plays a critical role in strengthening America's nonprofit sector and addressing the nation’s challenges through service. Several programs harness America's most powerful resource – the energy and talents of our citizens – to solve problems. From grade school through retirement, CNCS empowers Americans and fosters a lifetime of service.

Research Grants

The United States Geological Survey (USGS) and the National Science Foundation (NSF) provide grant money for hazard mitigation-related research efforts.

Program	Details	Notes
National Science Foundation (NSF) Decision, Risk, and Management Sciences Program (DRMS)	Grants for small-scale, exploratory, high-risk research having a severe urgency with regard to natural or anthropogenic disasters and similar unanticipated events. http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423&org=SES	
U.S. Geological Survey (USGS) National Earthquake Hazards Reduction Program	The purpose of NEHRP is to provide products for earthquake loss reduction to the public and private sectors by carrying out research on earthquake occurrence and effects. http://www.usgs.gov/contracts/nehrp/	Community with a population under 20,000

State of Texas mitigation funding sources

Texas Water Development Board

Program	Details
FEMA Flood Mitigation Assistance Program (FMA)	As described under federal programs, the Texas Water Development Board (TWDB) manages grants to subgrantees for planning or project assistance to communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program. https://www.fema.gov/grants/mitigation/floods https://www.twdb.texas.gov/flood/grant/fma.asp
Flood Protection Planning Program	Planning assistance to communities in evaluation of structural and nonstructural solutions to flooding problems, including flood early warning systems and flood response plans. Upstream and/or downstream effects of proposed solutions must be considered in the planning. The proposed planning must be regional in nature and include an entire watershed. https://www.twdb.texas.gov/flood/planning/index.asp
Drinking Water State Revolving Fund	Below-market, fixed interest rate loans. Principal forgiveness for qualifying disadvantaged, green, very small systems, and urgent need projects. https://www.twdb.texas.gov/waterplanning/rwp/education/SimplifiedPlanningProcess.pdf
Rural Water Assistance Fund	Long-term, fixed interest rate loans that provide small, rural water utilities with low-cost, long-term financing for the planning, design acquisition, and construction of water and wastewater projects. www.twdb/texas.gov/publications/shells/rwaf.pdf

Program	Details
State Participation Program – Regional Water and Wastewater Facilities	Long-term, fixed interest rate financing through temporary TWDB ownership interest in a regional facility. https://www.twdb.texas.gov/innovativewater/reuse/projects/CRMWD%20RWPF/index.asp
State Water Implementation Fund for Texas (SWIFT)	Flexible financing options: low-interest loans, deferred loans, or temporary TWDB ownership interest. https://www.twdb.texas.gov/financial/programs/SWIFT/implementation.asp
Economically Distressed Areas Program	Provides financial assistance for the planning, design, acquisition, and construction of water and wastewater projects in economically distressed areas where service is unavailable or is inadequate to meet state standards. https://www.twdb.texas.gov/financial/programs/edap/index.asp
Agricultural Water Conservation Grants	Funding for conservation projects or programs. Among the conservation programs is the agricultural water conservation technical assistance program, including an on-farm soil and water conservation plan developed jointly by a landowner, an operator, and a local soil and water conservation district. Conservation projects include improving water use efficiency of water delivery and application, preparing irrigated land for conversion to dry land farming, and others. https://www.twdb.texas.gov/financial/programs/awcg/index.asp
Agricultural Water Conservation Loans	Funding for conservation projects or conservation programs as outlined in Agricultural Water Conservation Grants above. https://www.twdb.texas.gov/financial/programs/awcl/index.asp
Groundwater Conservation District Loan Program	Finance the startup costs (salaries and payroll taxes, utilities, travel, insurance, building and office leases, office supplies and furniture, telephone and computer equipment, and legal and professional fees) of groundwater conservation districts. https://www.twdb.texas.gov/financial/programs/GDLP/index.asp
Regional Water Planning Group Grants Program	Planning activities for the long-term (50-year) water supply needs of Texas. Tasks eligible for funding include determining future water demands, availability of current and future water supplies, identifying needs for additional supplies, recommending management strategies to meet water needs, and developing a regional water plan every five years. https://www.twdb.texas.gov/waterplanning/rwp/regions/index.asp
Regional Facility Planning Grant Program	Studies to evaluate and recommend the most feasible alternatives to meet regional (two or more participating entities or service areas) water supply and wastewater facility needs, estimate the costs associated with implementing the recommendations, and identify any institutional arrangements that may be necessary to provide regional water supply and wastewater services. Regional systems often have inherent operational advantages or economies of scale over stand-alone systems https://www.twdb.texas.gov/waterplanning/rwp/index.asp

Program	Details
Water Research Grant Program	Water research that addresses one of the Texas Water Development Board's designated research topics published in its most recent request for proposals. https://www.twdb.texas.gov/waterplanning/rwp/research/index.asp

Texas General Land Office (GLO)

Program	Details
Natural Resources Damage Assessment (NRDA)	Natural resource trustees are the designated federal, state and tribal agencies who are responsible for the natural resources impacted by an oil spill or hazardous substance release. In-state agencies that work together on these efforts include: The General Land Office: https://www.glo.texas.gov/ Texas Commission on Environmental Quality: http://www.tceq.texas.gov/remediation/nrtp/nrtp.html Texas Parks and Wildlife Department (TPWD) https://tpwd.texas.gov/landwater/water/environconcerns/damage_assessment

Texas Department of Agriculture

Program	Details
CDBG Program	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. http://www.texasagriculture.gov/GrantsServices/RuralEconomicDevelopment/RuralCommunityDevelopmentBlockGrant(CDBG).aspx
Agricultural Management Assistance (AMA)	Program 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. https://www.nrcs.usda.gov/wps/portal/nrcs/main/tx/programs/farmbill/
Agricultural Water Enhancement Program (AWEP)	The Agricultural Water Enhancement Program is a 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. https://www.texasagriculture.gov/tabid/76/Article/1061/awep.aspx
Wildlife Habitat Incentive Program (WHIP)	Voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and tribal land. https://tpwd.texas.gov/landwater/land/private/farmbill/whip/

Texas Department of Housing and Community Affairs

Program	Details
HOME Program	The program goal is to expand in rural areas the supply of decent, safe, affordable housing and strengthen public-private housing partnerships between units of general local governments, public housing authorities, nonprofits, and for-profit entities. Funding has been set aside funding for Disaster Relief and Persons with Disabilities, among others. https://www.tdhca.state.tx.us/home-division/home.htm

Texas Commission on Environmental Quality (TCEQ)

Program	Details
Nonpoint Source Grant Program	The TCEQ and the Texas State Soil and Water Conservation Board (TSSWCB) administer federal grants for activities that prevent or reduce nonpoint source pollution. Grants are awarded annually and fund projects for up to three years. The TCEQ usually solicits grants in the summer of each year. Opportunities and instructions for how to apply are published on the web site below. The grants are made available through a federal program authorized under §319 of the Clean Water Act (CWA). http://www.tceq.texas.gov/waterquality/nonpoint-source/grants/grant-pgm.html
American Recovery and Reinvestment Act (ARRA)	State-managed program utilizing federal funding, ARRA provided significant funding for states to finance high priority water infrastructure projects through a $2 billion appropriation to the DWSRF (see below) program and a $4 billion appropriation to the CWSRF (see below) program. EPA's CWSRF & DWSRF ARRA Implementation webpage provides information on the status of ARRA implementation as well as guidance and resources for states and other stakeholders. http://water.epa.gov/grants_funding/
Clean Water State Revolving Fund	Provides attractive, low-cost funding for projects that improve water quality, renew wastewater infrastructure, and support local economies. The independent, revolving loan funds all 50 states and Puerto Rico to administer the SRF program, providing financial assistance to local communities. https://www.twdb.texas.gov/financial/programs/CWSRF
Drinking Water State Revolving Fund (DWSRF)	The Safe Drinking Water Act, through the DWSRF, 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. https://www.twdb.texas.gov/financial/programs/DWSRF/index.asp

SECTION 6: PLAN MAINTENANCE

FEMA REQUIREMENTS – Element A - PLANNING PROCESS

A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))

A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))

A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

The City of Georgetown will implement the Plan, continue to evaluate the document at least annually, and enhance it over time as appropriate. Continual public involvement is also addressed. The sustained hazard mitigation planning process consists of three main parts:

- Incorporation into existing planning mechanisms
- Monitoring and evaluation
- Continued public involvement

Incorporation into Other Planning Mechanisms

The City of Georgetown will be responsible for further development and implementation of mitigation actions. Each action has been assigned to a specific department within the City. Table 6-1 describes the process by which Georgetown will incorporate relevant information of the Hazard Mitigation Plan into other planning mechanisms such as the Community Wildfire Protection Plan and Flood Protection Plan Appendices within the Williamson County plans. The City will also review the HMP for risks to ensure that they are considered in the Georgetown 2030 Plan, as well as other plans in which natural hazard risk is a consideration. Once the Plan is adopted, the City will consider implementation of actions based on priority and the availability of funding and resources. The City already implements policies and programs to reduce loss to life and property from hazards and many of these are carried out on an ongoing basis. The mitigation actions developed for this Plan build upon that effort and will be implemented through other program mechanisms to the fullest extent possible.

The potential funding sources listed for each identified action may be used when the jurisdiction begins to seek funds to implement actions. An implementation time period has been assigned to each action as a gauge for the time required to complete each project, from start to finish.

Georgetown will integrate implementation of its mitigation actions with other plans and policies such as construction standards, building codes, and emergency preparedness plans and ensure that these actions, or proposed projects, are reflected in other planning efforts as applicable. Coordinating and integrating components of other plans and policies into goals and objectives of the HMP will also help leverage funding opportunities and potential cost-sharing of key projects. Upon formal adoption of the Plan, the City's Emergency Management Coordinator or their designee will help responsible plan managers to integrate hazard mitigation strategies and pertinent information into existing plans. As list (not all inclusive) is provided below of planning mechanisms that can benefit from the Hazard Mitigation information and strategies.

Table 6.1 - Process of Incorporation by Planning Mechanism

Planning Mechanism	Incorporation of Plan
Grants Applications	The Plan will be consulted by Planning Team Members whenever grant funding is sought for mitigation projects. If a project that has not been previously identified, is not in the Plan, an adjustment can be made as necessary to include the action in the Plan.
Annual Budget Review	Various departments and key personnel that participated in the planning process will review the Plan and mitigation actions therein when conducting their annual budget review. Allowances will be made in accordance with grant applications sought or mitigation actions that will be undertaken according to the implementation schedule of the specific
Regulatory Plans	Currently, Plan to name a few. The HMP has been and will continue to be consulted when City departments review or revise their current regulatory planning mechanisms, or in the development of regulatory plans that are not currently in place.
Capital Improvement Plan	Georgetown has a Capital Improvement Plan (CIP) in place. Prior to any revisions to the CIP, City departments will review the risk assessment and mitigation strategy sections of the HMP, as limiting public spending in hazardous zones is one of the most effective long- term mitigation actions available to local governments.
Comprehensive Plan	Georgetown has a Comprehensive 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.
Community Flood Protection Plan	The Williamson County Office of Emergency Management has developed and implemented the Interjurisdictional Community Flood Protection Plan (CFPP) 2019 with other jurisdictions and stakeholders within the county and region. The City of Georgetown is part of the Core Planning Team and supported coordinated efforts and information sharing between City stakeholders and County plan developers. The CFPP is intended to be a living document that captures the dynamic nature of flooding and its impacts, and to identify multi-jurisdictional flood mitigation projects.
Community Wildfire Protection Plan	The Williamson County Office of Emergency Management developed and implemented the Community Wildfire Protection Plan (CWPP) 2018 with other jurisdictions and stakeholders within the county and region. The City of Georgetown supported *Annex 6: Georgetown Fire*

Planning Mechanism	Incorporation of Plan
	Department. The plan provides a comprehensive view of the wildfire risk and sets forth goals and objectives and actions and policies designed to reduce the risk and impact of wildfire in Williamson County.

Monitoring and Evaluation

Periodic revisions of the Plan are required to ensure that the goals, objectives, and mitigation action plans are kept current. More important, revisions may be necessary to ensure that the Plan is in full compliance with federal regulations and state statutes. This portion outlines the procedures for completing such revisions and future updates for the City. More importantly, the monitoring and evaluation process includes a review of all elements associated with its most recent plan. These include paying attention to, and documenting how, the reviews address the planning process; foster ongoing continued public involvement; revisit the risk, vulnerability, and capability assessments; and the mitigation strategy. It is expected that a growing region like the City of Georgetown may see the need for additional discussion of one or more of these elements. Documentation of discussion will help to ensure that appropriate updates and changes are included in the 2026 plan update.

Monitoring

The City of Georgetown will oversee the monitoring and evaluation process, although designated Hazard Mitigation Plan Team Members and action managers, will be responsible for monitoring the status of components of the hazard mitigation plan related to their department or agency. The Emergency Management Coordinator or designee will organize an annual meeting to discuss the progress made on implementation of the mitigation actions, discuss challenges to action implementation, and review overall progress of plan implementation. Those responsible for plan monitoring and implementation and shown in Table 6-2.

Table 6.2 – Planning Team Members Responsibility for Evaluation and Monitoring of the Plan

DEPARTMENT/ORGANIZATION	TITLE	RESPONSIBILITY
Mayor	Emergency Management Director	Presiding Officer and Approving Authority
Community Services	Emergency Management Coordinator	Plans Administration and Plans Management
City Department or Entity as Assigned	Project Action Managers	Project Management
City Department or Entity as Assigned	Emergency Support Function (ESF) Coordinators	Project and Actions Support

Evaluation

Each year, Planning Team Members will meet to evaluate the hazard mitigation plan and projects status. As part of the evaluation process, they will assess any changes in risk, determine whether implementation of mitigation actions is on schedule, or if there are any implementation problems (such as technical,

political, legal or coordination issues), and reflect changes in development and capabilities. The development of land or construction programs that affect the risk and mitigation priorities will also be considered during plan updates and evaluation. This process will help determine if any plan updates are necessary. Additionally, post disaster reviews may help in ensuring that risks are reviewed and updated and that the actions are receiving proper prioritization.

Plan Amendments

At any time, minor technical changes may be made to the Plan to keep it updated. However, material changes to the mitigation actions or major changes in the overall direction of the Plan or the policies contained therein will be subject to formal adoption by the governing body.

At the end of the comment period, the proposed amendment and any comments will be forwarded to the governing body of the City of Georgetown. Planning Team members will then review the proposed amendment and comments received, and vote to accept, reject, or amend the proposed change. Upon ratification, the amendment will be transmitted to TDEM.

In determining whether to recommend approval or denial of a plan amendment request, the following factors will be considered:

- Errors or omissions made in the identification of issues or needs during the Plan preparation;
- New issues or needs that were not adequately addressed in the Plan; and
- Changes in information, data, or assumptions from those on which the Plan was based.

Five (5)-Year Review

The Plan will be thoroughly reviewed by the Planning Team every five years to determine whether there have been significant changes in the planning area necessitating changes in the types of mitigation actions proposed. The plan will also be reviewed after each occurrence of major hazard incidents, particularly those triggering a federally disaster declaration for the community.

As with the development of this Plan, the Emergency Management Coordinator or their designee for the City of Georgetown will oversee the review process. At the beginning of each fiscal year, Planning Team members will meet once to evaluate the Plan. In addition, participants will also meet twice a year, by conference call or presentation, to discuss the status of implementing each mitigation actions New developments in identified hazard areas, an increased exposure to hazards, disaster declarations, the increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the content of the Plan.

Plan reviews will provide an opportunity to evaluate those actions that have been implemented successfully, and to document potential losses avoided due to the implementation of specific mitigation measures. The plan review also provides the opportunity to review the relevant risk for actions that have not been implemented or assigned and re-assess how they can be feasibly implemented.

Following the five-year review, revisions deemed necessary will be summarized and utilized according to

the reporting procedures and plan amendment process outlined herein. Upon completion of the review and update/amendment process, the revised plan will be submitted to TDEM for final review and approval in coordination with FEMA.

Continued Public Involvement

Input from the public was an integral part of the preparation of this Plan and will continue to be essential throughout the monitoring and evaluation process. Changes or suggestions to this Plan will provide opportunities for community input to include neighborhood association forums, special events, and other engagement opportunities.

Once this plan is formally adopted, it will be available on the City of Georgetown website (https://georgetown.org), where officials and the public are invited to provide ongoing feedback. Copies of the Plan also will be kept for public review at the Georgetown Public Library.

Ongoing mitigation efforts will also be shared with the public through notices posted on its many communications vehicles. These include the City's Facebook page, Twitter feed, cable access television channel, and print and electronic media. Additional efforts will be made using multi-lingual communications in an effort to reach those for whom English is not their primary language. The City will also utilize local media to notify the public of any maintenance or periodic review activities taking place.