ROCKWALL COUNTY

Hazard Mitigation Plan

Mitigating Risk for a Safe, Secure, and Sustainable Future

DRAFT: August 1, 2016

For more information, visit our website at:

www.rockwallcountytexas.com

Written comments should be forwarded to:

H2O Partners, Inc.

P. O. Box 160130

Austin, Texas 78716

info@h2opartnersusa.com

www.h2opartnersusa.com

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Section 1: Introduction

Background

Rockwall County is the smallest county in Texas, covering only 147 square miles. It was formed in 1873, splitting from Kaufman County after citizens thought the county seat of Kaufman was too inconvenient. The County shares its name with the county seat, Rockwall, which comes from the wall-like subterranean rock formation that runs throughout the county. Bounded on the west by Lake Ray Hubbard, it has become a very desirable residential area for the continuously growing Dallas Metropolitan area, and in 2010 it was one of the top twenty-five fastest-growing counties in the U.S. Rockwall County has a population of 87,809 according to the U.S. Census Bureau's 2014 Population Estimates, and it is currently listed as the 6th wealthiest Texas County.

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

While it is impossible to prevent a hazard event from occurring, the impact of hazards can be lessened in terms of their effect on people and property through effective hazard mitigation planning and implementation. This Hazard Mitigation Action Plan, or *the Plan,* provides an opportunity for the County to evaluate successful mitigation actions and explore opportunities to avoid future disaster loss.

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."[2] Mitigation differs from emergency preparedness and protective measures, which focus on activities designed to make communities more prepared to take appropriate action in a disaster with emergency response and equipment. Mitigation activities involve alteration of physical environments to reduce risks and vulnerabilities to hazards and make it more cost-effective to respond to, and recover from, disasters.

[1] http://floodsafety.com/texas/regional_info/regional_info/dallas_zone.htm
[2] www.fema.gov

Scope and Participation

Rockwall County's Hazard Mitigation Action Plan, or *the Plan,* is a multi-jurisdictional Plan. The participating jurisdictions include the City of Rockwall, the City of Royse City, the City of Fate, the City of Heath, the City of McLendon-Chisholm, the City of Mobile City, Rural Rockwall County, along with two independent school districts, Rockwall Independent School District, and Royse City Independent School District. These jurisdictions provided valuable input into the planning process.

The focus of the Plan is to mitigate those hazards selected from the State Hazard Mitigation Plan which are deemed to pose a risk to the planning area. For each of the hazards selected, a detailed risk assessment was conducted as part of the hazard mitigation planning process. The risk assessment enables the County to prioritize mitigation actions based on hazards that pose the greatest risk to lives and property.

Purpose

The Plan, prepared by Rockwall County and H2O Partners, Inc., is an opportunity for the Rockwall County's planning team members to evaluate successful mitigation actions and explore opportunities to avoid future disaster loss.

In developing the Plan, Rockwall County identified 9 hazards to be addressed in developing mitigation projects, as the goal of the Plan is to minimize or eliminate long-term risk to human life and property from known hazards, and identify and implement cost-effective mitigation actions. Therefore, the purpose of the Plan is to develop successful mitigation projects to reduce future risk in the community, including loss of life and property damage throughout Rockwall County.

Through this process, Rockwall County seeks to:

- Assess any previous mitigation projects and develop unique mitigation strategies to meet future development and risks;
- Encourage improvements in floodplain management, participate in the National Flood Insurance Program (NFIP); and qualify for FEMA's Community Rating System, thereby reducing flood insurance premiums for citizens;
- Devise solutions to strengthen emergency management by addressing moderate and high risk natural hazards; and
- Develop and implement comprehensive mitigation planning activities for Rockwall County, and integrate these activities into existing planning mechanisms.

Authority

The Plan will be tailored specifically for the Rockwall County planning area. When complete, the Plan will comply with all requirements promulgated by the Texas Division of Emergency Management (TDEM) and all applicable provisions of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Section 104 of the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390), and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108–264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al). 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). The Plan will also be developed in accordance with FEMA's Community Rating System (CRS) Floodplain Management Plan standards and policies.

Summary of Sections

Sections 1 and 2 of the Plan outline the purpose and the process of development. Section 3 profiles Rockwall County and participating jurisdictions in terms of population and economy, while Section 4 provides an overview of the people and property at risk and hazards facing the area, including the process of identification and risk assessment methodologies utilized.

Sections 5 through 13 present a hazard overview and information on individual hazards. For each hazard, the Plan presents a description of the hazard, a list of historical hazard events, and the results of the vulnerability and risk assessment process.

Section 14 presents mitigation goals and objectives. Mitigation actions for the County and participating jurisdictions are presented in Section 15, while Section 16 identifies plan maintenance mechanisms.

The list of planning team members and stakeholders is located in Appendix A. Public Survey Results are analyzed in Appendix B. Appendix C contains a detailed list of critical facilities for the area, and Appendix D lists dam locations. Appendix E contains information regarding workshops and meeting documentation.

Section 2: Planning Process

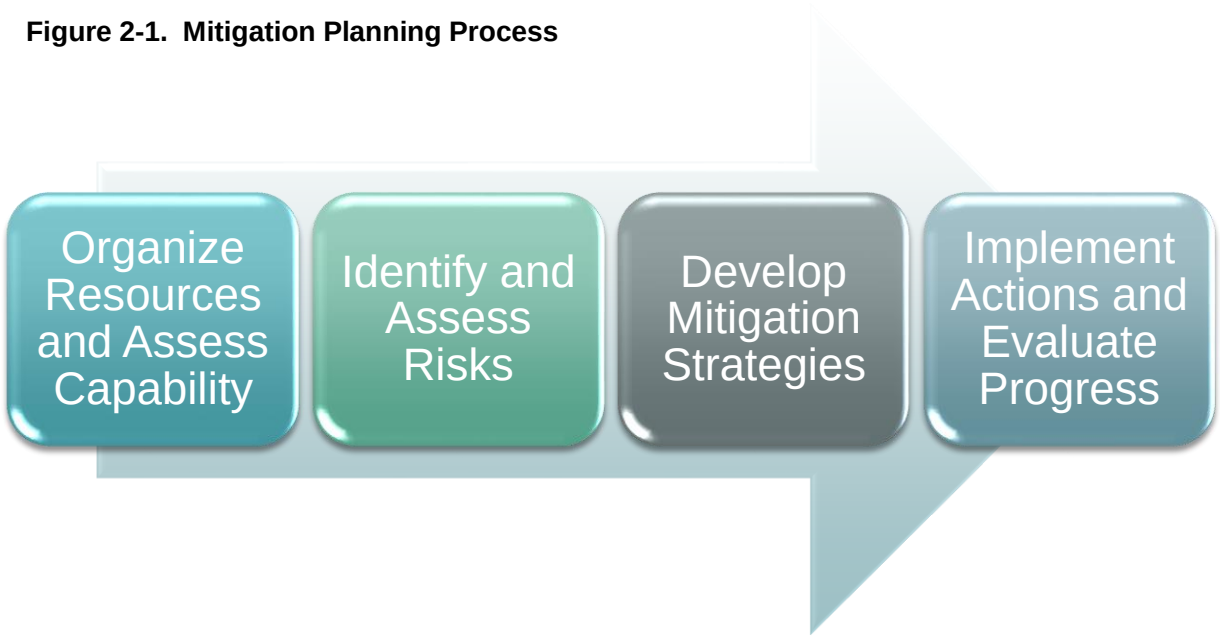
Plan Preparation and Development

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

Overview of the Plan

Rockwall County solicited bids and hired the consultant team of H2O Partners, Inc. to provide technical support and oversee the development of the Hazard Mitigation Action Plan, or *the Plan*. In developing the Plan, the consultants used the October 2011 *Local Multi-Hazard Mitigation Planning Guidance*, *the State and Local Mitigation Planning How-to Guides* (FEMA Publication Series 386), and the March 2013 *Local Mitigation Planning Handbook* to create the Plan in accordance with the process, as shown in Figure 2-1 below.

Figure 2-1. Mitigation Planning Process



Rockwall County and the consultant team met in October 2015 to begin organizing resources by identifying Planning Team members and conducting a Capability Assessment.

Planning Team

The Planning Team was established using a direct representation model. Key members of H2O Partners, Inc. developed the Plan in conjunction with the Advisory Committee and the Planning Team. The Advisory Committee was comprised of Rockwall County staff. The Planning Team consisted of key staff from the participating jurisdictions and ISDs. A Stakeholder Working Group was invited to participate via email, attend meetings, and was integral to providing comments and data for the Plan. Appendix A provides a complete listing of all participating Planning Team members and stakeholders by organization and title.

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

- The nature/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; and
- How Rockwall County, agencies, and partners will participate in the implementation process.

Based on results of completed Capability Assessments, Rockwall County also described methods for achieving mitigation in the future by expanding on their existing capabilities. Sample mitigation actions developed with similar hazard risk by planning team members were shared at the meetings. These

important discussions resulted in development of multiple mitigation actions that are included in the Plan to further mitigate risk from natural hazards in the future.

Table 2-1. Advisory Committee Planning Team

ORGANIZATION	TITLE
Rockwall County	Emergency Management Coordinator
Rockwall County	County Judge

Table 2-2. Planning Team Members

ORGANIZATION	TITLE
Rockwall County Office of Emergency Management	EMC Volunteer
Rockwall County Office of Emergency Management	Emergency Management Specialist
Rockwall County Sheriff's Office	Captain
City of Fate	City Manager
City of Fate Department of Public Safety	Captain
City of Heath Department of Public Safety	Detective
City of Heath Department of Public Safety	Sergeant
City of Heath Department of Public Safety	Fire Marshal
City of McLendon-Chisholm	City Manager
City of Mobile City	Mayor
City of Rockwall	Emergency Management Coordinator
City of Rockwall Engineering	Assistant City Engineer
City of Rockwall Engineering	Engineer
City of Rockwall Fire Department	Fire Chief
City of Rockwall Police Department	Lieutenant
City of Rockwall Police Department	Lieutenant
City of Rockwall Streets and Drainage	Street Superintendent
City of Royse City	Fire Chief
Rockwall Independent School District	Principal
Royse City Independent School District	Principal

Section 2: Planning Process

Planning Process

The process to prepare this Plan included following the four major steps included in Figure 2-1. After the Planning Team was organized, a Capability Assessment survey was developed and distributed at the Kick-Off Workshop. Hazards were identified and assessed, and results associated with each of the hazards were provided at the Risk Assessment Workshop. Based on hazard risk and vulnerabilities to the planning area, specific mitigation strategies were discussed and created at the Mitigation Workshop. Finally, Section 16 includes Plan Maintenance and Implementation procedures that were developed in conjunction with the planning process. Documentation for participation at each workshop is found in Appendix E.

Kickoff Workshop

The Kickoff Workshop was held at the Rockwall County Sheriff's Office on October 27, 2015. This initial meeting was an opportunity to inform County officials and participating jurisdictions and school districts about how the planning process pertained to their distinct roles and responsibilities. It also served as an opportunity to discuss methods to involve stakeholder groups such as the East Texas Community Emergency Response Team, the Rockwall Chamber of Commerce, and area businesses. In addition to the kickoff presentation, participants received the following information:

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

A risk ranking exercise was conducted at the Kickoff Workshop to get input from the Planning Team and stakeholders pertaining to various risks from a list of natural hazards affecting the planning area. Participants ranked hazards high to low in terms of perceived level of risk, frequency of occurrence, and potential impact.

Hazard Identification

At the close of the Kickoff Meeting, and through a series of email and phone correspondences, the Planning Team conducted preliminary hazard identification. The group reviewed and considered a full range of natural and human-caused hazards, then narrowed the list to significant hazards by reviewing hazards affecting the area as a whole, the State of Texas Hazard Mitigation Plan, and initial study results from reputable sources such as federal and state agencies. Based on this initial analysis, the team identified a total of nine natural hazards that pose risk to the planning area.

Risk Assessment

An initial risk assessment for the County and participating jurisdictions was completed in October 2015. The results of the assessment were presented at a workshop held on February 5, 2016. Participants and stakeholder groups were invited to the Risk Assessment Workshop. At this workshop, the characteristics and consequences of each hazard were evaluated to determine how much of the area would be affected, in terms of potential danger to property and citizens.

Potential dollar losses from each hazard were estimated using the Federal Emergency Management Agency's Hazards U.S. Multi-Hazards (MH) Model (HAZUS-MH) and other modeling techniques. The assessments examined the impact of various hazards on the built environment, including general

building stock (e.g., residential, commercial, industrial), critical facilities, lifelines, and infrastructure. The resulting risk assessment profiled hazard events, provided information on previous occurrences, estimated probability of future events, and detailed the spatial extent and magnitude of impact on people and property. Each participant was also provided a risk ranking sheet at the Risk Assessment workshop and was asked to rank hazards in terms of perceived level of risk, frequency of occurrence, and potential impact.

The assessments were also used to set priorities for mitigation strategy based on potential dollar losses and loss of lives. A hazard profile and vulnerability analysis for each of the hazards may be found in Sections 5 through 13 in this Plan.

Mitigation Review and Development

The mitigation strategy development for the Plan involved developing mitigation goals and new mitigation actions. A Mitigation Workshop was held at the Rockwall County Sheriff's Office on March 29, 2016. As with the Risk Assessment Workshop, stakeholder groups were invited.

An inclusive and structured process was used to develop and prioritize new mitigation actions for the Plan, including the following steps:

- A "menu" of optional mitigation actions was developed based on plan reviews, studies, and interviews with federal, state, and local officials. The participants reviewed the optional mitigation actions, and narrowed the list down to those that were most applicable to their area of responsibility, most cost-effective in reducing risk, could be effectively implemented, and would be most likely to receive institutional and community support.
- The participants inventoried federal and state funding sources that could potentially assist in implementing the proposed mitigation actions. Information was collected, including the program name authority, purpose of the program, types of assistance and eligible projects, conditions on funding, types of hazards covered, matching requirements, application deadlines, and points of contact for participants. Mitigation Planning Team members considered benefits that would result from the mitigation actions, versus the cost of those projects. Detailed cost-benefit analyses were beyond the scope of this Plan; however, economic evaluation was one factor that helped Team Members select one mitigation action from competing actions.
- Team Members then selected and prioritized mitigation actions.

The prioritization method was based on FEMA's STAPLE+E criteria and included social, technical, administrative, political, legal, economic, and environmental considerations. As a result of this exercise, an overall priority was assigned to each mitigation action by each Team Member. The overall priority of each action is reflected in the mitigation actions found in Section 15.

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.

Mitigation actions identified in the process were made available to the Planning Team for review. In addition, the Plan will be made available for review and comment on Rockwall County's website.

Review of Existing Plans, Plan Integration, and Updates

A variety of existing studies, plans, reports, and technical information were reviewed as part of the planning process. Sources of the information included FEMA, the United States Army Corps of Engineers (USACE), the U.S. Fire Administration, the National Oceanic and Atmospheric Administration (NOAA), the Texas Water Development Board (TWDB), the Texas Commission on Environmental Quality (TCEQ), the State Comptroller, the Texas State Data Center, Texas Forest Service, the Texas Division of Emergency Management (TDEM), and local hazard assessments and plans.

Section 4 and the hazard-specific sections of the Plan (Sections 5-13) summarize the findings from these sources. 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 documents, including those from NOAA's National Climatic Data Center (NCDC), provided previous hazard occurrences and descriptions of the events in the area. The USACE studies were reviewed for their assessment of risk and potential projects in the region. State Data Center documents were used to obtain population projections. Materials from FEMA and TDEM were reviewed for guidance on plan development requirements. The preliminary results were also presented at the Risk Assessment Workshop in order to facilitate a discussion on risk to help participants appropriately complete Mitigation Action worksheets. Furthermore, these studies were used as a starting point for suggesting grant and mitigation activities based on flood-related funding availability. The State Comptroller materials were reviewed for county economic projections, which were also used to fully develop Section 3 of the Plan. Information from the Texas Forest Service was used to appropriately rank the wildfire hazard, and to help identify potential grant opportunities. The State of Texas Mitigation Plan, developed by TDEM, was discussed in the initial planning meeting in order to develop a specific group of hazards to address in the planning effort. The State Mitigation Plan was also used as a guidance document, along with FEMA materials, in the development of the Plan.

Incorporation of the HMAP into Other Planning Mechanisms

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

Rockwall County and each participating jurisdiction will be responsible for implementing its own mitigation actions contained in Section 15. Each action has been assigned to a specific person or local government office that is responsible for implementing it. The governing bodies of each participating jurisdiction will adopt the mitigation action plan for their jurisdiction.

A funding source has been listed for each identified action. This source may be used when the jurisdiction begins to seek funds to implement the action. An implementation time period or a specific implementation date also has been assigned to each action as an incentive for seeing the action through to completion and to gauge whether actions are implemented on a timely basis.

Participating jurisdictions will integrate implementation of their mitigation action plans with other, existing planning mechanisms such as annual budget reviews, comprehensive plans, emergency response or disaster response plans, local ordinances and protocols, evacuation plans, and regional planning efforts. Jurisdictions will ensure that the actions contained in the mitigation action plan are reflected in these other planning efforts. These other planning efforts will be used to advance the mitigation strategies of the jurisdiction.

Table 2-3. Designated Planning Team Members Responsible for Plan Review, Integration, and Updates

ORGANIZATION	TITLE
Rockwall County Office of Emergency Management	Emergency Management Coordinator
Rockwall County Office of Emergency Management	County Judge
City of Fate	City Manager
City of Heath Department of Public Safety	Fire Marshal
City of McLendon-Chisholm	City Manager
City of Mobile City	Mayor
City of Rockwall	Emergency Management Coordinator
City of Royse City	Fire Chief
Rockwall Independent School District	Principal
Royse City Independent School District	Principal

Upon formal adoption of the Plan, Planning Team members from the County will review existing plans identified here, along with building codes to guide and control development. Planning Team members, shown in Table 2-3, will be responsible for coordinating periodic review of the Plan to ensure integration of hazard mitigation strategies into these planning mechanisms and codes. The designated Planning Team (Table 2-3) will also conduct periodic reviews of its various existing planning mechanisms and analyze the need for any amendments or updates in light of the approved Plan. The County will ensure that future long-term planning objectives will contribute to the goals of this hazard mitigation plan to reduce the long-term risk to life and property from moderate and high risk hazards. Within one year of formal adoption of the hazard mitigation plan, existing planning mechanisms will be reviewed and analyzed as they pertain to the hazard mitigation plan.

Planning Team members will review and revise, as necessary, the long-range goals and objectives in their strategic plan and budgets to ensure that they are consistent with the mitigation plan. Further, the County will work with neighboring jurisdictions to advance the goals of the Plan as it applies to ongoing, long-range planning goals and actions for mitigating risk to natural hazards throughout the planning area.

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

Table 2-4. Examples of Methods of Incorporation

PLANNING MECHANISM	METHOD OF INCORPORATION
Grant Applications	Jurisdictions and school districts will consult the Plan whenever there are yearly grant funding cycles available through FEMA, including the Pre-Disaster Mitigation (PDM) cycle, and when there is a Disaster Declaration for Texas triggering Hazard Mitigation Grant Program (HMGP) funds. Mitigation actions for each jurisdiction will be reviewed by the planning team members and information will be updated for completing applications, such as maps and risk assessment data. If a project is not in the Plan, an amendment may be developed.
Annual Budget Review	Each jurisdiction and school district that participated in the planning process will review the Plan and mitigation actions therein when conducting its annual budget review. When allocating funds for upcoming operating and construction budgets, high priority mitigation actions will be reviewed during City Council meetings, Independent School District Board meetings, and Commissioner Court meetings. Each identified staff member/planning Team member will be responsible for bringing mitigation actions to the meeting to discuss feasibility of the potential project in terms of the availability of funds, grant assistance, and preliminary cost benefit review.
Emergency Planning	The Plan will be consulted during updates to each jurisdiction's local emergency and/or disaster recovery plan. Risk assessment and vulnerability data will be pulled from the plan and analyzed in conjunction with the review, renewal, or re-writing of an Emergency Operations or Management Plan. This data will either be included within the new emergency planning mechanism or included as an appendix. Mitigation projects that relate to prevention and protection will also be reviewed for relevance to determine if they should be included.

PLANNING MECHANISM	METHOD OF INCORPORATION
Comprehensive/Capital Improvements	Before any updates to the Comprehensive/Capital Improvement Plans (CIP) are conducted, the County will review the risk assessment and mitigation strategy sections of the Plan, as limiting public spending in hazardous zones is one of the most effective long-term mitigation actions available to local governments. Profile information and data regarding NFIP compliance and maintenance will be reviewed in conjunction with any CIP that is developed. If new census or land use data is available, this information should be added to the Plan Update.
Floodplain Management Plan and Fire Protection	The Plan will be utilized in updating and maintaining floodplain management and fire protection plans, as the goals of both planning mechanisms are similar. In updating or maintaining these plans, the Plan will be consulted for National Flood Insurance Program compliance, flood risk, wildfire risk, and extent. Information from these sections will be reviewed for inclusion. In addition, mitigation actions that address wildfire and flood will be reviewed for inclusion.

Plan Review and Plan Update

As with the development of this Plan, Rockwall County will oversee the review and update process for relevance and to make adjustments, as necessary. The title of the person(s) responsible for Plan review and updates are found above in Table 2-3. At the beginning of each fiscal year, Team Members will meet to evaluate the Plan and review other planning mechanisms to ensure consistency with long-range planning efforts.

Timeline for Implementing Mitigation Actions

Planning Team members will engage in discussions regarding a timeframe for how and when to implement each mitigation action. Considerations include when the action will be started, how existing planning mechanisms' timelines affect implementation, and when the action should be fully implemented. Timeframes may be general, and there will be short, medium, and long term goals for implementation based on prioritization of each action, as identified on individual Mitigation Action worksheets included in the Plan for Rockwall County.

The Planning Team will evaluate and prioritize the most suitable mitigation actions for the community to implement. For some of the participating jurisdictions, the timeline for implementation of actions will partially be directed by their comprehensive planning process or capital improvements plan; for other jurisdictions, budgetary constraints and community needs will affect the timeline for implementation. For example, unincorporated Rockwall County has identified multiple high priority actions for implementation such as installing permanent generators at all critical facilities, and installing automatic flood warning gates to prevent access into flooded areas. These will be addressed as such with respect to other existing plans and budgetary constraints that need to be considered. Overall, the

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

Stakeholder and Public Involvement

An important component of mitigation planning is public participation and stakeholder involvement. Input from individual citizens and the community as a whole provides the Planning Team with a greater understanding of local concerns, and increases the likelihood of successfully implemented 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 and stakeholder input in the development of the Rockwall County Hazard Mitigation Action Plan was sought at separate periods, throughout the planning process, and prior to official Plan approval and adoption. Input was sought using three methods: (1) open public meetings, (2) survey instruments, and (3) ensuring the draft Plan deliverables were available for public review on Rockwall County's website and in government offices. Additionally, a series of open public meetings were held during the development of the Plan, as described below.

The draft Plan was made available to the general public for review and comment on the Rockwall County website and their offices. The public was notified at the public meetings that the draft Plan would be available on the County's website. No feedback was received on the draft Plan, although it was given on the public survey, and all relevant information was incorporated into the Plan.

A copy of the Plan will be kept at the County offices upon approval from FEMA.

Stakeholder Involvement

Stakeholders provide an essential service in hazard mitigation planning; therefore, throughout the planning process, members of community groups, local businesses, neighboring jurisdictions, schools, and hospitals were invited to participate. The Stakeholder Working Group (Table A-3, Appendix A, and Table 2-5, below), is formed from a broad range of representatives from both the public and private sector, and served as a key component in the County's outreach efforts for development of the Plan. A list of organizations invited to attend via email may be found below.

Table 2-5. Stakeholder Working Group

ORGANIZATION	TITLE
East Texas Community Emergency Response Team	Program Director
Family Safe of Texas Storm Shelters	Owner
Rockwall Community Emergency Response Team	Coordinator
Texas Forest Service	Regional Fire Coordinator

ORGANIZATION	TITLE
Blue Ribbon News	Reporter
Rockwall Chamber of Commerce	President, Director
TH Enterprises, Inc.	President
Ebby Halliday Realtors	Realtor
Lowe's	Assistant Store Manager
Honda Cars of Rockwall	President, Public Relations Director
Special Products & MFG	Safety Coordinator
Herald Banner	Reporter
Rest Haven Funeral Home	Assistant Controller

Stakeholders and the general public that attended the various Planning Team and public meetings played a key role in the planning process and were key to identifying areas of concern and potential mitigation actions.

Public Meetings

A series of open public workshops were held at local library branches, which were scheduled specifically for seeking public and stakeholder input. Topics of discussion for the meetings included the purpose of hazard mitigation, discussion of the planning process, and types of hazards, both natural and human-caused. Representatives from area neighborhood associations were invited to participate, as well as residents located in and around the area. In an effort to further engage the public, the County utilized social media such as Facebook, Twitter, and the local media.

Public meetings were held on the following dates and locations:

- October 27, 2015, Rockwall County Historic Courthouse
- February 4, 2016, Rockwall County Sheriff's Office
- March 29, 2016, Rockwall County Library

Documentation of public outreach meetings may be found in Appendix E.

Public Participation Survey

In addition to the open public meetings, Rockwall County was able to solicit input from citizens and stakeholders through the use of a public survey, which was designed to obtain data and information from the residents of the Rockwall County planning area. The survey was promoted by local officials and a link was made available for citizens to access the survey by visiting Rockwall County's website, and some of the participating jurisdictions' websites. A total of 130 surveys were completed online, the results of which are analyzed in Appendix B. The purpose of the survey was twofold: 1) to solicit public input during the planning process and, 2) to help the jurisdiction to identify any potential actions or problem areas. Rockwall County reviewed and incorporated input from the survey into the Plan as mitigation actions. For example, many citizens mentioned the need for public education and outreach

about natural hazards and how to prepare themselves and their property for disasters. In response to public input several hazard mitigation actions were added to the Plan to put in place education programs to inform residents about natural disasters and potential ways to mitigate them, as well as specific programs for the different hazards.

Section 3: County Profile

Overview

Rockwall County covers only 147 square miles, making it the smallest county in Texas, and includes the following jurisdictions for an aggregate population of 78,337, according to the 2010 U.S. Census Bureau: the Cities of Fate, Heath, McLendon-Chisholm, Mobile City, Rockwall, Rowlett, Royse City, and Wylie. Rockwall County has two Independent School Districts within the county: Rockwall Independent School District, and Royse City Independent School District. The County shares its name with the City of Rockwall, which is the county seat. Rockwall County is located in northeast Texas and is bordered by Collin County to the north, Hunt County to the east, Kaufman County to the south, and Dallas County to the west. In 1972, the North Texas Commission copyrighted the term "Dallas/Fort Worth Metroplex," which refers to the 13 counties that comprise the greater Dallas/Fort Worth area, including Rockwall County.

In the early 1850s, farmers digging a well discovered a rock wall that crossed the county and at some places appeared above ground level. Scientists have determined that this is a natural formation, but folk tales continue to say that it was built by prehistoric natives. This rock formation gives the City and County its name. In present day, the area has become a very desirable residential area for the continuously growing Dallas Metropolitan area.[1]

Figure 3-2 shows the general location of Rockwall County along with the Cities that are located within the County.

[1] http://www.rockwallcountytexas.com/255/History

Figure 3-2. Location of Rockwall County Area

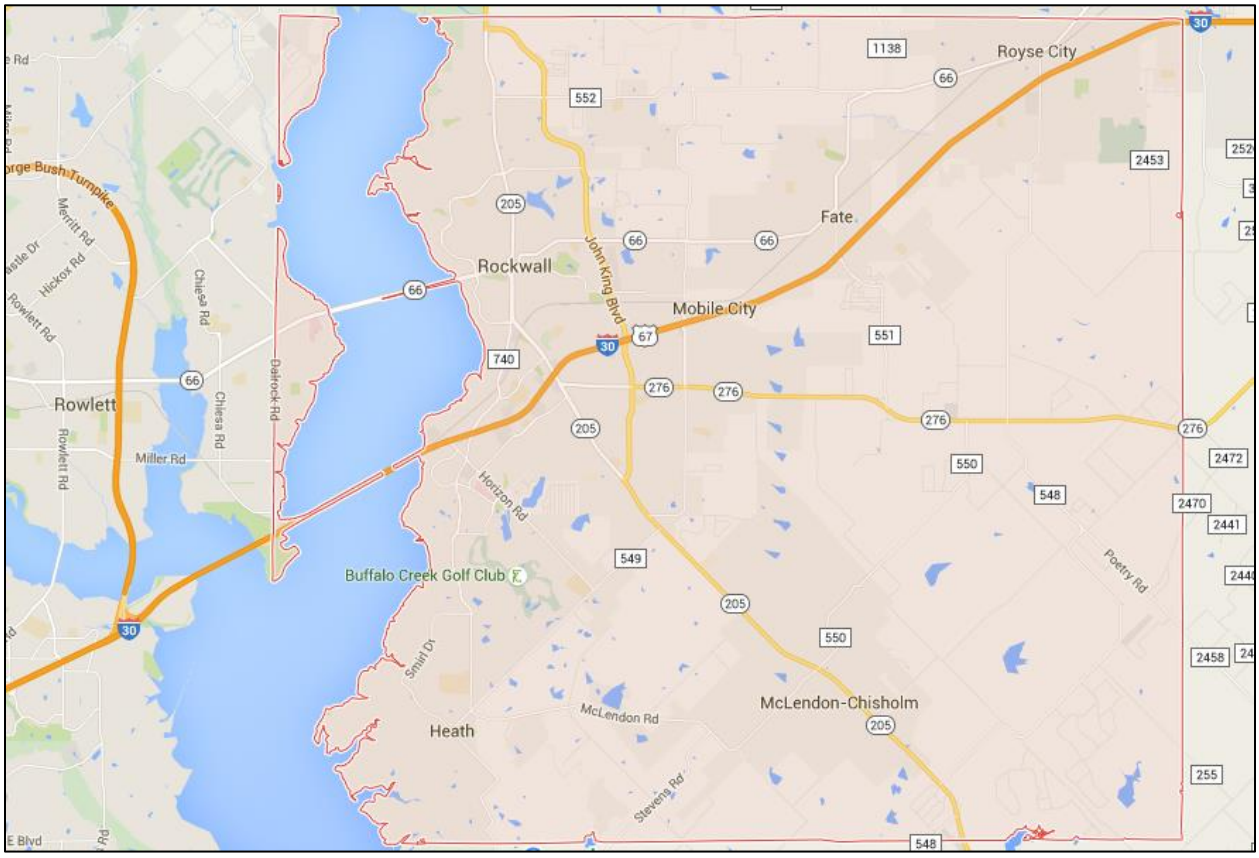
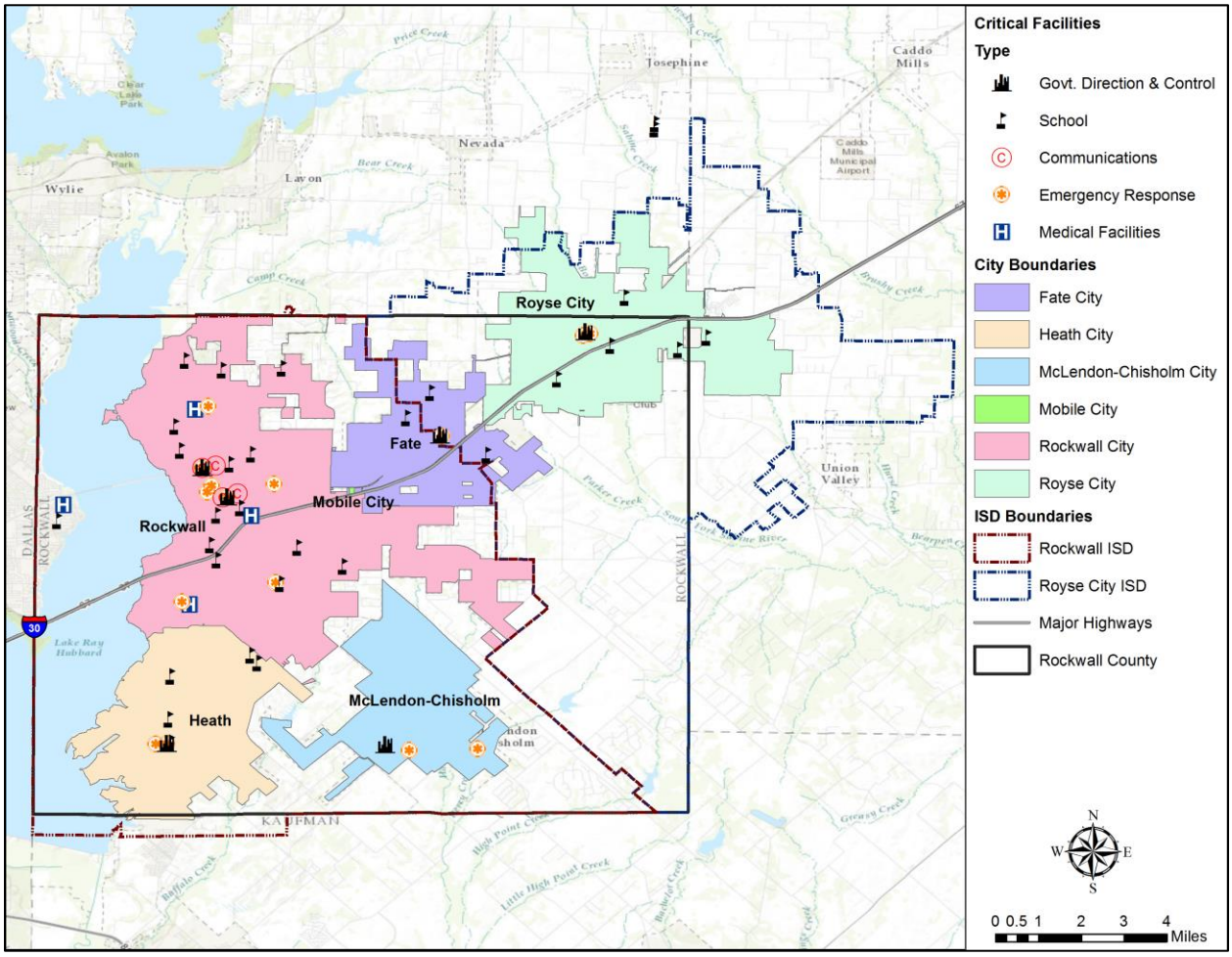


Figure 3-3 shows the Rockwall County Study Area, including the participating jurisdictions and Independent School Districts that are covered in the risk assessment analysis of the Plan.

Figure 3-3. Rockwall County Study Area



Provided in Table 3-1 below is a listing of the jurisdictions and Independent School Districts in Rockwall County that participated in the Hazard Mitigation Plan. The jurisdictions of Wylie and Rowlett did not participate in this Hazard Mitigation Plan, as they are part of separate Hazard Mitigation Plans.

Table 3-1. Participating Jurisdictions and Independent School Districts

PARTICIPATING JURISDICTIONS	PARTICIPATING INDEPENDENT SCHOOL DISTRICTS
Rural Rockwall County	Rockwall ISD
City of Fate	Royse City ISD
City of Heath	
City of McLendon-Chisholm	
City of Mobile City	
City of Rockwall	

PARTICIPATING JURISDICTIONS	PARTICIPATING INDEPENDENT SCHOOL DISTRICTS
City of Royse City	

Population and Demographics

In the official Census population count, as of April 1, 2010, Rockwall County had a population of 78,337 residents. By July 2013, the number had grown to 85,290, and by July 2014, the population was 87,809. Table 3-2 provides the population distribution by participating jurisdiction within Rockwall County. [2]

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.

Table 3-2. Population Distribution by Participating Jurisdiction

JURISDICTION	TOTAL 2010 POPULATION	PERCENTAGE	ESTIMATED VULNERABLE OR SENSITIVE POPULATIONS	
			Elderly (Over 65)	Below Poverty Level
City of Fate	6,357	8.1%	299	369
City of Heath	6,921	8.8%	734	277
City of McLendon-Chisholm	1,373	1.8%	140	43
City of Mobile City	188	0.2%	4	89
City of Rockwall	37,490	47.9%	3,974	2,362
City of Royse City	9,349	11.9%	589	570
Rural Rockwall County	16,659	21.3%	1,780	1,617
COUNTY TOTAL	**78,337**	**100%**	**7,520**	**5,327**

Population Growth

The official 2010 Rockwall County population is 78,337. Rockwall County experienced an increase in population between 1980 and 2010 by 439.2 percent, or 63,809 people. The cities of Rockwall, Royse City, Fate, Heath, McLendon-Chisholm, and rural Rockwall County all exhibited an increase in population between 1980 and 2010. These cities all continued to have population growth between 2000 and 2010. The City of Mobile City did experience population loss from 2000 to 2010. Table 3-2 provides historic growth rates in Rockwall County.

[2] *www.census.gov/quickfacts/table/PST045215/48397,00*

Table 3-2. Population for Rockwall County, 1980-2010[3]

JURISDICTIONS	1980	1990	2000	2010	POP CHANGE 1980-2010	PERCENT OF CHANGE	POP CHANGE 2000-2010	PERCENT OF CHANGE
City of Fate	263	292	497	6,357	6,094	2,317.1%	5,860	1,179.1%
City of Heath	1,459	2,108	4,149	6,921	5,462	374.4%	2,772	66.8%
City of McLendon-Chisholm	403	646	914	1,373	970	240.7%	459	50.2%
City of Mobile City	-	-	196	188	-	-	-8	-4.1%
City of Rockwall	5,939	10,486	17,976	37,490	31,551	531.3%	19,514	108.6%
City of Royse City	1,394	2,039	2,769	9,349	7,955	570.7%	6,580	237.6%
Rural Rockwall County	5,070	10,035	16,579	16,659	11,589	228.7%	80	0.5%
COUNTY TOTAL	**14,528**	**25,604**	**43,080**	**78,337**	**63,809**	**439.2%**	**35,257**	**81.8%**

Future Development

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

Population projections from 2010 to 2040 are listed in Table 3-3, as provided by the Office of the State Demographer, Texas State Data Center, and the Institute for Demographic and Socioeconomic Research. Population projections are based on a 0.5 scenario growth rate, which is 50 percent of the population growth rate that occurred during 2000-2010. This information is only available at the County level; however, the population projection shows an increase in population density for the County, which would mean overall growth for the County.

[3] Not enough data was available to show the population growth from 1980 for the City of Mobile City. Data was analyzed when available.

Table 3-3. Rockwall County Population Projects

County	LAND AREA (SQ MI)	2010		2020		2030		2040	
		Population							
		Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)
Rockwall	147	78,337	532.9	97,466	663.0	120,573	820.2	146,334	995.5

Economic Impact

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

Major employers in the area are critical to the health of the economy, as well as effective transportation connectivity.

Existing and Future Land Use and Development Trends

Many of the communities located in Rockwall County are directed by a Comprehensive or Land Use Plan that serves as a guide for development. These plans focus on the quality of life, housing, community livability, infrastructure and utilities, and transportation. Rockwall County is also a member of the North Central Texas Council of Governments (NCTOG), which assists local governments in planning for common needs, including future development. NCTCOG efforts, in part, assist Rockwall County communities in strengthening both the individual and collective power of their local government in making wise planning decisions with regard to future development, transportation, future business opportunities, and maximizing economies of scale in seeking grant funding for County-wide or Regional mitigation projects.

Building Permits

Building permits indicate what types of buildings are being constructed and their relative uses. Table 3-4 lists the number of residential building permits for Rockwall County that have been granted between 2010 and 2015. 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 reviewed in the risk assessment. The increase in vulnerability can be attributed to the higher construction costs that would be factored into repairing or replacing a structure using current market values. Permits are reported annually in September; the data reflects permits for years 2010 through 2015 to demonstrate growth rates in Rockwall County.

Table 3-4. County Residential Building Permits[4]

Rockwall County			
Year	Buildings	Units	Construction Cost
2010	497	613	$107,347,430
2011	411	411	$96,111,770
2012	676	793	$177,840,591
2013	741	741	$190,340,818
2014	965	965	$278,666,914
2015	1,046	1,046	$297,741,667

[4] http://censtats.census.gov/cgi-bin/bldgprmt/bldgdisp.pl

Section 4: Risk Overview

Hazard Identification

This section begins the risk assessment, which also includes hazard descriptions and vulnerability assessments found in Sections 5 through 13. The purpose of this section is to provide background information for the hazard identification process, as well as descriptions for the hazards identified.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, Rockwall County identified nine hazards that are to be addressed in the Hazard Mitigation Action Plan, or *the Plan.* These hazards were identified through an extensive process utilizing input from planning team members, 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 were also evaluated to supplement information as needed. Based on this review, eight natural hazards and one quasi-technological hazard (dam failure) were identified as significant, as shown in Table 4-1.

Atmospheric hazards are events or incidents associated with weather generated phenomenon. Atmospheric hazards identified as significant from Table 4-1 include: extreme heat, thunderstorm wind, tornado, hail, and winter storm.

Hydrologic hazards are events or incidents associated with water related damage and account for over 75 percent of Federal disaster declarations in the United States. Hydrologic hazards identified as significant includes flood and drought. For the purposes of the risk assessment, the wildfire hazard is considered "other," since they may be natural or human-caused, and are neither atmospheric nor hydrologic.

The term, "technological hazards," refers to the origins of incidents that can arise from human activities, such as the construction and maintenance of dams. Incidents are distinct from natural hazards primarily in that they originate from human activity. While the risks presented by natural hazards may be increased or decreased as a result of human activity, they are not inherently human-induced; therefore, dam failure is classified as a quasi-technological hazard, referred to as "technological," in Table 4-1 for purposes of description.

Table 4-1. Hazard Descriptions

HAZARD	DESCRIPTION
ATMOSPHERIC	
Extreme Heat	Extreme heat is the condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period.
Hail	Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and subsequent cooling of the air mass.
Thunderstorm Wind	Extreme winds can have gusts of 100 mph or more, and are often accompanied by hail or rain. Windstorms have a broader path that is several miles wide and can cover several counties.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. The destruction caused by tornadoes ranges from light to catastrophic, depending on the intensity, size, and duration of the storm.
Winter Storm	Severe winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 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. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.
HYDROLOGIC	
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality.
Flood	The accumulation of water within a body of water, which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, or shallow flooding.

HAZARD	DESCRIPTION
OTHER	
Wildfire	A wildfire is an uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase the risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors.
TECHNOLOGICAL	
Dam Failure	Dam failure is the collapse, breach, or other failure of a dam structure resulting in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream of the dam.

Natural Hazards and Climate Change

Climate change is defined as a long-term hazard which can increase or decrease the risk of other weather hazards, and also directly endangers property due to sea level rise and biological organisms due to habitat destruction.

While sea level rise is a natural phenomenon and has been occurring for several thousand years, the general scientific consensus is that the rate has increased fourfold in the past 200 years, from .5 millimeters per year to 2 millimeters per year. With a higher sea level, storm surges will be bigger and coastal erosion will accelerate.

All communities along the Texas coast face similar futures, according to some scientists, and Texas is considered one of the more vulnerable states in the U.S. to both abrupt climate changes and to the impact of gradual climate changes.

Mega-droughts can trigger abrupt changes to regional ecosystems and the water cycle, drastically increase extreme summer temperature and fire risk, and reduce availability of the water resources, as Texas experienced during 2011-2012.

Texas also has thousands of miles of coastline that are highly vulnerable to the combined impact of sea-level rise and the potential increase of storm intensity. Paleoclimate records also show that the climate over Texas had large swings between periods of frequent mega-droughts and the periods of mild droughts that Texas is currently experiencing. While the cause of these fluctuations is unclear, it would be wise to anticipate that such change could occur again, and may even be occurring now.

Overview of Hazard Analysis

This risk assessment was conducted using two distinct methodologies: HAZUS-MH (FEMA's loss estimation software) and a statistical approach. Each approach provides estimates of potential impact by using a common, systematic framework for evaluation.

The HAZUS-MH risk assessment methodology is parametric, in that distinct hazard and inventory parameters (e.g., wind speed and building types) were modeled using the HAZUS-MH software to determine the impact (e.g., damages and losses) on the built environment. The HAZUS-MH software was used to estimate losses from flooding.

HAZUS-MH is FEMA's standardized loss estimation software program built upon an integrated geographic information system (GIS) platform. This risk assessment applies HAZUS-MH to produce regional profiles and estimate losses for flooding.

Records retrieved from National Climatic Data Center (NCDC) are reported for the named participating cities. Remaining records occurring in a named area in a county were considered in the total for County 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, and a statement of the hazard's impact.

Frequency of return was calculated by dividing the number of events in the recorded time period for each hazard by the overall time period that the resource database was recording events. Frequency of return statements are defined in Table 4-2, and impact statements are defined in Table 4-3 below.

Table 4-2. Frequency of Return Statements

PROBABILITY	DESCRIPTION
Highly Likely	Event is probable in the next year.
Likely	Event is probable in the next 3 years.
Occasional	Event is probable in the next 5 years.
Unlikely	Event is probable in the next 10 years.

Table 4-3. Impact Statements

POTENTIAL SEVERITY	DESCRIPTION
Substantial	Multiple deaths. Complete shutdown of facilities for 30 days or more. More than 50 percent of property destroyed or with major damage.
Major	Injuries and/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.

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 total amount of damages (including property and crop damages) for each hazard is divided by the total number of assets (building value totals) in that community in order to find out the percentage of damage that each hazard can cause to the community.

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

Hazard Ranking

Table 4-4 portrays the results of the planning area's self-assessment for hazard ranking, based on the preliminary results of the risk assessment presented at the Risk Assessment Workshop. This table also takes into account local knowledge regarding frequency of occurrence and the potential impact of each hazard.

Table 4-4. Hazard Risk Ranking

HAZARD	FREQUENCY OF OCCURENCE	POTENTIAL SEVERITY	RANKING
Thunderstorm Wind	Highly Likely	Limited	High
Tornado	Occasional	Minor	Moderate
Extreme Heat	Highly Likely	Minor	Moderate
Hail	Highly Likely	Limited	Moderate

Section 4: Risk Overview

HAZARD	FREQUENCY OF OCCURENCE	POTENTIAL SEVERITY	RANKING
Drought	Highly Likely	Limited	Moderate
Winter Storm	Highly Likely	Limited	Moderate
Wildfire	Highly Likely	Limited	Moderate
Flood	Highly Likely	Limited	Low
Dam Failure	Unlikely	Substantial	Low

Section 5: Thunderstorm Wind

Hazard Description

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

Thunderstorms are created when heat and moisture near the Earth's surface are transported to the upper levels of the atmosphere. By-products of this process are the clouds, precipitation, and wind that become the thunderstorm. Sub-hazards of thunderstorms are hail and tornadoes, which are profiled separately in this Plan.

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

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

Location

Thunderstorms can develop in any geographic location, and are considered a common occurrence in Texas. Therefore a thunderstorm could occur at any location within Rockwall County's planning area, as these storms develop randomly and are not confined to any geographic area within the County. It

is assumed that the Rockwall County planning area is uniformly exposed to the threat of thunderstorms.

Extent

The extent or magnitude of a thunderstorm event is measured by the Beaufort Wind Scale. Table 5-1 describes the different intensities of wind in terms of speed and effects, from calm to violent and destructive.

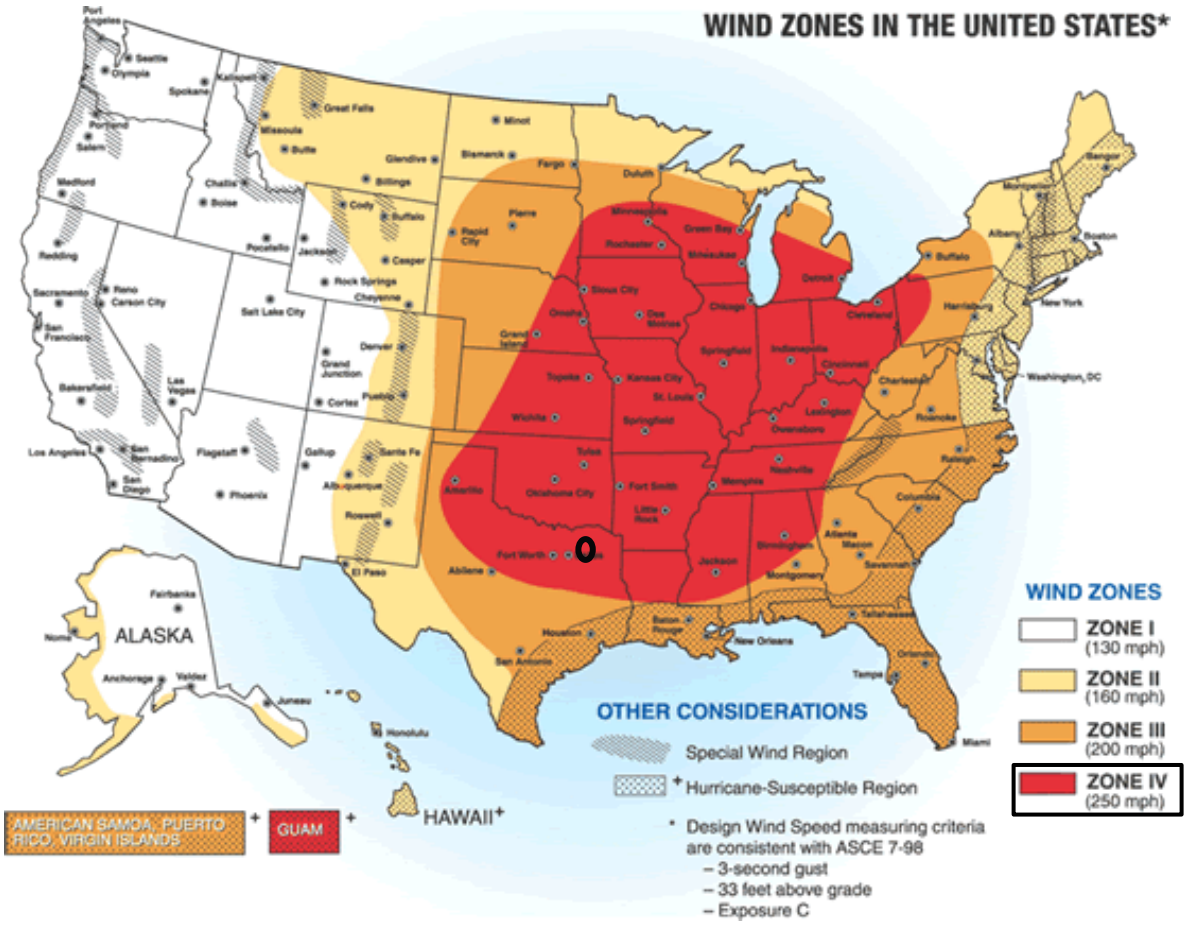
Table 5-1. Beaufort Wind Scale[1]

FORCE	WIND (KNOTS)	WMO CLASSIFICATION	APPEARANCE OF WIND EFFECTS
0	Less than 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
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

Figure 5-1 displays the wind zones as derived from NOAA.

[1] Source: World Meteorological Organization

Figure 5-1. Wind Zones in the United States[2]



On average, the planning area experiences one to two thunderstorm events every year, which are not usually accompanied by maximum or extreme wind speeds. The County is located within the Zone IV, meaning they can experience winds up to 250 mph. Rockwall County has experienced a significant wind event, or an event with winds in the range of "Force 12" on the Beaufort Wind Scale with winds above 73 knots.

Historical Occurrences

Tables 5-2, 5-3 and 5-4 depict historical occurrences of thunderstorm events for the Rockwall County planning area according to the National Climatic Data Center (NCDC) data. Since January 1955, 78 severe thunderstorm events are known to have impacted Rockwall County, based upon NCDC records. Table 5-3 presents information on known historical events impacting the Rockwall County planning area, with resulting damages. It is important to note that high wind events associated with other hazards, such as tornadoes, are not accounted for in this section.

[2] Rockwall County is indicated by the circle.

Section 5: Thunderstorm Wind

The NCDC is a national data source organized under the National Oceanic and Atmospheric Administration. The NCDC is the largest archive available for climate data; however, it is important to note that the only incidents recorded are those that are reported to the NCDC that have been factored into this risk assessment. In the tables that follow throughout this section, some occurrences seem to appear multiple times in one table. This is due to reports from various locations throughout the County. In addition, property damage estimates are not always available. When this occurs, estimates are provided. Where an estimate has been provided in a table for losses, the dollar amounts have been altered to indicate the damage in 2015 dollars.

Table 5-2. Historical Thunderstorm Events, With Reported Damages, 1955-2016

MAXIMUM WIND SPEED RECORDED (KNOTS)	NUMBER OF REPORTED EVENTS
0-30	0
31-40	1
41-50	8
51-60	18
61-70	4
71-80	1
81-90	1
91-100	0
Unknown	45

Table 5-3. Historical Thunderstorm Events, 1955-2016[3]

JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Rockwall	1/23/1993	7:15 PM	Unknown	0	0	$8,212	$0
Royse City	4/13/1993	4:05 PM	Unknown	0	0	$82	$0
Royse City	8/31/1993	1:50 PM	Unknown	0	0	$8,212	$0
Royse City	11/4/1994	10:45 PM	Unknown	0	0	$8,007,287	$0
Heath	3/25/1995	8:00 PM	Unknown	0	0	$31,146	$0
Rockwall	3/25/1995	8:00 PM	Unknown	0	0	$7,787	$0
Royse City	4/10/1995	1:27 PM	Unknown	0	0	$23,360	$0

[3] Only recorded events with fatalities, injuries or damages are listed. Magnitude is listed when available. Damage values are in 2015 dollars.

Section 5: Thunderstorm Wind

JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Rockwall	4/19/1996	5:30 PM	Unknown	0	0	$60,506	$0
Rockwall	4/19/1996	5:30 PM	Unknown	0	2	$605,063	$0
Royse City	4/19/1996	5:35 PM	Unknown	0	6	$15,127	$0
Rockwall	6/1/1996	11:30 AM	Unknown	0	0	$3,025	$0
Rockwall	6/1/1996	12:31 PM	61 knots	0	0	$22,690	$0
Rockwall	4/22/1997	4:15 AM	71 knots	0	0	$221,809	$0
Rockwall	5/30/1997	5:49 PM	Unknown	0	0	$29,575	$0
Rockwall	6/16/1997	7:20 PM	Unknown	0	0	$36,968	$0
Rockwall	5/8/1998	10:45 PM	Unknown	0	0	$72,802	$0
Royse City	5/8/1998	10:55 PM	Unknown	0	0	$145,605	$0
Royse City	2/6/1999	8:55 PM	Unknown	0	0	$2,849	$0
Rockwall	4/26/1999	8:00 AM	Unknown	0	0	$142	$0
Rockwall	11/22/1999	10:48 PM	Unknown	0	0	$7,123	$0
County	8/27/2003	3:41 PM	52 knots	0	0	$6,449	$0
Rockwall	8/4/2005	5:00 PM	50 knots	0	0	$3,646	$0
Rockwall	9/28/2005	7:05 PM	50 knots	0	0	$6,076	$0
Royse City	3/30/2007	8:10 PM	61 knots	0	0	$2,289	$0
Royse City	5/2/2007	6:48 PM	50 knots	0	0	$22,893	$0
County	5/2/2009	2:43 PM	52 knots	0	0	$7,744	$0
Fate	7/29/2009	1:25 PM	50 knots	0	0	$553	$0
Royse City	8/15/2012	2:00 AM	35 knots	0	0	$51,686	$0
Rockwall Muni Airport	6/9/2014	5:20 AM	52 knots	0	0	$15,038	$0
Fate	10/2/2014	3:51 PM	60 knots	0	0	$25,063	$0
Rockwall	10/2/2014	4:00 PM	50 knots	0	0	$1,003	$0
Rockwall Muni Airport	12/13/2015	3:35 AM	54 knots	0	0	$5,000	$0

Table 5-4. Summary of Historical Thunderstorm Wind Events, 1955-2016

JURISDICTION	NUMBER OF EVENTS	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Rockwall County	78	84 knots	0	8	$9,456,813	$0
Fate	3	60 knots	0	0	$25,617	$0
Heath	4	57 knots	0	0	$31,147	$0
McLendon-Chisholm	2	54 knots	0	0	$0	$0
Mobile City	0	N/A	0	0	$0	$0
Rockwall	44	84 knots	0	2	$1,106,466	$0
Royse City	17	61 knots	0	6	$8,279,391	$0
TOTAL LOSSES		**(Max Extent)**	**0**	**8**	**$9,456,813**	

Significant Past Events

November 4, 1994 – Royse City
Thunderstorm winds in excess of 60 mph produced widespread damage to a Royse City manufactured Home Park. Five manufactured homes were completely destroyed, 13 manufactured homes sustained major damage and an additional 42 manufactured homes sustained minor damage. Multiple power lines were downed by high winds throughout the area creating significant power outages for area residents.

April 19, 1996 – City of Rockwall
Strong winds blew through the area damaging equipment at a local carnival and toppling a Ferris wheel. Two carnival employees were injured during the event. The roof of the middle school auditorium was blown off and the press box at the football field was destroyed. Trees and power lines were blown down in the area creating power outages for area residents. A plane at the Rockwall Municipal Airport was severely damaged when it was blown over. Windows were blown out at a local diner in Royse City. The shattered glass injured 6 people.

May 8, 1998 – Rockwall County and Royse City
A significant severe weather episode occurred across north Texas during the evening hours of May 8th. Severe thunderstorms developed between Abilene and Childress along a dry-line late in the afternoon and moved east into north Texas. In Royse City, thunderstorm winds destroyed a barn, blew the roof off of a residential structure and destroyed a travel trailer. Two additional homes reported wind damage. In all, damage from this severe weather episode was estimated at between $30 and $40 million, with damage in Rockwall County and Royse City estimated at $150,000, combined.

Probability of Future Events

Most thunderstorms occur during the spring, in the months of March, April and May, and in the fall, during the month of September. Based on available records of historic events, 78 events in a 60 year reporting period provides a frequency of occurrence of 1 to 2 events every year. Even though the intensity of thunderstorm wind events is not always damaging for the Rockwall County planning area, the frequency of occurrence for a thunderstorm wind event is highly likely, meaning that an event is probable within the next year for the Rockwall County planning area.

Vulnerability and Impact

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

Trees, power lines and poles, signage, manufactured housing, radio towers, concrete block walls, storage barns, windows, garbage recepticles, brick facades, and vehicles, unless reinforced, are vulnerable to thunderstorm wind events. Mobile City would be especially vulnerable to thunderstorm wind as the community is comprised entirely of residential manufactured homes. The Lake Rockwall Estates (LRE) neighborhood in the City of Rockwall would be vulnerable, as many of the homes are manufactured homes. More severe damage involves windborne debris, in some instances, patio furniture and other lawn items have been reported to have been blown around by wind and, very commonly, debris from damaged structures in turn have caused damage to other buildings not directly impacted by the event. In numerous instances roofs have been reported as having been torn off of buildings. The portable buildings used at both the Rockwall ISD and Royse City ISD campus locations would be more vulnerable to thunderstorm wind events than typical site built structures and could potentially pose a greater risk for wind-blown debris.

A thunderstorm wind event can also result in traffic disruptions, injuries and in rare cases, fatalities. Impact of thunderstorms experienced in the Rockwall County planning area has resulted in 8 injuries and no fatalities. Impact of thunderstorm wind events experienced in the Rockwall County planning area would be “Minor,” and injuries and illnesses do not result in permanent disability, the quality of life lost would be minor, and facilities would be shut down for more than 1 week. Overall, the average loss estimate (in 2015 dollars) is $9,456,813, having an approximate annual loss estimate of $157,614 (Table 5-5).

Table 5-5. Potential Annualized Losses for Rockwall County

JURISDICTION	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATES
Rockwall County	$9,456,813	$157,614
Fate	$25,617	$427
Heath	$31,146	$519

Section 5: Thunderstorm Wind

JURISDICTION	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATES
McLendon-Chisholm	$0	$0
Mobile City	$0	$0
Rockwall	$1,101,466	$18,441
Royse City	$8,279,391	$137,990
Planning Area	**$9,451,813**	**$171,851**

Assessment of Impacts

Thunderstorm wind events have the potential to pose a significant risk to people, and can create dangerous and difficult situations for public health and safety officials. Impacts to the planning area can include:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- During exceptionally heavy wind events, first responders may be prevented from responding to calls, as the winds may reach a speed in which their vehicles and equipment are unsafe to operate.
- Thunderstorm wind events often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage often results in an increase in structure fires and carbon monoxide poisoning, as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications.
- Critical staff may be unable to report for duty, limiting response capabilities.
- City or county departments may be damaged, delaying response and recovery efforts for the entire community.
- Private sector entities that the City and its residents rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long term loss in revenue.
- Some businesses not directly damaged by thunderstorm wind events may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.

- Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to thunderstorm winds.
- Large scale wind events can have significant economic impact on the affected area, as it must now fund expenses such as infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damages without a backup power source.
- Lake Ray Hubbard is a large recreational lake that attracts fishing and boating activities throughout the year. A large thunderstorm could impact recreational water activities, placing boaters and campers in imminent danger, potentially requiring emergency services or lake evacuation. The boat docks at Lake Ray Hubbard shoreline could also sustain damage.
- Recreational areas and parks may be damaged or inaccessible due to downed trees or debris, causing temporary impacts to area businesses.

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

Section 6: Tornado

Hazard Description

Tornadoes are among the most violent storms on the planet. A tornado is a rapidly rotating column of air extending between, and in contact with, a cloud and the surface of the earth. The most violent tornadoes are capable of tremendous destruction, 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.

The most powerful tornadoes are produced by "Supercell Thunderstorms." Supercell 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.

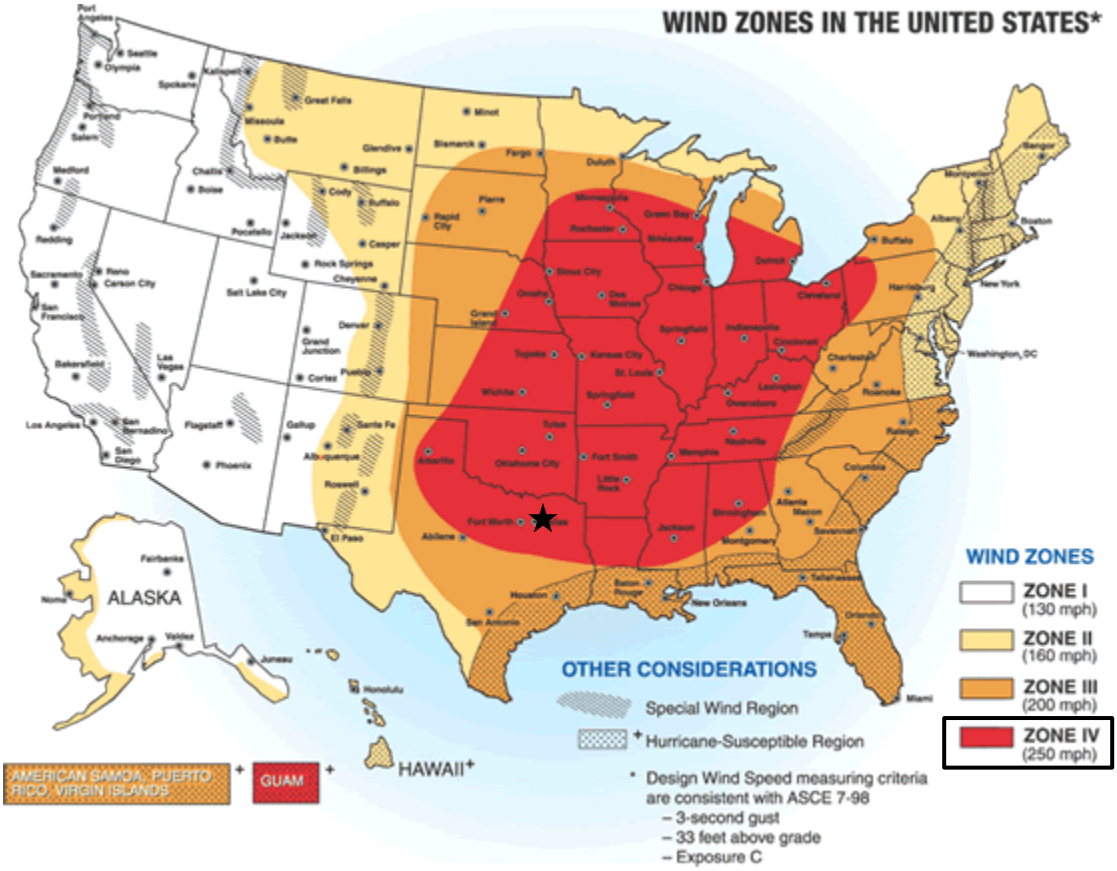
Table 6-1. Variations Among Tornadoes

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

Tornadoes do not have any specific geographic boundary and can occur throughout the County uniformly. It is assumed that the Rockwall County planning area is uniformly exposed to tornado activity. Rockwall County is located in Wind Zone IV (Figure 6-1), where tornado winds can be as high as 250 mph.

Figure 6-1. FEMA Wind Zones in the United States[1]



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).

[1] Rockwall County is indicated by the star.

Table 6-2. The Fujita Tornado Scale[2]

F-SCALE NUMBER	INTENSITY	WIND SPEED (MPH)	TYPE OF DAMAGE DONE	PERCENT OF APPRAISED STRUCTURE VALUE LOST DUE TO DAMAGE
F0	Gale Tornado	40 – 72	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.	None Estimated
F1	Moderate Tornado	73 – 112	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads; attached garages may be destroyed.	0% – 20%
F2	Significant Tornado	113 – 157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.	50% – 100%
F3	Severe Tornado	158 – 206	Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.	100%
F4	Devastating Tornado	207 – 260	Well-constructed homes leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.	100%
F5	Incredible Tornado	261 – 318	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.	100%

Tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita Scale (Table 6-2). Since February 2007, the Fujita Scale has been replaced by the Enhanced Fujita Scale (Table 6-3), which retains the same basic design and six strength categories as the previous scale. The newer scale reflects more refined assessments of tornado damage surveys, standardization, and damage consideration to a wider range of structures.

[2] Source: http://www.tornadoproject.com/fscale/fscale.htm

Table 6-3. Enhanced Fujita Scale for Tornadoes

STORM CATEGORY	DAMAGE LEVEL	3 SECOND GUST (MPH)	DESCRIPTION OF DAMAGES	PHOTO EXAMPLE
EF0	Gale	65 – 85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.	
EF1	Weak	86 – 110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads; attached garages may be destroyed.	
EF2	Strong	111 – 135	Considerable damage; roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.	
EF3	Severe	136 – 165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest 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 since tornado events prior to 2007 will follow the original Fujita Scale. The largest magnitude reported within the planning area is EF2 on the Fujita Scale, a “Strong Tornado.” Based on the planning areas location in wind zone IV, the planning area could experience anywhere from an EF0 to an EF5 depending on the wind speed.

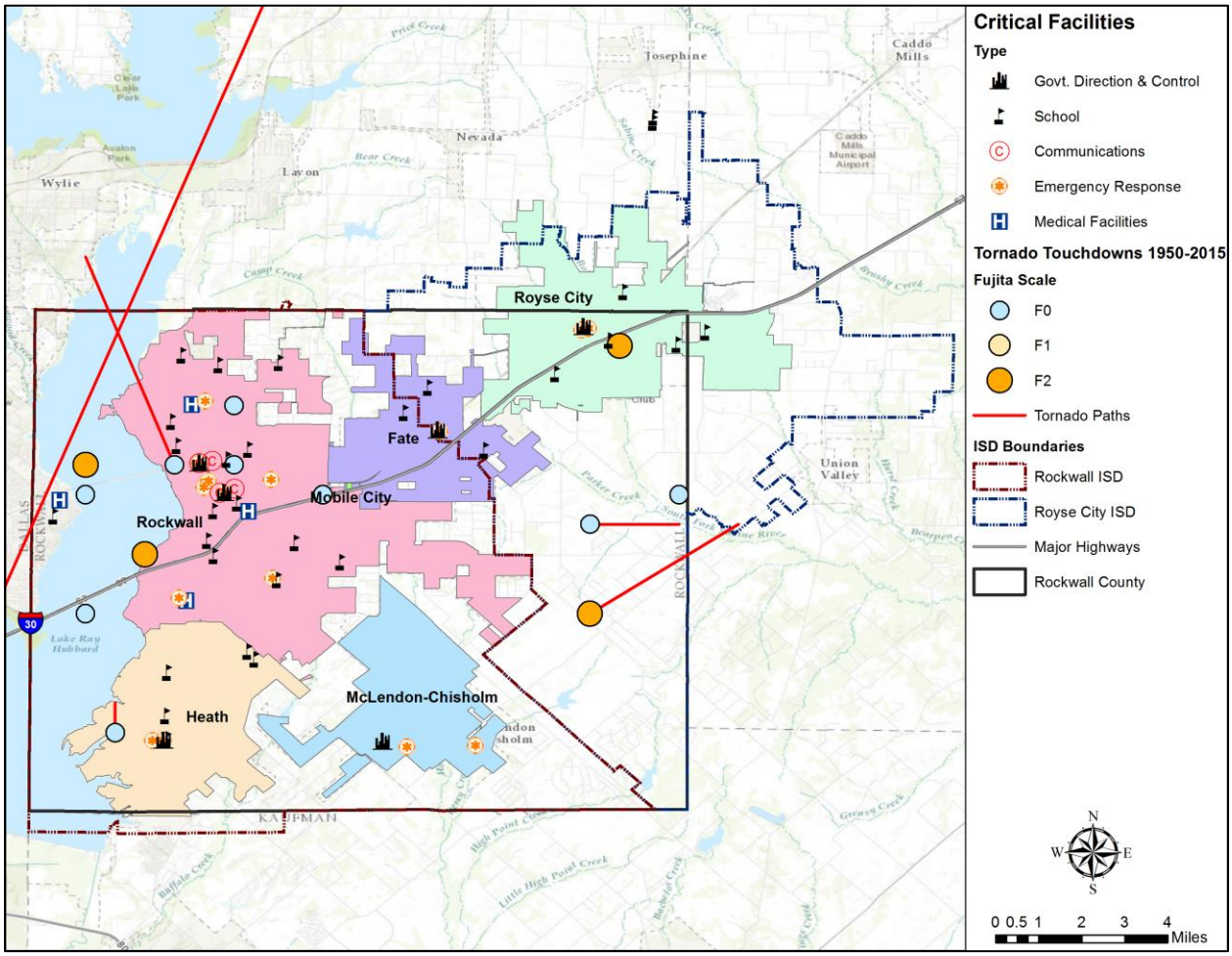
The events in Rockwall County have been between EF0 to an EF2 (Table 6-4). Therefore, the range of intensity that the Rockwall County planning area would be expected to mitigate is a tornado event that would be a low to moderate risk, an EF0 to EF2.

Historical Occurrences

Only reported tornadoes were factored into the Risk Assessment. It is likely that a high number of occurrences have gone unreported over the past 65 years.

Figure 6-2 identifies the locations of previous occurrences in the Rockwall County planning area from 1950 to February 2016. A total of 14 events have been recorded by the Storm Prediction Center (NOAA) and NCDC databases for Rockwall County. The most significant event reported occurred in Rockwall County near Royse City on April 3, 2012. The EF2 tornado and associated storm system destroyed 8 homes in Rockwall County, caused major damage to 17 homes and minor damage to 8 homes. Three people sustained minor injuries in the planning area.

Figure 6-2. Spatial Historical Tornado Events, 1950–2016[3]



[3] Source: NOAA Records

Table 6-4. Historical Tornado Events, 1950-2016

JURISDICTION	DATE	TIME	MAGNITUDE	DEATH	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
County	6/20/1958	9:00	F0	0	0	$246	$0
County	7/5/1958	14:10	F0	0	0	$246	$0
County	4/18/1970	22:00	F2	0	0	$152,923	$0
County	5/10/1972	3:00	F1	0	0	$141,947	$0
County	10/12/1973	18:44	F0	0	0	$0	$0
County	5/23/1976	20:40	F2	0	0	$10,428	$0
County	5/30/1976	20:55	F1	0	0	$0	$0
County	3/23/1984	17:20	F0	0	0	$5,711	$0
County	5/13/1985	11:00	F0	0	0	$0	$0
Lake Ray Hubbard	4/19/1995	21:15	F0	0	0	$0	$0
Royse City	4/13/2007	18:45	EF0	0	0	$40,063	$0
Heath	9/8/2010	17:20	EF0	0	0	$54,421	$0
Blackland	4/3/2012	14:56	EF2	0	3	$15,505,806	$0
County	12/26/2015	18:59	EF4	0	0	$800,000	$0
TOTALS				**0**	**3**	**$16,711,791**	**$0**

Table 6-5. Summary of Historical Tornado Events, 1950-2016

JURISDICTION	Number of Events	MAGNITUDE	FATALITIES	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Rockwall County	14	F2	0	3	$16,711,791	$0
Fate	0	N/A	0	0	$0	$0
Heath	1	F0	0	0	$54,421	$0
McLendon-Chisholm	0	N/A	0	0	$0	$0
Mobile City	0	N/A	0	0	$0	$0
Rockwall	5	F2	0	0	$16,385	$0
Royse City	3	F2	0	0	$193,232	$0
TOTAL LOSSES		**(Max Extent)**			**$16,711,791**	

Significant Past Events

April 13, 2007 – Royse City
A tornado touched down just east of the intersection of Highways 548 and 276. The path of the tornado was 1.95 miles long with a maximum width of 30 yards. The damage from the tornado was rated EF0 with maximum winds estimated at 80 mph. The tornado completely destroyed two barns and downed fences in its path. No injuries or deaths were reported.

September 8, 2010 – Heath
A tornado touched down on the southeast side of Lake Ray Hubbard near Heath causing roof damage to several brick homes and destroying the chimney on another home. The path of the tornado was 0.67 miles long with a maximum width of 108 yards. The damage from the tornado was rated EF0 with maximum winds estimated at 85 to 95 mph. The tornado damaged multiple large trees along its path. No injuries or deaths were reported.

April 3, 2012 – Rockwall County
A strong tornado touched down in eastern Rockwall County and traveled northeast into Hunt County before dissipating. The tornado touched down just southwest of the intersection of FM 548 and Bent Road in Rockwall County. The tornado severely damaged or destroyed several homes in a subdivision along its path. Roof and structural damage occurred to multiple homes and trees and shrubs were completely debarked. The tornado continued northeast and produced damage to homes along Country Manor Road including one structure that lost a portion of its roof and second floor. Several small barns were destroyed. The tornado continued northeast where it crossed Hwy 276, damaging a cabinet factory and creating an extensive debris field. The tornado continued to move northeast and demolished one mobile home and damaged another right at the Rockwall/Hunt County line. In total, 8 homes in Rockwall County were deemed destroyed, 17 sustained major damage, and 8 sustained minor damage. The path of the tornado was 2.38 miles long with a maximum width of 400 yards. The damage from the tornado was rated EF2 with maximum winds estimated at 150 mph. Three people sustained minor injuries when their doublewide mobile home was struck near the Rockwall/Hunt County line.

December 26, 2015 – Rockwall County
A severe storm system impacted the North Texas areas on December 26, 2015. Twelve tornadoes were confirmed on the afternoon and evening of the 26th, killing 13 and injuring over 300. The strongest tornado was an EF-4 that struck the Garland and Rowlett areas of Dallas County where most of the fatalities occurred. The tornado continued across a small tract of land in western Rockwall County. The tornado continued doing significant damage in the City of Rowlett, before moving onto Lake Ray Hubbard and dissipating over the lake. The City of Rowlett is located within in Dallas County, with a small portion located within Rockwall County.

Probability of Future Events

Tornadic storms can occur at any time of year and at any time of day, but they are typically more common in the spring months during the late afternoon and evening hours. A smaller, high frequency period can emerge in the fall during the brief transition between the warm and cold seasons.

According to historical records, Rockwall County experiences a tornado touchdown approximately every three years. This frequency supports a likely probability of future events for Rockwall County, the Cities of Fate, Heath, McLendon-Chisholm, Mobile City, Rockwall, and Royse City, and the schools districts of Rockwall and Royse City.

Vulnerability and Impact

Because tornadoes often cross jurisdictional boundaries, all existing and future buildings, facilities and populations in Rockwall County are considered to be exposed to this hazard and could potentially be impacted. The damage caused by a tornado is typically a result of high wind velocity, wind-blown debris, lightning, and large hail.

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

- Manufactured Homes;
- Homes on crawlspaces (more susceptible to lift); and
- Buildings with large spans, such as shopping malls, gymnasiums, and factories.

Mobile City would be especially vulnerable to tornados as the community is comprised entirely of residential manufactured homes; additional communities with manufactured housing in Rockwall and Royse City would also be vulnerable to tornados. Utility systems on roofs at school districts would be vulnerable and could be damaged by debris and high winds. The portable buildings used at both the Rockwall ISD and Royse City ISD campus locations would be more vulnerable to tornado damage than typical site built structures. Tornadoes can possibly cause a significant threat to people as they could be struck by flying debris, falling trees/branches, utility lines, and poles. First responders could also not be able to respond to calls due to blocked roads. Tornadoes commonly cause power outages which could cause health and safety risks to faculty and students at schools, as well as to patients in hospitals.

The average loss estimate of property and crop is $16,711,791 (in 2015 dollars), having an approximate annual loss estimate of $257,104 (Table 6-6). Based on historic loss and damages, the impact of tornado on the Rockwall County planning area can be considered “Minor”, with more than 10 percent of property expected to be destroyed, treatable injuries that are not permanently disabling, and critical facilities shut down for one week or more.

Table 6-6. Potential Annualized Losses by Jurisdiction, 1950-2016

JURISDICTION	PROPERTY & CROP DAMAGE	ANNUAL LOSS ESTIMATES
Rockwall County	$16,711,791	$257,104
Fate	$0	$0
Heath	$54,421	$837
McLendon-Chisholm	$0	$0
Mobile City	$0	$0
Rockwall	$16,385	$252
Royse City	$193,232	$2,973

Assessment of Impacts

Tornadoes have the potential to pose a significant risk to the population and can create dangerous situations. Often providing and preserving public health and safety is difficult. Impacts to the planning area can include:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Manufactured homes may suffer substantial damage as they would be more vulnerable than typical site built structures.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- Tornadoes often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- Tornadoes can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.
- First responders must enter the damage area shortly after the tornado passes to begin rescue operations and to organize cleanup and assessments efforts, therefore they are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Emergency operations and services may be significantly impacted due to damaged facilities, loss of communications, damaged emergency vehicles and equipment.

- City or county departments may be damaged or destroyed, delaying response and recovery efforts for the entire community.
- Private sector entities that the City and its residents rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long term loss in revenue.
- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- Some businesses not directly damaged by the tornado may be negatively impacted while roads and utilities are being restored, further slowing economic recovery.
- When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Residential structures destroyed by a tornado may not be rebuilt for years, reducing the tax base for the community.
- Large or intense tornadoes may result in a dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- Recreation activities may be unavailable and tourism can be unappealing for years following a large tornado, devastating directly related local businesses.

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

Section 7: Extreme Heat

Hazard Description

Extreme heat is a prolonged period of excessively high temperatures and exceptionally humid conditions. Extreme heat during the summer months is a common occurrence throughout the State of Texas, and Rockwall County is no exception. The unincorporated areas of the County and the jurisdictions of Fate, Heath, McLendon-Chisholm, Mobile City, Rockwall, and Royse City typically experience extended heat waves. A heat wave is an extended period of extreme heat, and is often accompanied by high humidity.

Although heat can damage buildings and facilities, it presents a more significant threat to the safety and welfare of citizens. The major human risks associated with 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.

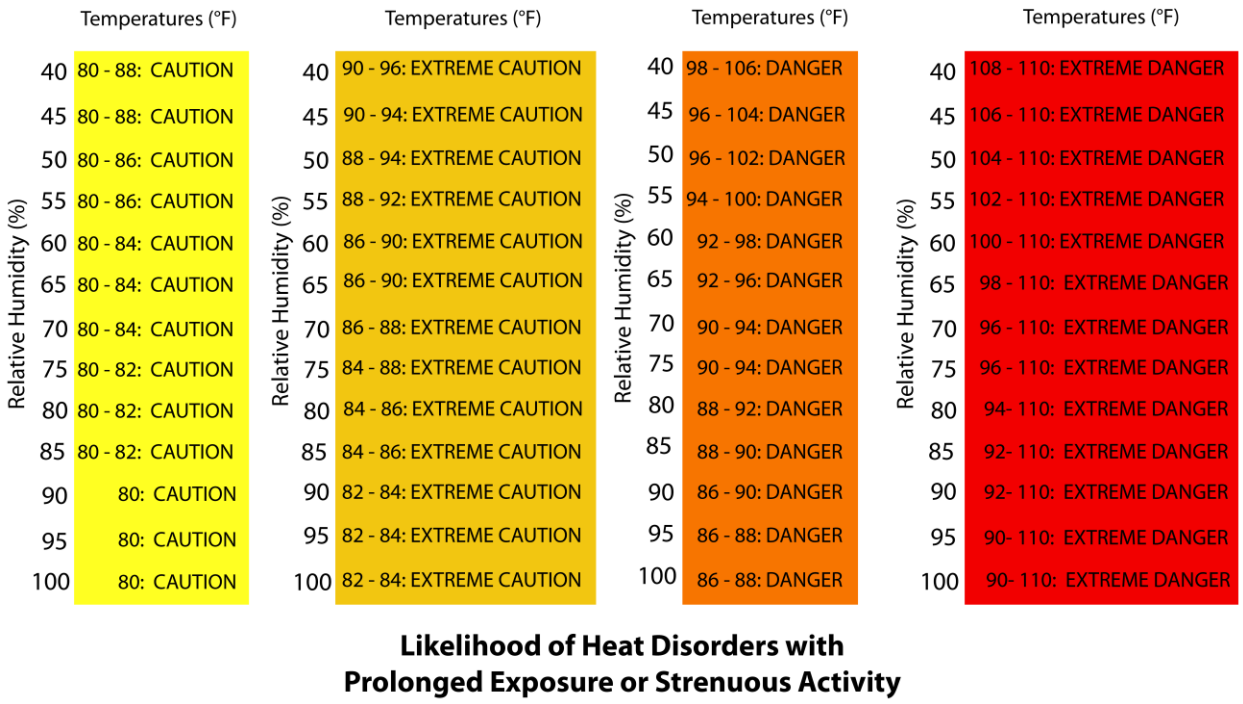
Location

Though a death from extreme heat has been recorded at a specific location in the County, there is no specific geographic scope to the extreme heat hazard. Extreme heat could occur anywhere within the Rockwall County planning area.

Extent

The magnitude or intensity of an extreme heat event is measured according to temperature in relation to the percentage of humidity. According to the National Oceanic Atmospheric Administration (NOAA), this relationship is referred to as the "Heat Index," and is depicted in Figure 7-1. This index measures how hot it feels outside when humidity is combined with high temperatures.

Figure 7-1. Extent Scale for Extreme Summer Heat[1]



The Extent Scale in Figure 7-1 displays varying categories of caution depending on the relative humidity combined with the temperature. For example, when the temperature is at 90 degrees Fahrenheit (ºF) or lower, caution should be exercised if the humidity level is at or above 40 percent.

The shaded zones on the chart indicate varying symptoms or disorders that could occur depending on the magnitude or intensity of the event. "Caution" is the first category of intensity and it indicates when fatigue due to heat exposure is possible. "Extreme Caution" indicates that sunstroke, muscle cramps or heat exhaustion are possible, and a "Danger" level means that these symptoms are likely. "Extreme Danger" indicates that heat stroke is likely. The National Weather Service (NWS) initiates alerts based on the Heat Index as shown in Table 7-1.

[1] Source: NOAA

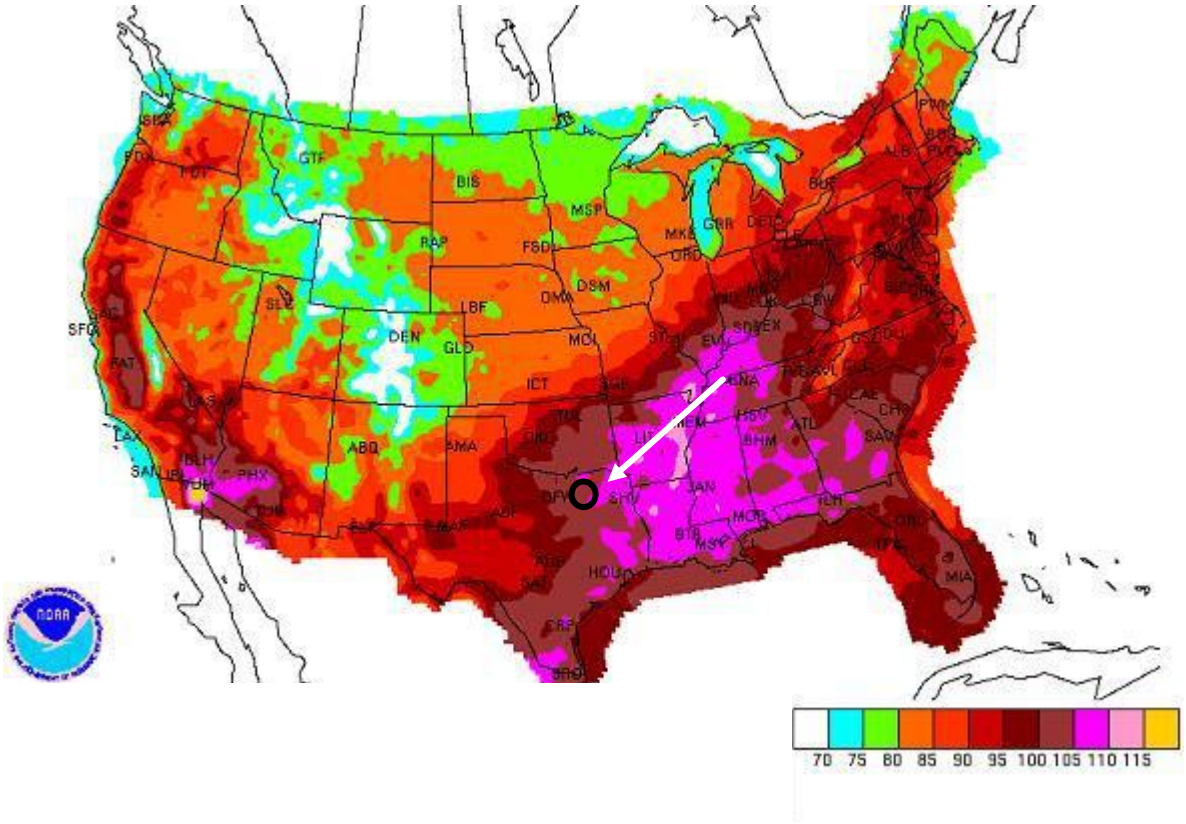
Table 7-1. Heat Index & Warnings

CATEGORY	HEAT INDEX	POSSIBLE HEAT DISORDERS	WARNING TYPE
Extreme Danger	125°F and higher	Heat stroke or sun stroke likely.	A heat advisory will be issued to warn that the Heat Index may exceed 105°F.
Danger	103 – 124°F	Sunstroke, muscle cramps, and/or heat exhaustion are likely. Heatstroke possible with prolonged exposure and/or physical activity.	
Extreme Caution	90 – 103°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.	

Rockwall County's terrain is level to gently rolling land located in Northeast Texas, the area is known as the Blackland Prairie. The greater part of Rockwall County is a treeless prairie, although there was once heavy timber along the East Fork of the Trinity River. Along the creeks and in the bottoms there are a variety of hard and softwood trees, including bois d'arc, elm, oak, mesquite, and pecan. Due to its geography, and its warm, sunny, humid subtropical climate, the Rockwall County planning area can expect an extreme heat event each summer. Citizens, especially children and the elderly should exercise caution by staying out of the heat for prolonged periods when a heat advisory or excessive heat warning is issued. Also at risk are those working or remaining outdoors.

Figure 7-2 displays the daily maximum heat index as derived from NOAA based on data compiled from 1838 to 2015. The black circle shows the Rockwall County area. The color brown indicates a daily maximum heat index of 100-105 degrees F. Rockwall County and all participating jurisdictions could experience extreme heat from 90° to 105° and should mitigate to the extent of "extreme caution", which can include sunstroke, muscle cramps, and heat exhaustion.

Figure 7-2. Average Daily Maximum Heat Index Days[2]



Historical Occurrences

Every summer, the hazard of heat-related illness becomes a significant public health issue throughout much of the US. Mortality from all causes increases during heat waves, and excessive heat is an important contributing factor to deaths from other causes, particularly among the elderly. Preliminary data suggest that by August 21, 2009, record high summer temperatures in Texas resulted in more than 120 heat-related deaths statewide. The United States Immigration and Naturalization Service reported that 51 foreign nationals died along the Texas/Mexico border though none of the reported deaths occurred in Rockwall County. Table 7-2 depicts historical occurrences of mortality from heat from 1994 to 2004 from the Texas Department of State Health Services, and 2005 to 2015 from the NCDC database.

[2] Sou ːa.

Table 7-2. Extreme Heat Related Deaths in Texas

YEAR	DEATHS
1994	1
1995	12
1996	10
1997	2
1998	66
1999	22
2000	71
2001	20
2002	1
2003	0
2004	3
2005	49
2006	2
2007	2
2008	7
2009	6
2010	4
2011	20
2012	2
2013	1
2014	0
2015	3

Because the Texas Department of State Health Services reports on total events statewide, previous occurrences for extreme heat are derived from the NCDC database. According to heat related incidents located solely within Rockwall County, there are seven heat waves[3] on record for Rockwall

[3] Even though the County experiences heat waves each summer, NCDC data only records events reported. Based on reports, only seven events are on record.

County (Table 7-3). Historical extreme heat information, as provided by the NCDC, shows extreme heat activity across a multi-county forecast area for each event, the appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event. Only extreme heat events that have been reported have been factored into this Risk Assessment. It is likely additional extreme heat occurrences have gone unreported before and during the recording period.

Table 7-3. Historical Extreme Heat Events, 1996-2016

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Rockwall County	7/1/1998	0	0	$0	$0
Rockwall County	8/1/1999	0	0	$0	$0
Rockwall County	7/1/2000	0	0	$0	$0
Rockwall County	8/1/2000	0	0	$0	$0
Rockwall County	9/1/2000	0	0	$0	$0
Rockwall County	7/1/2011	1	0	$0	$0
Rockwall County	8/1/2011	0	0	$0	$0
TOTALS		**1**	**0**	**$0**	**$0**

Significant Past Event

July 1, 2011
Triple digit daytime temperatures and warm overnight lows were experienced throughout nearly all of north Texas for the entire month of July. A few records for daily high temperatures were set or tied, but several records for highest minimum temperatures were set. Dallas/Fort Worth set a new all-time record highest minimum temperature of 86 degrees on the 26th. A 55-year old woman was found deceased in her car on the 15th. The medical examiner in Dallas determined heat played a role in her death. A heat advisory was in effect on this day.

Probability of Future Events

According to historical records, the Rockwall County planning area has experienced 7 events in a 19 year reporting period. This provides a frequency of occurrence of 1 event every year. This frequency supports a highly likely probability of future events.

Vulnerability and Impact

There is no defined geographic boundary for extreme heat events. While all Rockwall County is exposed to extreme temperatures; existing buildings, infrastructure and critical facilities are not likely

to sustain significant damage from extreme heat events. Therefore, any estimated property losses associated with the extreme heat hazard are anticipated to be minimal across the area.

Extreme temperatures do however present a significant threat to life and safety for the population of the County as a whole. Heat casualties for example are typically caused by a lack of adequate air-conditioning or heat exhaustion. The most vulnerable population to heat casualties are the elderly or infirmed, who frequently live on 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.

Students in the Independent School Districts are also susceptible as sporting events and practices are often held outside during early fall or late spring when temperatures are at the highest. Another segment of the population at risk are those whose jobs consist of strenuous labor outdoors. Additionally, livestock and crops can become stressed, decreasing in quality or in production, during times of extreme heat.

Extreme high temperatures can have significant secondary impacts, leading to droughts, water shortages, increased fire danger, and prompt excessive demands for energy. The possibility of rolling blackouts increases with unseasonably high temperatures in what is a normally mild month with low power demands.

Typically more than 12 hours of warning time would be given before the onset of an extreme heat event. Only minor property damage would result. 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 running constantly, leading to a temporary power outage. Less than ten percent of residential and commercial property could be damaged if extreme heat events lead to structure fires.

The potential impact of extreme heat for the Rockwall County planning area can be considered “Minor,” resulting in few injuries and minimal disruption to the quality of life. Based on historical records over a 19-year period, annualized losses for Rockwall County are negligible.

Assessment of Impacts

The greatest risk from extreme heat is to public health and safety. Potential impacts the community may include:

- Vulnerable populations, particularly the elderly and infants, can face serious or life-threatening health problems from exposure to extreme heat including hyperthermia; heat cramps; heat exhaustion; and heat stroke (or sunstroke).
- Response personnel including utility workers, public works personnel, and any other professions where individuals are required to work outside, are more subject to extreme heat related illnesses since their exposure would typically be greater.
- High energy demand periods can outpace the supply of energy, potentially creating the need for rolling brownouts which would elevate the risk of illness to vulnerable residents.

- Highways and roads may be damaged by excessive heat causing asphalt roads to soften and concrete roads to shift or buckle.
- Vehicles engines and cooling systems typically run harder during extreme heat events resulting in increases in mechanical failures.
- Extreme heat events during times of drought can exacerbate the environmental impacts associated with drought, decreasing water and air quality and further degrading wildlife habitat.
- Extreme heat increases ground-level ozone (smog), increasing the risk of respiratory illnesses.
- Tourism and recreational activities predominant in the Lake Ray Hubbard area may be negatively impacted during extreme heat events, reducing seasonal revenue.
- Food suppliers can anticipate an increase in food costs due to increases in production costs and crop and livestock losses.
- Fisheries may be negatively impacted by extreme heat, suffering damage to fish habitats (either natural or man-made) and a loss of fish and/or other aquatic organisms due to decreased water flows or availability.
- Negatively impacted water suppliers may face increased costs resulting from the transport water or develop supplemental water resources.
- Outdoor activities may see an increase in school injury or illness during extreme heat events.

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

Section 8: Hail

Hazard Description

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

Location

Hailstorms are an extension of severe thunderstorms that could potentially cause severe damage. As a result, they are not confined to any specific geographic location, and can vary greatly in size, location, intensity and duration. Therefore, the Rockwall County planning area is equally at risk to the hazard of hail.

Extent

The National Weather Service (NWS) classifies a storm as "severe" if there is hail three-quarters of an inch in diameter (approximately the size of a penny) or greater, based on radar intensity or as seen by observers. The intensity category of a hailstorm depends on hail size and the potential damage it could cause, as depicted in the National Climatic Data Center (NCDC) Intensity Scale in Table 8-1.

Table 8-1. Hail Intensity and Magnitude[1]

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

The intensity scale in Table 8-1 ranges from H0 to H10, with increments of intensity or damage potential in relation to hail size (distribution and maximum), texture, fall speed, speed of storm translation, and strength of the accompanying wind. Based on available data regarding the previous occurrences for the area, the Rockwall County planning area may experience hailstorms ranging from an H0 to an H10. The County can mitigate a storm from low risk or hard hail to a severe, super hailstorm with baseball size hail that leads to extensive structural damage and could cause fatal injuries.

Historical Occurrences

Historical evidence shown in Figure 8-1 demonstrates that the planning area is vulnerable to hail events overall, which typically result from severe thunderstorm activity. Historical events with reported damages, injuries or fatalities are shown in Table 8-2. A total of 55 reported historical hail events

[1] NCDC Intensity Scale, based on the TORRO Hailstorm Intensity Scale.

impacted Rockwall County between 1955 and April 2016 (Summary Table 8-3). These events were reported to NCDC and NOAA databases, and may not represent all hail events to have occurred during the past 60 years. Only those events for Rockwall County with latitude and longitude available were plotted (Figure 8-1).

Figure 8-1. Spatial Historical Hail Events, 1955–2016

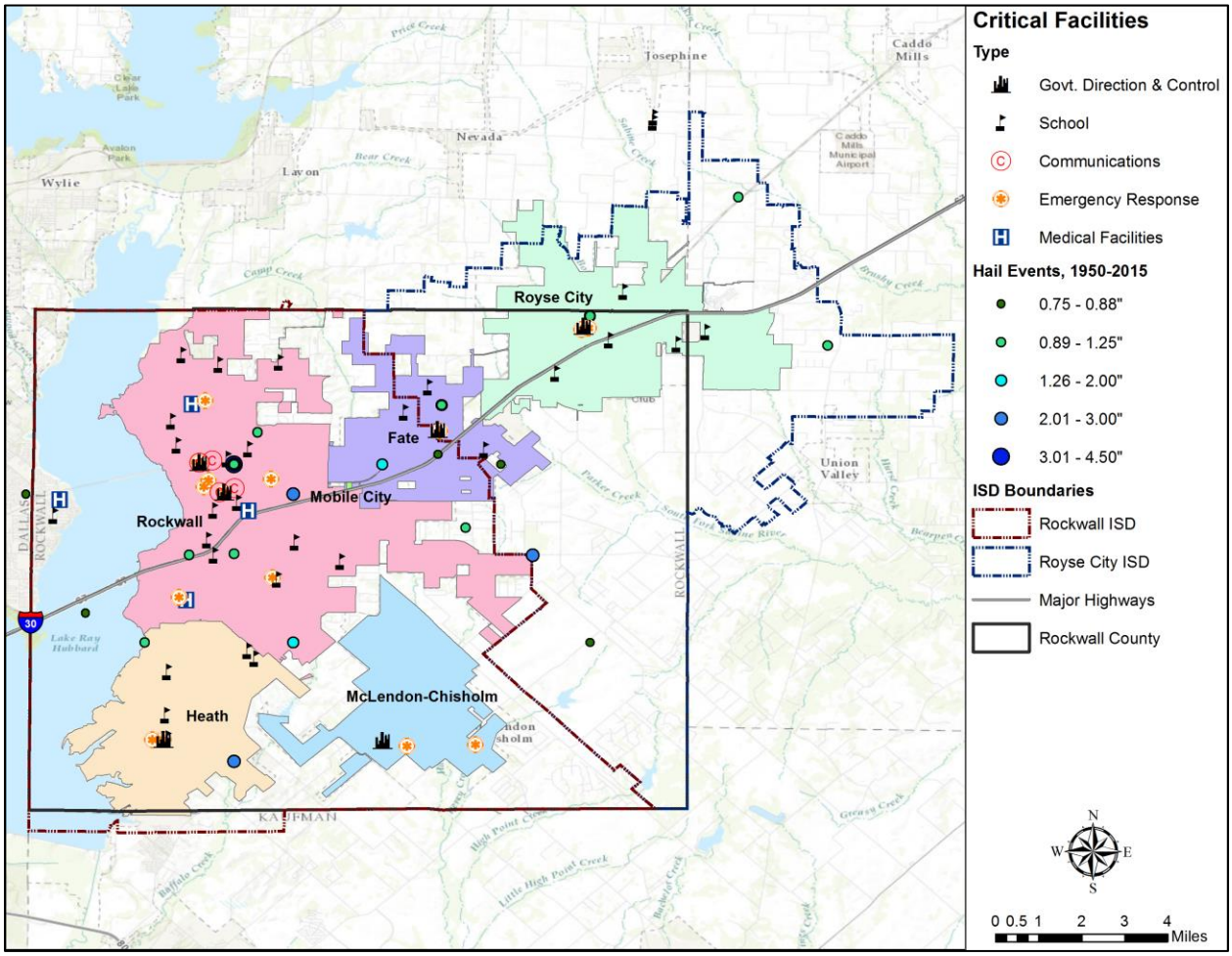


Table 8-2. Historical Hail Events, 1955-2016[2]

JURISDICTION	Date	MAGNITUDE	INJURIES	FATALITIES	PROPERTY DAMAGE	CROP DAMAGE
Rockwall	4/25/1994	4.5 inches	0	0	$8,007,287	$0
Heath	4/3/2012	2.75 inches	0	0	$15,505,806	$0
Rockwall	4/3/2012	1.25 inches	0	0	$2,067	$0
Rockwall County	4/3/2012	3.0 inches	0	0	$15,505,806	$0
Lake Ray Hubbard	4/11/2016	4.0 inches	0	0	$50,000,000	$0
Rockwall	4/11/2016	1.75 inches	0	0	$250,000	$0
Rockwall	4/11/2016	3.0 inches	0	0	$10,000,000	$0
Royse City	4/11/2016	2.0 inches	0	0	$2,000,000	$0
TOTALS		**(Max Extent)**			**$101,270,967**	

Table 8-3. Historical Hail Events Summary, 1955-2016

JURISDICTION	Number of Events	MAGNITUDE	INJURIES	FATALITIES	PROPERTY DAMAGE	CROP DAMAGE
Rockwall County	55	4.00 inches	0	0	$101,270,967	$0
Fate	4	1.75 inches	0	0	$0	$0
Heath	7	2.75 inches	0	0	$15,505,806	$0
McLendon-Chisholm	0	N/A	0	0	$0	$0
Mobile City	0	N/A	0	0	$0	$0
Rockwall	28	4.50 inches	0	0	$18,259,355	$0
Royse City	9	2.00 inches	0	0	$2,000,000	$0
TOTAL LOSSES		**(Max Extent)**	**0**	**0**	**$101,270,967**	

Significant Past Events

April 25, 1994 – Rockwall County

On April 25, 1994 a hail storm brought golf ball to soft ball size hail to the southern portion of Rockwall County. Hail in sizes up to four and a half inches damaged more than 100 homes.

[2] Only recorded events with fatalities, injuries, and/or damages are listed.

April 3, 2012 – City of Heath, City of Rockwall, Rockwall County
On April 3, 2012 a historic tornado outbreak occurred south of Dallas creating substantial damage across multiple counties. In addition to the tornadoes, the tornadic supercell produced large hail that damaged many parts of the DFW Metroplex, including extensive damage in the City of Heath, the City of Rockwall and Rockwall County, where golf ball to baseball size hail was reported. Hail in sizes up to three inches, accompanied by damaging winds, destroyed roofs of hundreds of homes, severely damaged hundreds of vehicles and broke windows in houses. Damages were estimated to reach at least $15,000,000 in property damages.

April 11, 2016 – City of Rockwall, City of Royse City, Rockwall County
A dry line, a warm front and a surface low pressure center all came together to produce a severe weather set-up during the late afternoon and evening hours of April 11. One long-lived supercell produced a multi-million dollar hailstorm across northern suburbs of the Dallas-Fort Worth Metroplex. A trained spotter reported grapefruit sized hail at Eastshore Road near Rockwall and golf-ball sized hail near Highway 205 and Ralph Hall Parkway.

Probability of Future Events

Based on available records of historic events, 55 events in a 61 year reporting period for Rockwall County provides a frequency of occurrence of 1 event every year. This frequency supports a highly likely probability of future events. The numbers listed for the jurisdictions within the County are historical events that are known to have specifically impacted those jurisdictions. Independent School District events are included under the appropriate jurisdiction.

Vulnerability and Impact

Damage from hail approaches $1 billion in the U.S. 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, roofs of buildings and homes, and landscaping are most commonly damaged by hail.

Utility systems on roofs at school districts and critical facilities would be vulnerable and could be damaged. Hail could cause a significant threat to people as they could be struck by hail and falling trees and branches. Outdoor student activities and events may elevate the risk to students and faculty when a hailstorm strikes with little warning. Hail events during school hours could elevate the risk to students and faculty due to broken windows and flying debris. Portable buildings utilized by both school districts would be more vulnerable to hail events than the typical site built structures at each campus.

First responders could not be able to respond to calls due to blocked roads. Also, hail could cause power outages which could cause health and safety risks to faculty and students at schools.

Hail has been known to cause injury to humans, and occasionally has been fatal. Overall, the average loss estimate of property and crop (in 2015 dollars) is $101,270,967, having an approximate annual loss estimate of $1,660,180. Based on historic loss and damages, the impact of hail damages on the Rockwall County planning area can be considered “Minor” severity of impact meaning injuries and illness do not result in permanent disability, County area facilities shut down for more than one week, and more than ten percent of property destroyed or with major damage.

Table 8-4. Potential Annualized Losses for Rockwall County

JURISDICTION	PROPERTY & CROP DAMAGE	ANNUAL LOSS ESTIMATE
Rockwall County	$101,270,967	$1,660,180
Fate	$0	$0
Heath	$15,505,806	$254,194
McLendon-Chisholm	$0	$0
Mobile City	$0	$0
Rockwall	$18,259,355	$299,334
Royse City	$2,000,000	$32,787
Planning Area	**$101,270,967**	**$1,660,180**

Assessment of Impacts

Hail events have the potential to pose a significant risk to people, and can create dangerous situations. Impacts to the planning area can include:

- Hail may create hazardous road conditions during and immediately following an event, delaying first responders from providing for or preserving public health and safety.
- Individuals and first responders who are exposed to the storm may be struck by hail, falling branches, or downed trees resulting in injuries or possible fatalities.
- Residential structures can be damaged by falling trees, which can result in physical harm to occupants.
- Large hail events will likely cause extensive roof damage to residential structures along with siding damage and broken windows, creating a spike in insurance claims and a rise in premiums.
- Automobile damage may be extensive depending on the size of the hail and length of the storm.
- Hail events can result in power outages over widespread areas increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- First responders are exposed to downed power lines, damaged structures, hazardous spills, and debris that often accompany hail events, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Downed power lines and large debris, such as downed trees, can result in the inability of emergency response vehicles to access areas of the community.
- Hazardous road conditions may prevent critical staff from reporting for duty, limiting response capabilities.

- Economic disruption negatively impacts the programs and services provided by the community due to short and long term loss in revenue.
- Some businesses not directly damaged by the hail event may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damages without a backup power source.
- Hazardous road conditions will likely lead to increases in automobile accidents, further straining emergency response capabilities.
- Depending on the severity and scale of damage caused by large hail events, damage to power transmission and distribution infrastructure can require days or weeks to repair.
- A significant hail event could significantly damage agricultural crops, resulting in extensive economic losses for the community and surrounding area.
- Hail events may injure or kill livestock and wildlife.
- A large hail event could impact the accessibility of recreational areas and parks due to extended power outages or debris clogged access roads.

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

Section 9: Drought

Hazard Description

Drought is a period of time without substantial rainfall that persists from one year to the next. Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of anticipated natural precipitation reduction over an extended period of time, usually a season or more in length. Droughts can be classified as meteorological, hydrologic, agricultural, and socioeconomic. Table 9-1 presents definitions for these different types of drought.

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

Table 9-1. Drought Classification Definitions[1]

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

Location

Droughts occur regularly throughout Texas and Rockwall County, and are a normal condition. However, they can vary greatly in their intensity and duration. The Drought Monitor shows the study region to currently be in an area with moderate drought conditions bordered by areas of abnormally dry and severe drought conditions. There is no distinct geographic boundary to drought; therefore, it can occur throughout the Rockwall County planning area equally.

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 9-2 depicts magnitude of drought, while Table 9-3 describes the classification descriptions.

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

Table 9-2. Palmer Drought Index

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

Table 9-3. Palmer Drought Category Descriptions[2]

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

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.

[2] Source: National Drought Mitigation Center

Based on the historical occurrences for drought and the location of Rockwall County in the Blackland Prairie, the area can anticipate a range of drought from abnormally dry to exceptional or D0 to D4 based on the Palmer Drought Category.

Historical Occurrences

Rockwall County may typically experience a severe drought. Tables 9-4 and 9-5 lists historical events that have occurred in Rockwall County as reported in the National Climatic Data Center (NCDC). Historical drought information, as provided by the NCDC, shows drought activity across a multi-county forecast area for each event, the appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event. Historical drought data for all participating jurisdictions in the Rockwall County planning area are provided on a County-wide basis per the NCDC database.

Table 9-4. Historical Drought Years, 1996-2016

DROUGHT YEAR
1996
1998
2000
2005
2006
2011
2013
2014
2015
9 unique events

Table 9-5. Historical Drought Events, 1996-2016[3]

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Rockwall County	10/1/2006	0	0	$588,631	$588,631
Rockwall County	11/1/2006	0	0	$0	$941,810
Rockwall County	3/14/2011	0	0	$0	$4,220

[3] Only recorded events with fatalities, injuries, and/or damages are listed.

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Rockwall County	4/1/2011	0	0	$0	$21,102
Rockwall County	5/1/2011	0	0	$0	$3,165
Rockwall County	8/1/2011	0	0	$0	$10,551
Rockwall County	9/1/2011	0	0	$0	$26,378
Rockwall County	10/1/2011	0	0	$0	$7,359
Rockwall County	11/1/2011	0	0	$0	$3,165
Rockwall County	12/1/2012	0	0	$0	$1,034
Rockwall County	1/1/2013	0	0	$0	$2,038
Rockwall County	2/1/2013	0	0	$0	$1,019
Rockwall County	3/1/2013	0	0	$2,038	$0
Rockwall County	5/14/2013	0	0	$3,056	$0
Rockwall County	7/9/2013	0	0	$0	$1,019
Rockwall County	8/1/2013	0	0	$0	$2,038
Rockwall County	9/1/2013	0	0	$0	$1,019
Rockwall County	4/1/2014	0	0	$0	$1,003
Rockwall County	5/1/2014	0	0	$0	$1,003
Rockwall County	6/1/2014	0	0	$0	$1,003
Rockwall County	7/1/2014	0	0	$0	$3,008
Rockwall County	10/1/2014	0	0	$0	$501
Rockwall County	11/1/2014	0	0	$0	$501
Rockwall County	12/1/2014	0	0	$0	$5,013
Rockwall County	1/1/2015	0	0	$0	$500
Rockwall County	2/1/2015	0	0	$0	$2,000
Rockwall County	3/1/2015	0	0	$0	$500
Rockwall County	4/1/2015	0	0	$0	$1,000
TOTALS		**0**	**0**	**$593,725**	**$1,630,577**

Significant Past Events

October - November, 2006
Persistent drought conditions continued across portions of north Texas through the month of October. According to the U.S. Drought Monitor, much of the region was still experiencing extreme (D3) drought conditions. This was a slight improvement from the prior month when the majority of the area was rated exceptional drought (D4). A few rain events through October lessened drought conditions. Almost every north Texas lake remained well below conservation levels. The rain events this month helped the lake level rebound somewhat, however, levels began dropping again within a day or two of the end of the rainfall. Stage 1 water restrictions remained in effect in most metroplex counties. The Drought Impact Reporter reported that hay prices in Texas were approximately twice what they were before the drought began. Crops continued to suffer, with the cotton production this year about half of last year crop. Burn bans remained in effect through the month of October and November.

September, 2011
Drought persisted through the month of September across all 46 counties in the Fort Worth County Warning Area (CWA), experiencing at least extreme drought (D3) conditions. By the end of the month, 37 of 46 counties were classified as exceptional (D4) drought.

Probability of Future Events

Based on available records of historic events, there have been 9 extended time periods of drought within a 19 year reporting period, which provides a frequency of occurrence of 1 event every year. This frequency supports a highly likely probability of future events. All participating jurisdictions and Independent School District events are included under the County.

Vulnerability and Impact

Loss estimates were based on 19 years of statistical data from the NCDC. A drought event frequency-impact was then developed to determine an impact profile on agriculture products and estimate potential losses due to drought in the area. Table 9-6 shows annualized exposure.

Table 9-6. Drought Event Damage Totals, 1996-2016

JURISDICTION	PROPERTY & CROP LOSS	ANNUALIZED LOSS ESTIMATES
Rockwall County	$2,224,302	$117,069

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 typically have no impact on buildings.

In terms of vulnerability, population, agriculture, property, and environment are all vulnerable to drought. The average person will survive only a few days without water, and this timeframe can be drastically shortened for those people with more fragile health – typically children, the elderly, and the

ill. The population is also vulnerable to food shortages when drought conditions exist and potable water is in short supply. Potable water is used for drinking, sanitation, patient care, sterilization, equipment, heating and cooling systems, and many other essential functions in medical facilities. While all residents in the Rockwall planning area could be adversely affected by drought conditions, which could limit water supplies and present health threats, during summer drought, or hot and dry, conditions elderly persons, small children, infants and the chronically ill who do not have adequate cooling units in their homes may become more vulnerable to injury and/or death.

Students and faculty in Rockwall and Royse City ISD are also vulnerable to drought however, elementary campuses are considered more vulnerable due to their higher population of small children. Outdoor athletic activities or events on all campuses may increase the risk to participating students and faculty.

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

Habitat damage is a vulnerability of the environment during periods of drought, for both aquatic and terrestrial species. The environment also becomes vulnerable during periods of extreme or prolonged drought due to severe erosion and land degradation.

Impact of droughts experienced in the Rockwall County planning area has resulted in no injuries and fatalities supporting a limited severity of impact meaning injuries and/or illnesses are treatable with first aid, shutdown of facilities and services for 24 hours or less, and less than 10% of property is destroyed or with major damage. Annualized loss over the 19-year reporting period in Rockwall County is $117,069 annually.

Assessment of Impacts

The drought Impact Reporter was developed in 2005 by the University of Nebraska-Lincoln to provide a national database of drought impacts. Droughts can have an impact on: the agriculture; business and industry; energy; fire; plants and wildlife; relief, response, and restrictions; society and public health; tourism and recreation; and water supply and quality. Table 9-7 lists the drought impacts to Rockwall County from 2005 to 2015, based on reports received by the Drought Impact Reporter.

Table 9-7. Drought Impacts, 2005-2015

DROUGHT IMPACTS 2005-2015	
Agriculture	24
Business & Industry	3
Energy	2
Fire	5
Plants & Wildlife	8

Section 9: Drought

DROUGHT IMPACTS 2005-2015	
Relief, Response & Restrictions	11
Society & Public Health	5
Tourism & Recreation	0
Water Supply & Quality	16

Drought has the potential to impact people in the Rockwall County planning area. While it is rare that drought, in and of itself, leads to a direct risk to the health and safety of people in the U.S., severe water shortages could result in inadequate supply for human needs. Drought also is frequently associated with a variety of impacts, including:

- The number of health-related low-flow issues (e.g., diminished sewage flows, increased pollution concentrations, reduced firefighting capacity, cross-connection contamination) will increase as the drought intensifies
- Public safety from forest/range/wildfires will increase as water availability and/or pressure decreases
- Respiratory ailments may increase as the air quality decreases
- There may be an increase in disease due to wildlife concentrations (e.g., rabies, Rocky Mountain spotted fever, Lyme disease)
- Jurisdictions and residents may disagree over water use/water rights, creating conflict
- Political conflicts may increase between municipalities, counties, states, and regions
- Water management conflicts may arise between competing interests
- Increased law enforcement activities may be required to enforce water restrictions
- Severe water shortages could result in inadequate supply for human needs as well as lower quality of water for consumption
- Firefighters may have limited water resources to aid in firefighting and suppression activities, increasing risk to lives and property.
- During drought there is an increased risk for wildfires and dust storms.
- The community may need increased operational costs to enforce water restriction or rationing.
- Prolonged drought can lead to increases in illness and disease related to drought.
- Utility providers can see decreases in revenue as water supplies diminish.
- Utilities providers may cut back energy generation and service to their customers to prioritize critical service needs.
- Hydroelectric power generation facilities and infrastructure would have significantly diminished generation capability. Dams simply cannot produce as much electricity from low water levels as they can from high water levels.
- Fish and wildlife food and habitat will be reduced or degraded over time during a drought and disease will increase, especially for aquatic life.
- Wildlife will more to more sustainable locations creating higher concentrations of wildlife in smaller areas, increasing vulnerability and further depleting limited natural resources.
- Severe and prolonged drought can result in the reduction of a species, or cause the extinction of a species altogether.

- Plant life will suffer from long-term drought. Wind and erosion will also pose a threat to plant life as soil quality will decline.
- Dry and dead vegetation will increase the risk of wildfire.
- Land subsidence threat increases as groundwater is depleted.
- Recreational activities that rely on water may be curtailed, such as hunting and fishing in or near Lake Ray Hubbard, resulting in fewer tourists and lower revenue.
- Drought poses a significant risk to annual and perennial crop production and overall crop quality leading to higher food costs.
- Drought related declines in production may lead to an increase in unemployment.
- Drought may limit livestock grazing resulting in decreased livestock weight, potential increased livestock mortality, and increased cost for feed.
- Negatively impacted water suppliers may face increased costs resulting from the transport water or develop supplemental water resources
- Long term drought may negatively impact future economic development.

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

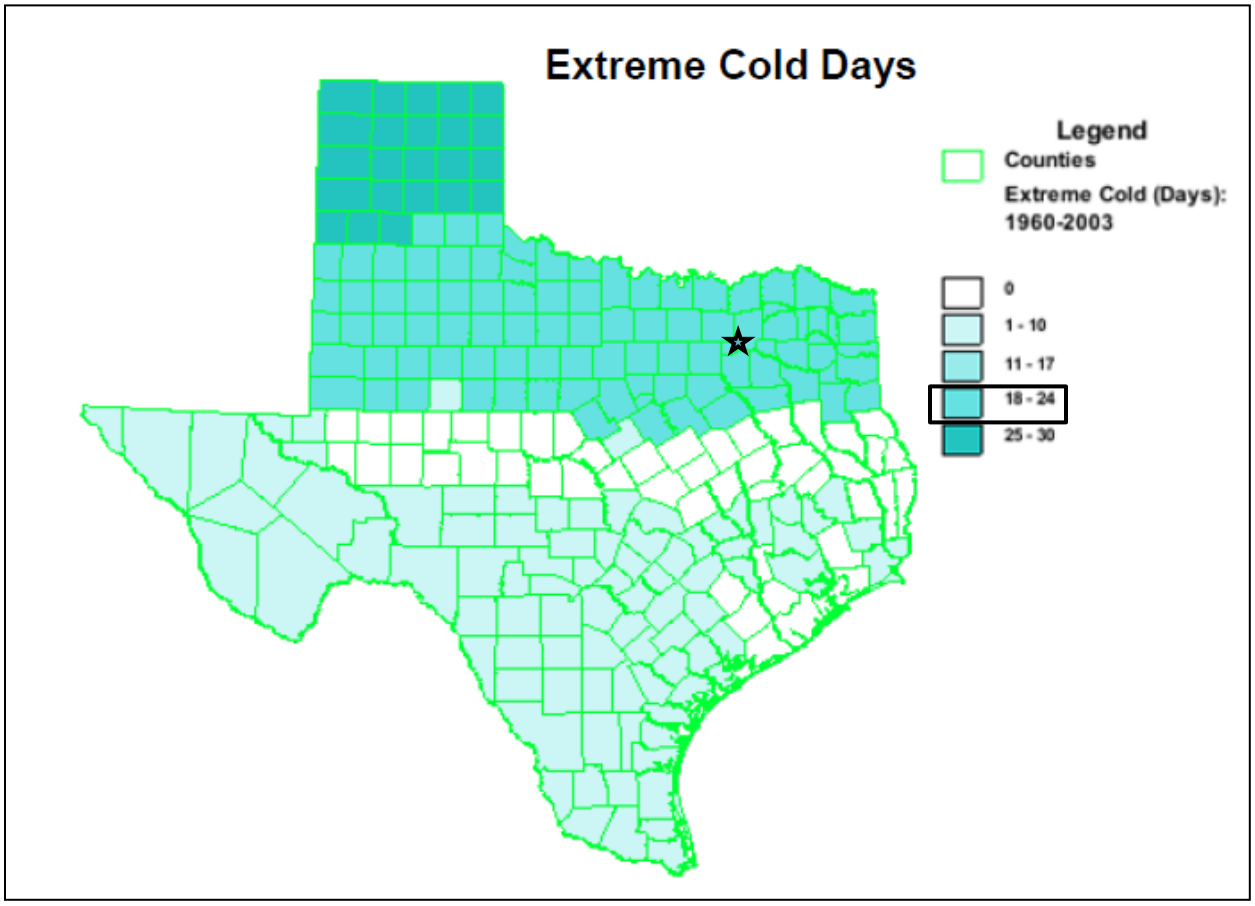
Section 10: Winter Storm

Hazard Description

A severe winter storm event is identified as a storm with snow, ice, or freezing rain. This type of storm can cause significant problems for area residents. Winter storms are associated with freezing or frozen precipitation such as freezing rain, sleet, snow and the combined effects of winter precipitation and strong winds. Wind chill is a function of temperature and wind. Low wind chill is a product of high winds and freezing temperatures.

Winter storms that threaten Rockwall County usually begin as powerful cold fronts that push south from central Canada. The County is at risk to ice hazards and extremely cold temperatures, as well as snow, the effects and frequencies of winter storm events are generally mild and short-lived. As indicated in Figure 10-1, on average, the area experiences 18-24 cold days a year, meaning 18-24 days per year are at or around freezing temperatures. During these times of ice and snow accumulation response times will increase until public works road crews are able to assist in making the major roads passable. Table 10-1 describes the types of winter storms possible to occur in Rockwall County.

Figure 10-1. Extreme Cold Days 1960-2003[1]



[1] Source: National Weather Service. Rockwall County indicated by star.

Table 10-1. Types of Winter Storms

TYPE OF WINTER STORM	DESCRIPTION
Winter Weather Advisory	This alert may be issued for a variety of severe conditions. Weather advisories may be announced for snow, blowing or drifting snow, freezing drizzle, freezing rain, or a combination of weather events.
Winter Storm Watch	Severe winter weather conditions may affect your area (freezing rain, sleet or heavy snow may occur separately or in combination).
Winter Storm Warning	Severe winter weather conditions are imminent.
Freezing Rain or Freezing Drizzle	Rain or drizzle is likely to freeze upon impact, resulting in a coating of ice glaze on roads and all other exposed objects.
Sleet	Small particles of ice usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.
Blizzard 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	A strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower in a calm atmosphere. The combined cooling power of the wind and temperature on exposed flesh is called the wind-chill factor.

Location

Winter storm events are not confined to specific geographic boundaries. Therefore, all existing and future buildings, facilities, and populations in the Rockwall County planning area are considered to be exposed to a winter storm hazard and could potentially be impacted.

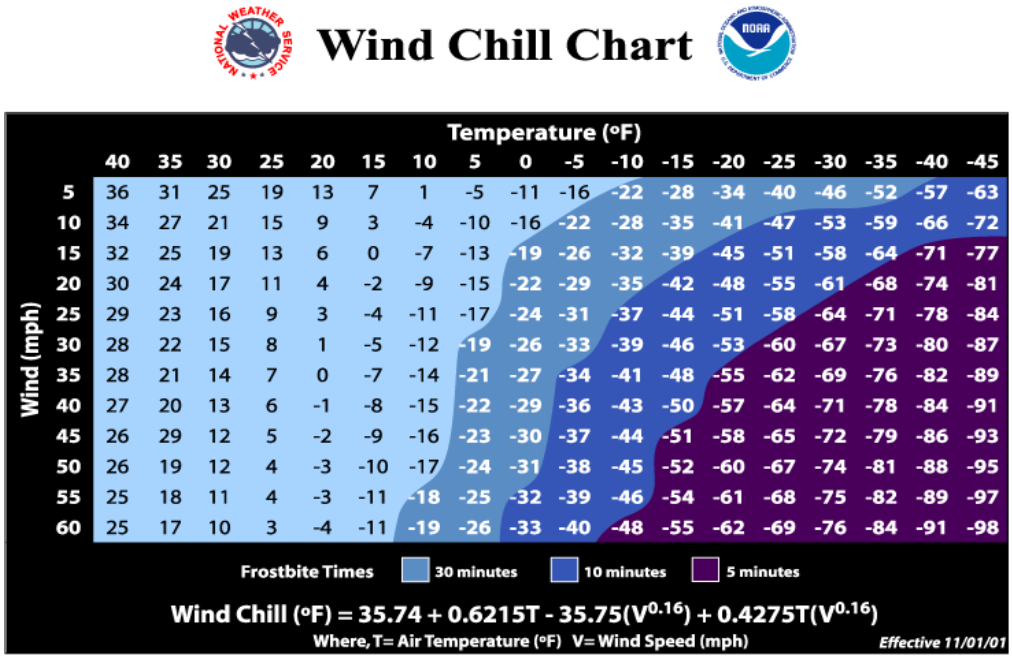
Extent

The extent or magnitude of a severe winter storm is measured in intensity based on the temperature and level of accumulations as shown in Table 10-2. Table 10-2 should be read in conjunction with the wind-chill factor described in Figure 10-2 to determine the intensity of a winter storm. The chart is not applicable when temperatures are over 50°F or winds are calm. This is an index developed by the National Weather Service.

Table 10-2. Magnitude of Severe Winter Storms

INTENSITY	TEMPERATURE RANGE (Fahrenheit)	EXTENT DESCRIPTION
Mild	40° – 50°	Winds less than 10 mph and freezing rain or light snow falling for short durations with little or no accumulations
Moderate	30° – 40°	Winds 10 – 15 mph and sleet and/or snow up to 4 inches
Significant	25° – 30°	Intense snow showers accompanied with strong gusty winds, between 15 and 20 mph with significant accumulation
Extreme	20° – 25°	Wind driven snow that reduces visibility, heavy winds (between 20 to 30 mph), and sleet or ice up to 5 millimeters in diameter
Severe	Below 20°	Winds of 35 mph or more and snow and sleet greater than 4 inches

Figure 10-2. Wind Chill Chart



Wind chill temperature is a measure of how cold the wind makes real air temperature feel to the human body. Since wind can dramatically accelerate heat loss from the body, a blustery 30°F day would feel just as cold as a calm day with 0°F temperatures. Rockwall County has never experienced a blizzard, but based on 22 previous occurrences recorded from 1996 to February 2016, it has been subject to winter storm watches, warnings, freezing rain, sleet, snow and wind chill.

The average number of cold days is similar for the entire county planning area. Therefore the intensity or extent of a winter storm event to be mitigated for the area ranges from mild to significant according to the definitions at Table 10-2. Rockwall County planning area can expect anywhere between 0.1 to

3.0 inches of ice and snow during a winter storm event and temperatures between 25 and 50 degrees with winds ranging from 0 to 20 mph.

Historical Occurrences

Table 10-3 shows historical occurrences for Rockwall County from 1996 to February 2016 provided by the NCDC database. There have been 22 recorded winter storm events in Rockwall County. Historical winter storm information, as provided by the NCDC, identifies winter storm activity across a multi-county forecast area for each event. The appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event. Historical winter storm data for all jurisdictions and Independent School Districts are provided on a County-wide basis per the NCDC database. Table 10-3 shows historical incident information for the planning area which resulted in property or crop damage.

Table 10-3. Historical Winter Storm Events, 1996-2016[2]

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Rockwall County	2/11/2010	0	0	$65,305.06	$0
Rockwall County	2/1/2011	0	0	$31,653.38	$0
Rockwall County	2/3/2011	0	0	$5,275.56	$0
Rockwall County	12/5/2013	0	0	$203,759.49	$0
Rockwall County	2/23/2015	0	0	$6,000.00	$0

Significant Past Events

February 11, 2010 – Rockwall County

A record snowfall fell across north Texas beginning the early morning hours of February 11th and continuing until the early morning hours of the 12th. Four climate data records for snow at DFW Airport were broken during this event including the highest 24-hour snowfall total. Nine to twelve inches of snow fell across Rockwall County. Royse City reported a total snow amount of 12 inches along with multiple icy bridges. The local newspaper reported 9 inches of snow in the City of Rockwall. This snow storm caused major tree damage and resulted in over 500,000 power outages in north Texas. Some residents were without power for up to 4 days after the event. Many power outages were caused by tree limbs breaking and falling on power lines. Fallen tree limbs also caused problems on area roadways and damage to vehicles and homes. The damage caused by falling trees and to powerlines accounted for most of the monetary damage estimate in the region. The weight of the snow also resulted in the collapse of several metal carports and a few roof collapses. School closings, early

[2] Only recorded events with fatalities, injuries, and/or damages are listed, values are in 2015 dollars.

releases, and delays were common on both days, and the same applied to numerous government offices and businesses.

February 1, 2011 – Rockwall County
Two significant winter weather events occurred in the first week of February 2011. The first winter storm began late on January 31st and ended during the morning hours of February 1st. A strong cold front blew through the region with very cold air ahead of an approaching upper level system. Before the snow began, periods of rain, freezing rain, and sleet provided a sheet of ice underneath the snow. The combination of sleet, freezing rain and snow resulted in hazardous conditions across the entire Rockwall County planning area. Another winter storm affected the region a few days later on the 3rd-4th. Schools and businesses were shut down for days and rolling blackouts were needed on the 2nd to account for the extreme demand on the state's electricity grids.

December 5, 2013 – Rockwall County
A combination of freezing rain, sleet, and a little snow began falling during the day on the 5th and continued through the morning hours of the 6th. As the ice and sleet settled on the 6th, a thick layer of ice paralyzed most of the area. Temperatures remained below freezing until the 9th and 10th resulting in a prolonged winter event. The accumulation of ice and sleet resulted in significant tree damage across Rockwall County. The ice also brought down power lines, resulting in a few hundred power outages. Damages to carports were also reported due to the weight of the ice and snow.

Probability of Future Events

According to historical records, Rockwall County experiences one or two winter storm events per year. Hence, the probability of a future winter storm event affecting the Rockwall County planning area is highly likely, with a winter storm likely to occur within the next year. Jurisdictions and Independent School District events are included under the County.

Vulnerability and Impact

During periods of extreme cold and freezing temperatures, water pipes can freeze and crack; and ice can build up on power lines, causing them to break under the weight or causing tree limbs to fall on the lines. These events can disrupt electric service for long periods.

An economic impact may occur due to increased consumption of heating fuel, which can lead to energy shortages and higher prices. House fires and resulting deaths tend to occur more frequently from increased and improper use of alternate heating sources. Fires during winter storms also present a greater danger because water supplies may freeze and impede firefighting efforts.

All populations, buildings, critical facilities, and infrastructure in the entire Rockwall County planning area 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 during these events, especially in the rural areas of the county 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, every year hypothermia kills about 600 Americans, half of whom are 65 years of age or older.

Students at Rockwall and Royse City Independent School Districts are at greater risk as sporting events and practices are often held outside during late fall or early winter when temperatures begin to lower. Ice storms during the school day can lead to early school closings often combined with hazardous driving conditions. The risk of injury to students and faculty will be elevated along walkways and parking lots as well as access and secondary roads.

Historic loss, in 2015 dollars, is estimated at $311,993 in damages over the 19-year recording period giving an approximate loss of $16,421 in damages annually (Table 10-4). The potential severity of impact is limited meaning injuries are treatable with first aid, shutdown of facilities and services for 24 hours or less, and less than 10% of property destroyed or with major damage.

Table 10-4. Winter Storm Event Damage Totals, 1996-2016

JURISDICTION	PROPERTY & CROP LOSS	ANNUALIZED LOSS ESTIMATES
Rockwall County	$311,993	$16,421

Assessment of Impacts

The greatest risk from a winter storm hazard is to public health and safety. Potential impacts for the planning area may include:

- Vulnerable populations, particularly the elderly and infants, can face serious or life-threatening health problems from exposure to extreme cold including hypothermia and frostbite.
- Loss of electric power or other heat source can result in increased potential for fire injuries or hazardous gas inhalation because residents burn candles for light or use fires or generators to stay warm.
- Response personnel, including utility workers, public works personnel, debris removal staff, tow truck operators, and other first responders are subject to injury or illness resulting from exposure to extreme cold temperatures.
- Response personnel would be required to travel in potentially hazardous conditions, elevating the life safety risk due to accidents, and potential contact with downed power lines.
- Operations or service delivery may experience impacts from electricity blackouts due to winter storms.
- Power outages are possible throughout the planning area due to downed trees and power lines and/or rolling blackouts.
- Critical facilities without emergency backup power may not be operational during power outages.
- Emergency response and service operations may be impacted by limitations on access and mobility if roadways are closed, unsafe, or obstructed.
- Hazardous road conditions will likely lead to increases in automobile accidents, further straining emergency response capabilities.
- Depending on the severity and scale of damage caused by ice and snow events, damage to power transmission and distribution infrastructure can require days or weeks to repair.

- A winter storm event could lead to tree, shrub, and plant damage or death.
- Severe cold and ice could significantly damage agricultural crops.
- Schools may be forced to shut early due to treacherous driving conditions.
- Exposed water pipes may be damaged by severe or late season winter storms at both residential and commercial structures, causing significant damages.

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

Section 11: Wildfire

Hazard Description

A wildfire event can rapidly spread out of control and occurs most often in the summer, when the brush is dry and flames can move unchecked through a highly vegetative area. Wildfires can start as a slow burning fire along the forest floor, killing and damaging trees. The fires 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 wildfire.

A wildfire event often begins unnoticed and spreads quickly, lighting brush, trees and homes on fire. For example, a wildfire may be started by a campfire that was not doused properly, tossed cigarette, burning debris, or arson.

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

Location and Historical Occurrences

A wildfire event can be a potentially damaging consequence of drought. Wildfires can vary greatly in terms of size, location, intensity and duration. While wildfires are not confined to any specific geographic location, they are most likely to occur in open grasslands. The threat to people and property from a wildfire event is greater in the fringe areas where developed areas meet open grass lands, such as the WUI. (Figures 11-1 through 11-7). It is estimated that 44 percent of the total population in Rockwall County live within the WUI. However, the entire Rockwall County planning area is equally at risk for wildfires.

Figure 11-1. Wildland Urban Interface Map – Rockwall County

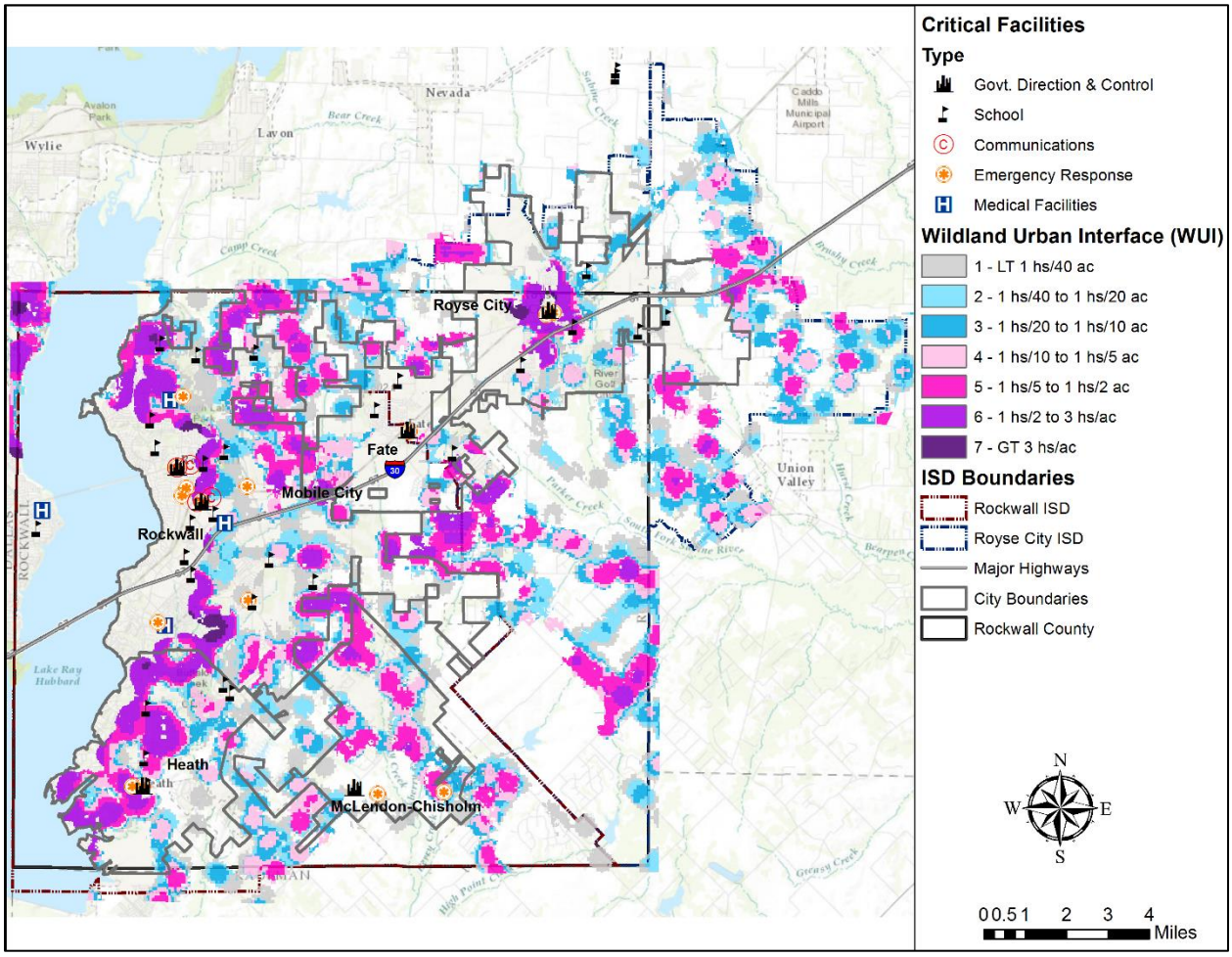
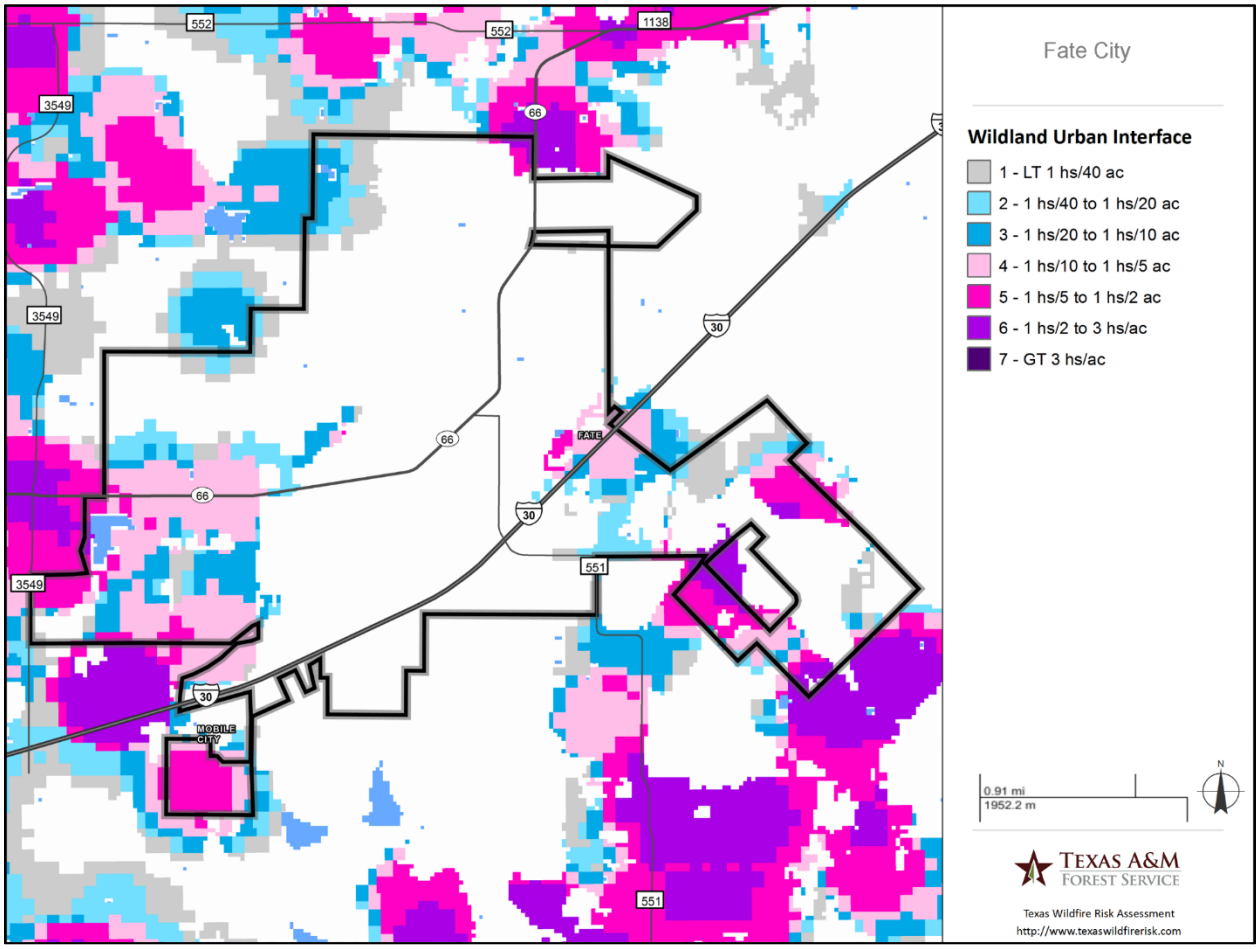
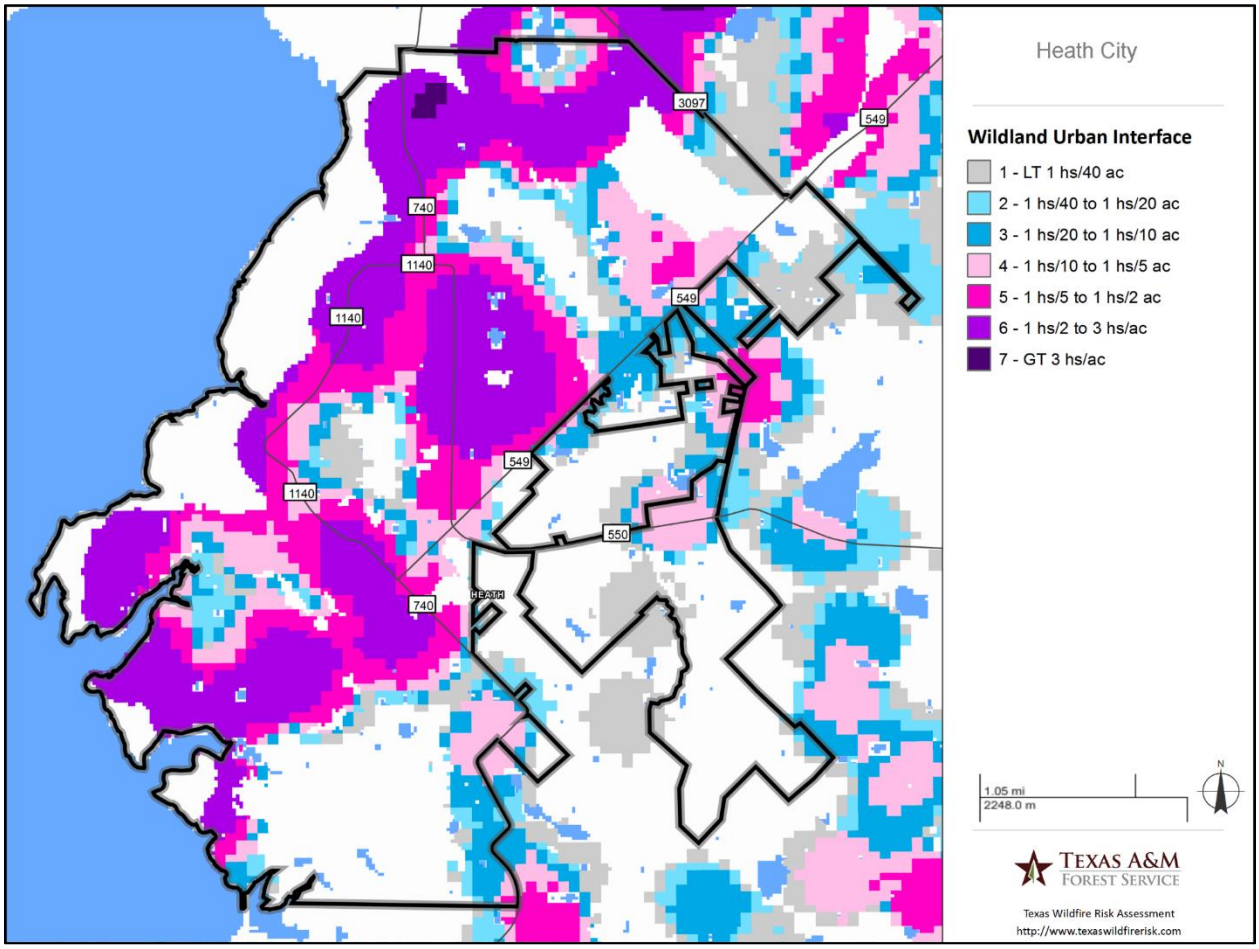


Figure 11-2. Wildland Urban Interface Map – Fate



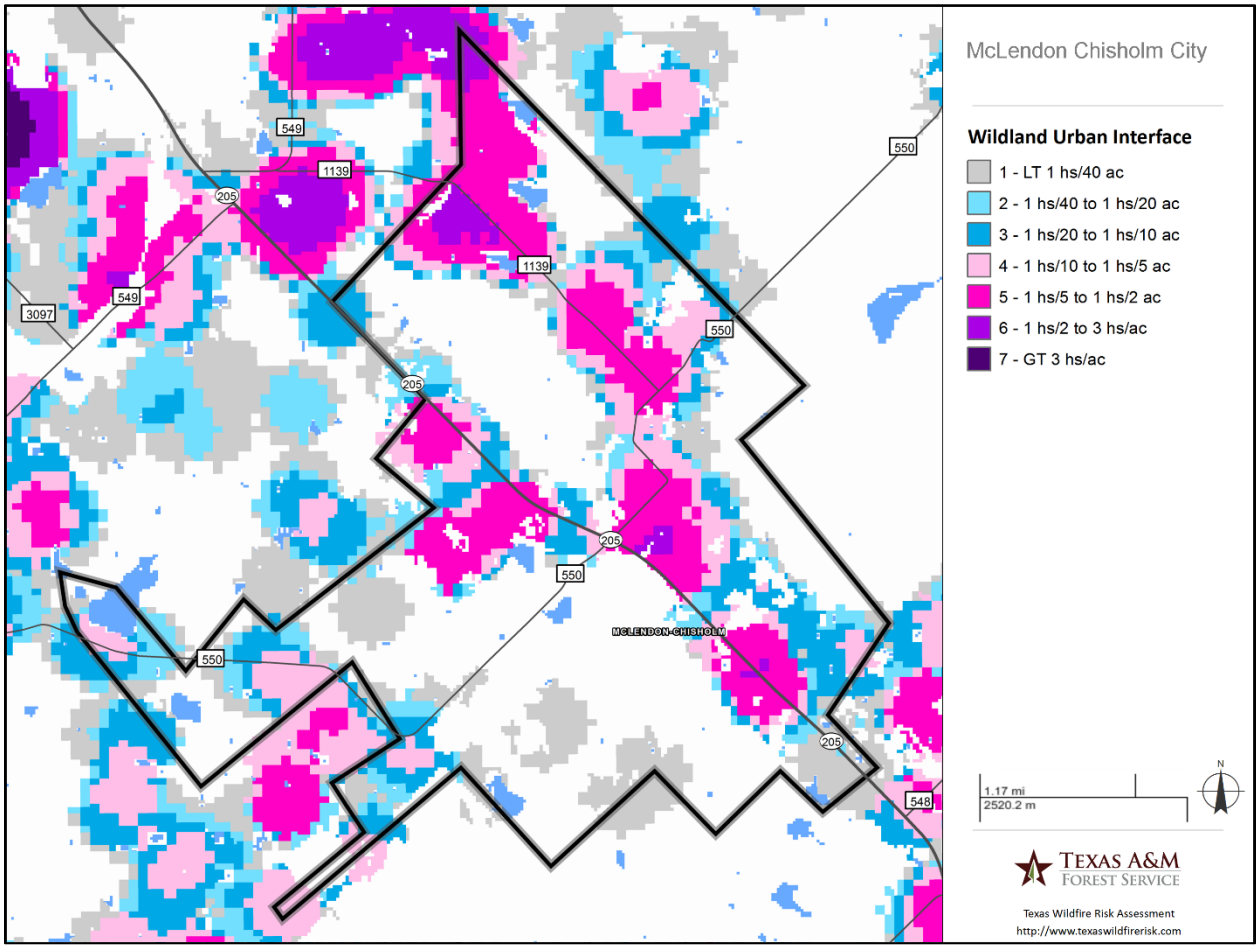
It is estimated that 38 percent of the total population in Fate live within the WUI. However, the entire City of Fate is equally at risk for wildfires.

Figure 11-3. Wildland Urban Interface Map – Heath



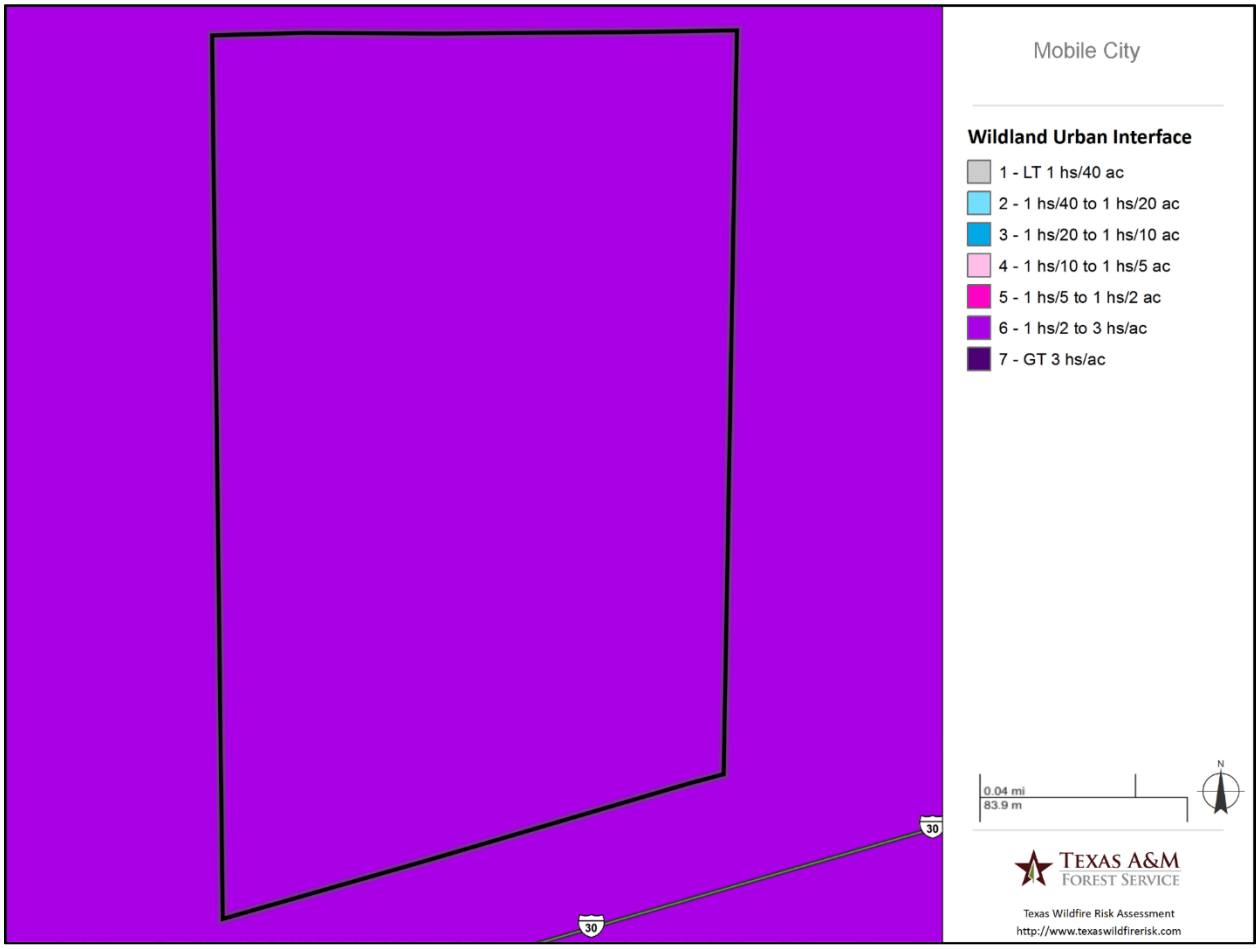
It is estimated that 70 percent of the total population in Heath live within the WUI. However, the entire City of Heath is equally at risk for wildfires.

Figure 11-4. Wildland Urban Interface Map – McLendon-Chisholm



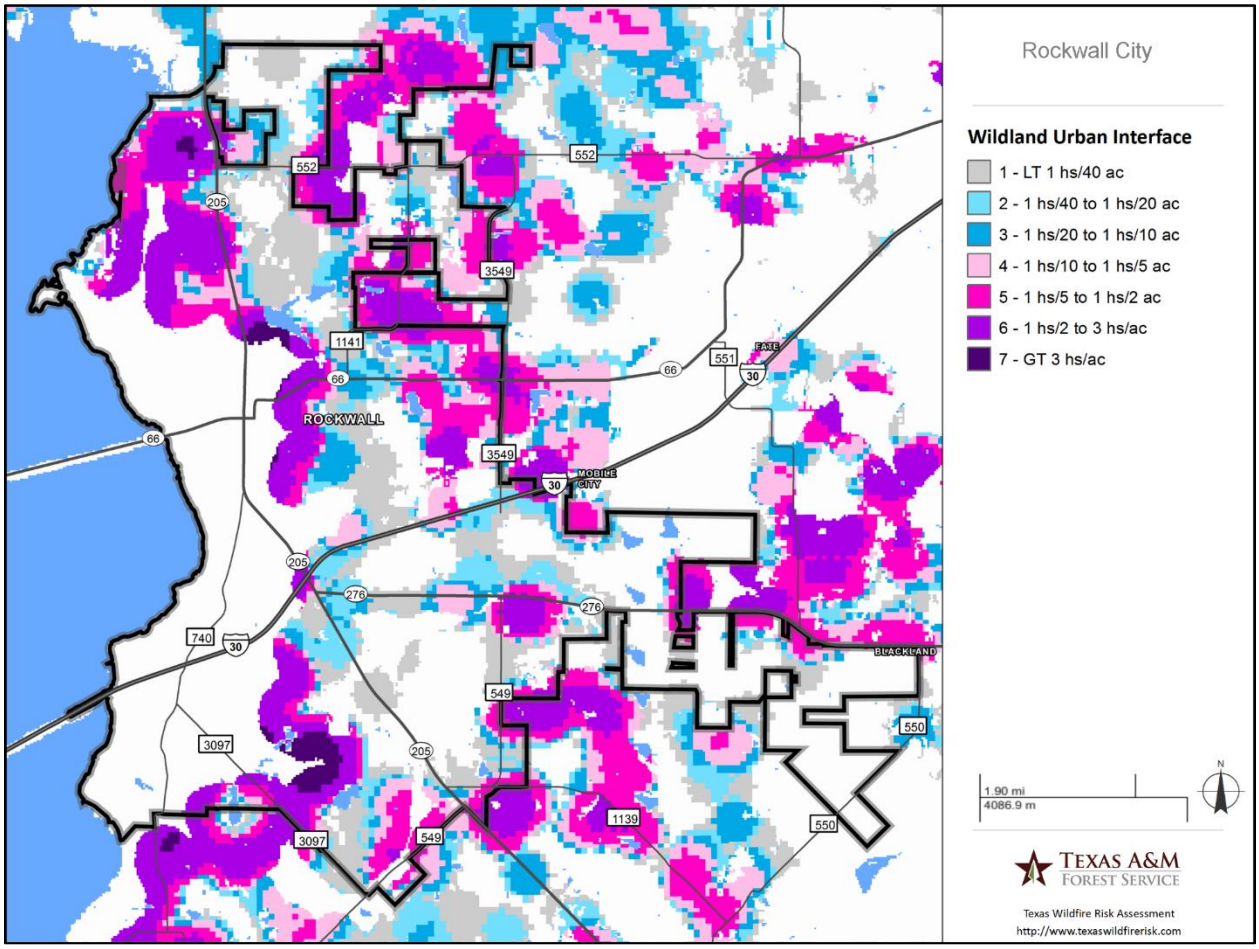
It is estimated that 98 percent of the total population in McLendon-Chisholm live within the WUI. However, the entire City of McLendon-Chisholm is equally at risk for wildfires.

Figure 11-5. Wildland Urban Interface Map – Mobile City



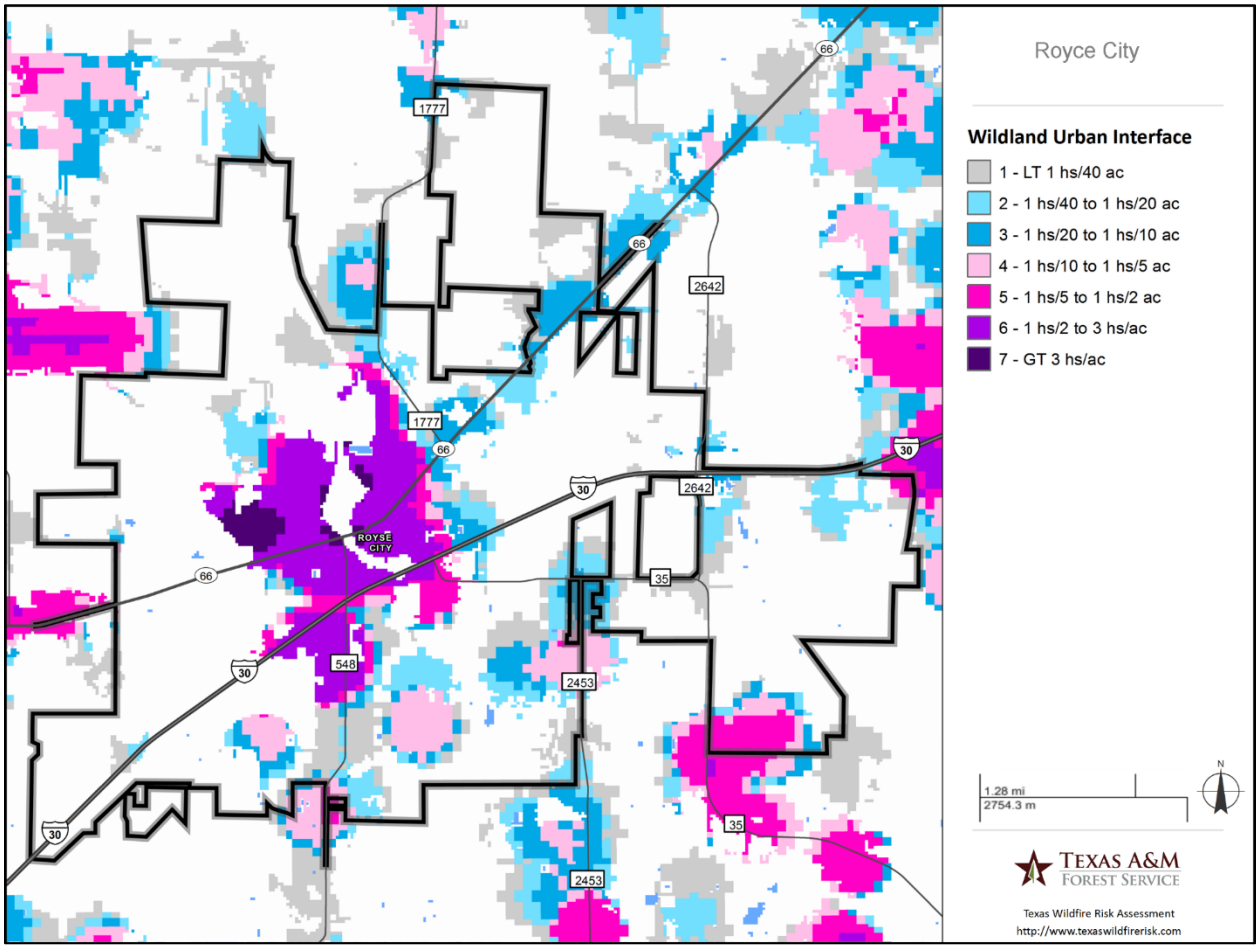
It is estimated that 100 percent of the total population in Mobile City live within the WUI.

Figure 11-6. Wildland Urban Interface Map – City of Rockwall



It is estimated that 26 percent of the total population in the City of Rockwall live within the WUI. However, the entire City of Rockwall is equally at risk for wildfires.

Figure 11-7. Wildland Urban Interface Map – Royse City



It is estimated that 73 percent of the total population in the City of Royse City live within the WUI. However, the entire City of Royse City is equally at risk for wildfires.

The Texas Forest Service reported 132 wildfire events between 2005 and 2009. The National Climatic Data Center (NCDC) did not have any reported events from 1996 through February 2016. The Texas Forest Service (TFS) started collecting wildfire data in 1985 and volunteer fire departments started reporting events until 2005. Due to a lack of recorded data for wildfire events prior to 2005, frequency calculations are based on a ten-year period, using only data from recorded years. The map below shows approximate locations of wildfires, which can be grass or brushfires of any size (Figure 11-8). Table 11-1 identifies the number of wildfires by jurisdiction, and total acreage burned.

Figure 11-8. Location and Historic Wildfire Events for Rockwall County

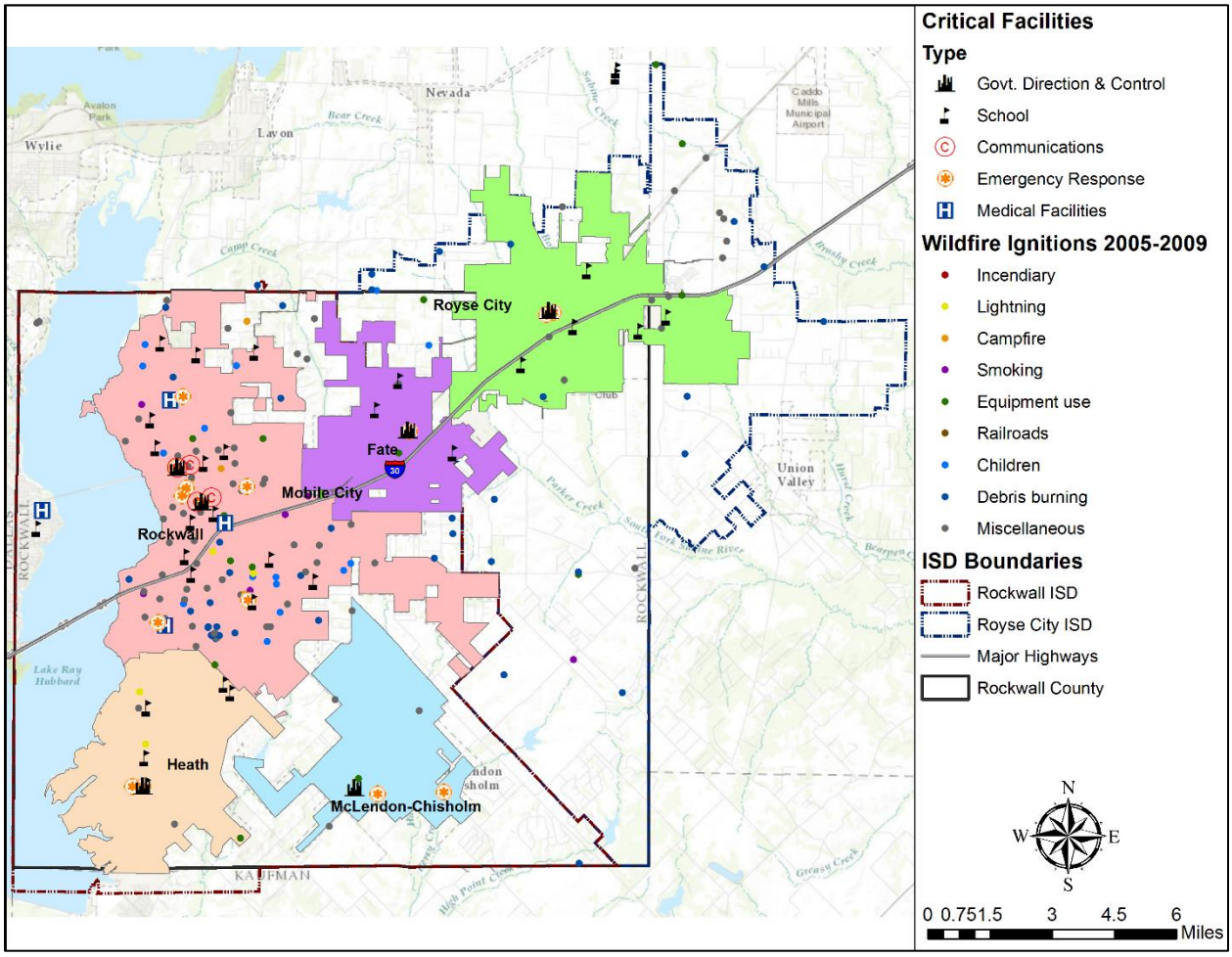


Table 11-1. Historical Wildfire Events Summary

JURISDICTION	NUMBER OF EVENTS	ACRES BURNED
Rockwall County	132	582.68
Fate	3	12
Heath	4	121.75
McLendon-Chisholm	5	6
Mobile City	0	0
Rockwall	91	111.93
Royse City	6	58.1

Table 11-2. Acreage of Suppressed Wildfire by Year

JURISDICTION	2005	2006	2007	2008	2009
Rockwall County	268	99.93	9.75	25	73
Fate	0	6	0	0	6
Heath	0	0	0.5	120.25	1
McLendon-Chisholm					
Mobile City	0	0	0	0	0
Rockwall	17	25.93	7	15.75	46.25
Royse City	0	57.5	0	0.5	0.1

Significant Past Events

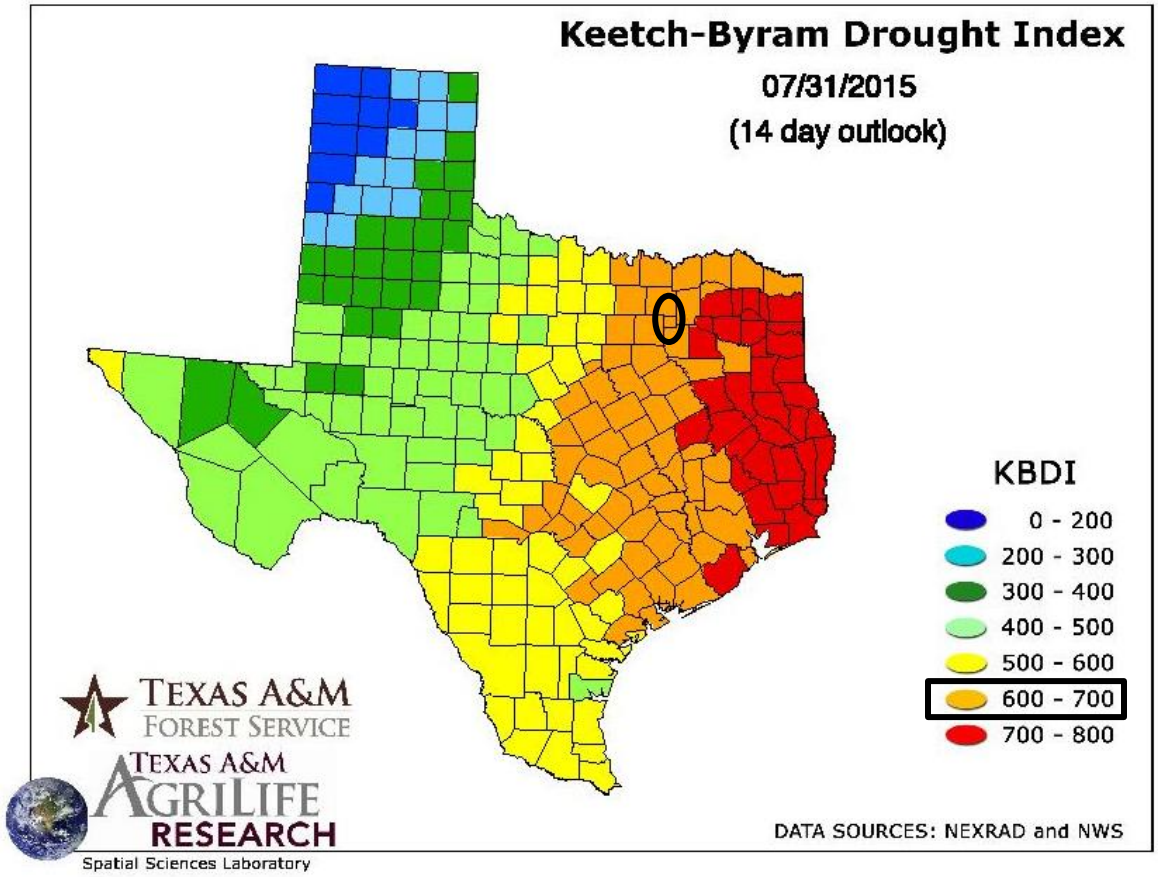
June 10, 2015
Dozens of firefighters responded to a large fire that erupted inside a home in Rockwall County early June 10, 2015. More than 30 firefighters from three departments responded to the fire. The fire continued to burn for four hours, initially firefighters had trouble with low water pressure due to the amount of hoses used. The extreme heat led to at least one firefighter being treated for dehydration. The house was completely destroyed, although no injuries were reported.

Extent

Risk for a wildfire event is measured in terms of magnitude and intensity using the Keetch Byram Drought Index (KBDI), a mathematical system for relating current and recent weather conditions to potential or expected fire behavior. The KBDI determines forest fire potential based on a daily water balance, derived by balancing a drought factor with precipitation and soil moisture (assumed to have a maximum storage capacity of eight inches), and is expressed in hundredths of an inch of soil moisture depletion.

Each color in Figure 11-9 represents the drought index at that location. The drought index ranges from 0 to 800. A drought index of 0 represents no moisture depletion, and a drought index of 800 represents absolutely dry conditions.

Figure 11-9. Keetch-Byram Drought Index (KBDI) for the State of Texas, 2014[1]



Fire behavior can be categorized at four distinct levels on the KBDI:

- **0 -200:** Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in spots and patches.
- **200 -400:** Fires more readily burn and will carry across an area with no gaps. Heavier fuels will not readily ignite and burn. Expect smoldering and the resulting smoke to carry into and possibly through the night.
- **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.

[1] Rockwall County is located within the black circle.

The KBDI is a good measure of the readiness of fuels for a wildfire event. The KBDI should be referenced as the area experiences changes in precipitation and soil moisture, and caution exercised in dryer, hotter conditions.

The range of intensity for Rockwall County in a wildfire event is within 600 to 700. The average extent to be mitigated for the Rockwall County planning area is a KBDI of 562. At this level fires intensity begins to significantly increase and fires readily burn in all directions, exposing mineral soils in some locations.

The Texas Forest Service's Fire Intensity Scale identifies areas where significant fuel hazards and associated dangerous fire behavior potential exist based on weighted average of four percentile weather categories. Rockwall County is between a potential low to moderate wildfire intensities. Figures 11-10 through 11-16 identifies the wildfire intensity for the Rockwall County planning area.

Figure 11-10. Fire Intensity Scale Map – Rockwall County

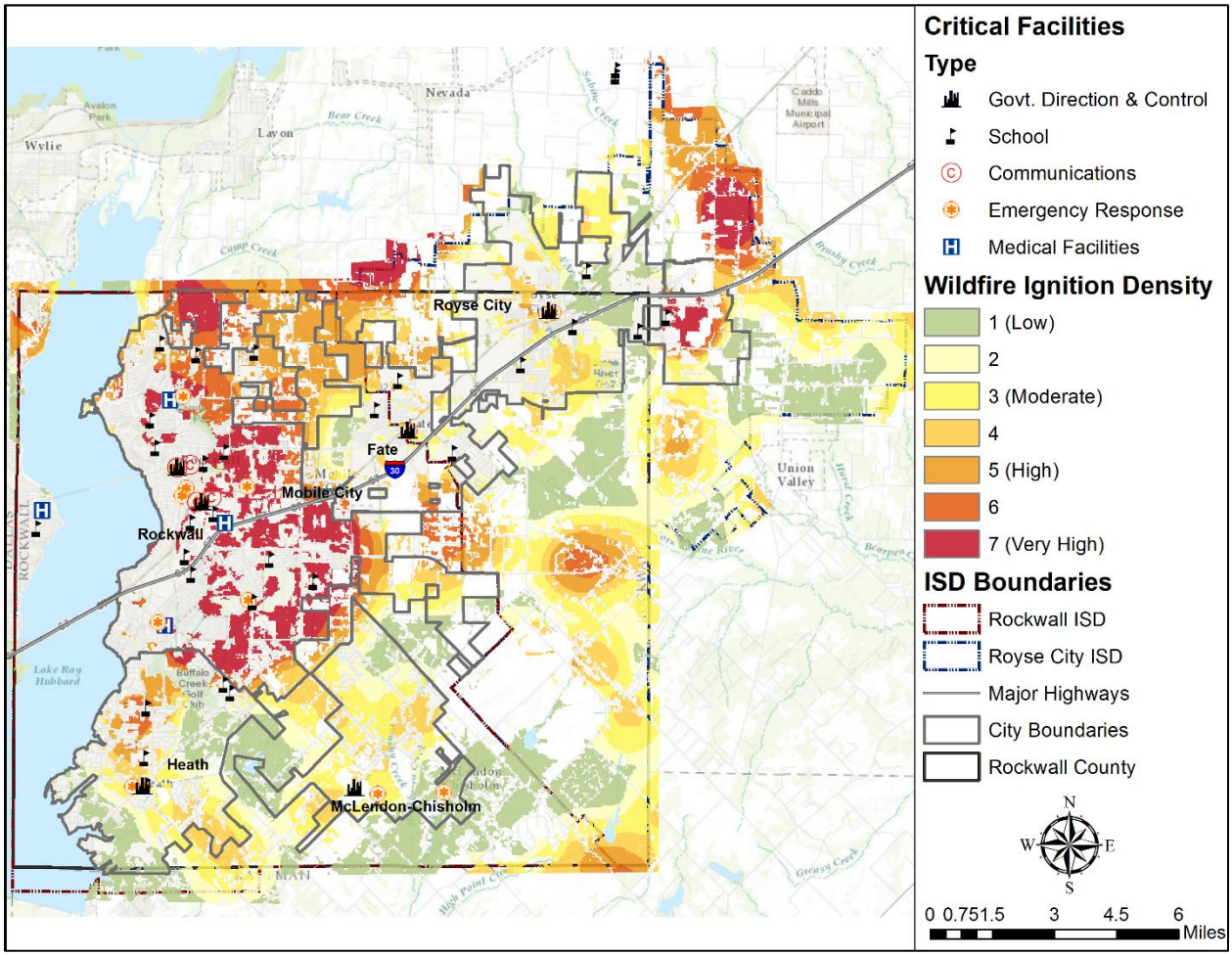


Figure 11-11. Fire Intensity Scale Map – Fate

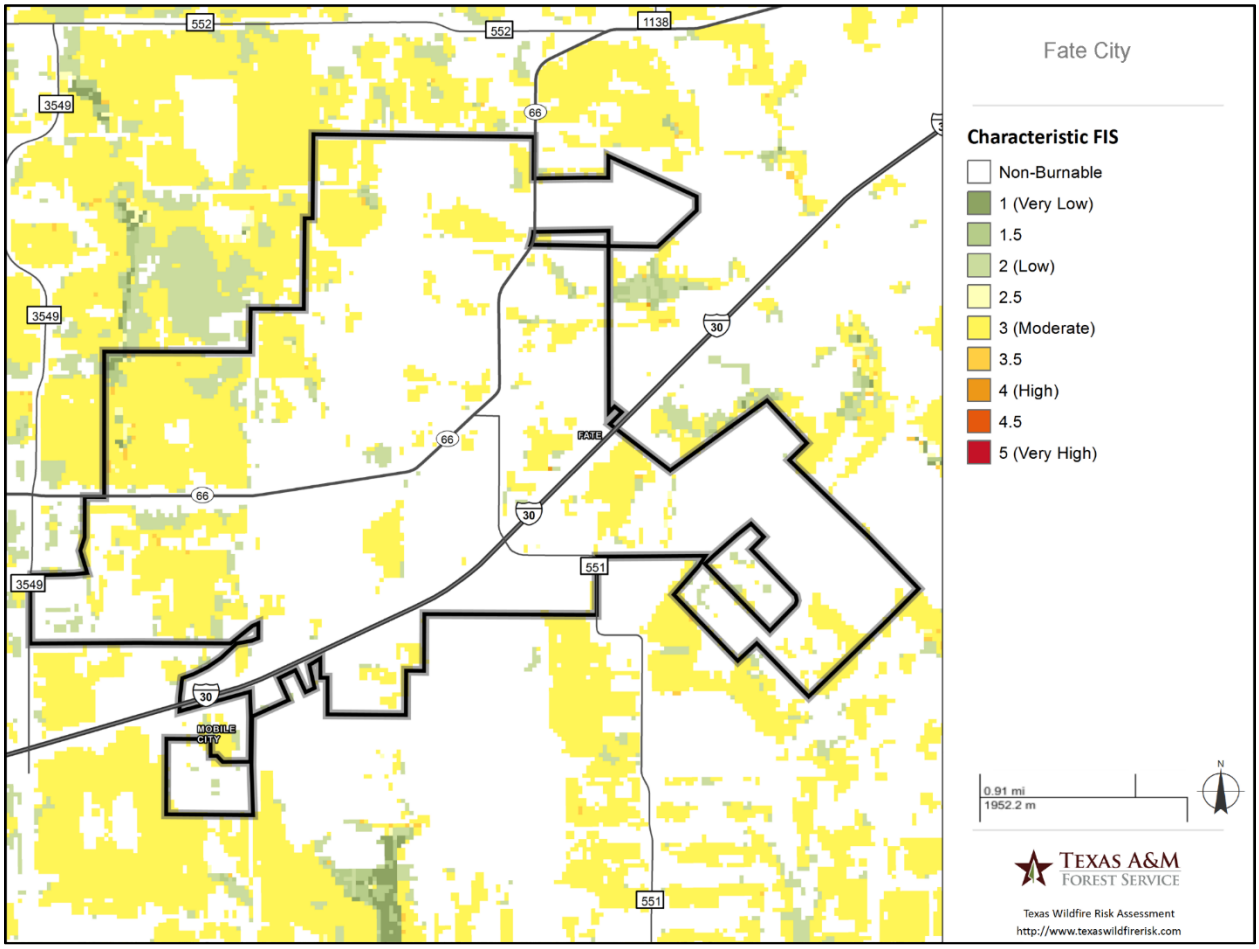


Figure 11-12. Fire Intensity Scale Map – Heath

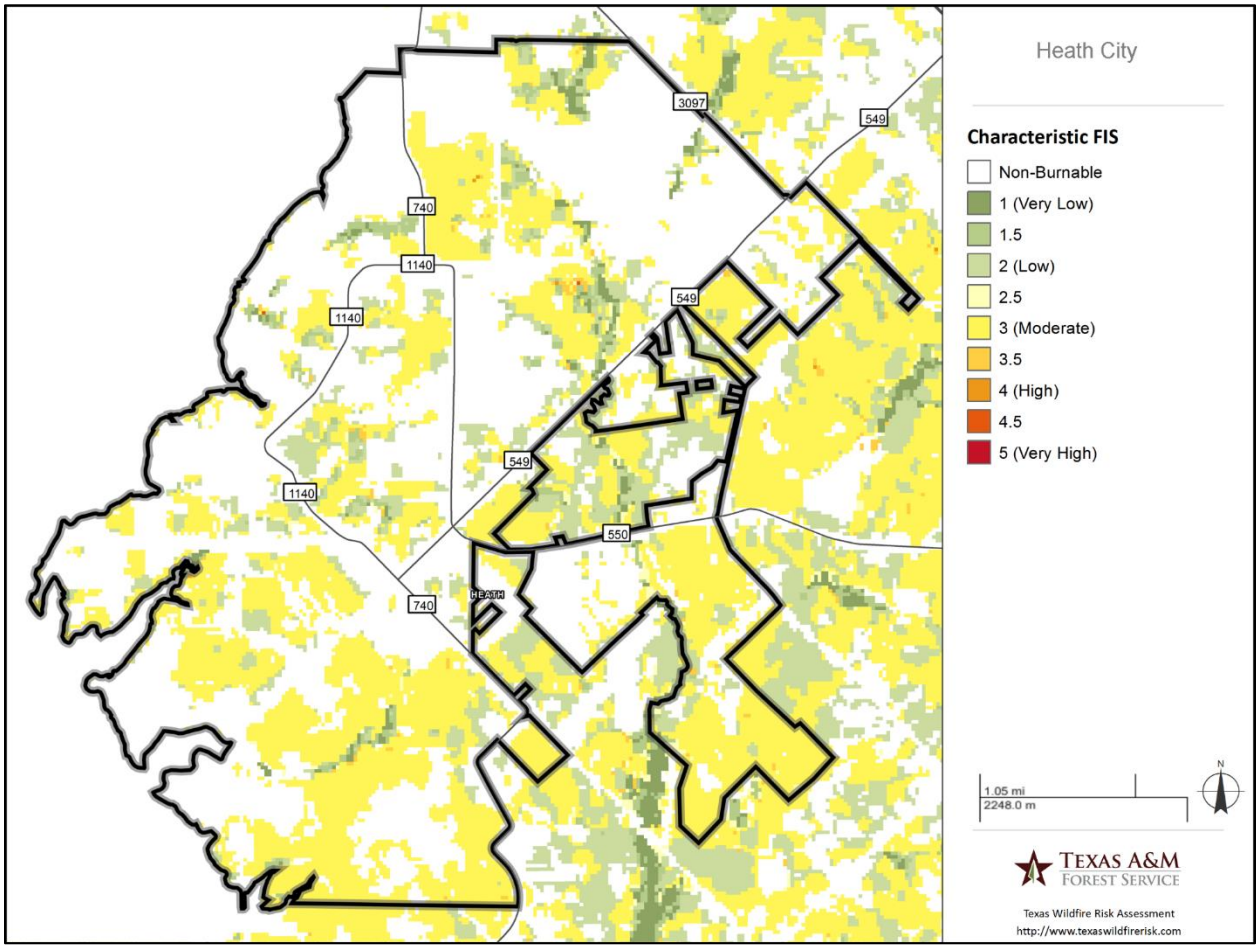


Figure 11-13. Fire Intensity Scale Map – Mobile City

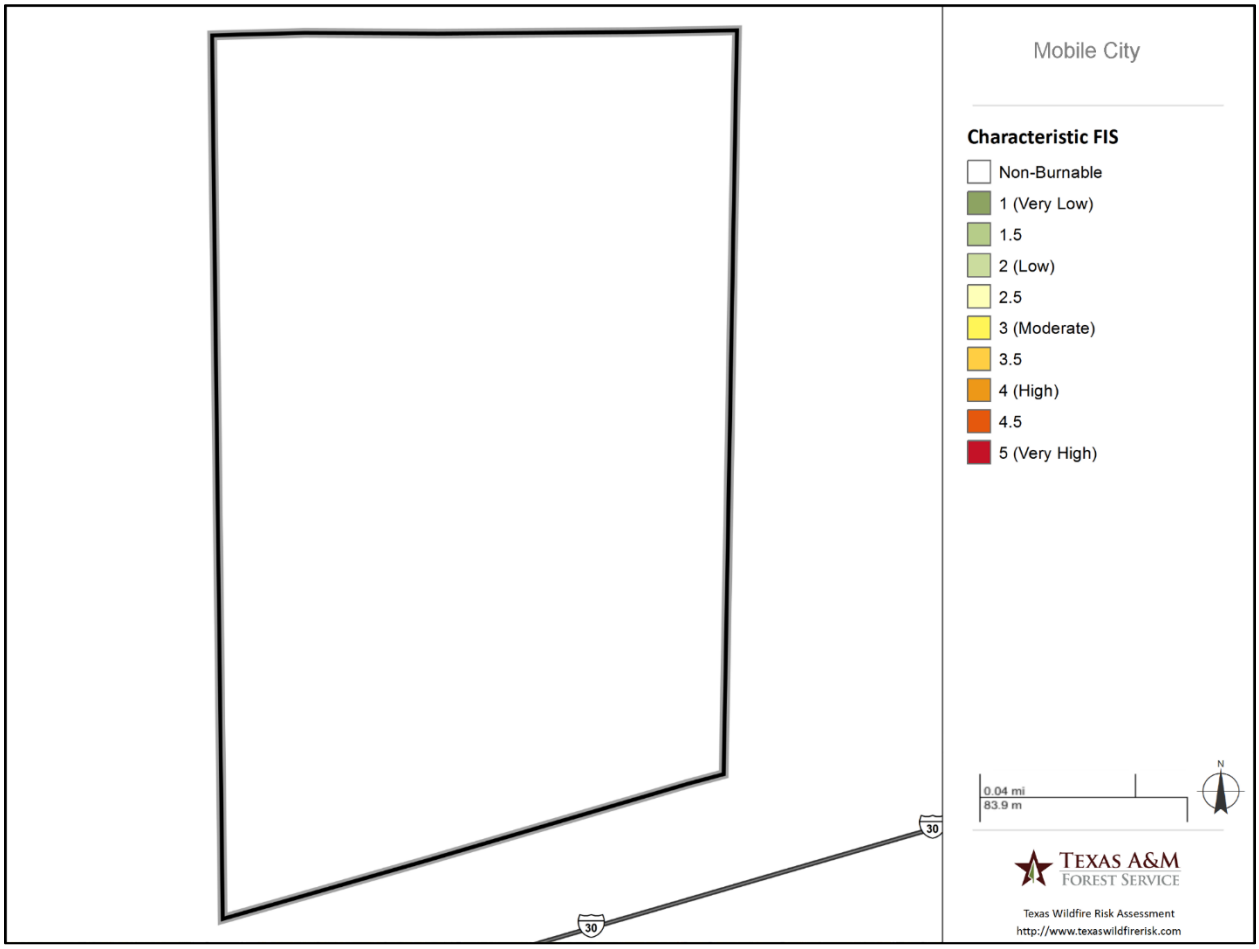


Figure 11-14. Fire Intensity Scale Map – McLendon-Chisholm

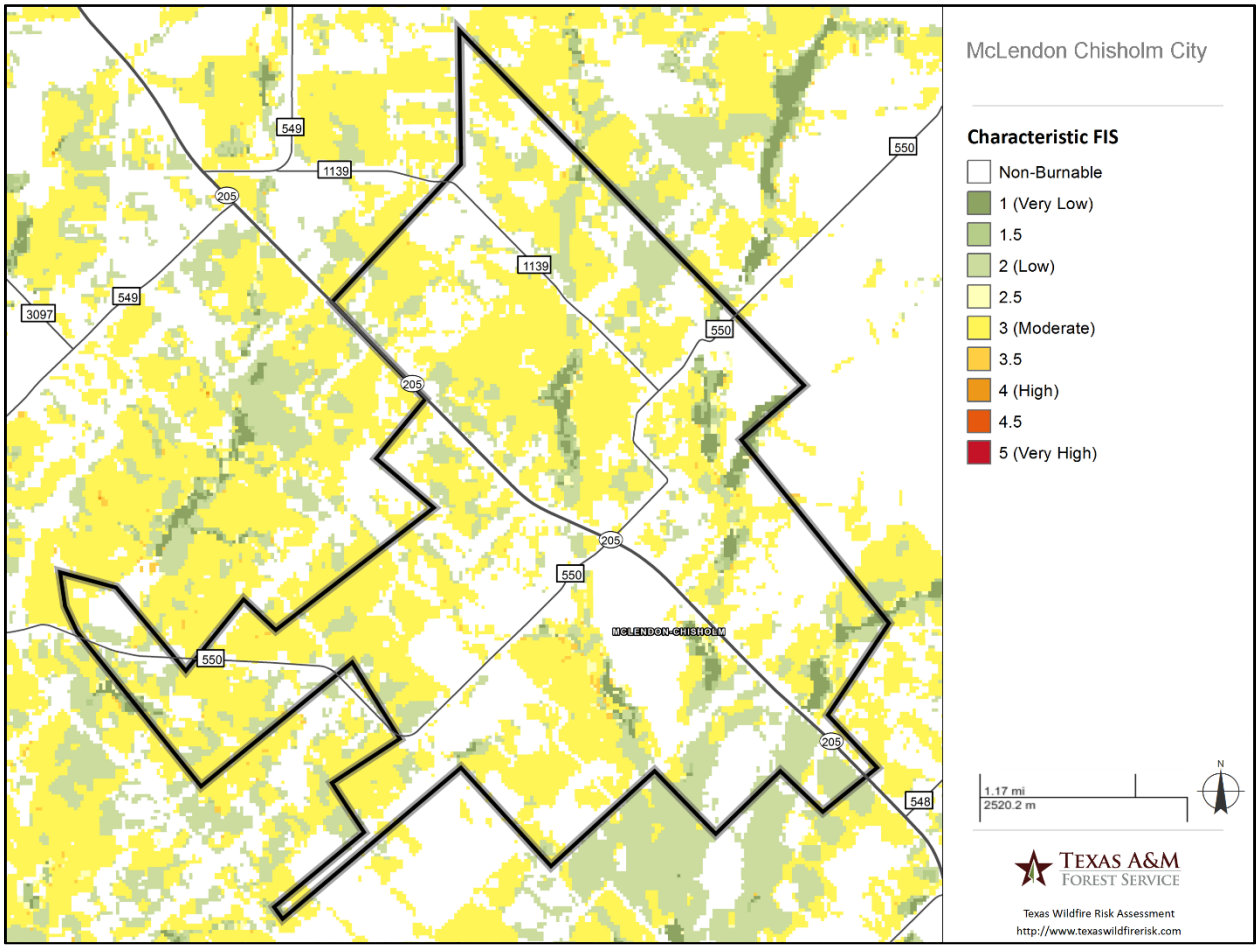


Figure 11-15. Fire Intensity Scale Map – City of Rockwall

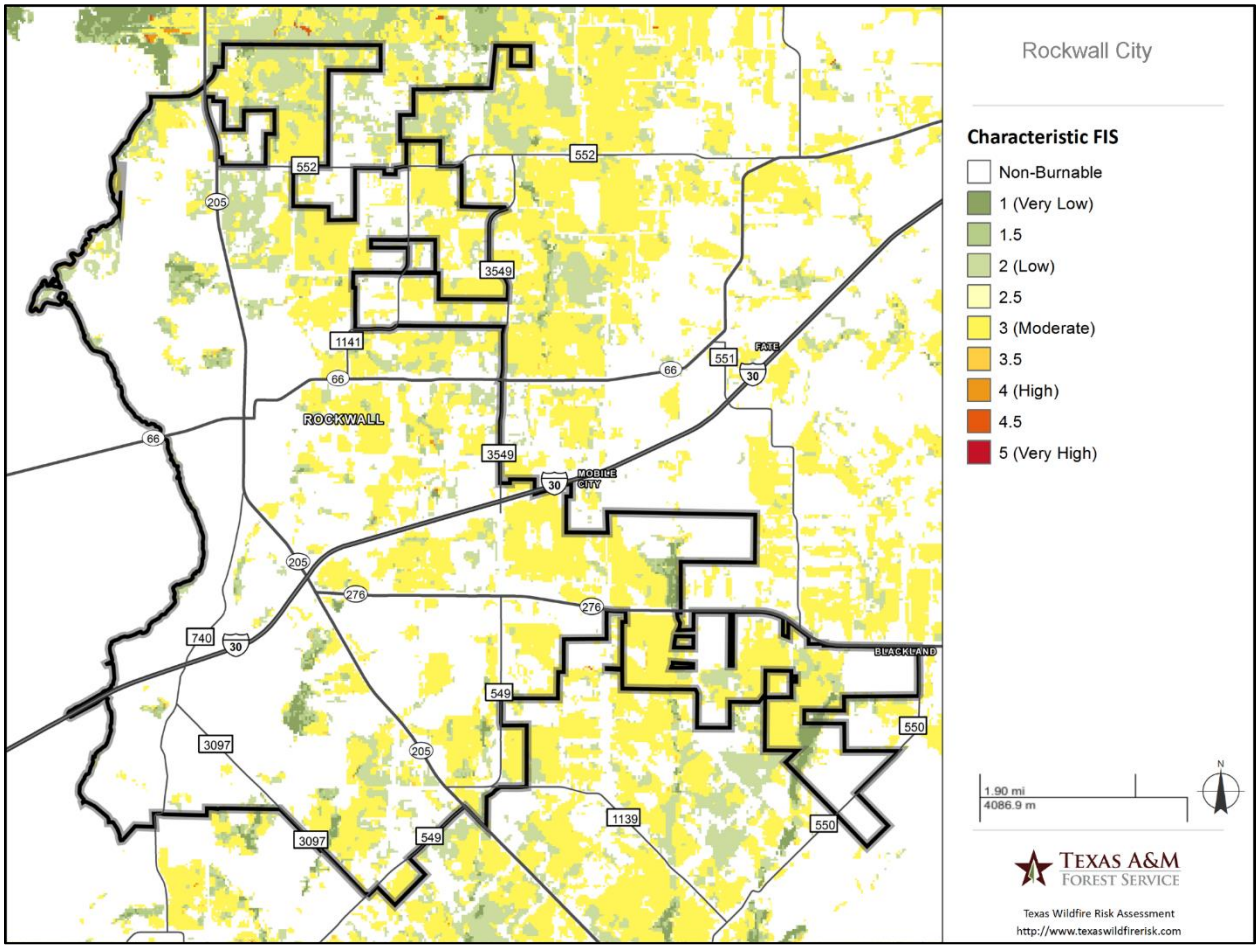
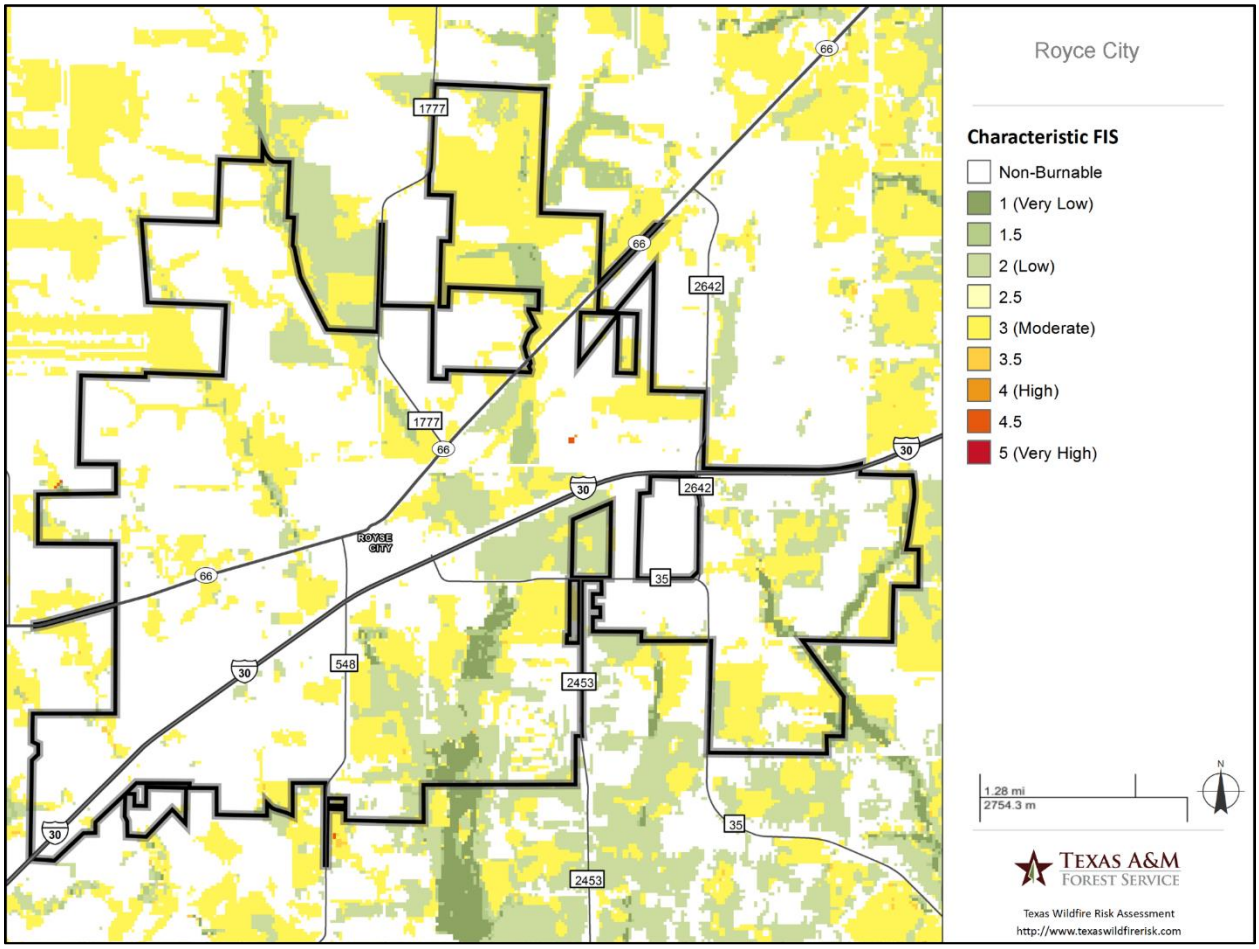


Figure 11-16. Fire Intensity Scale Map – Royse City



Probability of Future Events

Wildfires can occur at any time of the year. As the jurisdictions within the county move into wildland, the potential area of occurrence of wildfire increases. With 132 events in a 10 year period, an event within Rockwall County, including all participating jurisdictions, is highly likely, meaning an event is probable within the next year. Independent School District events are included under the appropriate jurisdiction.

Vulnerability and Impact

Periods of drought, dry conditions, high temperatures, and low humidity are factors that contribute to the occurrence of a wildfire event. 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 Rockwall County are not likely to experience large, sweeping fires. Areas outside of city limits and in the unincorporated areas of Rockwall 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. Figures 11-1 through 11-7 illustrate the areas that are the most vulnerable to wildfire throughout the County.

The sparsely populated participating jurisdictions and rural areas of Mobile City and McLendon-Chisholm are capable of experiencing large sweeping fires, especially where areas of vegetation are not maintained. Areas along major highways in Fate, McLendon-Chisolm, Mobile City, Royse City, and Rockwall County have an increased vulnerability where empty lots and unoccupied areas are located.

Within Rockwall County, a total of 132 fire events were reported from 2005 to 2016. All of these events were suspected wildfires. Historic loss and annualized estimates due to wildfires are presented in Table 11-3 below. The frequency is approximately 13 events every year.

Table 11-3. Historic Loss Estimates Due to Wildfire[2]

JURISDICTION	NUMBER OF EVENTS	ACRES BURNED	ANNUAL ACRE LOSSES
Rockwall County	132	582.68	58.3
Fate	3	12	1.2
Heath	4	121.75	12.2
McLendon-Chisholm	5	6	0.06
Mobile City	0	0	0
Rockwall	91	111.93	11.2
Royse City	6	58.1	5.8

Figures 11-17 through 11-23 show Rockwall County and the threat of wildfire to the County and participating jurisdictions.

[2] Events divided by 10 years of data.

Figure 11-17. Wildfire Threat – Rockwall County

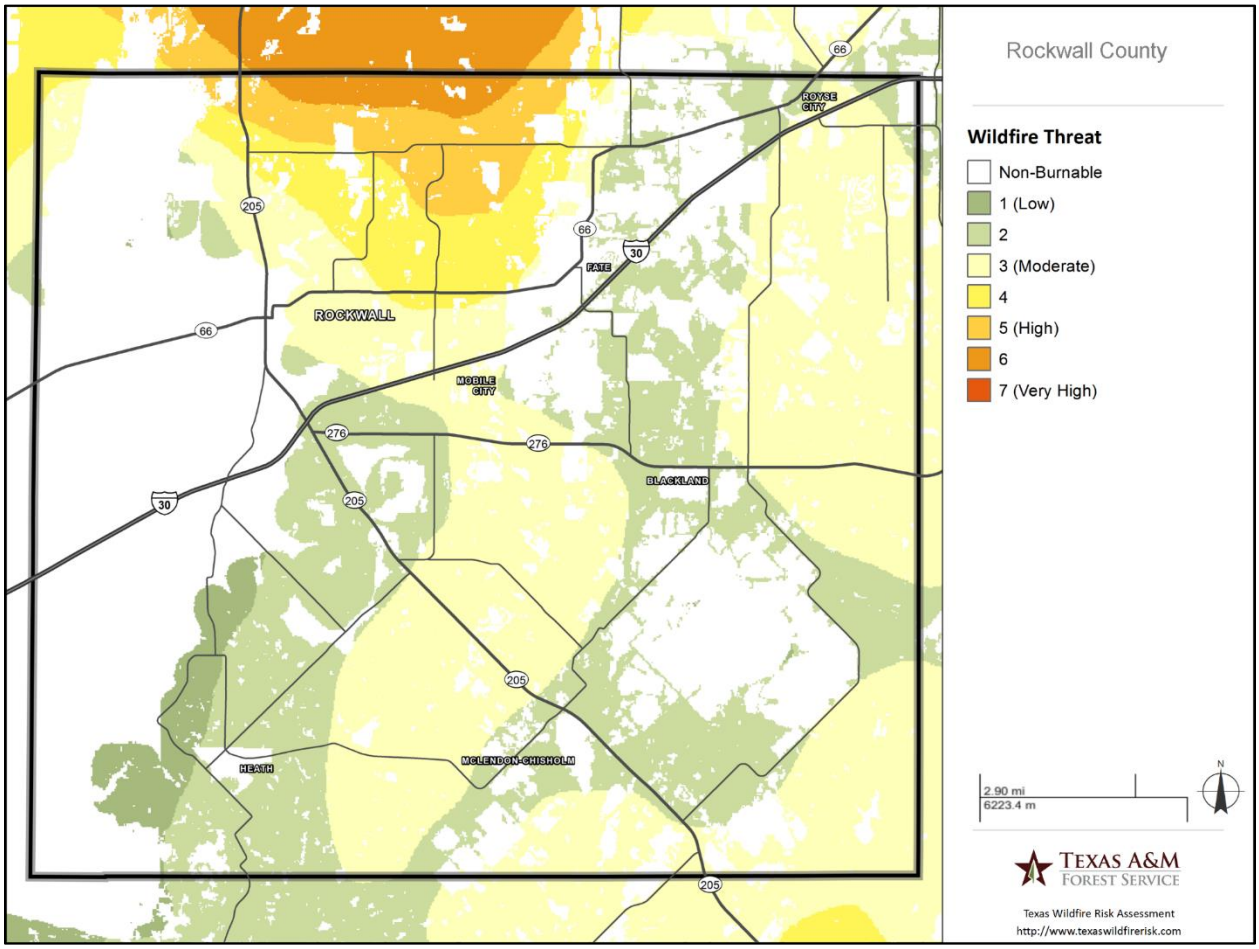


Figure 11-18. Wildfire Threat – Fate

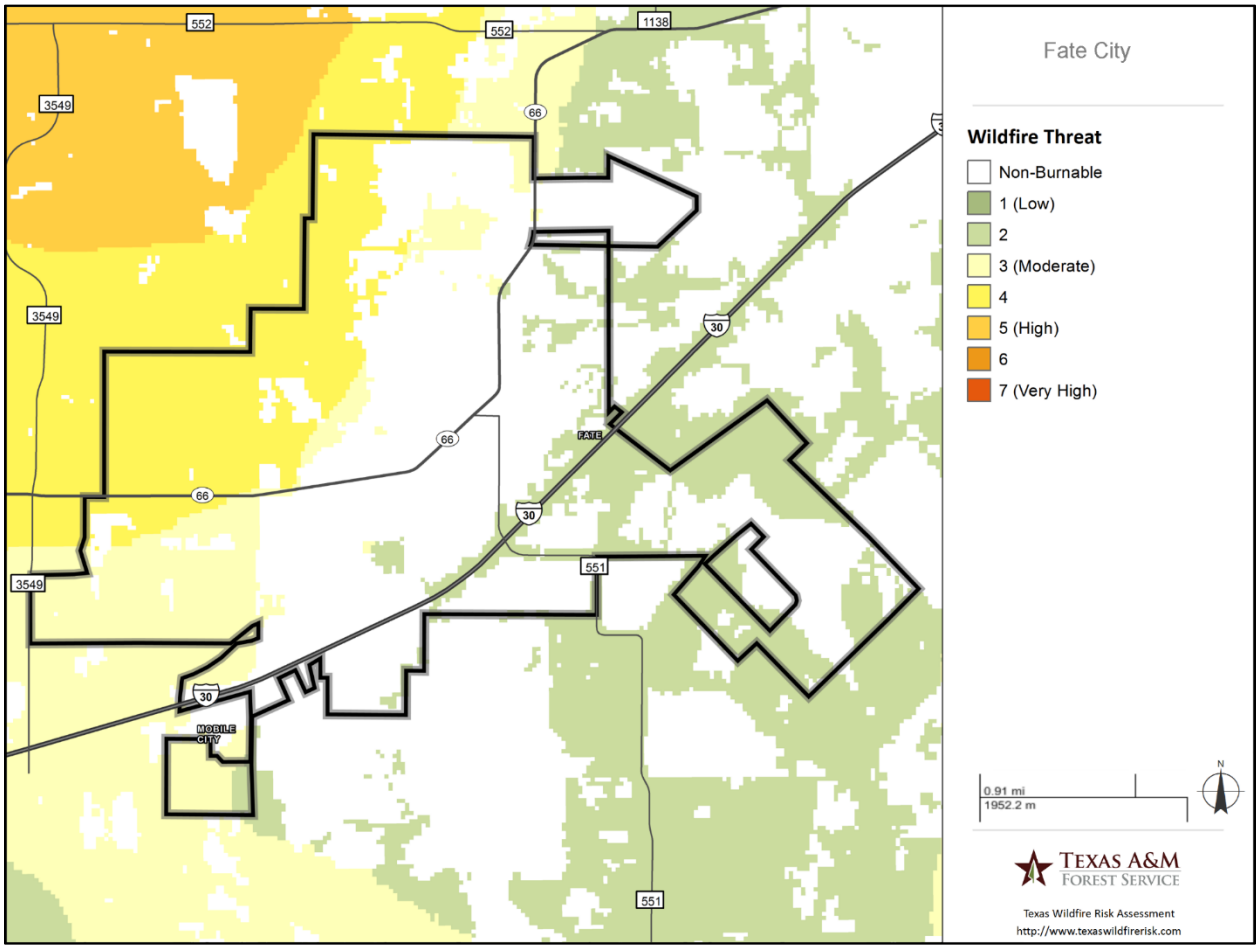


Figure 11-19. Wildfire Threat – Heath

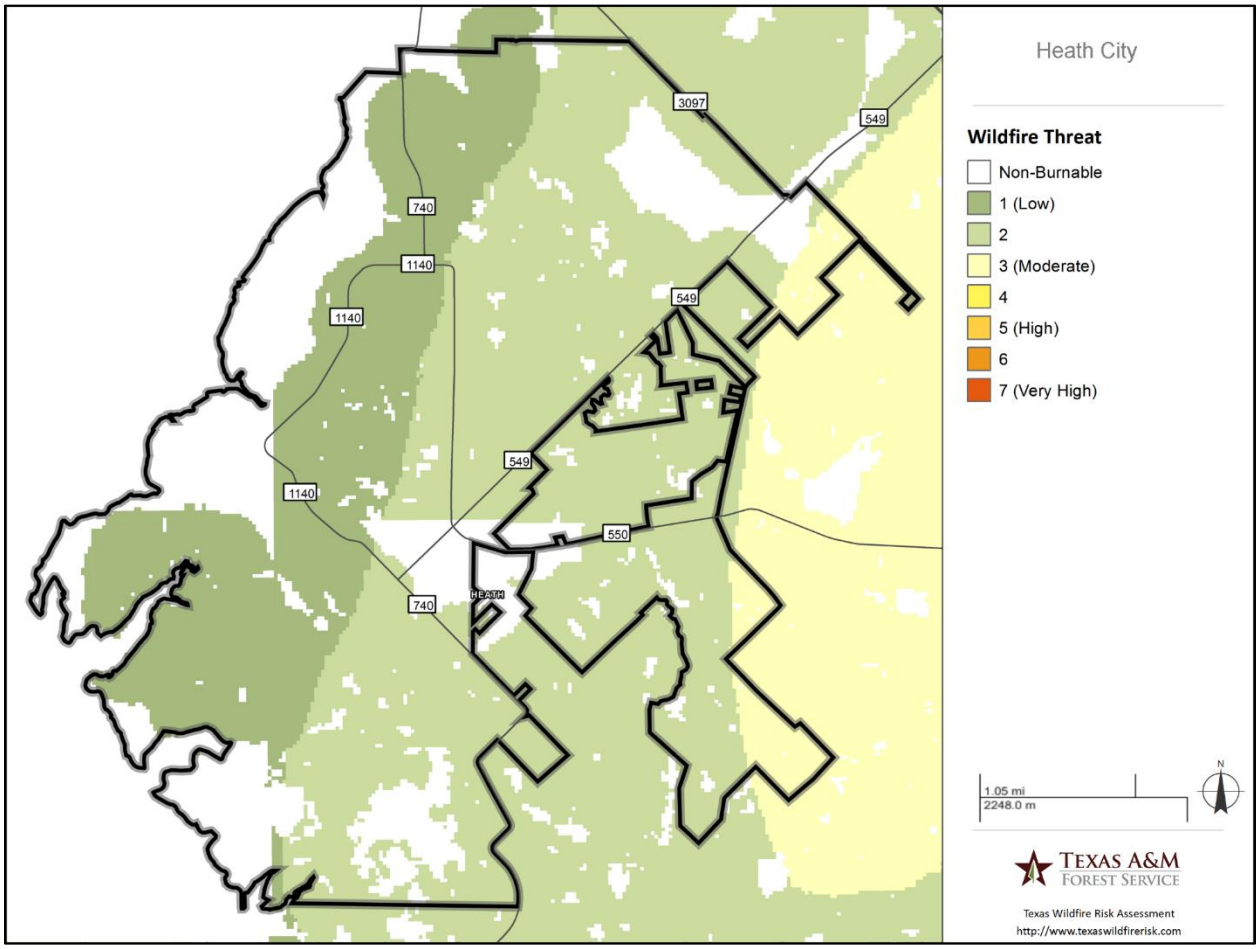


Figure 11-20. Wildfire Threat – Mobile City

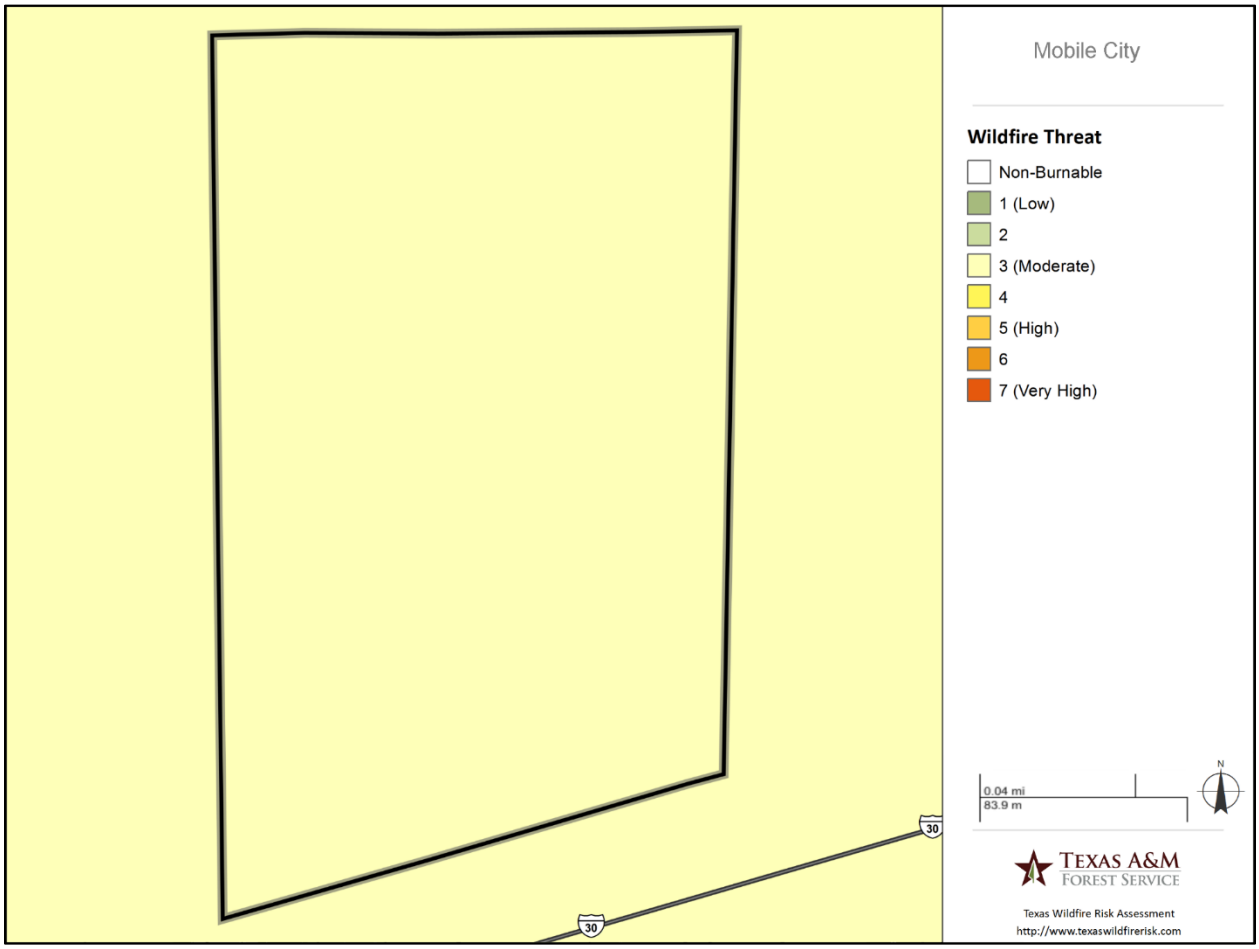


Figure 11-21. Wildfire Threat – McLendon-Chisholm

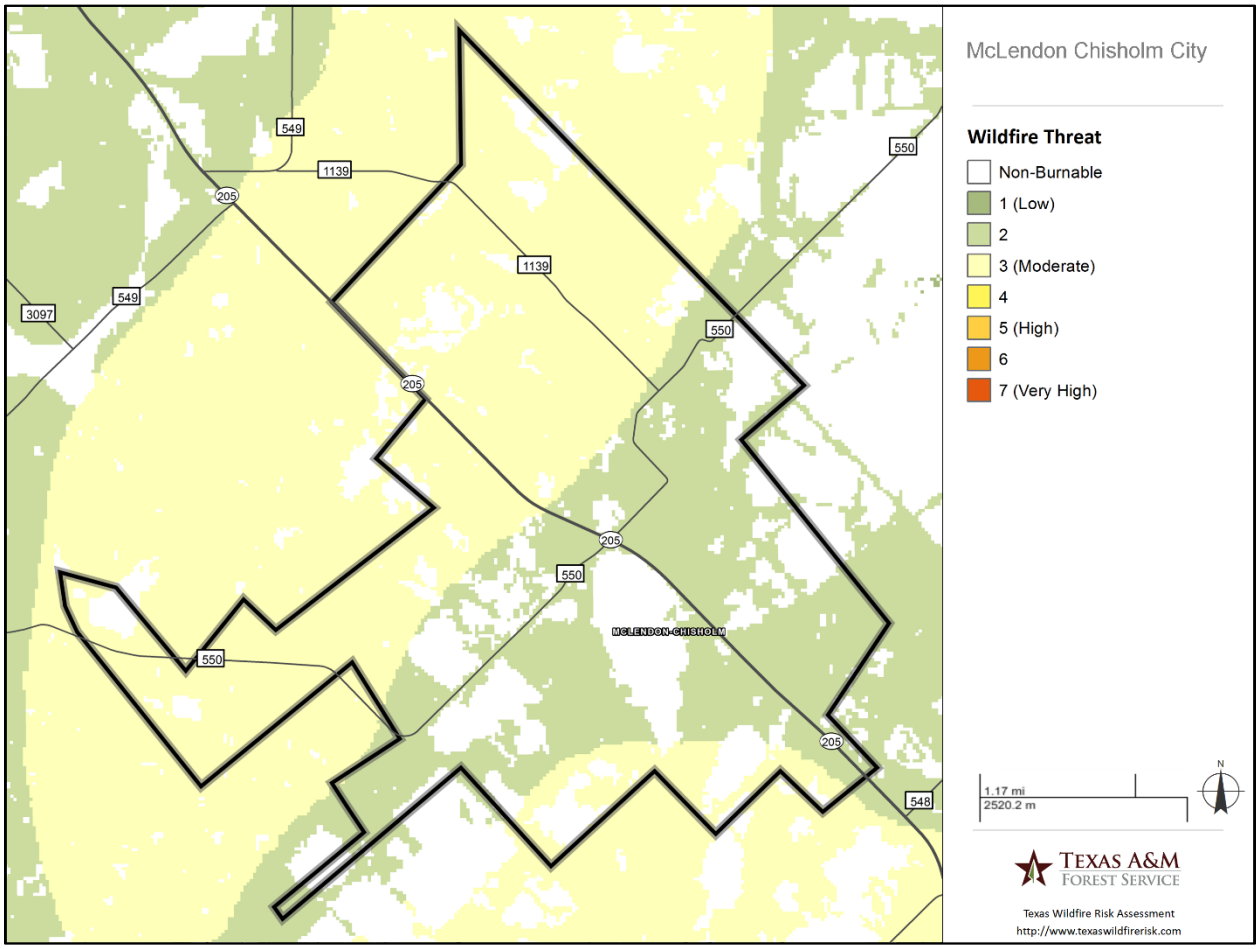


Figure 11-22. Wildfire Threat – City of Rockwall

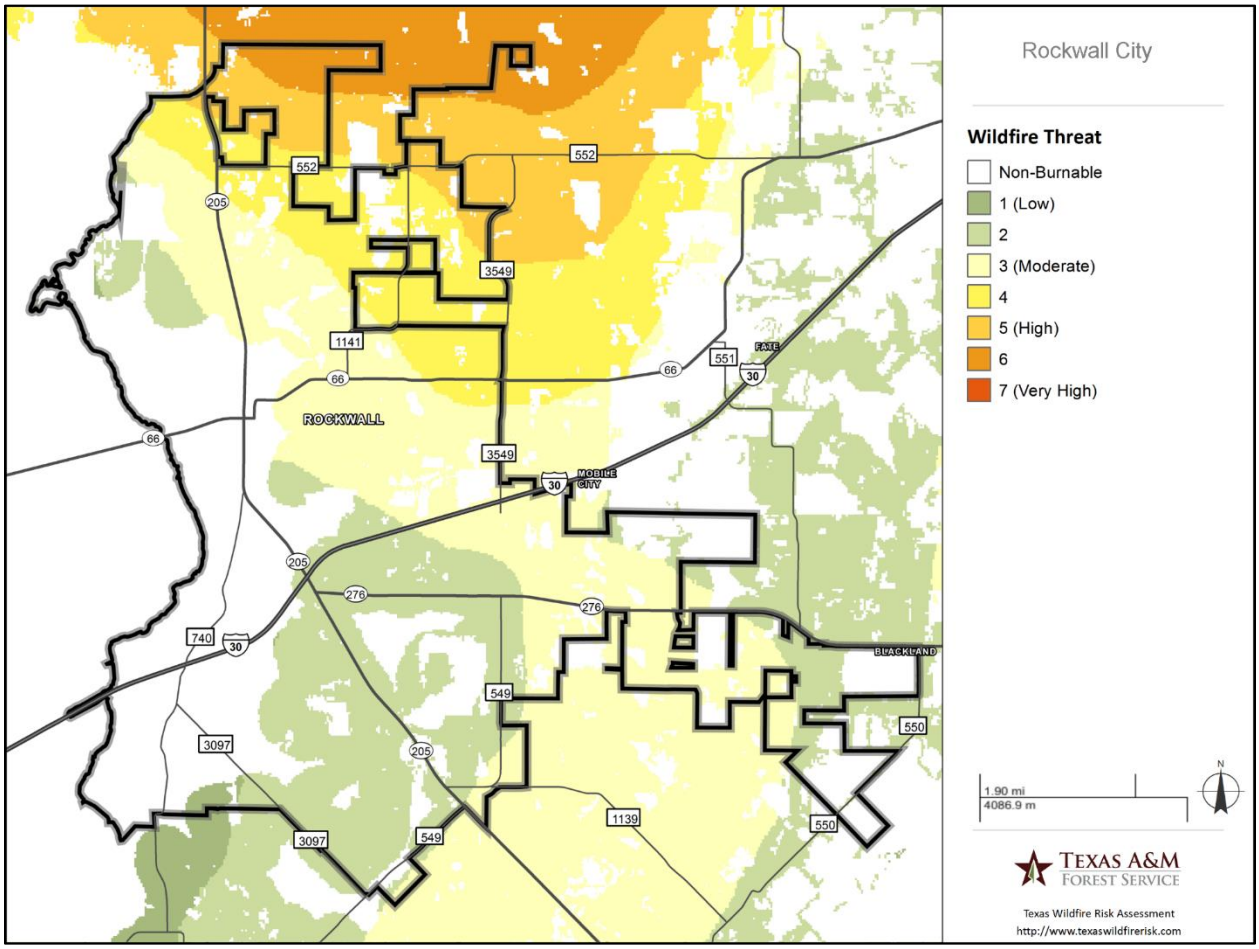
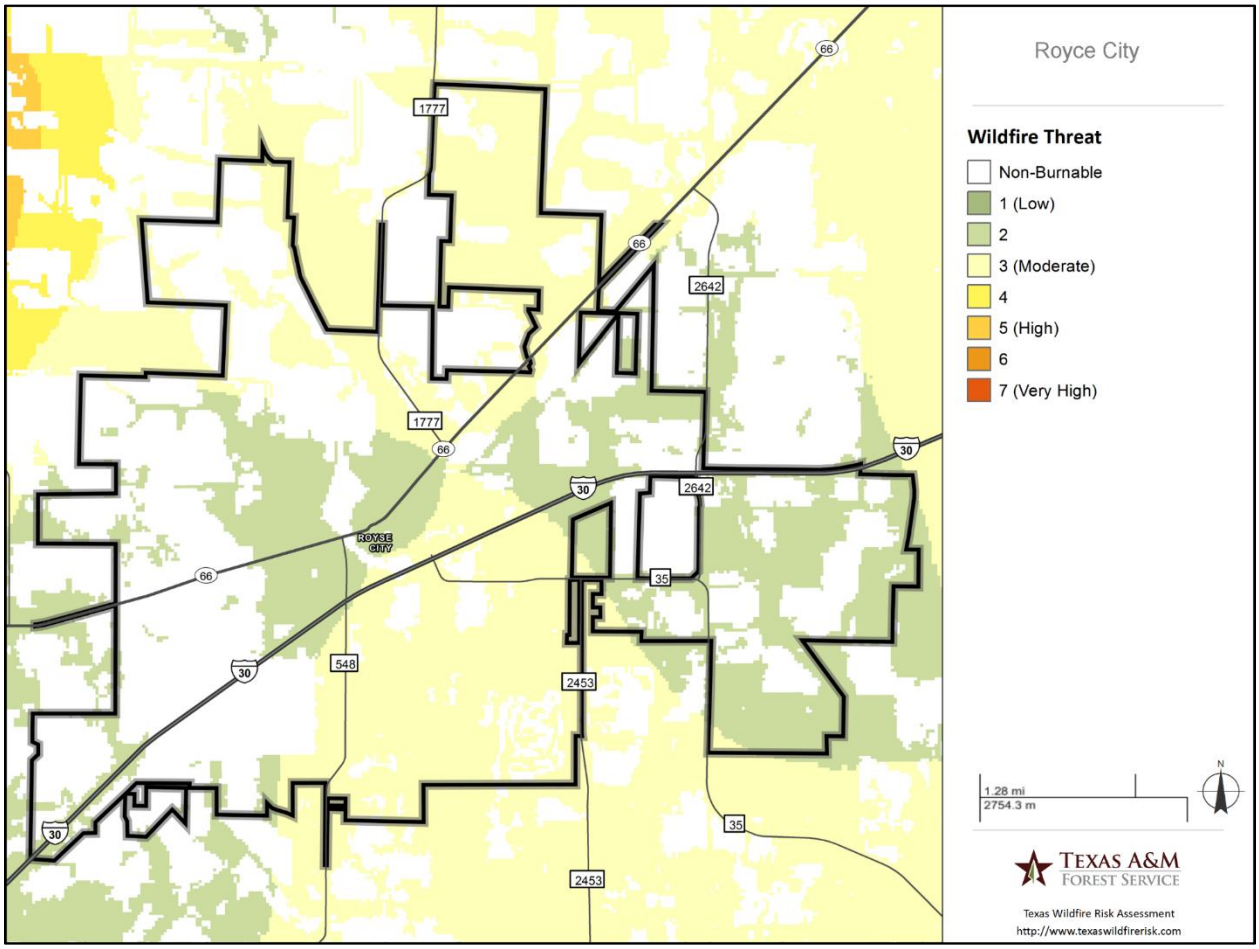


Figure 11-23. Wildfire Threat – Royse City



Diminished air quality is an environmental impact that can result from a wildfire event and pose a potential health risk. The smoke plumes from wildfires can contain potentially inhalable carcinogenic matter. Fine particles of invisible soot and ash that are too microscopic for the respiratory system to filter can cause immediate and possibly long term health effects. The elderly or those individuals with compromised respiratory systems may be more vulnerable to the effects of diminished air quality after a wildfire event.

Climatic conditions such as severe freezes and drought can significantly increase the intensity of wildfires since these conditions kill vegetation, creating a prime fuel source for wildfires. The intensity and rate at which wildfires spread are directly related to wind speed, temperature, and relative humidity.

The severity of impact from major wildfire events can be substantial. Such events can cause multiple deaths, shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. Severity of impact is gauged by acreage burned, homes and structures lost, and the number of resulting injuries and fatalities. For the Rockwall County planning area, the impact from a wildfire event can be considered “Minor," meaning injuries and/or illnesses are

treatable with first aid, shutdown of facilities and services for 24 hours or less, and less than 10% of property is destroyed or with major damage.

Assessment of Impacts

A Wildfire event poses a potentially significant risk to public health and safety, particularly if the wildfire is initially unnoticed and spreads quickly. The impacts associated with a wildfire are not limited to the direct damages. Potential impacts for the planning area include:

- Persons in the area at the time of the fire are at risk for injury or death from burns and/or smoke inhalation.
- First responders are at greater risk of physical injury since they are in close proximity to the hazard while extinguishing flames, protecting property or evacuating residents in the area.
- First responders can experience heart disease, respiratory problems, and other long term related illnesses from prolonged exposure to smoke, chemicals, and heat.
- Emergency services may be disrupted during a wildfire if facilities are impacted, roadways are inaccessible or personnel are unable to report for duty.
- Critical city and/or county departments may not be able to function and provide necessary services depending on the location of the fire, and the structures or personnel impacted.
- Non-critical businesses may be directly damaged, suffer loss of utility services, or be otherwise inaccessible, delaying normal operations and slowing the recovery process.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Roadways in or near the WUI could be damaged or closed due to smoke and limited visibility.
- Older homes are generally exempt from modern building code requirements, which may require fire suppression equipment in the structure.
- Some high density neighborhoods feature small lots with structures close together, increasing the potential for fire to spread rapidly
- Air pollution from smoke may exacerbate respiratory problems of vulnerable residents
- Charred ground after a wildfire cannot easily absorb rainwater, increasing the risk of flooding and potential mudflows
- Wildfires can cause erosion, degrading stream water quality
- Wildlife may be displaced or destroyed
- Historical or cultural resources may be damaged or destroyed
- Tourism can be significantly disrupted, further delaying economic recovery for the area
- Vegetated dunes can be stripped, significantly damaging the function of the dunes to protect inland areas from the destructive forces of wind and waves.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long term loss in revenue.
- Fire suppression costs can be substantial, exhausting the financial resources of the community.
- Residential structures lost in a wildfire may not be rebuilt for years, reducing the tax base for the community
- Lake Ray Hubbard recreation and tourism can be unappealing for years following a large wildfire, devastating directly related businesses.

- Direct impacts to municipal water supply may occur through contamination of ash and debris during the fire, destruction of aboveground delivery lines, and soil erosion or debris deposits into waterways after the fire.

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

Section 12: Flood

Hazard Description

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

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

Location

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

- Zone A: Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance requirements and floodplain management standards apply.

- Zone AE: Areas subject to inundation by 1-percent-annual-chance shallow flooding. It is the base floodplain where base flood elevations are provided. AE zones are now used on new format FIRMs instead of A1-30 zones.
- Zone X: Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones.

Locations of flood zones in Rockwall County based on the digital Flood Insurance Rate Map (DFIRM) from FEMA are illustrated in Figures 12-1 to 12-9.

Figure 12-1. Estimated Flood Zones in Rockwall County

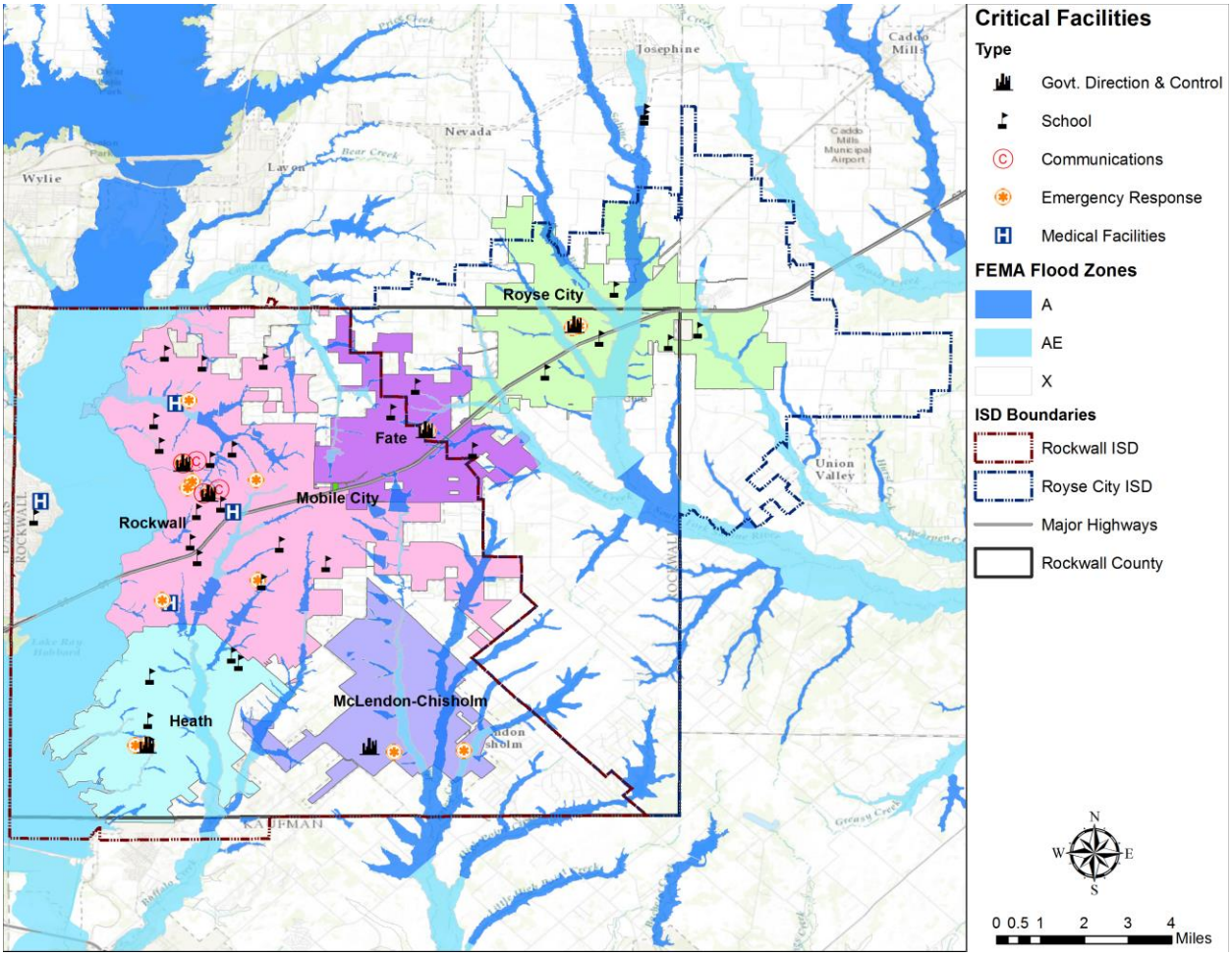


Figure 12-2. Estimated Flood Zones in the City of Fate

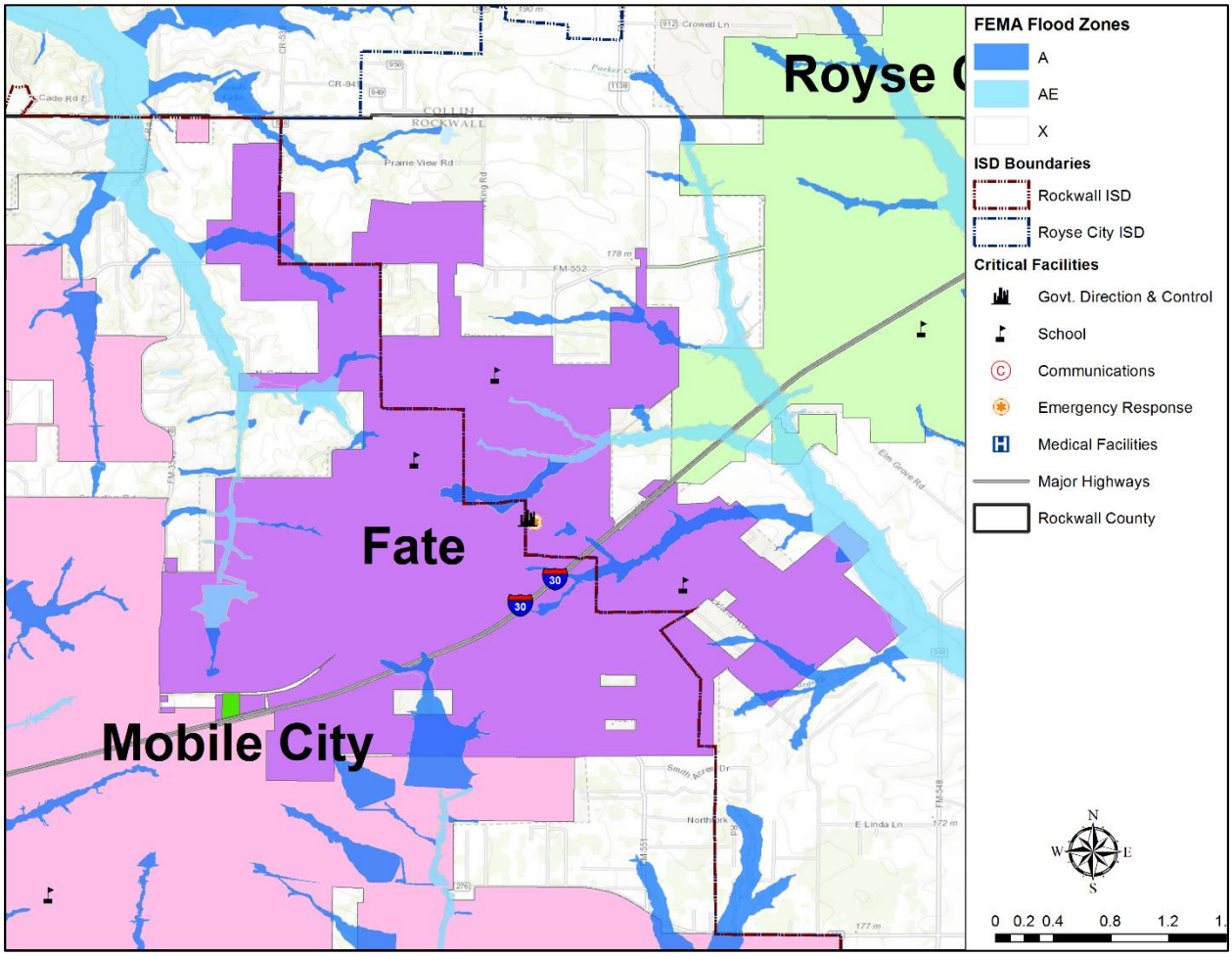


Figure 12-3. Estimated Flood Zones in the City of Heath

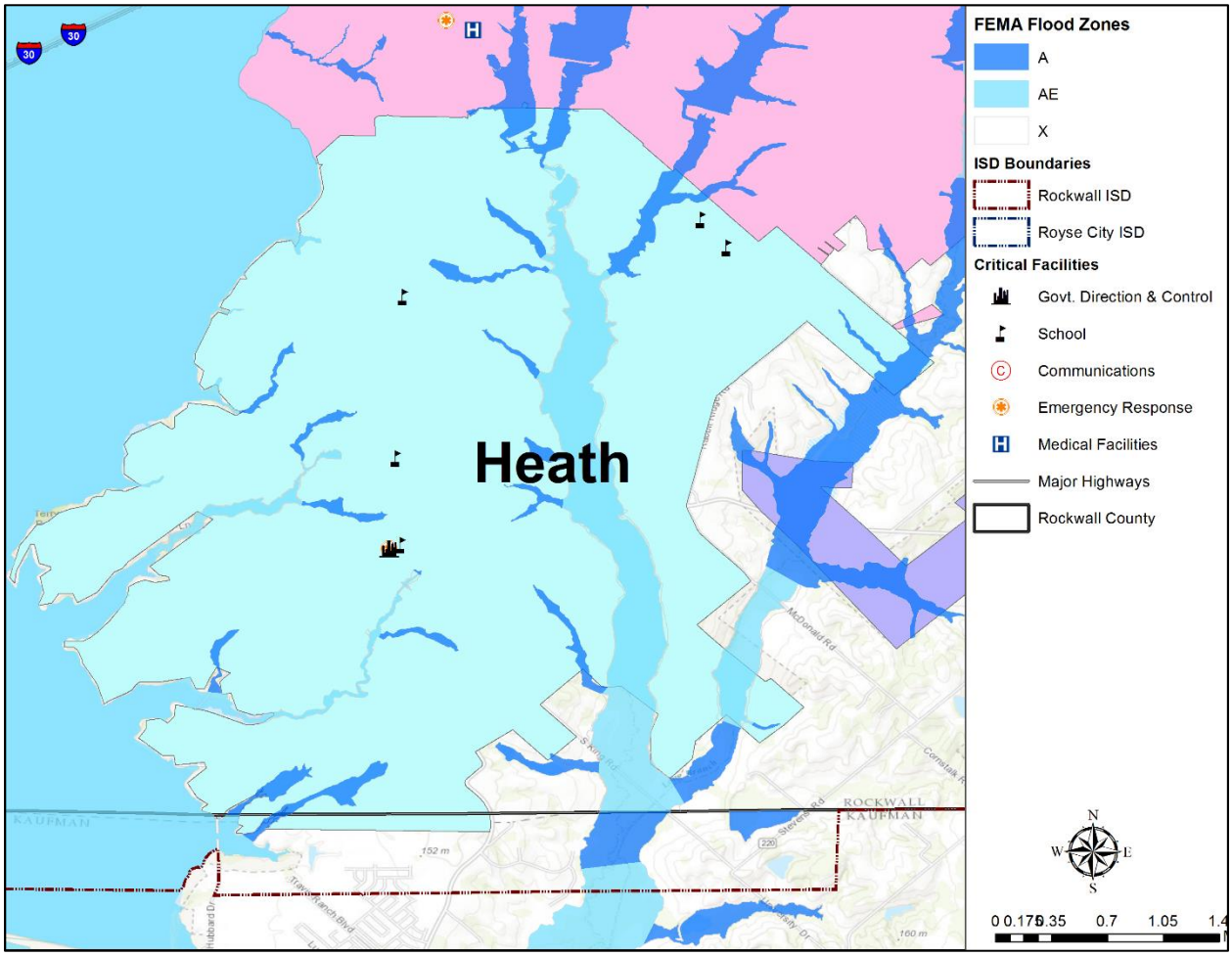


Figure 12-4. Estimated Flood Zones in the City of McLendon-Chisholm

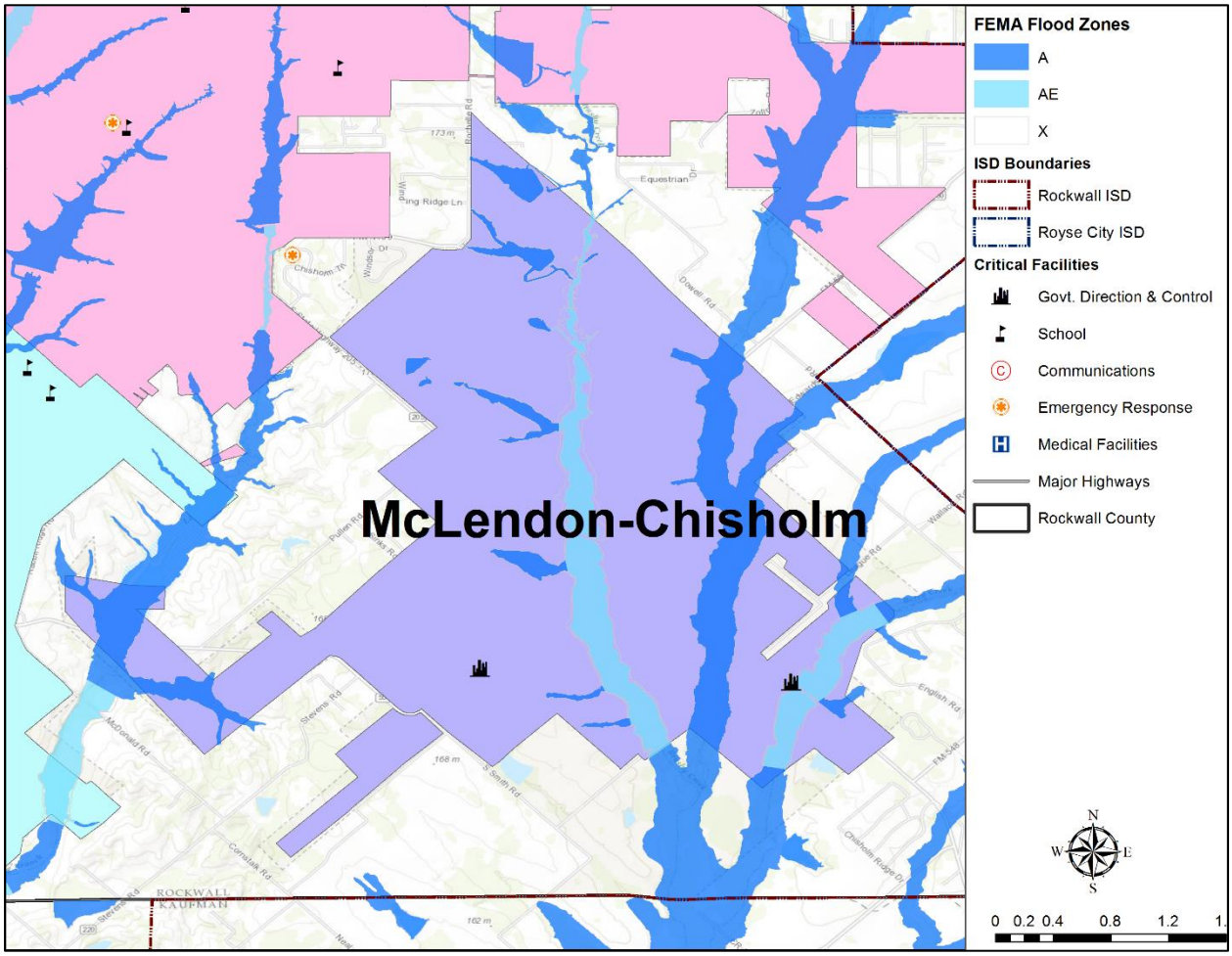


Figure 12-5. Estimated Flood Zones in the City of Mobile City

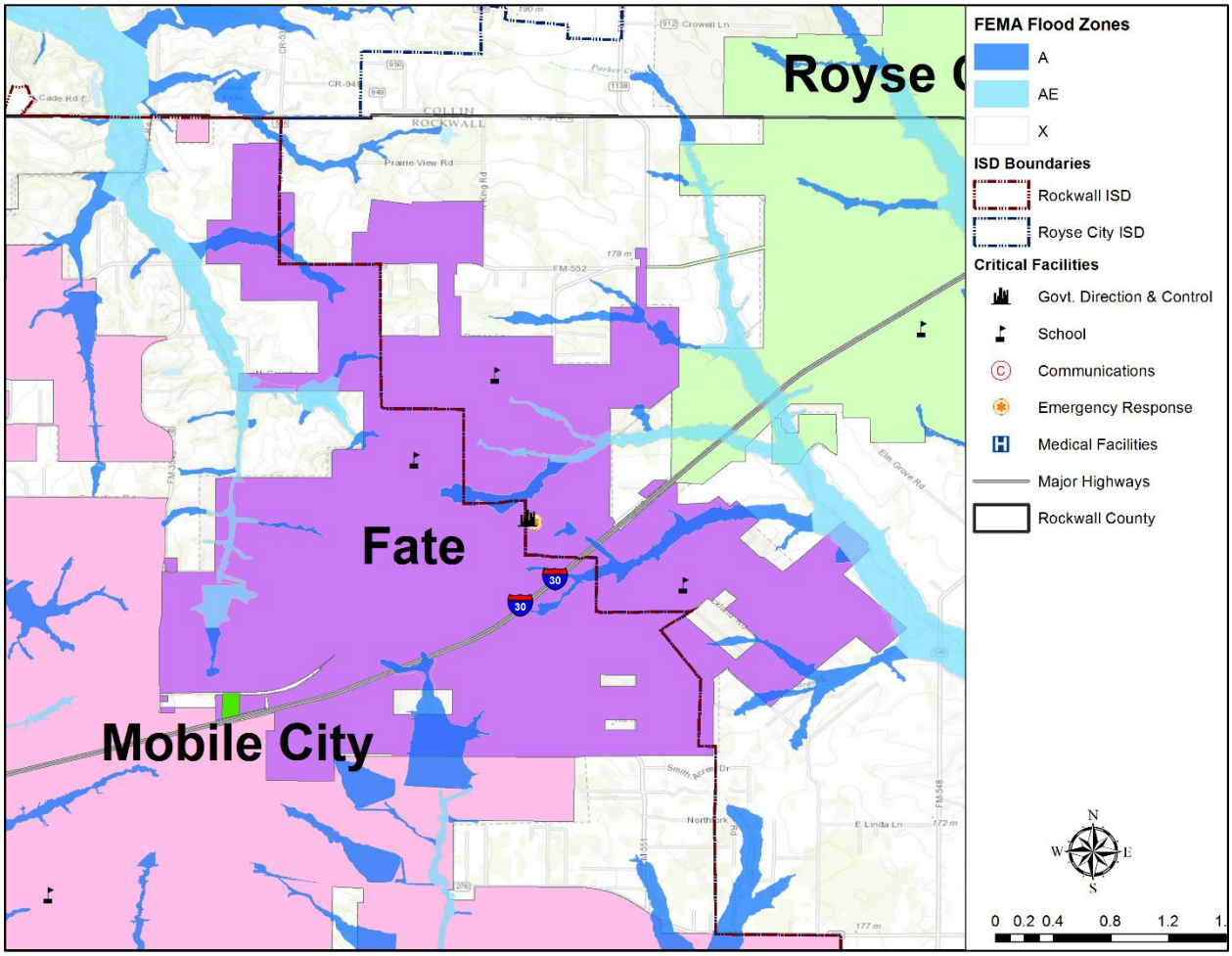


Figure 12-6. Estimated Flood Zones in the City of Rockwall

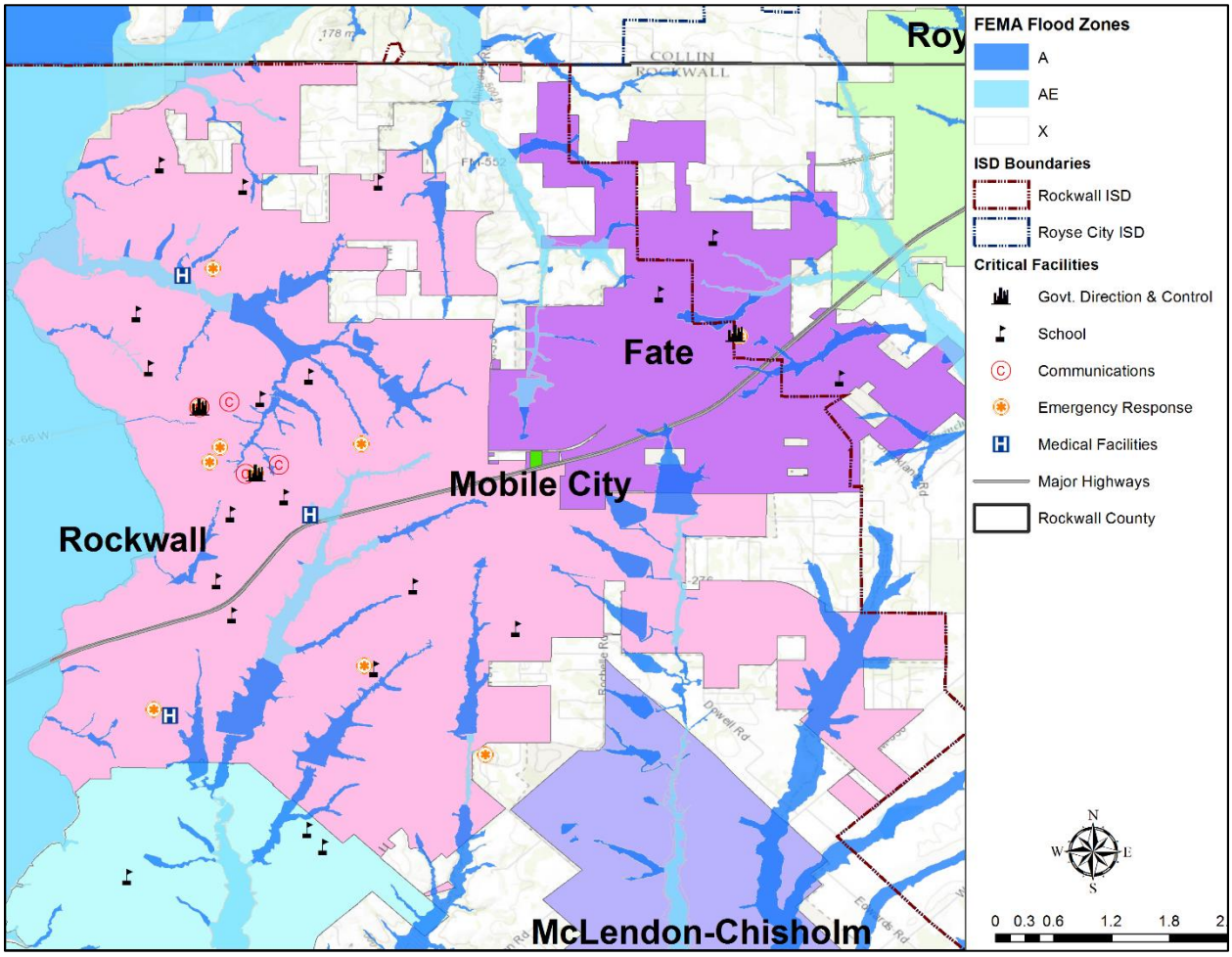


Figure 12-7. Estimated Flood Zones in the City of Royse City

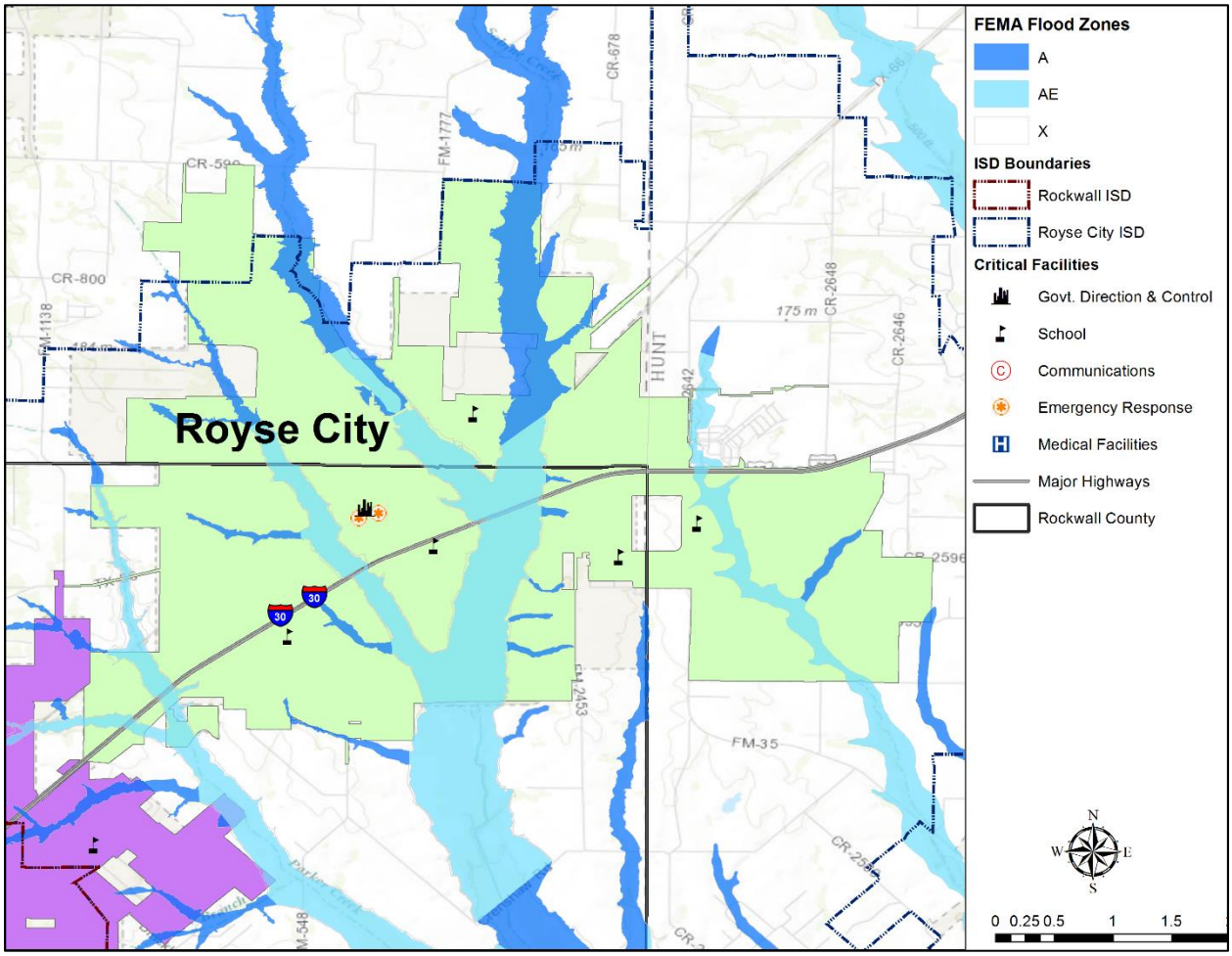


Figure 12-8. Estimated Flood Zones in the Rockwall Independent School District

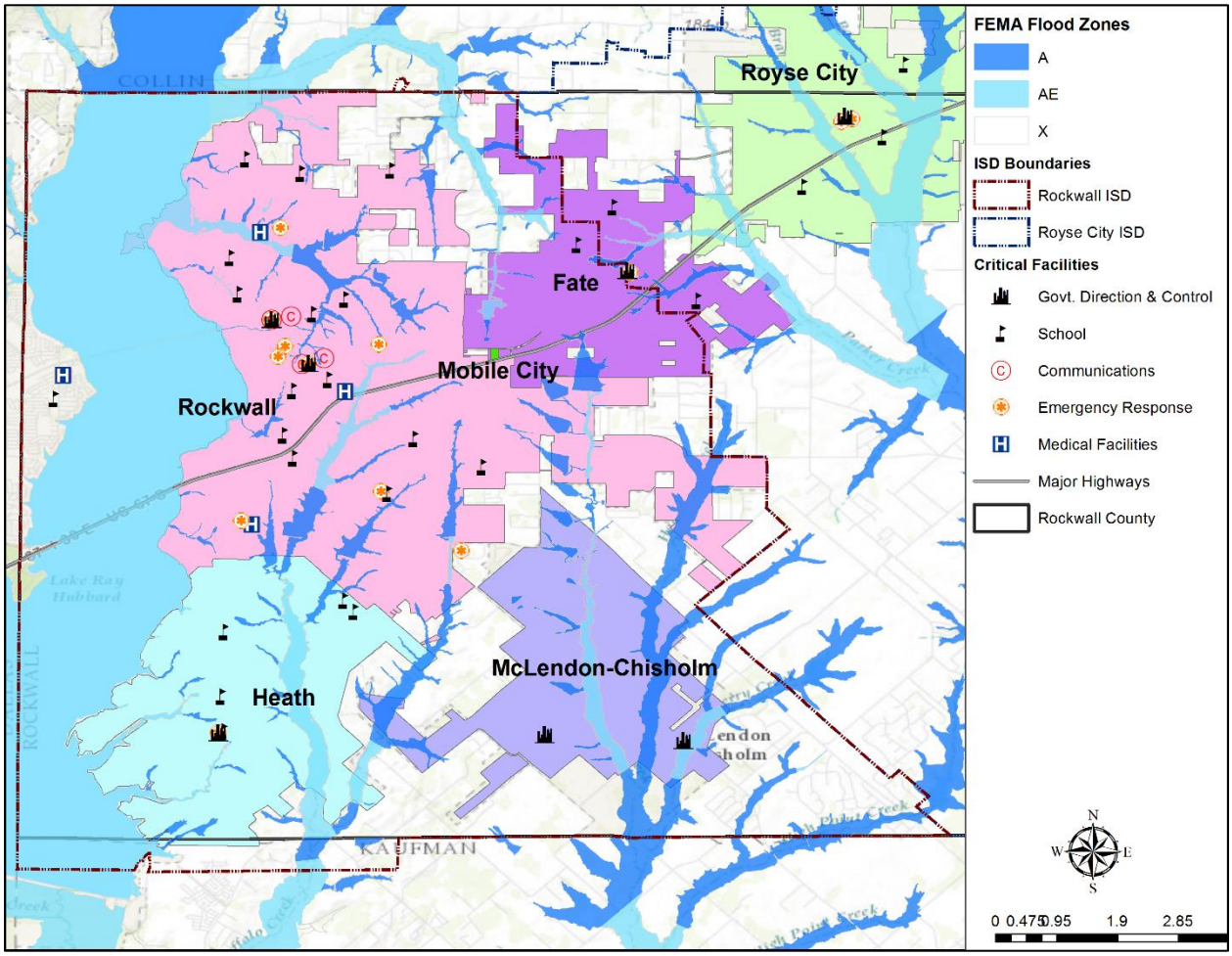
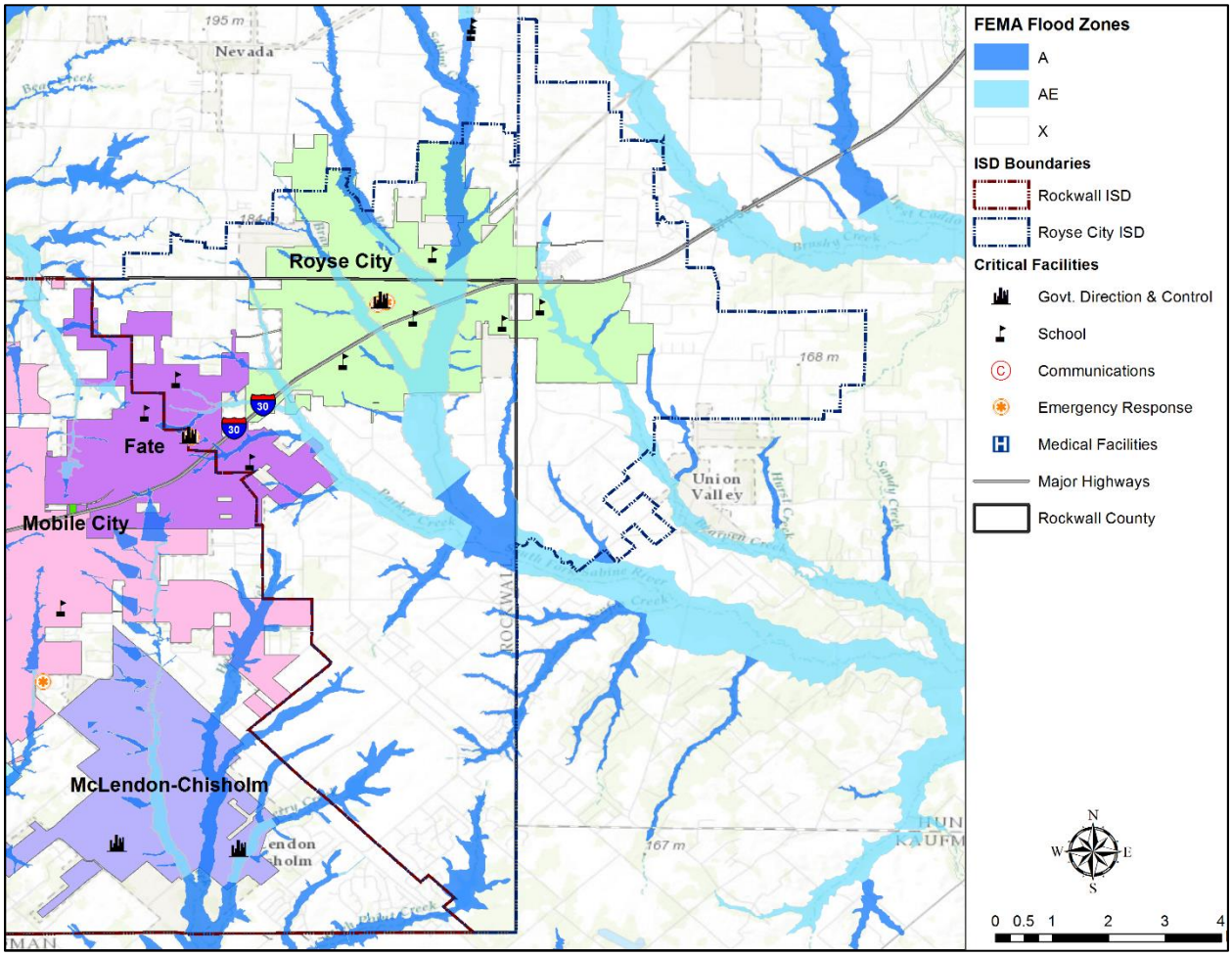


Figure 12-9. Estimated Flood Zones in the Royse City Independent School District



Extent

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

Determining the intensity and magnitude of a flood event is dependent upon the flood zone and location of the flood hazard area in addition to depths of flood waters. 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 12-1 provides a description of FEMA flood zones and the flood impact in terms of severity or potential harm. Flood Zones A, AE, and X are the only hazard areas mapped in the region. Figures 12-1 through 12-9 should be read in conjunction with the extent for flooding in Tables 12-1, 12-2, and 12-3 to determine the intensity of a potential flood event.

Table 12-1. Flood Zones

INTENSITY	ZONE	DESCRIPTION
HIGH	ZONE A	Areas with a one percent annual chance of flooding and a 26 percent chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.
	ZONE A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a Base Flood Elevation (BFE) (old format).
	ZONE AE	The base floodplain where 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 one percent or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from one to three feet. These areas have a 26 percent chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
	ZONE AH	Areas with a one percent annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from one to three feet. These areas have a 26 percent 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 one percent annual chance of flooding that will be protected by a federal flood control system where construction has reached specified legal requirements. No depths or 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 500-year flooding; an area inundated by 100-year flooding with average depths of less than one foot or with drainage areas less than one square mile; or an area protected by levees from 100-year flooding.

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. This is the area that will convey the base flood and constitutes a threat to the planning area. The impact from a flood event can be more damaging in areas that will convey a base flood.

Structures built in the SFHA are subject to damage by rising waters and floating debris. Moving flood water exerts pressure on everything in its path and causes erosion of soil and solid objects. 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.

The intensity and magnitude of a flood event is also determined by the depth of flood waters. Table 12-2 below describes the category of risk and potential magnitude of an event in correlation to water depth. The water depths depicted in Table 12-2 are an approximation based on elevation data. Table 12-3 describes the extent associated with stream gauge data provided by the United States Geological Survey (USGS).

Table 12-2. Extent Scale – Water Depth

SEVERITY	DEPTH (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.
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.

Table 12-3. Extent for Rockwall County[1]

JURISDICTION[2]	ESTIMATED SEVERITY PER FLOOD EVENT	PEAK FLOOD EVENT
Rockwall County	Action Stage, 16 to 23 feet	Action Stage: East Fork Trinity River reached an overflow elevation of 24.82 feet in April of 1942 near Rockwall.

The range of flood intensity that the County can experience is high, or Zone A. Based on reporting from the USGS, a flood event can place the County at the extent of "Action Flood Stage" as shown in Tables 12-2 and 12-3. However, the Rockwall County planning area has experienced flooding over 24 feet. Based on historical occurrences, the planning area could expect to experience from 8 to 12 inches of water within a 24 hour period due to flooding.

The data described in Tables 12-1 through 12-3, together with Figures 12-1 through 12-9, and historical occurrences for the area, provides an estimated potential magnitude and severity for the County. For example Rockwall, as shown in Figure 12-7, has areas designated as Zone A and Zone AE. Reading this figure in conjunction with Table 12-1 means the area is an area of high risk for flood.

Historical Occurrences

Historical evidence indicates that areas within the County are susceptible to flooding, especially in the form of flash flooding. It is important to note that only flood events that have been reported have been factored into this risk assessment, therefore it is likely that additional flood occurrences have gone unreported before and during the recording period. Table 12-4 identifies historical flood events that resulted in damages, injuries, or fatalities within the Rockwall County planning area. Table 12-5 provides the historical flood event summary by jurisdiction. Historical Data is provided by the Storm Prediction Center (NOAA), NCDC database for Rockwall County.

Table 12-4. Historical Flood Events, 1996-2016[3]

JURISDICTION	DATE	TIME	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Rockwall County	5/30/1999	9:30 AM	0	0	$35,615	$0
Royse City	5/3/2009	3:00 AM	0	0	$7,744	$0
Royse City	6/21/2015	10:40 AM	0	0	$1,000	$0
Royse City	6/21/2015	7:15 AM	0	0	$1,000	$0

[1] Severity estimated by averaging floods at certain stage level over the history of flood events. Severity and peak events are based on U.S. Geological Survey data.
[2] Severity is provided for jurisdictions where peak data was provided.
[3] Only recorded events with fatalities, injuries, and/or damages are listed, values are in 2015 dollars.

Table 12-5. Summary of Historical Flood Events, 1996-2016

JURISDICTION	Number of Events	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Rockwall County	24	0	0	$45,359	$0
Fate	2	0	0	$0	$0
Heath	1	0	0	$0	$0
McLendon-Chisholm	0	0	0	$0	$0
Mobile City	0	0	0	$0	$0
Rockwall	13	0	0	$35,615	$0
Royse City	8	0	0	$9,744	$0
Total Losses				**$45,359**	

Significant Events

Flash Flood on May 30, 1999 – Rockwall County
Multiple severe storm systems passed through the DFW metroplex throughout the month of May. Heavy rain caused flash flooding in and around the county and created higher than normal lake and river levels throughout the area. At the peak of the flooding, the bridge at State Highway 205 collapsed from the pressure of debris against the structure.

Flash Flood on May 3, 2009 – Royse City
The combination of a southward advancing cold front, warm air over the cold front, and an approaching shortwave aided in a flash flood event that began the afternoon of May 2nd and continued into the morning hours of May 3rd. Several rounds of severe thunderstorms and thunderstorm clusters moved through north Texas including the Rockwall County planning area. Flash flooding and flooding became a problem as several clusters of storms produced heavy rainfall over repeated areas. A vehicle was reportedly trapped in high water on Highway 66 in Royse City.

Flash Flood on June 21, 2015 – Royse City
Persistent showers and thunderstorms occurred over the northeastern counties of North Texas, including Rockwall County, where a weak upper level trough was located. The heavy rainfall resulted in some flash flooding in the northeast DFW area. Westbound I-30 near FM 36 in Royse City was closed due to high water. Service roads along I-30 in Royse City were also closed due to high water.

Probability of Future Events

Based on recorded historical occurrences and extent within the Rockwall County planning area, flooding is highly likely and an event will occur within the next year.

Vulnerability and Impact

A property's vulnerability to a flood depends on its location and proximity to the floodplain. Structures that lie along banks of a waterway are the most vulnerable and are often repetitive loss structures.

The County encourages development outside of the floodplain, and the impact for flood for the County is limited as facilities and services would be shut down for 24 hours or less, depending on the scale of the storm.

Historic loss estimates due to flood are presented in Table 12-6 below. Considering 24 flood events over a 19-year period, frequency is approximately one to two events every year.

Table 12-6. Potential Annualized Losses by Jurisdiction, 1996-2016

JURISDICTION	NUMBER OF EVENTS	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATES
Fate	2	$0	$0
Heath	1	$0	$0
McLendon-Chisholm	0	$0	$0
Mobile City	0	$0	$0
Rockwall	13	$35,615	$1,874
Royse City	8	$9,744	$513
Rockwall County	24	$45,359	$2,387

The severity of a flooding event varies depending on the relative risk to citizens and structures located within each city. Table 12-7 depicts the level of impact for Rockwall County and each participating city, which includes the level of impact for the participating independent school districts.

Table 12-7. Impact by Jurisdiction

JURISDICTION	IMPACT	DESCRIPTION
Fate	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Heath	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
McLendon-Chisholm	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24

JURISDICTION	IMPACT	DESCRIPTION
		hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Mobile City	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Rockwall	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Royse City	Limited	Royse City, including Royse City ISD could have injuries or illnesses that would be treatable with first aid, with minor quality of life lost. If critical facilities or school campuses are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Rockwall County	Limited	Rockwall County, including Rockwall ISD could have injuries that would be treatable with first aid. Critical facilities including school campuses would be shut down for 24 hours or less, and less than 10 percent of property would be destroyed or damaged.

Assessment of Impacts

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

- Flood-related rescues may be necessary at swift water and low water crossings or in flooded neighborhoods where roads have become impassable, placing first responders in harm's way.
- Evacuations may be required for entire neighborhoods because of rising floodwaters, further taxing limited response capabilities and increasing sheltering needs for displaced residents.
- Health risks and threats to residents are elevated after the flood waters have receded due to contaminated flood waters (untreated sewage and hazardous chemicals) and mold growth typical in flooded buildings and homes.
- Significant flood events often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- Floods can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.
- First responders are exposed to downed power lines, contaminated and potentially unstable debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.

- Emergency operations and services may be significantly impacted due to damaged facilities.
- Significant flooding can result in the inability of emergency response vehicles to access areas of the community.
- Critical staff may suffer personal losses or otherwise impacted by a flood event and unable to report for duty, limiting response capabilities.
- City or county departments may be flooded, delaying response and recovery efforts for the entire community.
- Private sector entities that the City and its residents rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- Some businesses not directly damaged by the flood may be negatively impacted while utilities are being restored or water recedes, further slowing economic recovery.
- When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Residential structures substantially damaged by a flood may not be rebuilt for years and uninsured or underinsured residential structures may never be rebuilt, reducing the tax base for the community.
- Large floods may result in a dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- Recreation activities may be unavailable and tourism can be unappealing for years following a large flood event, devastating directly related local businesses and negatively impaction economic recovery.
- Flooding may cause significant disruptions of clean water and sewer services, elevating health risks and delaying recovery efforts.
- The psycho-social effects on flood victims and their families can traumatize them for long periods of time, creating long term increases in medical treatment and services.
- Extensive or repetitive flooding can lead to decreases in property value for the affected community.
- Flood poses a potential catastrophic risk to annual and perennial crop production and overall crop quality leading to higher food costs.
- Flood related declines in production may lead to an increase in unemployment.
- Large floods may result in loss of livestock, potential increased livestock mortality due to stress and water borne disease, and increased cost for feed.

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

National Flood Insurance Program (NFIP) Participation

Flood insurance offered through the National Flood Insurance Program (NFIP) is the best way for home and business owners to protect themselves financially against the flood hazard. All of the jurisdictions located in Rockwall County participate in the NFIP, except for the City of Mobile City. This community has no Special Flood Hazard Areas (SFHA). A mitigation action to work towards joining the NFIP has been included for this jurisdiction as a goal and objective for the Plan. The community recognizes the importance of joining the NFIP and responsibly managing a local NFIP Program in order to maintain the overall goal of reducing and eliminating the long-term risk of loss of life and property from flooding, protect new and existing properties by elevating and purchasing NFIP flood insurance, and reduce repetitive losses to the National Flood Insurance Program (NFIP). The County Emergency Management Office actively works with local communities to minimize potential flood losses in the County to further support NFIP goals by maintaining Certified Floodplain Manager (CFM) status through continuing education and as active participants of Texas Floodplain Management Association (TFMA).

As an additional indicator of floodplain management responsibility, communities may choose to participate in FEMA's Community Rating System (CRS). This is an incentive-based program that allows communities to undertake flood mitigation activities that go beyond NFIP requirements. Currently, none of the communities in Rockwall County participate in CRS, but this is also a goal and objective of the Plan that was discussed during Planning Team meetings.

Rockwall County and participating jurisdictions in the NFIP currently have in place minimum NFIP standards for new construction and substantial Improvements of structures. The City of Rockwall and Heath have also adopted 2 foot of freeboard in their respective flood damage prevention ordinance, further reducing risk to structures and reducing flood insurance costs to residents. All jurisdictions are considering adopting additional higher regulatory NFIP standards to limit floodplain development.

The flood hazard areas throughout Rockwall County are subject to periodic inundation, which may result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief, of which adversely affect public safety.

These flood losses are created by the cumulative effect of obstructions in floodplains which cause an increase in flood heights and velocities, and by the occupancy of flood hazard areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, flood-proofed or otherwise protected from flood damage. Mitigation actions are included to address flood maintenance issues as well, including routinely clearing debris from roadside ditches and bridges, and expanding drainage culverts and storm water structures to more adequately convey flood waters.

It is the purpose of Rockwall County and NFIP jurisdictions participating in the Hazard Mitigation plan to continue to promote the public health, safety and general welfare by minimizing public and private losses due to flood conditions in specific areas. Each of the NFIP participating jurisdictions in the Plan are guided by their local Flood Damage Prevention Ordinance. These communities will continue to comply with NFIP requirements through their local permitting, inspection, and record-keeping requirements for new and substantially developed construction. The Rockwall County Environmental

Health office has positioned itself to effectively manage the county NFIP Program as active members of TFMA and maintaining their CFM status through continuing education. Further, the NFIP program for each of the participating jurisdictions promotes sound development in floodplain areas and includes provisions designed to:

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

In order to accomplish these tasks, Rockwall County and participating NFIP jurisdictions seek to follow these guidelines to achieve flood mitigation by:

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

NFIP Compliance and Maintenance

As mentioned, Rockwall County and participating jurisdictions have developed mitigation actions that relate to either NFIP maintenance or compliance. Compliance and maintenance actions can be found in Section 15.

Flooding was identified by the majority of the communities as a moderate risk hazard during hazard ranking activities at the Risk Assessment Workshop. However, many of the mitigation actions were developed with flood mitigation in mind. A majority of these flood actions address compliance with the NFIP and implementing flood awareness programs. County-wide, communities recognize the need and are working towards adopting higher NFIP regulatory standards to further minimize flood risk in their community. Smaller no-growth communities that typically do not have personnel or funds to implement more stringent NFIP compliance measures are focusing on NFIP public awareness activities. This includes promoting the availability of flood insurance by placing NFIP brochures and flyers in public libraries or public meeting places.

Repetitive Loss

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.

Severe Repetitive Loss properties are defined as residential properties that are:

- 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 such claims payments exceed $20,000; or
- At least two separate claim payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

In either scenario, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart.[4]

[4] Source: Texas Water Development Board

Section 13: Dam Failure

Portions of the Rockwall County Hazard Mitigation Plan are considered confidential and not for release to the public. The information in this section is covered under the Privacy Act of 1974 (5 U.S.C. Section 552a).

Section 14: Mitigation Strategy

Mitigation Goals

Based on the results of the risk and capability assessments, the Planning Team was able to develop and prioritize the mitigation strategy. At the Risk Assessment Workshop held February 4, 2016, and the Mitigation Workshop held March 29, 2016, Planning Team members refined the Plan's mitigation strategy. The following goals and objectives were identified.

Goal 1

Protect public health and safety.

Objective 1.1

Partner with agencies serving vulnerable populations to minimize harm in the event of an emergency.

Objective 1.2

Promote disaster contingency planning and facility safety among institutions that provide essential services such as food, clothing, shelter and health care to vulnerable populations.

Objective 1.3

Educate individuals and communities about disaster preparedness and mitigation.

Objective 1.4

Improve disaster warning systems.

Objective 1.5

Strengthen local building code enforcement.

Objective 1.6

Train emergency responders.

Section 14: Mitigation Strategy

Goal 2
Protect critical public facilities and infrastructure.

Objective 2.1
Implement mitigation programs that protect critical facilities and services and promote reliability of lifeline systems to minimize impacts from hazards, maintain operations, and expedite recovery in an emergency.

Objective 2.2
Consider known hazards when siting new facilities and systems.

Objective 2.3
Create redundancies for critical networks such as water, sewer, digital data, power and communications.

Objective 2.4
Educate public officials, developers, realtors, contractors, building owners, and the public about hazard risks and building requirements.

Goal 3
Protect the environment.

Objective 3.1
Consider the secondary effects of disasters, such as hazardous waste and hazardous materials spills, when planning and developing mitigation projects.

Objective 3.2
Use environmentally and conservation friendly materials in mitigation projects whenever possible and economically feasible.

Goal 4
Increase public education and awareness.

Objective 4.1
Enhance understanding of local hazards and the risks they pose.

Objective 4.2
Educate the public on actions they can take to prevent or reduce the loss of life or property from all hazards and increase individual efforts to respond to potential hazards.

Objective 4.3
Publicize and encourage the adoption of appropriate hazard mitigation measures.

Goal 5
Encourage partnerships.

Objective 5.1
Partner with private sector, including small businesses, to promote structural and non-structural hazard mitigation as part of standard business practice.

Objective 5.2
Educate businesses about contingency planning, targeting small businesses and those located in high risk areas.

Objective 5.3
Partner with private sector to promote employee education about disaster preparedness and practice conservation while at work and at home.

Section 15: Mitigation Actions

Summary

As discussed in Section 2, at the mitigation workshop the planning team and stakeholders met to develop mitigation actions for each of the natural and human-caused hazards included in the Plan. Each of the actions in this section were prioritized based on FEMA's Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLEE) criteria necessary for the implementation of each action. As a result of this exercise, an overall priority was assigned to each mitigation action.

As part of the economic evaluation of the STAPLEE analysis, jurisdictions analyzed each action in terms of the overall costs, measuring whether the potential benefit to be gained from the action outweighed costs associated with it. As a result of this exercise, priority was assigned to each mitigation action by marking them as High (H), Moderate (M), or Low (L). An action that is ranked as "High" indicates that the action will be implemented as soon as funding is received. A "Moderate" action is one that may not be implemented right away depending on the cost and number of citizens served by the action. Actions ranked as "Low" indicate that they will not be implemented without first seeking grant funding and after "High" and "Moderate" actions have been completed.

All mitigation actions created by Planning Team members are presented in this section in the form of Mitigation Action Worksheets. More than one hazard is sometimes listed for an action, if appropriate. Actions presented in this section represent a comprehensive range of mitigation actions per current State and FEMA Guidelines, including two actions, per hazard, and of two different types. Check marks in Table 15-1 represent number of actions created of each type.

Section 15: Mitigation Actions

Table 15-1. Rockwall County and Participating Jurisdictions Mitigation Action Matrix*

* FEMA does not review mitigation actions for human-caused hazards; therefore, they are not included in the comprehensive list of mitigation actions in Table 15-1.

MITIGATION ACTION MATRIX				
Actions presented in this matrix represent a comprehensive range and minimum number of required mitigation actions per current State and FEMA Guidelines, including two actions per hazard, and of two different types.				
ROCKWALL COUNTY: MITIGATION ACTION MATRIX				
HAZARDS	**Types of Action:**			
	LOCAL PLANS/ REGULATIONS	**STRUCTURAL/ INFRASTRUCTURE**	**NATURAL SYSTEM PROTECTION**	**EDUCATION & AWARENESS**
Tornado	XXX	XXXXXX		X
Hail	XXX	XXXXX		X
Thunderstorm Wind	XXX	XXXXX		X
Extreme Heat	X	XXX		X
Drought	X	XX		X
Wildfire	XXX	XXXX		X
Winter Storm	XXX	XXXX		X
Flood	XXX	XXXXX		X
Dam Failure	XXX	XX		X
CITY OF FATE: MITIGATION ACTION MATRIX				
HAZARDS	**Types of Action:**			
	LOCAL PLANS/ REGULATIONS	**STRUCTURAL/ INFRASTRUCTURE**	**NATURAL SYSTEM PROTECTION**	**EDUCATION & AWARENESS**
Tornado	XXXX	XX		XXX
Hail	XX	XX		XXX
Thunderstorm Wind	XXXXX	XX		XXX
Extreme Heat				XXXX
Drought	XX			XXX
Wildfire	XXXXX	X		XXX
Winter Storm	XX	XX		XXX
Flood	XXXX	XX	X	XX
Dam Failure	XXXX	XX	X	XX

CITY OF HEATH: MITIGATION ACTION MATRIX				
HAZARDS	Types of Action:			
	LOCAL PLANS/ REGULATIONS	STRUCTURAL/ INFRASTRUCTURE	NATURAL SYSTEM PROTECTION	EDUCATION & AWARENESS
Tornado	XXX	XXXXXXX	XX	XX
Hail	XXX	XXXXXXX	XX	XX
Thunderstorm Wind	XXX	XXXXXXX	XX	XX
Extreme Heat	XX	XXXX	X	XX
Drought	XX	XXXXX	XX	XX
Wildfire	XXX	XXXXX	X	XX
Winter Storm	XXX	XXXXXX	X	XX
Flood	XXX	XXXXXX	X	XX
Dam Failure	XXX	XXXXX	X	XX

CITY OF McLENDON-CHISHOLM: MITIGATION ACTION MATRIX				
HAZARDS	Types of Action:			
	LOCAL PLANS/ REGULATIONS	STRUCTURAL/ INFRASTRUCTURE	NATURAL SYSTEM PROTECTION	EDUCATION & AWARENESS
Tornado	XXX	XXXXXXX	XX	XX
Tornado	X	XX		XX
Hail	X	XX		XX
Thunderstorm Wind	X	XX		XX
Extreme Heat	X	X		XX
Drought	X	X		XX
Wildfire	X	X		XX
Winter Storm	X	X		XX
Flood	X	X		XX
Dam Failure	X	X		XX

CITY OF MOBILE CITY: MITIGATION ACTION MATRIX				
HAZARDS	Types of Action:			
	LOCAL PLANS/ REGULATIONS	STRUCTURAL/ INFRASTRUCTURE	NATURAL SYSTEM PROTECTION	EDUCATION & AWARENESS
Tornado	X	X		X
Hail	X	X		X

CITY OF MOBILE CITY: MITIGATION ACTION MATRIX				
Extreme Heat		X		X
Drought	X			X
Wildfire	X			X
Winter Storm	X			X
Flood	X			X
Dam Failure	X			X

CITY OF ROCKWALL: MITIGATION ACTION MATRIX				
HAZARDS	Types of Action:			
	LOCAL PLANS/ REGULATIONS	STRUCTURAL/ INFRASTRUCTURE	NATURAL SYSTEM PROTECTION	EDUCATION & AWARENESS
Tornado	XX	XXXX	X	XXXXX
Hail	XX	XXXX	X	XXXX
Thunderstorm Wind	XX	XXXX	X	XXXXX
Extreme Heat	X	XX		XXX
Drought	XX		X	XXX
Wildfire	XXX	X	X	XXX
Winter Storm	XX	XX	X	XXXX
Flood	XXX	XX	XX	XXXX
Dam Failure	X	XX	X	XXX

CITY OF ROYSE CITY: MITIGATION ACTION MATRIX				
HAZARDS	Types of Action:			
	LOCAL PLANS/ REGULATIONS	STRUCTURAL/ INFRASTRUCTURE	NATURAL SYSTEM PROTECTION	EDUCATION & AWARENESS
Tornado	XXX	XXX	X	XXX
Hail	XXX	XXX	X	XXX
Thunderstorm Wind	XXXX	XXXX	XX	XXX
Extreme Heat		X		XXX
Drought	XX	X	XX	XXX
Wildfire	XXXX	XX	X	XX
Winter Storm	XXX	XX	X	XX
Flood	XXXX	X	XX	X
Dam Failure	XXXX	XXX	X	XX

ROCKWALL ISD: MITIGATION ACTION MATRIX				
HAZARDS	Types of Action:			
	LOCAL PLANS/ REGULATIONS	STRUCTURAL/ INFRASTRUCTURE	NATURAL SYSTEM PROTECTION	EDUCATION & AWARENESS
Tornado	XX	X		XXXX
Hail	XX	X		XXXX
Thunderstorm Wind	XX	X		XXXX
Extreme Heat		X		XXX
Drought		X		XXX
Wildfire	X	X		XXX
Winter Storm	X	X		XXX
Flood	XX	X		XXXX
Dam Failure	X	X		XXX

ROYSE CITY ISD: MITIGATION ACTION MATRIX				
HAZARDS	Types of Action:			
	LOCAL PLANS/ REGULATIONS	STRUCTURAL/ INFRASTRUCTURE	NATURAL SYSTEM PROTECTION	EDUCATION & AWARENESS
Tornado	XX	X		XXXX
Hail	XX	X		XXXX
Thunderstorm Wind	XX	X		XXXX
Extreme Heat		X		XXX
Drought		X		XXX
Wildfire	X	X		XXX
Winter Storm	X	X		XXX
Flood	XX	X		XXXX
Dam Failure	X	X		XXX

Rockwall County

	Rockwall County – Action #1	
	Proposed Action:	**Install automatic flood warning gates to prevent access into flooded areas.**
	BACKGROUND INFORMATION	
	Jurisdiction/Location:	North and Southbound service roads of I-30 (Sabine Creek) in Royse City
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to life safety of motorist.
	Type of Action *(Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)*	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	HGMP, Local and State Funding
Lead Agency/Department Responsible:	Texas Dept. of Transportation
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Local and TxDOT protocols

COMMENTS
This will be a coordinated project with Rockwall County and TxDOT. Current manual gates are ineffective and in need of repair.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

	Rockwall County – Action #2
Proposed Action:	**Develop a "Continuity of Operations' plan in the event of a natural disaster.**
BACKGROUND INFORMATION	
Jurisdiction/Location:	Countywide Operations
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce the interruption of county service to residents and community in the event of a natural disaster.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Extreme Heat, Drought, Wildfire, Winter Storm, Flood, Dam Failure
Effect on New/Existing Buildings:	Reduce risk to existing structures through continuity of county emergency services
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$50,000
Potential Funding Sources:	Grant or Local Funding
Lead Agency/Department Responsible:	Rockwall County/OEM
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Interjurisdictional EOP & Emergency Operations Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

	Rockwall County – Action #3
Proposed Action:	**Install permanent generators at all critical facilities.**
BACKGROUND INFORMATION	
Jurisdiction/Location:	Critical County facilities
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Ensure continuity and continuation of essential services to residents/community in the event of a natural disaster.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Extreme Heat, Drought, Wildfire, Winter Storm, Flood, Dam Failure
Effect on New/Existing Buildings:	Reduce risk to existing structures through continuation of post-disaster response including emergency response services
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$250,000
Potential Funding Sources:	HMGP Grant Funds with Local match
Lead Agency/Department Responsible:	Rockwall County/OEM
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Interjurisdictional EOP

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

		Rockwall County – Action #4
	Proposed Action:	**Coordinate and Improve Animal Shelter capacity during and following a natural disaster.**
	BACKGROUND INFORMATION	
	Jurisdiction/Location:	City Shelters (i.e. City of Rockwall and Royse City)
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to public health, safety and general welfare to the general public as it relates to displaced animals during a natural disaster.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Extreme Heat, Wildfire, and Flood
Effect on New/Existing Buildings:	Increased capacity at existing facility
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$150,000
Potential Funding Sources:	HMGP & other grant funds
Lead Agency/Department Responsible:	Rockwall County OEM/County Ag Extension Office
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Interjurisdictional EOP

COMMENTS
During normal daily operations, the current shelters remain near to full capacity. Any disaster will cause an influx of domestic animals resulting in a potential public and animal health issue.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 3; Legal = 3; Economically Sound = 3; and Environmentally Sound = 4

	Rockwall County – Action #5
Proposed Action:	**Install quick emergency generator hook-ups for critical county facilities.**
BACKGROUND INFORMATION	
Jurisdiction/Location:	Rockwall County critical facilities
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce time to hardwire backup generators that could be critical during and following a disaster.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Extreme Heat, Drought, Wildfire Winter Storm, Flood
Effect on New/Existing Buildings:	Continuation of essential services to existing facilities
Priority (High, Moderate, Low):	Low
Estimated Cost:	$50,000
Potential Funding Sources:	HMGP & other grant funds
Lead Agency/Department Responsible:	Rockwall County OEM/County Facility Maintenance
Implementation Schedule:	Within 36 months of plan adoption pending funding
Incorporation into Existing Plans:	Interjurisdictional EOP

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 3; Legal = 3; Economically Sound = 4; and Environmentally Sound = 4

		Rockwall County – Action #6
	Proposed Action:	**Identify and acquire a predesignated safe site for debris removal management.**
	BACKGROUND INFORMATION	
	Site and Location:	Rockwall County Unincorporated Area
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce disaster response time and increase environmental life safety by pre-designating a safe site for debris relocation from public roadways and public buildings.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations; Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Dam Failure, Wildfire, Winter Storm, Flood
Effect on new/existing buildings:	Continuation of essential services to existing facilities
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	HMGP & other grant funds
Lead Agency/Department Responsible:	Rockwall County OEM/County Road and Bridge
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Interjurisdictional EOP

COMMENTS:
Work with Texas Commission with Environmental Quality (TCEQ) to get pre-designated approval for debris site.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 3; Legal = 3; Economically Sound = 4; and Environmentally Sound = 4

		Rockwall County – Action #7
	Proposed Action:	**Installation of covered/protected vehicle parking area.**
	BACKGROUND INFORMATION	
	Site and Location:	Rockwall County Sheriff's Office
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce repair costs associated with the impacts of major weather events, continue essential emergency response services during and immediately after a serious severe weather event.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Winter Storm
Effect on new/existing buildings:	Reduce risk to existing structures through continuity of emergency response
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$25,000
Potential Funding Sources:	Local funding or grant funding
Lead Agency/Department Responsible:	Sheriff's Office
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 3; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 3; Legal = 3; Economically Sound = 4; and Environmentally Sound = 3

Countywide

		Countywide – Action #1
	Proposed Action:	**Implement and participate in the Safe Room Rebate Program for residential property owners in Rockwall County**
	BACKGROUND INFORMATION	
	Site and Location:	Countywide (Rockwall County; Cities: Rockwall, Fate, Royse City, Mobile City, McLendon-Chisholm and Heath)
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Protect residents from possible injury or loss of life during natural disasters.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind
Effect on new/existing buildings:	Secure structures which reduces risks
Priority (High, Moderate, Low):	High
Estimated Cost:	$5,000 per unit
Potential Funding Sources:	HMGP or PDM Grant Funding
Lead Agency/Department Responsible:	Rockwall County OEM/NCTCOG
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Interjurisdictional EOP

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 3; Politically Acceptable = 3; Legal = 3; Economically Sound = 3; and Environmentally Sound = 4

		Countywide – Action #2
	Proposed Action:	**Develop and implement a county-wide pre-disaster debris removal and monitoring contracts.**
	BACKGROUND INFORMATION	
	Site and Location:	Countywide (Rockwall County, Cities: Rockwall, Fate, Royse City, Mobile City, McLendon-Chisholm, and Heath; School Districts: Rockwall ISD and Royse City ISD)
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce impacts and lost revenue post disaster with the expedient removal of debris from public property and right of ways.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Wildfire, Winter Storm, Flood, Dam Failure
Effect on new/existing buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$2,500
Potential Funding Sources:	Local funding
Lead Agency/Department Responsible:	Rockwall County/OEM
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Interjurisdictional EOP

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 3; Technically Feasible = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 5; and Environmentally Sound = 5

		Countywide – Action #3
	Proposed Action:	**Develop a public education and awareness website to educate and inform Rockwall County residents/businesses about the natural hazards and the potential ways to mitigate them.**
	BACKGROUND INFORMATION	
	Site and Location:	Countywide (Rockwall County, Cities: Rockwall, Fate, Royse City, Mobile City, McLendon-Chisholm and Heath; School Districts: Rockwall ISD and Royse ISD)
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risks and impacts to properties throughout Rockwall County through education and awareness of dangers associated with natural disasters.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Extreme Heat, Drought, Wildfire, Winter Storm, Flood, Dam Failure
Effect on new/existing buildings:	Preparedness can Increase time to retrofit and protect existing structures prior to an event
Priority (High, Moderate, Low):	Low
Estimated Cost:	$2,500
Potential Funding Sources:	Grant or Local Funding
Lead Agency/Department Responsible:	Rockwall County/OEM
Implementation Schedule:	Within 36 months of plan adoption pending funding
Incorporation into Existing Plans:	Interjurisdictional EOP & County Procedures and Policies

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 5; and Environmentally Sound = 5

City of Fate

	City of Fate – Action #1
Proposed Action:	**Require density/prohibit sprawl so that the amount of land area and the improvements thereon susceptible to Tornados and other natural hazards is significantly reduced.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to citizens and property by restricting future development.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind, Wildfire, Flood, Dam Failure
Effect on new/existing buildings:	Reduce risk to new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$1,200 to update Comprehensive Plan
Potential Funding Sources:	Local and State Funding
Lead Agency/Department Responsible:	City of Fate planning
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Comprehensive Land Use Plan

COMMENTS:
This action will be part of the updated Comprehensive plan in conjunction with annexation plans.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 3; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

	City of Fate – Action #2
Proposed Action:	**Adopt ordinances which require safe-rooms in new residential construction.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to citizens and property. Life safety benefit expected to exceed low cost.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind
Effect on new/existing buildings:	Added costs for building safe room. Provide protection for residents of new construction.
Priority (High, Moderate, Low):	Low
Estimated Cost:	$5,000
Potential Funding Sources:	Grant or Local Funding
Lead Agency/Department Responsible:	City of Fate planning
Implementation Schedule:	Within 36 months of plan adoption pending funding
Incorporation into Existing Plans:	Emergency Management Plan, Emergency Response Plan

COMMENTS:
This action can be implemented with adoption of ordinances and securing funding.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = ;4 Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

		City of Fate – Action #3
	Proposed Action:	**Add secondary entry/access roads to existing neighborhoods where possible/enforce two entry/access road requirements in existing code for new construction.**
	BACKGROUND INFORMATION	
	Site and Location:	New residential neighborhoods throughout community and existing neighborhoods
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to citizens and property. Protection to existing structures along with life safety benefits are expected to outweigh the project costs.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations, Structure and Infrastructure Projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Dam Failure, Wildfire, Thunderstorm Wind, Tornado, Hail, Winter Storm
Effect on new/existing buildings:	Additional roadways/alleys to new and existing residential communities
Priority (High, Moderate, Low):	High
Estimated Cost:	TBD
Potential Funding Sources:	Developers, Local and Grant Funding
Lead Agency/Department Responsible:	City of Fate planning
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Comprehensive Plans

COMMENTS:
This action is currently in use per city building codes for new developments. Existing neighborhoods need additional egress and ingress routes for single entry neighborhoods.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

City of Fate – Action #4	
Proposed Action:	**Acquire, reuse, and preserve open spaces adjacent to floodplain areas.**
BACKGROUND INFORMATION	
Site and Location:	Citywide locations adjacent to floodplain
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to citizens and property from flooding both in and near the floodplain.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations, Natural System Projection, Structure and Infrastructure Project (acquisition)

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Dam Failure
Effect on new/existing buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	TBD
Potential Funding Sources:	State and Local Grants
Lead Agency/Department Responsible:	City of Fate planning
Implementation Schedule:	Within 36 months of plan adoption pending funding
Incorporation into Existing Plans:	Flood Ordinance, Comprehensive Plans

COMMENTS:
This action is currently under consideration for implementation as part of the County wide open space plan.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

		City of Fate – Action #5
	Proposed Action:	**Educate residents on the benefits of obtaining and maintaining a personal generator(s) in case of power outage.**
	BACKGROUND INFORMATION	
	Site and Location:	Citywide
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce health risk to citizens and loss of perishable items.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Tornado, Thunderstorm Wind, Winter Storm, Hail
Effect on new/existing buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	$500
Potential Funding Sources:	State and Local Grants
Lead Agency/Department Responsible:	City of Fate Code Enforcement
Implementation Schedule:	Within 36 months of plan adoption pending funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS:
This action can be in conjunction with an education program to inform citizens of ways to stay healthy during the extreme heat.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 4

	City of Fate – Action #6
Proposed Action:	**Develop an educational program to educate citizens of ways to stay healthy and reduce heat related risk during extreme heat.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce health risk to citizens
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on new/existing buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	N/A
Potential Funding Sources:	State and Local Grants
Lead Agency/Department Responsible:	City of Fate Code Enforcement
Implementation Schedule:	Within 36 months of plan adoption pending funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS:
This action can be in conjunction with an educational program to inform citizens on the benefits of obtaining and maintaining personal generators.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 4

	City of Fate – Action #7
Proposed Action:	**Purchase anti-icing equipment that will fit on existing vehicles**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce health risk to citizens
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on new/existing buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	$1,500
Potential Funding Sources:	Local funding
Lead Agency/Department Responsible:	City of Fate Public Works
Implementation Schedule:	Within 36 months of plan adoption pending funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS:
This action can be in conjunction with an education program to inform citizens of ways to stay healthy during the extreme cold.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 3

	City of Fate – Action #8
Proposed Action:	**Educate residents on the benefits of rain-water harvesting systems and other water saving techniques. Offer incentives to residents who install approved systems.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce water consumption.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations, Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on new/existing buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	$100
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	City of Fate Public Works
Implementation Schedule:	Within 36 months of plan adoption pending funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS:
This action would require council approval.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

	City of Fate – Action #9
Proposed Action:	**Prohibit water intensive landscaping.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce water consumption.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on new/existing buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$100
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	City of Fate Public Works
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Annual budget, Building Code, Emergency Management Plan

COMMENTS:
This action would require council approval in conjunction with an educational program through water bills.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

	City of Fate – Action #10
Proposed Action:	**Require fire breaks between Agriculture land and residential or commercial use properties.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to citizens.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on new/existing buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	$1,000
Potential Funding Sources:	Grants or Local Funding
Lead Agency/Department Responsible:	City of Fate Department of Public Safety
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	CWPP

COMMENTS:
This action can be implemented and maintained by the Fire Department.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

	City of Fate – Action #11
Proposed Action:	**Require tie downs on all manufactured and accessory buildings.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to citizens and property.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind
Effect on new/existing buildings:	Reduce risk to new and existing manufactured homes and accessory structures
Priority (High, Moderate, Low):	High
Estimated Cost:	$1,000
Potential Funding Sources:	State and Local Grants
Lead Agency/Department Responsible:	City of Fate Code Compliance
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Annual budget, Building Code, Emergency Management Plan

COMMENTS:
Create an ordinance to require builders to provide for added safety when installing and building manufactured homes and accessory buildings.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

		City of Fate – Action #12
	Proposed Action:	**Purchase NOAA weather radios for early warning and place in critical infrastructures within the city.**
	BACKGROUND INFORMATION	
	Site and Location:	Critical Facilities, Schools, Nursing Homes
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Assist with early warning to citizens.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Extreme Heat, Drought, Wildfire, Winter Storm, Flood, Dam Failure
Effect on new/existing buildings:	Increase time to retrofit and protect existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	$500
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	City of Fate Department of Public Safety
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Annual budget, Emergency Response Plan

COMMENTS:
Purchase of radios will assist the DPS along with the use of NIXLE to provide early warning to citizens.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

City of Fate – Action #13	
Proposed Action:	**Create an educational program about fire safety and burning regulations.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk of wildfire, fire fuels, loss of life and property.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations, Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on new/existing buildings:	Reduce potential fire threat to existing structures, residents, and businesses
Priority (High, Moderate, Low):	High
Estimated Cost:	$100
Potential Funding Sources:	Texas Forest Service, Local Funding
Lead Agency/Department Responsible:	City of Fate Department of Public Safety
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	CWPP

COMMENTS:
Create an educational awareness program on fire safety and outdoor burning.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

	City of Fate – Action #14
Proposed Action:	**Increase tree planting around buildings to shade parking lots and along public right of ways**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	To protect citizens from the dangers associated with extreme heat temperature events, such as dehydration, heat stroke, etc.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on new/existing buildings:	Lower heat values within structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$3,000
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	City of Fate Administration
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Local Ordinance

COMMENTS:
Purchase of radios will assist the DPS along with the use of NIXLE to provide early warning to citizens.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

City of Heath

		City of Heath – Action #1
	Proposed Action:	**Adopt and enforce minimal street width requirement.**
	BACKGROUND INFORMATION	
	Site and Location:	New residential neighborhoods throughout community
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Allow for egress/ingress for emergency responders to disaster events.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local building codes and regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Extreme Heat, Drought, Wildfire, Winter Storm, Flood, Dam Failure
Effect on new/existing buildings:	Reduce risk to new/future structures in new developments
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$1,000
Potential Funding Sources:	Local and Grant Funding
Lead Agency/Department Responsible:	City Public Works/Public Safety Director
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Comprehensive plans

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

		City of Heath – Action #2
	Proposed Action:	**Add secondary entry/access roads to existing neighborhoods where possible/enforce two entry/access road requirements in existing code for new construction.**
	BACKGROUND INFORMATION	
	Site and Location:	New residential neighborhoods throughout the community and existing neighborhoods
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	All for egress/ingress for emergency responders and allows for egress/ingress of civilian vehicles to and from homes during disaster.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project, Local plans and regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Extreme Heat, Drought, Wildfire, Winter Storm, Flood, Dam Failure
Effect on new/existing buildings:	Additional roadways/alleys to new and existing residential communities
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Undetermined at this time
Potential Funding Sources:	Developers, Local and Grant Funding
Lead Agency/Department Responsible:	City of Heath Public Works
Implementation Schedule:	Implement within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Comprehensive Plans

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

	City of Heath – Action #3
Proposed Action:	**Adapt ADA standards to accommodate disabled persons at existing city facilities.**
BACKGROUND INFORMATION	
Site and Location:	City Hall/Public Safety Building
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Provide access to city facilities during a disaster for disabled persons.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Extreme Heat, Drought, Wildfire, Winter Storm, Flood, Dam Failure
Effect on new/existing buildings:	Modifications to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	Local funding, Grant Funding
Lead Agency/Department Responsible:	City Public Works
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Emergency Response Plan, Emergency Management Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

	City of Heath – Action #4
Proposed Action:	**Implement tree maintenance measures.**
BACKGROUND INFORMATION	
Site and Location:	Crisp Road, Buffalo Creek area, Myers Road, Peninsula Court and Yankee Creek
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Allow for emergency vehicles ingress/egress, reduce potential damage from falling trees/limbs across roadway. Reduce power outages and fire from downed power lines. Reduce debris jams along creeks during flood events.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Drought, Wildfire, Winter Storm, Flood, Dam Failure
Effect on new/existing buildings:	Reduce damage to new/existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$75,000 annually
Potential Funding Sources:	Local funding, Utility fee, HMGP
Lead Agency/Department Responsible:	City Public Works
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

	City of Heath – Action #5
Proposed Action:	**Update electronic security controls and physical security of city infrastructure.**
BACKGROUND INFORMATION	
Site and Location:	City Hall/Public Safety Building, pump stations and water towers
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce or prevent damage to critical city infrastructure
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Drought, Wildfire, Winter Storm, Flood, Dam Failure
Effect on new/existing buildings:	Physical security and installation of electronic controls at existing city facilities listed above
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	Local funding
Lead Agency/Department Responsible:	Private contracted Professional Services/Public Safety Director
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

	City of Heath – Action #6
Proposed Action:	**Installation of covered/protected parking.**
BACKGROUND INFORMATION	
Site and Location:	City Hall/Public Safety Building
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce or prevent damage to emergency response vehicles.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Winter Storm
Effect on new/existing buildings:	Covered parking area to existing city hall/public safety building
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$200,000
Potential Funding Sources:	Local funding
Lead Agency/Department Responsible:	Private contracted Professional Services/Public Safety Director
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Comprehensive Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

	City of Heath – Action #7
Proposed Action:	**Installation of emergency backup generators at critical city/school facilities.**
BACKGROUND INFORMATION	
Site and Location:	City Hall/Public Safety Building, Rockwall-Heath H.S., Cain Middle School, Amy Parks and Pullen Elementary
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Used to power city critical government facilities to maintain continuity of government during natural disaster events, power EOC and provide for emergency shelter needs at schools.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Winter Storm, Extreme Heat, Drought, Wildfire, Flood, Dam Failure
Effect on new/existing buildings:	Essential power to existing and future critical facilities
Priority (High, Moderate, Low):	High
Estimated Cost:	$250,000 per site
Potential Funding Sources:	Local funding, HMGP
Lead Agency/Department Responsible:	Private contracted Professional Services/Public Safety Director
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

		City of Heath – Action #8
	Proposed Action:	**Installation of outdoor waring/siren system.**
	BACKGROUND INFORMATION	
	Site and Location:	Citywide – (sites TBD)
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduction in loss of life/injury
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project, Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Winter Storm, Extreme Heat, Drought, Wildfire, Flood, Dam Failure
Effect on new/existing buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Number of sites will determine cost
Potential Funding Sources:	Local funding and grant funding
Lead Agency/Department Responsible:	Private contracted Professional Services/Public Safety Director
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

		City of Heath – Action #9
	Proposed Action:	**Installation of warning signs and flood control (gates, culverts, etc.).**
	BACKGROUND INFORMATION	
	Site and Location:	Meadowview between Darr and Terry Roads
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduction in drowning potential, allow for emergency egress/ingress, reduction in flood damages.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on new/existing buildings:	Reduce flooding potential to new and existing homes in the area
Priority (High, Moderate, Low):	High
Estimated Cost:	$500,000
Potential Funding Sources:	HMGP, Local Revenue, Grants
Lead Agency/Department Responsible:	City Public Works
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan, Storm Water Plan, Comprehensive Drainage Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

		City of Heath – Action #10
	Proposed Action:	**Enforcement of adopted density codes**
	BACKGROUND INFORMATION	
	Site and Location:	Open land area throughout city
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce wildfire potential, erosion control measures.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Drought, Flood
Effect on new/existing buildings:	Prevent erosion in areas adjacent to commercial and residential structures, new and existing
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$50,000/acre
Potential Funding Sources:	Local funding, HMGP
Lead Agency/Department Responsible:	City Public Works
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Comprehensive Land Use Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

City of Mc Lendon-Chisholm

	City of McLendon-Chisholm – Action #1
Proposed Action:	**Purchase NOAA weather radios for early warning and place in critical infrastructures within the city.**
BACKGROUND INFORMATION	
Site and Location:	Critical Facilities, Schools, Nursing Homes
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Assist with early warning to citizens.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Extreme Heat, Drought, Wildfire, Winter Storm, Flood, Dam Failure
Effect on new/existing buildings:	Increase time to retrofit and protect existing structures, evacuate
Priority (High, Moderate, Low):	High
Estimated Cost:	$100 per unit
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Annual budget, Emergency Response Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

		City of McLendon-Chisholm – Action #2
	Proposed Action:	**Install permanent generators on all critical facilities.**
	BACKGROUND INFORMATION	
	Site and Location:	Critical facilities throughout the City
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Ensure continuation of essential services to residents during and post disaster.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Extreme Heat, Drought, Wildfire, Winter Storm, Flood, Dam Failure
Effect on new/existing buildings:	Continuation of services post disaster at new and existing critical facilities
Priority (High, Moderate, Low):	High
Estimated Cost:	$100,000
Potential Funding Sources:	HMGP Funding
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Interjurisdictional Emergency Operation's Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 4

	City of McLendon-Chisholm – Action #3
Proposed Action:	**Incorporate tolerant or xeriscape practices into landscape ordinances to reduce dependence on irrigation.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Critical water conservation during drought conditions.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plan and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on new/existing buildings:	Reduce impact of drought on new and existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$1,000
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Local Ordinances

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 4

	City of McLendon-Chisholm – Action #4
Proposed Action:	**Increase tree plantings around buildings to shade parking lots and along public right of ways.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	To protect citizens from the dangers associated with extreme heat temperature events, such as heat stroke, dehydration, etc.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on new/existing buildings:	Lower heat values with existing and new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$4,000
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Local Ordinance

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 4

City of Mobile City

	City of Mobile City – Action #1
Proposed Action:	**Incorporate tolerant or xeriscape practices into landscape ordinances to reduce dependence on irrigation.**
BACKGROUND INFORMATION	
Site and Location:	Community wide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Critical water conservation during drought conditions.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on new/existing buildings:	Reduce impact of drought on new and existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	$500
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 48 months of plan adoption pending funding
Incorporation into Existing Plans:	Local Ordinances

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 4

	City of Mobile City – Action #2
Proposed Action:	**Installation of public misting systems outdoors and air conditioned rooms indoors.**
BACKGROUND INFORMATION	
Site and Location:	Community wide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	To protect citizens from the dangers associated with extreme heat temperature events such as heat stroke, dehydration, etc.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on new/existing buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	$500
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 48 months of plan adoption pending funding
Incorporation into Existing Plans:	Local Ordinances

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 4

City of Rockwall

	City of Rockwall – Action #1	
	Proposed Action:	**Purchase and install a Weather Tracking Station that integrates with NWS systems.**
	BACKGROUND INFORMATION	
	Site and Location:	City Emergency Operations Center
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to residents by providing advanced information and faster warnings, thereby mitigating loss of life and property.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project, Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Tornado, Hail, Thunderstorm Wind, Flood, Dam Failure, Extreme Heat
Effect on new/existing buildings:	Increase warning time to protect existing structures and preserve life and property
Priority (High, Moderate, Low):	Low
Estimated Cost:	TBD
Potential Funding Sources:	HMGP or other grant program funding
Lead Agency/Department Responsible:	Internal Operations, City Administration, Police, Fire
Implementation Schedule:	Within 36 months of plan adoption pending funding and council review/approval
Incorporation into Existing Plans:	Plans related to Future EOC enhancements and media/public relations campaign(s), Emergency Response Plan

COMMENTS:
The system could be integrated into the local emergency management system to provide real-time weather data, mapping, forecast tables, radar and satellite information. Data could be available to local media outlets and citizens via mobile apps and the internet.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

	City of Rockwall – Action #2
Proposed Action:	**Monitor and update (as needed) the city's water conservation and drought contingency plans.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Conserve water, especially during periods of drought.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on new/existing buildings:	Reduce water usage at existing and new structures
Priority (High, Moderate, Low):	High
Estimated Cost:	TBD
Potential Funding Sources:	Funding absorbed in staff time of local employee(s) salaries
Lead Agency/Department Responsible:	Public Works (Water Dept.)
Implementation Schedule:	Within 12 months of plan adoption pending council review / approval
Incorporation into Existing Plans:	Drought Contingency & Water Emergency Response Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 3; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 3; Economically Sound = 3; and Environmentally Sound = 5

		City of Rockwall – Action #3
	Proposed Action:	**Conduct study to identify needed upgrades to storm water conveyance systems (including upsizing pipes, inlets, channels, culverts, etc.) and implement where identified.**
	BACKGROUND INFORMATION	
	Site and Location:	Citywide, particularly areas previously affected by the flooding events or streams within the city and ETJ that have not yet been studied
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Identify areas of opportunity for reduction in flood risks to residents and businesses.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations, Structure and Infrastructure Projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on new/existing buildings:	Identify areas to potentially reduces risk of flooding on existing structures and new buildings
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	HMGP, other grant funding, or local funding as approved by city council
Lead Agency/Department Responsible:	Public Works (Engineering, Streets & Drainage)
Implementation Schedule:	Within 24 months of plan adoption pending funding and council review/approval
Incorporation into Existing Plans:	Flood Mitigation Planning

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 3; and Environmentally Sound = 3

		City of Rockwall – Action #4
	Proposed Action:	**Study, develop and implement stream restoration/channelization program to ensure adequate drainage/diversion of storm water and remediation of stream bank erosion where feasible.**
	BACKGROUND INFORMATION	
	Site and Location:	Citywide streams
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk of flooding, reduce risk of stream/ creek erosion encroachment and damage/loss of property and structures. Compromising of existing utilities.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on new/existing buildings:	Reduce flooding and structure damage/loss due to erosion to existing and future structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	HMGP, other grant funding, local funding as approved by city council
Lead Agency/Department Responsible:	Public Works (Engineering, Streets & Drainage)
Implementation Schedule:	Within 24 months of plan adoption pending funding and council review/approval
Incorporation into Existing Plans:	Flood Mitigation and Streambank Stabilization Planning

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 3; and Environmentally Sound = 3

	City of Rockwall – Action #5
Proposed Action:	**Purchase and install a minimum of four (4) covered parking structures (35'x35'x14') for Police, and Public Works emergency response fleet vehicles and trailers.**
BACKGROUND INFORMATION	
Site and Location:	The City's Service Center and the Police station
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce repair costs associated with the impacts of major weather events, continue essential emergency response services during and immediately after a serious severe weather event.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Thunderstorm Wind, Winter Storm, Tornado
Effect on new/existing buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$100,000 (rough estimate w/ each costing about $25,200)
Potential Funding Sources:	HMGP, other grant funding
Lead Agency/Department Responsible:	City Internal Operations Dept.
Implementation Schedule:	Within 12-24 months of plan adoption pending funding and council review/approval
Incorporation into Existing Plans:	Disaster Response Plan, Future facility enhancements 'wish list'

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 3; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

	City of Rockwall – Action #6
Proposed Action:	**Add additional outdoor public warning sirens and upgrade existing sirens, including associated software and hardware.**
BACKGROUND INFORMATION	
Site and Location:	At least 3 additional sites, including (but not limited to): • The Harbor • Off of SH-276 • Northern portion of City
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to the public.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm Wind, Tornado, Hail, Wildfire, Dam Failure, Extreme Heat
Effect on new/existing buildings:	Early warning allows for retrofitting/protecting buildings prior to disaster
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Approximately $75-80,000 (for sirens only (at $25k/each), Unknown re: cost to upgrade existing sirens/software
Potential Funding Sources:	HMGP, potentially with some local funding as approved by city council
Lead Agency/Department Responsible:	Internal Operations Dept.
Implementation Schedule:	Within 12-24 months of plan adoption pending funding and council review/approval
Incorporation into Existing Plans:	Disaster Response Plan, Emergency Management Evacuation Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

	City of Rockwall – Action #7
Proposed Action:	**Public Education Campaign – educate the public on the dangers of tornadoes and high winds.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to residents and businesses by promoting personal emergency preparedness practices.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education & Awareness Program

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind
Effect on new/existing buildings:	Preparedness can increase time to retrofit and protect existing structures prior to an event
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Minimal (likely only expense related to staff time)
Potential Funding Sources:	HMGP, local funds (staff time absorbed with funding of local employee(s) salaries)
Lead Agency/Department Responsible:	City Administration, Fire Marshal's Division
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan, future Public Information project plans

COMMENTS:
Focus on the following efforts: disseminate and advertise FEMA "How-To" documents to educate citizens on how to protect their property from high winds http://www.fema.gov/library/viewRecord.do?id=3263 As well as promote the KnowWhat2Do and other public education-related programs
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

		City of Rockwall – Action #8
	Proposed Action:	**Take to city council for consideration adoption of the most current version of International Building Codes with local amendments on a regular basis, including (but not limited to) those actions which may mitigate fire-related hazards.**
	BACKGROUND INFORMATION	
	Site and Location:	Citywide
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to residents and property owners, thereby mitigating loss of life and property.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on new/existing buildings:	Reduce risk on new and existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$5,000 (to purchase new code books)
Potential Funding Sources:	Local Funding as approved by city council
Lead Agency/Department Responsible:	Building and Fire Marshal's Division
Implementation Schedule:	Within 4 years of release of newest version of the IBC w/ local amendments
Incorporation into Existing Plans:	Comprehensive Plan, Building & Fire Codes

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

	City of Rockwall – Action #9
Proposed Action:	**Achieve certification by the National Weather Service as a "StormReady" Community.**
BACKGROUND INFORMATION	
Site and Location:	City of Rockwall
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	• Improve the timeliness and effectiveness of hazardous weather warnings for the public; • Provide detailed and clear recommendations by which local emergency managers may establish/improve effective hazardous weather operations; • Help local emergency managers justify costs and purchases related to supporting their hazardous weather-related program; • Reduce risks associated with life safety and reduce property damage.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations, Education and Awareness Programs

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Tornado, Hail, Thunderstorm Wind, Flood
Effect on new/existing buildings:	Reduce risk to new and existing structures through advanced preparedness and emergency response
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$1,500 (to purchase weather radios for each city facility)
Potential Funding Sources:	HMGP, other grant funding or local funds as approved by city council
Lead Agency/Department Responsible:	City Administration, Internal Operations, Fire, Police
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	Plans related to future EOC enhancements and media/public relations campaign(s), Emergency Response Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

City of Rockwall – Action #10	
Proposed Action:	**Implement Tree Trimming Educational and Awareness Program.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	• Reduce future storm damage through proper pruning • Provide ingress and egress clearance for residents and vehicles at sidewalk and roadway locations • Improve visibility for residents and vehicle operators
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Natural Systems Protection; Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Drought, Wildfire, Winter Storm, Flood, Dam Failure
Effect on new/existing buildings:	Reduce damage to new/existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	Local funding(staff time absorbed by employee(s) salaries)
Lead Agency/Department Responsible:	City Administration (PIO), Neighborhood Improvement Services Parks & Streets
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Public Information Program (future project plans)

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

City of Rockwall – Action #11	
Proposed Action:	**Promote Conservation through Low Water Usage Landscaping.**
BACKGROUND INFORMATION	
Site and Location:	Citywide
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	• Significantly reduce landscape related water usage by implementing water smart landscaping requirements for developers; • Water conservation is the most cost-effective and environmentally cost effective way to reduce our demand for water; • Once established, native and low water-using plants require little water beyond normal rainfall; • Xeriscape can reduce landscape water use by 50-75%
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations, Education and Awareness Programs

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Extreme Heat, Wildfire
Effect on new/existing buildings:	Impacts landscaping for new development and the city's public landscaping at city owned/operated facilities
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	Local Funding (as staff time absorbed with local employee(s) salaries)
Lead Agency/Department Responsible:	City Administration, Planning Dept.
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Planning and Zoning, Water Conservation and Drought Contingency Plans, Parks Ground Maintenance

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 3; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

City of Royse City

	Royse City – Action #1
Proposed Action:	**Adopt and implement a "green infrastructure" program for parks, nature preserves, greenbelts.**
BACKGROUND INFORMATION	
Site and Location:	Coverage throughout entire community (effecting mostly the flood plain areas)
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce property loss by assuring private property loss is limited and areas are protected for proper downstream flows.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations, Structure and Infrastructure Project, Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Flood, Thunderstorm Wind, Wildfire, Drought
Effect on new/existing buildings:	Reduce risk to new and existing structures by restoring natural function to floodplain and preserving open space.
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	Local Funding, HMGP
Lead Agency/Department Responsible:	City – Development Services
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Comprehensive Plan, Subdivision and Zoning Ordinances, acquisition of property

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

		Royse City – Action #2
	Proposed Action:	**Update Flood Prevention ordinance, adopting a "no-rise" in Base Flood Elevation in the 100-year floodplain.**
	BACKGROUND INFORMATION	
	Site and Location:	Entire City
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risks of those near floodplains in City and downstream
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Dam Failure
Effect on new/existing buildings:	Reduce risk to new and substantially improved existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$5,000
Potential Funding Sources:	Local Funding – budgetary
Lead Agency/Department Responsible:	City – Development Services
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Flood Prevention Ordinance and Subdivision Ordinance

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

		Royse City – Action #3
	Proposed Action:	**Establish safe sites at public facilities during extreme heat and winter storms.**
	BACKGROUND INFORMATION	
	Site and Location:	Various Public Facilities
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk for residents during extreme heat and winter storm events.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Winter Storm
Effect on new/existing buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	Local Funding and Grants
Lead Agency/Department Responsible:	City – Fire Department and Administration
Implementation Schedule:	Within 24 months of plan adoption pending building owner participation and funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

		Royse City – Action #4
	Proposed Action:	**Achieve certification by the National Weather Service as "StormReady" Community.**
	BACKGROUND INFORMATION	
	Site and Location:	Royse City
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	• Improve the timeliness and effectiveness of hazardous weather warnings for the public; • Provide detailed and clear recommendations by which local emergency managers may establish/improve effective hazardous weather operations; • Help local emergency managers justify costs and purchases related to supporting their hazardous weather-related program; Reduce risks associated with life safety and reduce property damage.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations, Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Tornado, Hail, Winter Storm, Flood
Effect on new/existing buildings:	Reduce risk to new and existing structures through advanced preparedness and emergency response
Priority (High, Moderate, Low):	High
Estimated Cost:	Limited (staff time)
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	City – Fire Department
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

	Royse City – Action #5
Proposed Action:	**Acquire outdoor warning siren system.**
BACKGROUND INFORMATION	
Site and Location:	Coverage throughout entire community
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risks for life safety.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Projects, Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind, Hail, Dam Failure
Effect on new/existing buildings:	Reduce risk to new and existing structures through advanced preparedness and early warning
Priority (High, Moderate, Low):	High
Estimated Cost:	TBD
Potential Funding Sources:	HMGP and Local Match
Lead Agency/Department Responsible:	City – Fire Department
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

		Royse City – Action #6
	Proposed Action:	**Increase public awareness and education regarding extreme temperatures (heat and cold) – including basic information on website, social media, and making presentations to schools and to others**
	BACKGROUND INFORMATION	
	Site and Location:	Throughout City and Royse City ISD
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risks associated with life safety and help reduce some property damage
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Extreme Heat
Effect on new/existing buildings:	Reduce risk to new and existing structures through education on preventative measures
Priority (High, Moderate, Low):	High
Estimated Cost:	Limited
Potential Funding Sources:	Local Funding and private funding
Lead Agency/Department Responsible:	City – Fire Department
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan, Future Media Relations project plans

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

		Royse City – Action #7
	Proposed Action:	**Create a public awareness campaign to assist in educating citizens of the dangers of tornadoes/ high winds and hail events. Will consist of page on City's website with basic information and important links. Will provide info regarding preparedness and post-event suggestions.**
	BACKGROUND INFORMATION	
	Site and Location:	Whole community
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risks for life and safety and reduce property damage
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind, Hail
Effect on new/existing buildings:	Reduce risk to new and existing structures through advanced preparedness and preventative measures
Priority (High, Moderate, Low):	High
Estimated Cost:	Limited – Staff Time
Potential Funding Sources:	Local Funding – budgetary
Lead Agency/Department Responsible:	City – Fire Department
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan, Future Media Relations project plans

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

		Royse City – Action #8
	Proposed Action:	**Develop a program to bury existing and future utilities – power, telephone, cable, and fiber optic lines.**
	BACKGROUND INFORMATION	
	Site and Location:	Throughout City
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risks associated with life safety and reduce property damage from natural disasters.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations, Structure and Infrastructure Projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storms, Thunderstorm Wind, Tornado, Hail, Wildfire, Dam Failure
Effect on new/existing buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	Local Funding and private funding
Lead Agency/Department Responsible:	City – Development Services (with cooperation of utility companies)
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Local Ordinances & Utility Companies protocols

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 3; Economically Sound = 4; and Environmentally Sound = 4

		Royse City – Action #9
	Proposed Action:	**Develop a public education program to educate citizens regarding the dangers of extreme heat, drought, and wildfires.**
	BACKGROUND INFORMATION	
	Site and Location:	Entire community
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to residents by education of dangers of extreme heat, drought, and wildfires.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Wildfire
Effect on new/existing buildings:	Reduce risk to new and existing structures through advanced preparedness and preventative measures
Priority (High, Moderate, Low):	High
Estimated Cost:	Limited – Staff Time
Potential Funding Sources:	Local Funding – Budgetary
Lead Agency/Department Responsible:	City – Fire Department
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan, CWPP

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

	Royse City – Action #10
Proposed Action:	**Implement program to promote conservation of landscaping to low water usage landscaping through public education and demonstration programs at City facilities. Require xeriscaping at public facilities.**
BACKGROUND INFORMATION	
Site and Location:	Entire community
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Water conservation through low water usage.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations, Natural Systems Protection, Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on new/existing buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	TBD
Potential Funding Sources:	Local Funding (Budgetary) and Grant opportunities
Lead Agency/Department Responsible:	City – Development Services and Public Works
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Zoning Ordinance and Conservation Plan

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 3; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

		Royse City – Action #11
	Proposed Action:	**Require large side yards between adjacent buildings in residential and commercial areas.**
	BACKGROUND INFORMATION	
	Site and Location:	Entire community
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce risk to residents, continue essential utility services during wildfire event.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on new/existing buildings:	Reduce risk on existing and new structures/ property
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Limited – Staff Time
Potential Funding Sources:	Local Funding – budgetary
Lead Agency/Department Responsible:	City – Development Services
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Zoning Ordinance, Subdivision Ordinance

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 3; Administratively Possible = 4; Politically Acceptable = 3; Legal = 3; Economically Sound = 3; and Environmentally Sound = 4

Rockwall Independent School District

		Rockwall ISD – Action #1
	Proposed Action:	**Establish communications for emergency events to the Rockwall ISD community.**
	BACKGROUND INFORMATION	
	Site and Location:	Central Office to district campuses and facilities
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce potential losses to Rockwall ISD community members (Students, staff and stakeholders).
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Wildfires, Extreme Heat, Drought, Winter Storm, Flood, Dam Failure
Effect on new/existing buildings:	Early communications can reduce risks at existing facilities through preventative measures
Priority (High, Moderate, Low):	High
Estimated Cost:	$2,500
Potential Funding Sources:	HMGP and district funds
Lead Agency/Department Responsible:	Rockwall ISD Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Rockwall ISD EOP

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

		Rockwall ISD – Action #2
	Proposed Action:	**Connect District EOC to building emergency generator**
	BACKGROUND INFORMATION	
	Site and Location:	Central Office
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Ensure continuation of essential district services to Rockwall ISD facilities and schools in case of a power outage as a result of a disaster.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Wildfire, Hail, Thunderstorm Wind, Extreme Heat, Winter Storm, Drought, Dam Failure, Flood
Effect on new/existing buildings:	Be able to have functional EOC in case of disaster
Priority (High, Moderate, Low):	High
Estimated Cost:	$5,000
Potential Funding Sources:	HMGP and district funds
Lead Agency/Department Responsible:	Rockwall ISD Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Rockwall ISD EOP

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

		Rockwall ISD – Action #3
	Proposed Action:	**Achieve certification by the National Weather Service as a "StormReady" school district.**
	BACKGROUND INFORMATION	
	Site and Location:	District wide
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Improve the timeliness and effectiveness of hazardous weather warnings for the school district.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness, Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Flood
Effect on new/existing buildings:	Reduce risk to new and existing structures through advanced preparedness and emergency response
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$1,000
Potential Funding Sources:	HMGP and district funds
Lead Agency/Department Responsible:	Rockwall ISD Administration
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Rockwall ISD EOP

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

		Rockwall ISD – Action #4
	Proposed Action:	**Purchase NOAA "All Hazard" radios for early warning and event notification information and be placed in schools and district buildings.**
	BACKGROUND INFORMATION	
	Site and Location:	Rockwall ISD facilities
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Improve the timeliness and effectiveness of notifications for hazardous weather warnings in the school district.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Extreme Heat, Drought, Wildfire, Winter Storm, Dam Failure, Flood
Effect on new/existing buildings:	Reduce risk to new and existing structures through advanced preparedness and emergency response
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$500
Potential Funding Sources:	HMGP and district funds
Lead Agency/Department Responsible:	Rockwall ISD Administration
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Rockwall ISD EOP

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Royse City Independent School District

		Royse City ISD – Action #1
	Proposed Action:	**Establish communications for emergency events to the RCISD community.**
	BACKGROUND INFORMATION	
	Site and Location:	RCISD Central Office to district campuses and facilities
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Reduce potential losses to RCISD community members (Students, staff and stakeholders).
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Wildfires, Extreme Heat, Drought, Winter Storm, Flood, Dam Failure
Effect on new/existing buildings:	Early communications can reduce risks at existing facilities through preventative measures
Priority (High, Moderate, Low):	High
Estimated Cost:	$2,500
Potential Funding Sources:	HMGP and district funds
Lead Agency/Department Responsible:	RCISD Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	RCISD EOP

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

		Royse City ISD – Action #2
	Proposed Action:	**Connect District EOC to building emergency generator**
	BACKGROUND INFORMATION	
	Site and Location:	RCISD Central Office
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Ensure continuation of essential district services to RCISD facilities and schools in case of a power outage as a result of a disaster.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure Projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Wildfire, Hail, Thunderstorm Wind, Extreme Heat, Winter Storm, Drought, Dam Failure, Flood
Effect on new/existing buildings:	Be able to have functional EOC in case of disaster
Priority (High, Moderate, Low):	High
Estimated Cost:	$5,000
Potential Funding Sources:	HMGP and district funds
Lead Agency/Department Responsible:	RCISD Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	RCISD EOP

COMMENTS:
District has an emergency generator at Central Office. This is to tie District EOC into generator so that EOC can continue to operate in case of a crisis/power loss.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

		Royse City ISD – Action #3
	Proposed Action:	**Achieve certification by the National Weather Service as a "StormReady" school district.**
	BACKGROUND INFORMATION	
	Site and Location:	RCISD wide
	Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Improve the timeliness and effectiveness of hazardous weather warnings for the school district.
	Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness, Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Flood
Effect on new/existing buildings:	Reduce risk to new and existing structures through advanced preparedness and emergency response
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$1,000
Potential Funding Sources:	HMGP and district funds
Lead Agency/Department Responsible:	RCISD Administration
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	RCISD EOP

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

	Royse City ISD – Action #4
Proposed Action:	**Purchase NOAA "All Hazard" radios for early warning and event notification information and be placed in schools and district buildings.**
BACKGROUND INFORMATION	
Site and Location:	RCISD facilities
Risk Reduction Benefit *(Current Cost/Losses Avoided)***:**	Improve the timeliness and effectiveness of notifications for hazardous weather warnings in the school district.
Type of Action: (*Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Thunderstorm Wind, Extreme Heat, Drought, Wildfire, Winter Storm, Dam Failure, Flood
Effect on new/existing buildings:	Reduce risk to new and existing structures through advanced preparedness and emergency response
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$500
Potential Funding Sources:	HMGP and district funds
Lead Agency/Department Responsible:	RCISD Administration
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	RCISD EOP

COMMENTS:
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Plan Maintenance

Plan Maintenance Procedures

The following is an explanation of how Rockwall County will implement the Hazard Mitigation Action Plan (Plan) and continue to evaluate and enhance the Plan over time. To ensure the Plan remains current and relevant, the following Plan Maintenance procedures will be addressed:

- Incorporation
- Monitoring and Evaluation
- Updating
- Continued Public Involvement

Monitoring and Evaluation

Periodic revisions of the Plan are required to ensure that goals, objectives, and mitigation actions are kept current. Revisions may be required to ensure the Plan is in compliance with federal and state statutes and regulations. This section outlines the procedures for completing Plan revisions, updates, and review. Table 16-1 indicates the department and title responsible for Plan monitoring, updating and review of the Plan.

Table 16-1. Team Members Responsible for Plan Monitoring, Updating and Review of the Plan

ORGANIZATION	TITLE
Rockwall County Office of Emergency Management	Emergency Management Coordinator
Rockwall County Office of Emergency Management	County Judge
City of Fate	City Manager

ORGANIZATION	TITLE
City of Heath Department of Public Safety	Fire Marshall
City of McLendon-Chisholm	City Manager
City of Mobile City	Mayor
City of Rockwall	Emergency Management Coordinator
City of Royse City	Fire Chief
Rockwall Independent School District	Executive Director of Human Resources
Royse City Independent School District	Principal

Monitoring

Designated Planning Team members are responsible for monitoring, updating, and reviewing the Plan, as shown in Table 16-1. Individuals holding the title listed in Table 16-1 will be responsible for monitoring the Plan on an annual basis. Plan monitoring, includes reviewing and incorporation into the Plan other existing planning mechanisms that relate or support goals and objectives of the Plan; monitoring the incorporation of the Plan into future updates of other existing planning mechanisms as appropriate; reviewing mitigation actions submitted and coordinating with various County and City departments to determine if mitigation actions need to be re-evaluated and updated; evaluating and updating the Plan as necessary; and monitoring plan maintenance to ensure the process described is being followed, on an annual basis, throughout the planning process. The Planning Team will develop a brief report that identifies if changes to the Plan are needed, such as recommending an action for funding. A written summary of meeting notes will report the particulars involved in turning an action into a project.

Evaluation

As part of the evaluation process, the Planning Team will assess changes in risk; determine whether the implementation of mitigation actions is on schedule; determine whether there are any implementation problems, such as technical, political, legal, or coordination issues; and identify changes in land development or programs that affect mitigation priorities for each respective department or organization.

The Planning Team will meet on an annual basis in September to evaluate the Plan and identify any needed changes. The annual evaluation process will help to determine if any changes are necessary.

Updating

Plan Amendments

At any time, minor technical changes may be made to update the Rockwall County Hazard Mitigation Plan. Material changes to mitigation actions or major changes in the overall direction of the Plan or the policies contained within it, must be subject to formal adoption by the County and the individual jurisdiction(s), if affected by the changes.

The County will review proposed amendments 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 County will consider the following factors:

- Errors or omissions made in the identification of issues or needs during the preparation of the Plan;
- 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 Year Review

The Plan will be thoroughly reviewed by the Planning Team at the end of three years from the approval date, to determine whether there have been significant changes in the planning area that necessitate changes in the types of mitigation actions proposed. Factors that may affect the content of the Plan include new development in identified hazard areas, increased exposure to hazards, disaster declarations, increase or decrease in capability to address hazards, and changes to federal or state legislation.

The Plan review process provides the County an opportunity to evaluate mitigation actions that have been successful, identify losses avoided due to the implementation of specific mitigation measures, and address mitigation actions that may not have been successfully implemented as assigned.

It is recommended that the full Advisory Committee and Planning Team (Section 2, Table 2-1 and Table 2-2) meet to review the Plan at the end of three years because grant funds may be necessary for the development of a five-year update. Planning grant options in advance of the five-year Plan update deadline is recommended considering the timelines for grant cycles.

Following the Plan review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and Plan amendment process outlined herein. Upon completion of the review, update, and amendment process the revised Plan will be submitted to TDEM for final review and approval in coordination with FEMA.

Incorporating the Plan into Other Planning Mechanisms

Upon formal adoption of the Plan, all Team members will work to integrate the hazard mitigation strategies into other planning mechanisms for the County. The Planning Team will review plans and policies on an annual basis, and analyze the need for amendments in light of the approved Plan. The Planning Team will ensure that future planning of capital improvement, disaster recovery, historic preservation, flood response plans, and other planning mechanisms will be consistent with the goals of the Plan.

The full Advisory Committee and Planning Team (Section 2, Table 2-1 and Table 2-2) will meet in person bi-annually, and more often if warranted, to ensure mitigation actions prioritized as high to moderate are tracked and monitored based on federal Disaster Declarations, Pre-Disaster Mitigation (PDM) funding cycles, and other non-federal funding sources. For Hazard Mitigation Grant Programs (HMGP), grant applications will be developed for submittal to TDEM and FEMA accordingly.

The potential funding sources listed for each identified mitigation action may be used when Planning Team members begin to seek funds to implement actions. An implementation time period, or a specific implementation date, has been assigned to each mitigation action as an incentive for completing each task and gauging whether actions are implemented in a timely manner.

Existing plans for the County will be reviewed by the Planning Team to optimize the incorporation of mitigation policies and actions. Table 16-2 indicates titles of persons for incorporating actions, method of incorporation, and approving authority. Table 16-3 identifies key planning mechanisms available and process of incorporation into current mitigation and planning efforts.

The Plan will be discussed at annual budget meetings to consider proposed funding sources for mitigation actions.

Table 16-2. Approving Authority, Team Members Responsible for Coordinating Incorporation of Planning Mechanisms into the Plan, Methods of Incorporation

POINTS OF CONTACT *(contact may vary based on 'Type' of Action to be Implemented)*	METHOD OF INCORPORATING MITIGATION ACTIONS INTO LOCAL PLANNING MECHANISMS
Advisory Committee, Planning Team	Annual budget review, Flood Damage Ordinance, Emergency Operations Plan, Building Codes, Disaster Response and Recovery Plan, Master Drainage Plan, National Flood Insurance Program (NFIP), Long-term Comprehensive Development Plan, Local Emergency Planning Committee, Fire Plan, Transportation and CIP Plan.

Table 16-3. Process of Incorporation by Planning Mechanism

PLANNING MECHANISM	INCORPORATION OF PLAN
Grant Applications	The Plan will be consulted by Planning Team Members whenever grant funding is sought for mitigation projects. If a project is not in the Plan, an amendment may be 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 action.
Regulatory Plans	Currently, Rockwall County has regulatory plans in place, such as Emergency Management Plans, Continuity of Operations, Disaster Recovery Plans, Economic Development and Evacuation Plans. The Plan will be consulted when county and city departments review or revise their current regulatory

PLANNING MECHANISM	INCORPORATION OF PLAN
	planning mechanisms, or in the development of regulatory plans that are not currently in place.
Capital Improvement Plans	Rockwall County has a Capital Improvement Plan (CIP) in place. Prior to any revisions to the CIP, county departments will review the risk assessment and mitigation strategy sections of the Plan, as limiting public spending in hazardous zones is one of the most effective long-term mitigation actions available to local governments.
Comprehensive Plans	Rockwall County has a Long-Term Comprehensive Development Plan in place. Since comprehensive plans involve developing a unified vision for a community, the mitigation vision and goals of the Plan will be reviewed in the development or revision of a Comprehensive Plan.
Floodplain Management and Fire Protection Plans	Floodplain Management Plans include preventative and corrective actions to address the flood hazard. Therefore, the actions for flooding, and information found in Section 12 of this plan discussing the people and property at risk to flood, will be reviewed and revised when Rockwall County and participating jurisdictions update their Management Plans or develop new plans.

Continued Public Involvement

Public input was an integral part of the preparation of this Plan and will continue to be essential for Plan updates. Changes or suggestions to improve or update the Plan will provide opportunities for additional public input.

The public can review the Plan on Rockwall County's website (www.rockwallcountytexas.com/246/Emergency-Management-Office), where officials and the public are invited to provide ongoing feedback by sending comments to an emergency management email. Additionally, copies of the Plan will be kept in the offices of the County as well as each jurisdiction.

The Planning Team may also designate voluntary citizens from the County, or willing stakeholder members that were involved in the Plan's development, to provide feedback on an annual basis. It is important that stakeholders and the community maintain a vested interest in preserving the functionality of the planning area as it pertains to the overall goals of the mitigation plan. The Planning Team is responsible for notifying stakeholders and community members on an annual basis, and maintaining the Plan. Media, including local newspaper and radio stations, will be used to notify the public of any maintenance or periodic review activities. Additionally, local news media will be contacted to cover information regarding Plan updates, status of grant applications, and project implementation. Local and social media outlets, such as Facebook and Twitter, will keep the public and stakeholders apprised of potential opportunities to fund and implement mitigation projects identified in the Plan.

Appendix A: Planning Team

Planning Team Members

The Rockwall County Hazard Mitigation Plan or *the Plan,* was organized using a direct representative model. Rockwall County acted as the direct representative for participating jurisdictions in this effort. At the beginning of the process Rockwall County sent notices to jurisdictions asking for input and participation in the process. The following organizations[1] responded to the request and participated throughout the planning process.

Table A-1. Advisory Committee Planning Team Members – Organization and Title

ORGANIZATION	TITLE
Rockwall County	Emergency Management Coordinator
Rockwall County	County Judge

Table A-2. Planning Team Members – Organization and Title

ORGANIZATION	TITLE
Rockwall County Office of Emergency Management	EMC Volunteer
Rockwall County Office of Emergency Management	Emergency Management Specialist
Rockwall County Sheriff's Office	Captain
City of Fate	City Manager
City of Fate Department of Public Safety	Captain
City of Heath Department of Public Safety	Detective
City of Heath Department of Public Safety	Sergeant
City of Heath Department of Public Safety	Fire Marshal
City of McLendon-Chisholm	City Manager
City of Mobile City	Mayor

[1] Titles are given rather than names as the person holding the title in the respective organization will be responsible for continual maintenance of the Update.

Appendix A: Planning Team

ORGANIZATION	TITLE
City of Rockwall	Emergency Management Coordinator
City of Rockwall Engineering	Assistant City Engineer
City of Rockwall Engineering	Engineer
City of Rockwall Fire Department	Fire Chief
City of Rockwall Police Department	Lieutenant
City of Rockwall Police Department	Lieutenant
City of Rockwall Streets and Drainage	Street Superintendent
City of Royse City	Fire Chief
Rockwall Independent School District	Principal
Royse City Independent School District	Principal

Stakeholders

The following groups listed in Table A-3 represent a partial list of organizations invited to stakeholder meetings, public meetings and workshops throughout the planning process and include: non-profit organizations; private businesses; hospitals; and school districts. The following list of persons, by Title, were sent an email and/or contacted by phone requesting their input into the HMAP planning process, and an invitation to participate at each of the Stakeholder meetings. Many did attend and were integral to providing comments and data for the Plan. For a list of attendance at meetings, please see Appendix E[2].

Table A-3. Stakeholder Working Group

ORGANIZATION	TITLE
East Texas Community Emergency Response Team	Program Director
Family Safe of Texas Storm Shelters	Owner
Rockwall Community Emergency Response Team	Coordinator
Texas Forest Service	Regional Fire Coordinator
Blue Ribbon News	Reporter
Rockwall Chamber of Commerce	President, Director
TH Enterprises, Inc.	President

[2] Information contained in Appendix E is exempt from public release under the Freedom of Information Act (FOIA).

Appendix A: Planning Team

ORGANIZATION	TITLE
Ebby Halliday Realtors	Realtor
Lowe's	Assistant Store Manager
Honda Cars of Rockwall	President, Public Relations Director
Special Products & MFG	Safety Coordinator
Herald Banner	Reporter
Rest Haven Funeral Home	Assistant Controller

Appendix B: Public Survey Results

Overview

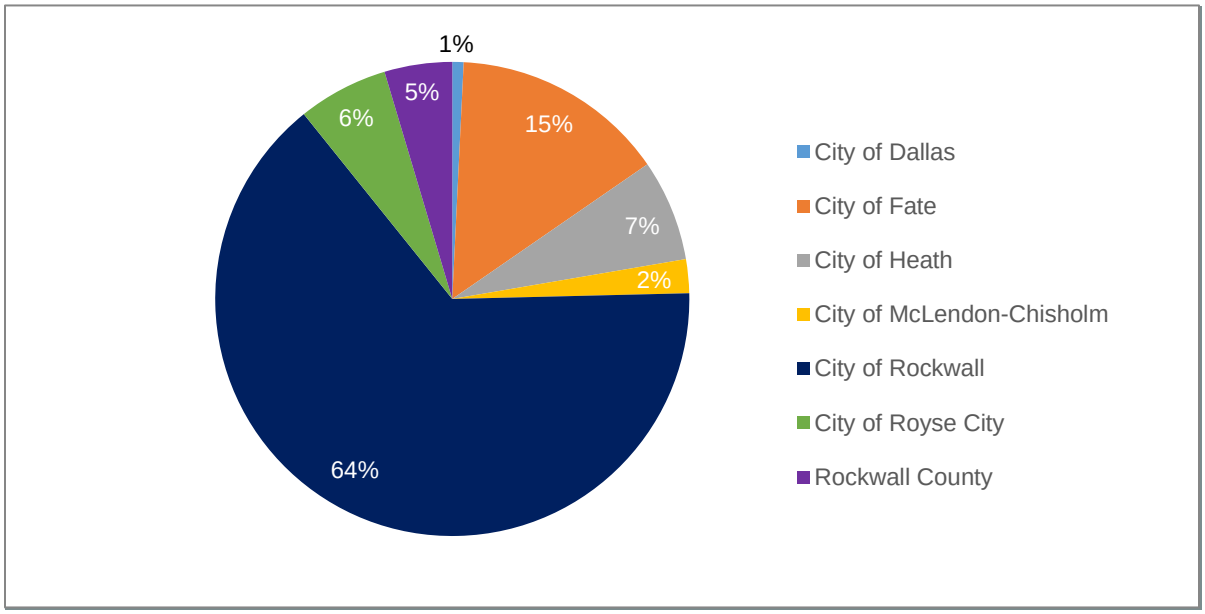
Rockwall County prepared a public survey that requested public opinion on a wide range of questions relating to natural and man-caused hazards. The survey was made available on the City of Rockwall and Rockwall County's website. This survey link was also distributed at public meetings and stakeholder events throughout the planning process.

A total of 130 surveys were collected, the results of which are analyzed in Appendix B. The purpose of the survey was twofold: 1) to solicit public input during the planning process, and 2) to help the jurisdictions identify any potential actions or problem areas.

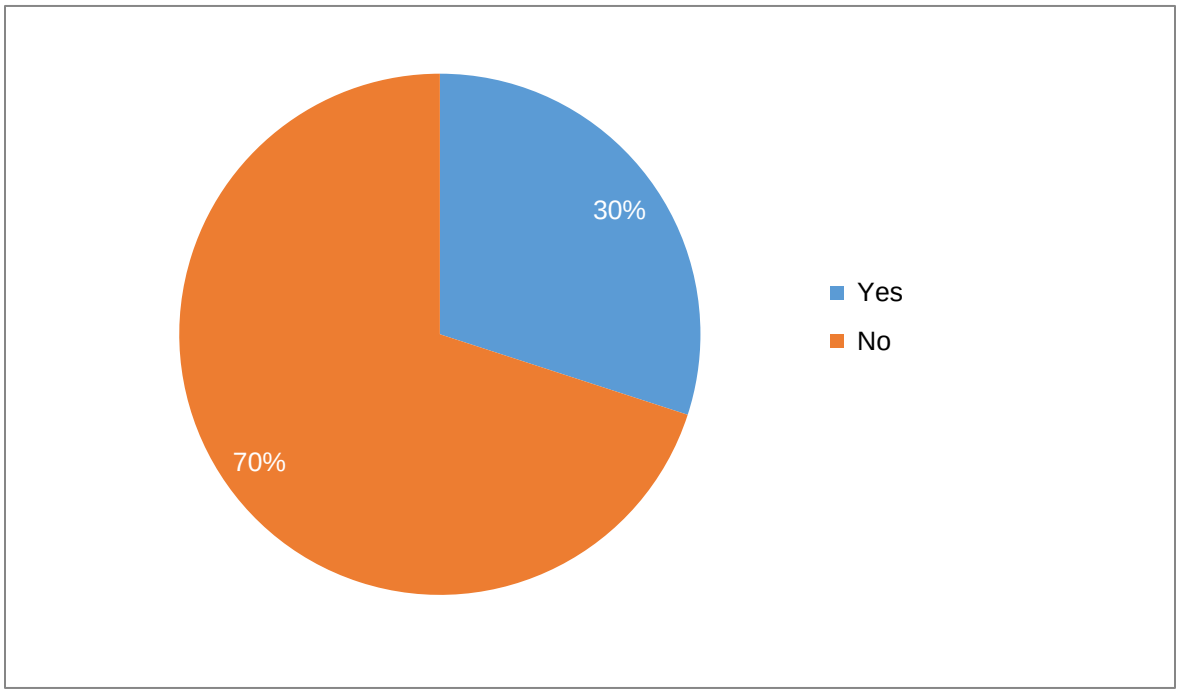
The following survey results depict the percentage of responses for each answer. Similar responses have been summarized for questions that did not provide a multiple-choice answer or that required an explanation.

Public Survey Results

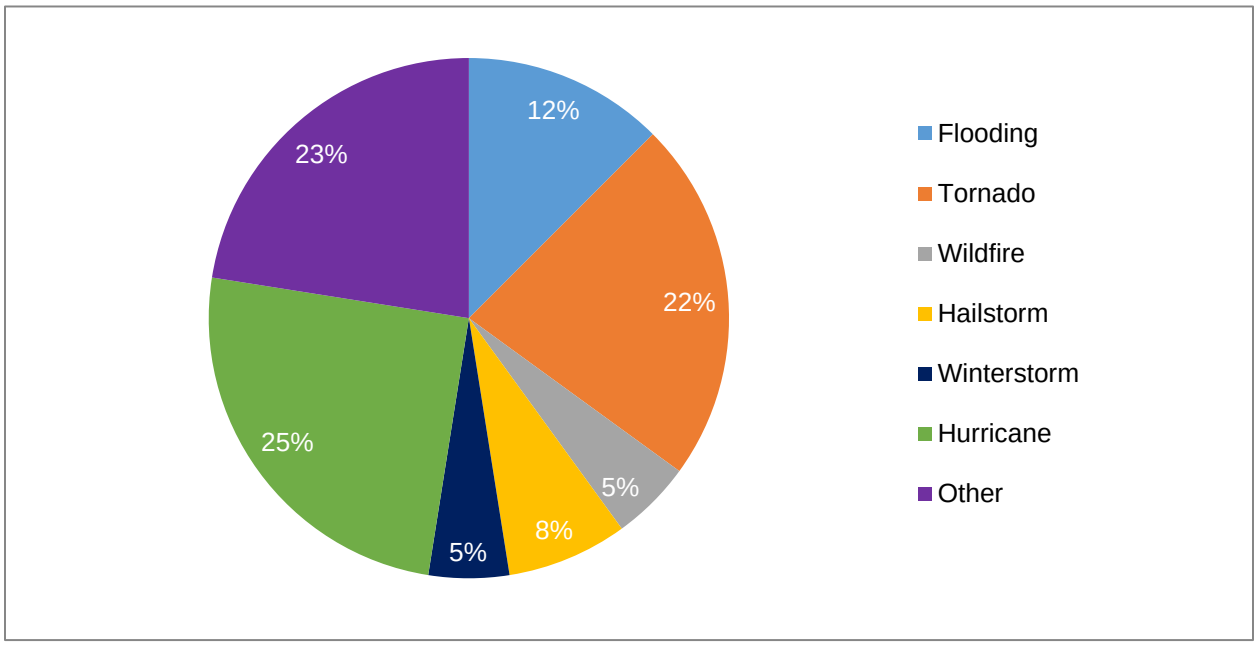
1. Please state the jurisdiction (city and community) where you reside.



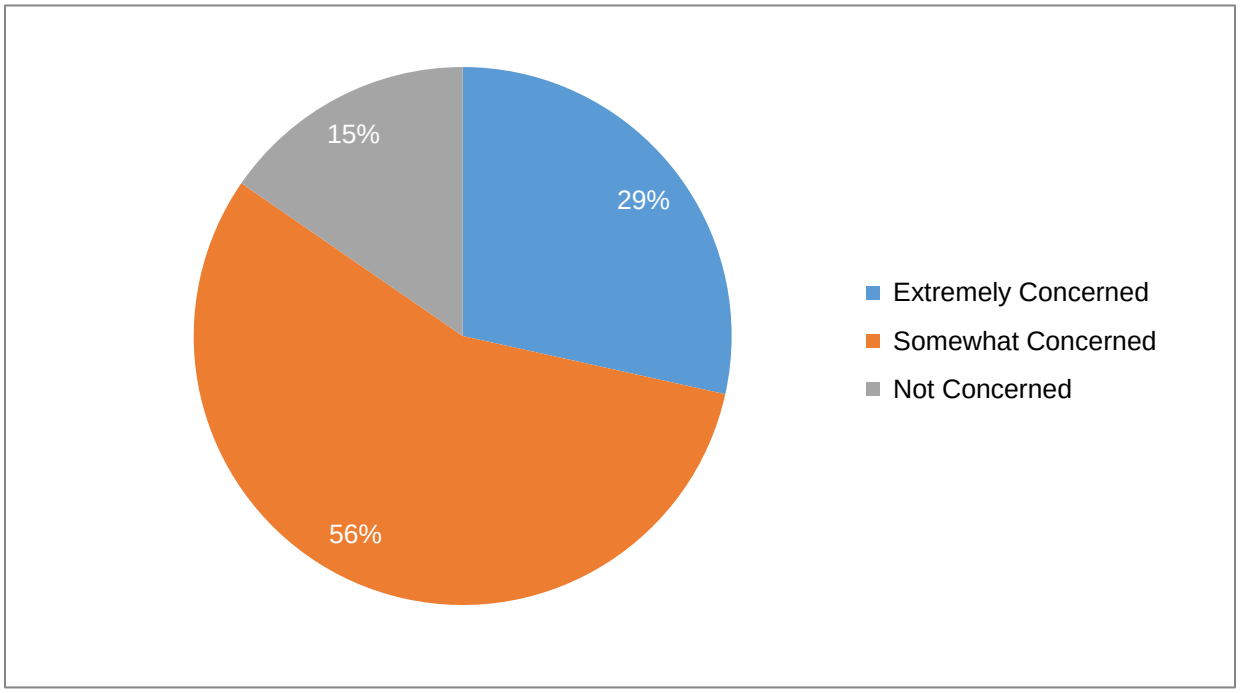
2. A. Have you ever experienced or been impacted by a disaster?



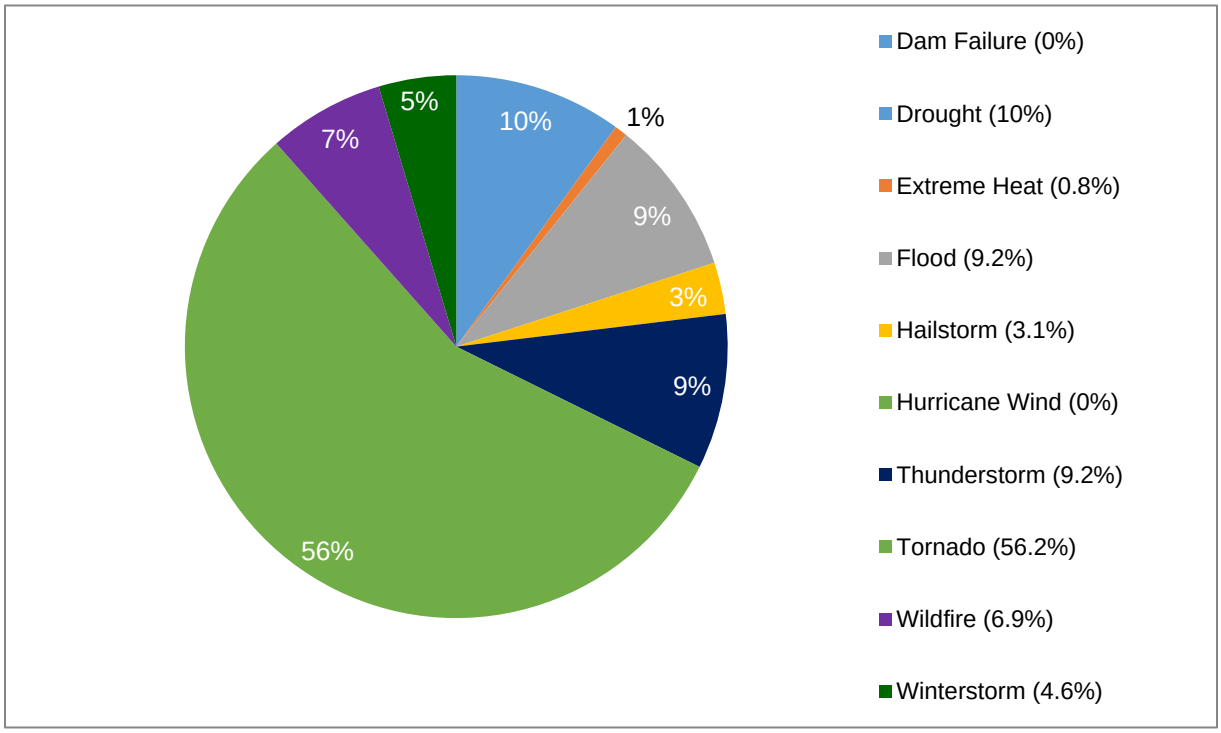
2. B. If “yes”, please explain:



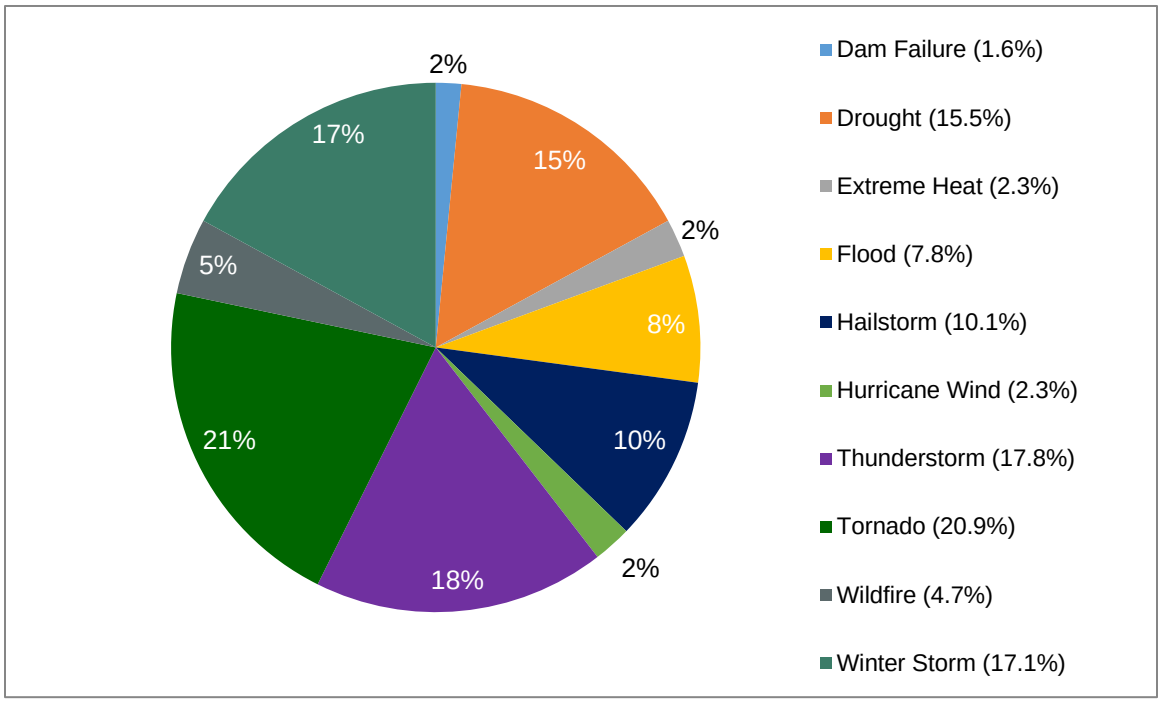
3. How concerned are you about the possibility of your community being impacted by a disaster?



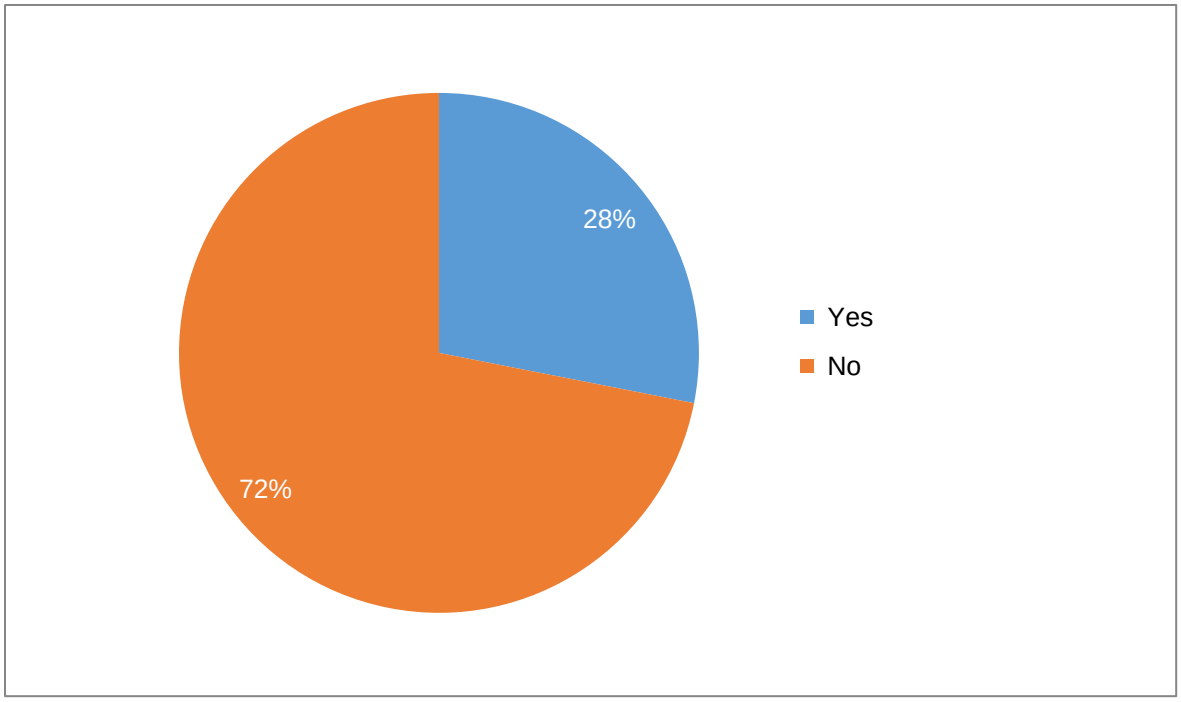
4. Please select the one hazard you think is the highest threat to your neighborhood:



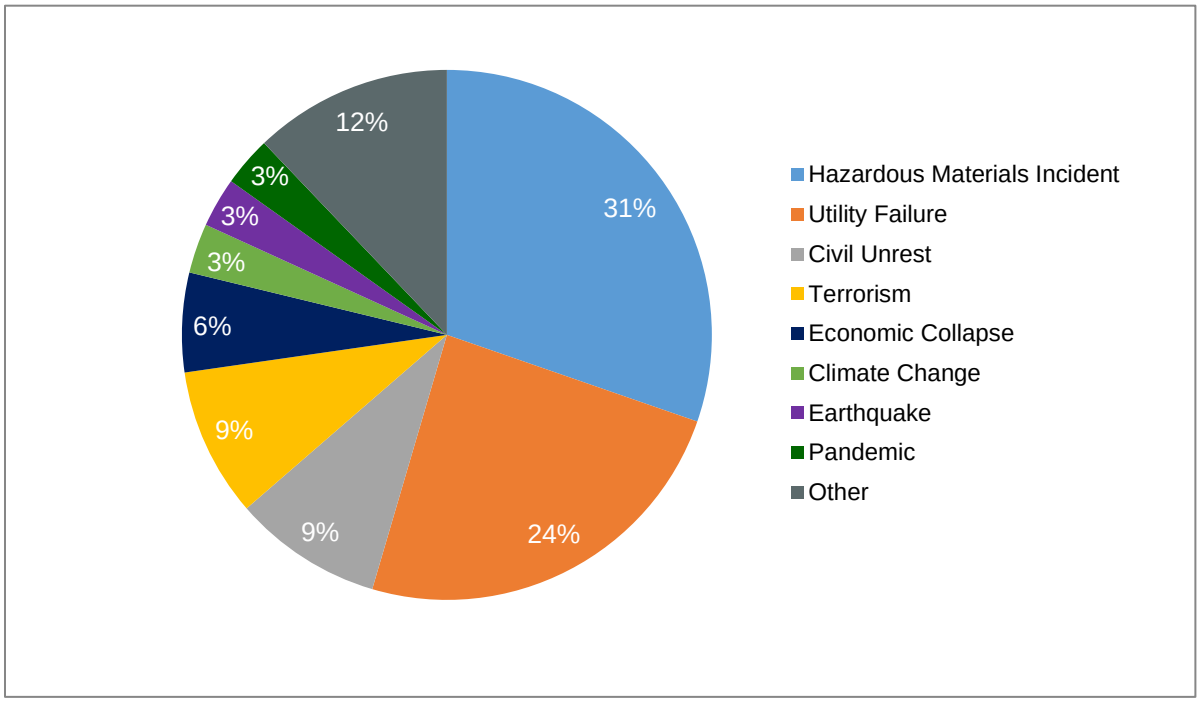
5. Please select the one hazard you think is the second highest threat to your neighborhood:



6. A. Are there hazards not listed above that you think is a wide-scale threat to your neighborhood?

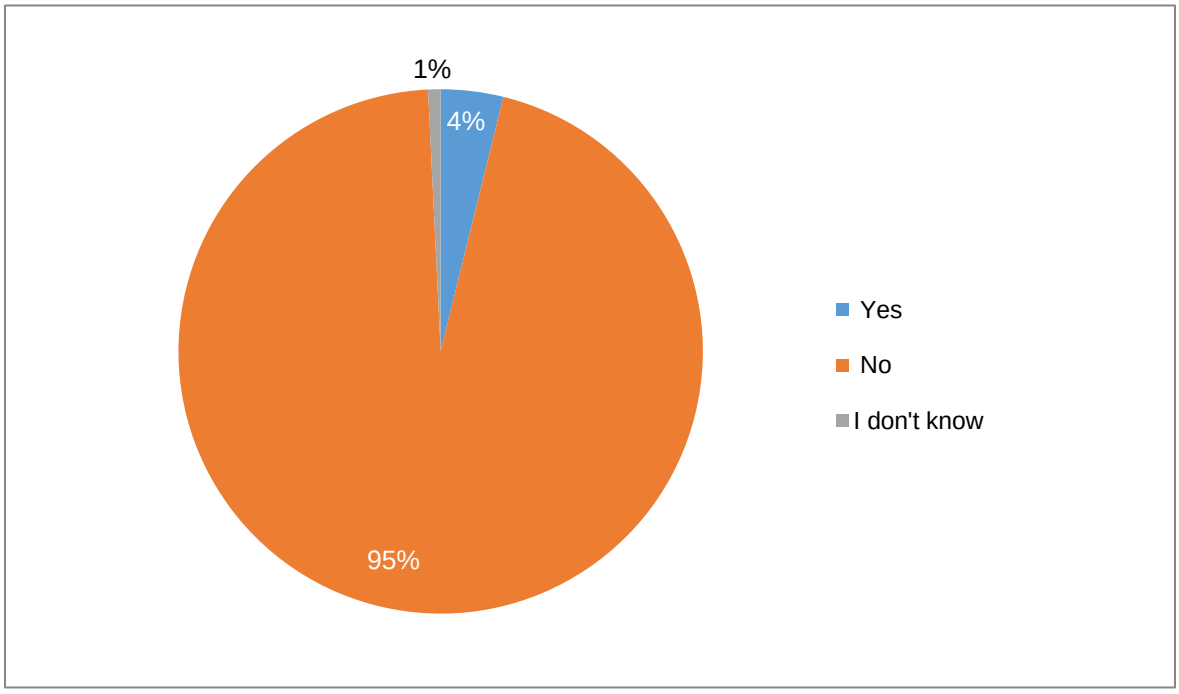


6. B. If “Yes,” please explain.

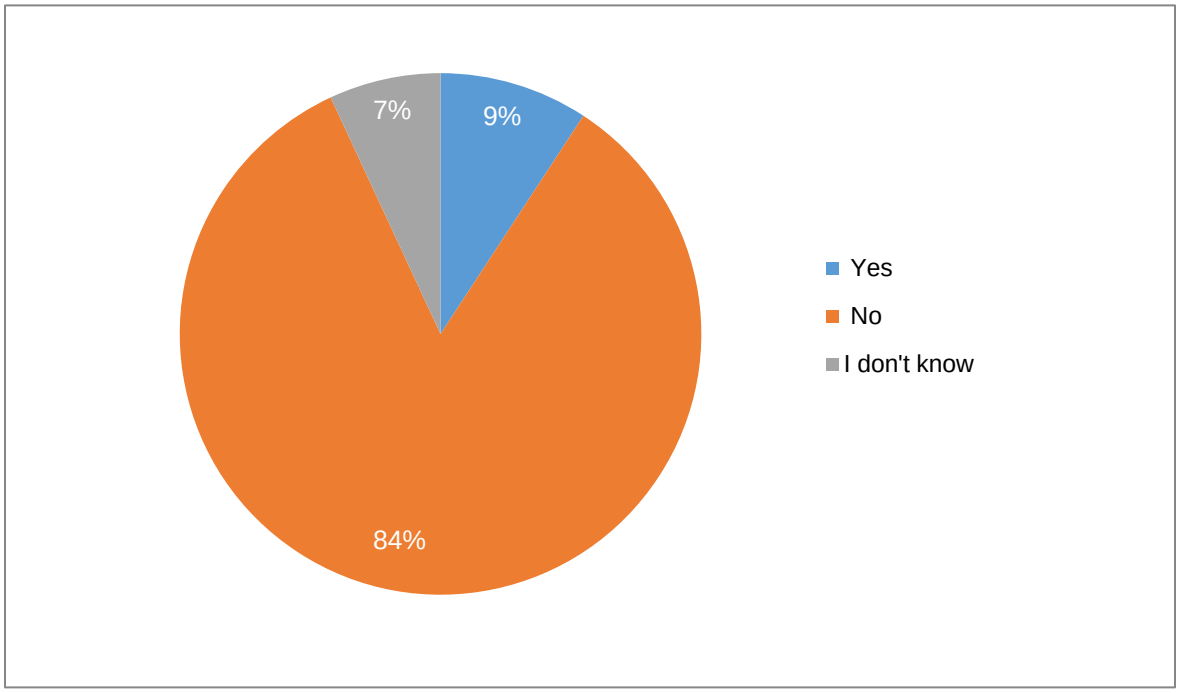


Appendix B: Public Survey Results

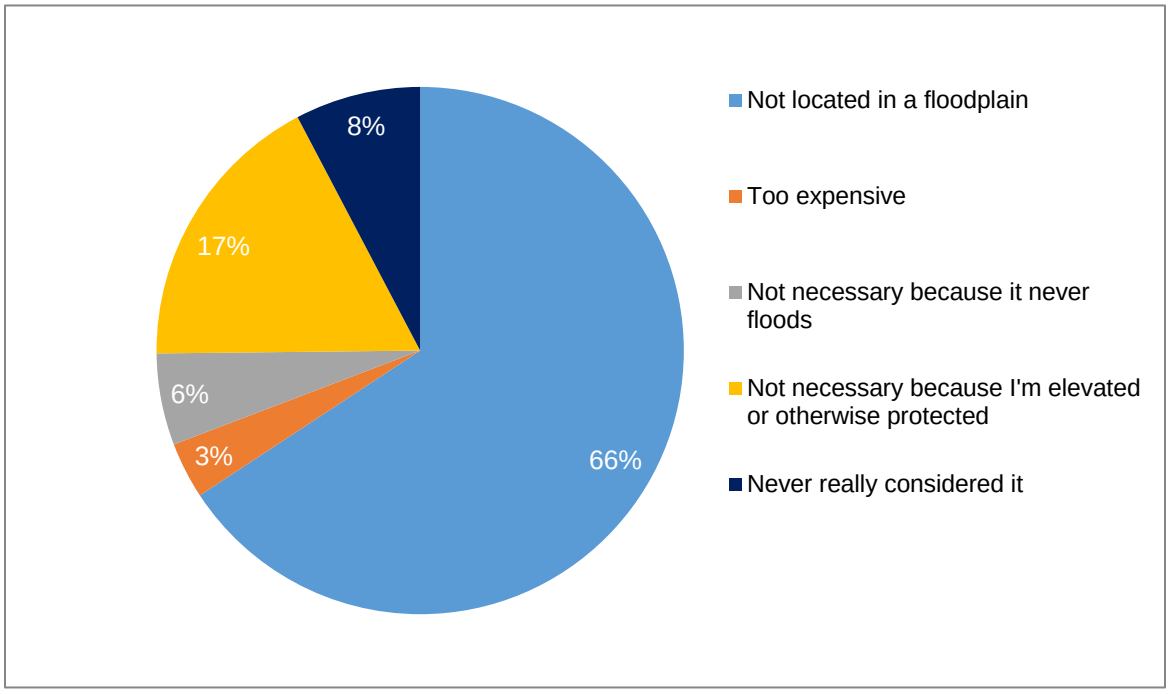
7. Is your home located in a floodplain?



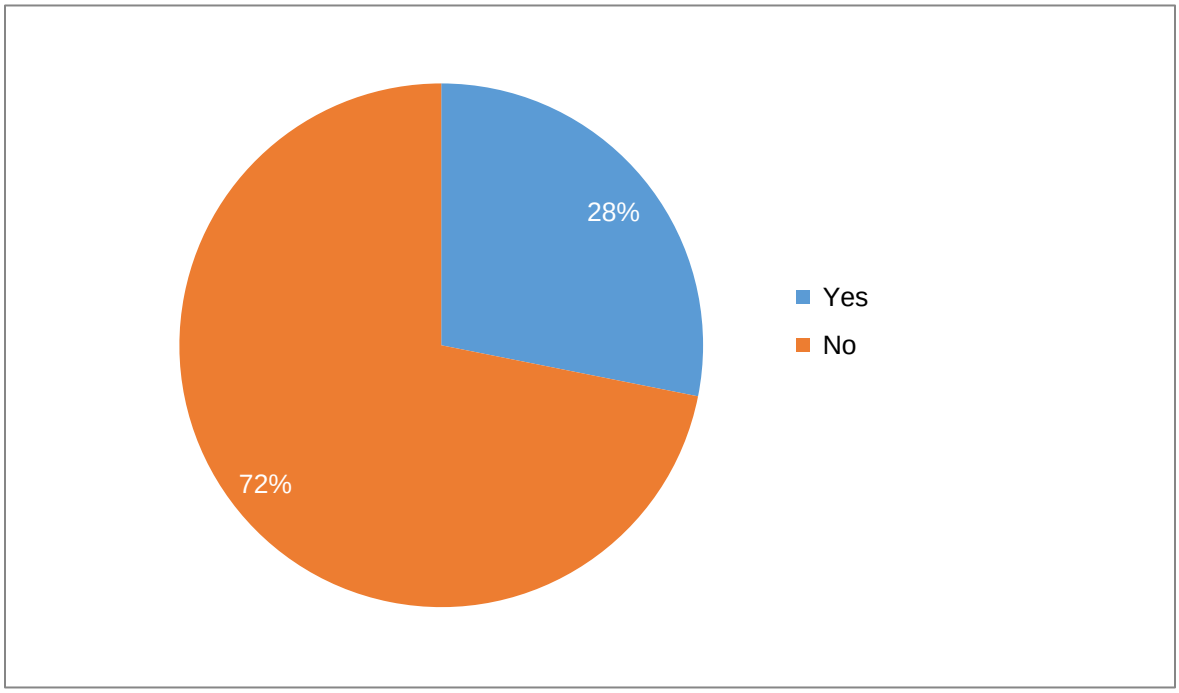
8. Do you have flood insurance?



9. If you do not have flood insurance, why not?

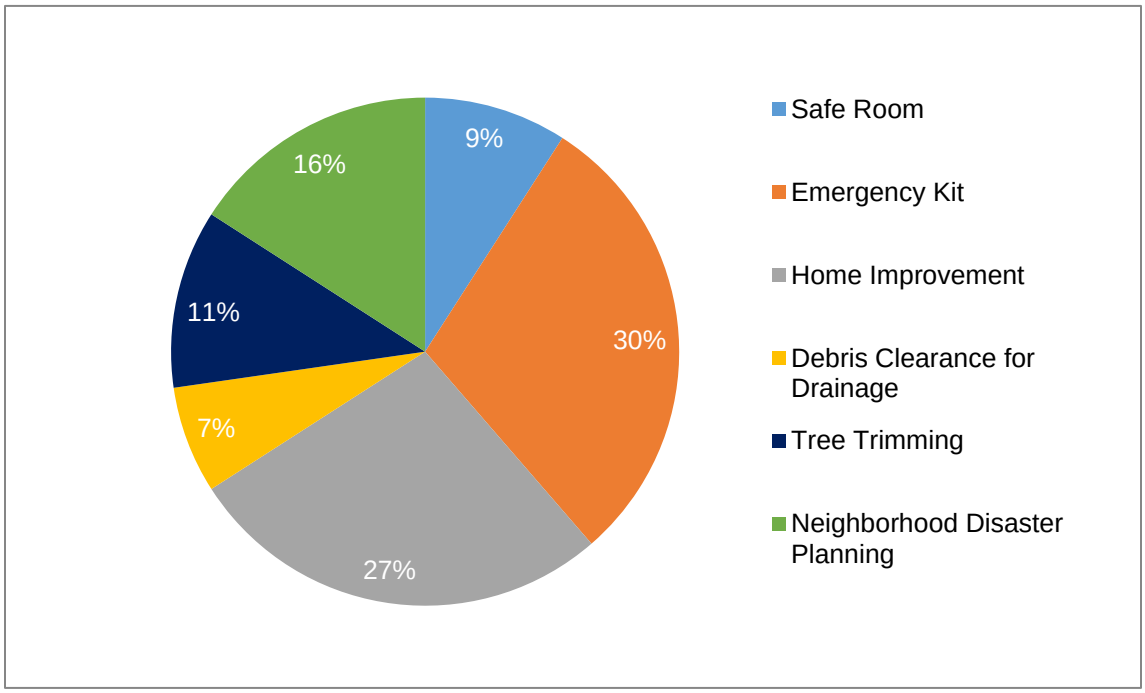


10. A. Have you taken any actions to make your home or neighborhood more resistant to hazards?

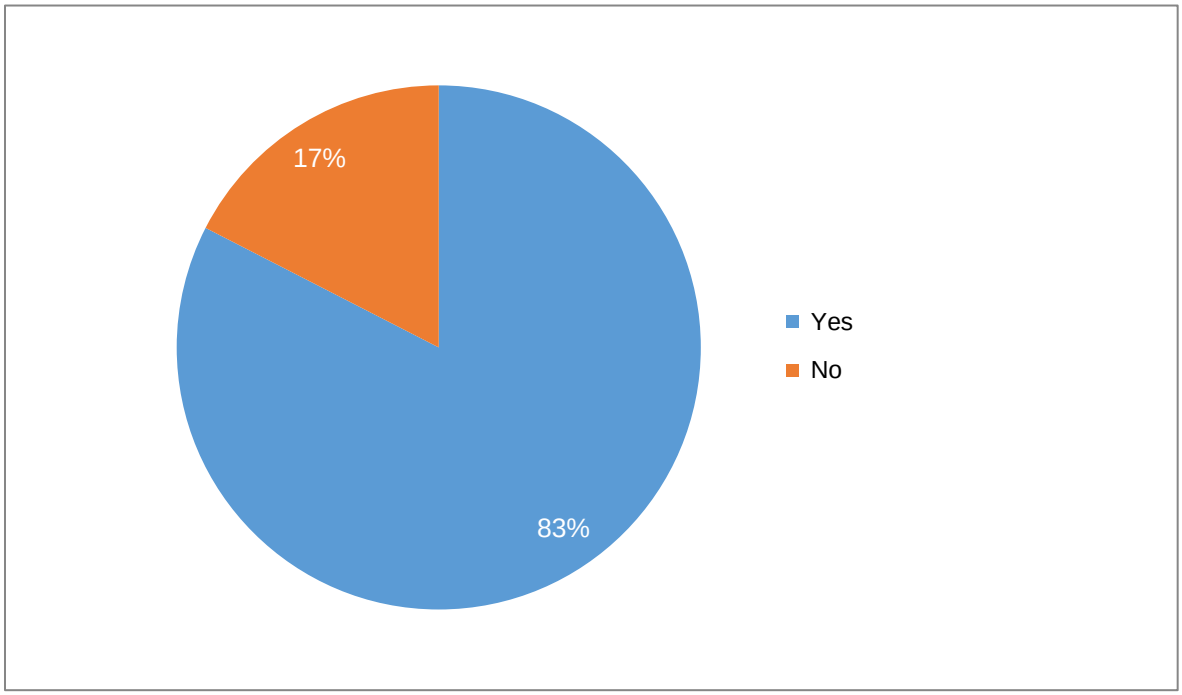


Appendix B: Public Survey Results

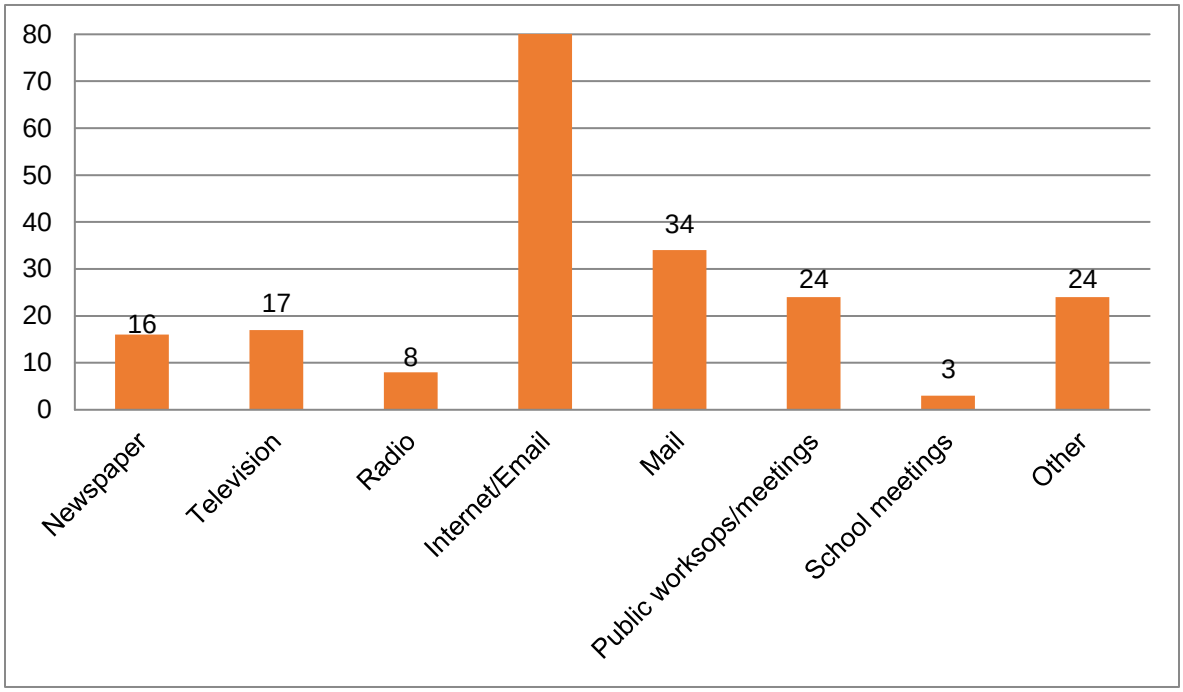
10. B. What have you done?



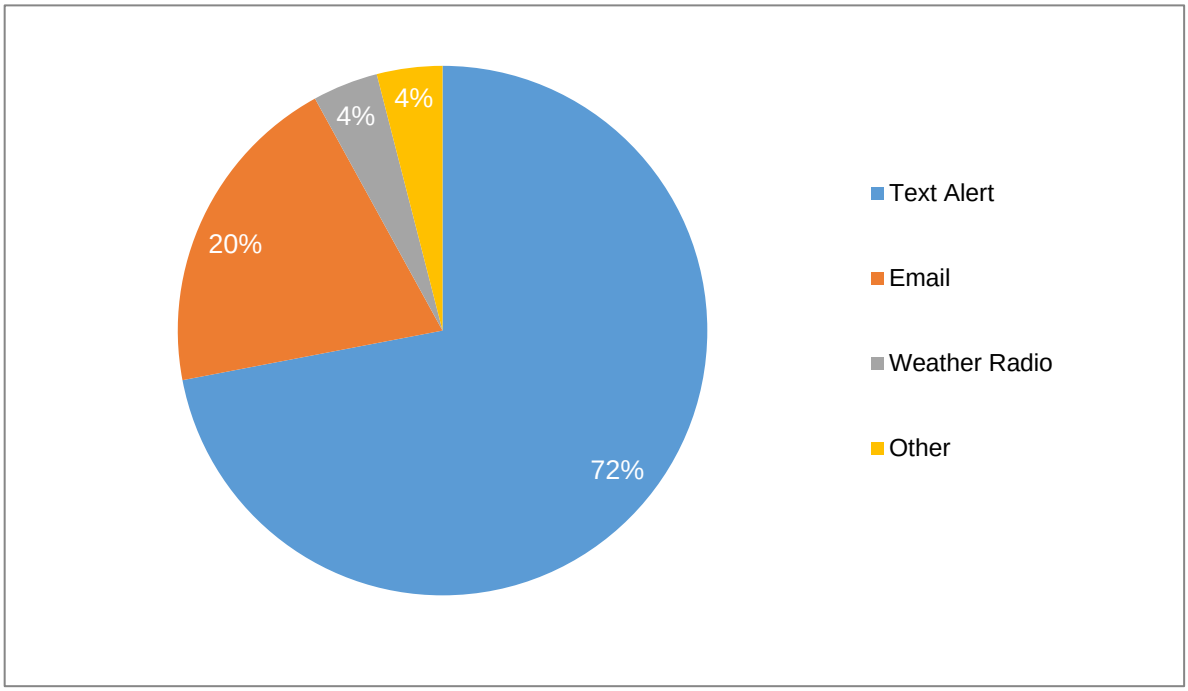
11. Are you interested in making your home or neighborhood more resistant to hazards?



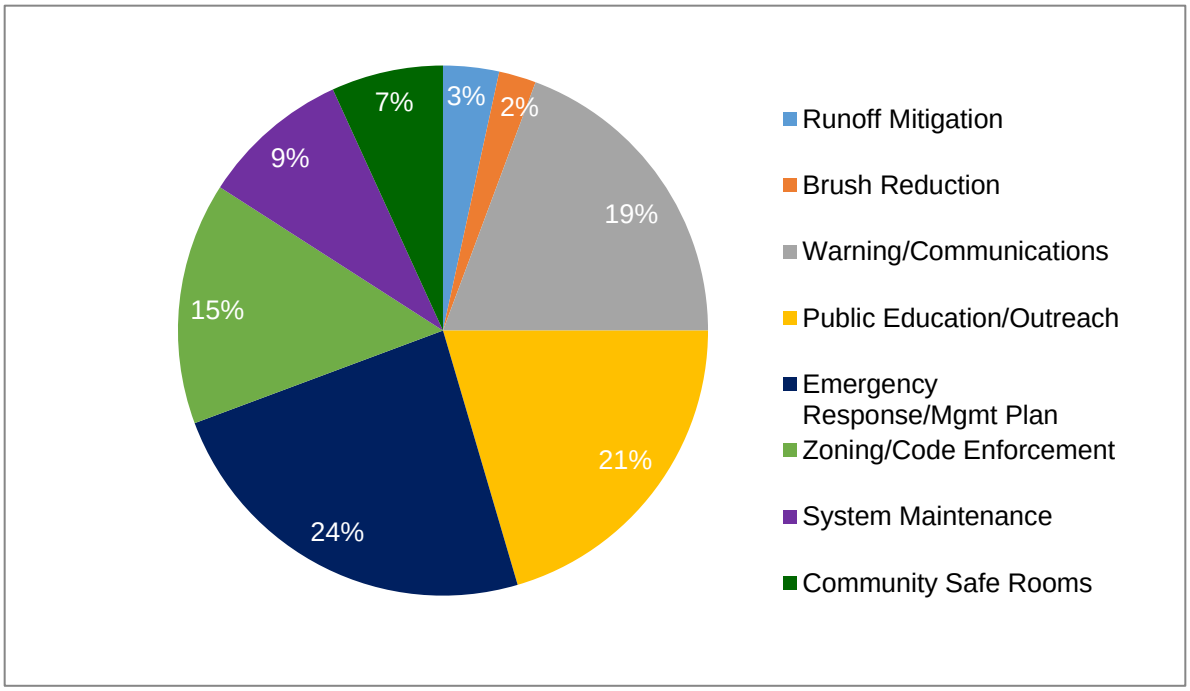
12. A. What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?



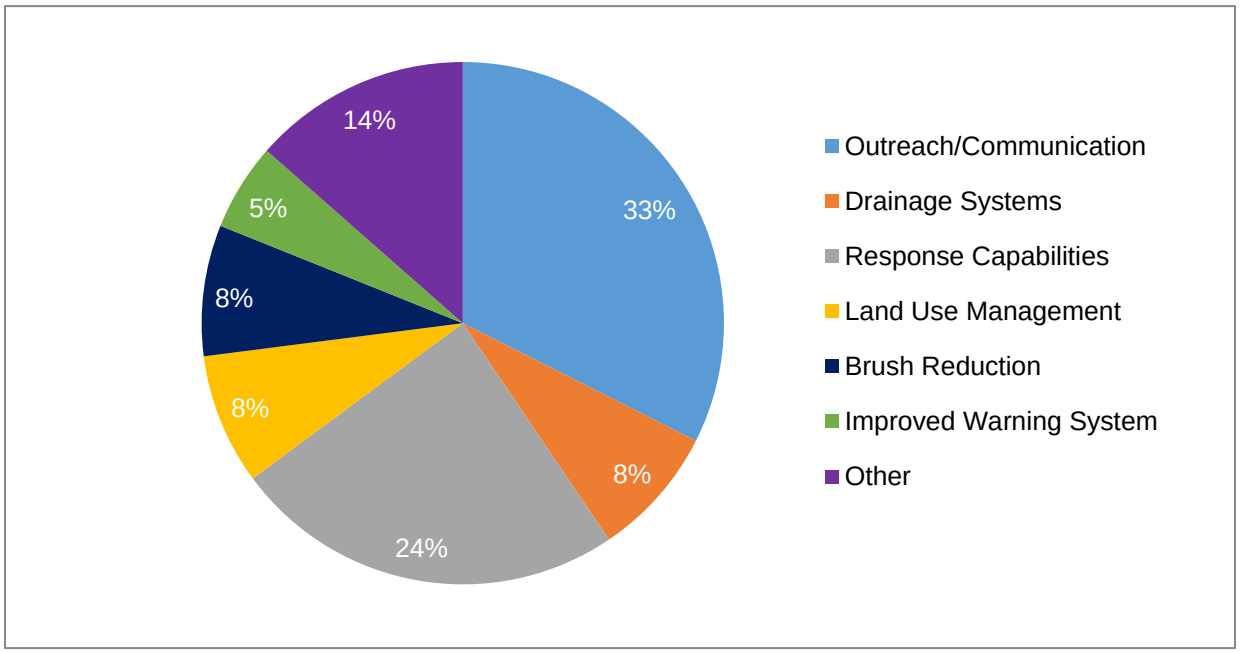
12. B. If other, please specify.



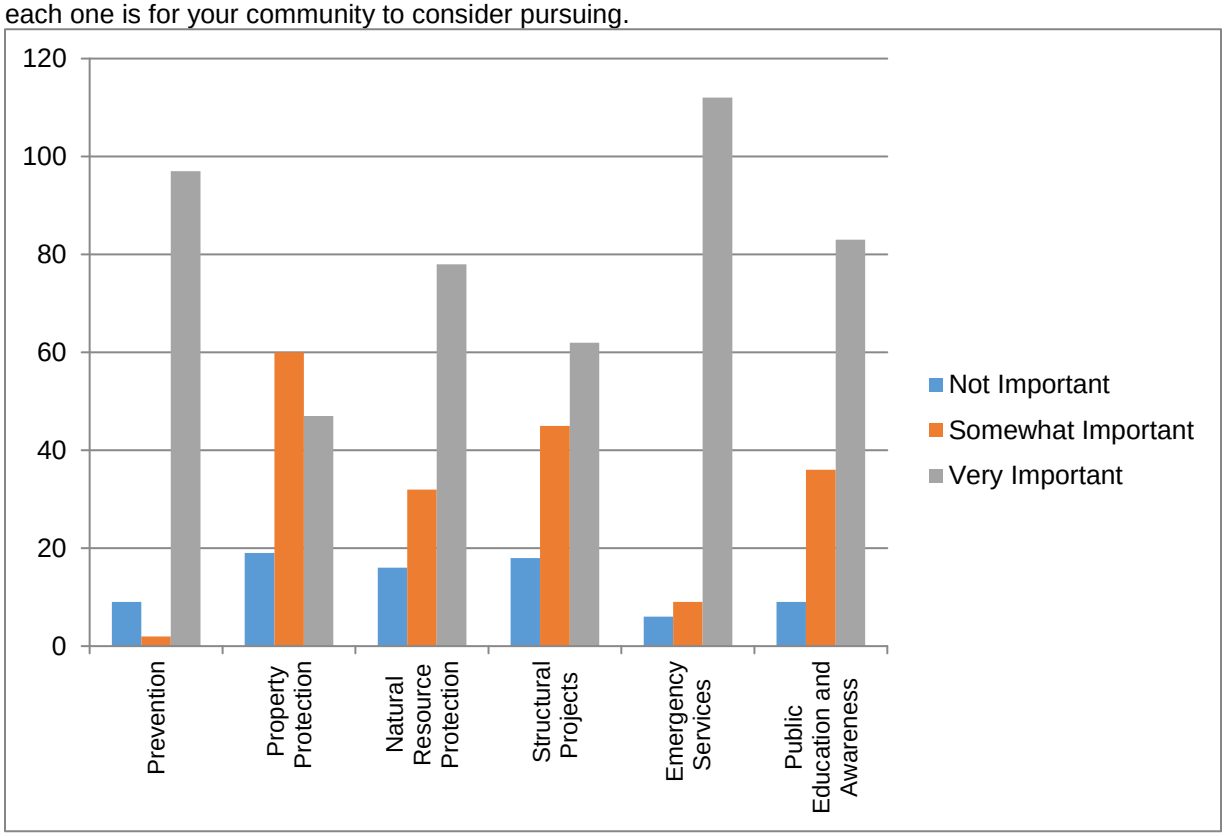
13. In your opinion, what are some steps your local government could take to reduce or eliminate the risk of future hazard damages in your neighborhood?



14. Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?



15. A number of community-wide activities can reduce our risk from hazards. In general, these activities fall into one of the following six broad categories. Please tell us how important you think each one is for your community to consider pursuing.



Prevention / Local Plans & Regulations - Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.

Property Protection - Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.

Natural Resource Protection - Actions that in addition to minimizing hazard losses also preserve or restore the functions of natural systems. Examples include: floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.

Structural Projects - Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, seawalls detention / retention basins, channel modification, retaining walls and storm sewers.

Emergency Services - Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical facilities or systems.

Public Education and Awareness - Actions to inform citizens about hazards and techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials and demonstration events.

Appendix C: Critical Facilities

This Appendix is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

Appendix D: Dam Locations

This appendix is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

Appendix E: Meeting Documentation

This appendix is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).