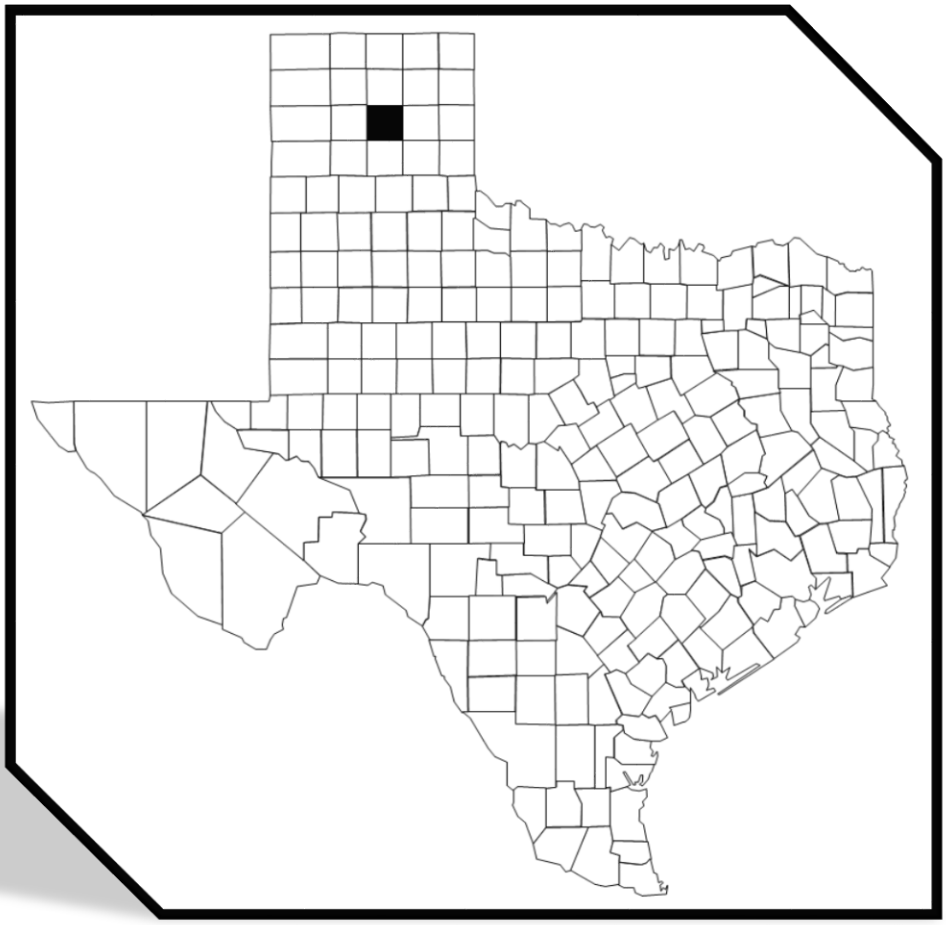
Carson County
Mitigation Action Plan

This Plan Covers:
Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer



DEVELOPED BY THE CARSON COUNTY HAZARD MITIGATION ACTION TEAM (MAT)
November 2014

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Explanation of Commonly Used Acronyms:

To the extent practical, the plan authors have limited the number of acronyms used in this document. However, several were used fairly frequently throughout this plan because they are part of the customary emergency management vernacular. An explanation of the acronyms most commonly used in this plan is provided below.

FEMA - *Federal Emergency Management Agency*: FEMA is an independent agency of the United States government that provides a single point of accountability for all federal emergency preparedness and mitigation and response activities. FEMA administers a variety of grant programs intended to support the agency's mitigation goals. The Carson County MAP was developed under a grant received by the PRPC intended to support the updating of all MAPs in the Texas Panhandle.

MAP - *Mitigation Action Plan*: The MAP is the document you are now reading. The MAP was developed to serve all jurisdictions in Carson County. Its purpose is to pre-identify potential natural hazards that could impact the County's jurisdictions with the goal of implementing hazard-specific strategies that will help to lessen their impact when they occur in the future

MAT - *Mitigation Action Team*: The MAT is committee comprised of representatives from each of the jurisdictions in the County that was responsible for the development of this MAP.

PRPC - *Panhandle Regional Planning Commission*: The PRPC is the Council of Governments serving the 26-county area of the Texas Panhandle. The PRPC served as the grantee for the FEMA grant that supported the costs of developing this plan.

TDEM - *Texas Division of Emergency Management*: TDEM, as with FEMA, serves as the State agency that provides a single point of accountability for all emergency preparedness, response and mitigation activities in Texas. This MAP was developed in accordance with FEMA standards and in support of TDEM's statewide hazard mitigation plan.

This document relies on a great deal of data and information compiled by and gathered from a variety of credible sources. Most of the citations and references, those which are not directly referenced in the plan, are listed in Section VIII – Resources.

RECORD OF CHANGES

CHANGE NUMBER	DATE OF CHANGE	INITIALS AND DATE ENTERED

EXECUTIVE SUMMARY

Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer voluntarily elected to collaboratively develop this multi-jurisdictional Hazard Mitigation Plan. It serves to benefit the residents of the County; wherever they live.

According to 44 CFR, Subpart M, § 206.401, **hazard mitigation** is "*any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards*". Carson County is vulnerable to a variety of natural hazards which can threaten the safety and wellbeing of the area's residents. Most of these hazards cannot be averted; they occur as natural events. However, in understanding the probability they're apt to occur, appropriate strategies can be developed to potentially moderate or mitigate their adverse impacts when these events occur in the future. In essence, this is the chief objective of this document.

While not legally obliged to develop a mitigation plan; the County and Cities will remain ineligible to receive certain federal hazard mitigation grant program funding until they've developed a hazard mitigation plan that has been approved by the Federal Emergency Management Agency (FEMA). This was another motivating factor that led to the development of this plan.

The Federal Disaster Mitigation Act of 2000 (DMA 2000) established a pre-disaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). DMA 2000 encourages and rewards local and state pre-disaster planning, promotes sustainability, and seeks to integrate State and local planning with an overall goal of strengthening statewide hazard mitigation planning. This enhanced planning approach enables local, jurisdictions to articulate accurate and specific needs for hazard mitigation, which results in faster, more efficient allocation of funding and more effective risk reduction projects.

The Carson County Hazard Mitigation Team (MAT) directed the development of this planning document. It builds on the first Carson County Hazard Mitigation Action Plan (MAP), adopted in 2006, by updating vulnerability assessments and by recalibrating original mitigation strategies to align with the planning goals and objectives established by the MAT members for the 5-year life of this new MAP.

While this MAP was jointly developed by a countywide MAT, it recognizes the unique needs of the different jurisdictions within the plan area. Generally speaking, each must contend with its own distinct set of circumstances and hazard challenges. Therefore, included in this MAP is a subset of hazard mitigation strategies for each jurisdiction involved with the planning process.

In developing this MAP, the Carson County MAT followed a process that included or will include these four phases:

1. Organized Assets - identified the MAT representatives as well as the resources each could bring to bear in supporting this planning process
2. Assessed Risks - identified our probable risks and evaluated their likely impacts to help in establishing planning priorities.

3. Develop the MAP - identified prioritized mitigation action items which at a minimum, are technically feasible, cost-effective and environmentally sound
4. Implement/Monitor - identified a process for reviewing and monitoring the progress being made in implementing the MAT's action items

This new MAP will assist the County and Cities by:

a. Providing an increased understanding of natural hazards the County faces;
b. Assisting with the development of more sustainable and disaster-resistant communities;
c. Ensuring eligibility for federal funds for pre-disaster mitigation planning (DMA2000);
d. Helping to build partnerships to support planning/mitigation efforts that could offer potential financial savings. For example:
   - Flood insurance premium reduction
   - Broader resources for funding of mitigation projects
   - Enhanced benefit-cost ratios for COE projects
e. Reduced long-term impacts and damages to human health and structures and reduced repair costs

National Flood Insurance Program (NFIP)

As described later in this document, flooding occurs occasionally in the County with most of these events being flash floods. Presently, City of Groom, Panhandle and White Deer have been mapped by FEMA. The Texas Water Development Board (TWDB) maintains a list County's Flood Plain Administrators. The list is supplied to the TWDB by FEMA and is shown below; current as of Aug. 1, 2014.

Table 1: County Flood Plain Administrators

CID	Community	Status	Firm Status	Map Date	Flood Plain Administrator & Title
	Carson County	Not Participating	Has never been mapped	NA	Lewis Powers, County Judge
480726	City Groom	Participating	All Zone A, C AND X – No elevation determine	06/19/85	Mary Sue Lyles, City Secretary
480727	City Panhandle	Participating	All Zone A, C AND X – No elevation determine	05/11/82	Rob Roach, City Manager
	City Skellytown	Not Participating	Has never been mapped	NA	None Listed
480729	City White Deer	Participating	Has been mapped	7/02/76	Brenda Vermillion< EMC

Through the Severe Repetitive Loss (SRL) Grant Program FEMA provides federal funding to assist to 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 National Flood Insurance Program (NFIP). The TWDB administers the SRL grant program for the State of Texas.

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

a) covered under the NFIP and have at least four (4) flood related damage claim payments (building and contents) over $5,000.00 each, and the cumulative amount of such claims payments exceed $20,000; or

b) for which at least two (2) separate claim payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

According to the NFIP, between 1978 and July 31, 2014, a total of 2 flood damage claims were made in the planning area. As shown below, both occurred with two separate properties located in the City of Groom. No claims have been filed in the County since July 2008. There are no Severe Repetitive Loss properties located in Carson County.

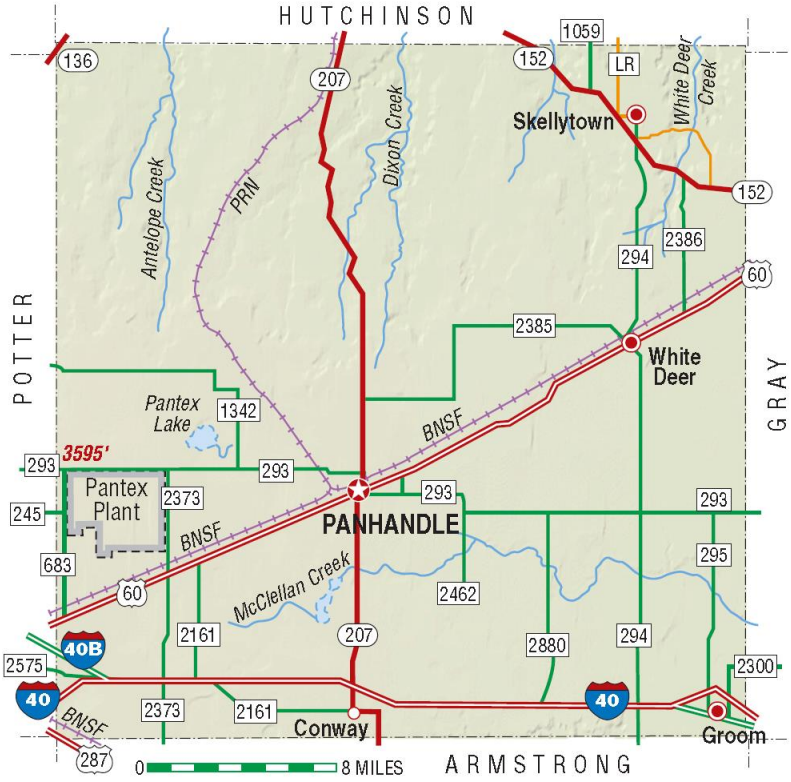
COMMUNITY NAME	TOTAL LOSSES	CLOSED LOSSES	OPEN LOSSES	CWOP LOSSES	TOTAL PAYMENTS
GROOM, CITY OF	2	1	0	1	$1,095.61

Legend: Closed losses –Losses that have been paid
Open losses – Losses that have not been paid in full
CWOP losses – Losses that have been closed without payment

Source: ***http://bsa.nfipstat.fema.gov/reports/1040.htm#48***

County Overview and Demographics

Overview:



Carson County lies in the center of the Panhandle and on the eastern edge of the Texas High Plains, is bounded on the north by Hutchinson County, on the west by Potter County, on the south by Armstrong County and on the east by Gray County.

The center of the county lies at roughly 35°25' north latitude and 101°22' west longitude. The county occupies 900 square miles of level to rolling prairies surfaced by dark clay and loam that make the county almost completely tillable and productive.

Native grasses and various crops such as wheat, oats, barley, grain sorghums, and corn flourish.

The huge Ogallala Aquifer beneath the surface provides water for people, crops, and livestock. Trees, usually cottonwood, oak, or elm, appear, along with mesquite, in the county's creek bottoms. Antelope and Dixon creeks, both intermittent streams, run northward from central Carson County to their mouths on the Canadian River in Hutchinson County. McClellan Creek, also intermittent, runs eastward across the southeastern corner of the county to join the Red River. Carson County ranges from 3,200 to 3,500 feet in elevation, averages 20.92 inches of rain per year, and varies in temperature from a minimum average of 21° F in January to a maximum average of 93° in July. The growing season averages 191 days a year.

The following information is intended to provide the reader with a general background of the County, its residents, population centers, economy, financial resources, basic infrastructure and climate. The population information cited below was gathered from various sources but is all based on data generated by the US Census Bureau.

Table 2: Population [i]

GENERAL INFORMATION	
County Size in square miles (per US Census Bureau)	6,157
Land Area:	900
Water Area	.10
Population Density (per Square Mile in 2010)	6.7
TOTAL COUNTY POPULATION	
Estimated 2012	6,272
Census 2010	6,182
Census 2000	6,516
Historic High County: 1960	7781
POPULATION OF CITY OF GROOM	
Estimated 2012	572
Census 2010	574
Census 2000	587
Historic High Count 1970	808
POPULATION OF CITY OF PANHANDLE (COUNTY SEAT)	
Estimated 2012	2,439
Census 2010	2,452
Census 2000	2,589
Historic High Count 2000	2,589
POPULATION OF SKELLYTOWN	
Estimated 2012	469
Census 2010	473

POPULATION OF SKELLYTOWN	
Census 2000	610
Historic High Count 1969	967
POPULATION OF WHITE DEER	
Estimated 2012	995
Census 2010	1,000
Census 2000	1,060
Historic High County 1980	1,210
POPULATION OF UNINCORPORATED AREAS OF THE COUNTY	
Estimated 2012	1,797
Census 2010	1,683
Census 2000	1,670
Historic High County 1960	3,120
IN THE PAST 10 YEARS THE COUNTY POPULATION HAS:	DECREASED

Table 3: Ethnicity [ii]

Ethnicity	White	Black	Hispanic	Asian	Other	Total
Texas	11,397,345	2,886,825	9,460,921	948,426	452,044	25,145,561
Panhandle Region	259,774	19,360	132,755	8,168	7,870	427,927
Carson County	5,473	35	525	19	130	6,182
Groom	525	5	34	0	10	574
Panhandle	2146	14	240	6	46	2,452
Skellytown	431	2	24	5	11	473
White Deer	901	1	66	1	31	1,000
Unincorp. Area	1,470	13	161	7	31	1,683

Table 4: Age [iii]

AGE 2012 (per US Census Bureau)	Percentage
17 and under:	24.5%
65 and older:	17.4%
85 and older:	2.4%
Median Age	42.3%

Every 2-3 years, the Texas State Data Center produces state and county level population projections for each year between 2015 through 2050.

The information shown below is provided under the three scenarios (or assumptions) used by the Texas State Data Center to generate population projections for Carson County. A fourth column has been added by the MAT to provide a balance between the three scenarios to forecast the population change expected to occur in the County during the 5-year life of this plan. Over the next 5 years, the population in Carson County is estimated to increase by.06 %.

Table 5: 5-Year Population Forecasts [iv]

YEAR	00. Scenario	0.5 Scenario	1.0 Scenario	Averaged
2010 (Actual)	6,182	6,182	6,182	6,182
2011 (Estimated)	6,188	6,206	6,238	6,210
2012 (Estimated)	6,196	6,216	6,281	6,231
2013 (Projected	6,194	6,221	6,316	6,244
2014 (Projected)	6,198	6,221	6,337	6,252
2015 (Projected)	6,194	6,227	6,362	6,261
2016 (Projected)	6,201	6,282	6,392	6,292
2017 (Projected)	6,201	6,243	6,413	6,288
2018 (Projected)	6,217	6,256	6,445	6,306

As of June 2013, the unemployment rate in Carson County was 5.0 %; representing an over the year increase from 2011 of 3.9%. However, it's projected that during the course of the next 10 years, job growth in the County will grow by 31.12%; exceeding the job growth expected for the rest of the nation (32.10%) for that same period. Wind energy and the retail sector are expected to be notable contributors to the area's job growth.

Table 6: Occupation by Class of Worker for Civilian Employed Population 16 Years and Over (2008-2012 American Community Survey): [v]

	Carson County, Texas					
	TOTAL	Employee of private company workers	Self-employed in own incorporated business workers	Private not-for-profit wage and salary workers	Local, state and federal government workers	Self-employed in own not incorporated business workers and unpaid family workers
Subject	Estimate / Margin of Error	Estimate / Margin of Error	Estimate / Margin of Error	Estimate / Margin of Error	Estimate / Margin of Error	Estimate / Margin of Error
Civilian employed population 16 years and over	2,952 / +/-141	61.3% / +/-4.3	2.5% / +/-1.3	5.1% / +/-1.9	19.0% / +/-3.4	12.1% / +/-3.2
Management, business, science and arts occupation	939 / +/-116	34.3% / +/-8.0	3.9% / +/-2.6	9.5% / +/-4.0	34.1% / +/-7.4	18.2% / +/-6.9
Service occupations	295 / +/-78	46.1% / +/-13.8	0.0% / +/-11.9	11.5% / +/-10.7	27.1% / +/-11.6	15.3% / +/-10.6

	Carson County, Texas					
	TOTAL	Employee of private company workers	Self-employed in own incorporated business workers	Private not-for-profit wage and salary workers	Local, state and federal government workers	Self-employed in own not incorporated business workers and unpaid family workers
Subject	Estimate / Margin of Error	Estimate / Margin of Error	Estimate / Margin of Error	Estimate / Margin of Error	Estimate / Margin of Error	Estimate / Margin of Error
Sales and office occupations	701 / +/-132	73.8% / +/-6.7	4.4% / +/-3.1	3.1% / +/-2.0	10.1% / +/-5.0	8.6% / +/-5.3
Natural, resources, construction and maintenance occupations	518 / +/-108	81.9% / +/-8.0	0.0% / +/-7.0	1.0% / +/-1.5	9.8% / +/-7.0	7.3% / +/-6.0
Productions, transportation and material moving occupations	499 / +/-107	82.4% / +/-7.4	1.2% / +/-2.1	0.0% / +/-7.2	7.6% / +/-5.5	8.8% / +/-5.7

Table 7: 2008-2012 County-Wide per Job Wage Estimates [vi]

WAGES	
Average Wage Per Job-2012	$71,147
Average Wage Per Job-2011	$69,347
Average Wage Per Job-2010	$69,366
Average Wage Per Job-2009	$65,055
Average Wage Per Job-2008	$62,624

Table 8: 2008-2012 County-Wide Unemployment Estimates [vii]

ANNUAL UNEMPLOYMENT RATE, Not Adjusted (Texas Workforce Commission)	
Unemployment Rate-2012	4.5%
Unemployment Rate-2011	5.0%
Unemployment Rate-2010	5.1%
Unemployment Rate-2009	5.8%
Unemployment Rate-2008	3.4%

Table 9: Local Government Finances [viii]

COUNTY FINANCES (Texas Comptroller of Public Accounts)	
Total County Tax Rate-2012	$0.516225
Total Market Value:	$1,250,365,250

COUNTY FINANCES (Texas Comptroller of Public Accounts)	
Total Appraised Value Available for County Taxation:	$844,811,220
Total Actual Levy	$4,359,285
OTHER TAXING DISTRICT IN THE COUNTY	
City of Groom	$0.820214
City of Panhandle	$0.595000
City of Skellytown	$1.257257
City of White Deer	$0.588630
Groom Independent School District – 2012	$1.402000
Panhandle Independent School District – 2012	$1.480000
White Deer Independent School District - 2012	$1.154300
Panhandle Groundwater District #3 - 2012	$0.008870

Table 10: County Infrastructure [ix]

COUNTY INFRASTRUCTURE	Units or No.
Airports (Public Use)	2
Hospitals	0
County Road Unpaved (Earth and All-weather Lane Miles 2004 [TxDOT])	589
County Road Paved (Earth and All-weather Lane Miles 2004 [TXDOT])	8
County Road Asphalt	4
County Road Concrete	0
County Owned Bridges	1

The following section briefly describes climate conditions in Carson County. More specific weather-related data and information is found later in this document.

Table 11: County Temperature [x]

	CARSON COUNTY		TEXAS	
COUNTY CLIMATE: Temperature	**High**	**Low**	**High**	**Low**
Avg. Annual Temperature	71.6ºF	43.2 ºF	78.7 ºF	55.8 ºF
Avg. January Temperature	50.0 ºF	21.9 ºF	59.5 ºF	36.8 ºF
Avg. February Temperature	54.7 ºF	25.6 ºF	63.7º F	40.4 ºF
Avg. March Temperature	62.5 ºF	31.9 ºF	71.1 ºF	47.5 ºF

	CARSON COUNTY		TEXAS	
COUNTY CLIMATE: Temperature	**High**	**Low**	**High**	**Low**
Avg. April Temperature	72.3 ºF	41.4 ºF	78.8 ºF	55.8 ºF
Avg. May Temperature	80.1 ºF	51.2 ºF	84.9 ºF	63.7 ºF
Avg. June Temperature	87.7 ºF	60.4 ºF	91.7 ºF	70.0 ºF
Avg. July Temperature	92.4 ºF	65.1 ºF	95.8 ºF	72.6 ºF
Avg. August Temperature	90.3 ºF	63.6 ºF	96.4 ºF	72.4 ºF
Avg. September Temperature	83.2 ºF	56.0 ºF	90.1 ºF	67.1 ºF
Avg. October Temperature	73.6 ºF	44.3 ºF	80.9 ºF	57.0 ºF
Avg. November Temperature	60.2 ºF	32.3 ºF	70.0 ºF	46.8 ºF
Avg. December Temperature	51.2 ºF	24.2 ºF	61.8 ºF	39.3 ºF

Table 12: County Precipitation [xi]

COUNTY CLIMATE: Precipitation	**CARSON COUNTY**	**TEXAS**
Avg. Annual Precipitation	22.48”	35.32”
Avg. January Precipitation	0.62”	2.04”
Avg. February Precipitation	0.74”	2.53”
Avg. March Precipitation	1.34”	2.55”
Avg. April Precipitation	1.71”	2.81”
Avg. May Precipitation	3.28”	4.79”
Avg. June Precipitation	3.64”	3.75”
Avg. July Precipitation	2.57”	1.75”
Avg. August Precipitation	2.94”	2.03”
Avg. September Precipitation	2.31”	3.46”
Avg. October Precipitation	1.72”	3.80”
Avg. November Precipitation	0.94”	2.95”
Avg. December Precipitation	0.67”	2.86”

Provided below is brief explanation on the lay-out and content of this document. The sections included in this plan are:

SECTION I – Adoption

This section identifies the local jurisdictions that have adopted the plan.

SECTION II – Authorities

This section provides a description of the legal authorities under which this plan was developed.

SECTION III – Purpose

This section explains why the plan was written and identifies the benefits to the participating jurisdictions within Carson County of having a current Hazard Mitigation Plan.

SECTION IV – Organizing Assets

This section explains how the plan was organized and the process followed in developing this document, including:

- Establishing the Mitigation Action Team: Identifies the process Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer followed in establishing their mitigation action team.
- Establishing an Open Public Process: Identifies the measures Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer took to encourage public participation during the development of this plan.

SECTION V – Assessing Risks

This section identifies and analyzes the hazards that affect Carson County and their impacts on the County's jurisdictions

- Hazards – Describes the hazards that impact Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer.
- History of Local Hazards – Provides historical and statistical data related to the specific hazards that have impacted the jurisdictions within Carson County.
- Risk Summary – Community priorities on specific hazards.
- Vulnerability Worksheets – Provides a graphical representation of each jurisdiction's vulnerability to the identified hazards.
- Loss Estimates – Provides an estimate of the impact each hazard would have on the critical infrastructure located within Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer.
- Past Mitigation – Provides a summary view of previous mitigation efforts undertaken by the jurisdictions within Carson County.

- Development Trends – Provides an analysis of a growth trends in the County which were considered in developing the mitigation strategies discussed in SECTION VI.

SECTION VI – Develop Mitigation Action Plan

- Mitigation Goals and Objectives – Provides the framework for the development of the long-term and short-term strategies identified with the Mitigation Actions.
- Mitigation Actions – Describes the actions that each participating jurisdictions proposes to undertake in order to mitigate the impact of future hazard events.

SECTION VII – Attachments

This section contains a listing of the other documents that supported the development of this document.

SECTION VIII – Resources

This section contains a listing of the various resource documents that supported the development of this document.

SECTION I - ADOPTION

This plan was formally adopted by Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer after the document had been reviewed by both the Texas Division of Emergency Management (TDEM) and the Federal Emergency Management Agency (FEMA) to ensure it met current state and federal guidelines governing local MAPs.

The evidence of local adoption has been sent to both agencies; essentially marking the conclusion of the planning process and the start of the plan's implementation phase. The plan was finally adopted as of the dates shown below.

Carson County:	Resolution No.:	Adoption Date:
City of Groom:	Resolution No.:	Adoption Date:
City of Panhandle:	Resolution No.:	Adoption Date:
City of Skellytown:	Resolution No.:	Adoption Date:
City of White Deer:	Resolution No.:	Adoption Date:

SECTION II - AUTHORITY

Authority for development and maintenance of this plan is as follows:

Federal Level Authority:

1. The Disaster Relief Act of 1974, PL 81-920 as amended
2. Emergency Management and Assistance, Code of Federal Regulations, Title 44
3. The Emergency Management Assistance Compact, PL 104-321

4. The Federal Civil Defense Act of 1950, PL 81-920 as amended
5. The Price-Anderson Act of 1957, as amended
6. Title III, of the Superfund Amendments and Reauthorization Act of 1986, (SARA), PL 99-499 as amended
7. The Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL 93-288), as amended by the Disaster Mitigation Act of 2000 (PL 106-390)

State Level Authority:

1. Constitution of the State of Texas
2. Texas Disaster Act of 1975, Texas Government Code, Chapter 418
3. Executive Order of the Governor
4. Attorney General Opinion MW-140, February 7, 1980
5. Hazard Communication Act, Texas Government Code, Chapter 502
6. Solid Waste Disposal Act, Texas Health and Safety Code, Chapter 301
7. State of Emergency, Texas Government Code, Chapter 433

Local Level Authority:

44 CFR §201.2 lists the jurisdictions having the authority to develop Local Hazard Mitigation Plans as follows: *any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.*

Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), 42 U.S.C. 5165, as amended by the Disaster Mitigation Act of 2000 [DMA] (P.L. 106-390), allows States, Tribes, and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning. The National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001 *et seq*, reinforced the need and requirement for mitigation plans, linking flood mitigation assistance programs to State, Tribal and Local Mitigation Plans.

FEMA has implemented a variety of hazard mitigation planning provisions through 44 CFR Part 201. These provisions assert the need for States, Tribal, and local governments to closely coordinate mitigation planning and implementation efforts, and describe the requirement for each State having their own State Mitigation Plan as a condition of certain pre- and post-disaster assistance funding. This mitigation plan requirement also extends to local and Tribal governments who must have their own Local Hazard Mitigation Plan as a prerequisite to receiving this same FEMA hazard mitigation assistance.

The regulations governing the mitigation planning requirements for local mitigation plans are published under 44 CFR §201.6 which affirms that local governments must have a FEMA-approved Local Hazard Mitigation Plan in order to apply for and/or receive project grants under

the following hazard mitigation assistance programs: Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), Severe Repetitive Loss (SRL).

SECTION III - PURPOSE

The main objective behind the development of this MAP is to enhance public safety and the protection of public and personal property in Carson County. Jurisdictions in Carson County realize they are subject to a variety of natural hazards; experience and history has proven that to be the case. Natural hazards cannot be prevented.
However, in analyzing the probability and potential consequences of the hazards most likely to affect the County, local officials can then develop and implement strategies for minimizing or averting impacts that might occur when future hazard events occur in the County.

The purpose of the hazard mitigation planning process is to identify community policies, actions, and tools; and implement projects that can eliminate the risk or reduce the severity of hazards on people and property.

A hazard mitigation plan serves as a comprehensive resource document to enhance public awareness and understanding, create a decision tool for community leaders, promote compliance with State and Federal program requirements, enhance local policies for hazard mitigation capability, and promote coordination among participating jurisdictions.

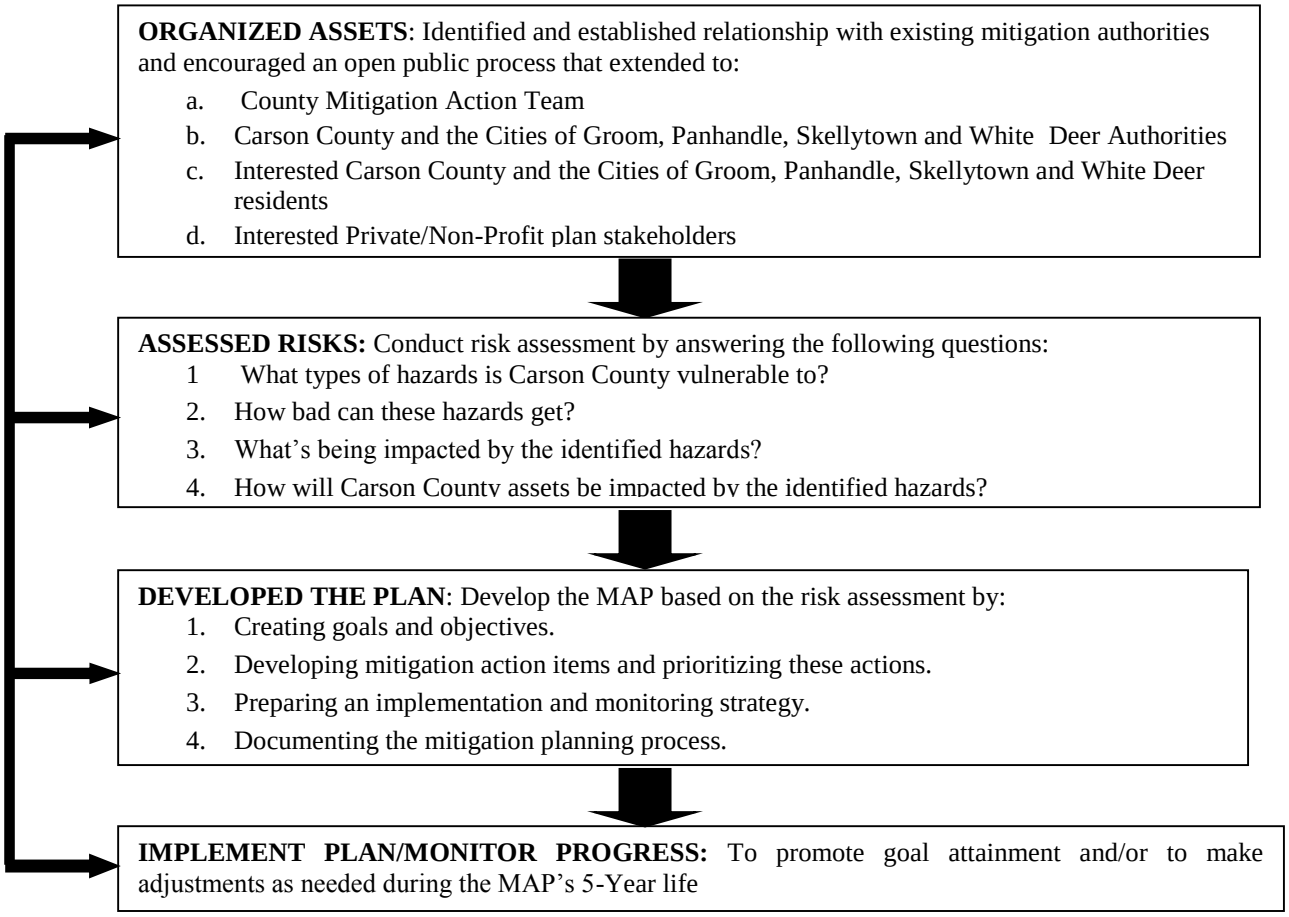
Hazard mitigation measures are the actions and steps taken before disasters occur to reduce the impact of future events on people and property in the County. These measures are essential to breaking the typical disaster cycle of damage, rebuilding, and repeated damage. This plan is intended to identify appropriate, cost-effective mitigation measures that could be undertaken in order to better protect the residents of the County from the hazard events most likely to occur in the future.

It’s also important to note that Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer must possess and maintain a FEMA-approved Hazard Mitigation Plan to remain eligible to receive funding through FEMA’s hazard mitigation assistance programs. This funding could play a critical part with the implementation of the mitigation strategies described in this plan; providing resources to carry out actions that would otherwise not be possible if the County/Cities had to rely solely on their own resources. In order to maintain that eligibility, this plan will have to be updated every 5 years. The MAT fully intends to review this document annually in order to prepare for the next 5-year update.

SECTION IV – ORGANIZING ASSETS

Mitigation Planning is somewhat of an applied science. FEMA provides the structure for the planning process in 44 CFR Part 201 (Mitigation Planning). Graphically, the four critical phases of developing the plan can be depicted as shown on the following page. This graphic basically illustrates the steps taken by the Carson County MAT in developing this document.

Diagram 1: Overview of Carson County Planning Process



Establishing the Mitigation Action Team

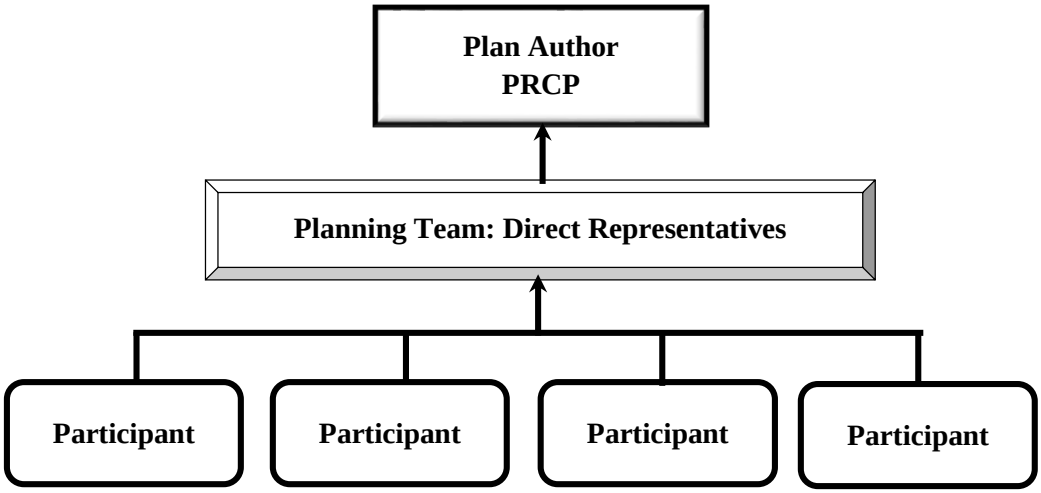
Carson County's ***first*** Hazard Mitigation Plan was finally approved on December 8, 2006. To ensure the plan continues to support the County's mitigation goals and in order for each jurisdiction in the County to maintain eligibility to apply for FEMA mitigation grant funding, the plan has to be updated every 5 years.

The Panhandle Regional Planning Commission (PRPC), the Council of Governments serving the 26-county area of the Texas Panhandle, wrote the first county plan under the direction of the County's previous MAT. The PRPC did the same for all other counties in the Panhandle under a Hazard Mitigation Grant Program (HMGP) grant provided through TDEM/FEMA. All the plans in the Panhandle were written and finally approved within a 6-month period during 2006-2007.

As the 5-year anniversary of the Panhandle's first generation of hazard mitigation plans approached, the PRPC contacted Carson County to determine if the County wanted to be part of another HMGP project; this one focused on the updating the Panhandle's hazard mitigation plans. The County agreed to participate. A grant application was submitted to TDEM/FEMA for consideration of approval and was subsequently awarded. The PRPC then committed itself to updating all 25 hazard mitigation plans from the Panhandle including, the Carson County plan.

Following the same approach used in developing the original County plan, PRPC staff agreed to author the new County plan as directed by a reconstituted County MAT. Because this will be the County's plan, with PRPC staff serving merely as scribes, Carson County elected to follow a Direct Representation Model in developing this plan update as depicted by the diagram below.

Diagram 2: Carson County Mitigation Action Team Hierarchy



At the outset of the planning process, the County Judge sent an solicitation by mail, email and personal invitation to the Cities of Groom, Panhandle, Skellytown and White Deer. In addition invitations were sent to all the school superintendents with in the county, the Carson County Appraisal District, local churches, private industry and also the public. The MAT meetings were well-advertised and all the meetings posted to encourage public participation.

Carson County, Groom, Panhandle, Skellytown and White Deer each made an effort to elicit participation on the MAT from the appropriate stakeholder groups within their jurisdictions. Particular focus was placed on inviting involvement by the local school districts and agencies who have authority to regulate key resources of development issues. Overall, the list of agencies / organizations thought to have a direct stake or interest in the Carson County MAP update process or that could somehow inform the planning process included:

Agency / Organization	Level of Involvement	Potential Stake, Interest or Contribution
Carson County	Direct Stake	The County, with several of its offices, is a direct plan stakeholder in that many of mitigation measures will be focused on reducing natural hazard risks that could impact its residents.
Carson County Appraisal District, *Chief Appraiser*	Could Inform	The Appraisal District could inform loss value determinations made by the MAT.
City of Groom, *City Secretary*	Direct Stake	Groom is a direct plan stakeholder; once this plan is finally approved, the City will be eligible to directly apply to FEMA for assistance in carrying out critical mitigation actions.

Agency / Organization	Level of Involvement	Potential Stake, Interest or Contribution
City of Panhandle, *City Manager*	Direct Stake	Panhandle is a direct plan stakeholder; once this plan is finally approved, the City will be eligible to apply directly to FEMA for assistance in carrying out critical mitigation actions.
City of Skellytown, *Mayor*	Direct Stake	Skellytown is a direct plan stakeholder; once this plan is finally approved, the City will be eligible to apply directly to FEMA for assistance in carrying out critical mitigation actions.
City of White Deer, *Mayor*	Direct Stake	White Deer is a direct plan stakeholder; once this plan is finally approved, the City will be eligible to apply directly to FEMA for assistance in carrying out critical mitigation actions.
Groom ISD, *Superintendent*	Direct Stake	The ISD could be a direct stakeholder; once the MAP update is approved, the District can either apply directly to FEMA for mitigation assistance or apply under the auspices of their local City government.
Panhandle ISD, *Superintendent*	Direct Stake	The ISD could be a direct stakeholder; once the MAP update is approved, the District can either apply directly to FEMA for mitigation assistance or apply under the auspices of their local City government.
Spring Creek ISD (serving the Skellytown area), *Superintendent*	Direct Stake	The ISD could be a direct stakeholder; once the MAP update is approved, the District can either apply directly to FEMA for mitigation assistance or apply under the auspices of their local City government.
White Deer ISD, *Superintendent*	Direct Stake	The ISD could be a direct stakeholder; once the MAP update is approved, the District can either apply directly to FEMA for mitigation assistance or apply under the auspices of their local City government.
Groom Volunteer Fire Dept., *Fire Chief*	Have an Interest and Inform	The VFD could both inform and have a direct interest in the MAP's mitigation measures, particularly those that apply to wildfires.
Panhandle Fire Dept.., *Fire Chief*	Have an Interest and Inform	The Department could both inform and have a direct interest in the MAP's mitigation measures, particularly those that apply to wildfires.
Skellytown Volunteer Fire Dept., *Fire Chief*	Have an Interest and Inform	The VFD could both inform and have a direct interest in the MAP's mitigation measures, particularly those that apply to wildfires.

Agency / Organization	Level of Involvement	Potential Stake, Interest or Contribution
White Deer Volunteer Fire Dept., *Fire Chief*	Have an Interest and Inform	The VFD could both inform and have a direct interest in the MAP's mitigation measures, particularly those that apply to wildfires.
Amarillo Office of the National Weather Service (NWS), *Meteorologist In Charge*	Could Inform	The NWS could provide regionalized data with regard to past/forecasted weather trends that could inform the formation of mitigation actions.
Army Corps of Engineers (ACE), *Regional Representative*	Could Inform	ACE resources could inform local flood control efforts with streambed/wetland data
High Plains RC&D (HP RC&D), *Council President*	Could Inform	HP RC&D resources could inform future economic trends
National Oceanic and Atmospheric Administration (NOAA), *Meteorologist In Charge*	Could Inform	NOAA resources could be used to chronicle past weather events as a means of measuring impacts and forecasting future events.
Panhandle Groundwater Conservation District (PGCD), *Executive Director*	Have an Interest and Inform	PGCD helps to regulate the use of the area's groundwater and could have an interest in the development of drought mitigation actions.
Panhandle Regional Planning Commission (PRPC), *Regional Service Director*	Could Inform	Aside from assisting the MAT in writing this update, PRPC could provide data that would inform the actions/decisions of the MAT
Texas AgriLife Extension, *Extension Agent*	Have an Interest and Inform	Agrilife could inform some of the decisions that might impact area farmers/ranchers and help in promoting certain mitigation actions.
Texas Association of Counties (TAC), *TAC Representative*	Could Inform	TAC resources could provide detail regarding county infrastructure and provide context for the development of mitigation actions
Texas Dept. of Transportation (TxDOT) *District Representative*	Could Inform	TxDOT resources could inform the MAT on flood-prone areas of the County's road system.
Texas Forest Service (TFS), *Regional Fire Coord.*	Could Inform	TFS resources could inform the MAT's development of wildfire mitigation actions
Texas Water Development Board (TWDB), *TWDB Contract Manager*	Have an Interest and Inform	TWDB resources could provide the County with severe repetitive loss data and inform actions focused on drought contingencies
THE PUBLIC	Direct Stake	The residents of the planning area would have a direct stake and interest in the outcome of this planning process.

In some form or fashion, all the groups/stakeholders listed above played a part in the MAP update process. State and federal agency participation was primarily obtained through the use of their websites. Information was gleaned from their sites to develop the hazard profiles found later in this document, to estimate future hazard impacts, for projecting future growth and development and for identifying potential actions that could be employed in mitigating the impacts of future hazard events in the planning area.

Those invited organizations that did not routinely and actively serve on the MAT didn't do so out of a lack of interest but primarily due to staffing limitations. However, they said they'd rely on local officials that were familiar with their mitigation needs to represent their interests on the MAT. Nevertheless, organizations that were unable to attend the MAT meetings were contacted independently by a representative of the Carson MAT to solicit their input and observations. The update's ancillary local participants included:

Organization/Agency	Input/Observations
Groom ISD	ISD Superintendents are chiefly concerned about safeguarding the welfare of their students and faculty and protecting their facilities and infrastructure. A number of the mitigation actions identified in this update are as pertinent to the ISDs as they are to the jurisdictions in which the ISDs are physically located
Panhandle ISD	
Spring Creek ISD	
White Deer ISD	

The MAT planning process was very open throughout and while each meeting was open to the public, none participated. However, while the public allowed their local officials to represent their needs/concerns at the meetings; 28 did participate in the MAT's county-wide Household Natural/ Hazards Preparedness Survey (shown under Attachment 2) and the attitudes and opinions reflected by the resident responses were considered as the mitigation actions in this MAP update were being developed.

In following FEMA's Local Mitigation Planning Handbook suggestions, the individuals that participated on the MAT brought certain skill sets or experiences to the process that helped to ensure the overall relevance of the plan. The types of MAT member contributions included:

1. Emergency managers/first responders – had direct experience with past hazard events and existing preparedness measures, and/or had a direct line of communication with the State emergency management agency.
2. Local community planners – were able to assist the planning team in understanding current, and future community development trends, the policies or activities that affect development, and the relationship between hazards and development.
3. Mapping specialists – the MAT didn't have access to a GIS specialist but did to individuals who could look at a topo map and explain terrain and natural drainage conditions to the rest of the team and how those could affect the impacts of natural hazards in the areas where they exist.
4. Public works staff – were able to identify current or projected problems for the community's infrastructure that could be addressed through capital improvements supported by the mitigation plan.

5. Elected and executive officials – were familiar with the total needs of their jurisdiction and were able to communicate how the mitigation plan could support other social, economic, or environmental goals locally.
6. Floodplain administrators – were able to provide information on local flood hazard maps, floodplain ordinance and actions that could be undertaken to support the goals of the National Flood Insurance Program and help reduce flood losses.
7. State/Federal Partners – were able to serve as a data resource; providing the MAT with relevant statistics, historical account, etc. that could be used to inform the planning process.

The table below lists the membership of the County's 2013 MAT and describes the contributions each member made with the development of this document.

Table 13: Carson County's MAT Membership

NAME	TITLE	JURISDICTION	CONTRIBUTION
Brenda Vermillion	EMC/Team Coordinator	Carson County	*Emergency Manager and FPA*; coordinated the MAT meetings, obtained data to profile hazards, provided background on past mitigation actions in the planning area; identified potential mitigation actions
Lewis Powers	County Judge	Carson County	*Executive official;* helped with discerning the "P" (political) in the STAPLE/E assessments of potential mitigation actions and with n
Donetta Davis	Appraisal District	Carson County	*Executive official*, helped in estimating potential loss values, helped to identify potential impacts and identified potential mitigation actions
Jim Raney	Asst. EMC	Carson County	*First responder*; assisted with gathering hazard data and with the identification of potential mitigation actions
Loren Brand	Sheriff	Carson County	*First responder and Executive official*; assisted with gathering hazard data and with the identification of potential mitigation actions
Julie Smith	Judge Assistance	Carson County	*Local community planner*; helped to facilitate the presentation of the updated MAP to the Commissioners' Court for adoption
Mike Darnell	Appraisal District	Carson County	*Executive official*, helped in estimating potential loss value, help to identify potential impacts and identified potential mitigation actions

NAME	TITLE	JURISDICTION	CONTRIBUTION
Joe Homer	Mayor	City Groom	*Elected official*; represented the City's mitigation needs, provided input on the development of mitigation actions
Gary Babcock	Fire Chief	City Groom	*First responder*; assisted with gathering wildfire data, identifying areas of hazard concern in Groom and with the identification of potential mitigation actions
Mary Sue Lyles	City Secretary	City Groom	*FPA*; helped to identify areas of flooding concern in Groom and to facilitate the presentation of the updated MAP to the City Council for adoption
Rob Roach	City Manager	City Panhandle	*Executive official*; helped in correlating the potential mitigation actions to the City's long-range vision; provided insight into the "L" (legal) STAPLE/E aspects of proposed actions
Sace Hardman	Police Chief	City Panhandle	*First responder*; assisted with gathering hazard data and with the identification of potential mitigation actions
Jay Baze	Fire Chief	City Panhandle	*First responder*; assisted with gathering wildfire data, identifying areas of hazard concern in Panhandle and with the identification of potential mitigation actions
Ralph Tice	Mayor	City Skellytown	*Elected official*; represented the City's mitigation needs, provided input on the development of mitigation actions
Sandra Perry	City Secretary	City Skellytown	*Local community planner*; helped to facilitate the presentation of the updated MAP to the City Council for adoption
Vance Griffith	Fire Chief	City Skellytown	*First responder*; assisted with gathering wildfire data, identifying areas of hazard concern in Skellytown and with the identification of potential mitigation actions
Katrina Warminski	City Secretary	City White Deer	*FPA*; helped to identify areas of flooding concern in White Deer and to facilitate the presentation of the updated MAP to the City Council for adoption

NAME	TITLE	JURISDICTION	CONTRIBUTION
Jay Smith	Mayor	City White Deer	*Elected official*; represented the City's mitigation needs, provided input on the development of mitigation actions
Terry Sargent	Fire Chief	City White Deer	*First responder*; assisted with gathering wildfire data, identifying areas of hazard concern in White Deer and with the identification of potential mitigation actions
Darrell Luster	Police Chief	City White Deer	*First responder*; assisted with gathering hazard data and with the identification of potential mitigation actions
Karl Vaughn	Superintendent	White Deer ISD	*Executive official*; described impacts of hazards on the ISD; suggested actions that could mutually benefit White Deer and the ISD
Blair Brown	Superintendent	Panhandle ISD	*Executive official*; described impacts of hazards on the ISD; suggested actions that could mutually benefit Panhandle and the ISD
Jay Lamb	Superintendent	Groom ISD	*Executive official*; described impacts of hazards on the ISD; suggested actions that could mutually benefit Groom and the ISD
Emily Nolte	Planner	PRPC	*Local community planner*; assisted the MAT Team leader with public communications; helped in gathering input from organizations not directly participating on the MAT, served as an interface with TDEM/FEMA as the Carson MAP update was being reviewed by State/Federal authorities,
John Kiehl	Regional Director	PRPC	*Local community planner and Mapping Specialist*, assisted the MAT with data collection, obtained planning maps from the PRPC's 911 staff, served as plan scribe and as an interface with TDEM/FEMA as the Carson MAP update was being reviewed by State/Federal authorities

Establishing an Open Public Process

As previously noted, the development of this plan followed the requirements set out by FEMA under 44 CFR §201.6. One of the foundational pieces of those requirements calls for the public to be given ample opportunity to observe, if not participate, in the planning process. §201.6(b)(1) required the County to provide, *"(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;*".

To that end, whenever a MAT meeting was scheduled, postings were placed in the customary locations used to announce public meetings in each of the participating jurisdiction, at least 72 hours prior to the meeting, which provided the following information:

NOTICE TO THE PUBLIC

The Carson County Mitigation Action Team (MAT) has scheduled a meeting on (date) at (time of day) in the (facility name) located at (street address), in (City), TX (ZIP). The Carson County Hazard Mitigation Plan is being updated. When completed, it will serve as a guide for implementing mitigation strategies intended to help reduce the human, economic, and environmental costs of natural disasters. The public is invited to attend. For more information, please contact (name of Jurisdiction's POC), with the (name of Jurisdiction), at (806) (phone number).

In addition, the County took advantage of another regional project funded by FEMA that allowed residents the opportunity to review the draft plan. The Panhandle Area Regional Information System (PARIS) is a virtual communications tool that serves the entire Panhandle region. Over the past two years, public mass notification tools have been added to PARIS courtesy of FEMA. These tools allow residents to subscribe to receive emergency alerts and information from their local jurisdictions. In this instance, PARIS was used to send out notices to subscribed residents in Carson County to inform them of the plan update process. The message contained a link to the draft version of the County's plan. Residents were then invited to read the plan and provide their comments and suggestions back to the MAT through the Team Coordinator, Brenda Vermillion.

Finally, before the final draft was adopted by the governing bodies of the jurisdictions that participated in this update process, the draft was made available for public comment physically in the OEM office of the Carson County Law Enforcement Center, at the City Halls in Groom, Panhandle, Skellytown and White Deer 72 hours in advance of the governing bodies, meetings. The final draft was discussed in open session during those meetings, with a call for public comment, before the adopting resolutions were considered and passed.

These adoption meetings were preceded with a different Notice to the Public which generally read as follows:

NOTICE OF A PUBLIC HEARING ON THE ADOPTION OF THE CARSON COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

Carson County will conduct a public hearing before considering final adoption of the recently completed 2013 Carson County Hazard Mitigation Plan Update on at p.m. in the Commissioner's Court Chambers of the Carson County Courthouse located at 501 Main, in Panhandle, Texas. This plan incorporates mitigation actions intended to minimize the impacts of certain natural hazards on the residents of the County.

The Disaster Mitigation Act of 2000, as amended, requires that local governments, develop, adopt, and update natural hazard mitigation plans in order to receive certain federal assistance. A Mitigation Action Team ("MAT") comprised of representatives from the cities of Groom, Panhandle, Skellytown, White Deer and Carson County was convened to assess the risks from and vulnerabilities to natural hazards that endemic to the Carson County area, and to make recommendations on mitigating the effects of such hazards. The original Hazard Mitigation plan was adopted in 2006 and is required to be updated every five (5) years.

A copy of the plan is now available for review in the County's Office of Emergency Management, located in 201 US-60 W, in Panhandle, during normal business hours or may be reviewed online at:

http://theprpc.org/Programs/EmergencyPreparedness/default.html

The meeting is open to the public and members of the community are encouraged to attend to offer feedback and comment.

.....

Each jurisdiction posted their own customized notice; giving their residents the date/time on which their governing body would consider the plan adoption along with a location at which the plan could be physically reviewed locally.

In addition, press releases were issued to the Panhandle Herald, the White Deer News and the Groom News to announce the pending jurisdictional adoption meetings. A copy of the release is found under Attachment 3 of this document.

The Carson County Hazard Mitigation Plan will remain available to the public on PARIS until it's replaced by the next 5-year update. The public will also be notified of and invited to the meetings when the Carson County MAT gathers to conduct its annual review of the Carson County Hazard Mitigation Plan.

SECTION V – ASSESSING RISKS

What types of hazards does Carson County face?

In total, the Carson County MAT identified eight (8) natural hazards that commonly impact the area. These are:

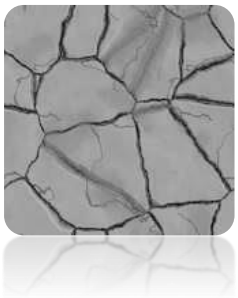
1.) Drought
2.) Earthquakes
3.) Flooding
4.) Hail or Hailstorms
5.) Severe Thunderstorms
6.) Tornado
7.) Wildfires
8.) Winter Storms

Some of these hazards are interconnected (*e.g*., droughts create more fuel for wildfires) and some hazards could be characterized as elements of a broader hazard agent. For example, hail and severe winds can be produced by thunderstorms and they may all occur during a single thunderstorm event. Yet, that's not always the case so; they're each discussed here separately. It should also be noted that some hazards, such as severe winter storms, may impact a large area and cause little damage, while other hazards, such as a tornadoes, may impact a small area but cause extensive damage.

Two hazards from the 2006 MAP have been dropped from this MAP update. Hazardous materials spills and terrorism ***are not*** natural hazards and so, have been removed from this natural hazard mitigation plan.

The information gathered to complete this element of the Plan was extracted from a variety of credible sources. Those resources are listed in SECTION VIII of this document. A brief description of each hazard addressed by this plan is provided below.

Drought



A **Drought** is, "*a period of unusually dry weather that persists long enough to cause environmental or economic problems, such as crop damage and water supply shortages.*" Extreme weather such as heat waves, heavy downpours and droughts are expected to accompanying climate change. Recent research indicates that a period of climate change may have begun.

In the 1930s-1950s the United States experienced a great drought called the "Dust Bowl." The planning area received damaging dust storms from that event which economically devastated the farming community. In June 2012, 55.79 percent of the land in the lower 48 U.S. states were in drought, the highest figure in the 12-year history of the U.S. Drought Monitor.

Droughts are frequently classified as one of following four types:

1. Meteorological – Drought defined by the level of "dryness" when compared to an average, or normal amount of precipitation over a given period of time.

2. Agricultural - Agricultural droughts relate common characteristics of drought to their specific agricultural-related impacts. Emphasis tends to be placed on factors such as soil water deficits, water needs based on differing stages of crop development, and water reservoir levels.
3. Hydrological - Hydrological drought is directly related to the effect of precipitation shortfalls on surface and groundwater supplies. Human factors, particularly changes in land use, can alter the hydrologic characteristics of a basin.
4. Socio-economic - Socio-economic drought is the result of water shortages that limit the ability to supply water dependent products in the marketplace.

In 1965, Wayne Palmer developed an index to "measure the departure of the moisture supply". Palmer based his index on the supply-and-demand concept of the water balance equation, taking into account more than only the precipitation deficit at specific locations. The objective of the Palmer Drought Severity Index (PDSI), as this index is now called, is to provide a measurement of moisture conditions that were "standardized" so that comparisons using the index could be made between locations and between months. The PDSI displayed in Table 7 is based on precipitation and temperature. The PDSI can therefore be applied to any site for which sufficient precipitation and temperature data is available. The PDSI varies roughly between -4.0 and +4.0. Weekly PDSI values are calculated for the climate divisions during every growing season and are on the Internet from the Climate Prediction Center.

Periods of drought occur on a frequent basis throughout the planning area with the PDSI values ranging from -2.0 to -3.9. Therefore, for future planning purpose, jurisdictions in Carson County can expect droughts with PDSI values ranging from -2.0 to -3.9 with the extent of drought being uniform across the planning area.

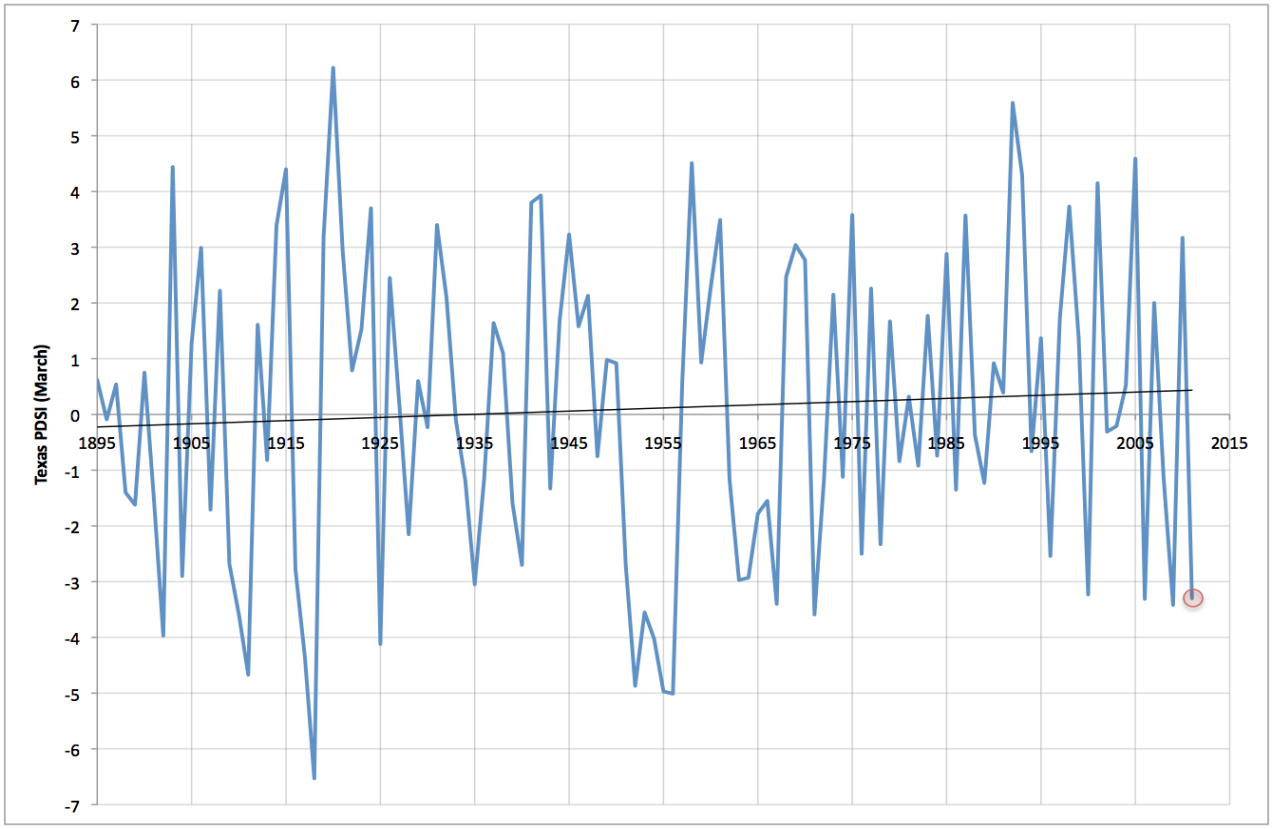
Table 14: Carson Drought Severity Index (PDSI)

PDSI Classifications for Dry and Wet Periods	
4.00 or more	Extremely wet
3.00 to 3.99	Very wet
2.00 to 2.99	Moderately wet
1.00 to 1.99	Slightly wet
0.50 to 0.99	Incipient wet spell
0.49 to -0.49	Near normal
-0.50 to -0.99	Incipient dry spell
-1.00 to -1.99	Mild drought
-2.00 to -2.99	Moderate drought
-3.00 to -3.99	Severe drought
-4.00 or less	Extreme drought

Source: ***http://drought.unl.edu/whatis/indices.htm***

The information on the table above helps to put the following chart, which provides an historical overview of droughts in Texas from 1895 – 2011, into perspective. Generally speaking; historically when it comes to a drought; as Texas goes, so goes Carson County.

Table 15: Drought History in Texas 1895-2011 [xii]



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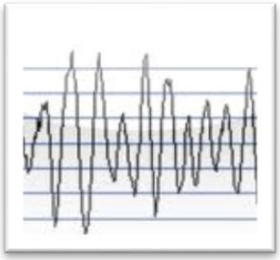
Earthquakes



An **Earthquake** is, "*A sudden movement of the Earth's lithosphere (its crust and upper mantle). Earthquakes are caused by the release of built-up stress within rocks along geologic faults or by the movement of magma in volcanic areas. They are usually followed by aftershocks*."

The Texas Panhandle sees a wide variety of weather throughout the year, but the area is also occasionally shaken by earthquakes. With respect to earthquake hazards nationally, the Panhandle is in a relatively low threat level area compared with locations along the U.S. west coast and the Intermountain West.

Within the State of Texas, the Panhandle is the geographic region with the ***second highest*** earthquake risk level (Frohlich et al. 2000). Although the exact number of earthquakes that have affected the Texas Panhandle is unknown, nearly 91 percent of the earthquakes recorded in the Panhandle since 1907 have had Richter Scale magnitudes less than 5.0. Only three known earthquakes have had magnitudes at or above 5.0. The largest known earthquake in the Texas Panhandle had a Richter Scale magnitude of 5.4 and occurred on July 30, 1925. No known earthquakes in the area have had a magnitude of 6.0 or greater, but there is no guarantee that has never happened since the seismic record is extremely small. Frohlich and Davis (2002) estimated that an earthquake with a magnitude greater than 6.0 might occur every 300 years in the Texas Panhandle, which could result in serious damage if it occurred near an inhabited location. An earthquake with a magnitude between 5.5 and 6.0 is estimated to occur every 50 to 100 years in the Texas Panhandle.

Most of the earthquakes in the Texas Panhandle occur along the boundary between the Amarillo-Wichita Uplift and the Anadarko Basin system. This area contains subterranean faults extending from just north of Amarillo into southwestern Oklahoma. Seismologists and geologists suggest that the earthquakes associated with the Amarillo-Wichita Uplift is of concern because it is geologically similar to the Reelfoot Rift (located in northeastern Arkansas), which has produced historic, powerful earth-quakes near New Madrid, Missouri. However, this is merely speculation since the largest known earthquake in the Texas Panhandle had a magnitude of 5.4. [xiii]

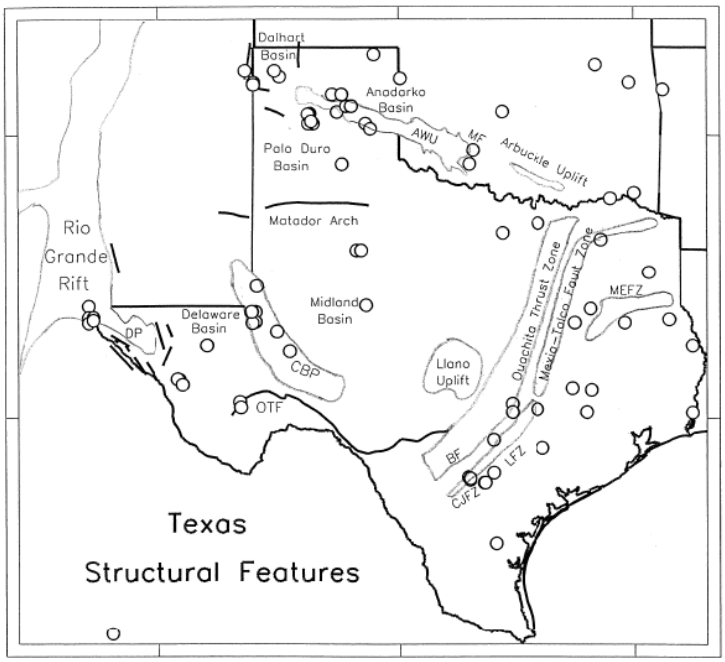


Figure 1:
Structural features of Texas

Lines indicate faults and circles are where earthquakes were felt through-out 2001. The abbreviation AWU denotes the Amarillo-Wichita Uplift (From Frohlich and Davis [2002]).

Flooding

According to the NFIP, a **Flood** is defined as "*A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from: 1) Overflow of inland or tidal waters; 2) Unusual and rapid accumulation or runoff of surface waters from any source; or, 3) Mudflow* (Mudflow is the collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.)" There are two types of floods which could *potentially* impact Carson County. Those are described below.

Riverine Floods:

Riverine floods are caused by precipitation over large areas and differ from flash floods in their extent and duration. Riverine floods take place in river systems whose tributaries may drain large geographic areas and encompass many independent river basins. Floods in large river systems may continue for periods ranging from a few hours to many days. Flood flows in large river systems are influenced primarily by variations in the intensity, amount, and distribution of precipitation. The condition of the ground, amount of soil moisture, seasonal variations in vegetation, and imperviousness due to urbanization directly affects flood runoff. The planning area has areas which are vulnerable in and around river systems; for this reason, riverine floods will be addressed within this plan.

Flash Floods:

A flash flood generally results from a torrential rain on a relatively small drainage area. Runoff from these intense rainfalls results in high flood waters that can destroy roads, bridges, homes, buildings and other community developments. Discharges quickly reach a maximum and diminish almost as rapidly. Flash floods are a potential source of destruction and a threat to public safety in areas where the terrain is steep, surface runoff rates are high, streams flow in narrow canyons and gullies, or severe thunderstorms stall over an area. The historical instances of flooding that have occurred across the planning area were all flash flood types of events. Therefore, flash flooding will be addressed within this plan.

Hail or Hailstorm

A **Hailstorm** is, "any storm that produces hailstorms that reach the ground. Ice crystals form in a low pressure front due to the rapid rising of warm air into the upper atmosphere and subsequent cooling of the air mass. Hail usually falls as shaped masses of ice greater than 0.75 inches in diameter. The size of the hail can be directly correlated with the size of the thunderstorm. Lightning accompanies hailstorms/ thunderstorms."

Hailstorms are an outgrowth of severe thunderstorms. People outdoors would be the most likely victims during a hailstorm, but the biggest threat would come from large hailstones and damage they would cause to property.

The size of hailstones is a direct function 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 function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size.

Table 16: NWS/TORRO Hail Scale

Combined NOAA/TORRO Hailstorm Intensity Scales				
Size Code	**Intensity Category**	**Typical Hail Diameter (inches)**	**Approximate Size**	**Typical Damage Impacts**
H0	Hard Hail	up to 0.33	Pea	No damage
H1	Potentially Damaging	0.33-0.60	Marble or Mothball	Slight damage to plants, crops
H2	Potentially Damaging	0.60-0.80	Dime or grape	Significant damage to fruit, crops, vegetation
H3	Severe	0.80-1.20	Nickel to Quarter	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	1.2-1.6	Half Dollar to Ping Pong Ball	Widespread glass damage, vehicle bodywork damage
H5	Destructive	1.6-2.0	Silver dollar to Golf Ball	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	2.0-2.4	Lime or Egg	Aircraft bodywork dented, brick walls pitted
H7	Very destructive	2.4-3.0	Tennis ball	Severe roof damage, risk of serious injuries
H8	Very destructive	3.0-3.5	Baseball to Orange	Severe damage to aircraft bodywork
H9	Super Hailstorms	3.5-4.0	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	4+	Softball and up	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source*: *http://www.riskfrontiers.com/damage_scales11.htm

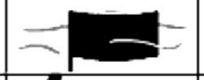
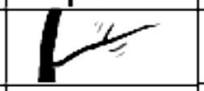
Severe Thunderstorms

A **Thunderstorm** is, "*A storm of heavy rain accompanied by lightning, thunder, wind, and sometimes hail. Thunderstorms occur when moist air near the ground becomes heated, especially in the summer, and rises, forming cumulonimbus clouds that produce precipitation. Electrical charges accumulate at the bases of the clouds until lightning is discharged. Air in the path of the lightning expands as a result of being heated, causing thunder*.

By definition, a **Severe Thunderstorm** is, "*a thunderstorm that contains any one or more of the following three weather conditions: 1) Hail that is 3/4 of an inch or greater in diameter; 2) Winds 58 miles per hour or greater; or 3) Tornadoes*."

The scale below is provided to give understanding to the third condition found in most severe thunderstorms. Created in 1805 by Admiral Beaufort, of the British navy, the Beaufort Scale was first used to describe the wind's effect on sailing ships. The chart is arranged from the numbers 0 to 12 to indicate the strength of the wind from calm (force 0) to hurricane (force 12). Though originally developed for nautical use, the scale has since been adapted for use on land.

Table 17. Beaufort Scale

Beaufort number	Wind Speed (mph)	Seaman's term		Effects on Land
0	Under 1	Calm		Calm; smoke rises vertically.
1	1-3	Light Air		Smoke drift indicates wind direction; vanes do not move.
2	4-7	Light Breeze		Wind felt on face; leaves rustle; vanes begin to move.
3	8-12	Gentle Breeze		Leaves, small twigs in constant motion; light flags extended.
4	13-18	Moderate Breeze		Dust, leaves and loose paper raised up; small branches move.
5	19-24	Fresh Breeze		Small trees begin to sway.
6	25-31	Strong Breeze		Large branches of trees in motion; whistling heard in wires.
7	32-38	Moderate Gale		Whole trees in motion; resistance felt in walking against the wind.
8	39-46	Fresh Gale		Twigs and small branches broken off trees.
9	47-54	Strong Gale		Slight structural damage occurs; slate blown from roofs.
10	55-63	Whole Gale		Seldom experienced on land; trees broken; structural damage occurs.
11	64-72	Storm		Very rarely experienced on land; usually with widespread damage.
12	73 or higher	Hurricane Force		Violence and destruction.

Source: ***http://www.almanac.com/beaufort-wind-force-scale***

Lightning is another potentially dangerous element that often accompanies thunderstorms. Lightning strikes are electrical discharges on a massive scale between the atmosphere and an earth-bound object. They mostly originate in thunderclouds and terminate on the ground, called cloud to ground (CG) lightning. However, lightning may also be initiated ground up from a very tall grounded object.

Although "lightning strike" is often used to describe all lightning; this is a bit of a misconception. Around 25% of all lightning strikes are CG events. The majority of lightning strikes occur intra-cloud (IC) or cloud to cloud (CC), where discharges only happen high in the atmosphere.

Most CG flashes only "strike" one physical location, referred to as a "termination". The primary conducting bolt, the bright coursing light that may be seen and is called a "strike", is only about one inch in diameter, but because of its extreme brilliance, it often looks much larger to the human eye. Lightning discharges are typically miles long, but certain types of horizontal discharges can be upwards of tens of miles in length. The entire flash lasts only a fraction of a second. Thunder is always produced by lightning, but very distant lightning may be seen but not heard. Lightning cannot happen in a vacuum devoid of ions, nor can thunder occur without molecules to vibrate.

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

Lightning can result in injuries, property damage and death. According to the U.S. National Weather Service, on average 73 people will die from lightning strikes each year and hundreds more will suffer life-debilitating injuries. In reviewing the NOAA storm events database, there have been no recorded instances of lightning-related injuries or deaths in Carson County.

However, anecdotally, local fire chiefs have attributed some area grass and wildland fires to dry lightning strikes and homeowners have claimed that damages done to their properties were caused by lightning.

The table to the left depicts NOAA's Lightning Activity Level index which is used as part of the National Fire Danger Rating System (NFDRS). The scale ranges from 1 to 6, reflecting the frequency and character of cloud-to-ground lightning (forecasted or observed). The scale for 1 to 5 is exponential, based on powers of 2 (*e.g.*, LAL 3 indicates twice the lightning of LAL 2). LAL 6 is a special category for dry lightning and is closely equivalent to LAL 3 in strike frequency.

Severe Thunderstorms can be complex events that may involve high winds, hail, lightning and tornados; all of which have the potential for impacting every jurisdiction within the planning area.

Tornadoes

A **Tornado** is, *"A violently rotating column of air extending from a cumulonimbus cloud to the Earth, ranging in width from a few meters to more than a kilometer and whirling at speeds between 64 km (40 mi) and 509 km (316 mi) per hour or higher with comparable updrafts in the center of the vortex. The vortex may contain several smaller vortices rotating within it. Tornadoes typically take the form of a twisting, funnel-shaped cloud extending downward from storm clouds, often reaching the ground, and dissolving into thin, ropelike clouds as the tornado dissipates. Tornadoes may travel from a few dozen meters to hundreds of kilometers along the ground. Tornadoes usually form in the tail end of violent thunderstorms, with weaker funnels sometimes forming in groups along a leading squall line of an advancing cold front or in areas near a hurricane. The strongest tornadoes, which may last several hours and travel hundreds of kilometers, can cause massive destruction in a relatively narrow strip along their path. The causes of tornado formation are not well understood."*

Each year, an average of over 1,000 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries (Texas Tech Weather Statistics, 2010). They are more likely to occur during the spring and early summer months of March through June and can occur at any time of day, but are likely to form in the late afternoon and early evening. Most Tornados are a few dozen yards wide and touchdown briefly, but even small short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and several miles long. Tornados may be described as follows:

- Tornado - A violent windstorm characterized by a twisting, funnel-shaped, cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity when cool, dry; air intersects and overrides a layer of warm, moist, air forcing the warm air to rise rapidly.
- Waterspout - Weak tornado that forms over warm water. These tornadoes are most common along the Gulf Coast and southeastern states. Waterspouts are typically weak and short-lived. Because they are so common, most go unreported unless they cause damage.

According to the National Weather Service, tornado wind speeds normally range from 40 to more than 300 miles per hour. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles.

The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, accompanied by lightning or large hail. Tornado destruction ranges from light to incredible depending on the intensity, size, and duration of the tornado. Typically, tornados cause the greatest damages to structures of light construction such as mobile homes, and tend to remain localized in impact.

The Enhanced Fujita (EF) Scale for tornadoes was developed to measure tornado strength and associated damages; it became operational on February 1, 2007. The EF Scale has the same basic design as the original Fujita scale, six categories from zero to five representing increasing degrees of damage.

It was revised to reflect better examinations of tornado damage surveys, so as to align wind speeds more closely with associated storm damage. The new scale takes into account how most structures are designed, and is thought to be a much more accurate representation of the surface wind speeds in the most violent tornadoes.

The EF Scale portrayed below on Table 5 represents the damage potential from tornadoes this community has faced in the past and will no doubt face in the future. As a tool, the EF Scale allows planners to gauge the potential damage associated with future tornadoes.

Where they have occurred within the planning area, tornadoes have ranged from EF0 to EF3; jurisdictions can expect tornadoes from EF0 to EF3. Tornados have impacted every jurisdiction in the County during the period between 2000 and 2013; therefore the extent of Tornado is considered to be uniform throughout the planning area.

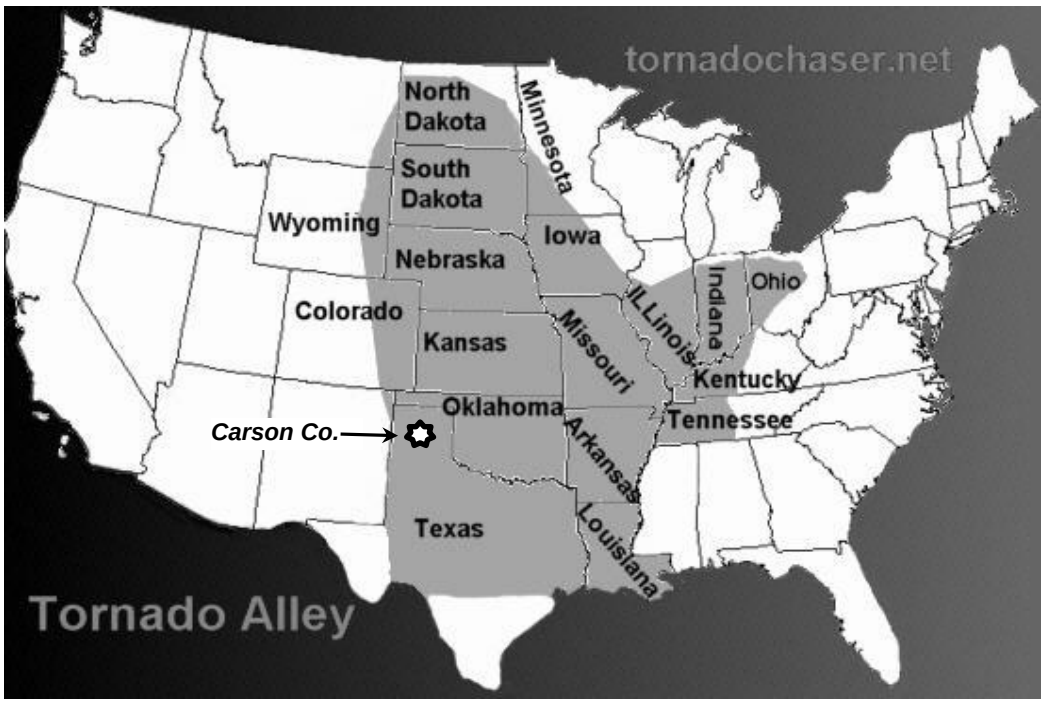
Table 18: The Enhanced Fujita (EF) Scale

Enhanced Fujita (EF) Scale		
Enhanced Fujita Category	**Wind Speed (mph)**	**Potential Damage**
EF0	65-85	**Light damage** Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	86-110	**Moderate damage** Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	**Considerable damage** Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	**Severe damage** Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	**Devastating damage** Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	>200	**Incredible damage** Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd.); high-rise buildings have significant structural deformation; incredible phenomena will occur.

Source: ***http://en.wikipedia.org/wiki/Enhanced_Fujita_Scale***

As can be seen with the figure on the following page, Carson County lies in the middle of the area of the country commonly referred to as Tornado Alley; a colloquial term used to describe that part of the United States where tornadoes have historically struck most frequently. The fact that the County sits in the middle of the Alley may in part explain why the tornados that have hit the planning area in the past have been extremely high in strength.

Figure 2: Map of Tornado Alley



***Source**: www.tornadochaser.net*

Wildfires

A **Wildfire** is "*An uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavy fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work together to increase risk of loss*."

Wildfires are part of the natural management of the Earth's ecosystems, but may also be caused by human factors. Over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. These fires are usually signaled by dense smoke that fills the area for miles around. Wildfires may be described as follows:

- Wildfire - A fire occurring in a wildland area (e.g., grasslands, forests, brush lands). An exception to this definition is a prescribed burn.
- Prescription Burning ("Controlled Burning") – The process of igniting fires under selected conditions, in accordance with strict parameters. For example, this fire may be undertaken by land management agencies is.

There are three classes of wildland fires: surface fire, ground fire, and crown fire.

1. Surface Fire – A fire that burns along the floor of a forest, moving slowly and killing or damaging trees. This is the most common wildfire.

2. Ground Fire ("Muck Fire") – Fire that is usually started by lightning or human carelessness and burns on or below the forest floor.
3. Crown Fire – Fire that spreads rapidly by wind and moves quickly by jumping along the tops of trees.

State and local governments can impose fire safety regulations on home sites and developments to help curb wildfire. Land treatment measures such as fire access roads, water storage, helipads, safety zones, buffers, firebreaks, fuel breaks, and fuel management can be designed as part of an overall fire defense system to aid in fire control. Fuel management, prescribed burning, and cooperative land management planning can also be encouraged to reduce fire hazards.

Fire probability depends on local weather conditions, outdoor activities such as camping, debris burning, and construction, and the degree of public cooperation with fire prevention measures. Drought conditions and other natural disasters (e.g., tornadoes, hurricanes, etc.) increase the probability of wildfires by producing fuel in both urban and rural settings. Fire probability may be determined by using the Keetch-Byram Drought Index (KBDI)

The KBDI is a mathematical system for relating current and recent weather conditions to potential or expected fire behavior. This system was originally developed for the southeastern United States and is based primarily on recent rainfall patterns. The KBDI presented in Table 6 is the most widely used drought index system by fire managers in the south. It is also one of the only drought index systems specifically developed to equate the effects of drought with potential fire activities. The result of this system is a drought index number ranging from 0 to 800 that accurately describes the amount of moisture that is missing. A rating of zero defines the point where there is no moisture deficiency and 800 is the maximum drought possible.

The extent of acreage burned during wildfires ranged from 85 acres to 5,166 acres. The extent of wildfire will generally be contained to those areas of the County where surface fuels are available and within the Wildland Urban Interface areas that surround the cities in the County as depicted with the maps shown beginning on page 64 of this document.

Table 19: Keetch-Byram Drought Index

Keetch-Byram Drought Index	
Drought Index #	**Potential Fire Behavior**
0 - 200	Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in spots and patches.
200 - 400	Fires more readily burn and will carry across an area with no gaps. Heavier fuels will still not readily ignite and burn. Also, expect smoldering and the resulting smoke to carry into and possibly through the night.
400 - 600	Fire 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 thorough the night and heavier fuels will actively burn and contribute to fire intensity.

***Source**: http://www.wfas.us/content/view/32/49/*

Winter Storms

A **Winter Storm** is, "*an event in which the varieties of precipitation are formed that only occur at low temperatures, such as snow or sleet, or a rainstorm where ground temperatures are low enough to allow ice to form (i.e. freezing rain). In temperate continental climates, these storms are not necessarily restricted to the winter season, but may occur in the late autumn and early spring as well*."

The difference between a blizzard and winter storms lies in the presence and strength of winds. Blizzards are massive snow storms with strong winds.

The chart below distinguishes a number of the chief characteristics of both types of storms.

Table 20: Comparison of a Blizzard to a Winter Storm

	BLIZZARD	WINTER STORM
Occurrence:	Winter	Winter, spring, autumn
Characteristics:	Severe storm with strong winds, severe temperatures and heavy snow.	Cold storm with low temperature, sleet, snow, rain and ice formations.
Economic impact:	Blizzards harm local economies and cause paralysis of normal life for days.	Infections due to frostbites, death from hypothermia, power outage, car accidents on slippery roads, fires, carbon monoxide poisoning etc. lead to disruption of life until conditions improve.
Effect:	Blizzard gives rise to a white out with minimum visibility.	Avalanches, cornices and spring flooding are common in winter storms.
Types:	Traditional and ground blizzards	Snow storm, Freezing rain storm or wintry mixes.
Forms of precipitation:	Snow	Snow, rime, ice pellets, rain, graupel (snow pellets)

Source: ***http://www.diffen.com/difference/Blizzard_vs_Winter_Storm***

Winter storms may be described as follows:

- Winter Storm – Winter storms can range from a moderate snow downfall over a period of a few hours to blizzard conditions with blinding wind-driven snow downfalls that lasts for several days. Some winter storms may be large enough to affect several states, while others may affect only a single community. Many winter storms are accompanied by low temperatures and/ or blowing snow, which can severely impair visibility. Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation.
- Sleet - Raindrops that freeze into ice pellets before reaching the ground. Sleet usually bounces off surfaces it strikes and does not stick to objects; however, sleet can accumulate like snow and cause a hazard to motorists.

- Freezing Rain - Rain that falls on a surface with a temperature below freezing, forming a glaze of ice. Even small accumulations of ice can cause a significant hazard, especially on power lines and trees.
- Ice storms occur when freezing rain falls and freezes immediately upon impact. Communications and power can be disrupted for days, and even small accumulations of ice may cause extreme hazards to motorists and pedestrians.
- Freeze is weather marked by low temperatures, especially when below the freezing point (zero degrees Celsius or thirty-two degrees Fahrenheit). Agricultural production is seriously affected when temperatures remain below the freezing point.

Every natural hazard has a direct impact on humans. Whether it involves loss of life, damage to property, or merely interruptions to normal activities that result in economic loss, natural hazards have consequences. The National Climatic Data Center (NCDC) tracks and records weather events; not only as to when they occur and how severe they might be but also how each event impacted the area in which it occurred.

The NCDC is currently developing an index to quantify the impacts from varying sized snowfall events (similar to the Modified Mercalli Intensity scale discussed later in this document) on society called the Regional Snowfall Impact Scale (ReSIS). The ReSIS considers the area of snowfall, the amount of snowfall, and the number of people living within a snowstorm to measure societal impact based on the magnitude of the event.

ReSIS has been calculated for large snowstorms dating back to 1900 and therefore the index puts a particular event into a century scale historical perspective. The index can be used along with prediction models to forecast the types of impacts that could occur. This then provides local emergency managers with a foreknowledge that can be used to mitigation the potential impacts of the event.

ReSIS Category Definitions

Category	***ReSIS Raw Score***	***Approximate Percent Of Storms***
5	>18	1%
4	10- 18	2%
3	6 – 10	5%
2	3 – 6	13%
1	1 – 3	25%
0	0 -1	54%

ReSIS is reported as both a raw index value and a categorical value from 0 through 5. The raw index value can range from 0.01 to 35.0 and are converted to categories as shown on the table to the left. A Category 5 snowstorm is a rare event while Category 0 and 1 snowstorms are quite typical. The greater the value of the Raw Score, the more significant the potential impacts on people, properties and commerce. The winter snow event that struck Carson County in Feb. 2013 had a category rating of 3.0 and was indexed at 9.53. (http://www.ncdc.noaa.gov/snow-and-ice/rsi/societal-impacts).

The wind chill temperature is simply a measure of how cold the wind makes real air temperature feel to the human body. Since wind can dramatically accelerate heat loss from the body, a blustery 30° day would feel just as cold as a calm day with 0° temperatures. The Wind Chill Chart depicted in Figure 3 was created in 1870, and on November 1, 2001, the National Weather Service released a more scientifically accurate equation.

The chart below is used for calculating wind chill. (Note: Wind Chill Chart is not applicable in calm winds or when the temperature is over 50°).

Figure 3: Wind Chill Chart

Wind Chill Chart

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

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Source: National Weather Service and NOAA

Extremely low wind chills can pose a hazard to people that work in the elements or spend extended periods out-of-doors when temperatures are low and the wind is high. Wind chill can contribute to such dangers as frostbite and hypothermia. Being exposed to below zero wind chills can induce frostbite within five minutes. While wind chills below minus 20 degrees can result in frostbite within a minute of exposure.

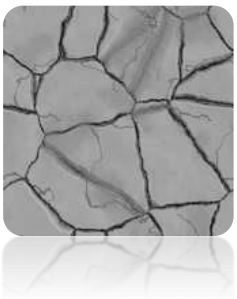
On average, Carson County and all jurisdictions within its planning area, will experience two days a year when the temperatures fall below zero but typically, extremely cold spells are fairly short-lived. Nevertheless, wind chill is a consideration in winter storm events and may prompt the opening of warming stations for individuals that may find themselves snowbound or whose homes may've lost electricity.

The best defense when outside in dangerous wind chills is to ensure that all skin, including the head, is well-covered. But even then, wind chills can still be dangerous when exposed to them for long periods of time. The best course of action is to stay indoors when these conditions exist. When that's not possible, dress in layers, and minimize skin exposure.

Hazard History

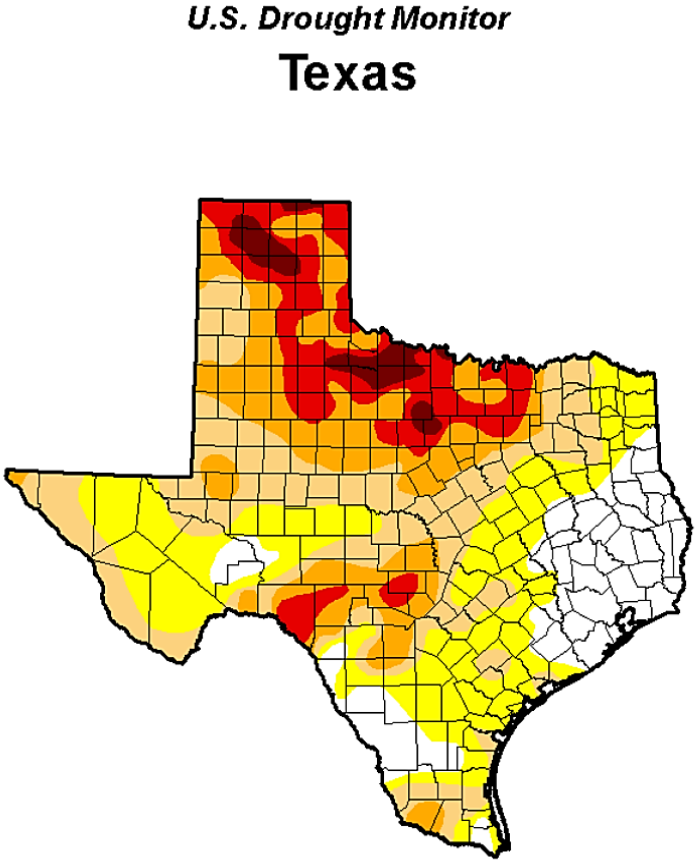
Or, "How have the Identified Hazards Impacted Carson County?"

Drought



The graphic below depicts drought conditions across Texas, current as of the date of this plan. Most of the Panhandle region was in some stage of drought from 2011-2012 but the situation has improved slightly during the past six months. As can be seen with Figure 5 below, area drought conditions have been gradually improving since the start of the year. According to the US Drought Monitor, "*Cooler, showery weather late in the period helped to offset the effects of several hot days, resulting in only minor changes to the drought depiction. There were some improvements noted in a few areas, including Texas' northern panhandle, where the coverage of extreme to exceptional drought (D3 to D4) was further reduced. Effects of the long-term drought can still be observed in low lake levels and subsoil moisture shortages. On July 27, USDA reported that subsoil moisture was rated 65% very short to short in both Oklahoma and Texas. Rangeland and pastures have exhibited some recovery and are currently rated just 24% very poor to poor in Texas*."

Figure 4: US Drought Outlook: July 2014



July 29, 2014
(Released Thursday, Jul. 31, 2014)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	15.95	84.05	58.10	32.96	14.29	2.94
Last Week 7/22/2014	16.58	83.42	57.97	33.37	14.98	3.28
3 Months Ago 4/29/2014	9.88	90.12	74.47	52.91	37.86	17.75
Start of Calendar Year 12/31/2013	28.48	71.52	43.84	21.15	5.82	0.79
Start of Water Year 10/1/2013	6.62	93.38	70.95	25.08	4.01	0.12
One Year Ago 7/30/2013	2.83	97.17	87.69	65.36	25.97	5.65

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Brad Rippey
U.S. Department of Agriculture

***Source*: http://droughtmonitor.unl.edu/**

http://droughtmonitor.unl.edu/

The table below provides context to the Intensity Classifications used on the chart above.

Table 21: Drought Severity Classification

		Ranges					
Category	**Description**	**Possible Impacts**	**Palmer Drought Index**	**CPC Soil Moisture Model (Percentiles)**	**USGS Weekly Streamflow (Percentiles**	**Standardized Precipitation Index (SPI)**	**Objective Short and Long-term Drought Indicator Blends (Percentiles)**
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered	-1.0 to -1.9	21-30	21-30	-0.5 to -0.7	21-30
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested	-2.0 to -2.9	11-20	11-20	-0.8 to -1.2	11-20
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed	-3.0 to -3.9	6-10	6-10	-1.3 to -1.5	6-10
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions	-4.0 to -4.9	3-5	3-5	-1.6 to -1.9	3-5
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0-2	0-2	-2.0 or less	0-2
Short-term drought indicator blends focus on 1-3 month precipitation. Long-term blends focus on 6-60 months. Additional indices used, mainly during the growing season, include the USDA/NASS Topsoil Moisture, Keetch-Byram Drought Index (KBDI), and NOAA/NESDIS satellite Vegetation Health Indices. Indices used primarily during the snow season and in the West include snow water content, river basin precipitation, and the Surface Water Supply Index (SWSI). Other indicators include groundwater levels, reservoir storage, and pasture/range conditions.							

This uptick in precipitation had been forecasted by the NWS Climate Prediction Center late last year. The Center also predicted that this relief could be temporary and that drought conditions might persist; possibly worsening through the end of August 2014. Yet, beyond that, there may be a return of wetter weather. Some analysts predict that the La Niña that has contributed to the region's lack of rainfall may be coming to an end and that an El Niño may arrive by late fall of 2014.

El Niño and La Niña are opposite phases of what is known as the El Niño-Southern Oscillation (ENSO) cycle. The cycle is a scientific term that describes the fluctuations in temperature between the ocean and atmosphere in the east-central Equatorial Pacific which affect global weather patterns. In the US, *La Niña* causes mostly the opposite effects of *El Niño*, above-average precipitation across the northern Midwest, the northern Rockies, Northern California, and the Pacific Northwest's southern and eastern regions. Meanwhile, precipitation in the southwestern and southeastern states is below average. An *El Niño* typically occurs every 2-7 years; lasting 9 months to 2 years. These episodes may be followed by a period of neutrality, when neither phenomenon persists or with the onset of another *La Niña*.

The Carson County MAT utilized data available from National Climatic Data Center of the National Oceanic and Atmospheric Administration (NOAA) to document the historical impacts of this hazard.

These events were recorded by NOAA and for reasons not known; the agency's record history for droughts begins much later than the records maintained for other types of weather events.

So, for the purpose of this hazard, the MAT measured the impacts of drought from 1996 through the end of 2013. The table below summarizes the drought events recorded for Carson County in that period. Over an 18-year period, 6 separate drought events were recorded in the County.

Recorded Events 2000 - 2013	Years in Record Period when Droughts occurred	Most Severe Event	Dth	Inj	PrD	CrD
6	**1996, 1998, 2000, 2005, 2012, 2013**	**2013**	**0**	**0**	**18K**	**143.5M**

Dth – *Deaths* **PrD** -*Property Damage* **Inj** – *Injuries* **CrD** -*Crop Damage*

Because the data set is relatively short, the table below lists all drought events recorded by NOAA for the planning area from the earliest recorded event through 2013. This data can be found at: http://www.ncdc.noaa.gov/stormevents/.

Table 22: Drought Data for Carson County: 1996 - 2013

Location or County	Date	Time	Type	Mag	Dth	Inj	Prd	CrD
1.Carson County	1-Apr-96	12:01 AM	Drought	N/A	0	0	0.0K	0.0K
2.Carson County	1-May-96	12:01 AM	Drought	N/A	0	0	0.0K	0.0K
3.Carson County	1-Aug-98	12:00 AM	Drought	N/A	0	0	0.0K	0.0K
4.Carson County	1-Sep-98	12:00 AM	Drought	N/A	0	0	0.0K	0.0K
5.Carson County	1-Oct-98	12:00 AM	Drought	N/A	0	0	0.0K	0.0K
6.Carson County	1-Jul-00	12:00 AM	Drought	N/A	0	0	0.0K	0.0K
7.Carson County	1-Aug-00	12:00 AM	Drought	N/A	0	0	0.0K	0.0K
8.Carson County	1-Sep-00	12:00 AM	Drought	N/A	0	0	0.0K	0.0K
9.Carson County	1-Oct-00	12:00 AM	Drought	N/A	0	0	0.0K	0.0K
10.Carson County	28-Aug-05	12:00 AM	Drought	N/A	0	0	18.00K	11.5M
11.Carson County	1-Oct-12	12:00 AM	Drought	N/A	0	0	0.0K	6.0M
12.Carson County	1-Nov-12	12:00 AM	Drought	N/A	0	0	0.0K	30.0M
13.Carson County	1-Dec-12	12:00 AM	Drought	N/A	0	0	0.0K	25.0M
14.Carson County	1-Jan-13	12:00 AM	Drought	N/A	0	0	0.0K	20.0M
15.Carson County	1-Feb-13	12:00 AM	Drought	N/A	0	0	0.0K	5.0M
16.Carson County	1-Apr-13	12:00 AM	Drought	N/A	0	0	0.0K	5.0M
17.Carson County	1-May-13	12:00 AM	Drought	N/A	0	0	0.0K	15.0M
18.Carson County	1-Jun-13	12:00 AM	Drought	N/A	0	0	0.0K	12.0M
19.Carson County	1-Jul-13	12:00 AM	Drought	N/A	0	0	0.0K	5.0M
20.Carson County	1-Aug-13	12:00 AM	Drought	N/A	0	0	0.0K	5.0M
21.Carson County	1-Sep-13	12:00 AM	Drought	N/A	0	0	0.0K	2.0M
22.Carson County	1-Oct-13	12:00 AM	Drought	N/A	0	0	0.0K	2.0M
23.Carson County	1-Nov-13	12:00 AM	Drought	N/A	0	0	0.0K	0.0K

Location or County	Date	Time	Type	Mag	Dth	Inj	Prd	CrD
24.Carson County	1-Dec-13	12:00 AM	Drought	N/A	0	0	0.0K	0.0K
			Totals		0	0	18.0K	143.5M

Dth– *Deaths* **PrD** -*Property Damage* **Inj** – *Injuries* **CrD** -*Crop Damage*

The narratives below provide more details on the extent and magnitude of the more recent drought events which resulted in property loss in Carson County. Detailed information for the majority of the events listed on the table above was never recorded. These descriptions were constructed to the extent practical, based upon the availability of data.

8/28/2005 - A severe drought caused damage to crops and livestock across the Texas Panhandle and lasted for nearly a year.

10/01/2012 –Persistent drought conditions have affected the Texas Panhandle through October. Exceptional (D4) drought affected most of Dallam County. Extreme (D3) drought affected almost all of the northern Texas Panhandle. Severe (D2) drought affected most of the southern Texas Panhandle and parts of Hartley County… Economic losses due to the drought through October were estimated near $120 million, and were predominately the result for poor growth of winter wheat, and supplemental feed for cattle in pastures and rangeland.

11/01/2012 –A dry November caused the ongoing drought conditions to worsen across the Texas Panhandle. Exceptional (D4) drought affects the majority of the north Texas Panhandle…most of the southern Texas Panhandle minus the southeastern corner of the Texas Panhandle. Severe (D2) drought affects parts of the southeastern corner of the Texas Panhandle. Economic losses through November were estimated between $20 and $30 million a county

12/01/2012 - December provided a few opportunities for improvement in drought conditions across the Texas Panhandle, but fell short of showing significant improvement. Exceptional (D4) drought affects most of the north Texas Panhandle including Carson County. Extreme (D3) drought affects most of the southern Texas Panhandle ... Severe (D2) drought affects parts of the southeastern corner of the Texas Panhandle. Economic losses through December were estimated near $15 million (D3)/$25 million (D4) a county; predominately due to poor growth of winter wheat, heavy supplemental watering, and supplemental feed for cattle in pastures and rangeland.

01/01/2013 - January provided some much needed precipitation for the southern Texas Panhandle. Exceptional (D4) drought affects the far northern Texas Panhandle including Carson County. Extreme (D3) drought affects most of the central and south central Texas Panhandle. Severe (D2) drought affects parts of the southeastern and southwestern corners of the Texas Panhandle. Economic losses due to the drought through January were estimated near $20 million (D3)/$30 million (D4) a county, and were predominately the result for poor growth of winter wheat, heavy supplemental watering, and supplemental feed for cattle in pastures and rangeland.

02/01/2013 - February brought both sporadic and widespread winter precipitation to the Texas Panhandle, which lead to a one drought category improvement for most of the region. Exceptional (D4) drought affects Dallam County. Extreme (D3) drought affects most of the northern Texas Panhandle. Severe (D2) drought affects the southwestern Texas Panhandle while the southeastern corner has dropped below the severe drought rating.

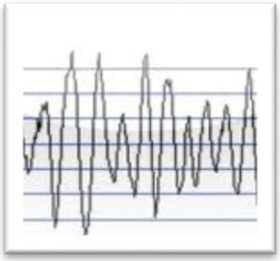
Economic losses due to the drought through February were estimated near $5 million (D2)/$10 million (D3)/$20 million (D4) a county, and were predominately the result for poor growth of winter wheat, heavy supplemental watering, and supplemental feed for cattle in pastures and rangeland.

04/01/2013 - The temporary relief brought by a late February blizzard continued to diminish due to the limited precipitation during the month of April. Over the course of the month, drought conditions degraded a full category for much of the Texas Panhandle.

Exceptional (D4) drought encompasses all of Dallam County and is affecting the extreme northern part of Hartley County. Extreme (D3) drought affects the northern and western Texas Panhandle. Severe (D2) drought affects the central and southeastern Texas Panhandle. Economic losses through April were estimated near $5 million (D2)/$10 million (D3)/$20 million (D4) a county, and were predominately the result for poor growth of winter wheat, heavy supplemental watering, reduction of cattle herd sizes, and supplemental feed for cattle in pastures and rangeland.

Drought Extent: Droughts will impact the entire County area. The impacts will likely be more damaging in the County, due to crop loss or forced relocation of cattle for grazing. However, Groom, Panhandle, Skellytown and White Deer will also feel the impacts of Drought which will cause greater demands on public drinking water supplies that could potentially lead to water rationing.

Earthquakes



By relative comparison, Carson County has experienced several *large* earthquakes during the past 100 years. The table below lists the most significant events recorded in the County; the information is available through ***www.earthquaketrack.com***. NOAA does not track and record earthquakes events. In general, almost no seismic record exists for the Panhandle prior to 1920.

However, the strongest earthquake ever to be recorded in the Texas Panhandle occurred in Panhandle in 1925 and was measured at 5.4 on the Richter Scale. The event was preceded with a series of foreshocks that were felt across the Panhandle and followed by aftershocks centered in the City of White Deer.

Table 23: Historic Earthquake Data for Carson County [xiv]

Date	Location	Richter Scale Magnitude	Modified Mercalli Intensity [1]	Comments
28-March-1917	Panhandle	3.9	VI	
30-July-1925	Panhandle-wide	4.2	IV	Foreshocks
30-July-1925	Panhandle	5.4	VI	Strongest Known
31-July-1925	White Deer	3.0	III	
20-July-1966	Carson County	4.8	VI	

According to a paper developed by NOAA, in 2002, two University of Texas geologists (Frohlich and Davis) estimated that an "*earthquake with a magnitude greater than 6.0 might occur every 300 years in the Texas Panhandle, which could result in serious damage if it occurred near an inhabited location*."

Richter Magnitude	Earthquake effects
0-2	Not felt by people
2-3	Felt little by people
3-4	Ceiling lights swing
4-5	Walls crack
5-6	Furniture moves
6-7	Some buildings collapse
7-8	Many buildings destroyed
8-Up	Total destruction of buildings, bridges and roads

This chart is intended to put the Richter values into a physical perspective. The Richter Scale is a standard scale used to measure earthquakes by recording the movement of the ground during the events. It is a logarithmic scale, meaning that the numbers on the scale measure factors of 10. So, for instance, an earthquake that measures 4.0 on the Richter Scale is 10 times stronger than one that measures 3.0. Usually, any event that registers below 2.0 on the Richter Scale will not be felt and is considered to be a "*microquake*". These mini quakes occur frequently. Moderate earthquakes typically measure below 6.0 on the Richter Scale. Earthquakes measuring more than 6.0 can cause significant damage.

The Modified Mercalli Intensity (MMI) scale provides a non-mathematical approach to measuring the physical impact of earthquake events. The effect of an earthquake on the Earth's surface is called the intensity. The MMI is the intensity scale currently being used in the US.
Developed in 1931 by the American seismologists Harry Wood and Frank Neumann, the MMI consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and finally - total destruction. It's composed of 12 increasing levels of intensity, designated by Roman numerals, which range from imperceptible shaking to catastrophic destruction. The MMI scale represents an arbitrary ranking based on *observed effects*. The table below translates the numeric values of the MMI into the effects a rated earthquake will have on an impact area.

MMI	What People Feel, or What Damage Occurs.
I	Not felt except by a very few people under special conditions. Detected mostly by instruments.
II.	Felt by a few people, especially those on the upper floors of buildings. Suspended objects may swing.
III.	Felt noticeably indoors. Standing automobiles may rock slightly.
IV.	Felt by many people indoors, by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.
V.	Felt by nearly everyone. Many people are awakened. Some dishes and windows are broken. Unstable objects are overturned.
VI.	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.

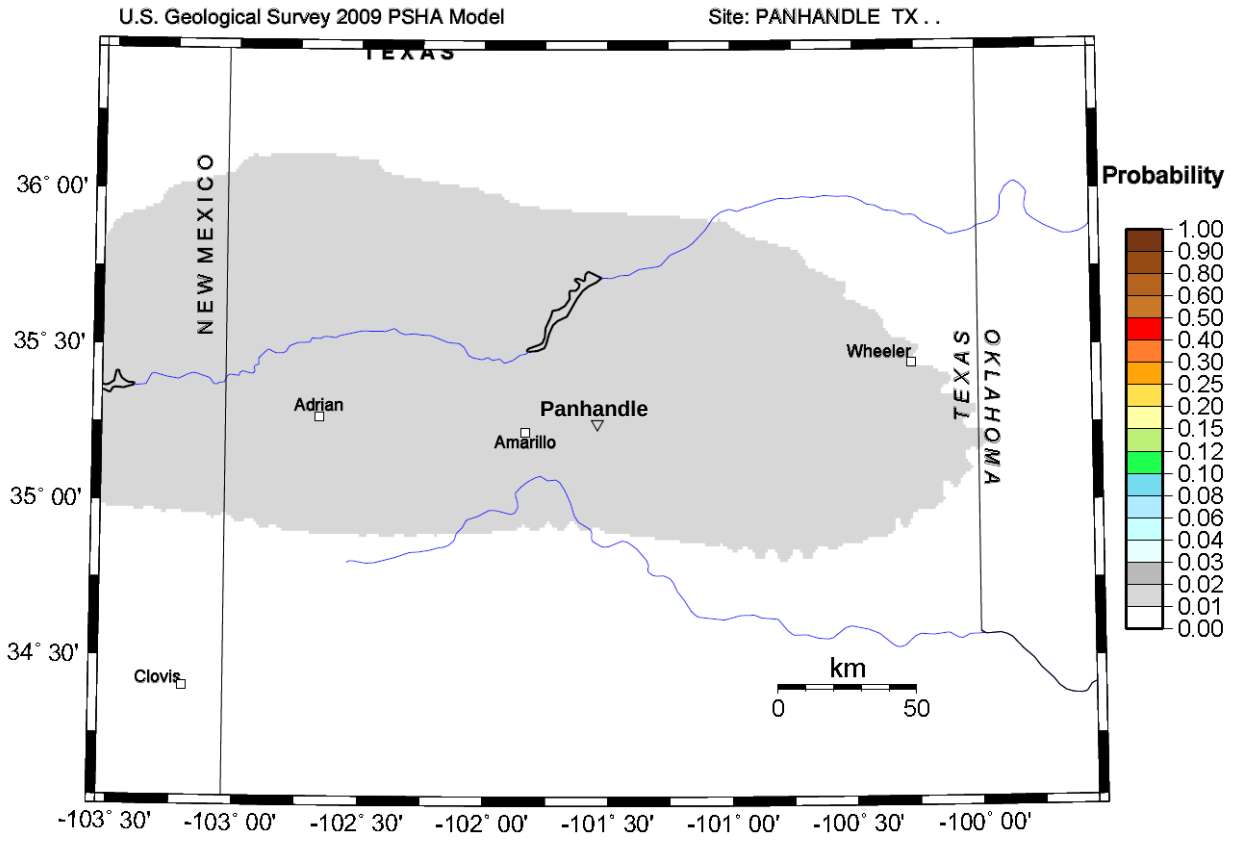
MMI	What People Feel, or What Damage Occurs.
VII.	Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction.
VIII.	Damage is slight in specially designed structures, considerable in ordinary buildings, great in poorly built structures. Heavy furniture is overturned.
IX.	Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.
X.	Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Considerable landslides occur on steep slopes.
XI.	Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.
XII.	Virtually total destruction. Waves are seen on the ground surface. Objects are thrown into the air.

In comparing earthquake risks in Carson County to other parts of Texas and the nation, Carson County is not in a high risk area. USA.com is a data aggregator website which accumulates a variety of information from many sources about specific places nationwide. The site provides summarized data on different aspects of the demographics and living conditions within specific geographic locales including data on Natural Disasters and Weather Extremes. Using their algorithms, USA.com calculated the indexed probability of a significant earthquake occurring in Carson County as being 0.00; as illustrated by the graph below.

The earthquake index value was calculated based on historical earthquake events data and is an indicator of the level of earthquake activity in a region. A higher earthquake index value means a higher chance of a significant earthquake (the number to the right of the jurisdiction name).
USA.com ranked the 254 counties in Texas based on their risk levels for earthquake, Carson County is ranked **#193** on that list; meaning that 192 other Texas counties are at greater risk of a significant earthquake event than is Carson County. Sixteen other Panhandle counties have been ranked higher.

The probability of an earthquake of severe magnitude occurring in the County at any time is relatively remote. The County will continue to experience minor earthquakes in the future but the chances of one occurring with a magnitude of 5.0 or greater within the next 50 years is less than 3% as depicted by the figure below.

Figure 5: 50 Year Projection of a >5.0 Earthquake in Carson County [xv]



However, Carson County will continue to experience microquakes and the occasional earthquake that falls into the low moderate range of the Richter Scale. This on-going activity can be attributed to man-made causes or to the geology underlying the County. Additional information concerning the potential for seismic activity in the County can be found in the Hazard Profile Worksheet section of this document.

Earthquake Extent: The impact of Earthquakes will be uniform to the entire County area. Quakes of greater magnitude than 6.0 could cause structural damage to homes and businesses throughout the County. Buried petrochemical/utility lines could shift causing line breaks or leaks. However, researchers believe that an earthquake of this magnitude is only expected to hit the Panhandle once every 300 years. Still, Carson County has witnessed some relatively large quakes over the past 100 years so this hazard cannot be totally discounted.

Flooding

The table below lists the flooding events that occurred in the planning area between 2000 and 2013. Eight significant flash flood events occurred within the area during this 14 year period. The NOAA records for these events can be found at: **http://www.ncdc.noaa.gov/stormevents/**.

Table 24: Flood Data for Carson County: 2000 - 2013

Location	Date	Type	Dth	Inj	PrD	CrD
1. WHITE DEER	5/25/2000	Flash Flood	0	0	0.00K	0.00K
2. PANHANDLE	5/30/2006	Flash Flood	0	0	0.00K	0.00K
3. WHITE DEER	9/7/2006	Flash Flood	0	0	0.00K	0.00K
4. PANHANDLE	7/7/2010	Flash Flood	0	0	0.00K	0.00K
5. PANHANDLE	6/19/2013	Flash Flood	0	0	0.00K	0.00K
6. PANHANDLE	6/19/2013	Flash Flood	0	0	0.00K	0.00K
7. WHITE DEER	6/19/2013	Flash Flood	0	0	0.00K	0.00K
8. PANTEX	6/19/2013	Flash Flood	0	0	0.00K	0.00K
Totals:			0	0	0.00K	0.00K

Dth – *Deaths* **PrD** -*Property Damage* **Inj** – *Injuries* **CrD** - *Crop Damage*

The narratives below provide more details on the extent and magnitude of the more recent flooding events within the planning area. Detailed information for the majority of the events listed on the table above was never recorded. These descriptions were constructed to the extent practical, based upon the availability of data.

07/07/10 - Local law enforcement officials reported that Farm to Market Road 293 west between Farm to Market Road 1342 and Farm to Market Road 2373 was closed due to high water and also that U.S. Highway 60 near Pantex was closed.

06/19/13 - Training thunderstorms brought heavy rain to Carson County during the morning hours of the 19th. This heavy rain caused flash flooding which swept a vehicle off of County Road 293 between County Roads J and H. A high water rescue was performed and the occupants in the vehicle were rescued uninjured.

Flooding Extent: Flash flooding will impact every jurisdiction in the planning area but will be prevalent in the unmapped, low-lying areas of Carson County and Skellytown and in the mapped SFHAs of Groom, Panhandle and White Deer. Potential impacts will likely be greater in the County, due to erosion of crop land or damage to County roads/culverts. However, Groom, Panhandle, Skellytown and White Deer will also feel the impacts of flooding due to damage foundations or temporary inundation of streets and properties. Historically, the greatest damage attributed to floods in the County occurred with property damage recorded in the unincorporated area of Carson County.

Hail or Hailstorm

The following tables, charts and narratives summarize how hail has impacted the jurisdictions in Carson County between the years 2000 and 2013. The data used to develop this profile was found on NOAA's website at: at **http://www.ncdc.noaa.gov/stormevents/**.

The entire record period is recapped below. Over the 14-year period, a total of 164 hail events were recorded in the County. The event accounts reported hailstones ranging anywhere from .75 inches in diameter up to 4. 5 inches in diameter. The average size of the hailstones involved with these events was 1.22 inches in diameter.

Recorded Events	Minimum Diameter	Maximum Diameter	Average Diameter	Dth	Inj	PrD	CrD
164	**.75 in**	**4.5 in**	**1.22 in**	**0**	**0**	**590.5K**	**80.0K**

Dth – *Deaths* **PrD** -*Property Damage* **Inj** – *Injuries* **CrD** -*Crop Damage*

The table below lists the individual hailstorm events that occurred during the record period. As can be seen from these records, hail impacts the entire planning area. During past 14 years, every part of the County experienced a hail event on multiple occasions.

Table 25: Hail Data for Carson County: 2000 - 2013

Location	Date	Mag	Dth	Inj	PrD	CrD
1. CONWAY	3/7/2000	0.75 in.	0	0	0.00K	0.00K
2. PANHANDLE	3/7/2000	1.00 in.	0	0	0.00K	0.00K
3. WHITE DEER	4/30/2000	0.88 in.	0	0	0.00K	0.00K
4. GROOM	4/30/2000	1.75 in.	0	0	0.00K	0.00K
5. PANHANDLE	5/20/2000	0.75 in.	0	0	0.00K	0.00K
6. SKELLYTOWN	5/24/2000	0.88 in.	0	0	0.00K	0.00K
7. WHITE DEER	5/25/2000	0.75 in.	0	0	0.00K	0.00K
8. PANHANDLE	5/25/2000	1.00 in.	0	0	0.00K	0.00K
9. PANTEX	5/25/2000	1.25 in.	0	0	0.00K	0.00K
10. PANHANDLE	5/25/2000	1.00 in.	0	0	0.00K	0.00K
11. PANTEX	6/9/2000	0.75 in.	0	0	0.00K	0.00K
12. PANHANDLE	6/25/2000	2.25 in.	0	0	0.00K	0.00K
13. WHITE DEER	6/25/2000	1.25 in.	0	0	0.00K	0.00K
14. CONWAY	6/25/2000	1.75 in.	0	0	0.00K	0.00K
15. WHITE DEER	10/31/2000	0.75 in.	0	0	0.00K	0.00K
16. PANHANDLE	4/6/2001	0.75 in.	0	0	0.00K	0.00K
17. WHITE DEER	4/6/2001	0.88 in.	0	0	0.00K	0.00K
18. SKELLYTOWN	4/30/2001	1.50 in.	0	0	0.00K	0.00K
19. WHITE DEER	4/30/2001	0.75 in.	0	0	0.00K	0.00K
20. WHITE DEER	4/30/2001	1.75 in.	0	0	0.00K	0.00K

Location	Date	Mag	Dth	Inj	PrD	CrD
21. PANHANDLE	4/30/2001	2.50 in.	0	0	70.00K	0.00K
22. PANTEX	5/17/2001	1.75 in.	0	0	0.00K	0.00K
23. CONWAY	5/17/2001	1.75 in.	0	0	0.00K	0.00K
24. GROOM	5/17/2001	0.75 in.	0	0	0.00K	0.00K
25. CONWAY	5/17/2001	2.00 in.	0	0	0.00K	0.00K
26. MCBRIDE	5/26/2001	1.00 in.	0	0	0.00K	0.00K
27. YARNALL	5/29/2001	0.88 in.	0	0	0.00K	0.00K
28. PANHANDLE	5/29/2001	0.75 in.	0	0	0.00K	0.00K
29. WHITE DEER	5/29/2001	1.25 in.	0	0	0.00K	0.00K
30. PANTEX	9/2/2001	1.75 in.	0	0	0.00K	0.00K
31. PANTEX	9/19/2001	1.50 in.	0	0	0.00K	0.00K
32. PANTEX	9/19/2001	1.75 in.	0	0	0.00K	0.00K
33. SKELLYTOWN	4/12/2002	1.75 in.	0	0	0.00K	0.00K
34. MCBRIDE	5/23/2002	1.00 in.	0	0	0.00K	0.00K
35. PANHANDLE	5/26/2002	0.75 in.	0	0	0.00K	0.00K
36. WHITE DEER	5/26/2002	0.75 in.	0	0	0.00K	0.00K
37. PANTEX	5/27/2002	0.75 in.	0	0	0.00K	0.00K
38. PANHANDLE	5/27/2002	0.95 in.	0	0	0.00K	0.00K
39. PANTEX	5/27/2002	0.75 in.	0	0	0.00K	0.00K
40. CONWAY	5/27/2002	0.75 in.	0	0	0.00K	0.00K
41. PANHANDLE	6/10/2002	0.75 in.	0	0	0.00K	0.00K
42. WHITE DEER	6/10/2002	0.88 in.	0	0	0.00K	0.00K
43. WHITE DEER	6/12/2002	2.75 in.	0	0	0.00K	0.00K
44. WHITE DEER	6/13/2002	0.75 in.	0	0	0.00K	0.00K
45. PANHANDLE	6/15/2002	0.75 in.	0	0	0.00K	0.00K
46. PANTEX	6/15/2002	0.88 in.	0	0	0.00K	0.00K
47. CONWAY	6/15/2002	0.75 in.	0	0	0.00K	0.00K
48. CONWAY	6/15/2002	0.88 in.	0	0	0.00K	0.00K
49. WHITE DEER	6/26/2002	0.75 in.	0	0	0.00K	0.00K
50. PANTEX	6/26/2002	0.88 in.	0	0	0.00K	0.00K
51. CONWAY	5/15/2003	1.00 in.	0	0	0.00K	0.00K
52. PANHANDLE	5/15/2003	1.00 in.	0	0	0.00K	0.00K
53. WHITE DEER	5/15/2003	1.00 in.	0	0	0.00K	0.00K
54. SKELLYTOWN	5/24/2003	0.88 in.	0	0	0.00K	0.00K
55. PANHANDLE	5/24/2003	0.88 in.	0	0	0.00K	60.00K
56. PANHANDLE	4/8/2004	0.88 in.	0	0	0.00K	0.00K
57. GROOM	4/19/2004	0.75 in.	0	0	0.00K	0.00K
58. WHITE DEER	4/19/2004	1.00 in.	0	0	0.00K	0.00K
59. WHITE DEER	4/25/2004	0.88 in.	0	0	0.00K	0.00K

Location	Date	Mag	Dth	Inj	PrD	CrD
60. PANHANDLE	4/25/2004	1.00 in.	0	0	0.00K	0.00K
61. WHITE DEER	6/4/2004	0.75 in.	0	0	0.00K	0.00K
62. MCBRIDE	6/17/2004	1.75 in.	0	0	0.00K	0.00K
63. MCBRIDE	6/24/2004	0.75 in.	0	0	0.00K	0.00K
64. PANHANDLE	4/17/2005	0.88 in.	0	0	0.00K	0.00K
65. WHITE DEER	5/10/2005	0.88 in.	0	0	0.00K	0.00K
66. SKELLYTOWN	5/10/2005	1.75 in.	0	0	0.00K	0.00K
67. CONWAY	5/12/2005	1.75 in.	0	0	0.00K	0.00K
68. WHITE DEER	5/12/2005	1.00 in.	0	0	0.00K	0.00K
69. SKELLYTOWN	5/12/2005	0.88 in.	0	0	0.00K	0.00K
70. SKELLYTOWN	6/9/2005	1.75 in.	0	0	0.00K	0.00K
71. PANTEX	6/9/2005	0.88 in.	0	0	0.00K	0.00K
72. PANHANDLE	6/9/2005	1.20 in.	0	0	0.00K	0.00K
73. PANTEX	6/9/2005	2.50 in.	0	0	0.00K	0.00K
74. WHITE DEER	6/9/2005	0.88 in.	0	0	0.00K	0.00K
75. SKELLYTOWN	8/26/2005	1.75 in.	0	0	0.00K	0.00K
76. PANTEX	8/26/2005	1.00 in.	0	0	0.00K	0.00K
77. WHITE DEER	5/2/2006	0.88 in.	0	0	0.00K	0.00K
78. GROOM	5/2/2006	1.75 in.	0	0	0.00K	0.00K
79. PANHANDLE	5/9/2006	1.50 in.	0	0	0.00K	0.00K
80. GROOM	5/9/2006	1.75 in.	0	0	0.00K	0.00K
81. MCBRIDE	5/21/2006	0.88 in.	0	0	0.00K	0.00K
82. PANHANDLE	5/25/2006	1.00 in.	0	0	0.00K	0.00K
83. PANHANDLE	5/30/2006	0.75 in.	0	0	0.00K	0.00K
84. PANTEX	5/30/2006	1.00 in.	0	0	0.00K	0.00K
85. PANHANDLE	5/30/2006	0.88 in.	0	0	0.00K	0.00K
86. PANHANDLE	5/30/2006	1.00 in.	0	0	0.00K	0.00K
87. MCBRIDE	6/21/2006	0.88 in.	0	0	0.00K	0.00K
88. PANTEX	6/21/2006	1.00 in.	0	0	0.00K	0.00K
89. PANHANDLE	6/21/2006	1.00 in.	0	0	0.00K	0.00K
90. MCBRIDE	6/22/2006	1.75 in.	0	0	0.00K	0.00K
91. GROOM	3/10/2007	1.00 in.	0	0	0.00K	0.00K
92. PANHANDLE	3/10/2007	1.00 in.	0	0	0.00K	0.00K
93. PANTEX	3/28/2007	2.75 in.	0	0	14.00K	0.00K
94. PANHANDLE	3/28/2007	2.75 in.	0	0	0.00K	0.00K
95. PANHANDLE	4/13/2007	0.88 in.	0	0	0.00K	0.00K
96. PANHANDLE	4/23/2007	1.00 in.	0	0	0.00K	0.00K
97. WHITE DEER	4/23/2007	0.88 in.	0	0	0.00K	0.00K
98. WHITE DEER	5/21/2007	0.75 in.	0	0	0.00K	0.00K

Location	Date	Mag	Dth	Inj	PrD	CrD
99. PANHANDLE	6/19/2007	1.00 in.	0	0	0.00K	0.00K
100.ABELL	8/9/2007	0.75 in.	0	0	0.00K	0.00K
101.CONWAY	8/24/2007	1.75 in.	0	0	0.00K	0.00K
102.LARK	10/13/2007	0.75 in.	0	0	0.00K	0.00K
103.GROOM	4/9/2008	1.20 in.	0	0	0.00K	0.00K
104.GROOM	6/8/2008	0.88 in.	0	0	0.00K	0.00K
105.MASTERSON	6/14/2008	0.88 in.	0	0	0.00K	0.00K
106.SKELLYTOWN	6/14/2008	0.88 in.	0	0	0.00K	0.00K
107.PANHANDLE	6/14/2008	1.00 in.	0	0	0.00K	0.00K
108.MASTERSON	6/19/2008	1.00 in.	0	0	0.00K	0.00K
109.PANTEX	6/19/2008	1.75 in.	0	0	500.00K	0.00K
110.MCBRIDE	4/29/2009	1.75 in.	0	0	0.00K	0.00K
111.MCBRIDE	4/29/2009	1.50 in.	0	0	0.00K	0.00K
112.PANHANDLE	4/29/2009	1.00 in.	0	0	0.00K	0.00K
113.WHITE DEER	4/29/2009	1.75 in.	0	0	0.00K	0.00K
114.PANHANDLE	4/29/2009	1.00 in.	0	0	0.00K	0.00K
115.PANHANDLE	4/29/2009	1.25 in.	0	0	0.00K	0.00K
116.PANHANDLE	5/25/2009	1.00 in.	0	0	0.00K	0.00K
117.MCBRIDE	6/5/2009	0.75 in.	0	0	0.00K	0.00K
118.MASTERSON	6/5/2009	1.75 in.	0	0	0.00K	0.00K
119.MCBRIDE	6/5/2009	1.00 in.	0	0	0.00K	0.00K
120.MCBRIDE	6/5/2009	1.50 in.	0	0	0.00K	0.00K
121.WHITE DEER	6/5/2009	1.50 in.	0	0	0.00K	0.00K
122.GROOM	6/5/2009	1.75 in.	0	0	0.00K	0.00K
123.CONWAY	6/13/2009	1.75 in.	0	0	0.00K	0.00K
124.PANHANDLE	6/13/2009	1.75 in.	0	0	0.00K	0.00K
125.MCBRIDE	6/13/2009	1.50 in.	0	0	0.00K	0.00K
126.MCBRIDE	6/13/2009	1.25 in.	0	0	0.00K	0.00K
127.PANHANDLE	7/19/2009	1.00 in.	0	0	0.00K	0.00K
128.PANTEX	8/9/2009	0.75 in.	0	0	0.00K	0.00K
129.PANHANDLE	8/17/2009	1.00 in.	0	0	0.00K	0.00K
130.CONWAY	8/17/2009	0.75 in.	0	0	0.00K	0.00K
131.GROOM	8/17/2009	2.75 in.	0	0	5.00K	0.00K
132.GROOM	8/17/2009	2.00 in.	0	0	0.00K	0.00K
133.WHITE DEER	5/24/2010	2.50 in.	0	0	0.00K	0.00K
134.GROOM	5/24/2010	1.50 in.	0	0	0.00K	0.00K
135.WHITE DEER	5/24/2010	2.00 in.	0	0	0.00K	0.00K
136.PANTEX	5/24/2010	1.00 in.	0	0	0.00K	0.00K
137.MCBRIDE	5/24/2010	1.00 in.	0	0	0.00K	0.00K

Location	Date	Mag	Dth	Inj	PrD	CrD
138.WHITE DEER	5/24/2010	1.00 in.	0	0	0.00K	0.00K
139.GROOM	6/1/2010	1.75 in.	0	0	0.00K	0.00K
140.PANHANDLE	6/10/2010	1.00 in.	0	0	0.00K	0.00K
141.WHITE DEER	6/18/2010	0.88 in.	0	0	0.00K	0.00K
142.SKELLYTOWN	6/18/2010	0.88 in.	0	0	0.00K	0.00K
143.GROOM	6/18/2010	1.75 in.	0	0	0.00K	0.00K
144.PANHANDLE	11/7/2011	0.88 in.	0	0	0.00K	0.00K
145.PANHANDLE	2/2/2012	1.00 in.	0	0	0.00K	0.00K
146.PANHANDLE	4/6/2012	1.00 in.	0	0	0.00K	0.00K
147.WHITE DEER	4/6/2012	1.00 in.	0	0	0.00K	0.00K
148.MCBRIDE	4/11/2012	1.75 in.	0	0	0.00K	0.00K
149.CONWAY	4/26/2012	1.50 in.	0	0	0.00K	0.00K
150.SKELLYTOWN	4/29/2012	1.75 in.	0	0	0.00K	0.00K
151.GROOM	4/29/2012	1.00 in.	0	0	0.00K	0.00K
152.PANTEX	6/1/2012	1.75 in.	0	0	0.00K	0.00K
153.PANHANDLE	6/1/2012	1.75 in.	0	0	0.00K	0.00K
154.CONWAY	6/1/2012	1.00 in.	0	0	0.00K	0.00K
155.GROOM	6/6/2012	0.88 in.	0	0	0.00K	0.00K
156.GROOM	6/14/2012	0.88 in.	0	0	0.00K	0.00K
157.MCBRIDE	9/5/2012	1.00 in.	0	0	0.00K	0.00K
158.PANHANDLE	5/28/2013	1.00 in.	0	0	0.00K	0.00K
159.PANHANDLE	6/8/2013	0.88 in.	0	0	0.00K	0.00K
160.PANTEX	6/8/2013	1.75 in.	0	0	0.00K	0.00K
161.MASTERSON	6/16/2013	1.00 in.	0	0	0.00K	0.00K
162.CONWAY	6/16/2013	1.50 in.	0	0	0.00K	0.00K
163.SKELLYTOWN	6/19/2013	1.75 in.	0	0	0.00K	0.00K
164.PANHANDLE	8/14/2013	1.00 in.	0	0	0.00K	0.00K
Totals:			0	0	590.50K	80.00K

Dth – *Deaths* **PrD** -*Property Damage* **Inj** – *Injuries* **CrD** - *Crop Damage*

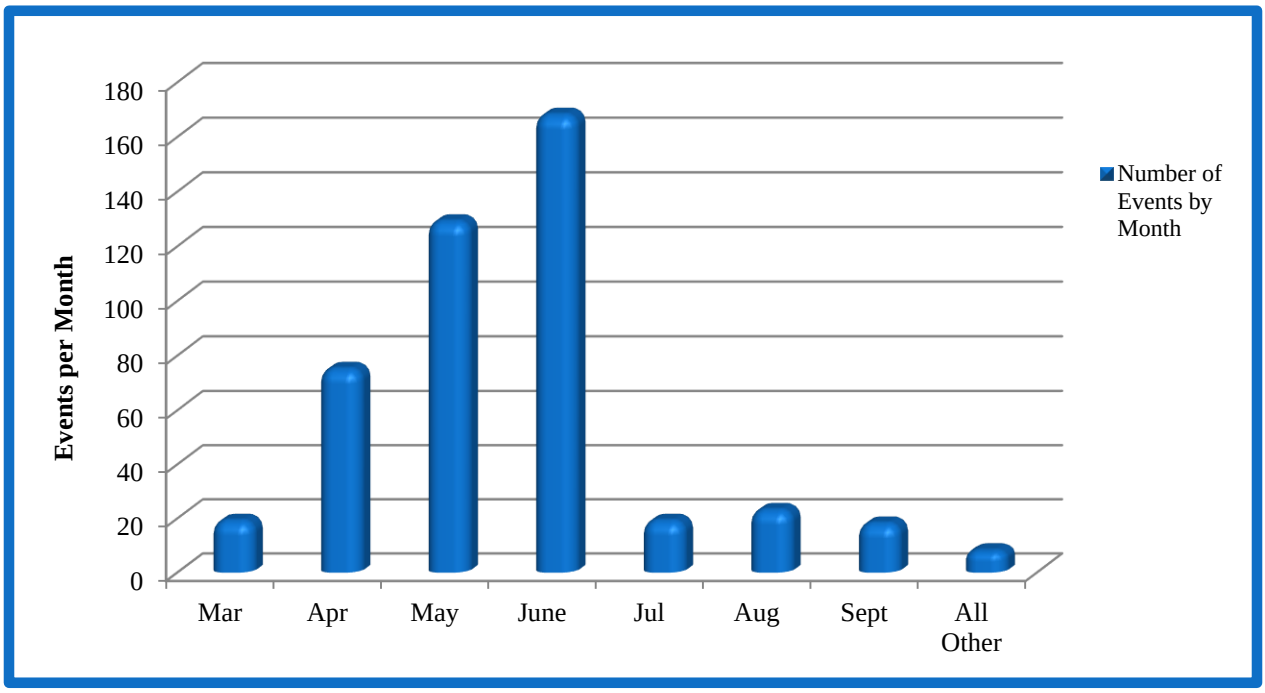
During the record period, the Cities of Groom and Panhandle, each respectively experienced an estimated $5,000 and $70,000 in property damages. There were no damages recorded in the City of Skellytown and White Deer. However, over $500,000 in damages was recorded at the Pantex Plant; the nation's last remaining nuclear weapon assembly/disassembly facility, which is located mid-way between Amarillo and Panhandle.

The impact to the County and the cities is demonstrated primarily in the damage done to roofs and windows in both public and private structures. While most homes/structures/vehicles in the County are covered by insurance, the County and cities are left with the immense task of disposing of the debris from damaged roofs and downed trees and branches.

Most vulnerable during this event are those residents who are either uninsured or underinsured and are unable to replace the damaged roof with a more suitable hail resistant replacement.

The graph below page depicts the months of the year when hailstorms are most apt to occur in the planning area. As might be expected, the most active period for hail events in the County historically occurs during the spring months.

Graph 1: Months when Hail Storms are most apt to occur in Carson County



Source: ***http://www.ncdc.noaa.gov/stormevents/***

This information coincides with the data found later in this document for severe thunderstorms and tornados; supporting the fact that hailstorms typically proceed or occur during either of those two other weather events. Historically, nearly 75% of all hailstorms that have occurred in the planning area will fall during the months of April, May and June.

The following information, which was obtained from The Weather Channel website (at: **http://www.weather.com/encyclopedia/thunder/hail.html**), helps to provide some perspective between hailstone size and other weather hazards discussed in this document.

Hail begins as tiny ice pellets that collide with water droplets. The optimum freezing level for the formation of hail is from 8,000 to 10,000 feet. The water droplets attach themselves to the ice pellets and begin to freeze as strong updraft winds toss the pellets and droplets back up into the colder regions of the upper levels of the cloud. As the attached droplets freeze, the pellets become larger.

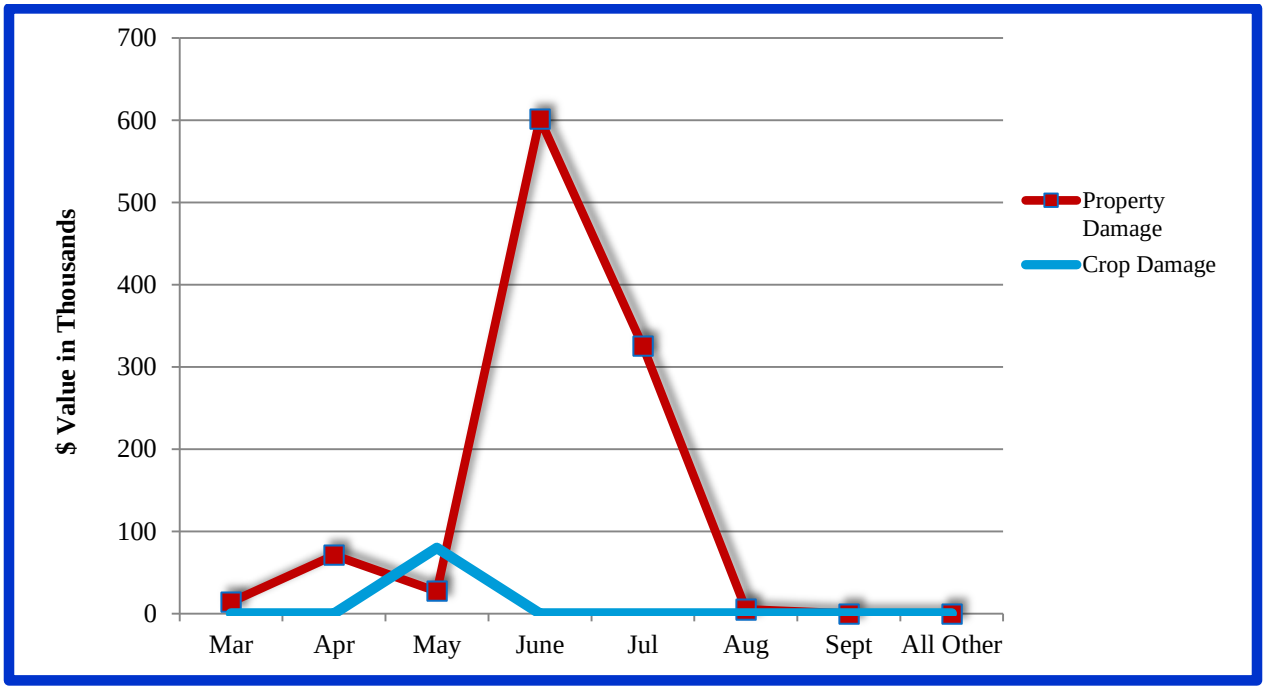
Both gravity and downdraft thunderstorm winds pull the pellets back down, where they encounter more droplets that attach and freeze as the pellets are thrown, once again, back up through the cloud.

The more times a hailstone is tossed up and down through the cloud; the larger the hailstone will be. Hailstones the size of softballs had many more trips up and down through the cloud than pea-sized hailstones.

To create pea-size hail (about 1/2 inch in diameter) winds within the thunderstorm updraft will generally be around 20 miles per hour. Quarter size hail (3/4 of an inch in diameter) requires updrafts of about 40 miles per hour. Golf ball size hail (1 3/4 inches in diameter) needs updrafts of around 55 miles per hour and softball size hail, approximately 100 miles per hour!

The chart on the following page depicts the months of the year when historically, hail events have caused damages within the planning area.

Graph 2: Months when Hail damage are most apt to occur in Carson County



Source: ***http://www.ncdc.noaa.gov/stormevents/***

The narratives below provide more details on the extent and magnitude of the more recent hailstorm events within the planning area. Detailed information for the majority of the events listed on the table above was never recorded. These descriptions were constructed to the extent practical, based upon the availability of data.

05/24/03 - Severe thunderstorms over the central and eastern Texas panhandle produced very large and damaging hail along with a couple of brief tornadoes during the evening hours. The tornadoes remained over open country and no damage or injuries were reported. A local farmer reported that the nickel sized hail flattened his wheat fields [$60,000 in crop damages].

06/19/08 - Severe thunderstorms moved southeast across the central and southern Texas Panhandle during the afternoon and early evening hours producing damaging winds and large hail.

Other severe thunderstorms with large hail moved across the northwest Texas Panhandle during the evening hours. No injuries were reported. An off-duty National Weather Service employee reported that numerous homes in eastern Carson County received considerable roof and window damage to homes...barns and other structures [$500,000 in property damages].

Hail or Hailstorm Extent: For the purpose of hail, the extent of this hazard is considered to be the entire Carson County planning area. Hailstorms have historically occurred throughout the country and it's anticipated that will continue to be the case throughout the life of this MAP update. Hailstorms have contributed to significant crop damage as the storms typically occur during June and July when some crops are at their most vulnerable. The damage is most noticeable in the destruction of roofs, broken windows and vehicles. Many of the hailstorms have been so destructive that insurance companies are forced to declare these vehicles totaled due to the hail damage on exterior.

Severe Thunderstorms

The following tables, charts and narratives summarize how severe thunderstorms have impacted the jurisdictions in Carson County between the years 2000 and 2013. There were no NOAA records found for thunderstorm events occurring prior to 1996. However, according to *USA.com*, 2,535 Thunderstorm wind events occurred within 50 miles of Carson County between 1950 and 2010. Since there is no quantifiable data behind the *USA.com* numbers, this description relies fully on the NOAA statistics which can be found on a searchable database at: **http://www.ncdc.noaa.gov/stormevents/**.

Over the 14-year record period, a total of 54 severe thunderstorm events were recorded in the County. The event accounts reported thunderstorm winds ranging anywhere from 50 knots (wind speeds of 57.6 mph) up to 79 knots (wind speeds of 91.04 mph). The average wind speed involved with these events was 57.2 knots (wind speeds of 65.72 mph). The storms that involved damages were well-dispersed across the County. During the record period, the City of Groom, Panhandle and Skellytown each respectively sustained an estimated $60,000, $161,000 and $4,200 in property damages. The City of White Deer escaped major damage from this hazard; only $3,000 in thunderstorm wind damages occurred in the City during the period. However, Conway, which is basically a zip code along with a gas station and hotel, located on I-40, sustained approximately $200,000 in thunderstorm wind-related damages over the past 17 years.

The entire record period is recapped on the table below. Over the 14-year period, a total of 54 thunderstorm events were recorded in the County. Those events have resulted in total of 1 injuries and estimated damages of $509,200.00.

Table 26: Severe Thunderstorm Data for Carson County: 2000 - 2013

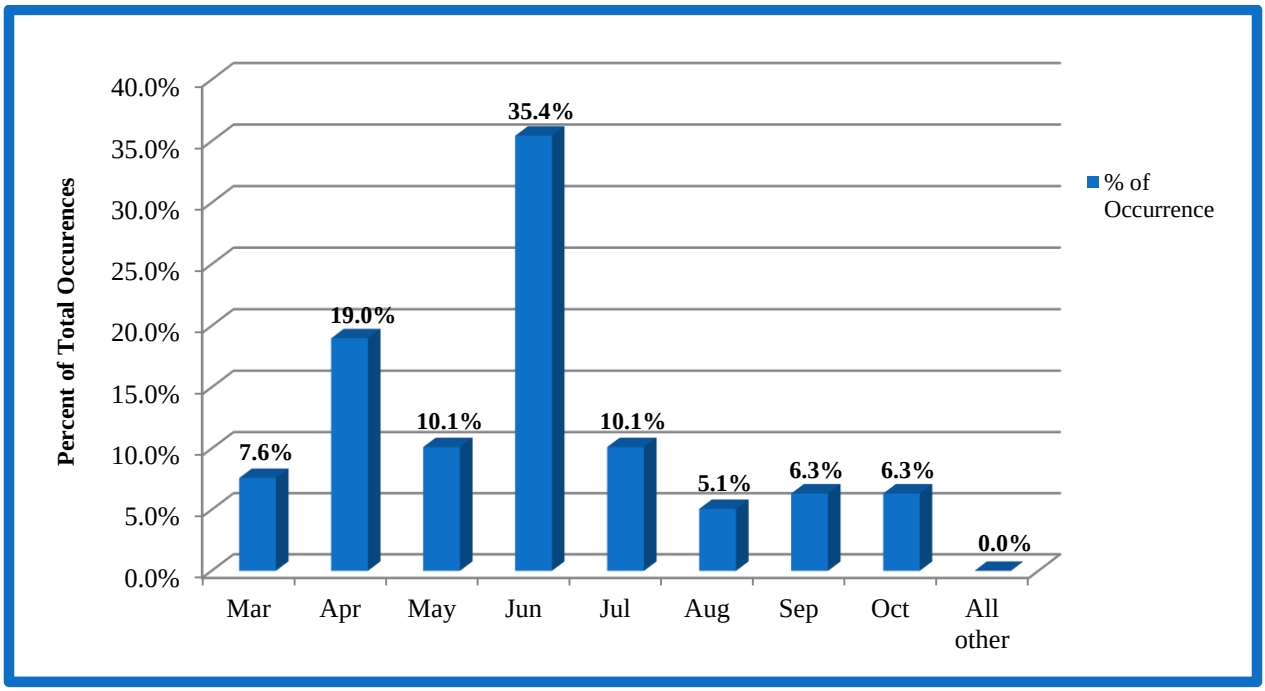
Location	Date	Average Wind	Dth	Inj	PrD	CrD
1. PANTEX	3/7/2000	63 kts. M	0	0	0.00K	0.00K
2. CONWAY	3/7/2000	60 kts. E	0	0	150.00K	0.00K
3. PANHANDLE	6/25/2000	63 kts. E	0	0	0.00K	0.00K

Location	Date	Average Wind	Dth	Inj	PrD	CrD
4. CONWAY	6/25/2000	52 kts. E	0	0	0.00K	0.00K
5. GROOM	10/28/2000	52 kts. E	0	0	0.00K	0.00K
6. PANHANDLE	4/6/2001	61 kts. E	0	0	0.00K	0.00K
7. WHITE DEER	4/6/2001	56 kts. E	0	0	0.00K	0.00K
8. CONWAY	5/17/2001	69 kts. E	0	0	0.00K	0.00K
9. CONWAY	8/23/2001	56 kts. E	0	0	0.00K	0.00K
10. WHITE DEER	5/26/2002	52 kts. E	0	0	0.00K	0.00K
11. PANTEX	6/15/2002	56 kts. E	0	0	0.00K	0.00K
12. WHITE DEER	6/26/2002	52 kts. E	0	0	0.00K	0.00K
13. CONWAY	7/27/2002	52 kts. E	0	0	0.00K	0.00K
14. PANTEX	9/5/2002	56 kts. E	0	0	0.00K	0.00K
15. PANHANDLE	9/5/2002	61 kts. E	0	0	60.00K	0.00K
16. PANTEX	10/1/2002	61 kts. E	0	0	65.00K	0.00K
17. PANHANDLE	10/1/2002	52 kts. E	0	0	30.00K	0.00K
18. PANHANDLE	4/15/2003	60 kts. EG	0	0	25.00K	0.00K
19. PANHANDLE	6/21/2004	56 kts. EG	0	0	0.00K	0.00K
20. GROOM	6/21/2004	60 kts. MG	0	0	0.00K	0.00K
21. GROOM	5/10/2005	50 kts. MG	0	0	0.00K	0.00K
22. WHITE DEER	5/31/2005	52 kts. EG	0	0	0.00K	0.00K
23. SKELLYTOWN	6/9/2005	52 kts. EG	0	0	4.00K	0.00K
24. PANHANDLE	7/2/2005	52 kts. EG	0	0	0.00K	0.00K
25. PANTEX	5/30/2006	52 kts. EG	0	0	0.00K	0.00K
26. CONWAY	6/16/2006	52 kts. EG	0	0	0.00K	0.00K
27. WHITE DEER	6/16/2006	70 kts. EG	0	0	0.00K	0.00K
28. YARNALL	8/27/2006	52 kts. EG	0	0	0.00K	0.00K
29. PANHANDLE	3/28/2007	76 kts. EG	0	0	0.00K	0.00K
30. PANHANDLE	4/12/2007	61 kts. EG	0	0	34.00K	0.00K
31. PANHANDLE	4/20/2007	64 kts. EG	0	0	8.00K	0.00K
32. WHITE DEER	6/19/2007	56 kts. EG	0	0	3.00K	0.00K
33. PANHANDLE	6/19/2007	52 kts. EG	0	0	0.00K	0.00K
34. CONWAY	10/17/2007	52 kts. EG	0	0	0.00K	0.00K
35. PANHANDLE	5/25/2008	52 kts. EG	0	0	0.00K	0.00K
36. MASTERSON	6/19/2008	70 kts. EG	0	0	0.00K	0.00K
37. PANTEX	6/19/2008	61 kts. EG	0	0	1.00K	0.00K
38. WHITE DEER	6/22/2008	56 kts. EG	0	0	0.00K	0.00K
39. PANHANDLE	4/29/2009	59 kts. MG	0	0	0.00K	0.00K
40. WHITE DEER	6/5/2009	52 kts. EG	0	0	0.00K	0.00K
41. GROOM	6/5/2009	52 kts. EG	0	0	0.00K	0.00K
42. PANHANDLE	6/14/2009	61 kts. EG	0	0	3.00K	0.00K

Location	Date	Average Wind	Dth	Inj	PrD	CrD
43. GROOM	6/27/2009	50 kts. MG	0	0	0.00K	0.00K
44. GROOM	7/28/2009	52 kts. MG	0	0	0.00K	0.00K
45. GROOM	5/24/2010	61 kts. EG	0	0	0.00K	0.00K
46. GROOM	6/10/2010	56 kts. EG	0	0	0.00K	0.00K
47. PANTEX	6/17/2010	61 kts. EG	0	0	15.00K	0.00K
48. PANHANDLE	9/13/2010	52 kts. EG	0	0	1.00K	0.00K
49. GROOM	7/29/2011	61 kts. EG	0	0	60.00K	0.00K
50. WHITE DEER	8/9/2011	52 kts. EG	0	0	0.00K	0.00K
51. WHITE DEER	4/6/2012	52 kts. MG	0	0	0.00K	0.00K
52. CONWAY	4/29/2012	61 kts. EG	0	1	50.00K	0.00K
53. GROOM	4/29/2012	52 kts. EG	0	0	0.00K	0.00K
54. SKELLYTOWN	3/8/2013	57 kts. MG	0	0	0.00K	0.00K
55. SKELLYTOWN	6/19/2013	50 kts. EG	0	0	0.20K	0.00K
Totals:			**0**	**1**	**509.20K**	**0.00K**

Dth – *Deaths* **PrD** -*Property Damage* **Inj** – *Injuries* **CrD** - *Crop Damage*

Graph 3: Months when Severe Thunderstorm are most apt to occur in Carson County



Source: *http://www.ncdc.noaa.gov/stormevents/*

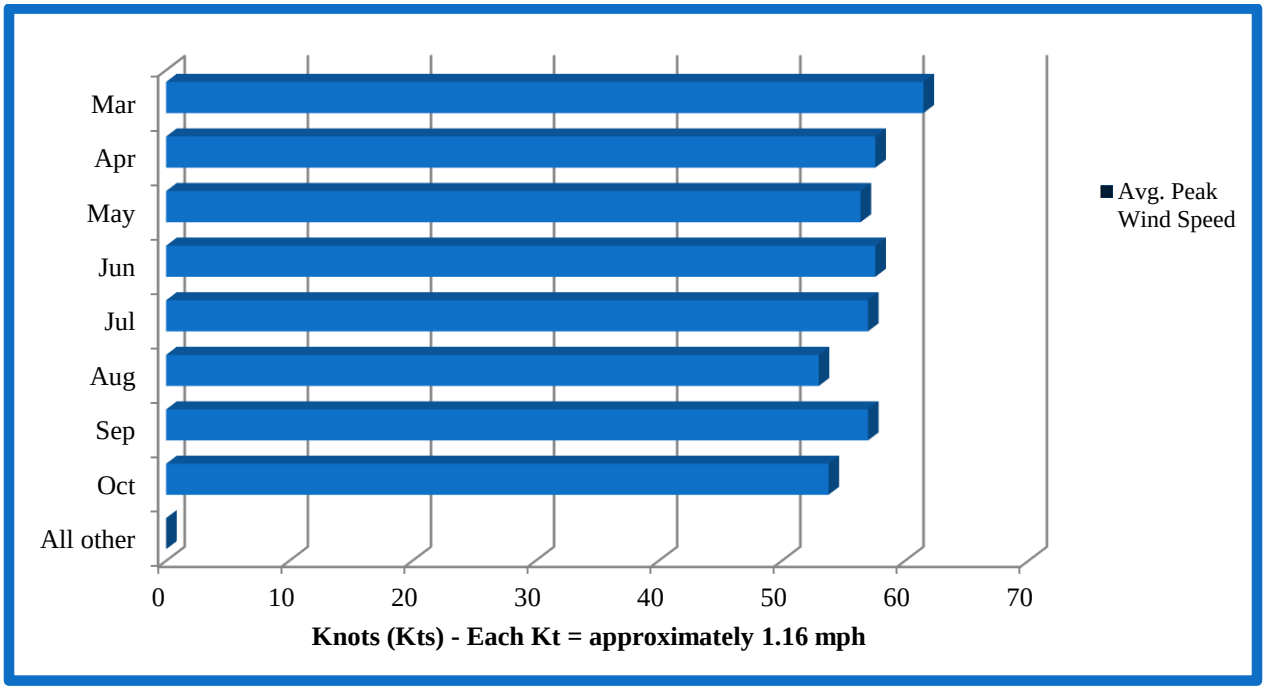
As can be seen from the graph above, which expands the sampling to all available Carson County records in the NOAA database (1996-2013), the most active time for severe thunderstorms in the planning area is typically between the months of April and June.

Approximately 64.5% of all severe thunderstorms that have occurred in Carson County during the past 17 years have struck during this 3-month period. Based on this range of historical records, the

months between November and February tend to be relatively quiet; over the past 18 years, no thunderstorm wind events occurred in Carson County during these months.

The following graph represents the average of the highest wind speed recorded for severe thunderstorms events in the planning area from 1996- 2013, by month.

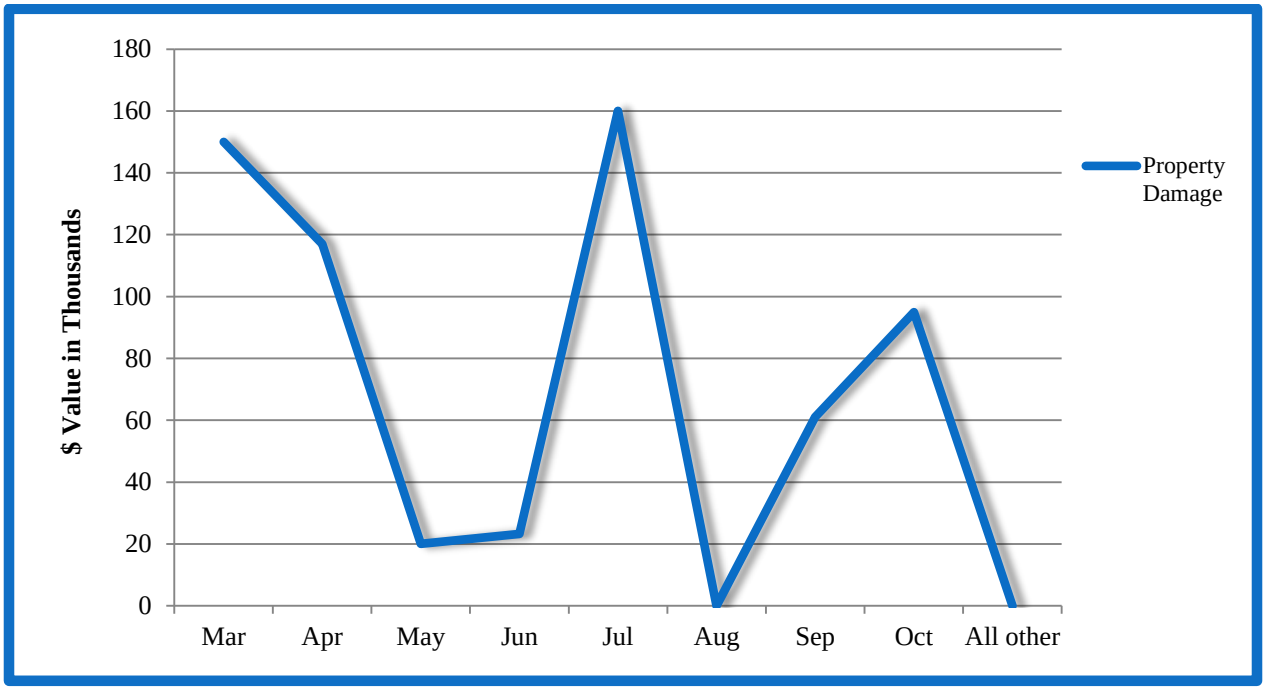
Graph 4: Months when Severe Thunderstorms winds are the strongest in Carson County



Source: ***http://www.ncdc.noaa.gov/stormevents/***

The NOAA records reflect the peak wind that occurred during a given event - the highest wind gusts recorded for the storm. Most typically, these events don't consist of straight-line winds that blow at a constant speed but the velocity will fluctuate throughout the event. Even so, short bursts of 50 – 60 Knot winds (57.6 - 74.9 MPH) can be very destructive as can be confirmed by the graph on the following page.

Graph 5: Months when Severe Thunderstorms damages are apt to occur in Carson County



Source: ***http://www.ncdc.noaa.gov/stormevents/***

The narratives below provide more details on the extent and magnitude of the more recent severe thunderstorm events in the planning area. Detailed information for the majority of the events listed on the table above was never recorded. These descriptions were constructed to the extent practical, based upon the availability of data.

09/05/02 - Severe thunderstorms producing damaging winds and large hail moved across the southern and central Texas panhandle during the early evening hours. Trucks were reported blown off the roadway and there was extensive damage to a home west of Panhandle when a large tree fell on the home [61 Knot peak wind speed; $60,000 in property damages].

04/12/07 - Severe thunderstorms which developed across the western Texas Panhandle during the evening hours moved east across the central Texas Panhandle by late evening and the early morning hours. These severe storms produced damaging winds across an extensive area across the southern Texas Panhandle and some large hail... High winds snapped power lines and knocked over a semi-trailer truck. Also...a roof was reportedly blown off of a farm house about five miles southwest of Panhandle. No injuries were reported [61 Knot peak wind speed; $34,000 in property damages].

07/29/11 - A severe thunderstorm moved across the east central Texas Panhandle during the afternoon hours and produced a thunderstorm wind gust which caused damage. Local law enforcement officials reported that a tractor trailer rig was blown off the road at mile marker 113 on Interstate 40 by a thunderstorm wind gust. There were no reports of injuries or fatalities [61 Knot peak wind speed; $60,000 in property damages].

Severe Thunderstorm Extent: For the purpose of Severe Thunderstorms, the extent of this hazard is considered to be the entire Carson County planning area; including the participating jurisdictions.

Historically, severe thunderstorms have occurred throughout the country and it's anticipated that this will continue to be the case throughout the life of this MAP update. As with hail, the impact of the wind associated with a thunderstorms contributes to the generation of debris for the county and its cities to clean up. Most significant debris is demonstrated through roof tiles, porches or exterior attachments and downed tree limbs. Mobile homes are especially vulnerable to these winds which can remove skirting and contribute to damage to the tie-downs and plumbing.

Tornadoes

The following tables, charts and narratives summarize how tornadoes have impacted the jurisidictions in Carson County between the years 2000 and 2013. The data used to develop this section was taken from the NOAA database found at: http://www.ncdc.noaa.gov/stormevents/.

Over the 14-year record period, a total of 18 Tornado events were recorded in the County. The event accounts reported tornados rated from EF0 (65-85 mph winds) to F3 (158-206 mph winds) on the Enhanced Fujita Scale/ Fujita Scale (predecessor to the EF Scale). According to the NOAA records, the tornados typically struck in the late afternoon to early evening hours; with the average time of occurrence being 5:53 PM. These 18 events resulted in 0 deaths, 0 injuries and a total of estimated damages of $375,000.00 in property damages. The entire record period is recapped on the table below.

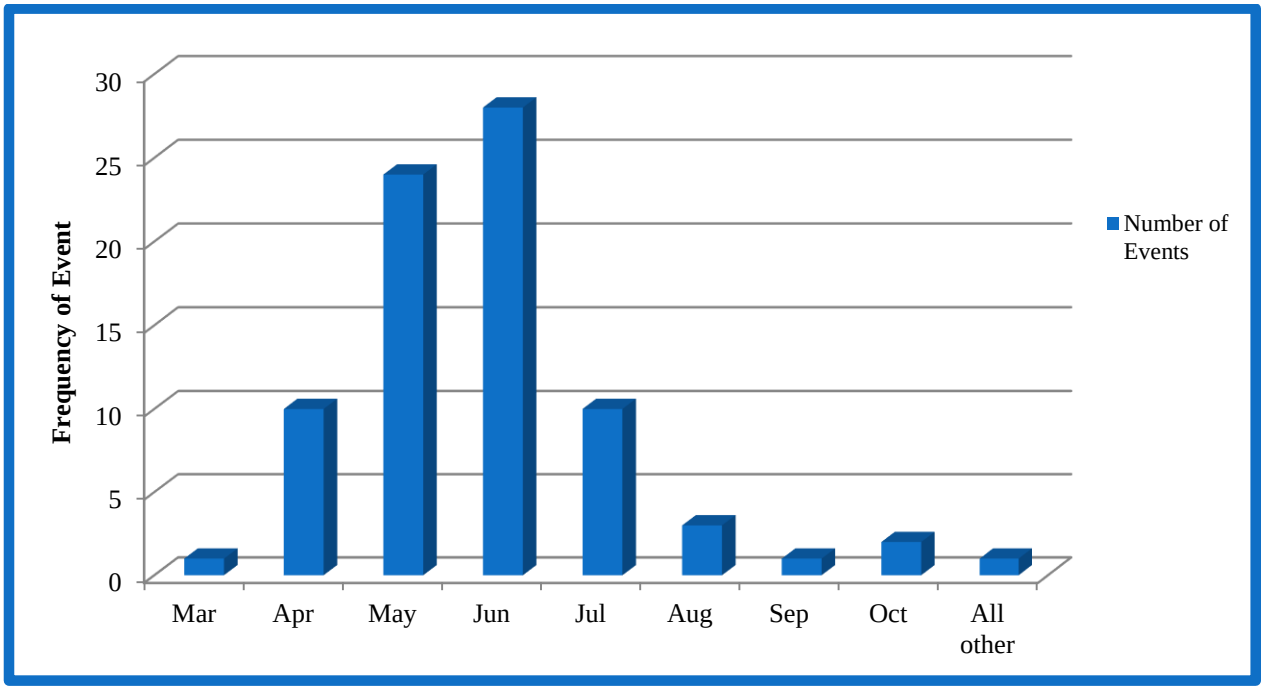
Table 27: Tornado Data for Carson County: 2000 – 2013

Location	Date	Event	Mag	Dth	Inj	PrD	CrD
1. PANHANDLE	6/25/2000	Tornado	F0	0	0	0.00K	0.00K
2. SKELLYTOWN	6/25/2000	Tornado	F0	0	0	0.00K	0.00K
3. MC BRIDE	4/10/2001	Tornado	F1	0	0	30.00K	0.00K
4. PANHANDLE	4/30/2001	Tornado	F0	0	0	0.00K	0.00K
5. POMEROY	5/29/2001	Tornado	F0	0	0	0.00K	0.00K
6. PANHANDLE	5/29/2001	Tornado	F0	0	0	0.00K	0.00K
7. CONWAY	5/29/2001	Tornado	F0	0	0	0.00K	0.00K
8. PANHANDLE	5/29/2001	Tornado	F0	0	0	0.00K	0.00K
9. PANHANDLE	5/29/2001	Tornado	F3	0	0	250.00K	0.00K
10. CONWAY	5/29/2001	Tornado	F0	0	0	0.00K	0.00K
11. PANHANDLE	9/19/2001	Tornado	F0	0	0	0.00K	0.00K
12. PANHANDLE	5/15/2003	Tornado	F0	0	0	0.00K	0.00K
13. WHITE DEER	6/9/2005	Tornado	F0	0	0	0.00K	0.00K
14. GROOM	4/21/2007	Tornado	EF2	0	0	72.00K	0.00K
15. MC BRIDE	4/29/2009	Tornado	EF1	0	0	15.00K	0.00K
16. PANHANDLE	4/29/2009	Tornado	EF0	0	0	8.00K	0.00K
17. WHITE DEER	6/5/2009	Tornado	EF0	0	0	0.00K	0.00K
18. PANTEX	12/14/2012	Tornado	EF0	0	0	0.00K	0.00K
Totals:				0	0	375.00K	0.00K

Dth – *Deaths* **PrD** -*Property Damage* **Inj** – *Injuries* **CrD** - *Crop Damage*

The graph below has expanded the sampling from 1951 (the earliest tornado record for Carson County in the NOAA database) to 2013 and illustrates when tornados have typically struck within the planning area. By far, the months of May and June have been the most active months for these types of events. Of the 80 tornados that have occurred during the 62-year span, 52 (or 65%) of them occurred in either May or June.

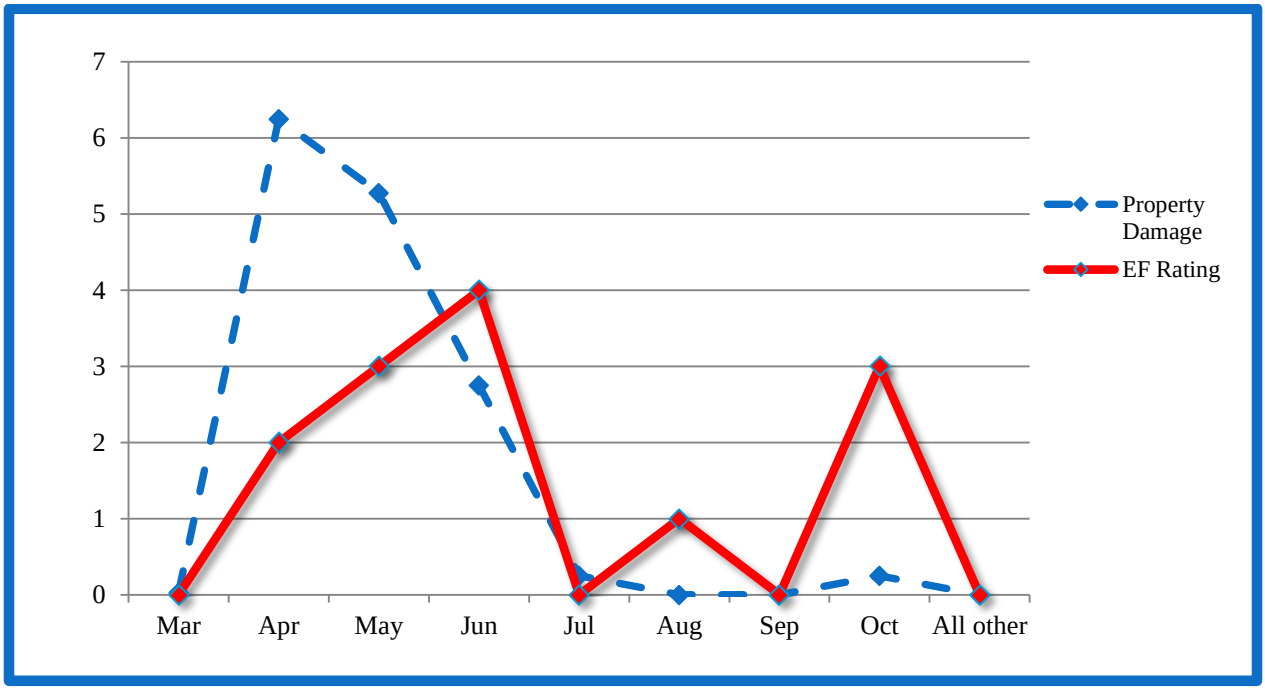
Graph 6: Months when Tornados are most apt to occur in Carson County



Source: ***http://www.ncdc.noaa.gov/stormevents/***

The graph on the following page juxtaposes data for the months when tornado damages have occurred in Carson County against the highest rated tornado event which occurred during the month. This information demonstrates that it's not always a matter of how strong a tornado is that dictates the level of damages caused but more so a matter of where the tornado happens to strike.

Graph 7: Months when Tornados damages are most apt to occur in Carson County



Source: ***http://www.ncdc.noaa.gov/stormevents/***

The narratives below provide more details on the extent and magnitude of the more recent severe tornado events within the planning area. Detailed information for the majority of the events listed on the table above was never recorded. These descriptions were constructed to the extent practical, based upon the availability of data.

05/29/01 - Severe thunderstorms produced tornadoes and large hail from the central and southern Texas panhandle into the eastern and southeastern Texas panhandle during the evening hours. The tornado destroyed an office building associated with a grain elevator...unroofed and severely damaged a nearby home...and tossed a pickup truck and suburban about fifty and one hundred yards respectively. Several cattle and one horse were reported killed or injured from the tornado. As many as fifty power poles and transmission lines were brought down from the storm. The tornado path and width were estimated and an official damage survey was made on the tornado [EF3 tornado; $250,000 in property damages].

04/21/07 - This tornado formed nine miles east northeast of Claude at 2035 CST and entered Carson County at 2037 CST one and a half miles southwest of Groom. The tornado tracked north and traveled about another ten miles before dissipating at 2110 CST ten miles east of Panhandle. In Carson County...the tornado plowed through a storage area for tractors and other farm equipment. Tractors...turbines...vehicles...cotton presser box cars similar to railroad cars were moved and thrown about in the tornado for considerable distances. Power poles were also damaged. No injuries were reported [EF2 tornado; $72,000 in property damages].

Tornado Extent: For the purpose of tornados, the extent of this hazard is considered to be the entire Carson County planning area. Tornados have historically occurred throughout the country and it's anticipated that this will continue to be the case throughout the life of this MAP update.

The impact of a tornado event to the Carson County and its cities could be disastrous depending on the strength and route of the tornado. Groom and Skellytown are both less than a square mile in size; Panhandle and White Deer are respectively 2.1 and 1.7 square miles in size. A large tornado could potentially devastate an entire city; as occurred with the EF5 tornado that struck Greensburg Kansas in 2007 (a city of 1.5 square miles). While hardened brick homes might be able to withstand the effects of a large tornado, mobile homes or pier and beam homes would likely be totally destroyed or removed so severely from their foundation that they'd be irreparable.

Wildfires

Because they occur so frequently in the County, this record of Wildfires only includes those events that have occurred since 2007, the year the original County MAP was adopted. Listed below are brief summaries of those events. These records were made available by the Texas A&M Fire Service and can be found online at: **https://www.texaswildfirerisk.com/**.

The entire record period is recapped on the table below. Over the 6-year period, Carson County Fire Departments responded to a total of 178 wildfire calls. Those events resulted in total of 101,422.27 acres damaged or destroyed and response costs to the agencies totaling $70,012.52.

Table 28: Wildfire Data for Carson County: 2007 - 2013

Date	Responding Fire Department	Acres Involved	Cost Associated with Response
1. 3/3/2007	Groom VFD	342	$132.50
2. 8/11/2007	Groom VFD	300	$212.00
3. 10/26/2007	White Deer Volunteer Fire Department	40	$106.00
4. 10/29/2007	White Deer Volunteer Fire Department	6	$104.94
5. 10/30/2007	White Deer Volunteer Fire Department	1	$53.00
6. 11/5/2007	White Deer Volunteer Fire Department	30	$66.25
7. 11/6/2007	White Deer Volunteer Fire Department	0	$66.35
8. 11/13/2007	White Deer Volunteer Fire Department	70	$172.25
9. 11/16/2007	White Deer Volunteer Fire Department	0	$75.00
10. 11/19/2007	White Deer Volunteer Fire Department	0	$154.70
11. 12/4/2007	White Deer Volunteer Fire Department	1	$53.00
12. 12/4/2007	White Deer Volunteer Fire Department	5	$159.00
13. 12/18/2007	Potter County Fire-Rescue	30	$89.51
14. 12/24/2007	Groom VFD	1	$53.00
15. 12/31/2007	White Deer Volunteer Fire Department	2	$254.23
16. 1/5/2008	Potter County Fire-Rescue	300	$695.88
17. 1/5/2008	Groom VFD	20	$159.00
18. 1/5/2008	White Deer Volunteer Fire Department	3200	$185.50
19. 1/24/2008	Fritch VFD	5	$21.90

Date	Responding Fire Department	Acres Involved	Cost Associated with Response
20. 1/31/2008	Groom VFD	5	$106.00
21. 2/1/2008	Stinnett VFD	24	$132.70
22. 2/3/2008	Groom VFD	100	$212.00
23. 2/3/2008	Stinnett VFD	90	$372.55
24. 2/10/2008	Groom VFD	1	$53.00
25. 2/22/2008	Groom VFD	1	$53.00
26. 2/22/2008	Potter County Fire-Rescue	102	$835.05
27. 3/20/2008	Groom VFD	1	$106.00
28. 5/22/2008	Groom VFD	1	$75.00
29. 5/23/2008	Groom VFD	200	$300.00
30. 5/27/2008	Groom VFD	5	$150.00
31. 7/19/2008	Groom VFD	1	$150.00
32. 8/8/2008	Groom VFD	1	$150.00
33. 8/9/2008	Groom VFD	1	$150.00
34. 9/10/2008	Fritch VFD	0.25	$112.50
35. 11/7/2008	Groom VFD	5	$150.00
36. 12/17/2008	Groom VFD	1	$75.00
37. 1/19/2009	Skellytown Volunteer Fire Dept.	320	$676.00
38. 1/19/2009	Stinnett VFD	63	$258.50
39. 1/19/2009	Fritch VFD	10	$94.00
40. 1/23/2009	Skellytown Volunteer Fire Dept.	1	$75.00
41. 1/31/2009	Groom VFD	1000	$525.00
42. 1/31/2009	Skellytown Volunteer Fire Dept.	6400	$1,690.00
43. 2/1/2009	Skellytown Volunteer Fire Dept.	1	$1,012.50
44. 2/3/2009	Skellytown Volunteer Fire Dept.	300	$600.00
45. 2/7/2009	Skellytown Volunteer Fire Dept.	1	$94.00
46. 2/28/2009	Skellytown Volunteer Fire Dept.	4	$150.00
47. 3/31/2009	Skellytown Volunteer Fire Dept.	1	$150.00
48. 4/4/2009	Skellytown Volunteer Fire Dept.	2000	$375.00
49. 4/8/2009	Skellytown Volunteer Fire Dept.	1	$75.00
50. 5/25/2009	Skellytown Volunteer Fire Dept.	1	$75.00
51. 6/7/2009	Skellytown Volunteer Fire Dept.	0.1	$75.00
52. 7/7/2009	Skellytown Volunteer Fire Dept.	1	$75.00
53. 8/7/2009	Skellytown Volunteer Fire Dept.	5	$75.00
54. 10/28/2009	Skellytown Volunteer Fire Dept.	1	$0.00
55. 12/9/2009	Borger Fire Dept.	1	$394.93
56. 1/17/2010	Skellytown Volunteer Fire Dept.	2	$300.00
57. 3/6/2010	Borger Fire Dept.	6	$117.53
58. 3/14/2010	Groom VFD	80	$225.00
59. 3/14/2010	Skellytown Volunteer Fire Dept.	100	$150.00

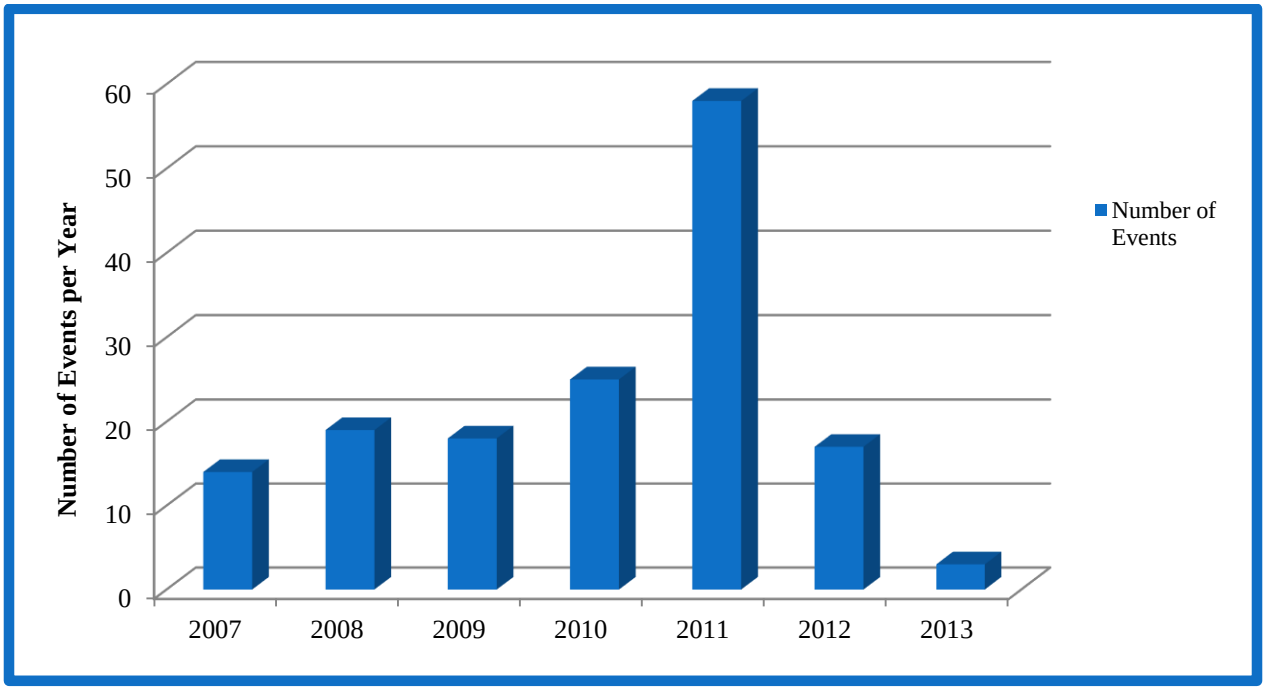
Date	Responding Fire Department	Acres Involved	Cost Associated with Response
60. 3/25/2010	Skellytown Volunteer Fire Dept.	7	$150.00
61. 4/1/2010	Skellytown Volunteer Fire Dept.	800	$1,472.00
62. 4/8/2010	Borger Fire Dept.	7	$276.00
63. 4/11/2010	Groom VFD	20	$450.00
64. 4/12/2010	Skellytown Volunteer Fire Dept.	0.1	$75.00
65. 4/29/2010	Groom VFD	1	$75.00
66. 5/4/2010	Groom VFD	1	$37.50
67. 5/18/2010	Skellytown Volunteer Fire Dept.	1	$75.00
68. 5/23/2010	Skellytown Volunteer Fire Dept.	0	$150.00
69. 6/18/2010	Groom VFD	1	$150.00
70. 6/18/2010	Borger Fire Dept.	0.5	$198.80
71. 6/21/2010	Groom VFD	0	$37.50
72. 6/27/2010	Groom VFD	25	$112.50
73. 7/7/2010	Skellytown Volunteer Fire Dept.	0	$150.00
74. 8/14/2010	Skellytown Volunteer Fire Dept.	30	$150.00
75. 8/23/2010	Skellytown Volunteer Fire Dept.	2	$610.00
76. 8/30/2010	Skellytown Volunteer Fire Dept.	75	$1,538.50
77. 8/30/2010	Borger Fire Dept.	50	$306.34
78. 10/11/2010	Skellytown Volunteer Fire Dept.	20	$900.00
79. 11/10/2010	Skellytown Volunteer Fire Dept.	1	$150.00
80. 11/11/2010	Skellytown Volunteer Fire Dept.	30	$300.00
81. 11/20/2010	Crutch Ranch VFD	3	$180.00
82. 11/21/2010	Skellytown Volunteer Fire Dept.	3	$150.00
83. 1/5/2011	Potter County Fire-Rescue	1	$1,110.00
84. 1/11/2011	Panhandle Fire Department	0	$35.00
85. 1/11/2011	Panhandle Fire Department	0.01	$28.00
86. 1/14/2011	Potter County Fire-Rescue	1	$1,170.00
87. 1/14/2011	Fritch VFD	120	$252.00
88. 1/15/2011	Panhandle Fire Department	0	$17.50
89. 1/15/2011	Skellytown Volunteer Fire Dept.	2	$150.00
90. 1/15/2011	Borger Fire Dept.	1	$176.30
91. 1/17/2011	Panhandle Fire Department	480	$192.50
92. 1/25/2011	Panhandle Fire Department	1	$84.00
93. 1/25/2011	Skellytown Volunteer Fire Dept.	1	$300.00
94. 1/29/2011	Panhandle Fire Department	0.1	$63.00
95. 2/16/2011	Panhandle Fire Department	2	$35.00
96. 2/19/2011	Panhandle Fire Department	0.1	$126.00
97. 2/27/2011	Skellytown Volunteer Fire Dept.	15	$450.00
98. 2/27/2011	Borger Fire Dept.	10	$236.00
99. 2/27/2011	Skellytown Volunteer Fire Dept.	3500	$1,500.00

Date	Responding Fire Department	Acres Involved	Cost Associated with Response
100.2/27/2011	Crutch Ranch VFD	25000	$990.00
101.2/28/2011	Borger Fire Dept.	40000	$5,798.22
102.3/3/2011	Skellytown Volunteer Fire Dept.	6	$450.00
103.3/4/2011	Fritch VFD	2200	$588.00
104.3/4/2011	Potter County Fire-Rescue	300	$3,144.00
105.3/4/2011	Sanford Volunteer Fire Department	2500	$210.00
106.3/4/2011	Skellytown Volunteer Fire Dept.	60	$591.50
107.3/17/2011	Skellytown Volunteer Fire Dept.	25	$140.00
108.3/17/2011	Skellytown Volunteer Fire Dept.	20	$630.00
109.3/25/2011	Skellytown Volunteer Fire Dept.	21	$280.00
110.4/10/2011	Skellytown Volunteer Fire Dept.	1000	$1,276.00
111.4/12/2011	Skellytown Volunteer Fire Dept.	50	$708.00
112.4/21/2011	Borger Fire Dept.	1	$270.88
113.5/8/2011	Skellytown Volunteer Fire Dept.	1	$140.00
114.5/9/2011	Skellytown Volunteer Fire Dept.	13	$560.00
115.5/23/2011	Skellytown Volunteer Fire Dept.	1	$315.00
116.5/25/2011	Skellytown Volunteer Fire Dept.	10	$462.00
117.5/29/2011	Skellytown Volunteer Fire Dept.	400	$2,520.00
118.6/13/2011	Skellytown Volunteer Fire Dept.	700	$1,260.00
119.6/15/2011	Borger Fire Dept.	150	$440.94
120.6/15/2011	Skellytown Volunteer Fire Dept.	650	$2,240.00
121.6/15/2011	Stinnett VFD	Mutual Aid	$245.00
122.6/15/2011	Fritch VFD	150	$350.00
123.6/16/2011	Skellytown Volunteer Fire Dept.	30	$70.00
124.6/19/2011	Skellytown Volunteer Fire Dept.	3	$2,240.00
125.6/27/2011	Skellytown Volunteer Fire Dept.	100	$1,078.00
126.6/27/2011	Skellytown Volunteer Fire Dept.	1	$70.00
127.6/28/2011	Skellytown Volunteer Fire Dept.	75	$420.00
128.6/28/2011	Borger Fire Dept.	2	$136.41
129.7/12/2011	Skellytown Volunteer Fire Dept.	25	$420.00
130.7/12/2011	Borger Fire Dept.	3	$397.46
131.7/12/2011	Crutch Ranch VFD	3	$140.00
132.7/12/2011	Skellytown Volunteer Fire Dept.	10	$245.00
133.7/12/2011	Skellytown Volunteer Fire Dept.	2	$210.00
134.7/13/2011	Skellytown Volunteer Fire Dept.	700	$882.00
135.7/21/2011	Skellytown Volunteer Fire Dept.	1	$140.00
136.7/21/2011	Skellytown Volunteer Fire Dept.	0.5	$35.00
137.7/30/2011	Skellytown Volunteer Fire Dept.	20	$1,400.00
138.8/1/2011	Skellytown Volunteer Fire Dept.	3000	$700.00

Date	Responding Fire Department	Acres Involved	Cost Associated with Response
139.8/2/2011	Skellytown Volunteer Fire Dept.	805	$820.00
140.8/9/2011	Skellytown Volunteer Fire Dept.	10	$84.00
141.8/9/2011	Skellytown Volunteer Fire Dept.	900	$616.00
142.9/13/2011	Skellytown Volunteer Fire Dept.	200	$210.00
143.9/20/2011	Skellytown Volunteer Fire Dept.	10	$175.00
144.10/2/2011	Skellytown Volunteer Fire Dept.	200	$210.00
145.11/11/2011	Skellytown Volunteer Fire Dept.	5	$240.00
146.1/16/2012	White Deer Volunteer Fire Department	68	$268.80
147.1/16/2012	Skellytown Volunteer Fire Dept.	68	$375.00
148.2/22/2012	Skellytown Volunteer Fire Dept.	100	$315.00
149.3/5/2012	Skellytown Volunteer Fire Dept.	15	$225.00
150.3/5/2012	Skellytown Volunteer Fire Dept.	0.5	$70.00
151.3/5/2012	White Deer Volunteer Fire Department	10	$157.08
152.3/6/2012	Skellytown Volunteer Fire Dept.	60	$825.00
153.3/19/2012	Skellytown Volunteer Fire Dept.	1	$141.00
154.5/25/2012	White Deer Volunteer Fire Department	0.5	$61.60
155.6/23/2012	Borger Fire Dept.	2	$309.50
156.6/30/2012	Skellytown Volunteer Fire Dept.	0.01	$35.00
157.7/2/2012	White Deer Volunteer Fire Department	0.5	$46.20
158.7/7/2012	Skellytown Volunteer Fire Dept.	6	$157.50
159.7/21/2012	White Deer Volunteer Fire Department	500	$280.00
160.7/30/2012	White Deer Volunteer Fire Department	150	$483.00
161.10/23/2012	Skellytown Volunteer Fire Dept.	1	$300.00
162.11/29/2012	White Deer Volunteer Fire Department	10	$385.00
163.12/9/2012	White Deer Volunteer Fire Department	0.5	$93.80
164.1/31/2013	Borger Fire Dept.	1	$70.00
165.4/22/2013	White Deer Volunteer Fire Department	2.5	$350.00
166.5/28/2013	White Deer Volunteer Fire Department	220	$487.50
167.5/28/2013	Skellytown Volunteer Fire Dept.	300	$608.00
168.8/11/2013	Skellytown Volunteer Fire Dept.	1	$140.00
169.11/13/2013	White Deer Volunteer Fire Department	6	$8.00
170.11/27/2013	White Deer Volunteer Fire Department	1.5	$74.40
171.11/30/2013	White Deer Volunteer Fire Department	0.5	$218.12
172.12/1/2013	White Deer Volunteer Fire Department	0.1	$280.50
173.12/17/2013	White Deer Volunteer Fire Department	0	$26.40
Totals:		101,422.27	$70,012.52

The graph below visually depicts the number of wildfire events that occurred across the planning area between 2007 and 2013.

Graph 8: Carson County – History of Wildfire Events 2007 - 2013



Source: ***https://www.texaswildfirerisk.com/***

The worst year for wildfires since the original Carson County MAP was written came in 2011. That year, local agencies responded to 58 calls at a cost $28,739.50. Over 44,643 acres were destroyed or damaged by those events.

It should also be noted that all fire departments in the County are fully staffed by volunteers. The Texas A&M Forest Service Fire Department Directory (at: **http://tfsfrp.tamu.edu/fdd/**) provides the following information regarding the personnel resources of the volunteer fire agencies in Carson County.

Department Name	**Active Firefighters**
Burnett (6666) Ranch	6
Groom VFD	15
Panhandle Fire Department	14
Skellytown Volunteer Fire Dept..	14
White Deer Volunteer Fire Department	16
Total Number of Volunteer Firefighters in Carson County:	**65**

Wildfire Extent: For the purpose of wildfires, the extent of this hazard is considered to be the unincorporated areas within the Carson County planning area as well as the Wildland-Urban Interface [WUI] areas that abut the Cities of Groom, Panhandle, Skellytown and White Deer (WUI is defined as the zones of transition between unoccupied land and human development). Wildfires have historically occurred in these areas of the County and it's anticipated that this will continue to be the case throughout the life of this MAP update.

Winter Storms

The tables, graphs and narratives below summarize the Winter Storm events recorded for Carson County between 2000 and 2013. All recent events are now available on a searchable NOAA database found at: **http://www.ncdc.noaa.gov/stormevents/**.

The entire record period is recapped on the table below. Over the 14-year period, a total of 31 winter storm/winter weather-related events were recorded in the County. Those events have resulted in 1 death, 1 injury and estimated damages of $746,000.00.

Recorded Events	Winter Weather	Winter Storm	Heavy Snow	Blizzard	Dth	Inj	PrD	CrD
31	**13**	**4**	**12**	**2**	**1**	**1**	**746 K**	**0K**

Dth – *Deaths* **PrD** *-Property Damage* **Inj** – *Injuries* **CrD** *-Crop Damage*

The table below provides a detailed overview of the dates on which these events occurred and the level of damages associated with each event.

Table 29 Winter Weather Data for Carson County: 2000 - 2013

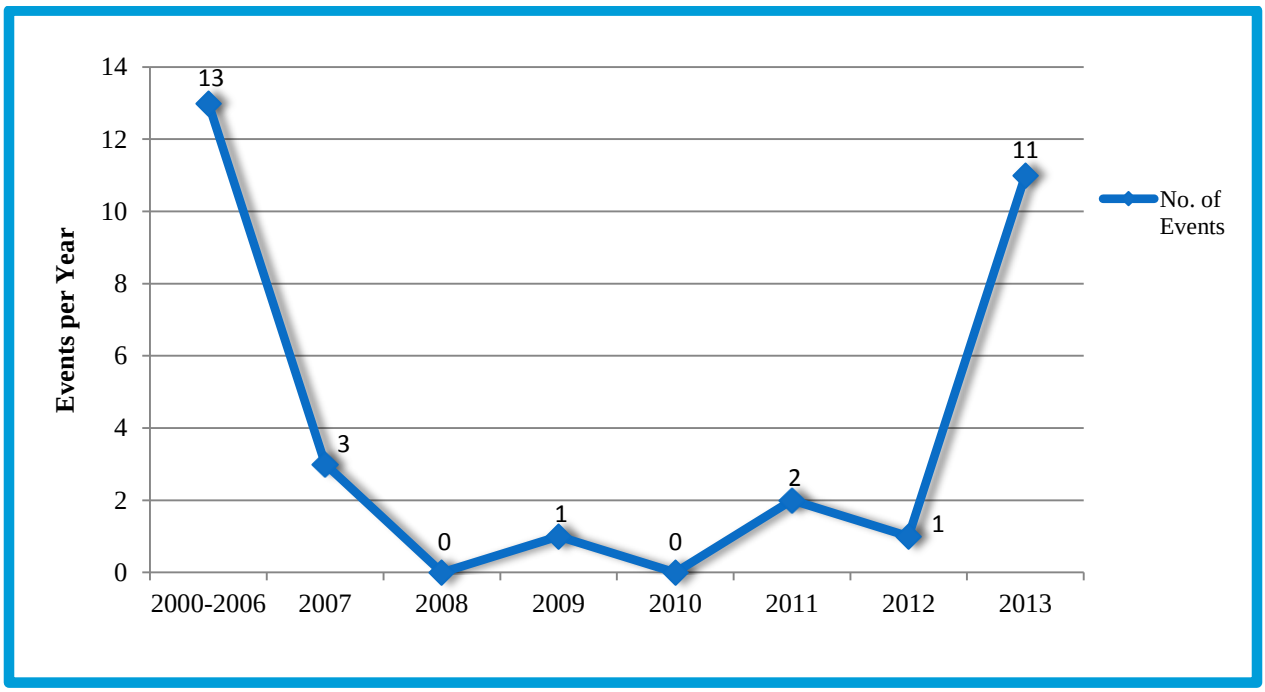
Location	Date	Average Wind	Dth	Inj	PrD	CrD
Carson	7-Nov-00	Heavy Snow	0	0	0.00K	0.00K
Carson	25-Dec-00	Heavy Snow	0	0	40.00K	0.00K
Carson	16-Jan-01	Heavy Snow	0	0	0.00K	0.00K
Carson	27-Jan-01	Winter Storm	0	0	0.00K	0.00K
Carson	30-Jan-02	Winter Storm	0	0	0.00K	0.00K
Carson	3-Dec-02	Heavy Snow	0	0	0.00K	0.00K
Carson	23-Dec-02	Heavy Snow	0	0	0.00K	0.00K
Carson	9-Feb-03	Heavy Snow	0	0	0.00K	0.00K
Carson	2-Nov-04	Heavy Snow	0	0	0.00K	0.00K
Carson	15-Mar-05	Heavy Snow	0	0	0.00K	0.00K
Carson	2-May-05	Heavy Snow	0	0	0.00K	0.00K
Carson	18-Dec-05	Winter Weather	1	1	21.00K	0.00K
Carson	30-Nov-06	Heavy Snow	0	0	0.00K	0.00K
Carson	19-Jan-07	Heavy Snow	0	0	0.00K	0.00K
Carson	24-Nov-07	Winter Weather	0	0	0.00K	0.00K
Carson	10-Dec-07	Winter Storm	0	0	0.00K	0.00K
Carson	26-Mar-09	Blizzard	0	0	0.00K	0.00K
Carson	8-Feb-11	Heavy Snow	0	0	0.00K	0.00K
Carson	25-Dec-11	Winter Weather	0	0	25.00K	0.00K
Carson	25-Dec-12	Winter Weather	0	0	0.00K	0.00K
Carson	12-Jan-13	Winter Weather	0	0	0.00K	0.00K

Location	Date	Average Wind	Dth	Inj	PrD	CrD
Carson	29-Jan-13	Winter Weather	0	0	0.00K	0.00K
Carson	12-Feb-13	Winter Storm	0	0	0.00K	0.00K
Carson	20-Feb-13	Winter Weather	0	0	0.00K	0.00K
Carson	24-Feb-13	Blizzard	0	0	660.00K	0.00K
Carson	2-Apr-13	Winter Weather	0	0	0.00K	0.00K
Carson	9-Apr-13	Winter Weather	0	0	0.00K	0.00K
Carson	21-Nov-13	Winter Weather	0	0	0.00K	0.00K
Carson	23-Nov-13	Winter Weather	0	0	0.00K	0.00K
Totals:			1	1	746.00 K	0.00 K

Dth – *Deaths* **PrD** *-Property Damage* **Inj** *– Injuries* **CrD** *-Crop Damage*

The table below depicts the years in which these 31 events have occurred. On average, Carson County will experience 1-2 storm events per year. But, as depicted by this graph, these events have occurred irregularly through the years.

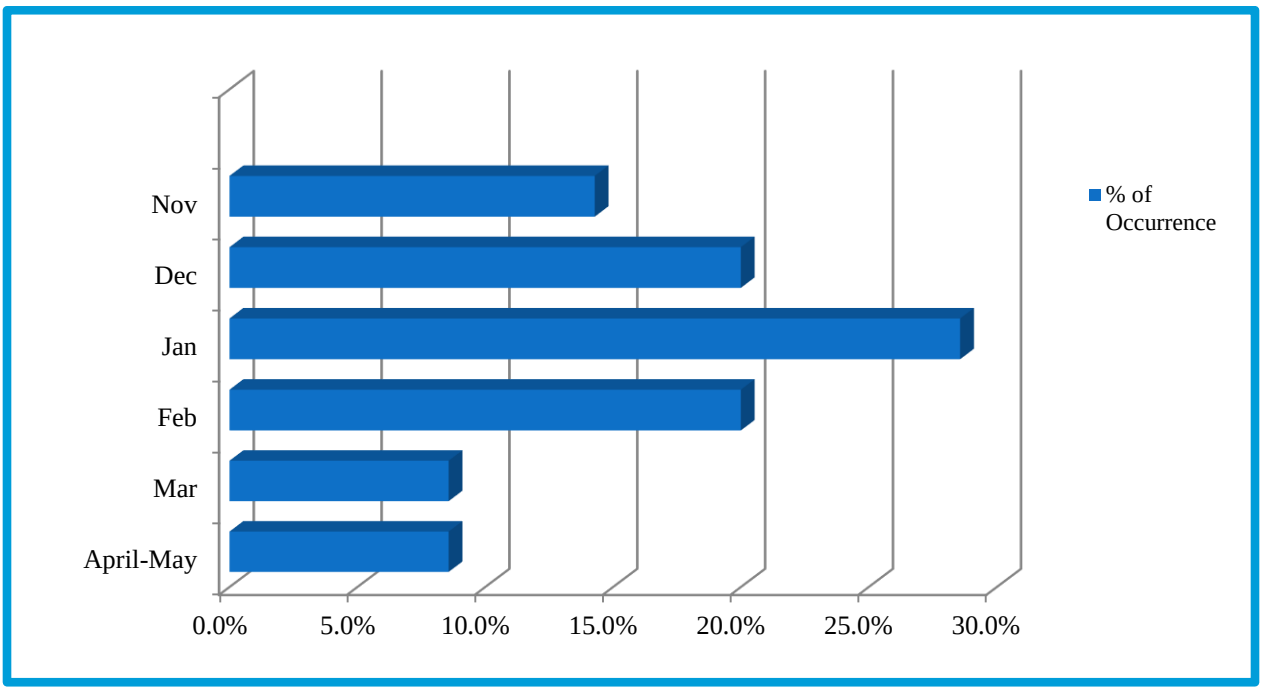
Graph 9: Carson County – History of Winter Weather Events: 2000 - 2013



Source: ***http://www.ncdc.noaa.gov/stormevents/***

However, the timing of these events has been a little more predictable. The graph on the following page depicts the months in the year when winter weather events are most likely to occur in Carson County and has expanded the sampling from 1996-2013. Over the past 17 years, 83% of all winter storm events within the planning area occurred during the months of November through February. During that timeframe, the earliest event occurred on November 2 (2004); with the latest occurring on May 2 (2005).

Graph 10: Months when Winter Storms are most apt to occur in Carson County



Source: ***http://www.ncdc.noaa.gov/stormevents/***

The narratives below provide more details on the extent and magnitude of the more recent severe winter storm/winter weather events within the planning area. Detailed information for the majority of the events listed on the table above was never recorded. These descriptions were constructed to the extent practical, based upon the availability of data.

12/25/00 - A strong storm system in the upper atmosphere moved from the four corners region moved slowly into west Texas producing heavy snowfall across the Texas panhandle. Snowfall amounts ranged from six to eight inches. Approximately thirty inches of snow collapsed the roof of a barn on a farm located ten miles northwest of Panhandle in Carson County [6”-8” snow; $40,000 in property damages].

12/25/11 - An upper level trough and cold front moved across the Texas Panhandle during the morning hours. Plenty of moisture combined with the cold air in place resulted in about one to three inches of snow across the southern and eastern Texas Panhandle. The Texas Department of Public Safety reported that one to two inches of snow in Carson county resulted in icy conditions which caused the driver of a pickup truck traveling eastbound on Interstate 40 near Groom, Texas on the Farm to Market Road 294 overpass to lose control of the vehicle around 0547CST.
The vehicle left the highway on the south side of the road and rolled down the overpass embankment. The driver died at the scene [1”-3” snow/ice, 1 fatality; $25,000 in property damages].

02/24/13 - Between the evening hours of February 24 and the afternoon hours of February 25th, widespread snowfall totals of 5 to 13 inches with a maximum of 19 inches of snow were reported across the Texas and Oklahoma Panhandle.

This snowfall crippled the Panhandles in ways not seen since the 1957 and 1934 blizzards. In Amarillo (Potter and Randall County), this blizzard was the third largest snowfall event on record, the second largest snowfall for a calendar day on record, the largest snowfall for a single day on record, and the 17 inch snow depth from 6 AM CST Tuesday, February 26th set the highest all-time snow depth at Amarillo on record. The following is a listing of the highest snow amounts per county: 14.0 inches in Panhandle (Carson County). While the total economic losses due to the blizzard remains largely undocumented, the blizzard cleanup cost the Texas Department of Transportation (TXDOT) nearly $1.6 million and cattle farmers $10.24 million in cattle losses [14" depth; $660,000 in property damages].

Winter Storm Extent: For the purpose of winter storms, the extent of this hazard is considered to be the entire Carson County planning area. Hwy 60 and Interstate 40 are the two major roadways that bisect the County. In addition to the natural winter weather inconveniences that frequently impact residents (e.g., road closures, power outages) the traveling public is also at risk whenever these types of events occur in the County. This can acerbate the burden on local first responders who not only have to attend to the needs of residents but who are also often required to rescue out-of-county travelers that become stranded on or off county roadways. During any day of the week, the traveling population on I-40 could exceed over 4,000 people traveling through the panhandle. Holiday travel can easily double that number. If the interstate closes, small town would be forced to provide basic care to thousands of stranded motorist. As witnessed by past events, significant winter weather episodes can also have devastating consequences on the County's ranching/livestock interests. Carson County does not have a hospital and therefore emergency services would be forced to provide critical care in their ambulances if major highways to the only hospitals which are located in Amarillo.

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Hazard Vulnerabilities and Profiles

The following pages provide a representation of the exposure that each jurisdiction in Carson County has to the seven hazards covered in this plan. The table below summarizes the more detailed Vulnerability worksheets that will follow. It is important to note that since this is a multi-jurisdiction plan, each jurisdiction may have prioritized the severity of the hazards differently than did their neighboring jurisdictions; depending on their perception as to the direct impact of the hazard(s) on their jurisdiction.

In reading this summary, it's also important to understand how the terminology is being used. The table below is intended to explain how the variations of Risk Level are being defined. All other terms on the summary are self-explanatory.

Risk Level	
Very High	People and facilities located in known risk areas.
High	People and facilities located in areas that have previously experienced impacts from hazards and/or in areas where impacts from hazards are possible and probable (e.g. 500 year floodplain, fringe areas along waterways, inland areas beyond coast, "tornado alley", etc.).
Limited	People and facilities located in areas that have low frequency history of impacts from hazards and/or in areas where impact is possible but not probable.
Minimal	People and facilities located in areas with no history of occurrence of hazards and/or in areas where impact is not possible or probable.

Table 30: Summary of Hazard Profiles in Carson County

Hazard	Sector	Probability of Occurrence	Warning Time	Potential Severity	Risk Level	Priority*
Drought	*Carson County*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☒ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**4**
Drought	*City of Groom*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☒ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**6**
Drought	*City of Panhandle*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☒ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**3**

Hazard	Sector	Probability of Occurrence	Warning Time	Potential Severity	Risk Level	Priority*
Drought	*City of Skellytown*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☒ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**6**
Drought	*City of White Deer*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☒ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**7**
Earthquake	*Carson County*	☐ Highly Likely ☐ Likely ☒ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☐ Minor ☒ Limited	☐ Very High ☐ High ☐ Limited ☒ Minimal	**8**
Earthquake	*City of Groom*	☐ Highly Likely ☐ Likely ☒ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☐ Minor ☒ Limited	☐ Very High ☐ High ☐ Limited ☒ Minimal	**8**
Earthquake	*City of Panhandle*	☐ Highly Likely ☐ Likely ☒ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☐ Minor ☒ Limited	☐ Very High ☐ High ☐ Limited ☒ Minimal	**8**
Earthquake	*City of Skellytown*	☐ Highly Likely ☐ Likely ☒ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☐ Minor ☒ Limited	☐ Very High ☐ High ☐ Limited ☒ Minimal	**8**
Earthquake	*City of White Deer*	☐ Highly Likely ☐ Likely ☒ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☐ Minor ☒ Limited	☐ Very High ☐ High ☐ Limited ☒ Minimal	**8**
Flooding	*Carson County*	☐ Highly Likely ☐ Likely ☒ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☒ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☒ Major ☐ Minor ☐ Limited	☐ Very High ☐ High ☒ Limited ☐ Minimal	**7**

Hazard	Sector	Probability of Occurrence	Warning Time	Potential Severity	Risk Level	Priority*
Flooding	*City of Groom*	☐ Highly Likely ☐ Likely ☒ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☒ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☐ Minor ☒ Limited	☐ Very High ☐ High ☒ Limited ☐ Minimal	**7**
Flooding	*City of Panhandle*	☐ Highly Likely ☐ Likely ☒ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☒ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☐ High ☒ Limited ☐ Minimal	**7**
Flooding	*City of Skellytown*	☐ Highly Likely ☐ Likely ☒ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☒ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☐ High ☒ Limited ☐ Minimal	**7**
Flooding	*City of White Deer*	☐ Highly Likely ☐ Likely ☒ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☒ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☐ High ☒ Limited ☐ Minimal	**6**
Hail or Hailstorms	*Carson County*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☒ Major ☐ Minor ☐ Limited	☐ Very High ☐ High ☒ Limited ☐ Minimal	**6**
Hail or Hailstorms	*City of Groom*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☒ Major ☐ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**5**
Hail or Hailstorms	*City of Panhandle*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☒ Major ☐ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**6**
Hail or Hailstorms	*City of Skellytown*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☒ Major ☐ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**5**

Hazard	Sector	Probability of Occurrence	Warning Time	Potential Severity	Risk Level	Priority*
Hail or Hailstorms	*City of White Deer*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**5**
Severe Thunder-storms	*Carson County*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☒ Major ☐ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**3**
Severe Thunder-storms	*City of Groom*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**3**
Severe Thunder-storms	*City of Panhandle*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**4**
Severe Thunder-storms	*City of Skellytown*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☒ Major ☐ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**4**
Severe Thunder-storms	*City of White Deer*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☒ Major ☐ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**4**
Tornados	*Carson County*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☒ Substantial ☐ Major ☐ Minor ☐ Limited	☒ Very High ☐ High ☐ Limited ☐ Minimal	**1**
Tornados	*City of Groom*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☒ Substantial ☐ Major ☐ Minor ☐ Limited	☒ Very High ☐ High ☐ Limited ☐ Minimal	**1**

Hazard	Sector	Probability of Occurrence	Warning Time	Potential Severity	Risk Level	Priority*
Tornados	*City of Panhandle*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☒ Substantial ☐ Major ☐ Minor ☐ Limited	☒ Very High ☐ High ☐ Limited ☐ Minimal	**2**
Tornados	*City of Skellytown*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☒ Substantial ☐ Major ☐ Minor ☐ Limited	☒ Very High ☐ High ☐ Limited ☐ Minimal	**1**
Tornados	*City of White Deer*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☒ Substantial ☐ Major ☐ Minor ☐ Limited	☒ Very High ☐ High ☐ Limited ☐ Minimal	**1**
Wildfires	*Carson County*	☐ Highly Likely ☒ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☒ Substantial ☒ Major ☐ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**2**
Wildfires	*City of Groom*	☐ Highly Likely ☒ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☐ Minor ☒ Limited	☐ Very High ☐ High ☒ Limited ☐ Minimal	**4**
Wildfires	*City of Panhandle*	☐ Highly Likely ☒ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☒ Substantial ☐ Major ☐ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**1**
Wildfires	*City of Skellytown*	☐ Highly Likely ☒ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☐ High ☒ Limited ☐ Minimal	**2**
Wildfires	*City of White Deer*	☐ Highly Likely ☒ Likely ☐ Occasionally ☐ Unlikely	☒ Minimal or None ☐ 3 to 6 hours ☐ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☐ High ☒ Limited ☐ Minimal	**2**

Hazard	Sector	Probability of Occurrence	Warning Time	Potential Severity	Risk Level	Priority*
Winter Storms	*Carson County*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☒ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☒ Major ☐ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**5**
Winter Storms	*City of Groom*	☒ Highly Likely ☐ Likely ☐ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☒ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☐ Major ☒ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**2**
Winter Storms	*City of Panhandle*	☐ Highly Likely ☒ Likely ☐ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☒ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☒ Major ☐ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**5**
Winter Storms	*City of Skellytown*	☐ Highly Likely ☒ Likely ☐ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☒ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☒ Major ☐ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**3**
Winter Storms	*City of White Deer*	☐ Highly Likely ☒ Likely ☐ Occasionally ☐ Unlikely	☐ Minimal or None ☐ 3 to 6 hours ☒ 6 to 12 hours ☐ More than 12 hours	☐ Substantial ☒ Major ☐ Minor ☐ Limited	☐ Very High ☒ High ☐ Limited ☐ Minimal	**3**

**** Scaled from 1 to 7 with 1 being the highest level priority***

In summary, each of the jurisdictions in Carson County prioritized the impact of the nine hazards that currently affect the County as shown below. For contrast, the hazards for this MAP update are compared to those prioritized in Carson County's 2006 plan. Persistent weather changes over the past several years are chiefly responsible for this realignment. For example, since 2006, the County has suffered more greatly from Drought conditions which have contributed to a greater number of Wildfires. Though it does most often accompany Thunderstorms, the Carson County MAT elected to prioritize Hail separately in 2013 (which was not done in 2006). And, FEMA no longer considers man-made/terrorist hazards within the context of a natural hazards mitigation plan. So for 2013, Terrorism was dropped from prioritization consideration by the Carson County MAT.

Table 31: Comparison of 2006-2013 Natural Hazard Priorities

Hazard and Comparison	Carson County		City of Groom		City of Panhandle		City of Skellytown		City of White Deer	
	2006	2013	2006	2013	2006	2013	2006	2013	2006	2013
Drought	3	4	6	6	1	3	4	6	6	7
Earthquake	7	8	5	8	6	8	4	8	7	8
Flooding	7	7	9	7	9	7	4	7	7	6
Hail or Hailstorms	N/L	6	N/L	5	N/L	6	N/L	5	N/L	5
Hazmat	1	N/A	4	N/A	1	N/A	4	N/A	3	N/A
Severe Thunderstorm	5	3	2	3	7	4	2	4	2	4
Tornado	2	1	1	1	5	4	1	1	1	1
Wildfire	3	2	6	4	1	1	4	2	5	2
Winter Storms	6	5	2	2	7	5	3	3	3	3
Terrorism	7	N/A	8	N/A	1	N/A	4	N/A	7	N/A

NL - *Hazard was not listed as a stand-alone hazard in the 2006 plan*

N/A - *Hazard is not considered a "natural hazard" and has been removed from the Natural Hazards Priority List*.

HAZARD PROFILE WORKSHEET

Droughts (can impact the entire planning area)

POTENTIAL SEVERITY OF IMPACT	
☐ 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 2 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 1 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.

PROBABILITY OF OCCURRENCE	SEASONAL PATTERN
☒ Highly likely: Event probable in next year. ☐ Likely: Event probable in next 3 years. ☐ Occasional: Event possible in next 5 years. ☐ Unlikely: Event possible in next 10 years.	The cold phase of the pan-Pacific sea surface temperature pattern tends to produce drier than normal conditions in the Great Plains.
PROBABLE DURATION	**PROBABLE RECOVERY**
Droughts can last up to ten years. Severe droughts with fire concerns can last for several months at a time.	Recovery regarding drought is a long term coordinated effort occurring simultaneously to the event.
WARNING TIME (POTENTIAL SPEED OF ONSET)	**PREDICTION TIME (FORECASTING POTENTIAL OF EVENT)**
☐ Minimal (or no) warning. ☐ 3 to 6 hours warning. ☐ 6 to 12 hours warning. ☒ More than 12 hours warning.	☐ Minimal (or no) warning. ☐ 3 to 6 hours warning. ☐ 6 to 12 hours warning. ☒ More than 12 hours warning.

Cascading Potential:

- Droughts pose a potential threat to municipal water supplies.
- Droughts can lead to a higher frequency and severity of wildfires

Existing Warning Systems:

- Media Outlets
- NWS Forecasts and Predictions
- Farm/Ranch Industry Forecasts and Predictions

HAZARD PROFILE WORKSHEET

Earthquakes (can impact the entire planning area)

POTENTIAL SEVERITY OF IMPACT	
☐ 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 2 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 1 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.

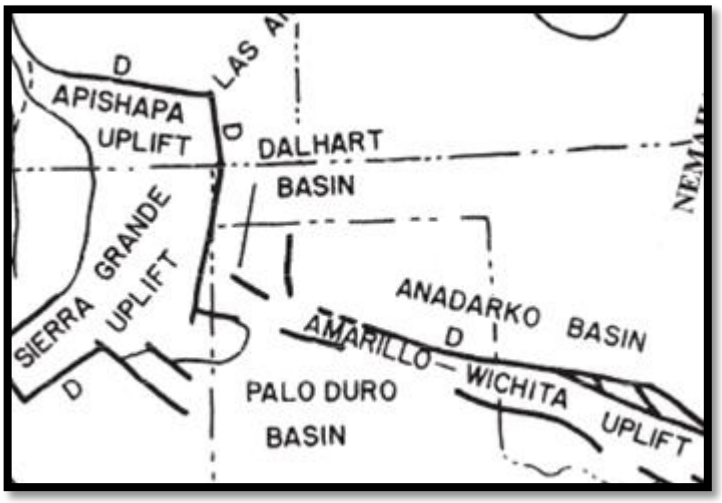
PROBABILITY OF OCCURRENCE	SEASONAL PATTERN
☐ Highly likely: Event probable in next year. ☐ Likely: Event probable in next 3 years. ☒ Occasional: Event possible in next 5 years. ☐ Unlikely: Event possible in next 10 years.	None.
PROBABLE DURATION	**PROBABLE RECOVERY**
Several seconds to a few minutes.	Recovery from a minor earthquake event will take only hours to days.
WARNING TIME (POTENTIAL SPEED OF ONSET)	**PREDICTION TIME (FORECASTING POTENTIAL OF EVENT)**
☒ Minimal (or no) warning. ☐ 3 to 6 hours warning. ☐ 6 to 12 hours warning. ☐ More than 12 hours warning.	☒ Minimal (or no) warning. ☐ 3 to 6 hours warning. ☐ 6 to 12 hours warning. ☐ More than 12 hours warning.

Cascading Potential:

- Minor damages to critical facilities, infrastructure, or HazMat facilities may be present.

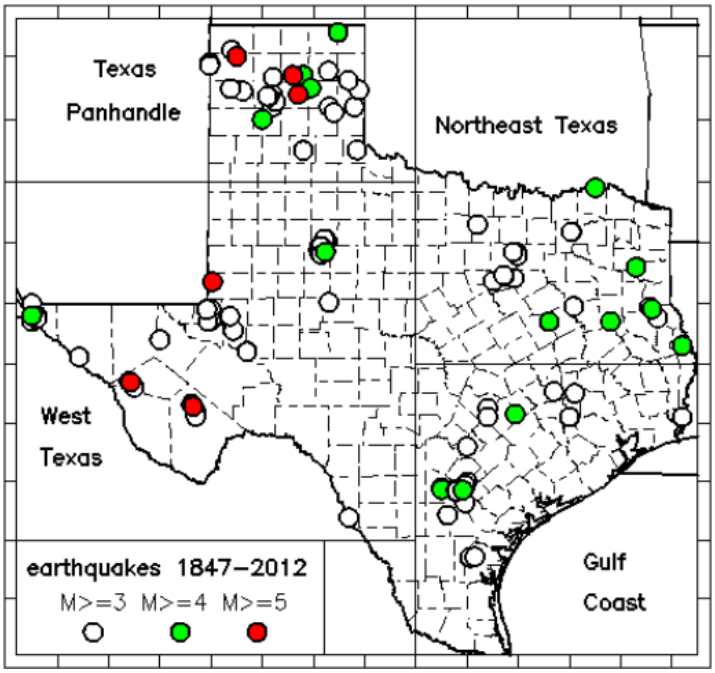
Existing Warning Systems:

- None, save for a heightened public awareness of the potential for another incident in the event of after-shocks



Carson County lies within the Palo Duro Basin, directly south of a major seismic uplift that runs through the region. The Amarillo-Wichita Uplift is a fault-related, vertical elevation of the earth's surface. Movement along faults as a result of crustal changes, volcanicity or proximity to plate boundaries may result in large slabs of crust moving upward along faults. In other words, this geologic feature tends to heighten the possibilties that a sizable earthquake could someday occur in the County.

According to the **Texas Almanac**, "*Notable earthquakes in the Texas Panhandle are probably associated with an ancient zone of crustal weakness that has been reactivated in recent times. Although the largest known earthquakes in the Panhandle have not exceeded magnitude 5.4, the potential for very large earthquakes remains uncertain*."



The map to the right, prepared by the **U. S. Geological Survey**, depicts the earthquakes that have occurred in the region since 1847; several of the larger quakes have occurred in or around the Carson County area. A statement found on a website maintained by the University of Texas provided that "*Although none of these earthquakes caused injury to Panhandle citizens, their occurrence at several different locations confirms that future damaging earthquakes are possible in the Panhandle*."…"*Why is there concern about Panhandle earthquakes, given that these historical events did little damage? The occurrence of several magnitude 5 earthquakes in the twentieth century suggests that a magnitude 6 may occur every few hundred years or so. And, the record indicates that magnitude 5 quakes are certain to happen approximately every few decades in the Panhandle, and suggests that larger earthquakes are possible*."[xvi]

This assertion is further supported by the Institute for Geophysics. On their website, the region's hazard level is described as follows; "*several earthquakes with magnitudes 4 to 5.5 will probably occur each century. Moreover, the historical earthquake record and regional geology suggest that much larger earthquakes might be possible. In most of this region population density is low and earthquakes only pose a significant hazard for poorly built or very sensitive structures*."[xvii]

HAZARD PROFILE WORKSHEET

Flooding (can impact low-lying areas and SFHAs of the planning area)

POTENTIAL SEVERITY OF IMPACT	
☐ 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 2 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 1 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.

PROBABILITY OF OCCURRENCE	SEASONAL PATTERN
☐ Highly likely: Event probable in next year. ☐ Likely: Event probable in next 3 years. ☒ Occasional: Event possible in next 5 years. ☐ Unlikely: Event possible in next 10 years.	Late Fall through Spring.
PROBABLE DURATION	**PROBABLE RECOVERY**
Flooding Events will result from prolonged periods of excessive precipitation. This type of event will likely last from several minutes (flash flooding) to several days (riverine flooding).	It may take weeks for flooding from this type of event to subside. Recovery efforts will be implemented both during and after this type of event.
WARNING TIME (POTENTIAL SPEED OF ONSET)	**PREDICTION TIME (FORECASTING POTENTIAL OF EVENT)**
☐ Minimal (or no) warning. ☐ 3 to 60 hours warning. ☒ 6 to 12 hours warning. ☐ More than 12 hours warning.	☐ Virtually no warning. ☒ 1 to 24 hours warning. ☐ 1 to 7 days warning. ☐ More than 7 days warning.

Cascading Potential:

- Downed trees, washed out roads, bridges and culverts, damaged buildings, displaced personnel, utility outages, slower response time (emergency services), city personnel diverted from normal every day duties.

Existing Warning Systems:

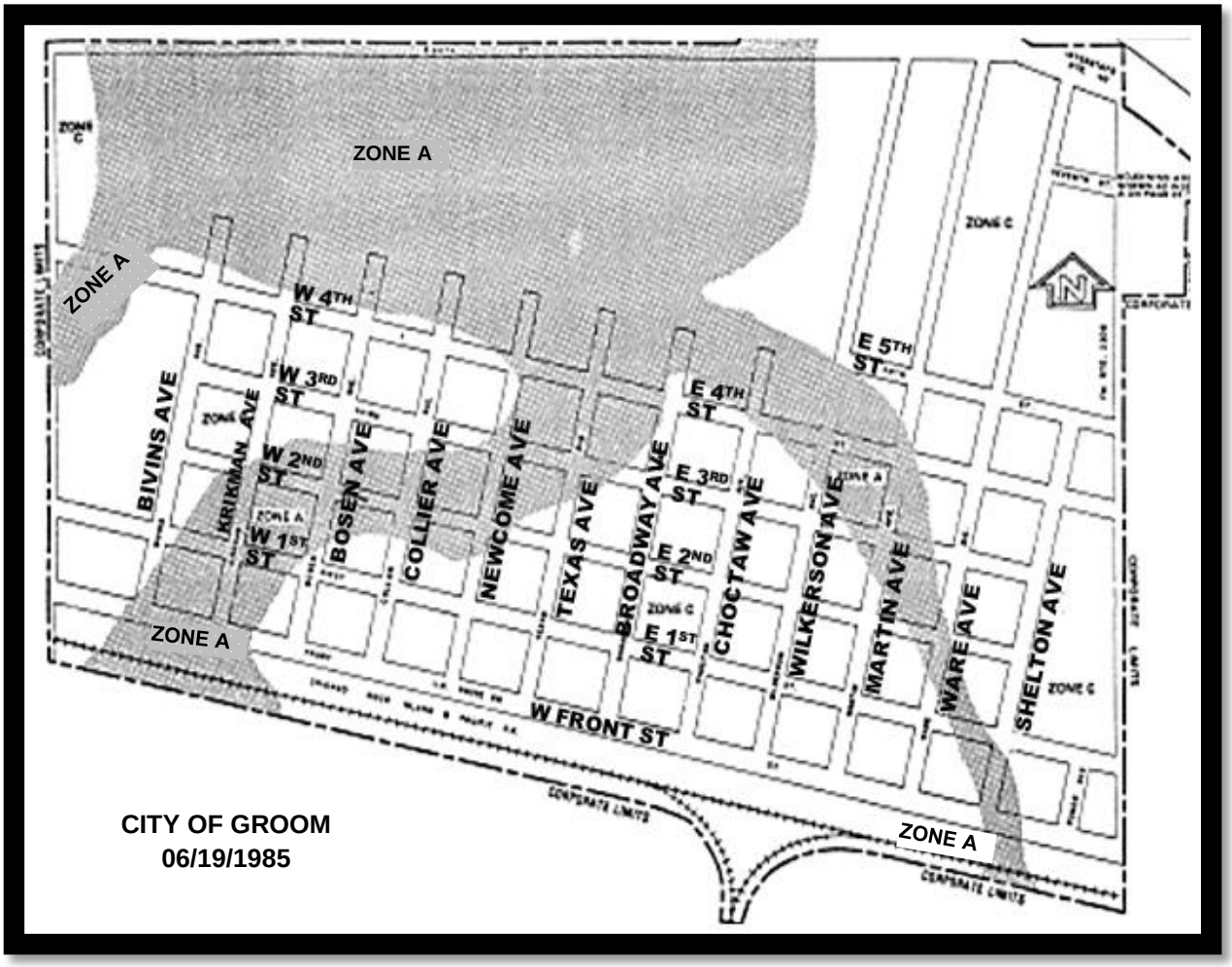
- Media Outlets
- NWS NOAA Weather Radios
- Public Emergency Notification System

Through its Flood Hazard Mapping Program, FEMA identifies flood hazards, assesses flood risks, and partners with States and communities to provide accurate flood hazard and risk data to guide them to mitigation actions. Flood Hazard Mapping is an important part of the National Flood Insurance Program, as it is the basis of the NFIP regulations and flood insurance requirements.

FEMA has been working toward digitizing the nation's Flood Insurance Rate Maps (FIRMS) on a prioritized schedule. As originally planned, the entire map modernization effort was to be completed over a five-year period but the timeline has been disrupted. Regardless, based on FEMA's latest (2009) Flood Map Modernization Progress Report; Carson County is not slated to receive any map updates as part of this project.

FIRMS identifying Special Flood Hazard Areas (SFHAs) have only been developed for the Cities of Groom, Panhandle and White Deer and these maps are fairly dated.

Map 1: <u>City of Groom Flood Hazard Map</u>

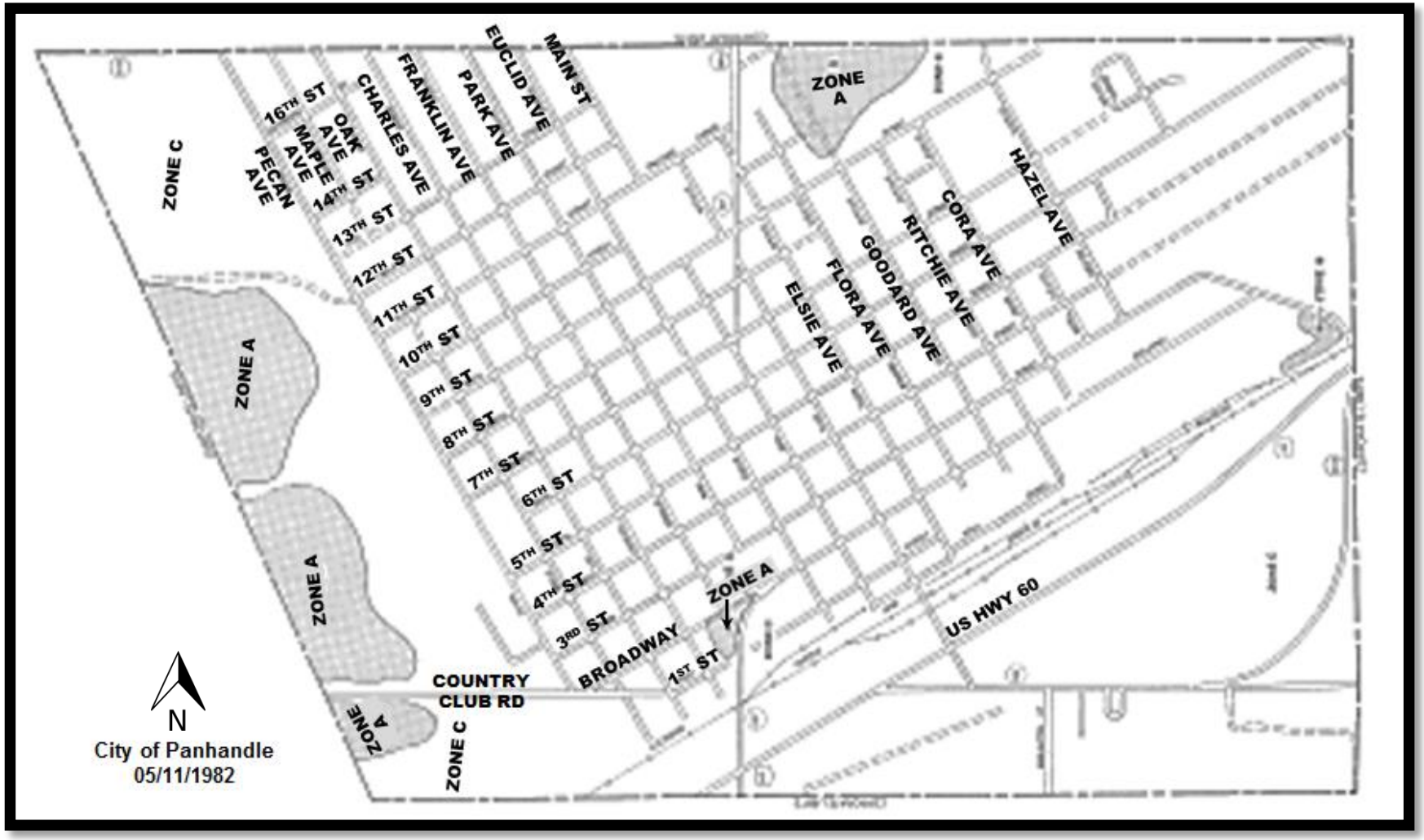


<u>Legend</u>:

ZONE A: or Special Flood Hazard Area (SFHA) – the area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. The 1% annual chance flood is also referred to as the base flood or 100-year flood.

ZONE C: The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood.

Map 2: City of Panhandle Flood Hazard Map



Legend:

ZONE A: or Special Flood Hazard Area (SFHA) – the area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. The 1% annual chance flood is also referred to as the base flood or 100-year flood.

ZONE C: The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood.

Map 3: City of White Deer Flood Hazard Map

Legend:

ZONE A: or Special Flood Hazard Area (SFHA) – the area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. The 1% annual chance flood is also referred to as the base flood or 100-year flood.

ZONE C: The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood.

Map 4: City of Skellytown Historical Flood-Prone Locations

FEMA has not yet developed a special flood hazard are map for the City of Skellytown. To the extent possible, this map highlights those areas of the City where flooding issues have been most prevalent over the years based on the historical recollections of the MAT members.

HAZARD PROFILE WORKSHEET

Hail or Hailstorms (can impact the entire planning area)

POTENTIAL SEVERITY OF IMPACT	
☐ 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 2 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 1 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.

PROBABILITY OF OCCURRENCE	SEASONAL PATTERN
☒ Highly likely: Event probable in next year. ☐ Likely: Event probable in next 3 years. ☐ Occasional: Event possible in next 5 years. ☐ Unlikely: Event possible in next 10 years.	Hail events can occur any time of the year but historically, they've occurred in Carson County in the months between April and August.
PROBABLE DURATION	**PROBABLE RECOVERY**
Based on historic records, a hail event in the County can be brief (5-15 minutes) or may last up to an hour. Hail may occur separately or as part of a Thunderstorm event.	Depending on how much damage was caused to buildings, roofs, etc. it may take weeks to months to complete recovery. Crops lost during a hail event cannot be recovered.
WARNING TIME (POTENTIAL SPEED OF ONSET)	**PREDICTION TIME (FORECASTING POTENTIAL OF EVENT)**
☒ Minimal (or no) warning. ☐ 3 to 60 hours warning. ☐ 6 to 12 hours warning. ☐ More than 12 hours warning.	☒ Virtually no warning. ☐ 1 to 24 hours warning. ☐ 1 to 7 days warning. ☐ More than 7 days warning.

Cascading Potential:

- Downed trees and tree limbs can make area roadways temporarily impassible, power lines can be disabled, dead livestock, animals which may not be recoverable by area renderers, may have to be buried on-site, requiring the appropriate permits

Existing Warning Systems:

- Media Outlets
- NWS NOAA Weather Radios
- Public Emergency Notification System

HAZARD PROFILE WORKSHEET

Severe Thunderstorms (can impact the entire planning area)

POTENTIAL SEVERITY OF IMPACT	
☐ 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 2 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 1 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.

PROBABILITY OF OCCURRENCE	SEASONAL PATTERN
☒ Highly likely: Event probable in next year. ☐ Likely: Event probable in next 3 years. ☐ Occasional: Event possible in next 5 years. ☐ Unlikely: Event possible in next 10 years.	Thunderstorms can occur at any time throughout the year.
PROBABLE DURATION	**PROBABLE RECOVERY**
This type of event, potentially including high winds, hail, lightning, and other dangerous characteristics, will likely last from several minutes to several hours.	Recovery may take weeks to months depending on the level of damage caused to homes, businesses, vehicles, etc.
WARNING TIME (POTENTIAL SPEED OF ONSET)	**PREDICTION TIME (FORECASTING POTENTIAL OF EVENT)**
☐ Minimal (or no) warning. ☒ 3 to 60 hours warning. ☐ 6 to 12 hours warning. ☐ More than 12 hours warning.	☐ Virtually no warning. ☒ 1 to 24 hours warning. ☐ 1 to 7 days warning. ☐ More than 7 days warning.

Cascading Potential:

- Downed trees, washed out roads, bridges and culverts, damaged buildings, displaced personnel, utility outages, slower response time (emergency services), city personnel diverted from normal every day duties.

Existing Warning Systems:

- Media Outlets
- Outdoor warning sirens
- Public Emergency Notification System

HAZARD PROFILE WORKSHEET

Tornados (can impact the entire planning area)

POTENTIAL SEVERITY OF IMPACT	
☒ 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 2 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 1 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.

PROBABILITY OF OCCURRENCE	SEASONAL PATTERN
☒ Highly likely: Event probable in next year. ☐ Likely: Event probable in next 3 years. ☐ Occasional: Event possible in next 5 years. ☐ Unlikely: Event possible in next 10 years.	Tornados can occur at any time of the year; however historically, most tornados in the County have occurred during the months of April - June.
PROBABLE DURATION	**PROBABLE RECOVERY**
Actual event will normally last from 1-5 minutes, but can potentially last up to 30 minutes.	Though complete recovery may never be possible, the direct impacts of a tornado event may be resolved in a matter of days/months or with extreme events - years.
WARNING TIME (POTENTIAL SPEED OF ONSET)	**PREDICTION TIME (FORECASTING POTENTIAL OF EVENT)**
☒ Minimal (or no) warning. ☐ 3 to 60 hours warning. ☐ 6 to 12 hours warning. ☐ More than 12 hours warning.	☒ Virtually no warning. ☐ 1 to 24 hours warning. ☐ 1 to 7 days warning. ☐ More than 7 days warning.

Cascading Potential:

- Possible shut down of facilities and businesses (long-term economic loss), health facilities overwhelmed, potential need for sheltering storm victims, disruption of essential services

Existing Warning Systems:

- Media Outlets
- Outdoor warning sirens
- Public Emergency Notification System

HAZARD PROFILE WORKSHEET

Wildfires (will primarily impact the WUIs and wildland areas in the planning area)

POTENTIAL SEVERITY OF IMPACT	
☐ 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 2 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 1 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.

PROBABILITY OF OCCURRENCE	SEASONAL PATTERN
☐ Highly likely: Event probable in next year. ☒ Likely: Event probable in next 3 years. ☐ Occasional: Event possible in next 5 years. ☐ Unlikely: Event possible in next 10 years.	Wildfires can occur throughout the year. They are most prevalent when Relative Humidity and soil moisture are low and winds are high. They can become particularly severe during periods of extended drought.
PROBABLE DURATION	**PROBABLE RECOVERY**
Wildfires may last several hours to several days depending on the locale of the fire (fires in the breaks will take longer to extinguish), weather conditions and the number of departments available to combat the fire.	On open range, fully recovery may take nearly a year to allow ground vegetation to regrow and downed fences to be replaced. Damaged power lines may up to a week to repair. May take months or longer to repair damaged homes
WARNING TIME (POTENTIAL SPEED OF ONSET)	**PREDICTION TIME (FORECASTING POTENTIAL OF EVENT)**
☒ Minimal (or no) warning. ☐ 3 to 60 hours warning. ☐ 6 to 12 hours warning. ☐ More than 12 hours warning.	☒ Virtually no warning. ☐ 1 to 24 hours warning. ☐ 1 to 7 days warning. ☐ More than 7 days warning.

Cascading Potential:

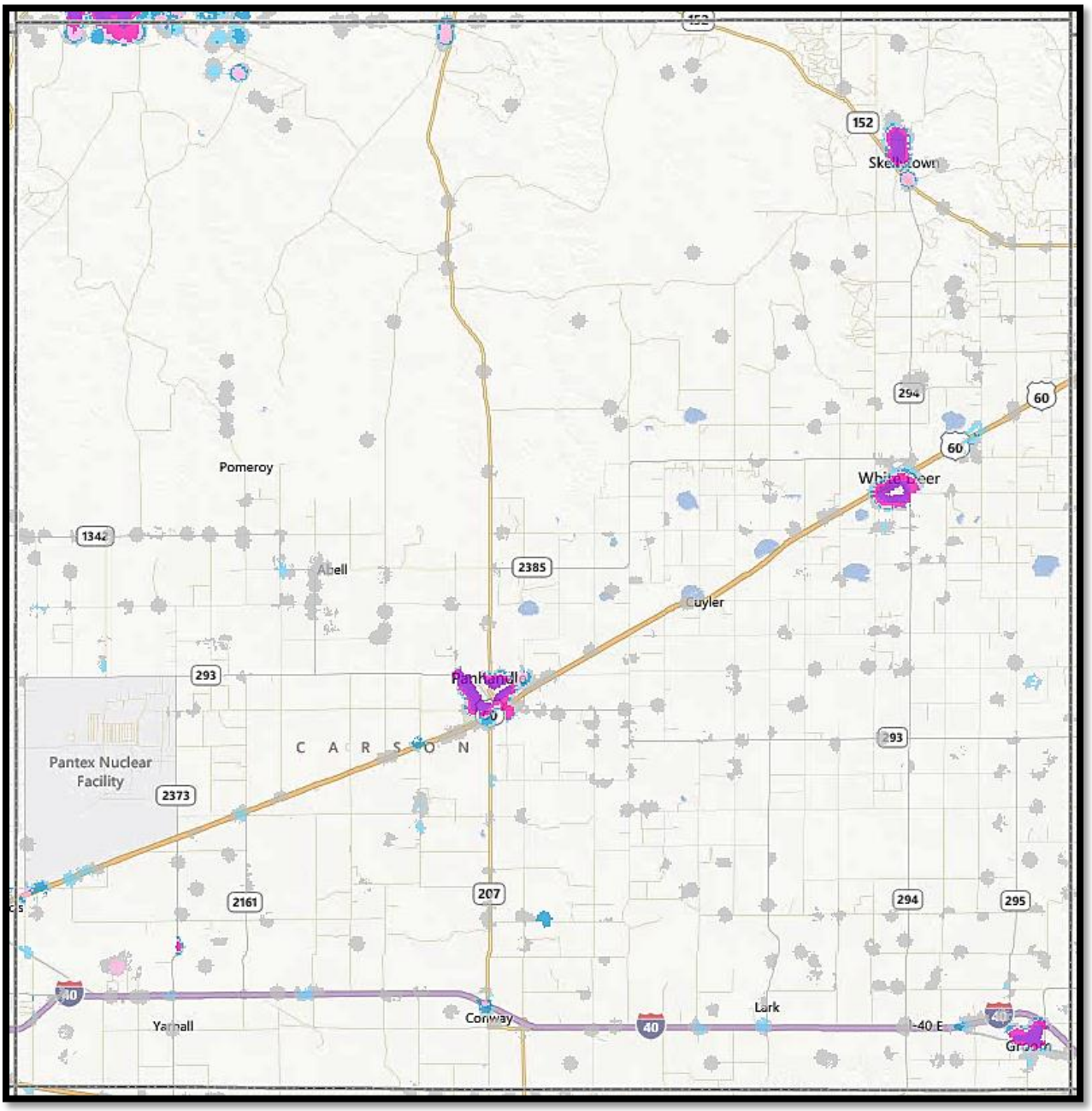
- Impaired air quality can impact residents with health conditions, loss of utilities, loss of grazing land, loss of sensitive habitat

Existing Warning Systems:

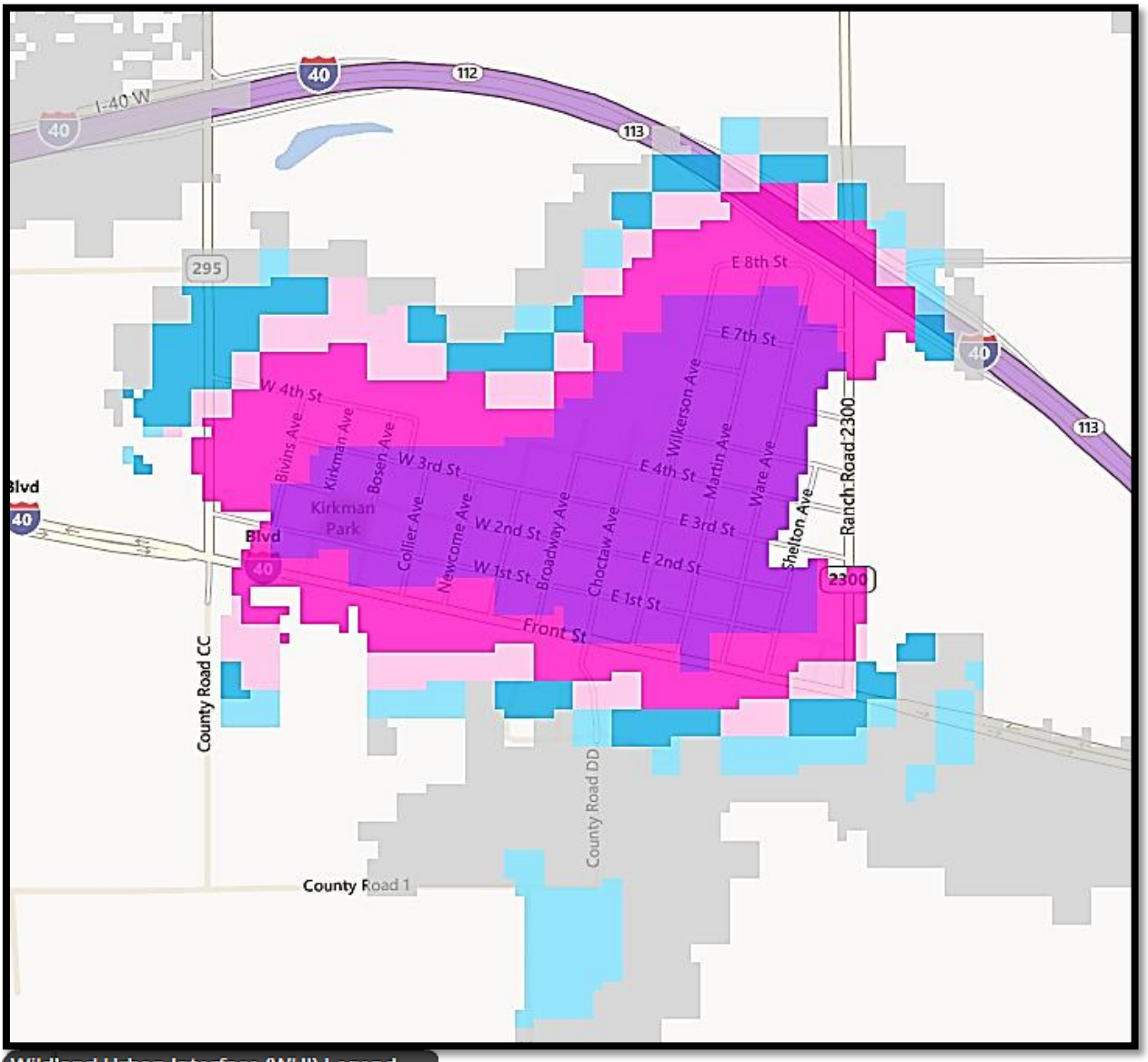
- Media Outlets
- Red Flag Warnings
- Public Emergency Notification System

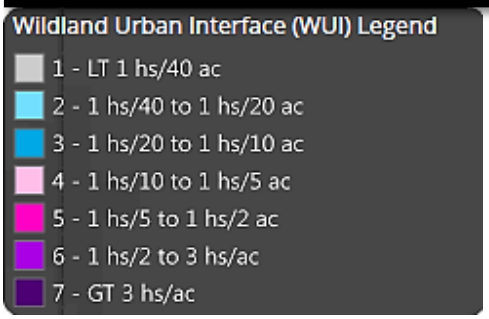
Map 5: Carson County Wildland Urban Interface Map

The following series of maps, as provided off the Texas A&M Forest Service Wildfire Risk Assessment Portal (**http://www.texaswildfirerisk.com/map**), depicts the Wildland Urban Interface (WUI) areas in Carson County.



Map 6: City of Groom Wildland Urban Interface Map

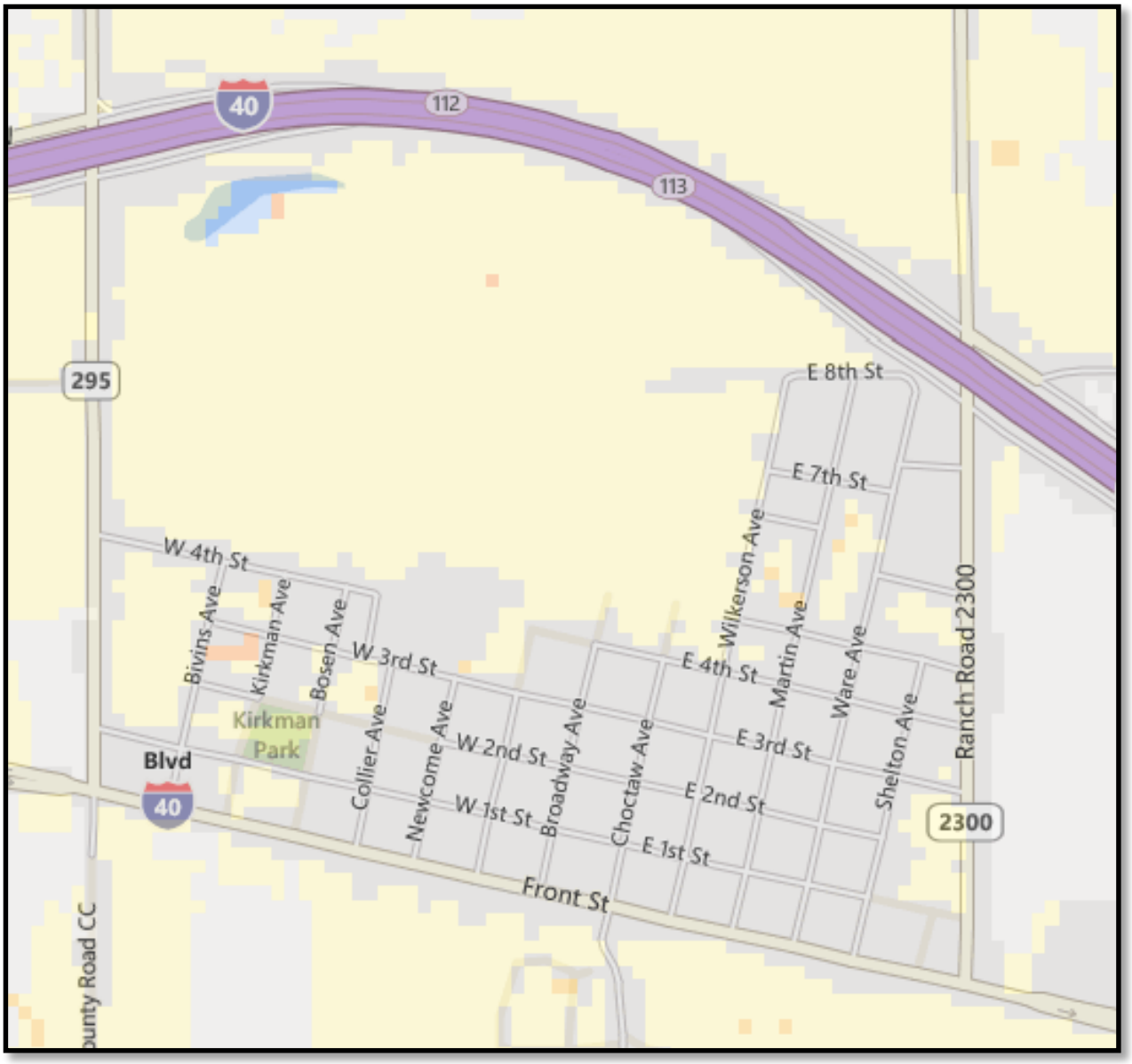




This Wildland Urban Interface (WUI) map reflects housing density depicting where humans and their structures meet or intermix with wildland fuels. WUI housing density is categorized based on the standard Federal Register and US Forest Service Silvis data set categories. The number of housing density categories is extended to provide a better gradation of housing distribution to meet specific requirements of the states for their fire protection planning activities. While units of the data set are in houses per sq. km., which is consistent with other data such as USFS SILVIS, the data is presented as the number of houses per acre to aid with the interpretation and use in Texas.

The map on the following page compares this housing density information to the wildland surface fuels that abut the City of Groom. An explanation of this Legend is provided at the end of this section.

Map 7: City of Groom Wildland Surface Fuels Map

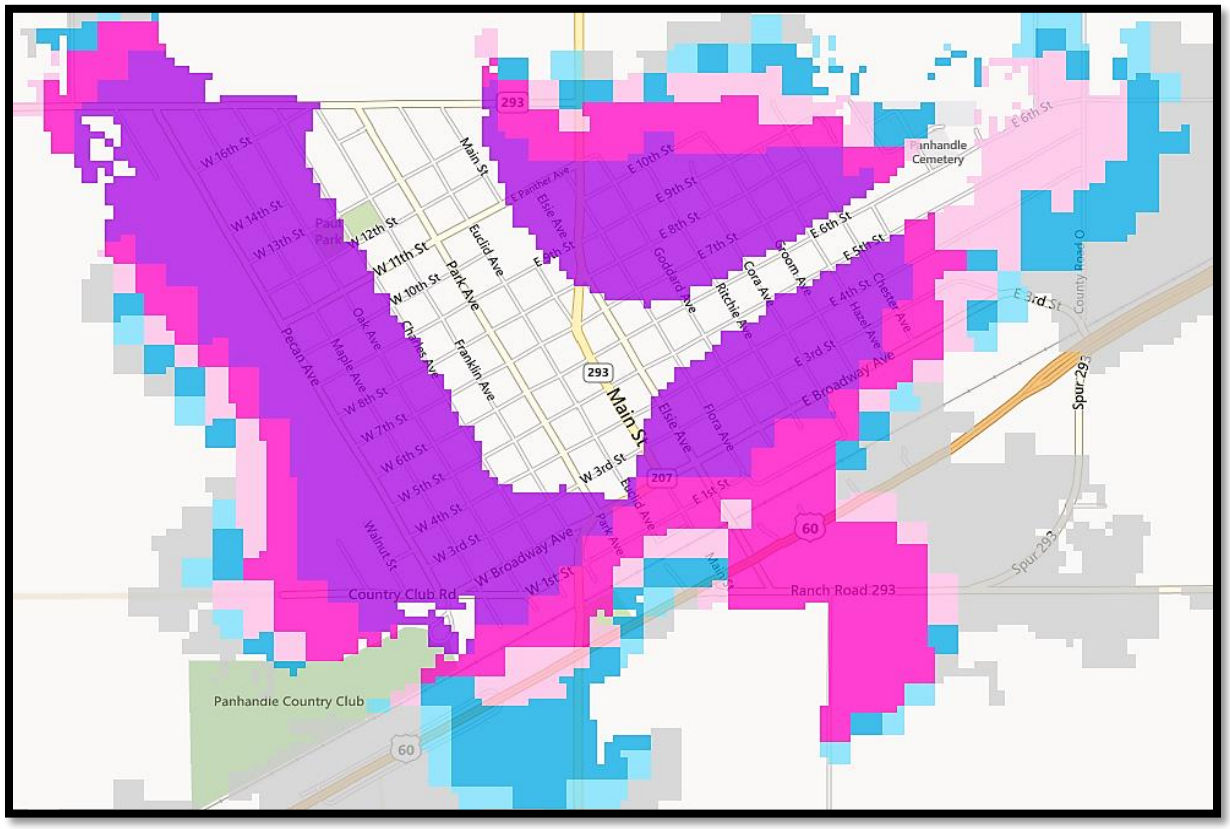


Legend:

GR 1	GS 3	FM 9
GR 2	SH 2	FM 9PPL
GR 3	SH 5	NB 91 - Urban/Developed
GR 4	SH 6	NB 93 - Agricultural
GS 1	FM 8	NB 98 - Open Water
GS 2	FM 9HWD	NB 99 - Bare Ground

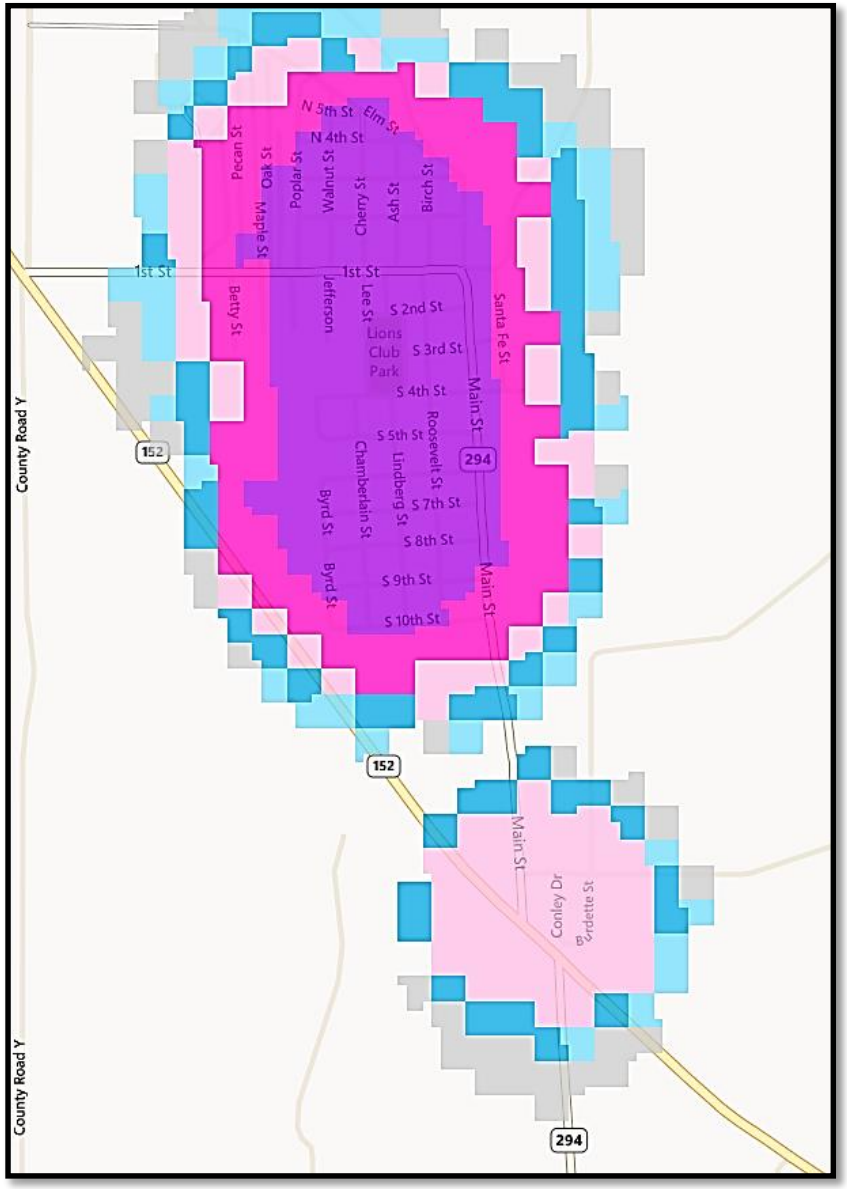
NOTE: An explanation of this Legend is provided at the end of this section.

Map 8: City of Panhandle Wildland Urban Interface Map

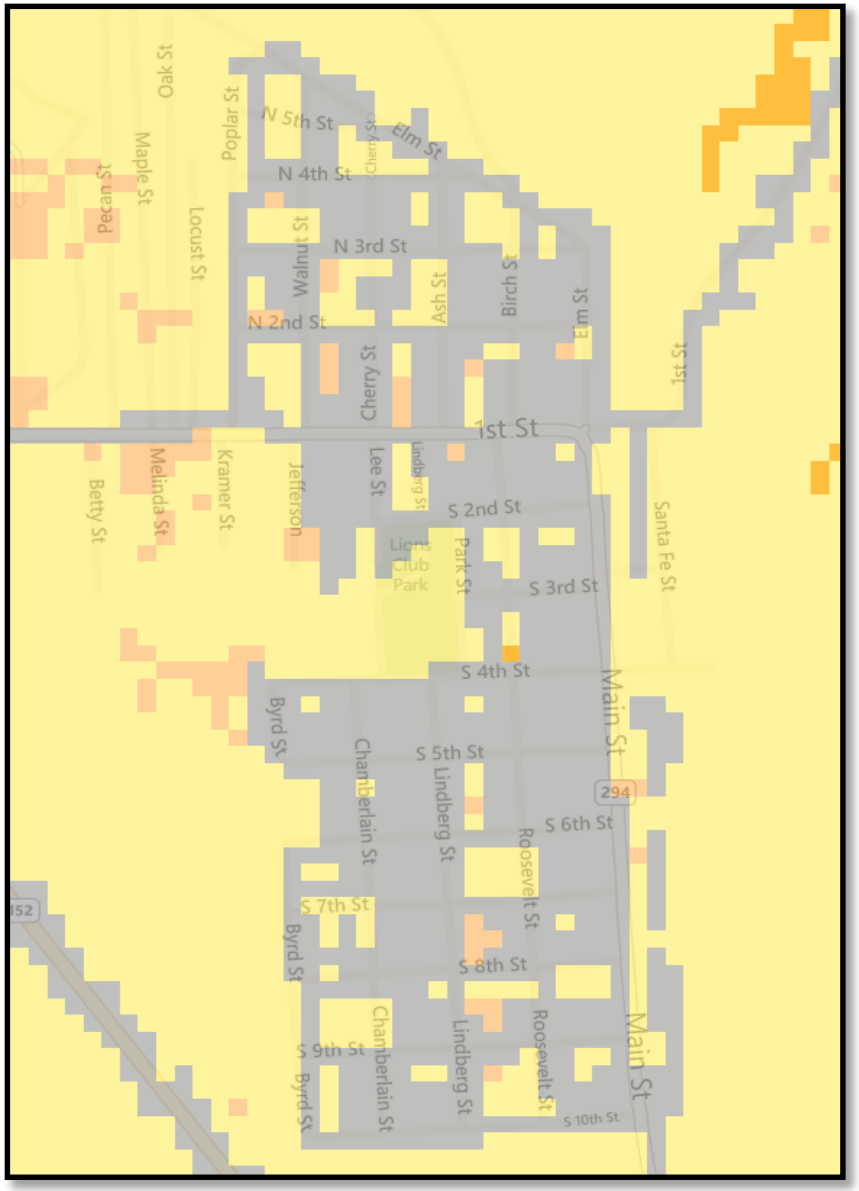


Map 9: City of Panhandle Wildland Surface Fuels Map

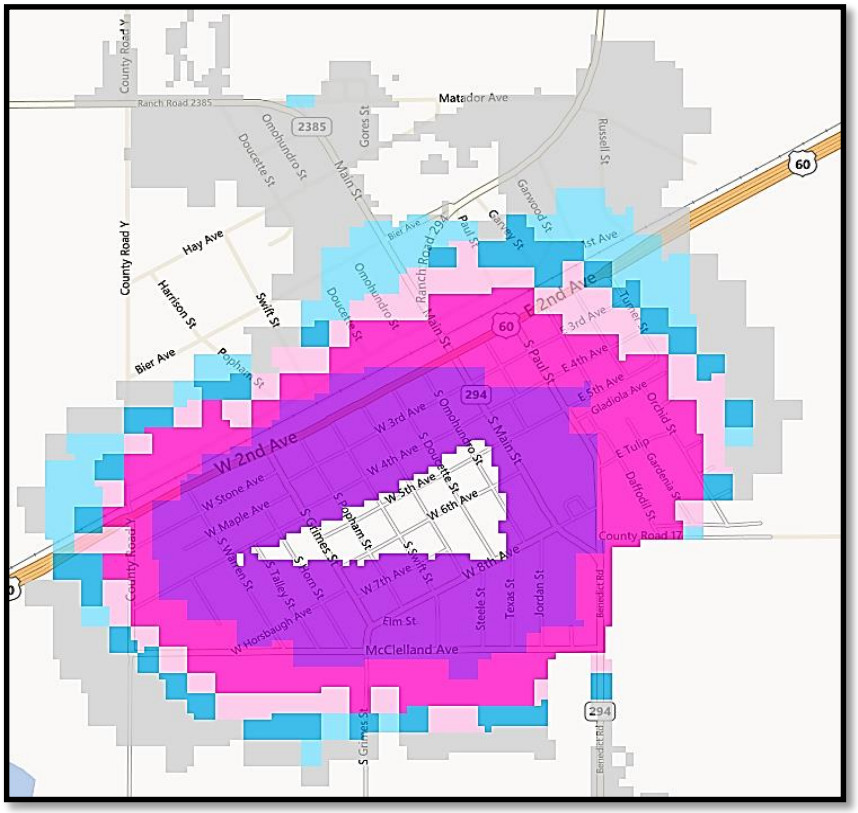
Map 10: City of Skellytown Wildland Urban Interface Map



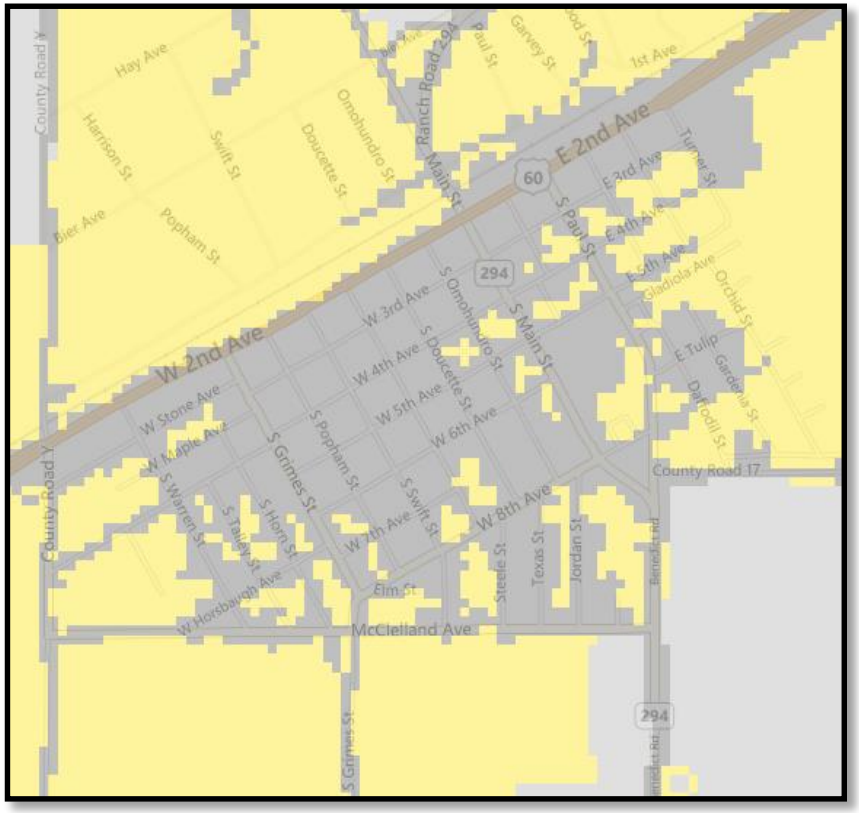
Map 11: City of Skellytown Wildland Surface Fuels Map



Map 12: City of White Deer Wildland Urban Interface Map



Map 13: City of White Deer Wildland Surface Fuels Map



Wildland Urban Interface (WUI) Legend definition:

Depicts housing density in terms of houses per acre; for example, *1 hs/40 ac* = 1 house per 40 acres.

Surface Fuels Legend definition:

The *National Wildfire Coordinating Group* defines the various surface fuel designations as shown on the table below. It should be noted that not all of these fuel types will be found in the County.

GR1	Short, sparse dry climate grass is short, naturally or heavy grazing, predicted rate of fire spread and flame length low
R2	Low load, dry climate grass primarily grass with some small amounts of fine, dead fuel, any shrubs do not affect fire behavior
GR3	Low load, very coarse, humid climate grass continuous, coarse humid climate grass, any shrubs do not affect fire behavior
GR4	Moderate load, dry climate grass, continuous, dry climate grass, fuelbed depth about 2 feet
GR5	Low load, humid climate grass, fuelbed depth is about 1-2 feet
GR6	Moderate load, continuous humid climate grass, not so coarse as GR5
GR7	High load, continuous dry climate grass, grass is about 3 feet high
GR8	High load, very coarse, continuous, humid climate grass, spread rate and flame length may be extreme if grass is fully cured
GR9	Very high load, dense, tall, humid climate grass, about 6 feet tall, spread rate and flame length can be extreme if grass is fully cured
GS1	Low load, dry climate grass-shrub shrub about 1 foot high, grass load low, spread rate moderate and flame length low
GS2	Moderate load, dry climate grass-shrub, shrubs are 1-3 feet high, grass load moderate, spread rate high, and flame length is moderate
GS3	Moderate load, humid climate grass-shrub, moderate grass/shrub load, grass/shrub depth is less than 2 feet, spread rate is high and flame length is moderate
SH2	Moderate load dry climate shrub, woody shrubs and shrub litter, fuelbed depth about 1 foot, no grass, spread rate and flame low
SH5	High load, humid climate grass-shrub combined, heavy load with depth greater than 2 feet, spread rate and flame very high
SH6	Low load, humid climate shrub, woody shrubs and shrub litter, dense shrubs, little or no herbaceous fuel, depth about 2 feet, spread rate and flame high
FM8	Timber Litter 0.2 foot deep, slow burning ground fire with low flame heights, mainly needles, leaves and some twigs
FM9 HWD	Timber Litter group (hardwoods such as hickory and oak) low flame height but can cause spotting due to blowing leaves.
FM9	Timber Litter Group is divided into two sub-groups, WHD-Hardwoods and PPL-Pine
FM9 PPL	Timber Litter Group (Pine such as Ponderosa, Jeffrey and Red Pine, Southern pine plantations are also grouped in this model. Concentrations of dead-down woody material will contribute to possible torching out of trees, spotting and crowning activity.
NB91	Urban/Developed
NB98	Open Water
NB99	Bare Ground

HAZARD PROFILE WORKSHEET

Winter Storms (can impact the entire planning area)

POTENTIAL SEVERITY OF IMPACT	
☐ 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 2 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 1 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.

PROBABILITY OF OCCURRENCE	SEASONAL PATTERN
☒ Highly likely: Event probable in next year. ☐ Likely: Event probable in next 3 years. ☐ Occasional: Event possible in next 5 years. ☐ Unlikely: Event possible in next 10 years.	November – Marcy (with an occasional event occurring late April/early May)
PROBABLE DURATION	**PROBABLE RECOVERY**
One to several days	Recovery time from a severe winter weather event will be directly correlated to the severity of the event. Recovery time can be from a few a day to several days
WARNING TIME (POTENTIAL SPEED OF ONSET)	**PREDICTION TIME (FORECASTING POTENTIAL OF EVENT)**
☐ Minimal (or no) warning. ☐ 3 to 60 hours warning. ☒ 6 to 12 hours warning. ☐ More than 12 hours warning.	☐ Virtually no warning. ☐ 1 to 24 hours warning. ☒ 1 to 7 days warning. ☐ More than 7 days warning.

Cascading Potential:

- Power outages at critical infrastructure, need to provide temporary shelter to storm victims, driving hazards that may result in a HazMat incident, decreased emergency response times

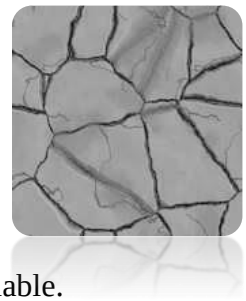
Existing Warning Systems:

- Media Outlets
- Public Emergency Notification System (reminding residents to avoid any unnecessary travel)

Probability of Future Events

To a certain extent, the Investment adage of "*past performance is no guarantee of future return*" holds true with natural hazards. There is no guarantee that future hazard events will mirror those of the past; particularly as many experts now believe, the US is going through a period of climate change. Nevertheless, using historical data as predictor of the future was the most practical approach available to the Carson County MAT in forecasting events that might occur during the life of this plan.

Drought



Historical patterns are assumed to be the dominant feature to determine future drought events. Based upon the historical instances of drought events which have occurred in the area during the last 17 years, the annual probability of occurrence for these events was estimated as follows.

The table below summarizes the drought events that have occurred within the planning area over the total number of years for which such information is available.

Historical Summary:	No. Of Events	Between	Dth	Inj	Prd	CrD
TOTALS:	20	**1996 - 2013**	**0**	**0**	**18.00K**	**67.53M**

Over a 17-year span, droughts occurred in 6 of those years. Based on this data, the MAT estimates the probability for a drought in any given year to be 35.29%.

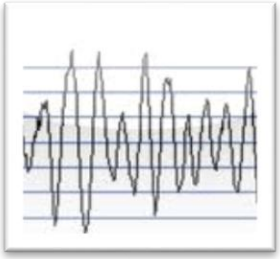
Years in the Record Span	No. of Years in the Span in which the Event occurred	Computation	Future Probability of 1 or more events per Year
17	6	(6/17) * 100 =	35.29%

Again - Why is this hazard of concern to the County?

Much of the planning area's economy relies on agriculture. The statistics below were obtained from http://www.city-data.com/county/Carson_County-TX.html and demonstrate the importance of the agriculture industry to the planning area. Extended periods of drought can have devastating consequences on local farm & ranch operations and on the local economy. Moreover, droughts can stress local water supplies for municipal use which can lead to the imposition of rationing.

- Average size of farms/ranch: 1,244 acres
- Average value of agricultural products sold per farm/ranch: $121,360.00
- Average total farm production expenses per farm/ranch: $119,980.00
- Average market value of all machinery and equipment per farm/ranch: $88,518.00
- Average value of crops sold per acre for harvested cropland: $134.96
- Value of livestock, poultry, and their products as a percentage of the total market value of agricultural products sold: 67.75%
- Irrigated harvested cropland as a percentage of land in farms: 42.02%
- Average number of cattle and calves per 100 acres of all land in farms: 8.89

Earthquakes



Historical patterns are assumed to be a dominant factor in determining future earthquake events. Based upon the historical instances of earthquake events that have occurred in the area during the last 96 years, the annual probability of occurrence for these events was estimated as follows.

The table below summarizes the earthquake events that have occurred in Carson County over the total number of years for which such information is available.

Historical Summary:	No. Of Events	Between	Dth	Inj	Prd	CrD
TOTALS:	**5**	**1917 - 2013**	**0**	**0**	**0K**	**0M**

Over a 96-year span, an earthquake struck in 5 of those years. Based on this data, the MAT estimates the probability for an earthquake in any given year to be 3.13%. Averaging those five events, the MAT also estimates the quakes would be in the range of 3.5 - 4.5 in magnitude.

Years in the Record Span	No. of Years in the Span in which the Event occurred	Computation	Future Probability of 1 or more events per Year
96	3	(3/96) * 100 =	3.13%

Again - Why is this hazard of concern to the County?

Relatively few earthquakes have been recorded in the Carson County planning area. It's suspected that a number of unrecorded *microquake* events have occurred in the County but the events don't appear in any of the reports found on file. Of concern though is that those that have been recorded have been some of the strongest earthquakes to have occurred in the Panhandle. Some in academia suggest that magnitude 5 quakes are certain to happen in the Panhandle approximately every few decades; and, that larger earthquakes are possible. While this conflicts with other projections that say that Carson County is a low-risk area for earthquakes, the MAT feels this hazard could potentially pose a threat to residents throughout the planning area.

Flooding

Historical patterns are assumed to be the dominant feature to determine future flooding events. Based upon the historical instances of flooding events that have occurred in the area during the last 14 years, the annual probability of occurrence for these events was estimated as follows.

The table below summarizes the flooding events that have occurred in Carson County over the total number of years for which such information is available.

Historical Summary:	No. Of Events	Between	Dth	Inj	Prd	CrD
TOTALS:	**8**	**2000 - 2013**	**0**	**0**	**0K**	**0M**

Over an 14-year span, at least one flood occurred in 5 of those years. Based on this data, the MAT estimates the probability for a flooding event in any given year to be 28.57%.

Years in the Record Span	No. of Years in the Span in which the Event occurred	Computation	Future Probability of 1 or more events per Year
14	4	(4/14) * 100 =	28.57%

Again - Why is this hazard of concern to the County?

Though only a limited number of flood events have occurred within the planning area during the past 18 years, they do present a risk to the County and the participating jurisdictions; particularly, flashfloods. When combined with the prolonged periods of drought Carson County often endures, a sudden burst of rain can run-off quickly, eroding county roads, culverts, bridges and causing low-lying areas to become hazardous, if only momentarily.

Hail or Hailstorms

Historical patterns are assumed to be a dominant factor in determining future hail events. Based upon the historical instances of hail events that have occurred in the area during the last 14 years, the annual probability of occurrence for these events was estimated as follows

The table below summarizes the hail events that have occurred within the planning area over the total number of years for which such information is available.

Hail Summary:	No. Of Events	Between	Dth	Inj	Prd	CrD
TOTALS:	**164**	**2000-2013**	**0**	**0**	**590.5K**	**80K**

166 hail events have occurred in locations throughout the County over a 13-year span. Based on historical records, the MAT estimates the probability for a hail event in any given year to be 1171.43% or on average more nearly 12 hail/hailstorm events could occur in any given year.

Years in the Record Span	No. of Events that Occurred within the Span	Computation	Future Probability of 1 or more events per Year
14	164	(164/14) * 100 =	1171.43%

Severe Thunderstorms

Historical patterns are assumed to be the dominant feature to determine future thunderstorm events. Based upon the historical instances of thunderstorm events that have occurred in the planning area during the last 14 years, the annual probability of occurrence for these events was estimated as follows.

The tables below summarizes the severe thunderstorm events that have occurred within the planning area over the total number of years for which such information is available.

Historical Summary:	No. Of Events	Between	Dth	Inj	Prd	CrD
TOTALS:	**55**	**2000-2013**	**0**	**1**	**509.20K**	**0.00K**

55 thunderstorm events have occurred in locations throughout the County over the past 14-year span. Based on historical records, the MAT estimates the probability for a thunderstorm in any given year to be 392.86% or average, the County will experience between 3-4 severe thunderstorm events per year.

Years in the Record Span	No. of Events that Occurred within the Span	Computation	Future Probability of 1 or more events per Year
14	55	(55/14) * 100 =	392.86%

Again - Why is this hazard of concern to the County?

Thunderstorms and thunderstorm winds can cause significant damage to property and to crops. High thunderstorm winds can create hazardous driving conditions which could result cascading events such as traffic accidents.

Tornados

Historical patterns are assumed to be the dominant feature to determine future tornado events. Based upon the historical instances of tornado events that have occurred within the area during the last 14 years, the annual probability of occurrence for these events was estimated as follows. The table below summarizes the tornado events that have occurred within the planning area over the total number of years for which such information is available.

Historical Summary:	No. Of Events	Between	Dth	Inj	Prd	CrD
TOTALS:	**18**	**2000 - 2013**	**0**	**0**	**375K**	**0.00K**

Over a 14-year span, at least one tornado event occurred in 7 of those years. Based on this data, the MAT estimates the probability for a tornado in any given year to be 50.00%. In evaluating those 18 events, the MAT also estimates that future events will likely carry wind speeds of between 65 -165 miles per hour; being rated between an EF0 and an EF3.

Years in the Record Span	No. of Years in the Span in which the Event occurred	Computation	Future Probability of 1 or more events per Year
14	7	(7/14) * 100 =	50.00%

Again - Why is this hazard of concern to the County?

Tornado winds and hail can cause significant damage to property and to crops. Past events have resulted in personal injuries and will also pose a threat to the lives and safety of the residents of all participating jurisdictions within the planning area.

Wildfire

Wildfires occur with high frequency within the planning area. Because of that, the Carson MAT chose to limit their assessment of this hazard simply to that those that have occurred, in the past 6 years; since the original Carson County MAP was adopted. Based upon the historical instances of wildfire events that have occurred in the area during the last 6 years, the annual probability of occurrence for these events was estimated as follows.

The table below summarizes the wildfire events that have occurred within the planning area during the past 6 years.

Historical Summary:	No. Of Events	Between	Acres Lost	Cost
TOTALS:	**173**	**2007 - 2013**	**101,422.27**	**70 K**

Multiple events occurred in each of the past seven years. Based on this data, the MAT estimates the probability for a wildfire in any given year to be 2883.33% or on average, 29 wildfire events will occur in any given year.

Years in the Record Span	No. of Events that Occurred within the Span	Computation	Future Probability of 1 or more events per Year
6	173	(173/6) * 100 =	2883.33%

Again - Why is this hazard of concern to the County?

Wildfires cause considerable damage to grazing land and property and will threaten the public safety in multiple ways. Injuries and deaths can occur as direct result both to people and to livestock. Depending on where they occur, they can also threaten the Cities of Fritch, Groom, Panhandle, Skellytown and White Deer. These events will consume a considerable amount of time and resources; the fire departments in the County are all-volunteer agencies. Due to geographical area and the availability of volunteer firefighters, Carson county not only provides mutual aid to neighboring counties, but receives the same. Firefighters typically have to leave their jobs or families to fight fires and they have to do so 29 or more times per year. Smoke from the fires can impair visibility, creating hazardous driving conditions which could result in traffic accidents.

Winter Storms

Historical patterns are assumed to be the dominant feature to determine future winter storm events. Based upon the historical instances of winter storm events that have occurred in the area during the last 14 years, the annual probability of occurrence for these events was estimated as follows.

The table below summarizes the winter storm events that have occurred in the planning area during the past 14 years.

Historical Summary: [1]	No. Of Events	Between	Dth	Inj	Prd	CrD
TOTALS:	**31**	**2000 - 2013**	**0**	**0**	**746 K**	**0K**

Over a 14-year span, at least one winter storm occurred in 5 of those years. Based on this data, the MAT estimates the probability for a winter storm in any given year to be 85.71%.

Years in the Record Span	No. of Years in the Span in which the Event occurred	Computation	Future Probability of 1 or more events per Year
14	12	(14/12) * 100 =	85.71%

Again - Why is this hazard of concern to the County?

Winter storms lead to hazardous driving conditions that can strand travelers in their vehicles for several hours, lead to traffic accidents and cause major roadways throughout the County (including those in Fritch, Groom, Panhandle, Skellytown and White Deer) to be closed for hours to days. Such storms can lead to power outages that put the welfare of residents that rely on medical devices at serious risk and place a hardship on the population at large. Time and resources are expended by emergency services in rescuing stranded travelers and in operating mass care shelters.

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Estimate of Potential Loss:

Table 32: List of Critical Infrastructure

	Carson County		City Groom		City Panhandle		City Skellytown		City White Deer	
Facilities/People Groups	NO.	PV	NO.	PV	NO.	PV	NO.	PV	NO.	PV
Critical Facilities										
Government	11	$1,733,694	1	$21,560.00	5	900,000	2	$56,010	5	$211,550
Law Enforcement	1	$6,688,370	0	---	1	100,000	0	---	1	$26,700
Fire Stations	0	---	2	[1] $1,006,510	1	$1,584,370	1	$356,870	2	$394,4370
Medical Facilities	0	---	0	---	1	$22,790	0	---	1	$31,770
Schools	0	---	3	3,223,560	3	13,249,070	0	---	3	$8,294,000
Specials Facilities										
Nursing Homes	0	---	0	---	2	950,000	0	---	0	---
Senior Citizens	0	---	0	---	0	---	0	0.00	0	0.00
Special Ed. Schools	0	---	0	---	0	---	0	---	0	---
Non-English Speaking Facilities	0	---	0	---	0	---	0	---	0	---
Infrastructure & Lifelines										
Dams [2]	2	750,000	0	---	0	---	0	---	0	---
Local Owned Bridges [3]	1	N/A -obsolete	1	$200,000	0	---	0	---	0	---
Public Utilities/Trans **	0	---	2	$1,238,420	2	$1,813,840	2	$509,440	2	$703,300
People	1797		572		2439		469		995	
Housing Units	983	$109,424,611	259	$34,091,652	924	$81,328,632	216	$19,032,840	402	$48,196,584
Commercial businesses	38	145 employed	26	96 employed	59	470 employed	10	20 employed	15	83 employed
Industrial businesses	45	139 employed	9	25 employed	25	52 employed	3	7 employed	10	40 employed
HazMat Facilities	1	3200 employed	0	---	0	---	0	---	0	---

[1] - Fire & EMS Combined [2] - 1 private owned [Horn Dam]/1 soil conservation dam [3] - 33 TxDOT bridges in the County ** - Includes water/wastewater treatment plants

The table above provides estimates of the current Present Values (PV) of some of the more critical infrastructure in the planning area. It should be noted that based on current construction costs, it could easily cost 2 – 3 times the present value to replace structures identified on this list. This information was taken into consideration as the Carson County MAT developed the mitigation action items described later in this document.

The forecasting of potential loss based on future events involves a variety of theoretical assumptions. Most certainly, worst case scenarios can be developed that could result in the loss of any number of the critical facilities listed on Table 30 generating millions in loss values.

However in a less generalized fashion, the Carson County MAT was able to use a historical perspective to not only measure the impact of past events but to predict the potential for future annualized losses; assuming the cycle of natural hazards continues to occur in the County.

The follow pages provide a series of tables that rely on historical data from events actually recorded in the County to predict future losses. The annual loss estimates average the total losses for the specific hazard over the number of years during the reporting span in which the hazards occurred.

For example, between the years 2000 – 2013, 31 winter weather events occurred in the County. The losses from those events totaled to $746,000.00 (Property) and $0.00 (crops). To determine an annualized Property loss estimate based on these historical records, the Carson County MAT used the following formula:

($746,000 [Total Property Loss] ÷ 12 [Years with a Winter Storm Event])
X (12 [Years with a Winter Storm Event] ÷ 14 [Total Years on Record])
= $53,285.71 in Estimated Annualized Property Losses from Winter Storms

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Drought

Avg. Property Loss per Event with Damages: $18,000.00 (for 1 events w/ damages)

Avg. Crop Loss per Event with Damages: $11,255,000 (for 6 events w/ damages)

Record Years 1996 - 2013	Years with an Event	Total Historical Damages recorded for Droughts		Computation	Annual Loss Estimate
17	6	Property	$18,000.00	(Property / 6) * 6/17 =	$1,058.82
17	6	Crops	$67,530,000.00	(Crops / 6) * 6/17 =	$3,972,352.94

Extent Range: Using the Palmer Drought Severity Index found under Table 14 as a reference, Carson County, including the Cities of Groom, Panhandle, Skellytown and White Deer should anticipate having to cope with conditions ranging from moderate to severe drought at some point during the 5-year life of this update.

[**Recorded Range of Events**: From moderate to severe. Annual rainfall from 1952 to 1955 averaged approximately 13" which was the most severe drought of record; according to the Texas Board of Water Engineers; Bulletin 5802.]

Earthquake

Avg. Property Loss per Event with Damages: $0.00 (for no events with damages)

Avg. Crop Loss per Event with Damages: $0.00 (for no events with damages)

Record Years 1982 - 2013	Years with an Event	Total Historical Damages recorded for Earthquakes		Computation	Annual Loss Estimate
31	5	Property	$0.00	(Property / 31) * 5/31 =	$ 0.00
31	5	Crops	$0.00	(Crops / 31) * 5/31 =	$ 0.00

Extent Range: Carson County, including the Cities of Groom, Panhandle, Skellytown and White Deer, will continue to experience periodic but minor microquakes. Though difficult to predict, the jurisdictions should anticipate having to cope with a larger earthquake, in the 2.5 – 3.0 Richter Scale range, at some point during the 5-year life of this update.

Recorded Range of Events: between 3.0 and 5.4 on the Richter Scale felt County-wide

Flooding

Avg. Property Loss per Event with Damages: $0.00 (for no events with damages)

Avg. Crop Loss per Event with Damages: $0.00 (for no events with damages)

Record Years 2000 - 2013	Years with an Event	Total Historical Damages recorded for Flooding Events		Computation	Annual Loss Estimate
14	4	Property	$0.00	(Property / 14) * 4/14 =	$0.00
14	4	Crops	$0.00	(Crops / 14) * 4/14 =	$0.00

Extent Range: Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer each have areas within their locales that are prone to flash flooding.

In each instance, events that result in 2-4 inches of rainfall within a 2 hour period can produce water running over roadways and in some cases backing up backing up onto resident's properties and potentially, into homes. According to several reports, in some low-lying areas of the planning area; water depth can reach the height of vehicle wheel wells, creating hazardous driving conditions for motorists. Each jurisdiction should anticipate having to cope with at least one significant rain event, at some point during the 5-year life of this update.

[**Recorded Range of Events**: Highest single-day rainfall total was 8.05" which occurred in 5/51 (***source***: www.texasalmanac.com)]

Hail or Hailstorms

Avg. Property Loss per Event with Damages: $147,625.00 (for 4 events with damages)

Avg. Crop Loss per Event with Damages: $40,000.00 (for 2 events with damages)

Record Years 2000 - 2013	Years with an Event	Total Historical Damages recorded for Hail Events		Computation	Annual Loss Estimate
14	14	Property	$590,500.00	(Property / 14) * 14/14 =	$42,178.57
14	14	Crops	$80,000.00	(Crops / 14) * 14/14 =	$5,714.29

Extent Range: Carson County and its municipal jurisdictions are frequently impacted by hail events. On average, 8 or more hail events will occur somewhere in the County each year; some with devastating effect. Based on historical cycles, the County's jurisdictions should anticipate having to cope with at least one hail event in which significant property damage is involved during the 5-year life of this plan. Most likely to occur during the Spring months, the hail event could include stones in the half dollar to golf ball size range.

[**Recorded Range of Events**: from Penny-size (.75") to DVD size (4.50")]

Severe Thunderstorm

Avg. Property Loss per Event with Damages: $33,946.67 (for 15 events with damages)

Avg. Crop Loss per Event with Damages: $0.00 (for no events with damages)

Record Years 2000 - 2013	Years with an Event	Total Historical Damages recorded for Thunderstorms		Computation	Annual Loss Estimate
14	14	Property	$509,200.00	(Property / 14) * 14/14 =	$36,371.43
14	14	Crops	$0.00	(Crops / 14) * 14/14 =	$ 0.00

Extent Range: Based on historical records, Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer are equally prone to severe thunderstorms. Rarely, has a storm occurred in the County when only one jurisdiction was impacted. Therefore, each jurisdiction should anticipate having to cope with at least three severe thunderstorm events at some point during the 5-year life of this update. Based on historical records, those storms could be packing winds of 55 knots or greater and most likely include hail in the nickel to quarter size.

[**Recorded Range of Events:** Thunderstorm winds from 50 to 79 knots (57.6 – 91.4 mph)]

Tornados

Avg. Property Loss per Event with Damages: $75,000.00 (for 5 events with damages)
Avg. Crop Loss per Event with Damages: $0.00 (for no events with damages)

Record Years 2000 - 2013	Years with an Event	Total Historical Damages recorded for Tornados		Computation	Annual Loss Estimate
14	7	Property	$375,000.00	(Property / 7) * 7/14=	$26,785.71
14	7	Crops	$0.00	(Crops / 7) * 7/14 =	$ 0.00

Extent Range: Based on historical records, Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer should anticipate having to cope with at least one tornado event during the 5-year life of this update. That one event may involve multiple tornados at varying locations in the County. Considering past occurrences, the tornado(s) are likely to be in the range of EF0 – EF2.

[**Recorded Range of Events**: from F0-F3 on the Enhanced Fujita Scale (65-165 mph)]

Wildfire

Avg. Acres Lost per Event: 586.25 acres (for 173 events)
Avg. Costs per Event: $404.63 (for 173 events)

Record Years 2007 - 2013	Years with an Event	Total Historical Damages recorded for Wildfires		Computation	Annual Loss Estimate
6	6	Acres	101,422.27	(Property / 6) * 6/6=	$16,903.71
6	6	Cost	$70,000.00	(Crops / 6) * 6/6 =	$11,666.67

Extent Range: Given the tendency for droughts in the County, the jurisdictions should anticipate having to cope with KBDI conditions of 575 or greater on at least four occasions during the 5-year life of this update; triggering the issuance of burn bans by the County.

[**Recorded Range of Events**: From < 1 – 25,000 acres burned between 2007-2013 (Soo Close (5) fire; 2/27/11]

Winter Storms

Avg. Property Loss per Event with Damages: $186,500.00 (for 4 events with damages)
Avg. Crop Loss per Event with Damages: $0.00 (for no events with damages)

Record Years 2000 - 2013	Years with an Event	Total Historical Damages recorded for Winter Storms		Computation	Annual Loss Estimate
14	12	Property	$746,000.00	(Property / 14) * 12/14=	$53,285.71
14	12	Cost	$0.00	(Crops / 14) * 12/14 =	$ 0.00

Extent Range: The jurisdictions in Carson County should anticipate having to cope with at least 3 winter storm events during the 5-year life of this update; at least one of which will be in the range of 2-3 on the RsSIS Scale.

[**Recorded Range of Events**: The heaviest 1-day snowfall on record was 16.8 inches recorded on December 26, 2000.]

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Past Mitigation

A more detailed explanation of the mitigation actions that have implemented by jurisdictions in Carson County is found is Annex 2 to this plan. Below is a brief explanation of the impact that past FEMA disaster/mitigation grant and related State funding has had on these jurisdictions.

FEMA Hazard Mitigation Grant Program (HMGP) Projects

1) HMGP funding received by the PRPC is being used to support the implementation of the Regional Residential Safe Room Rebate Program which has benefited Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer. To date, residents in the five jurisdictions have received safe room rebates as follows:

   Carson County: 13
   City of Groom: 5
   City of Panhandle: 26
   City of Skellytown: 3
   City of White Deer: 13

2) HMGP funding received by the PRPC is being used to support the implementation of the Regional Mass Notification and Alerting System. The system is benefiting all jurisdictions in Carson County. The system enables authorized emergency management officials to send emergency alerts and notices to local residents before, during and after periods of imminent threat to the public's safety.

FEMA Past Disaster Declarations/Public Assistance Program Grant:

1) Carson County:

   The unincorporated areas of Carson County received $28,074.68 as a sub-grantee through the County's participation in the 1356 Winter 2000 Ice Storm Funding Category B & C allotment provided through the Public Assistance Grants Program.

2.) The City of Groom:

   The City of Groom received $1,429.85 as a sub-grantee through the City's participation in the 1356 Winter 2000 Ice Storm Funding Category B allotment provided through the Public Assistance Grants Program.

3.) The City of Panhandle:

   The City of Panhandle received $11,946.81 as a sub-grantee through the City's participation in the 1356 Winter 2000 Ice Storm Funding Category B & C allotment provided through the Public Assistance Grants Program.

4.) The City of Skellytown:

   The City of Skellytown received $1,371.76 as a sub-grantee through the City's participation in the 1356 Winter 2000 Ice Storm Funding Category B allotment provided through the Public Assistance Grants Program.

5.) The City of White Deer:

The City of White Deer received $1,187.67 as a sub-grantee through the City's participation in the 1356 Winter 2000 Ice Storm Funding Category B allotment provided through the Public Assistance Grants Program.

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Status of Previously Identified Mitigation Actions

The tables on the following pages list the status of the mitigation projects that were identified, by participating jurisdiction in the Carson County 2006 Hazard Mitigation Plan. A number of these actions have now been completed. Several others are being removed from the jurisdictions' action list because they're no longer appropriate for this plan due to the fact that they do not apply directly to the mitigation of natural hazards. A number of the "Deferred" items will be carried into the action item list of the updated Carson County Hazard Mitigation Plan with prospect of their implementation during the 5-year life cycle of the new plan.

Table 33: Status of 2006 Mitigation Action Items **Carson County**

Hazard	Action Item	Completed, Deleted or Deferred	Reason and Supporting Information
Earthquakes	To set up a Regional Monitoring Station that will monitor ongoing seismic activity, and will be operated by students. This Station will be centrally located to serve all of the Texas Panhandle.	Deleted	There does not appear to be sufficient seismic activity in the County to warrant this action. If a station is developed, that decision will likely be made by a state university. Should that time come, the County will cooperate to the extent possible.
Flooding	To install flash flood signs in the Webb Brags housing edition area of the County.	Completed	County road was rebuilt in 2010 which then resolved this problem
Flooding	To review the current engineering design, and determine potential construction improvements for culverts, bar ditches, and curbs.	Completed	County has gradually addressed these issues over time with the installation of new culverts and cleaning of bar ditches.
HazMat Incidents	To partner with BNSF railroad to become familiar with emergency response plans and protocol.	Completed	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards
HazMat Incidents	To develop warning procedures, protocols, and guidelines for HAZMAT instances, and to implement these findings into current policies.	Completed	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards
Severe Thunderstorms	Encourage County residents to abide by current state standards for building codes.	On-going	Residents are continually encouraged to build to the appropriate codes/standards for all-hazards
Severe Winter Weather	To review the current snow and ice removal procedures and to purchase equipment where deemed applicable and necessary.	Completed	Work Order-Warren Cat $260.000.00 Invoice #6772201 Approved 12-9-2010

Table 33: Status of 2006 Mitigation Action Items **Carson County**

Hazard	Action Item	Completed, Deleted or Deferred	Reason and Supporting Information
Severe Winter Weather	To purchase a snow plow to use for the clearing of snow along County roads and right of ways.	Completed	Work Order-Warren Cat $70,200.00-Invoice #6920201 Approved 1-20-11 Work Order-Warren Cat $175,200.00-Invoice #6675401 Approved 1-24-11
Tornado	To familiarize the unincorporated areas of the County with NOAA weather radios, and to purchase these radios for all populations out in the County, as well as partnering with the NWS.	Completed and on-going	Weather radios have been provided to the areas within 10 miles of Pantex. We needed to notify residents of the advantage of NOAA weather radios through newspaper and public meetings.
Wildfire	To continue to implement County burn bans during dry periods, and whenever necessary.	Completed and on-going	Number of Burn Bans from 2006 –20
Wildfire	To encourage residents in the unincorporated areas of the County to create a fire defensible area around all structures.	Completed and on-going	Through the use of periodic newspaper/radio awareness campaigns (as needed)

Table 33: Status of 2006 Mitigation Action Items **City of Groom**

Hazard	Action Item	Completed, Deleted or Deferred	Reason and Supporting Information
Drought	Improve existing water conservation strategies to limit the impact of drought on the jurisdictions water supply by passing an ordinance to prioritize or control water use, particularly for emergency situations like firefighting.	Completed	Implemented through Ordinance #184
Earthquakes	To set up a Regional Monitoring Station that will monitor ongoing seismic activity, and will be operated by students. This Station will be centrally located to serve all of the Texas Panhandle.	Deleted	There does not appear to be sufficient seismic activity in the County to warrant this action. If a station is developed, that decision will likely be made by a state university. Should that time come, the City will cooperate to the extent possible.

Table 33: Status of 2006 Mitigation Action Items **City of Groom**

Hazard	Action Item	Completed, Deleted or Deferred	Reason and Supporting Information
Earthquakes	To replace and upgrade all sewer and water lines, thus decreasing the chances for future damage by using more flexible, earthquake prone materials.	Deleted	The city will continue to replace old, defective utility lines as needed but they won't be earthquake –proof. There's not enough seismic activity to justify the cost.
Flooding	To install flash flood signs and gauges in flood prone areas.	Deferred	These signs have not yet been installed primarily due to lack of funding
Flooding	Continue the interlocal agreement with the County to dredge the draw that acts as a waterway during flooding activities.	Completed	By way of Interlocal Agreements 10-14-1997
HazMat Incidents	Continue to educate and train EMS, fire, and first responder personnel on hazardous materials emergency procedures, chemical identification, and evacuation procedures.	Completed	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards
Severe Thunderstorms	To continue to be active in the Storm Watchers Program with volunteer firemen and law enforcement observing severe thunderstorm conditions and warning the local residents.	Completed	Annual meetings and trainings are being held/conducted
Severe Winter Weather	To purchase a maintainer that will be used to clear snow from city streets.	Deleted	Due to lack of funding; action is being dropped from further consideration under HMGP
Terrorism	To work with Pantex on local terrorism plans and procedures.	Deleted	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards
Terrorism	To install a camera security system around the cities' water wells.	Deleted	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards
Tornado	Replace the tornado siren that is southwest of the school.	Deferred	Due to lack of funds. This action is being carried forward into the action list for the updated MAP
Tornado	Maintain/test and review the current warning systems monthly to insure sirens are in the proper working order, and that the current warning system is still effective in warning for tornados. Upgrade system if necessary.	Completed	The sirens are tested each Friday at 12:00 noon.

Table 33: Status of 2006 Mitigation Action Items **City of Groom**

Hazard	Action Item	Completed, Deleted or Deferred	Reason and Supporting Information
Tornado	Construct a storm shelter in a central area of town.	Deferred	The project has deferred due to lack of funding and the City may work with the ISD to implement this project in the future.

Table 33: Status of 2006 Mitigation Action Items **City of Panhandle**

Hazard	Action Item	Completed, Deleted or Deferred	Reason and Supporting Information
Drought	To strengthen existing water conservation strategies by review and update of the City's Drought Contingency Plan.	Completed	Annual review through the water meter replacement program
Earthquakes	To set up a Regional Monitoring Station that will monitor ongoing seismic activity, and will be operated by students. This Station will be centrally located to serve all of the Texas Panhandle.	Deleted	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards
Flooding	To replace culverts and dredge the right of way along 6th St.	Complete	Completed with Work Order # 4206
Flooding	Continue to dredge and maintain the easements and ditches throughout the City as necessary.	Completed	Maintenance is routinely conducted to ensure bar ditches remain clear of silt and debris
Flooding	To extend the storm sewer from the east side of Pecan under the road to intersect with the ditches that drain into the playa lakes.	Complete	Completed with Work Order # 06-0325
HazMat Incidents	To continue to work with Carson County to keep a running inventory of tier 2 hazardous materials facilities in the City of Panhandle and in the surrounding areas of the county. This will aid in	Completed	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards

Table 33: Status of 2006 Mitigation Action Items **City of Panhandle**

Hazard	Action Item	Completed, Deleted or Deferred	Reason and Supporting Information
	identifying vulnerable areas during the adoption of this plan.		
Tornado	To install warning sirens at 3rd St. & Groom St, and 9th St. & Chester St.	Completed	Replaced 3 warning sirens; because of technology advancement, need was met with a single warning siren placed on 3rd St. & Groom St: 2008 – Certificates of Deposits from City of Panhandle
Tornado	Maintain/test and review the current warning systems monthly to insure sirens are in the proper working order, and that the current warning system is still efficient to warn for tornados and severe thunderstorms. Upgrade system if necessary.	Completed	Daily Circuit tests; upgraded system installed in 2010
Wildfire	To continue to implement the City burn ban policies.	Completed	Number of Burn Bans issued since 2006 - 20

Table 33: Status of 2006 Mitigation Action Items **City of Skellytown**

Hazard	Action Item	Completed, Deleted or Deferred	Reason and Supporting Information
Earthquakes	To set up a Regional Monitoring Station that will monitor ongoing seismic activity, and will be operated by students. This Station will be centrally located to serve all of the Texas Panhandle.	Deleted	There does not appear to be sufficient seismic activity in the County to warrant this action. If a station is developed, that decision will likely be made by a state university. Should that time come, the City will cooperate to the extent possible.
Earthquakes	To replace and upgrade all sewer and water lines, thus decreasing the chances for future damage by using more flexible, earthquake prone materials.	Deleted	The city will continue to replace old, defective utility lines as needed but they won't be earthquake –proof. There's not enough seismic activity to justify the cost.

Table 33: Status of 2006 Mitigation Action Items **City of Skellytown**

Hazard	Action Item	Completed, Deleted or Deferred	Reason and Supporting Information
Flooding	To install flash flood signs along Poplar St. due to the low crossing.	Completed	The flooding on Poplar St. has been corrected by the addition of a culvert.
Flooding	To construct a bigger culvert system under Byrd St at the intersection of 10th St.	Deferred	This project has not yet been implemented primarily due to lack of funding
Flooding	To pave and curb and gutter Byrd St., Chamberlain St., Popular St., Elm St., 10th St., 2nd St.	Deferred	This project has not yet been implemented primarily due to lack of funding
HazMat Incidents	Continue to educate and train EMS, fire, and first responder personnel on hazardous materials emergency procedures, chemical identification, and evacuation procedures.	Deleted	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards
HazMat Incidents	To continue to work with TxDOT to better identify intersections and hazardous materials routes.	Deleted	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards
Severe Winter Weather	To purchase a maintainer to use in the clearing of streets.	Deferred	Due to lack of funding; action is being dropped from further consideration under HMGP
Severe Winter Weather	To continue to work with TxDOT on keeping Main St. clear during this type of event.	Complete	State Maintained Roadways
Severe Winter Weather	To complete a map or address listing of all medically sensitive residents, which may need assistance during these events, to be placed at City Hall, as well as, first responder facilities such as fire departments and EMS facilities.	Completed and on-going	Completed with Work Order #387753
Terrorism	To install an alarm system, cameras, and surveillance that will monitor the water wells.	Deleted	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards
Terrorism	Continue to test, maintain and upgrade the panic button system.	Deleted	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards
Tornado	Maintain/test and review the current warning systems monthly to insure sirens are in the proper working order, and that the current warning	Completed	Weekly test; Upgraded of warning siren on 4th and Roosevelt-Invoice #100237

Table 33: Status of 2006 Mitigation Action Items **City of Skellytown**

Hazard	Action Item	Completed, Deleted or Deferred	Reason and Supporting Information
	system is still effective in warning for tornados. Upgrade system if necessary.		
Tornado	To replace the warning siren at Cabot Camp south of town.	Deferred	This project has not yet been implemented primarily due to lack of funding
Wildfire	To continue to enforce burn bans during heightened wildfire times.	Completed	Number of Burn bans from 2006-20
Wildfire	Purchase a brush truck with a 1,500 gallon tank to be used for wildfires.	Completed	Received 5/25/2006 a 1967 Kaiser 2 ½ ton truck with two 600 gallon tanks. Forest Service #AG001612355 Vehicle ID # 04A-59770-0325-26602

Table 33: Status of 2006 Mitigation Action Items **City of White Deer**

Hazard	Action Item	Completed, Deleted or Deferred	Reason and Supporting Information
Drought	To strengthen existing water conservation strategies by review and update of the City's Drought Contingency Plan.	Deferred	The City still intends to develop a valid drought contingency plan but has not yet been able to do so due to lack of resources.
Earthquakes	To strengthen building codes by establishing earthquake specific codes.	Deleted	It's been determined that there's not enough seismic activity in the area to further justify this action
Flooding	To dredge a drainage ditch along 8th St from 8th St to Paul St. so that the water will drain into the playa lake. Also to dredge multiple roadway drainage ditches in the eastern portion of the City, south of Hwy. 60.	Deferred	Due to lack of funding. This is an important project so this action is being carried into the City's action list in the updated MAP.
Flooding	To determine the flood areas in the future development areas.	Complete	Currently, White Deer has a new housing addition and will have storage buildings being constructed.

Table 33: Status of 2006 Mitigation Action Items **City of White Deer**

Hazard	Action Item	Completed, Deleted or Deferred	Reason and Supporting Information
HazMat Incidents	To partner with BNSF railroad to become familiar with emergency response plans and protocol.	Deleted	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards
HazMat Incidents	To develop warning procedures, protocols, and guidelines for HAZMAT instances, and to implement these findings into current policies.	Deleted	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards
HazMat Incidents	To identify necessary equipment needed to handle HAZMAT incidents, and to purchase this equipment.	Deleted	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards
Severe Thunderstorms	To continue to enforce and update current building codes.	Deferred	The City would still like to update its code of ordinances but has not the resources to do so as of yet.
Severe Winter Weather	To develop a partnership with area businesses to provide an emergency back-up generator for the water and sewer systems.	Deferred	City has purchased three small portable generators but will continue efforts to purchase a large generator for back up in the cities utilities.
Severe Winter Weather	To purchase back-up generators for the water and sewer systems.	Complete	Three small generators have been purchased.
Terrorism	To install an alarm system that will monitor the active water and gas wells.	Deleted	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards.
Terrorism	To install a panic button in City Hall that will notify law enforcement personnel of a terroristic threat or civil dispute.	Deleted	This is on-going but hazmat actions are being dropped from the MAP as they are not natural hazards.
Tornado	Maintain/test and review the current warning systems monthly to insure sirens are in the proper working order, and that the current warning system is still efficient to warn for tornados. Evaluate the need for an additional siren in the north portion of town.	Complete and on-going	Weekly tests; Evaluation resulted in the finding that new sirens are needed for the city.
Tornado	To construct a community shelter at the community center located at 300 Paul St. This center would service the entire community.	Deferred	The project has deferred due to lack of funding and the City may work with the ISD to implement this project in the future.
Tornado	Partner with the local school district to try and establish a community shelter in the old high	Complete	First Baptist Church is a designated Red Cross Shelter and the school will not be used as a shelter.

Table 33: Status of 2006 Mitigation Action Items **City of White Deer**

Hazard	Action Item	Completed, Deleted or Deferred	Reason and Supporting Information
	school basement, and also at the First Baptist Church basement.		
Wildfire	To continue to implement the City burn ban policies.	Complete	Number of Burn Bans from 2006-20
Wildfire	To develop and determine uniform water hydrant coverage focusing on the city limit boundaries.	Complete	Installed a new water tower to aid in creating increased water pressure. Completed
Wildfire	To purchase and implement a brush rig and a pumper into the current wildfire defense mechanisms.	Completed Brush Rig Deferred Pumper	Invoice # 1182008 Lack of funding

Development Trends

As of 2012, Carson County's population is 6,157. Since 2000, it has had a population change of -5.51% percent. The median home cost in Carson County is $105,600. Home appreciation the last year has been 2.38 percent. Compared to the rest of the country, Carson County's cost of living is 79.1%; lower than the U.S. average. The unemployment rate in Carson County is 4.4 percent (U.S. avg. is 8.60%). Recent job growth is positive with an increase of 1.78% since 2011. Future job growth over the next ten years is predicted to be 39.16%.

As of 2012, Groom population is 572. Since 2000, it has had a population change of –9.4 percent. The median home cost in Groom is $80,200. Home appreciation in the past year has been 2.17 percent. Compared to the rest of the country, Groom's cost of living is 18.4%; lower than the U.S. average. The unemployment rate in Groom is 4.40 percent (U.S. avg. is 8.60%). Recent job growth is positive. Groom jobs have increased by 1.78 percent since 2011 and are expected to increase in line with the percentage predicted for the County during the next 10 year period.

As of 2012, Panhandle’s population is 2,439. Since 2000, it has had a population change of -5.8 percent. The median home cost in Panhandle is $141,100. Home appreciation in the past year has been 2.19 percent. Compared to the rest of the country, Panhandle's cost of living is 18.9%; lower than the U.S. average. The unemployment rate in Panhandle is 4.40 percent (U.S. avg. is 8.60%). Recent job growth is positive. Panhandle jobs have increased by 1.78 percent since 2011 and are expected to increase in line with the percentage predicted for the County during the next 10 year period.

As of 2012, Skellytown’s population is 469. Since 2000, it has had a population change of -23.1 percent. The median home cost in Skellytown is $39,700. Home appreciation in the past year has been 2.81 percent. Compared to the rest of the country, Skellytown cost of living is 25.6%; lower than the U.S. average. The unemployment rate in Skellytown 4.40 percent (U.S. avg. is 8.60%). Recent job growth is positive. Skellytown jobs have increased by 1.78 percent since 2011 and are expected to increase in line with the percentage predicted for the County during the next 10 year period.

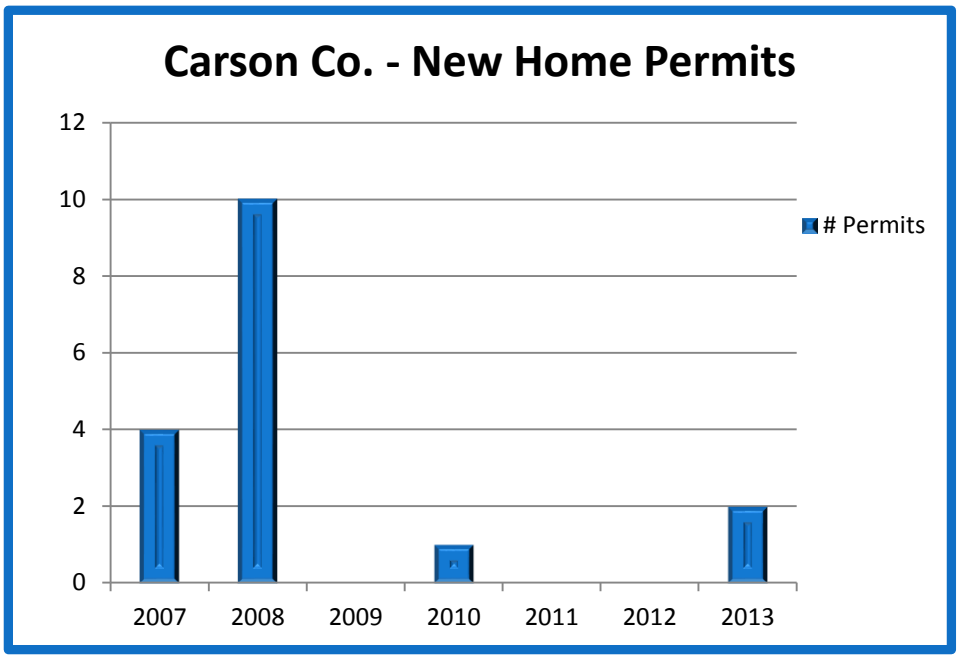
As of 2012, White Deer population is 995. Since 2000, it has had a population change of - -6.13% percent. The median home cost in White Deer is $56,460. Home appreciation in the past year has been 2.33 percent. Compared to the rest of the country, White Deer cost of living is 19.5%; lower than the U.S. average. The unemployment rate in White Deer is 4.40 percent (U.S. avg. is 8.60%). Recent job growth is positive. White Deer jobs have increased by 1.78 percent since 2011 and are expected to increase in line with the percentage predicted for the County during the next 10 year period.

Fifteen new home permits were issued in the County since the original Carson County MAP was adopted in 2006. Five new commercial facilities have been or are currently being built in the County within that same timeframe. In 2011, Carson County cut the ribbon on a new 48-bed County Jail. At a cost of $7.5 million, this has been the most visible building construction project that has taken place since 2006.

However, even as this plan is being completed, a new housing development is underway on the south side of the City of White Deer. It's anticipated that up to 30 new housing units will be built in this area during the life of this MAP update.

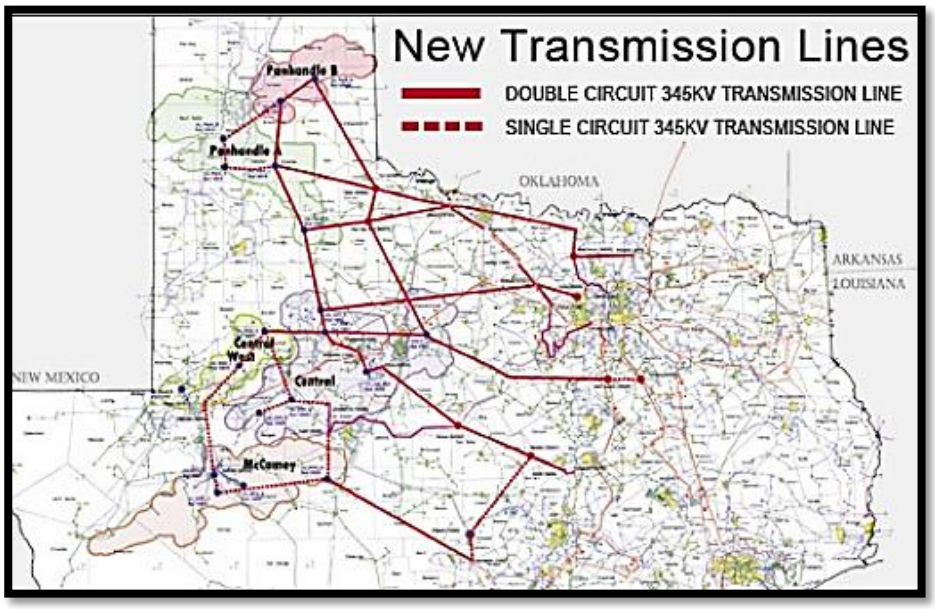
None of the development that has occurred in the planning area since the original adoption of the Carson County MAP has increased any of the participating jurisdictions' overall vulnerability to the hazards that impact the area. Improvements or new developments have been designed with these hazard risks in mind so that neither the development nor areas adjacent are placed at greater risk to those hazards. To the extent possible, new construction is built to increase resiliency to local hazards in an effort to mitigate damages from future hazard events.

Graph 11: New Home Permit History: 2007 - 2013



The summary of new home permits issued in Carson County over the past 6 years is as follows:

2007: 4 homes;
Avg. cost: $178,400.
2008: 10 homes;
Avg. cost $128,700.
2009: 0 homes
2010: 1 home;
Cost: $30,000
2011: 0 homes
2012: 0 homes
2013: 2 homes:
Avg. cost: $325,000



The most noteworthy development trend that has occurred in the County since the 2006 MAP (and one that will continue during the life of this update) has been the growth of the wind energy industry. The CREZ trans-mission line that feeds the power generated in Carson County into the ERCOT grid was completed earlier this year.

There are now six different wind farms and over 500 wind turbines operating in the County. The latest farm, which started construction in October 2013, will see another 118 wind turbines, capable of generating 218 megawatts of electricity, erected in the County at a cost of over $400 million. Now that the CREZ line is in place, this expansion is expected to continue for the foreseeable future.

The excerpt below, taken from an article found on **http://www.eenews.net/stories/1059995041** helps to explain the impact of this new transmission line on the area and on what its completion now implies for future expansion in the County.

On Jan. 29, [2014] *the final segment of the $6.8 billion Competitive Renewable Energy Zone transmission project, called CREZ, was placed into service, capping eight years of planning, upgrades and new construction along 3,600 miles of high-voltage transmission lines across a broad swath of central and West Texas.*

The new lines broadly link five CREZ zones from Amarillo in the north to the Edwards Plateau in the south with tentacles reaching eastward to Dallas-Fort Worth, Waco, Austin and San Antonio. They will provide the backbone for what could eventually be 16,000 MW of wind power flowing from West Texas' high lonesome country to the state's burgeoning population centers by 2016, according to the Electric Reliability Council of Texas (ERCOT). ERCOT runs the state's largest electricity grid and oversees development along the CREZ lines.

CREZ has also helped solve what experts have called the "chicken and egg problem," whereby insufficient transmission infrastructure dampens interest in building wind farms while at the same time investment in transmission is hampered by a lack of certainty that the new lines will be used.

"While a wind farm can be developed in less than a year, it takes years to undergo the regulatory process, siting, easement acquisition and construction to develop transmission facilities," Robbie Searcy, an ERCOT spokeswoman, said in an email. "The wind developers, in turn, were not willing to commit to projects knowing that the transmission they needed would not be available for five to seven years."

While the wind industry has been good for the local economy; its growth is not projected to directly result in substantial long-term job growth. Once a farm has been built only a handful of technicians are required to maintain its operation.

The jurisdictions in Carson County do not foresee significant change in current development trends during the life of this plan. According to the Texas State Data Center, over the next five years, the projected population change is anticipated to be approximately 6%; or an increase of around 149 in population. In assessing recent trends, most of this growth is expected to come from individuals relocating to Carson County from neighboring counties. Recent development has not altered vulnerabilities to the identified hazards within Carson County or the City of Groom, Panhandle, Skellytown or White Deer.

FEMA Flood Mitigation Assistance (FMA):

None of the jurisdictions in Carson County have ever received funding under the FMA grant program.

FEMA Hurricane Property Protection Mitigation:

None of the jurisdictions in Carson County have ever received funding under the Hurricane Property Protection Mitigation program.

FEMA Pre-Disaster Mitigation (PDM)

1) PDM funding received by the PRPC was used to support the development of the original MAP for Carson County in 2006
2) PDM funding received by the PRPC is being used to support the implementation of a regional Hazard Mitigation Planning Project that will result in the updating of all MAPs in the Panhandle including, the Carson County MAP. All jurisdictions in Carson County have been benefited by this PDM project.

Texas Water Development Board:

All jurisdictions in Carson County were included in and benefited by the 2002 Regional Water Planning Process to develop a regional water plan. That plan was created to assess current groundwater resources in the Panhandle as a means of conserving and extending the life of those resources. The plan was ultimately adopted by the Texas Water Development Board and supported the development of the 2002 State water plan. The process of updating the plan is currently underway in 2012. While the Cities of Groom, Panhandle, Skellytown and White Deer each implement local strategies during drought conditions; they've yet to develop their own Drought Contingency Plan in conformance with Title 30, Texas Administrative Code, Chapter 288. That is an action each city intends to implement during the period of this plan update.

Incorporated Planning Mechanisms

Carson County and each participating jurisdiction will be responsible for implementing its own mitigation action plans contained in Section VI. 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 have adopted the mitigation action plan for their jurisdictions.

At this time, no jurisdiction in the County has a long range development plan, Capital Improvement Plan, Master Stormwater Management/Drainage Plan or other development-focused plan. Due to fiscal constraints, the planning horizon is typically year-to-year and is established with the annual budget process. So in short, aside of their ability to enforce their code and zoning requirements, the jurisdictions in Carson County don't have an expansive array of plans currently in place that can be incorporated into this MAP update.

However, the MAT did draw upon Regional Water Plans, Regional Livestock Resiliency plans and the State of Texas Mitigation Plan and incorporated guidance from those documents into this update.

Within the mitigation action items 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 timely implemented.

Due to limited funding sources and lack of a separate planning staff, jurisdictions in Carson County do not anticipate any development of new planning mechanisms during the 5-year period of this update. Their primary mitigation planning tools will continue to be this update, their building codes and their annual budget process. The ability to implement projects to address their hazard vulnerabilities will be limited by their budgets, but each municipality has existing zoning ordinances and zoning committees that have the authority to enforce those codes. The County is currently establishing zoning codes and it is anticipated that they will be in place prior to the next 5 year update.

Jurisdiction	**Elected Officials** *Review budget, pass laws, create codes/ordinances & determines ability to implement mitigation actions*	**Administration**	**Zoning Codes**	**Code Enforcement**
Carson County	County Judge & 4 Commissioners	County Judge	In progress	In progress
Groom	Mayor & 5 City Council Members	City Secretary	Yes	Zoning Cmte
Panhandle	Mayor & 5 City Council Members	City Manager	Yes	Zoning Cmte
Skellytown	Mayor & 5 City Council Members	City Secretary	Yes	Zoning Cmte
White Deer	Mayor & 5 City Council Members	City Secretary	Yes	Zoning Cmte

Nevertheless, each jurisdiction will work with what they have to be as forward-looking as they can with their future development goals. When feasible, the actions contained in this document can be incorporated in with future development/construction activities of the jurisdictions. For example, a paving project in Skellytown may be altered to include curb/ gutter work to address some of the flood/drainage issues experienced by that community. This plan can continue to influence projects, planned, ad hoc or otherwise, as they arise in each jurisdiction in the future to further the goals of this plan.

The one mechanism that will enable each jurisdiction to perpetuate their mitigation goals will be the annual review process. Revisiting the MAP, checking on progress made and looking ahead to the coming year for opportunities to advance their mitigation objectives will help to keep the plan in motion. The review process will also allow new Commissioners/Councilmen to become part of the on-going effort to mitigate the natural hazards in their jurisdiction.

Carson County is committed to supporting the cities, communities, and other jurisdictions in the planning area as they implement their mitigation plans. Carson County will review and revise, as necessary, goals and objectives in its County-wide emergency operations plans to ensure that they are consistent with this mitigation action plan. Carson County will work with participating jurisdictions to advance the goals of this hazard mitigation plan through its routine, ongoing, long-range preparedness planning, budgeting, and work processes.

Annual Budget Review

Each jurisdiction that participated in the planning process will review the Plan and mitigation actions therein when conducting their annual budget review. When allocating funds for upcoming operating and construction budgets, high priority mitigation actions will be reviewed during City Council and Commissioner Court meetings. Each identified staff member/planning team member will be responsible for bringing mitigation actions to their respective city council/board meeting to discuss feasibility of the potential project in terms of the availability of funds, grant assistance and preliminary cost benefit review. If funds become available to implement a particular action(s) after the budget has been set, the jurisdictions will work to amend their budget to allow for that action(s) to be carried out.

Existing Emergency Operations Plans are at Advanced Level

Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer share a common Emergency Management Plan (EOP) which at the present, is maintained at the Advanced Level as determined by the Texas Division of Emergency Management. The EOP consists of a Basic Plan backed by 22 separate Annexes which address specific actions to be taken by the jurisdictions to safeguard the welfare of local residents. In addition to the 22 Annexes Carson County maintains Annex W for B&W Pantex Plant.

Annex P (Mitigation) is not currently required at the Intermediate EOP level. However, upon the adoption of this MAP, a new Annex will be developed for the County to ensure that the goals of the MAP are fully integrated in with the goals of the EOP.

The Plan will be consulted during the update to each jurisdiction's local emergency and/or disaster recovery plan. Risk assessment and vulnerability data will be pulled from the plan and reviewed 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. Mitigations projects that relate to prevention and protection will also be reviewed for relevance to determine if they should be included.

Current Building and Fire Codes

No jurisdiction in Carson County currently has the authority to enforce building codes and/or trained personnel to staff a code enforcement program. When these services are needed; they're procured by contract. Through these contracted services, the Cities enforce the standards listed below.

- 2006 International Codes; Building, Fire, Residential, Plumbing, Mechanical, Gas
- 2008 International Electric Code
- 2006 International Residential Code

Building Code Effectiveness Grading Report (BCEGS)

The Building Code Effectiveness Grading Schedule (BCEGS) assesses the building codes in effect in a particular community and how the community enforces its building codes, with special emphasis on mitigation of losses from natural hazards. Because none of the jurisdictions in Carson

County maintains a Code Enforcement Program, no jurisdiction in the County qualifies for a BCEGS rating.

Master Drainage & Storm Water Management Plans:

No jurisdiction in Carson County operates under a Master Drainage & Storm Water Management Plan. The purpose of a Master Drainage & Storm Water Management Plan is to evaluate optional drainage measures and to recommend a plan for resolving existing storm drainage problems. The plan also provides guidance for the implementation of future storm drainage improvements. None of the jurisdictions in Carson County is sufficiently impacted by persistent flooding issues to warrant the cost of such a plan. Local planners/consultant engineers consider the potential effects of flash flooding/heavy rain during the design phase for capital improvement projects.

Areas that are subject to occasional inundation are being addressed to the extent possible as new development or re-development occurs in those areas. Structures that will eliminate or relieve those problems are installed or enhanced as the development work takes place; without causing downstream impacts.

Capital Improvement Plans (CIP):

None of the jurisdictions in Carson County currently maintains a CIP. To a certain extent, this MAT serves as a CIP for the jurisdictions, at least for the purpose of directing long/short-term hazard mitigation activities.

Flood Plain Ordinances / Orders

Jurisdictions receiving a Flood Insurance Rate Map (FIRM) from FEMA are required to adopt a floodplain management ordinance or order that will meet or exceed the minimum National Flood Insurance Program (NFIP) requirements. The main purpose of the floodplain management regulations is to ensure that participating jurisdictions take into account flood hazards, to the extent that they are known, in all official actions relating to land management and use.

Jurisdictions that participate in the National Flood Insurance Program (NFIP) generally ensure that the following duties are carried out within their area:

- Require floodplain development permits for all proposed construction within designated floodplains.
- Make sure all other local, State, and Federal permits covering the construction are obtained. This may include such things as wetlands, historic preservation, and endangered species.
- Maintain records of all floodplain development permits issued or denied.
- Review permit applications for completeness and to make sure that the proposed development will be safe from flooding and will not cause increased flooding upstream or downstream. This includes obtaining professional engineering help when needed.
- Require structures in or adjacent to the floodplain to have their finished floor at or above the statutory elevation, or require flood-proofing of those structure for which flood-proofing is allowed.
- Require that manufactured homes be adequately elevated and anchored.

- Require water and wastewater utilities within the floodplain to comply with flood plain regulations, especially infiltration of storm water into the water supply or the sewage collection system
- Ensure that the flood carrying capacity of the waterway is not reduced when the waterway is relocated or altered.
- Enforce these regulations by field checks, especially of the finished floor elevations of buildings with a regulatory elevation.
- Maintain a library of community flood maps, studies, and documents.
- In the case of actual flooding, determine what damage has occurred; if what FEMA terms "substantial damage" has occurred, require all structures to be repaired to current flood-hazard area building standards.

The Cities of Groom, Panhandle and White Deer are the only jurisdictions in Carson County that currently have the authority to enforce ordinances or orders in the Flood Plain. However, while each city has been mapped by FEMA; those maps are now nearly 30-40 years old and have very limited value in supporting local floodplain management activities.

National Flood Insurance Program and Community Rating System

The Cities of Groom, Panhandle and White Deer are the only jurisdictions in Carson County that currently participate in the National Flood Insurance Program. The jurisdictions that are participating in the NFIP have passed an ordinance establishing minimum floodplain management standards consistent with Section 60.3 of the Rules and Regulations of the National Flood Insurance Program. Every jurisdiction reviews their existing codes and continue to enforce high regulatory standards for new building development and managing stormwater. FEMA's Community Status Book Report listing the Communities Participating in the National Flood Program in Carson County provides the following information.

CID	Community Name	County	Init FHBM Identified	Init FIRM Identified	Current Eff Map Date	Reg-Emer Date	Tribal
480726	Groom, City of	Carson County	12/03/76	10/15/85	06/19/85(M)	06/19/85	No
480727	Panhandle, City of	Carson County	06/25/76	05/11/82	05/11/82(M)	05/11/82	No
480729	White Deer, City of	Carson County	07/02/76	07/02/76		06/08/12	No

Source: ***http://www.fema.gov/cis/TX.html***

Carson County has enacted an order establishing minimum floodplain management standards consistent with Section 60.3 of the Rules and Regulations of the National Flood Insurance Program. However, the County has never been mapped by FEMA. With the exception of the wind farms that have been developed in the County over the past five year; each of which required an extensive Environmental Planning and Historic Preservation (EHP) review, and the limited new

construction in the Cities of Groom, Panhandle, Skellytown and White Deer, there has been no other significant new development in the County to regulate.

The Community Rating System (CRS) is a voluntary program that recognizes and encourages a community's efforts that exceed the NFIP minimum requirements for floodplain management. The CRS program emphasizes three goals: the reduction of flood losses, facilitating accurate insurance rating and promoting the awareness of flood insurance. By participating in the CRS program, communities can earn a discount for flood insurance premiums based upon the activities that reduce the risk of flooding within the community.

None of the jurisdictions in Carson County currently participate in the Community Rating System. Where flood maps exist (in Groom, Panhandle and White Deer), they have no elevations; which makes it difficult to meet even the minimum requirements for the NFIP. The other jurisdictions have no flood maps whatsoever.

SECTION VI – DEVELOP MITIGATION ACTION PLAN

This MAP planning process was undertaken voluntarily by the jurisdictions in Carson County. Each of the participating jurisdictions viewed the development of an appropriate array of local mitigation strategies and implementation actions, based on known conditions, to be of value to their constituents. These strategies and actions are aimed at protecting the welfare of the public and reducing or mitigating losses that might occur as a result of future natural hazard events.

As with the Carson County EOP, the MAP was likewise developed on a county-wide basis yet, each jurisdiction retained the ability to develop mitigation actions appropriate to their own local needs.

The Carson County MAT began the development of the new MAP by agreeing to a common set of goals and objectives, flexible enough they could be used to formulate customized mitigation actions for local implementation. The goals and objectives of the Carson County MAP are provided below.

Goal 1: Protect public health and safety

- Objective 1.1: Advise the public about health and safety precautions to guard against injury and loss of life from hazards.
- Objective 1.2: Maximize the use of modern technology to provide adequate warning, communication, and mitigation of hazards events.
- Objective 1.3: Reduce the danger to, and enhance protection of, dangerous areas during hazard events.
- Objective 1.4: Protect critical infrastructure facilities and critical services.

Goal 2: Protect existing and new properties

- Objective 2.1: Use the most cost-effective approaches to protect existing and new building and public infrastructure from hazards.
- Objective 2.2: Work to develop local guidance to ensure that development will not inadvertently endanger the public or increase threats to existing and new properties.

Goal 3*:* Increase public understanding, support, and demand for hazard mitigation

- Objective 3.1: Increase public awareness of the full range of natural and man-made hazards they face.
- Objective 3.2: Educate the public on actions they can take to prevent or reduce the loss of life or property from all hazards.
- Objective 3.3: Publicize and encourage the adoption of appropriate hazard mitigation measures.
- Objective 3.4: Encourage public policy to promote mitigation activities among the local jurisdictions.

Goal 4: Promote growth in a sustainable manner.

Objective 4.1: Incorporate hazard mitigation into the long-range planning and development activities

Objective 4.2: Encourage developers to voluntarily use codes and standards that will help to prevent the creation of future hazards to life and property

Goal 5: Maximize the use of outside sources of funding

Objective 5.1: Maximize the use of outside sources of funding

Objective 5.2: Maximize participation of residents in protecting their welfare and their properties

Objective 5.3: Maximize insurance coverage to provide financial protection against hazard events

The goals and objectives of this MAP reflect similar goals to those found in the State of Texas Mitigation Plan and the National Flood Insurance Program. This similarity is not intentional. It is, however understandable that the goals established through these three separate efforts are similar because of the shared purposes of the NFIP, the State of Texas's MAP, and the Carson County.

Once the goals and objectives had been identified, Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer conducted an extensive review of past mitigation activities. Part of the reason for doing so was to maintain consistency with the goals established in the original Carson County MAP. Also, for those action items from the previous plan that had been deferred or not completed; the MAT wanted to evaluate the existing barriers which hindered the implementation of those items.

The assessment of the historical hazard incidents, along with the review of past mitigation actions and the available planning mechanisms, enabled the MAT members to identify critical areas of hazard concern. However, there were other considerations that had to be taken into account before each jurisdiction could develop a suitable set of mitigation action items for their use. These are described below.

Action Plan/Cost Benefit Considerations

Cost-Benefit Analysis (CBA) is a systematic process for calculating and comparing benefits and costs of a project, decision or government policy. CBA has two purposes:

1. To determine if it is a sound investment/decision (justification/feasibility),
2. To provide a basis for comparing projects. It involves comparing the total expected cost of each option against the total expected benefits, to see whether the benefits outweigh the costs, and by how much.

CBA is an analysis of the expected balance of benefits and costs, including an account of foregone alternatives and the status quo. CBA helps predict whether the benefits of a project or policy outweigh its costs, and by how much relative to other alternatives (i.e. one can rank alternate projects or policies in terms of the cost-benefit ratio).

In this instance, the MAT members assessed the cost of implementing an action, both in social and monetary capital, against the assumed benefits of implementing the action. The MAT members felt that the greatest return would be received on actions items where public safety was of greatest concern.

Action Plan/STAPLE/E Considerations

Considering detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity can be time consuming and may not always be practical. Alternate approaches for conducting a quick evaluation of proposed mitigation activities can be used to identify mitigation activities that merit a more detailed assessment. One of those methods used by the Carson MAT was the STAPLE/E approach.

STAPLE/E allowed mitigation activities to be evaluated quickly by the MAT members in a simulated fashion. This set of criteria allowed the MAT to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLE/E) constraints and opportunities of implementing a particular mitigation item in their jurisdiction.

The STAPLE/E tool was used to assist the MAT members in deciding which actions to include in their implementation strategy. The criteria are designed to account for a wide range of factors that affect the appropriateness of an action. Each jurisdiction evaluated the following criteria and considerations in developing the mitigation action items.

S - **Social**: Community acceptance, public support, adverse effects on population segments, health/welfare/safety impacts, and financial effects

T - **Technical**: Technical feasibility, long term effectiveness, and secondary impacts

A - **Administrative**: Staff, funding, and maintenance capabilities

P - **Political**: Political support, local champion, and public support

L - **Legal**: State authority, existing local authority, and potential opposition

E - **Economic**: Benefits, costs, and availability of outside funding

/

E - **Environmental**: impact on environment and consideration of federal, state and local regulations that apply to the protection of the environment.

This allowed the jurisdictions to quickly weigh the pros and cons of implementing a particular action. In evaluating potential mitigation actions, the MAT members also considered:

- Compatibility of local mitigation actions with the goals and objectives of the State of Texas Hazard Mitigation Plan;
- An assessment of the impact of an identified action on other jurisdictions within Carson County and in the Panhandle;
- Funding priorities identified in the Current State of Texas Hazard Mitigation Plan; and
- Compatibility of local mitigation actions with other local or regional plans and programs.

In assigning the STAPLE/E values, each factor was weighted evenly with a ranking of 1-5; with 5 being the highest or most vital value. Each of the participating jurisdictions assigned the STAPLE/E values to their respective mitigation action items. The STAPLE/E ranking, along with the evaluation of cost-effectiveness, contributed to the determination of the action item's priority of Low, Medium or High

The table below illustrates how the total STAPLE/E score, along with the cursory evaluation of cost-effectiveness, helped each jurisdiction in setting the priority for their mitigation action(s).

Table 34: Prioritization Criteria

	LOW			**MEDIUM**			**HIGH**		
STAPLE/E Score	*Low*	–	*Low Medium*	*Medium*	–	*Medium High*	*High*	–	*Very High*
Estimated CBA*	1	–	14	15	–	24	25	--	35

* - *CBA or Cost Benefit Analysis rating refers to the anticipated return on investment. For instance, a 1:1 rating assumes every dollar invested in a mitigation action will yield a return of one dollar. A rating of 1 to a value greater than 1 indicates that the anticipated return on investment will be greater than the cost of the investment. Specific CBAs are not registered for each of the mitigation actions listed in this MAP Update but the Estimated CBA value was a consideration used in setting an action's priority.*

The next section of this document identifies the specific mitigation actions developed for Carson County and the Cities of Groom, Panhandle, Skellytown and White Deer.

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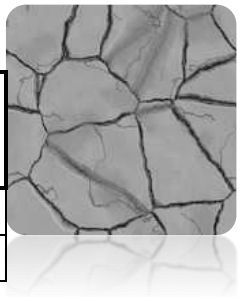
Mitigation Action Items – Droughts



Carson County	*Develop and distribute public education materials on water metering/leak detection programs.*
Objective(s) Addressed:	1.1, 3.2, 3.3, 5.1
Other Hazards(s) Addressed:	Drought only
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$2,000.00
Potential Funding Source(s):	General Funds, HMGP, PDM, PWPG Information Resources, local funds
Lead Agency/Department Responsible:	Carson County Commissioners' Court / Carson County EMC
Implementation Schedule:	Within 6 months of securing the necessary funding

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	2	3	4	3	5	24

Cost Effectiveness	Will encourage residents to seek ways of saving water during times of drought which will not reduce needless water loss but also save residents money.

Discussion: This action will help the residents in identifying saving water methods during all times; particularly during times of drought. The materials will discuss the impact of a prolonged drought on the County and what residents can do to help minimize that impact.

Carson County	*Actively engage in and contribute to the Panhandle Water Planning Group's (PWPG) 2016 Regional Water Planning efforts*
Objective(s) Addressed:	1.1, 3.2, 3.3, 4.1, 5.1
Other Hazards(s) Addressed:	Drought only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$2,000.00
Potential Funding Source(s):	In-Kind; time spent in attending/participating in PWPG meetings
Lead Agency/Department Responsible:	Carson County Commissioners' Court / Carson County Judge
Implementation Schedule:	Throughout the PWPG's 2016 Regional Water Planning process.

S	T	A	P	L	E	/ E	Total
4	3	3	4	3	4	4	25

Cost Effectiveness	Time spent in the PWPG planning process will yield a wealth of information that can support water conservation efforts locally

Discussion: The PWPG is updating the Regional Water Plan for the 21 counties located in Planning Region A, which includes Carson County. Carson County has the opportunity to participate in the process to learn of other mitigation actions that can be implemented in the County and to ensure the County's long-term water needs are represented in the water plan update.

Mitigation Action Items – Droughts

City of Groom	*Develop/implement an aggressive water line inspection and repair schedule to minimize the loss of water to leaks.*
Objective(s) Addressed:	1.1; 2.1; 4.1; 5.1
Other Hazards(s) Addressed:	Drought only
Priority (High, Medium, Low):	High
Estimated Cost:	$8,000.00
Potential Funding Source(s):	General Budget
Lead Agency/Department Responsible:	City of Groom City Council / City of Groom Public Works Department
Implementation Schedule:	To be implemented within a year of the adoption of this update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	2	3	4	3	4	5	25

Cost Effectiveness	This action will help to reduce water waste and ultimately extend the life of the City's water system.

Discussion: This action will allow city officials and the City Council the opportunity to develop an enhanced business plan for maintaining its water distribution system. Water supply and drought conditions change periodically, as such, minimizing water loss, especially during times of drought, can increase the city's access to water utilizes and aid in preventing cascading disasters.

City of Groom	*Develop/distribute public information of the benefits of showerhead replacement, flow restrictors and xeriscaping*
Objective(s) Addressed:	1.1, 3.1, 3.2, 3.3, 5.2
Other Hazards(s) Addressed:	Wildfire (ensuring water resources are available for firefighting)
Priority (High, Medium, Low):	Medium
Estimated Cost:	$2,000.00
Potential Funding Source(s):	General Fund (much of this information is already available; it needs to be compiled for Vega's use)
Lead Agency/Department Responsible:	Groom City Council / Public Works Dept.
Implementation Schedule:	Developed as part of the Drought Contingency Planning process; to be completed by May 5, 2014

S	T	A	P	L	E	/ E	Total
4	3	3	3	4	3	4	24

Cost Effectiveness	This action will help to reduce water waste and would also help to cut resident utility costs.

Discussion: With a relatively minor effort, the City of Groom can provide residents with guidance and tips on actions they can voluntarily undertake to reduce their discretionary use of water resources. Over time, these actions will contribute to the City's water conservation goals and potentially extend the life of the municipality's current water resources.

Mitigation Action Items – Droughts

City of Panhandle	*Develop/implement an aggressive water line inspection and repair schedule to minimize the loss of water to leaks.*
Objective(s) Addressed:	1.1; 2.1; 4.1; 5.1
Other Hazards(s) Addressed:	Drought only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$8,000.00
Potential Funding Source(s):	General Budget
Lead Agency/Department Responsible:	City of Panhandle City Council / Panhandle City Manager
Implementation Schedule:	To be implemented within a year of the adoption of this update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
5	4	2	3	3	3	4	24

Cost Effectiveness	This action will help to reduce water waste and ultimately extend the life of the City's water system.

Discussion: This action will allow city officials and the City Council the opportunity to develop an enhanced business plan for maintaining its water distribution system. Water supply and drought conditions change periodically, as such, minimizing water loss, especially during times of drought, can increase the city's access to water utilizes and aid in preventing cascading disasters.

City of Panhandle	*Conduct a public awareness program to promote voluntary water conservation.*
Objective(s) Addressed:	1.1; 3.1; 3.2; 3.3; 5.2
Other Hazards(s) Addressed:	Drought & Wildfires
Priority (High, Medium, Low):	High
Estimated Cost:	$1,000.00
Potential Funding Source(s):	General Budget
Lead Agency/Department Responsible:	City of Panhandle City Council / City of Panhandle City Manager / Carson County EMC
Implementation Schedule:	Implemented on an annual basis throughout the 5-year MAP update.

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	4	4	4	4	4	28

Cost Effectiveness	This action is aimed at engaging voluntary public participation in sensible water conservation programs that will not only help to extend local water supplies but also result in cost savings to the public.

Discussion: With relatively minor effort City of Panhandle can produce the brochures and the materials will include guidance and tips on conserving water year-round; especially during times of the year when droughts and wildfires are most prevalent.

Mitigation Action Items – Droughts

City of Skellytown	*Develop and implement a Drought Contingency Plan consistent with Title 30 TAC§295.9.*
Objective(s) Addressed:	1.3; 1.4; 3.1; 3.2; 3.3; 3.4; 4.1; 5.2
Other Hazards(s) Addressed:	Wildfire
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$2,000.00
Potential Funding Source(s):	General Fund
Lead Agency/Department Responsible:	City of Skellytown City Council / Mayor
Implementation Schedule:	Plan completed/implemented during the 5-year life of this update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
3	3	2	3	5	3	5	24

Cost Effectiveness	The plan will provide a pre-defined policy for effectively mitigating the effects of drought conditions in advance of the next event and provide the city with a tool to conserve water when it is high demand.

Discussion: Texas Commission on Environment Quality (TCEQ) recommends that public water systems should have a contingency plan ready in case of drought or similar water shortages. Though due to its size, Skellytown is not required by the State to develop such a plan, the City believes that to do so would be in the best interest of its residents.

City of Skellytown	*Implement water conservation public awareness programs with brochures, public meetings and billing inserts.*
Objective(s) Addressed:	1.1; 1.2; 2.1; 2.2; 3.1; 3.2; 4.1
Other Hazards(s) Addressed:	Drought
Priority (High, Medium, Low):	Very High
Estimated Cost:	$1,000.00
Potential Funding Source(s):	General Budget
Lead Agency/Department Responsible:	City of Skellytown City Council / Mayor
Implementation Schedule:	On-going throughout the 5-year life of this MAP update.

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
5	5	5	5	5	4	5	34

Cost Effectiveness	Water conservation brochures are already available from different state agencies. The City will procure and use information that benefits this effort.

Discussion: Since there is no newspaper in Skellytown, city officials will have to use a different tact to inform residents of the practical measures they can take to individually contribute to the City's water conservation efforts. Using brochures, public meetings and letters will be the most effective way of informing the public of the various steps that can be undertaken to better achieve smart water consumption.

Mitigation Action Items – Droughts

City of White Deer	*Develop/implement an aggressive water line inspection and repair schedule to minimize the loss of water to leaks.*
Objective(s) Addressed:	1.1; 2.1; 4.1; 5.1
Other Hazards(s) Addressed:	Drought only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$8,000.00
Potential Funding Source(s):	General Budget
Lead Agency/Department Responsible:	White Deer City Council / White Deer Public Works Dept.
Implementation Schedule:	To be implemented within a year of the adoption of this update

S	T	A	P	L	E	/ E	Total
4	3	3	3	4	3	4	24

Cost Effectiveness	This action will help to reduce water waste and ultimately extend the life of the City's water system.

Discussion: This action will allow city officials and the City Council the opportunity to develop an enhanced business plan for maintaining its water distribution system. Water supply and drought conditions change periodically, as such, minimizing water loss, especially during times of drought, can increase the city's access to water utilizes and aid in preventing cascading disasters.

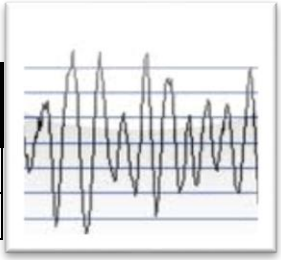
City of White Deer	*Conduct a water conservation public awareness program, utilizing brochures, public meetings and billing inserts.*
Objective(s) Addressed:	1.1; 1.2; 2.1; 2.2; 3.1; 3.2; 4.1
Other Hazards(s) Addressed:	Drought
Priority (High, Medium, Low):	Very High
Estimated Cost:	$1,000.00
Potential Funding Source(s):	General Budget
Lead Agency/Department Responsible:	City of White Deer City Council / Mayor
Implementation Schedule:	On-going throughout the 5-year life of this MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
5	5	5	5	5	4	5	34

Cost Effectiveness	Water conservation brochures are already available from different state agencies. The City will procure and use information that benefits this project.

Discussion: There is a newspaper in White Deer. The City intends to use the newspaper; along with brochures, public meetings and letters to keep residents aware of the local Drought Contingency plan, to inform them as needed when the plan has to be activated and to provide them with practical measures that can be used year-round to reduce unnecessary water usage.

Mitigation Action Items – Earthquakes



Carson County	*Inform residents that earthquakes can and do occur in the County.*
Objective(s) Addressed:	2.1, 5.1
Other Hazards(s) Addressed:	Earthquake only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$200.00
Potential Funding Source(s):	Local funds
Lead Agency/Department Responsible:	Carson County Commissioners' Court / Carson County EMC
Implementation Schedule:	Annually as part of an all-hazards awareness campaign conducted by the County EMC

S	**T**	**A**	**P**	**L**	**E**	**/ E**	Total
3	3	3	4	4	4	2	23

Cost Effectiveness	While the probability of a large, damaging earthquake occurring in the County is extremely low; these preparedness tips could also apply to high wind/tornado hazards.

Discussion: Citizens should be encouraged to plan for earthquakes; this includes taking steps at home and in the office to mitigate possible injury caused by falling objects such as bookcases or chimneys. Citizens should be aware that it is possible that some Panhandle earthquakes are induced by petroleum production.

Carson County	*Replacing/Bracing of windows on the Carson County Courthouse.*
Objective(s) Addressed:	2.1, 5.1
Other Hazards(s) Addressed:	Severe Thunderstorms, tornados, winter storms
Priority (High, Medium, Low):	Medium
Estimated Cost:	$300,000.00
Potential Funding Source(s):	Texas Historical Commission (THC) Courthouse Preservation, PDM, or HMGP – matched with General Funds as necessary
Lead Agency/Department Responsible:	Carson County Commissioners' Court / Consulting Architect
Implementation Schedule:	Two years after funding is secured; to allow sufficient time for the THC to approve the project

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
3	3	3	4	4	4	2	23

Cost Effectiveness	This project will not only make the courthouse windows more resistant to seismic tremors but over time the energy savings will offset the cost of the project.

Discussion: Due to their age, the windows on the Carson County Courthouse are susceptible to potentially cracking or shattering during an earthquake event. Replacing them with tempered glass, braced and anchored to the window frames, will help to reduce the potential loss of the windows or possible occupant injury from broken glass. The new windows will also be more energy efficient and retain building heat much more effectively during winter weather events.

Mitigation Action Items – Earthquakes

City of Groom	*When applicable, cost-effectively install expansion joints to reinforce, restrain, or improve utility transmission lines and connections*
Objective(s) Addressed:	1.4, 2.1, 4.1, 5.1
Other Hazards(s) Addressed:	Drought
Priority (High, Medium, Low):	Medium
Estimated Cost:	Water: $.4M; Sewer: $.4M (for total system replacement; however, the replacement(s) can occur sections at a time)
Potential Funding Source(s):	HMGP, PDM, CDBG, TWDB low-interest loans, local funds
Lead Agency/Department Responsible:	City of Groom City Council / Groom's Consulting Engineer
Implementation Schedule:	As necessary, when lines are replaced or when new line work is installed

S	T	A	P	L	E	/ E	Total
2	3	2	3	4	3	3	20

Cost Effectiveness	This action will help by decreasing cost associated with repairs following and earthquake.

Discussion: This action calls for the City to consider bracing underground utility lines whenever old lines are being replaced or new lines are being installed. The benefit of doing so will be to protect the lines from the shear forces that can occur with seismic activity.

City of Groom	*Inform residents that earthquakes can and do occur in the planning area.*
Objective(s) Addressed:	2.1, 5.1
Other Hazards(s) Addressed:	Earthquake only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$200.00
Potential Funding Source(s):	Local funds
Lead Agency/Department Responsible:	City of Groom City Council / Carson County EMC
Implementation Schedule:	Annually as part of an all-hazards awareness campaign conducted by the County EMC

S	T	A	P	L	E	/ E	Total
2	3	2	3	4	3	3	20

Cost Effectiveness	While the probability of a large, damaging earthquake occurring in the County is extremely low; these preparedness tips could also apply to high wind/tornado hazards.

Discussion: Residents should be encouraged to plan for earthquakes; this includes taking steps at home and in the office to mitigate possible injury caused by falling objects such as bookcases or chimneys. Residents should be aware that it is possible that some Panhandle earthquakes are induced by petroleum production.

Mitigation Action Items – Earthquakes

City of Panhandle	*When applicable, use cost-effective measures to structurally retrofit roofs on projects involving new construction or the re-roofing of public facilities*
Objective(s) Addressed:	1.4, 4.1, 5.2
Other Hazards(s) Addressed:	Tornados and Severe Thunderstorms
Priority (High, Medium, Low):	Medium
Estimated Cost:	Cost to be determined; based on roof size and whether or not the project involves new construction or retrofitting of an existing roof
Potential Funding Source(s):	State/federal grants, General Funds
Lead Agency/Department Responsible:	City of Panhandle City Council / Panhandle City Manager
Implementation Schedule:	Action to be implement within 6-9 months of securing the necessary funding

S	T	A	P	L	E	/ E	Total
2	3	2	3	4	3	3	20

Cost Effectiveness	This action will also benefit the City's tornado mitigation efforts.

Discussion: This action is focused on mitigating the impacts that seismic movement could have on public facilities. During retrofit or new construction projects, the City will consider the potential impacts that a 5.0 (RS) earthquake may have on the facility during the design phase. The intent will be to minimize the potential for earthquake-caused roof collapse and also, to harden the facility to the potential effects of tornados.

City of Panhandle	*Inform residents that earthquakes can and do occur in the planning area.*
Objective(s) Addressed:	2.1, 5.1
Other Hazards(s) Addressed:	Earthquake only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$200.00
Potential Funding Source(s):	Local funds
Lead Agency/Department Responsible:	City of Panhandle City Council / Carson County EMC
Implementation Schedule:	Annually as part of an all-hazards awareness campaign conducted by the County EMC

S	T	A	P	L	E	/ E	Total
2	3	2	3	4	3	3	20

Cost Effectiveness	While the probability of a large, damaging earthquake occurring in the County is extremely low; these preparedness tips could also apply to high wind/tornado hazards.

Discussion: Residents should be encouraged to plan for earthquakes; this includes taking steps at home and in the office to mitigate possible injury caused by falling objects such as bookcases or chimneys. Residents should be aware that it is possible that some Panhandle earthquakes are induced by petroleum production.

Mitigation Action Items – Earthquakes

City of Skellytown	*Inform residents that earthquakes can and do occur in the planning area.*
Objective(s) Addressed:	1.4, 2.1, 4.1, 5.1
Other Hazards(s) Addressed:	Earthquake only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$200.00
Potential Funding Source(s):	Local funds
Lead Agency/Department Responsible:	City of Skellytown City Council / Carson County EMC
Implementation Schedule:	Annually as part of an all-hazards awareness campaign conducted by the County EMC

S	T	A	P	L	E	/ E	Total
2	3	2	3	4	3	3	20

Cost Effectiveness	While the probability of a large, damaging earthquake occurring in the County is extremely low; these preparedness tips could also apply to high wind/tornado hazards.

Discussion: Residents should be encouraged to plan for earthquakes; this includes taking steps at home and in the office to mitigate possible injury caused by falling objects such as bookcases or chimneys. Residents should be aware that it is possible that some Panhandle earthquakes are induced by petroleum production.

City of Skellytown	*Replace outdated, fragile underground water and sewer lines with new updated lines/construction techniques that meet TCEQ requirements in withstanding ground movement.*
Objective(s) Addressed:	1.4, 2.1, 4.1, 5.1
Other Hazards(s) Addressed:	Droughts
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	Cost will vary by type/diameter of the line replaced and should range between $180 and $320 per linear foot.
Potential Funding Source(s):	CDBG, General Revenue
Lead Agency/Department Responsible:	City of Skellytown City Council/Skellytown Engineer Design Consultant
Implementation Schedule:	As system audits identify lines that need to be replaced

S	T	A	P	L	E	/ E	Total
4	3	4	4	4	3	3	25

Cost Effectiveness	The costs of replacing lines while operable but well past their prime will cost less than replacing them after they've burst.

Discussion: This action renews the City's commitment to keeping its utility lines in good operational condition to mitigate disruptions in service that might otherwise occur when obsolete lines break. This action will help to avoid the financial and environmental consequences that could occur by continuing to rely on vulnerable line sections to provide critical basic human services

Mitigation Action Items – Earthquakes

City of White Deer	*Inform residents that earthquakes can and do occur in the planning area.*
Objective(s) Addressed:	1.4, 2.1, 4.1, 5.1
Other Hazards(s) Addressed:	2.1, 5.1
Priority (High, Medium, Low):	Earthquake only
Estimated Cost:	Medium
Potential Funding Source(s):	$200.00
Lead Agency/Department Responsible:	City of White Deer City Council / Carson County EMC
Implementation Schedule:	Annually as part of an all-hazards awareness campaign conducted by the County EMC

S	T	A	P	L	E	/ E	Total
2	3	2	3	4	3	3	20

Cost Effectiveness	While the probability of a large, damaging earthquake occurring in the County is extremely low; these preparedness tips could also apply to high wind/tornado hazards.

Discussion: Residents should be encouraged to plan for earthquakes; this includes taking steps at home and in the office to mitigate possible injury caused by falling objects such as bookcases or chimneys. Residents should be aware that it is possible that some Panhandle earthquakes are induced by petroleum production.

City of White Deer	*Replace outdated, fragile underground water and sewer lines with new updated lines/construction techniques that meet TCEQ requirements in withstanding ground movement.*
Objective(s) Addressed:	1.4, 2.1, 4.1, 5.1
Other Hazards(s) Addressed:	Droughts , Earthquakes
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	Cost will vary by type/diameter of the line replaced and should range between $180 and $320 per linear foot.
Potential Funding Source(s):	CDBG, General Revenue
Lead Agency/Department Responsible:	City of White Deer City Council/White Deer Engineer Design Consultant
Implementation Schedule:	As system audits identify lines that need to be replaced

S	T	A	P	L	E	/ E	Total
4	3	4	4	4	3	3	25

Cost Effectiveness	The costs of replacing lines while operable but past their prime will cost less than replacing them after they've burst.

Discussion: This action renews the City's commitment to keeping its utility lines in good operational condition to mitigate disruptions in service that might otherwise occur when obsolete lines break. This action will help to avoid the financial and environmental consequences that could occur by continuing to rely on vulnerable line sections to provide critical basic human services

Mitigation Action Items – Flooding

Carson County	*Educate residents on the NWS Turn Around/ Don't Drown program..*
Objective(s) Addressed:	1.1, 3.1, 3.2, 5.2
Other Hazards(s) Addressed:	Flooding Only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$0.00 (utilize the resources available at: http://tadd.weather.gov/)
Potential Funding Source(s):	General Budget (for ancillary promotional costs)
Lead Agency/Department Responsible:	Carson County Commissioners' Court / Carson County EMC
Implementation Schedule:	Annually during National Preparedness Month

S	**T**	**A**	**P**	**L**	**E**	**/ E**	Total
4	3	2	2	4	4	3	22

Cost Effectiveness	There is no cost associated with using the NWS Turn Around/ Don't Drown resources. If this effort results in even one avoided injury/loss of life; the benefit return will be enormous.

Discussion: The National Weather Service has developed and is providing at no cost, video and printed materials that can be used to promote the Turn Around/Don't Drown (TADD) program. Each year, more deaths occur due to flooding than from any other severe weather related hazard. The purpose of the program is to warn people of the hazards associated with walking or driving a vehicle through flood waters. The message will be delivered annually as part of the all-hazards awareness campaign conducted in observance of FEMA's National Preparedness Month program.

Carson County	*Replace or add culverts, bar ditches and curbs for water diversion capabilities. This action would be initiated based on engineer recommendations.*
Objective(s) Addressed:	1.4; 2.1; 4.2
Other Hazards(s) Addressed:	Flooding only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$200,000-$500,000 (consultant only for county-wide recommendations)
Potential Funding Source(s):	Grant funds matched as necessary by funds from the General Budget
Lead Agency/Department Responsible:	Carson County Commissioners' Court / Carson County Judge
Implementation Schedule:	As currently conceived; within two years of this MAP update's final adoption

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	2	2	4	4	3	3	22

Cost Effectiveness	Designing to better account for both in situ and outfall conditions will help to limit unintended consequences from heavy run-off events

Discussion: After a study is conducted, county officials would be able to identify and prioritize areas within the county where improvements can be made in drainage system design. This would help to mitigate flooding in those areas of the system that don't drain well or that overrun with the lightest rain.

Mitigation Action Items – Flooding

City of Groom	*Install flash flood signs and gauges in flood prone areas in and around the City.*
Objective(s) Addressed:	1.2; 4.2
Other Hazards(s) Addressed:	Flooding only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$500.00-$1,500.00
Potential Funding Source(s):	General Budget
Lead Agency/Department Responsible:	City of Groom City Council / Mayor
Implementation Schedule:	Within two years of this update's final adoption

S	T	A	P	L	E	/ E	Total
3	3	3	4	4	2	2	21

Cost Effectiveness	If this action results in only one vehicle/passengers avoiding damage/ injury; its benefits will have already far exceeded its costs.

Discussion: This action will mitigate potential damage to life and property by serving as a visible warning of standing or rushing water in low-lying areas. If these signs are properly observed, motorists will likely heed those warnings and avoid traveling through them thereby serving the intended purpose of the signs.

City of Groom	*Educate residents on the NWS Turn Around/Don't Drown program.*
Objective(s) Addressed:	1.1, 3.1, 3.2, 5.2
Other Hazards(s) Addressed:	Flooding Only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$0.00 (utilize the resources available at: http://tadd.weather.gov/)
Potential Funding Source(s):	General Budget (for ancillary promotional costs)
Lead Agency/Department Responsible:	City of Groom City Council / Carson County EMC
Implementation Schedule:	Ongoing annually

S	T	A	P	L	E	/ E	Total
4	3	4	4	3	4	3	25

Cost Effectiveness	There is no cost associated with using the NWS Turn Around/ Don't Drown resources. If this effort results in even one avoided injury/loss of life; the benefit return will be enormous.

Discussion: The National Weather Service has developed and is providing at no cost, a host of video and printed materials that can be used to promote the Turn Around/Don't Drown (TADD) program. Each year, more deaths occur due to flooding than from any other severe weather related hazard. The purpose of the program is to warn people of the hazards associated with walking or driving a vehicle through flood waters. In this case, the County EMC will bundle the TADD message into the all-hazards awareness campaign conducted each year in the planning areas as part of FEMA's National Preparedness Month observation.

Mitigation Action Items – Flooding

City of Panhandle	*Construct and integrate storm water drainage to operate/connect into existing TxDOT storm water draining infrastructure.*
Objective(s) Addressed:	1.4; 2.2; 3.4; 5.1
Other Hazards(s) Addressed:	Flooding Only
Priority (High, Medium, Low):	High
Estimated Cost:	$125,000.00
Potential Funding Source(s):	HMGP, PDM, CDBG, local funds and resources
Lead Agency/Department Responsible:	City of Panhandle City Council / Panhandle City Manager / TxDOT
Implementation Schedule:	Completed within 12-24 months of securing the necessary funding and TxDOT approvals.

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	4	4	3	4	3	25

Cost Effectiveness	Alleviating drainage problems by tying into an existing system will be far more cost-effective than building a separate system.

Discussion: This action will require the cooperation of TxDOT but if allowed, the City will be able to better manage run-off that occurs during heavy rainfall events (which typically inundate streets lateral to Main) by diverting the water into TxDOT's storm water system.

City of Panhandle	*Educate residents on the NWS Turn Around/Don't Drown program.*
Objective(s) Addressed:	1.1, 3.1, 3.2, 5.2
Other Hazards(s) Addressed:	Flooding Only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$0.00 (utilize the resources available at: http://tadd.weather.gov/)
Potential Funding Source(s):	General Budget (for ancillary promotional costs)
Lead Agency/Department Responsible:	City of Panhandle City Council / Carson County EMC
Implementation Schedule:	Ongoing annually

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	4	4	3	4	3	25

Cost Effectiveness	There is no cost associated with using the NWS Turn Around/ Don't Drown resources. If this effort results in even one avoided injury/loss of life; the benefit return will be enormous.

Discussion: The National Weather Service has developed and is providing at no cost, a host of video and printed materials that can be used to promote the Turn Around/Don't Drown (TADD) program. Each year, more deaths occur due to flooding than from any other severe weather related hazard. The purpose of the program is to warn people of the hazards associated with walking or driving a vehicle through flood waters. In this case, the County EMC will bundle the TADD message into the all-hazards awareness campaign conducted each year in the planning areas as part of FEMA's National Preparedness Month observation.

Mitigation Action Items – Flooding

City of Skellytown	*Construct a larger culvert system under Byrd St at the intersection of 10th St.*
Objective(s) Addressed:	1.4; 4.1; 4.2
Other Hazards(s) Addressed:	Flooding only
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$25,000.00-$250,000.00
Potential Funding Source(s):	HMGP, PDM, CDBG, local funds and resources
Lead Agency/Department Responsible:	City of Skellytown City Council/Skellytown Engineer Design Consultant
Implementation Schedule:	To be implemented within 12-24 months of securing the necessary funding.

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	3	4	3	3	2	23

Cost Effectiveness	The installation of this enlarged culvert will mitigate the water backup/rising water that occurs with heavy rainfalls which often threatens homes in in the area.

Discussion: This is a carry-forward action from the previous mitigation plan. Its implementation will rely on the ability of the City to procure grant funding to carry this project out. The existing culver is undersized. Anytime a significant rainfall occurs in the vicinity of the culvert, it quickly backs up with the water flooding onto adjacent properties. Enlarging the culvert will eliminate the problem.

City of Skellytown	*To pave and curb and gutter Byrd St., Chamberlain St., Popular St., Elm St., 10th St., 2nd St*
Objective(s) Addressed:	1.4; 4.1; 4.2
Other Hazards(s) Addressed:	Flooding only
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$5,000,000-$6,000,000
Potential Funding Source(s):	HMGP, PDM, CDBG, local funds and resources
Lead Agency/Department Responsible:	City of Skellytown City Council / Skellytown Engineer Design Consultant
Implementation Schedule:	To be implemented within 12-24 months of securing the necessary funding.

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	3	3	3	4	4	24

Cost Effectiveness	This action will mitigate the recurring flooding issues in this area of the City and also help to improve the area's aesthetics.

Discussion: This is a carry-forward action from the previous mitigation plan. Paving/curbing the roads in these areas of Skellytown will eliminate the flooding/drainage problems that occur following heavy rainfall events. This action will also extend the life of these roadways. As it is, they now have to be re-graded and re-packed with caliche after each event to repair damages. The roads can be difficult to travel until those repairs are made which is not only inconvenient to residents but can also hamper first responders when dispatched to the area.

Mitigation Action Items – Flooding

City of White Deer	*Install a drainage structure along 8th St from 8th St to Paul St. to allow runoff to drain to the playa on the east side of White Deer. Install similar structures to serve the neighborhood in the eastern part of the City, south of Hwy. 60.*
Objective(s) Addressed:	1.3; 1.4; 4.1; 4.2
Other Hazards(s) Addressed:	Flooding only
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$250,000.00-$500,000.00
Potential Funding Source(s):	Grant funds
Lead Agency/Department Responsible:	City of White Deer City Council/White Deer Engineer Design Consultant
Implementation Schedule:	Action to be implemented within 12-24 months of securing the necessary funding.

S	T	A	P	L	E	/ E	Total
4	3	4	4	3	3	3	24

Cost Effectiveness	This should be a cost-effective means for eliminating recurring drainage issues across a wide area of White Deer.

Discussion: This is a carry-forward action from the previous mitigation plan. Its implementation will rely on the ability of the City to procure grant funding to carry this project out. The existing culver is undersized. Anytime a significant rainfall occurs in the vicinity of the culvert, it quickly backs up with the water flooding onto adjacent properties. Enlarging the culvert will eliminate the problem.

City of White Deer	*Create/Maintain a program to keep the City's curb/gutter system and bar ditches clear of debris; encourage residents to do the same*
Objective(s) Addressed:	1.3, 3.2, 3.3, 5.2
Other Hazards(s) Addressed:	Flooding only
Priority (High, Medium, Low):	Medium
Estimated Cost:	Annually $5,000.00
Potential Funding Source(s):	General Fund
Lead Agency/Department Responsible:	White Deer City Council / White Deer Public Works Dept.
Implementation Schedule:	City ROWs will be clean semi-annually; curbs/gutters as needed

S	T	A	P	L	E	/ E	Total
3	3	3	4	3	3	3	24

Cost Effectiveness	Routine maintenance represents a fraction of the costs that could be incurred as a result of flooding in the community. In addition, the City maintains its aesthetics

Discussion: Weed, brush and debris build-up needs to be removed from drainage areas on public and private property to maintain proper run-off control. City will work to encourage voluntary clean-up of private properties by property owners.

Mitigation Action Items – Hail or Hailstorms

Carson County	*Where a determination of cost-effectiveness has been made, install hail resistant roofing and window coverings with a focus on critical county structures.*
Objective(s) Addressed:	1.4, 2.1, 5.3, 5.4
Other Hazards(s) Addressed:	Severe Thunderstorm, tornado
Priority (High, Medium, Low):	Medium
Estimated Cost:	Estimated replacement cost for county buildings: $3 million
Potential Funding Source(s):	State/federal grant funds; matched as necessary with Local Funds
Lead Agency/Department Responsible:	Carson County Commissioners' Court / Carson County Judge
Implementation Schedule:	Action to be initiated within 12 months of securing the necessary funding.

S	**T**	**A**	**P**	**L**	**E**	**/ E**	Total
4	3	2	2	4	4	3	22

Cost Effectiveness	This action would reduce the cost of recurring damages to critical county structures caused by frequent hailstorms.

Discussion: Installing hail resistant roofing and window coverings on the critical structures within the county would reduce the amount of hail-cause damage to those facilities and better protect the individuals that happen to be inside those facilities when damaging hailstorm events occur.

Carson County	*Implement a public education campaign to encourage local agricultural producers to ensure their crops/herds are well insured against hail damage*
Objective(s) Addressed:	3.1; 3.2; 3.3; 5.2; 5.3
Other Hazards(s) Addressed:	Drought, Severe Thunderstorm, Winter Weather
Priority (High, Medium, Low):	Medium
Estimated Cost:	$200-$500 annually
Potential Funding Source(s):	Local funds
Lead Agency/Department Responsible:	Carson County Commissioners' Court / Carson County Extension Agent
Implementation Schedule:	Educational campaign will be carried out annually throughout the 5-year life of this MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
3	3	3	3	3	3	2	20

Cost Effectiveness	Policy premiums represent a fraction of the total losses that would be incurred with a large hail event in the County

Discussion: Even though purchasing insurance should be a standard business practice not all producers routinely do so. This action will be used to remind farmers/ranchers that hailstorms occur at any time/place in the County and that an ounce of prevention is more than worth a pound of cure.

Mitigation Action Items – Hail or Hailstorms

City of Groom	*Educate the public on the value of using of hail resistant roofing products when replacing damaged roofing on existing structures and when installing roofing on new structures*
Objective(s) Addressed:	1.4, 2.1, 3.2, 4.1, 5.2
Other Hazards(s) Addressed:	Severe Thunderstorms, tornado
Priority (High, Medium, Low):	Medium
Estimated Cost:	$50.00 (production of informational brochure)
Potential Funding Source(s):	General Fund
Lead Agency/Department Responsible:	City of Groom City Council / Mayor
Implementation Schedule:	Action to be initiated within 12 months of the final approval of this MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
3	4	2	4	4	3	3	23

Cost Effectiveness	If the message is accepted by the public, this effort will result in a reduction in property loss claims.

Discussion: Roof damage is generally the costliest consequence of hailstorms. The use of hail resistant roofing materials will help to reduce the potential for significant damages and add value to residents' homes.

City of Groom	*Where a determiniation of cost-effectiveness has been made, install hail resistant roofing and window coverings on City facilities with a focus on critical structures*
Objective(s) Addressed:	1.4, 2.1, 3.2, 4.1, 5.2
Other Hazards(s) Addressed:	Severe Thunderstorm
Priority (High, Medium, Low):	Medium
Estimated Cost:	Evaluation would cost $0.00. Replacement roofing for identified city buildings estimated cost is $100,000.
Potential Funding Source(s):	State/federal grant funds; matched as necessary with Local Funds
Lead Agency/Department Responsible:	Groom City Council
Implementation Schedule:	Within 12 months of securing the necessary funding

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	3	3	2	4	3	23

Cost Effectiveness	This project would reduce the cost of hail damages to critical City-owned structures which over time could off-set the cost of the roof and window renovation.

Discussion: Installing hail resistant roofing and window coverings on the critical structures in the city would reduce the amount of damage to facilities that support the conduct of day-to-day governmental operations and are necessary at times of disaster.

Mitigation Action Items – Hail or Hailstorms

City of Panhandle	*Provide hail-resistant cover/shelter for city-owned vehicles and equipment.*
Objective(s) Addressed:	1.3; 1.4; 5.1
Other Hazards(s) Addressed:	Severe Thunderstorms
Priority (High, Medium, Low):	High
Estimated Cost:	$40,000
Potential Funding Source(s):	HMGP, PDM, other grant funds, local funds
Lead Agency/Department Responsible:	City of Panhandle City Council / City Manager
Implementation Schedule:	To be implemented within 12 months of securing the necessary funding

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	4	4	4	4	3	27

Cost Effectiveness	The cost of covering municipal vehicles and equipment will be far less than the potential damage caused by allowing them to remain outdoors unprotected.

Discussion: The purpose of this action is to reduce damages to city-owned equipment and vehicles by ensuring they remain under cover when not in use. This will not only help to reduce future insurance claims but also potentially help to extend the useful life of the vehicles / equipment.

City of Panhandle	*Implement a campaign to increase the public's hail risk awareness for their personal safety and for the protection of their property.*
Objective(s) Addressed:	1.1; 3.2; 5.2
Other Hazards(s) Addressed:	Severe Thunderstorms, tornados
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$250.00
Potential Funding Source(s):	General Fund
Lead Agency/Department Responsible:	City of Panhandle City Council / City Secretary
Implementation Schedule:	As needed after damaging storms occur

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	3	4	3	4	3	24

Cost Effectiveness	This action can be implemented inexpensively through the use of monthly billing inserts or the posting of signs at city parks or other outdoor venues. The safety message can also be imparted as part of the County's annual weather awareness campaign, led by the County EMC.

Discussion: Action involves educating residents about the dangers involved with hail and how to take appropriate safety precautions to prevent personal injury. Action also involves advising residents of what they can do to protect themselves from the "*secondary*" impacts of hail if they happen to suffer property damages by providing them with consumer protection information.

Mitigation Action Items – Hail or Hailstorms

City of Skellytown	*Implement a campaign to increase the public's hail risk awareness for their personal safety and for the protection of their property.*
Objective(s) Addressed:	1.1; 3.2; 5.2
Other Hazards(s) Addressed:	Severe Thunderstorms, tornados
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$250.00
Potential Funding Source(s):	General Fund
Lead Agency/Department Responsible:	City of Skellytown City Council / City Secretary
Implementation Schedule:	As needed after damaging storms occur

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	3	4	3	4	3	24

Cost Effectiveness	This action can be implemented inexpensively through the use of monthly billing inserts or the posting of signs at city parks or other outdoor venues. The safety message can also be imparted as part of the County's annual weather awareness campaign, led by the County EMC.

Discussion: Action involves educating residents about the dangers involved with hail and how to take appropriate safety precautions to prevent personal injury. Action also involves advising residents of what they can do to protect themselves from the "*secondary*" impacts of hail if they happen to suffer property damages by providing them with consumer protection information.

City of Skellytown	*Provide hail-resistant cover/shelter for city-owned vehicles and equipment.*
Objective(s) Addressed:	1.3; 1.4; 5.1
Other Hazards(s) Addressed:	Severe Thunderstorms
Priority (High, Medium, Low):	High
Estimated Cost:	$50,000
Potential Funding Source(s):	HMGP, PDM, other grant funds, local funds
Lead Agency/Department Responsible:	City of Skellytown City Council / Mayor
Implementation Schedule:	Within 12 months of securing the necessary funding

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	2	4	4	4	3	25

Cost Effectiveness	The cost of covering municipal vehicles and equipment will far less than the potential damage caused by allowing them to remain outdoors unprotected.

Discussion: The purpose of this action is to reduce damages to city-owned equipment and vehicles by ensuring they remain under cover when not in use. This will not only help to reduce future insurance claims but also potentially help to extend the useful life of the vehicles / equipment.

Mitigation Action Items – Hail or Hailstorms

City of White Deer	*Implement a public education campaign to encourage hail resistant roofing in new construction and replacement*
Objective(s) Addressed:	1.1, 3.1, 3.2, 5.2, 5.3
Other Hazards(s) Addressed:	Severe Thunderstorm, tornado
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$50.00 for the production of promotional materials
Potential Funding Source(s):	General Funds
Lead Agency/Department Responsible:	White Deer City Council / City Secretary
Implementation Schedule:	Ongoing throughout the 5-year life of this MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	3	3	3	3	3	22

Cost Effectiveness	This action can be implemented inexpensively through the use of monthly billing inserts or the posting of signs at city parks or other outdoor venues. The safety message can also be imparted as part of the County's annual weather awareness campaign, led by the County EMC.

Discussion: Action involves educating residents about the dangers involved with hail and how to take appropriate safety precautions to prevent personal injury. Action also involves advising residents of what they can do to protect themselves from the "*secondary*" impacts of hail if they happen to suffer property damages by providing them with consumer protection information.

City of White Deer	*Where a determiniation of cost-effectiveness has been made, install hail resistant roofing and window coverings on City facilities with a focus on critical structures*
Objective(s) Addressed:	1.4, 2.1, 3.2, 4.1, 5.2
Other Hazards(s) Addressed:	Severe Thunderstorm
Priority (High, Medium, Low):	Medium
Estimated Cost:	Evaluation would cost $0.00. Replacement roofing for identified city buildings estimated cost is $100,000.
Potential Funding Source(s):	State/federal grant funds; matched as necessary with Local Funds
Lead Agency/Department Responsible:	White Deer City Council
Implementation Schedule:	Within 12 months of securing the necessary funding

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	3	3	2	4	3	23

Cost Effectiveness	This project would reduce the cost of hail damages to critical City-owned structures which over time could off-set the cost of the roof and window renovation.

Discussion: Installing hail resistant roofing and window coverings on the critical structures in the city would reduce the amount of damage to facilities that support the conduct of day-to-day governmental operations and are necessary at times of disaster.

City of White Deer	*Implement a campaign to increase the public's hail risk awareness for their personal safety and for the protection of their property.*
Objective(s) Addressed:	1.1; 3.2; 5.2
Other Hazards(s) Addressed:	Severe Thunderstorms, Tornados
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$250.00
Potential Funding Source(s):	General Fund
Lead Agency/Department Responsible:	White Deer City Council / City Secretary
Implementation Schedule:	As needed after damaging storms occur

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	3	4	3	4	3	24

Cost Effectiveness	It costs very little to first background check a potential contractor compared to the potential losses that might be incurred by working with one who is unfit or bent on cheating a homeowner..

Discussion: Unscrupulous contractors will take advantage of storm events to swindle homeowners when making repairs; if in fact they're made at all. Encouraging residents to check before they contract could prevent them from being scammed in the aftermath of a storm; which could spare them from secondary losses and help to ensure their homes are properly repaired.

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Mitigation Action Items – Severe Thunderstorms

Carson County	*Equip essential county facilities with emergency back-up power*
Objective(s) Addressed:	1.4, 2.1, 5.1
Other Hazards(s) Addressed:	Tornados, Winter Storms
Priority (High, Medium, Low):	High
Estimated Cost:	$100,000.00
Potential Funding Source(s):	HMGP, PDM, General Revenue funds
Lead Agency/Department Responsible:	Carson County Commissioners' Court / Carson County EMC
Implementation Schedule:	Generators will be installed, by facility, within 9-12 months of securing the necessary funding

S	**T**	**A**	**P**	**L**	**E**	**/ E**	Total
5	4	3	3	4	4	3	26

Cost Effectiveness	Keeping these facilities operational at all times is critical to the welfare and in some cases, safety, of the County's residents.

Discussion: The County must maintain electrical power at its critical facilities (e.g., courthouse, county barns, etc.) at all times in order to run its emergency operations and/or maintain continuity of operations; particularly during severe weather events.

Carson County	*Implement a tree trimming program that routinely clears tree limbs hanging in right-of-way*
Objective(s) Addressed:	1.3, 1.4, 5.1
Other Hazards(s) Addressed:	Tornados, Wildfires, Winter Storms
Priority (High, Medium, Low):	Medium
Estimated Cost:	$100,000 (limb truck/wood chipper)
Potential Funding Source(s):	HMGP, PDM, TCEQ Solid Waste funds; matched by County funds as may be required
Lead Agency/Department Responsible:	Carson County Commissioners' Court / Carson County Road & Bridge
Implementation Schedule:	Action to be implemented within 12 months of securing the necessary funding

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	2	3	4	3	3	23

Cost Effectiveness	This project will help to reduce the potential for communications / power loss due to lines downed by falling limbs and branches

Discussion: Routinely trimming tree limbs that could cause damage, either to adjacent properties or to overhead utility lines, would help to mitigate the potential for damage. Project could also be used to support a wood waste diversion program in the County, thereby mitigating another in-town hazard from fires.

Mitigation Action Items – Severe Thunderstorms

City of Groom	*Participate in the Amarillo National Weather Service's bi-annual Weather Symposium and annual Storm Spotter Training program*
Objective(s) Addressed:	1.1; 3.1; 3.2; 3.4
Other Hazards(s) Addressed:	Hail, tornado
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$0.00
Potential Funding Source(s):	General Budget, Donations & Volunteer Time
Lead Agency/Department Responsible:	Groom Volunteer Fire Dept. / Carson County EMC / NWS
Implementation Schedule:	Ongoing throughout the 5-year life of the MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	4	3	3	3	5	26

Cost Effectiveness	Trained volunteer Storm Spotters provide an invaluable service to the community by providing timely situational awareness of looming weather conditions that could place the safety of local residents at risk.

Discussion: With this action the City will be recruiting/training local volunteers to serve as their local cadre of Storm Spotters whose job it will be to communicate/forewarn imminent weather hazards to the public via local emergency management officials. Attendance at the NWS Weather Symposium will help to deepen the understanding of the local Storm Spotters of the types of weather hazards that may threaten Groom.

City of Groom	*Implement a program to test the City sirens on a monthly basis and publish a notice in the local paper to inform residents of the testing schedule and the weather warning tones.*
Objective(s) Addressed:	1.1; 3.2; 3.4
Other Hazards(s) Addressed:	Tornado and other weather events that might trigger evacuation
Priority (High, Medium, Low):	Very High
Estimated Cost:	$0.00
Potential Funding Source(s):	General Budget & Volunteer time
Lead Agency/Department Responsible:	City of Groom City Council / Groom Volunteer Fire Dept.
Implementation Schedule:	This action will be maintained throughout the 5-year life of the MAP update.

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
5	4	5	4	5	2	4	29

Cost Effectiveness	This low-cost action will accomplish two purposes. It'll help to ensure the operability of the City's siren system and it will help to educate residents to know how to respond when the system is activated during hazard events.

Discussion: This action will help to ensure that all sirens in the City are in always in good working order and that citizens are aware of the various tones used by the City's outdoor public warning system and the meanings of each tone. The action will also be used to identify when sirens need to be replaced/enhanced.

Mitigation Action Items – Severe Thunderstorms

City of Panhandle	*Participate in the Amarillo National Weather Service's bi-annual Weather Symposium and annual Storm Spotter Training program*
Objective(s) Addressed:	1.1; 3.1; 3.2; 3.4
Other Hazards(s) Addressed:	Hail, tornado
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$0.00
Potential Funding Source(s):	General Budget, Donations & Volunteer Time
Lead Agency/Department Responsible:	Panhandle Volunteer Fire Dept. / Carson County EMC / NWS
Implementation Schedule:	Ongoing throughout the 5-year life of the MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	4	3	3	3	5	26

Cost Effectiveness	Trained volunteer Storm Spotters provide an invaluable service to the community by affording timely situational awareness of looming weather conditions that could place the safety of local residents at risk.

Discussion: With this action the City will be recruiting/training local volunteers to serve as their local cadre of Storm Spotters whose job it will be to communicate/forewarn imminent weather hazards to the public via local emergency management officials. Attendance at the NWS Weather Symposium will help to deepen the understanding of the local Storm Spotters of the types of weather hazards that may threaten Panhandle.

City of Panhandle	*Implement a program to test the City sirens on a monthly basis and publish a notice in the local paper to inform residents of the testing schedule and the weather warning tones.*
Objective(s) Addressed:	1.1; 3.2; 3.4
Other Hazards(s) Addressed:	Tornado and other weather events that might trigger evacuation
Priority (High, Medium, Low):	Very High
Estimated Cost:	$0.00
Potential Funding Source(s):	General Budget & Volunteer Time
Lead Agency/Department Responsible:	City of Panhandle City Council / Panhandle Vol. Fire Dept.
Implementation Schedule:	This action will be maintained throughout the 5-year life of the MAP update.

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
5	4	5	4	5	2	4	29

Cost Effectiveness	This low-cost action will accomplish two purposes. It'll help to ensure the operability of the City's siren system and it will help to educate residents to know how to respond when the system is activated during hazard events.

Discussion: This action will help to ensure that all sirens in the City are in always in good working order and that citizens are aware of the various tones used by the City's outdoor public warning system and the meanings of each tone. The action will also be used to identify when sirens need to be replaced/enhanced.

Mitigation Action Items – Severe Thunderstorms

City of Skellytown	*Participate in the Amarillo National Weather Service's bi-annual Weather Symposium and annual Storm Spotter Training program*
Objective(s) Addressed:	1.1; 3.1; 3.2; 3.4
Other Hazards(s) Addressed:	Hail, tornado
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$0.00
Potential Funding Source(s):	General Budget, Donations & Volunteer Time
Lead Agency/Department Responsible:	Skellytown Vol. Fire Dept. / Carson County EMC / NWS
Implementation Schedule:	Ongoing throughout the 5-year life of the MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	4	3	3	3	5	26

Cost Effectiveness	Trained volunteer Storm Spotters provide an invaluable service to the community by affording timely situational awareness of looming weather conditions that could place the safety of local residents at risk.

Discussion: With this action the City will be recruiting/training local volunteers to serve as their local cadre of Storm Spotters whose job it will be to communicate/forewarn imminent weather hazards to the public via local emergency management officials. Attendance at the NWS Weather Symposium will help to deepen the understanding of the local Storm Spotters of the types of weather hazards that may threaten Panhandle.

City of Skellytown	*Implement a program to test the City sirens on a monthly basis and publish a notice in the local paper to inform residents of the testing schedule and the weather warning tones.*
Objective(s) Addressed:	1.1; 3.2; 3.4
Other Hazards(s) Addressed:	Tornado and other weather events that might trigger evacuation
Priority (High, Medium, Low):	Very High
Estimated Cost:	$0.00
Potential Funding Source(s):	General Budget & Volunteer Time
Lead Agency/Department Responsible:	City of Skellytown City Council / Skellytown Vol. Fire Dept.
Implementation Schedule:	This action will be maintained throughout the 5-year life of the MAP update.

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
5	4	5	4	5	2	4	29

Cost Effectiveness	This low-cost action will accomplish two purposes. It'll help to ensure the operability of the City's siren system and it will help to educate residents to know how to respond when the system is activated during hazard events.

Discussion: This action will help to ensure that all sirens in the City are in always in good working order and that citizens are aware of the various tones used by the City's outdoor public warning system and the meanings of each tone. The action will also be used to identify when sirens need to be replaced/enhanced.

Mitigation Action Items – Severe Thunderstorms

City of White Deer	*Implement a back-up plan for storing vital public records and digital copies offsite in a non-hazard area.*
Objective(s) Addressed:	1.3; 1.4; 2.2; 3.2; 5.2
Other Hazards(s) Addressed:	Tornados, Flooding, Fires
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$1,000.00-$2,000.00 annually
Potential Funding Source(s):	General Budget
Lead Agency/Department Responsible:	City of White Deer City Council / City Secretary
Implementation Schedule:	Implemented during the 5-year life of this MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	4	4	4	3	4	26

Cost Effectiveness	This action will minimize potential disruptions in local government affairs caused by power failures or other destructive weather events that could result in the loss on-site records stored at City Hall

Discussion: With this action, the City intends to purchase the equipment or procure the services needed to ensure that vital public records can be quickly retrieved in the wake of weather-related power failures or other events that might damage City Hall or impair the computer system(s) utilized by the City.

City of White Deer	*Implement a program to test the City sirens on a monthly basis and publish a notice in the local paper to inform residents of the testing schedule and the weather warning tones.*
Objective(s) Addressed:	1.1; 3.2; 3.4
Other Hazards(s) Addressed:	Tornado
Priority (High, Medium, Low):	Very High
Estimated Cost:	$0.00
Potential Funding Source(s):	General Budget & Volunteer Time
Lead Agency/Department Responsible:	City of White Deer City Council / White Deer Vol. Fire Dept.
Implementation Schedule:	This action will be maintained throughout the 5-year life of the MAP update.

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
5	4	5	4	5	2	4	29

Cost Effectiveness	This low-cost action will accomplish two purposes. It'll help to ensure the operability of the City's siren system and it will help to educate residents to know how to respond when the system is activated during hazard events.

Discussion: This action will help to ensure that all sirens in the City are in always in good working order and that citizens are aware of the various tones used by the City's outdoor public warning system and the meanings of each tone. The action will also be used to identify when sirens need to be replaced/enhanced.

Mitigation Action Items – Tornados

Carson County	*Establish a cost-share program to equip residents in the County's unincorporated areas with weather radios to provide additional advanced warning of tornados*
Objective(s) Addressed:	1.1; 3.1; 3.2;
Other Hazards(s) Addressed:	Severe Thunderstorms, Winter Weather, Wildfire
Priority (High, Medium, Low):	High
Estimated Cost:	Matching cost to be paid by residents
Potential Funding Source(s):	HMGP, PDM, local matching funds as needed
Lead Agency/Department Responsible:	Carson County Commissioners' Court / Carson County EMC
Implementation Schedule:	Initiated within 6-12 months of securing the necessary funding

S	**T**	**A**	**P**	**L**	**E**	**/ E**	Total
4	4	4	4	4	4	3	27

Cost Effectiveness	This action will allow those residents out in the County to have another source for adequate warning in advance of hazardous weather events.

Discussion: Preliminary warning of such events allows time for residents to take cover or evacuate which potentially reduces injury and/or loss of life.

Carson County	*Educate residents on the value of participating in the Regional Residential Safe Room Rebate program.*
Objective(s) Addressed:	1.1; 3.1; 3.2; 5.2
Other Hazards(s) Addressed:	Tornados
Priority (High, Medium, Low):	High
Estimated Cost:	Matching cost to be paid by residents
Potential Funding Source(s):	HMGP
Lead Agency/Department Responsible:	Carson County Commissioners' Court / Carson County EMC
Implementation Schedule:	Routinely, as Regional Residential Safe Room Rebate funds are available

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
5	4	3	4	4	5	5	17

Cost Effectiveness	The rebate program is a highly cost-effective method available to residents to equip their homes with storm shelters.

Discussion: On behalf of the entire region, PRPC has operated a Residential Safe Room Rebate Program, funded through the HMGP. It's much more cost-effective for the County to promote the availability of the regional program than it would be for the county to independently operate a program.

Mitigation Action Items – Tornados

City of Groom	*Replace the tornado siren located to the southwest of the Groom ISD.*
Objective(s) Addressed:	1.1; 1.2; 3.1; 5.2
Other Hazards(s) Addressed:	Tornados only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$15,000.00
Potential Funding Source(s):	Grant Funds, local matching funds as needed
Lead Agency/Department Responsible:	City Groom City Council / Groom Vol. Fire Dept.
Implementation Schedule:	Completed within 6-12 months of securing the funding necessary to implement the action

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	4	4	4	3	3	25

Cost Effectiveness	This action will help to ensure that the City's siren system fully serves the entire community.

Discussion: The current warning siren is outdated, and should be replaced because it warns both populations on that side of the City and the large population present at the school. This siren system must be maintained and tested regularly to ensure a quick response to these hazards being spotted in the area. Preliminary warning of such events allows time for residents to take cover which reduces bodily injury, life loss, and property damage.

City of Groom	*Install emergency back-up power generators at critical municipal facilities.*
Objective(s) Addressed:	1.3; 1.4, 2.1, 5.1
Other Hazards(s) Addressed:	Severe Thunderstorms, Winter Weather
Priority (High, Medium, Low):	Medium
Estimated Cost:	$40,000.00-$50,000.00 per facility equipped
Potential Funding Source(s):	HMGP, PDM, General Budget
Lead Agency/Department Responsible:	City Groom City Council / Mayor
Implementation Schedule:	Completed within 12 months of securing the funding necessary to implement the action

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	4	4	4	3	3	25

Cost Effectiveness	Even the temporary loss of critical facilities and/or utility infrastructure could result in damages that far exceed the cost of implementing this action

Discussion: With this action, the City intends to ensure that City Hall, the fire department, the EMS service and public utilities (operated by the City) are equipped with generators, properly sized, to ensure that when direct power is lost to those facilities, they can continue to operate until the necessary repairs have been made to restore power.

Mitigation Action Items – Tornados

City of Groom	*Construct a storm shelter in a central part of the City.*
Objective(s) Addressed:	1.1; 3.1; 3.2
Other Hazards(s) Addressed:	Other high, dangerous wind events
Priority (High, Medium, Low):	High
Estimated Cost:	$200,000.00-$500,000.00
Potential Funding Source(s):	Grant Funds, local matching funds as needed
Lead Agency/Department Responsible:	City Groom City Council / Mayor
Implementation Schedule:	Completed within 24-30 months of securing the funding necessary to implement the action

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	3	3	4	4	3	25

Cost Effectiveness	As currently conceived, this shelter will be developed as part of a multi-purpose facility to allow for its use during fair and foul weather conditions.

Discussion: The intent of this action is to supplement the handful of individual safe rooms that have already been installed in the City with a community shelter sited to serve the greatest number of residents within a 2-block radius. The City intends to work with the Groom ISD to implement this action by identifying a location that could serve both the ISD occupants and residents in close proximity to the ISD.

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Mitigation Action Items – Tornados

City of Panhandle	*Install a tornado shelter to serve the City Park, baseball field, Fire Department, and the Panhandle ISD sports fields.*
Objective(s) Addressed:	1.1; 1.2; 3.1; 3.4
Other Hazards(s) Addressed:	Tornado Only
Priority (High, Medium, Low):	High
Estimated Cost:	$40,000.00
Potential Funding Source(s):	Grant Funds, local matching funds as needed
Lead Agency/Department Responsible:	City of Panhandle City Council / City Manager
Implementation Schedule:	Completed within 6-12 months of securing the funding necessary to implement the action

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	4	4	4	3	4	25

Cost Effectiveness	These are central locations for people to congregate such that one facility would be able to serve a large number of residents

Discussion: This action supplements the individual safe rooms that have been built in Panhandle with the addition of one or more community safe rooms; strategically in locales where residents are most apt to be caught unawares in the out-of-doors.

City of Panhandle	*Implement a monthly test program to ensure the current warning system remains in proper working order and provides adequate coverage to reach the entire community. Upgrade the system as necessary.*
Objective(s) Addressed:	1.3; 2.1; 4.1
Other Hazards(s) Addressed:	Tornado Only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$1,000.00-$5,000.00
Potential Funding Source(s):	General Budget
Lead Agency/Department Responsible:	City of Panhandle City Council / Panhandle Vol. Fire Dept.
Implementation Schedule:	This action will be maintained throughout the 5-year life of the MAP update.

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	3	4	4	2	2	25

Cost Effectiveness	Preliminary warning of such events allows time for residents to take cover which reduces bodily injury and life loss.

Discussion: The current warning siren is centrally located in the City of Panhandle; it serves as the only outdoor public warning device available at this time. This siren system must be tested regularly to ensure it will function properly when hazards threaten the City. As new development occurs in the City, these tests will also be used to determine where the system needs to be improved to ensure adequate tone coverage across the City.

Mitigation Action Items – Tornados

City of Panhandle	*Design/implement a program to efficiently sift/recover reusable/ recyclable materials from storm debris piles so as to minimize the impact of debris disposal on the City's landfill*
Objective(s) Addressed:	1.4; 3.3; 5.1
Other Hazards(s) Addressed:	Earthquake, Hail, Severe Thunderstorms
Priority (High, Medium, Low):	High
Estimated Cost:	$100,000.00
Potential Funding Source(s):	HMGP, PDM, other grant funds, local matching funds as needed
Lead Agency/Department Responsible:	City of Panhandle City Council / City Manager / Public Works Director
Implementation Schedule:	Developed within 6-12 months of securing the funding necessary to implement the action

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	4	4	4	4	5	25

Cost Effectiveness	Landfill space is quite expensive to permit/construct; the more materials that can be diverted from debris piles for reuse; the less disposal space lost to a natural disaster.

Discussion: Mountains of debris are created in the aftermath of every major hailstorm, thunderstorm and/or tornado that impacts the City. Panhandle operates the only landfill in Carson County. When natural disasters strike the City, Panhandle follows the County's EOP Debris Disposal plan but the plan does not account for shingles, which often makes up the bulk of the materials that are now being disposed of following a disaster. This action calls for the implementation of a more vigorous debris sorting program that will mitigate the loss of disposal space and minimize disposal costs.

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Mitigation Action Items – Tornados

City of Skellytown	*Upgrade the warning siren at 10th and Main and the siren at 4th and Lindberg.*
Objective(s) Addressed:	1.1; 1.3; 3.1
Other Hazards(s) Addressed:	Tornado Only
Priority (High, Medium, Low):	High
Estimated Cost:	$50,000.00
Potential Funding Source(s):	Grant Funds, local matching funds as needed
Lead Agency/Department Responsible:	City of Skellytown City Council / Mayor
Implementation Schedule:	Completed within 12 months of securing the funding necessary to implement the action

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	3	4	4	4	4	27

Cost Effectiveness	This action will help reduce loss of life and property due to tornadic activities by increasing warning capabilities

Discussion: The current outdoor public warning system consists of one siren centrally located in Skellytown with another located south of town in Cabot Camp. Additional sirens would saturate the community more thoroughly when tornados threaten the City. Preliminary warning of such events allows time for residents to take immediate cover which will reduce the potential for injury and/or loss of life loss.

City of Skellytown	*Implement a monthly test program to ensure the current warning system remains in proper working order and provides adequate coverage to reach the entire community. Upgrade the system as necessary.*
Objective(s) Addressed:	1.3; 2.1; 4.1
Other Hazards(s) Addressed:	Tornado Only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$50.00-$200.00
Potential Funding Source(s):	General Budget
Lead Agency/Department Responsible:	City Skellytown City Council / Skellytown Vol. Fire Dept.
Implementation Schedule:	This action will be maintained throughout the 5-year life of the MAP update.

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
3	3	3	4	4	3	3	25

Cost Effectiveness	Preliminary warning of such events allows time for residents to take cover which reduces bodily injury and life loss.

Discussion: This action goes hand-in-hand with the City's goal of expanding its current siren system. The City's current outdoor public warning siren relies on only two sirens. While the need for additional sirens has been identified, the City realizes that it must ensure that the current system continues to function properly until and after any new sirens can be added. Therefore, the siren system must be tested regularly to ensure that it will operate at its fullest capacity at all times, particularly when hazards threaten the City.

Mitigation Action Items – Tornados

City of Skellytown	*Retrofit the Skellytown City Hall basement to serve as an ADA-compliant community storm shelter*
Objective(s) Addressed:	1.1; 1.3; 3.1
Other Hazards(s) Addressed:	Tornado Only
Priority (High, Medium, Low):	High
Estimated Cost:	$150,000.00
Potential Funding Source(s):	HMGP, PDM, local matching funds as needed
Lead Agency/Department Responsible:	City of Skellytown City Council / Mayor
Implementation Schedule:	Completed within 24 months of securing the funding necessary to implement the action

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	3	4	4	4	4	27

Cost Effectiveness	This action will help reduce loss of life and property due to tornadic activities by increasing warning capabilities

Discussion: This action will give those residents that do not have a protected location to go during tornadic activity a place to seek refuge. Not all residents may have a basement or storm shelter readily available to them, so this facility would provide them with a place to go when this type of weather occurs. This action will likely reduce the risk to life and property.

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Mitigation Action Items – Tornados

City of White Deer	*Implement a monthly test program to ensure the current warning system remains in proper working order and provides adequate coverage to reach the entire community. Upgrade the system as necessary.*
Objective(s) Addressed:	1.3; 2.1; 4.1
Other Hazards(s) Addressed:	Tornados Only
Priority (High, Medium, Low):	High
Estimated Cost:	$100.00-$500.00
Potential Funding Source(s):	General Budget
Lead Agency/Department Responsible:	City of White Deer City Council / White Deer Vol. Fire Dept.
Implementation Schedule:	On-going throughout the 5-year life of the MAP update.

S	T	A	P	L	E	/ E	Total
3	3	3	4	3	2	3	27

Cost Effectiveness	This action will help reduce loss of life and property due to tornadic activities.

Discussion: The current warning siren is centrally located within the City of White Deer and serves as the only local warning mechanism at this time. The north portion of town is currently underserved as far as having a siren within earshot of the residents. This siren system must be maintained and tested regularly to ensure a quick response to these hazards being spotted in the area. Preliminary warning of such events allows time for residents to take cover which reduces bodily injury and life loss.

City of White Deer	*Construct a community shelter at the community center located at 300 Paul St. This center would service the entire community.*
Objective(s) Addressed:	1.3; 2.1; 4.1
Other Hazards(s) Addressed:	Tornado Only
Priority (High, Medium, Low):	High
Estimated Cost:	$1,000,000.00-$1,250,000.00
Potential Funding Source(s):	Grant Funds, local matching funds as needed
Lead Agency/Department Responsible:	City of White Deer City Council / Shelter Design Consultant
Implementation Schedule:	Completed within 36 months of securing the funding necessary to implement the action

S	T	A	P	L	E	/ E	Total
4	4	3	5	4	4	3	27

Cost Effectiveness	This action will give those residents that do not have a protected location to go during tornadic activity a place to seek refuge

Discussion: Not all residents have a basement or storm shelter readily available to them, so this facility would provide them with a place to go when this type of weather occurs. This action will likely reduce the risk to life and/or injury.

Mitigation Action Items – Wildfires

Carson County	*Install a network of dry hydrants in stock ponds / small lakes in the County to increase the supply of water for fire protection.*
Objective(s) Addressed:	1.3; 2.1; 5.1
Other Hazards(s) Addressed:	Wildfires Only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$5,000.00
Potential Funding Source(s):	HMGP, PDM, other grant funds, local matching funds as needed
Lead Agency/Department Responsible:	Carson County Commissioner's Court / Carson County EMC
Implementation Schedule:	Action to be implemented during the 5-year life of this MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	Total
3	4	4	4	4	4	3	26

Cost Effectiveness	This action will allow for the identification and utilization of existing water resources in the County that can be used to combat wildfires

Discussion: The mapping and equipping of stock ponds, playas and lakes in the County with dry hydrants will provide volunteer fire departments quick access to water during wildfire events. These devices should allow them to move more quickly and effectively in suppressing the fire(s); thereby helping to minimize the potential property losses that might otherwise occur if firefighters have to wait on water resources to be tendered to them.

Carson County	*Educate residents in the unincorporated areas of the County to create a fire defensible area around all structures.*
Objective(s) Addressed:	1.1; 3.1; 3.3; 4.1;
Other Hazards(s) Addressed:	Wildfires Only
Priority (High, Medium, Low):	High
Estimated Cost:	$500.00
Potential Funding Source(s):	General Budget
Lead Agency/Department Responsible:	Carson County Commissioner's Court / Carson County EMC
Implementation Schedule:	On-going throughout the 5-year life of this MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
5	4	4	4	4	4	4	27

Cost Effectiveness	This action will encourage residents to become proactively engaged in mitigating fire hazards around their home.

Discussion: Action will allow County officials to educate residents in the unincorporated areas of the County to create a fire defensible area around their property to keep wildfires from burning right up to their structures. The County may could educate residents by posting a public notice, word of mouth, or in the local newspapers.

Mitigation Action Items – Wildfires

City of Groom	*Educate area residents/business on the value of having fire suppression systems and/or fire extinguishers on premises*
Objective(s) Addressed:	1.3, 1.4, 2.1, 5.1
Other Hazards(s) Addressed:	Any hazard in which fire might be involved
Priority (High, Medium, Low):	High
Estimated Cost:	$500.00 per year
Potential Funding Source(s):	Local funds
Lead Agency/Department Responsible:	City of Groom City Council / Groom Volunteer Fire Dept.
Implementation Schedule:	On-going throughout the 5-year life of this MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
3	4	4	4	4	4	2	25

Cost Effectiveness	Highly effective. Homes/businesses that are properly equipped with fire suppression devices can react quickly to small fires, helping to contain them before they become large fires.

Discussion: This action will target those facilities and the general public which are not routinely inspected by the Groom Fire Marshal; encouraging the occupants of those structures to ensure they have adequate on-site capabilities to suppress and contain minor fires; that those fire suppression devices are kept in good working order and that the occupants know how/when those devices should be used.

City of Groom	*Utilize mass notification or other social media outlets to alert residents when Red Flag conditions exist in/around the City*
Objective(s) Addressed:	1.1, 1.2, 1.3, 1.4, 2.1, 3.1, 3.2, 5.2
Other Hazards(s) Addressed:	Wildfires only
Priority (High, Medium, Low):	High
Estimated Cost:	Negligible. There is no cost to text information to registered residents; costs are only incurred when text-to-voice messages are used
Potential Funding Source(s):	Local funds
Lead Agency/Department Responsible:	Groom Fire Chief / Carson County EMC
Implementation Schedule:	Immediately and on-going

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
3	4	4	4	4	4	2	25

Cost Effectiveness	This action is highly cost-effective. Residents are far more likely to heed locally-issued advisories and suspend outdoor activities that could result in fire (e.g., welding, etc.).

Discussion: City residents subscribe to receive no-cost emergency alerts and warnings from local emergency management. In this instance, red flag notices will be added to the menu of alerts residents will received because being forewarned is being forearmed for fire prevention.

Mitigation Action Items – Wildfires

City of Panhandle	*Educate area residents/business on the value of having fire suppression systems and/or fire extinguishers on premises*
Objective(s) Addressed:	1.3, 1.4, 2.1, 5.1
Other Hazards(s) Addressed:	Any hazard in which fire might be involved
Priority (High, Medium, Low):	High
Estimated Cost:	$500.00 per year
Potential Funding Source(s):	Local funds
Lead Agency/Department Responsible:	City of Panhandle City Council / Panhandle Volunteer Fire Dept.
Implementation Schedule:	On-going throughout the 5-year life of this MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
3	4	4	4	4	4	2	25

Cost Effectiveness	Highly effective. Homes/businesses that are properly equipped with fire suppression devices can react quickly to small fires, helping to contain them before they become large fires.

Discussion: This action will target those facilities and the general public which are not routinely inspected by the Panhandle Fire Marshal; encouraging the occupants of those structures to ensure they have adequate on-site capabilities to suppress and contain minor fires; that those fire suppression devices are kept in good working order and that the occupants know how/when those devices should be used.

City of Panhandle	*Utilize mass notification or other social media outlets to alert residents when Red Flag conditions exist in/around the City*
Objective(s) Addressed:	1.1, 1.2, 1.3, 1.4, 2.1, 3.1, 3.2, 5.2
Other Hazards(s) Addressed:	Wildfires only
Priority (High, Medium, Low):	High
Estimated Cost:	Negligible. There is no cost to text information to registered residents; costs are only incurred when text-to-voice messages are used
Potential Funding Source(s):	Local funds
Lead Agency/Department Responsible:	Panhandle Fire Chief / Carson County EMC
Implementation Schedule:	Immediately and on-going

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
3	4	4	4	4	4	2	25

Cost Effectiveness	This action is highly cost-effective. Residents are far more likely to heed locally-issued advisories and suspend outdoor activities that could result in fire (e.g., welding, etc.).

Discussion: City residents subscribe to receive no-cost emergency alerts and warnings from local emergency management. In this instance, red flag notices will be added to the menu of alerts residents will received because being forewarned is being forearmed for fire prevention.

Mitigation Action Items – Wildfires

City of Skellytown	*Educate area residents/business on the value of having fire suppression systems and/or fire extinguishers on premises*
Objective(s) Addressed:	1.3, 1.4, 2.1, 5.1
Other Hazards(s) Addressed:	Any hazard in which fire might be involved
Priority (High, Medium, Low):	High
Estimated Cost:	$500.00 per year
Potential Funding Source(s):	Local funds
Lead Agency/Department Responsible:	City of Skellytown City Council / Skellytown Volunteer Fire Dept.
Implementation Schedule:	On-going throughout the 5-year life of this MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
3	4	4	4	4	4	2	25

Cost Effectiveness	Highly effective. Homes/businesses that are properly equipped with fire suppression devices can react quickly to small fires, helping to contain them before they become large fires.

Discussion: This action will target those facilities and the general public which are not routinely inspected by the Skellytown Fire Marshal; encouraging the occupants of those structures to ensure they have adequate on-site capabilities to suppress and contain minor fires; that those fire suppression devices are kept in good working order and that the occupants know how/when those devices should be used.

City of Skellytown	*Utilize mass notification or other social media outlets to alert residents when Red Flag conditions exist in/around the City*
Objective(s) Addressed:	1.1, 1.2, 1.3, 1.4, 2.1, 3.1, 3.2, 5.2
Other Hazards(s) Addressed:	Wildfires only
Priority (High, Medium, Low):	High
Estimated Cost:	Negligible. There is no cost to text information to registered residents; costs are only incurred when text-to-voice messages are used
Potential Funding Source(s):	Local funds
Lead Agency/Department Responsible:	Skellytown Fire Chief / Carson County EMC
Implementation Schedule:	Immediately and on-going

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
3	4	4	4	4	4	2	25

Cost Effectiveness	This action is highly cost-effective. Residents are far more likely to heed locally-issued advisories and suspend outdoor activities that could result in fire (e.g., welding, etc.).

Discussion: City residents subscribe to receive no-cost emergency alerts and warnings from local emergency management. In this instance, red flag notices will be added to the menu of alerts residents will received because being forewarned is being forearmed for fire prevention.

Mitigation Action Items – Wildfires

City of White Deer	*Utilize mass notification or other social media outlets to alert residents when Red Flag conditions exist in/around the City*
Objective(s) Addressed:	1.1, 1.2, 1.3, 1.4, 2.1, 3.1, 3.2, 5.2
Other Hazards(s) Addressed:	Wildfires only
Priority (High, Medium, Low):	High
Estimated Cost:	Negligible. There is no cost to text information to registered residents; costs are only incurred when text-to-voice messages are used
Potential Funding Source(s):	Local funds
Lead Agency/Department Responsible:	White Deer Fire Chief /Carson County EMC
Implementation Schedule:	Immediately and on-going

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	5	4	4	4	4	4	29

Cost Effectiveness	This action is highly cost-effective. Residents are far more likely to heed locally-issued advisories and suspend outdoor activities that could result in fire (e.g., welding, etc.).

Discussion: City residents subscribe to receive no-cost emergency alerts and warnings from local emergency management. In this instance, red flag notices will be added to the menu of alerts residents will received because being forewarned is being forearmed for fire prevention.

City of White Deer	*Educate residents on the fire-prevention value of keeping their properties clear of junk and other combustible materials.*
Objective(s) Addressed:	1.1, 1.3, 1.4, 3.1, 3.2, 3.3, 5.2
Other Hazards(s) Addressed:	Wildfires only
Priority (High, Medium, Low):	High
Estimated Cost:	$200 (to cover production of informational brochures)
Potential Funding Source(s):	General Funds
Lead Agency/Department Responsible:	City of White Deer City Council / Childress Volunteer Fire Dept.
Implementation Schedule:	On-going throughout the 5-year life of this MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	3	4	5	4	3	29

Cost Effectiveness	While reducing the potential for loss of life and property, this action will also help to improve the appearance of the community.

Discussion: Junk vehicles, wood piles and overgrown vegetation can become the source of and/or fuel for fires in the City; particularly on the outskirts of White Deer. Proper disposal this fuel source can help to limit the spread of fire when wildfires threaten the City. This action will have other public safety benefits. Removal of such material will also help to address vermin and vector issues and in general, by keeping their properties free of debris, residents can also help to improve the appearance of the City. The City will work to persuade residents to voluntarily keep their properties clear by underscoring the public safety and aesthetic benefits of doing so.

Mitigation Action Items – Winter Storms

Carson County	*Construct a structure near I-40 to house an Ambulance and crew temporarily during severe winter weather.*
Objective(s) Addressed:	1.4; 2.2; 4.1; 5.3
Other Hazards(s) Addressed:	Winter Storm only
Priority (High, Medium, Low):	High
Estimated Cost:	$40,000.00
Potential Funding Source(s):	Grant Funds, local matching funds as needed
Lead Agency/Department Responsible:	Carson County Commissioners Court / Precinct 2 Commissioner
Implementation Schedule:	Completed within 9-12 months of securing the necessary funding

S	**T**	**A**	**P**	**L**	**E**	**/ E**	Total
4	5	4	4	4	5	2	28

Cost Effectiveness	This action could decrease emergency response time to winter weather-related accidents on I-40 by 30-40 minutes; increasing the odds that injured motorists receive medical treatment within the "*Golden Hour*".

Discussion: Invariably, accidents will occur on 1-40, where it traverses Carson County, during any type of severe winter weather event. Snow-choked FMs/County roads often increase the time it takes to reach I-40. By staging an ambulance nearby the Interstate in advance of winter storms, the County hopes to minimize these delays; increasing the rapidity at which injured individuals can be treated and mitigating the potential for the loss of life/injury complications from prolonged exposure to frigid temperatures.

Carson County	*Develop/maintain a program, staffed by volunteers, to conduct welfare checks on Medical Functional Needs residents during protracted winter weather incidents*
Objective(s) Addressed:	3.1; 3.2; 5.1; 5.2
Other Hazards(s) Addressed:	Tornados, Severe Thunderstorms, events resulting in power loss
Priority (High, Medium, Low):	High
Estimated Cost:	$1,000.00
Potential Funding Source(s):	Local funds
Lead Agency/Department Responsible:	Carson County Commissioners Court / Precinct 2 Commissioner
Implementation Schedule:	Implemented throughout the 5-year life of the MAP update

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	5	4	4	4	5	2	28

Cost Effectiveness	This action cost-effectively takes the good neighbor policy to another level

Discussion: Medical functional needs residents are most vulnerable during weather events that result in the loss of power; many of them rely on medical devices that run on electricity. With this action, the County intends to create a system whereby volunteers will check on these individuals to ensure their short-term needs are met for the duration of the event.

Mitigation Action Items – Winter Storms

Carson County	*Develop public education to stress the need for wrapping exterior lines a pipes to prevent water line breaks during extended periods of hard freeze*
Objective(s) Addressed:	1.1, 3.1, 3.2, 3.3, 5.2
Other Hazards(s) Addressed:	Winter storms only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$200
Potential Funding Source(s):	General Revenue
Lead Agency/Department Responsible:	Carson County Commissioners' Court / Carson County EMC / County Extension Agent
Implementation Schedule:	9 months after securing funding

S	T	A	P	L	E	/ E	Total
4	3	3	3	4	3	3	23

Cost Effectiveness	Residents will be encouraged to invest in pipe wrap to insulate exterior lines against freezing temperature which could cause significant damages and inconvenience due to broke water lines.

Discussion: Though it may be a common sense thing to do, some residents still have to be reminded to protect their water lines from hard freezing temperatures. This promotional action is proposed as a means of highlighting practical steps that residents can take to protect their homes to the rigors of hard freezes.

Carson County	*Install manual road closure gates on major transportation routes in the County that are prone to road closure during severe winter events*
Objective(s) Addressed:	1.1, 3.1, 3.2, 3.3, 4.1, 5.2
Other Hazards(s) Addressed:	Winter Storms Only
Priority (High, Medium, Low):	Medium
Estimated Cost:	TBD
Potential Funding Source(s):	Local & Grant funds
Lead Agency/Department Responsible:	Carson County Commissioners Court / Precinct Commissioners / Carson County EMC / TxDOT
Implementation Schedule:	Within 6 months of obtaining the necessary approvals and funding

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	3	3	3	3	2	22

Cost Effectiveness	This action will eliminate the need for sheriff office employees or local volunteers to have to man stop points on the highway(s) to prevent travelers from getting onto roads that are unsafe to travel

Discussion: The installation of manual road closure gates, similar to those used by the State of New Mexico to bar access to I-40 during winter weather events, will help to reduce the potential loss of life/property damage that could occur when travelers drive through the County unaware of road/winter weather conditions. The gates would be strategically placed at intersections on the stretches of highway/road in the County that are most apt to close when winter storms occur.

Mitigation Action Items – Winter Storms

City of Groom	*Create a small cache of generators that can be used to provide temporary power to homes/devices where Medical Functional Needs residents reside.*
Objective(s) Addressed:	1.4; 2.2; 4.1; 5.3
Other Hazards(s) Addressed:	Tornados, Severe Thunderstorms, events resulting in power loss
Priority (High, Medium, Low):	High
Estimated Cost:	$40,000 (est. cost for 7 small generators)
Potential Funding Source(s):	Grant Funds, local matching funds as needed
Lead Agency/Department Responsible:	City of Groom City Council / Mayor
Implementation Schedule:	Implemented within 3 months of securing the necessary funding

S	T	A	P	L	E	/ E	Total
4	4	4	4	4	4	4	28

Cost Effectiveness	Cache will be utilized only during power-outage events; possibly preserving the lives of individuals who have to rely on medical devices for their survival.

Discussion: There are a number of residents in Groom who have medical issues that require the daily use of medical devices. Many of these individuals are elderly and lack the wherewithal to purchase their own back-up generator. With this action, the City will establish a cache of generators and a program that will allow these cached units to be "loaned" out on a temporary basis to individuals who need to power devices during outages.

City of Groom	*Purchase/install a generator to run the City's water wells, water and sewer plant pumps to provide back-up power and ensure the continued operability of the City's public utilities during power outages.*
Objective(s) Addressed:	2.1; 2.2; 4.1; 5.1
Other Hazards(s) Addressed:	Tornados, Severe Thunderstorms, events resulting in power loss
Priority (High, Medium, Low):	High
Estimated Cost:	$50,000.00
Potential Funding Source(s):	HMGP, PDM, CDBG, TWDB, local funds
Lead Agency/Department Responsible:	City of Groom City Council / Public Works Dept.
Implementation Schedule:	To be completed during the 5-year life of this MAP update

S	T	A	P	L	E	/ E	Total
5	5	4	5	4	5	5	33

Cost Effectiveness	Action will enable the City of Groom to provide water and sewer services to the community in the case of power failure from ice and snow in winter storms, when direct electrical power fails.

Discussion: The generator will help to ensure the availability of water and sewer services to residents and to travelers. Several facilities in Groom are used as mass care shelters for I-40 travelers during winter storm events.

Mitigation Action Items – Winter Storms

City of Groom	*Develop public education to stress the need for wrapping exterior lines a pipes to prevent water line breaks during extended periods of hard freeze*
Objective(s) Addressed:	1.1, 3.1, 3.2, 3.3, 5.2
Other Hazards(s) Addressed:	Winter storms only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$200
Potential Funding Source(s):	General Revenue
Lead Agency/Department Responsible:	City of Groom City Council / Public Works Dept.
Implementation Schedule:	9 months after securing funding

S	T	A	P	L	E	/ E	Total
4	3	3	3	4	3	3	23

Cost Effectiveness	Residents will be encouraged to invest in pipe wrap to insulate exterior lines against freezing temperature which could cause significant damages and inconvenience due to broke water lines.

Discussion: Though it may be a common sense thing to do, some residents still have to be reminded to protect their water lines from hard freezing temperatures. This promotional action is proposed as a means of highlighting practical steps that residents can take to protect their homes to the rigors of hard freezes.

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Mitigation Action Items – Winter Storms

City of Panhandle	*Create a small cache of generators that can be used to provide temporary power to homes/devices where Medical Functional Needs residents reside.*
Objective(s) Addressed:	1.4; 2.2; 4.1; 5.3
Other Hazards(s) Addressed:	Tornados, Severe Thunderstorms, events resulting in power loss
Priority (High, Medium, Low):	High
Estimated Cost:	$40,000 (est. cost for 7 small generators)
Potential Funding Source(s):	Grant Funds, local matching funds as needed
Lead Agency/Department Responsible:	City of Groom City Council / Mayor
Implementation Schedule:	Implemented within 3 months of securing the necessary funding

S	T	A	P	L	E	/ E	Total
4	4	4	5	4	4	4	29

Cost Effectiveness	Cache will be utilized only during power-outage events; possibly preserving the lives of individuals who have to rely on medical devices for their survival.

Discussion: There are a number of residents in Panhandle who have medical issues that require the daily use of medical devices. Many of these individuals are elderly and lack the wherewithal to purchase their own back-up generator. With this action, the City will establish a cache of generators and a program that will allow these cached units to be "loaned" out on a temporary basis to individuals who need to power devices during outages.

City of Panhandle	*Equip the City's water wells, water pumps and sewer facilities with back-up power.*
Objective(s) Addressed:	2.1; 2.2; 4.1; 5.1
Other Hazards(s) Addressed:	Tornados, Severe Thunderstorms, events resulting in power loss
Priority (High, Medium, Low):	High
Estimated Cost:	$75,000.00
Potential Funding Source(s):	Grant Funds, local matching funds as needed
Lead Agency/Department Responsible:	City of Panhandle City Council / City Manager / Public Works Dept.
Implementation Schedule:	Action will be completed within 12-18 months of securing the necessary funding.

S	T	A	P	L	E	/ E	Total
5	5	4	5	4	5	5	32

Cost Effectiveness	This will enable City of Panhandle to provide water and sewer services to the community in the case of power failure from ice and snow in winter storms, when direct electrical power fails.

Discussion: The generator will help to ensure the availability of water and sewer services to residents and to travelers. Several facilities in Panhandle are used as mass care shelters for Hwy 60 & 207 travelers during winter storm events.

Mitigation Action Items – Winter Storms

City of Panhandle	*Develop public education to stress the need for wrapping exterior lines a pipes to prevent water line breaks during extended periods of hard freeze*
Objective(s) Addressed:	1.1, 3.1, 3.2, 3.3, 5.2
Other Hazards(s) Addressed:	Winter storms only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$200
Potential Funding Source(s):	General Revenue
Lead Agency/Department Responsible:	City of Panhandle City Council / City Manager / Public Works Dept.
Implementation Schedule:	9 months after securing funding

S	T	A	P	L	E	/ E	Total
4	3	3	3	4	3	3	23

Cost Effectiveness	Residents will be encouraged to invest in pipe wrap to insulate exterior lines against freezing temperature which could cause significant damages and inconvenience due to broke water lines.

Discussion: Though it may be a common sense thing to do, some residents still have to be reminded to protect their water lines from hard freezing temperatures. This promotional action is proposed as a means of highlighting practical steps that residents can take to protect their homes to the rigors of hard freezes.

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Mitigation Action Items – Winter Storms

City of Skellytown	*Develop public education to stress the need for wrapping exterior lines a pipes to prevent water line breaks during extended periods of hard freeze*
Objective(s) Addressed:	1.1, 3.1, 3.2, 3.3, 5.2
Other Hazards(s) Addressed:	Winter storms only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$200
Potential Funding Source(s):	General Revenue
Lead Agency/Department Responsible:	City of Skellytown City Council / Carson County EMC
Implementation Schedule:	9 months after securing funding

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	3	3	3	4	3	3	23

Cost Effectiveness	Residents will be encouraged to invest in pipe wrap to insulate exterior lines against freezing temperature which could cause significant damages and inconvenience due to broke water lines.

Discussion: Though it may be a common sense thing to do, some residents still have to be reminded to protect their water lines from hard freezing temperatures. This promotional action is proposed as a means of highlighting practical steps that residents can take to protect their homes to the rigors of hard freezes.

City of Skellytown	*Ensure critical infrastructure, including designated mass care shelter are adequately equipped with backup power*
Objective(s) Addressed:	1.4; 2.1; 5.1
Other Hazards(s) Addressed:	Tornados, Severe Thunderstorms, events resulting in power loss
Priority (High, Medium, Low):	High
Estimated Cost:	$80,000.00
Potential Funding Source(s):	HMGP, PDM, General Revenue funds
Lead Agency/Department Responsible:	City of Skellytown City Council / Mayor
Implementation Schedule:	Action to be completed with 12-18 months of securing the necessary funding

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	3	4	4	4	3	32

Cost Effectiveness	Supplying the utility systems with back-up power will not only ensure they continue to perform at all times but also help to avoid costs incurred by having them off-line for periods of time.

Discussion: With this action item, the city proposes to install back-up generators on its water and sewer systems, city hall and if funding is available, the local mass care shelter. It may take a period of years before this action can be fully completed.

Mitigation Action Items – Winter Storms

City of White Deer	*Develop/disseminate a list of appropriate items that should be carried in an in-vehicle winter weather ready kit*
Objective(s) Addressed:	1.1; 3.1, 3.2, 5.2
Other Hazards(s) Addressed:	Winter storms only
Priority (High, Medium, Low):	Medium-High
Estimated Cost:	$500.00
Potential Funding Source(s):	Local Funds
Lead Agency/Department Responsible:	City of White Deer City Council / Carson County EMC
Implementation Schedule:	Annually as part of an all-hazards awareness campaign conducted by the County EMC

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	3	4	3	4	4	26

Cost Effectiveness	Highly effective. Action requires the development of a practical list of items that should be carried in resident's vehicles at all times during the winter months.

Discussion: Out-of-County travelers aren't the only ones vulnerable to becoming stranded during winter storm events; it happens to residents as well. With this action, the City will develop a list of items that should be kept in vehicles during the winter months. That way, should residents become stranded; they can fend for themselves until help arrives. The goal is to have residents pre-equip their vehicles with the tools/supplies/ they'll need to remain relatively comfortable until they're freed and provide them with practical survival tips/advice.

City of White Deer	*Ensure critical infrastructure, including designated mass care shelter are adequately equipped with backup power*
Objective(s) Addressed:	1.4; 2.1; 5.1
Other Hazards(s) Addressed:	Tornados, Severe Thunderstorm winds
Priority (High, Medium, Low):	High
Estimated Cost:	$70,000.00
Potential Funding Source(s):	HMGP, PDM, General Revenue funds
Lead Agency/Department Responsible:	City of White Deer City Council / Mayor / Public Works Dept.
Implementation Schedule:	Action to be completed with 12-18 months of securing the necessary funding

S	**T**	**A**	**P**	**L**	**E**	**/ E**	**Total**
4	4	3	4	4	3	3	25

Cost Effectiveness	Supplying the utility systems with back-up power will not only ensure they continue to perform at all times but also help to avoid costs incurred by having them off-line for periods of time.

Discussion: With this action item, the city proposes to install back-up generators on its water and sewer systems, city hall and if funding is available, the local mass care shelter. It may take a period of years before this action can be fully completed.

Mitigation Action Items – Winter Storms

City of White Deer	*Develop public education to stress the need for wrapping exterior lines a pipes to prevent water line breaks during extended periods of hard freeze*
Objective(s) Addressed:	1.1, 3.1, 3.2, 3.3, 5.2
Other Hazards(s) Addressed:	Winter storms only
Priority (High, Medium, Low):	Medium
Estimated Cost:	$200
Potential Funding Source(s):	General Revenue
Lead Agency/Department Responsible:	City of White Deer City Council / Public Works Dept.
Implementation Schedule:	9 months after securing funding

S	T	A	P	L	E	/ E	Total
4	3	3	3	4	3	3	23

Cost Effectiveness	Residents will be encouraged to invest in pipe wrap to insulate exterior lines against freezing temperature which could cause significant damages and inconvenience due to broke water lines.

Discussion: Though it may be a common sense thing to do, some residents still have to be reminded to protect their water lines from hard freezing temperatures. This promotional action is proposed as a means of highlighting practical steps that residents can take to protect their homes to the rigors of hard freezes.

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Monitoring

The Carson County MAT participants will be responsible for monitoring the plan annually for updates to jurisdictional goals, objectives, and action items. If needed, these participants will coordinate through the County's Emergency Management Coordinator to integrate these updates into the Plan. A record of those changes will be maintained in the plan. The County Emergency Management Coordinator will be responsible for monitoring the overall plan for updates on an annual basis.

The County will be assisted in the plan monitoring process by the PRPC. The PRPC provides support to the County in keeping its Emergency Operations Plan (EOP) current to the Advance Level. A report card is used to provide a status of the Basic plan and plan annexes. In this instance, an evaluation of the County's hazard mitigation plan will be added to the list of documents that will have to be annually reviewed.

Plan Evaluation

The Plan is evaluated by the County Emergency Management Coordinator and by each participating jurisdiction annually to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. This includes re-evaluation by MAT leads (Carson County Judge, Groom City Council, Panhandle City Manager, Skellytown City Council and White Deer City Council) based upon the initial STAPPLE/E criteria used to draft goals, objectives, and action items for each jurisdiction.

The County Emergency Management Coordinator and jurisdictional representatives also review the goals and action items to determine their relevance to changing situations in the county, as well as changes in State or Federal regulations and policy. The County Emergency Management Coordinator and jurisdictional representatives will also review the risk assessment portion of the plan to determine if this information should be updated or modified, given any new available data.

The coordinating organizations responsible for the various action items will report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised. Any updates or changes necessary will be forwarded to the County Emergency Management Coordinator for inclusion in further updates to the plan. The MAT will meet annually to discuss the status of the Plan.

Plan Updates

The Carson County MAT fully intends to update this plan within 5 years of its final adoption and approval by FEMA. The monitoring and plan evaluation measures will help to make the update process

The County Emergency Management Coordinator will continue to serve as the lead agent for the plan update process. All other MAT participants will continue to be responsible to provide the County's Emergency Management Coordinator with jurisdictional-level updates to the plan annually or when/if necessary as described above. Every five years the plan will be updated and submitted to TDEM and FEMA for review.

Continued Public Involvement

The Carson County MAP will be posted on regional shared portal, maintained the PRPC, which will allow the public to access the document at any time. A point of contact is provided for every plan in the portal; the PRPC will be responsible for ensuring the contact list stays current. As an alternate, the PRPC'S contact information will also be provided to ensure that public inquiries and comments are properly channeled for processing to the appropriate County point of contact on a timely basis.

In addition, because it serves a multitude of regional preparedness purposes, each year, the PRPC will also send out a survey to all Panhandle residents that have registered to receive emergency management information through the Panhandle-Area Regional Information System. This survey will be sent out as part of the region's annual recognition of FEMA's National Preparedness Month, which falls each year during the month of September.

A copy of the initial PRPC regional survey form is provided in Attachment 2 of this MAP. This survey form was used to promote public participation and input for all counties in the Panhandle during the 2012-2013 Panhandle Regional MAP update process. A summary of the responses given by Carson County residents to a December 2013 survey is also provided under Attachment 2.

ATTACHMENT 1

RESOLUTION NO: _____

A RESOLUTION BY THE COMMISSIONERS' COURT OF CARSON COUNTY, TEXAS, ADOPTING THE 2013 UPDATED CARSON COUNTY HAZARD MITIGATION PLAN

WHEREAS, certain areas of the Carson County, Texas, are vulnerable and subject to a variety of natural hazards which pose a potential threat to the welfare, safety and property of the County's residents; and,

WHERAS, to the extent practical, the Carson County intends to prepare for and mitigate against such hazards; and,

WHEREAS, under the Disaster Mitigation Act of 2000 (P.L. 106-390), as of November 1, 2004, the Federal Emergency Management Agency (FEMA) now requires that local jurisdictions maintain a FEMA-approved Hazard Mitigation Plan as a condition of receiving certain Federal mitigation grant funding; and,

WHEREAS, Carson County participated in the updating of the Carson County Hazard Mitigation Plan which includes the unincorporated areas of the County.

NOW, THEREFORE, be it resolved by the Commissioners' Court of Carson County, Texas, that:

1. The County hereby adopts the 2013 updated Carson County Hazard Mitigation Plan which will have a five-year lifespan from the date upon which the update is finally approved by FEMA.
2. The County's Emergency Management Coordinator is instructed to ensure the updated Plan is reviewed at least annually and that any proposed revisions to the County's portion of the Carson County Mitigation Action Plan are presented to the Commissioner's Court for consideration of approval.
3. The County agrees to take such other official action as may be deemed reasonably necessary to carry out the goals, objectives and mitigation actions of the updated Carson County Hazard Mitigation Plan.

CONSIDERED AND APPROVED THIS _____ DAY OF _____, 2014.

_____
Lewis Powers, County Judge
Carson County

ATTEST:

_____
Celeste Bichsel, County Clerk
Carson County

RESOLUTION NO: _____

A RESOLUTION BY THE CITY COUNCIL OF THE CITY OF GROOM, TEXAS, ADOPTING THE 2013 UPDATED CARSON HAZARD MITIGATION PLAN

WHEREAS, certain areas of the Carson County, Texas, are vulnerable and subject to a variety of natural hazards which pose a potential threat to the welfare, safety and property of the City's residents; and,

WHERAS, to the extent practical, the City of Groom intends to prepare for and mitigate against such hazards; and,

WHEREAS, under the Disaster Mitigation Act of 2000 (P.L. 106-390), as of November 1, 2004, the Federal Emergency Management Agency (FEMA) now requires that local jurisdictions maintain a FEMA-approved Hazard Mitigation Plan as a condition of receiving certain Federal mitigation grant funding; and,

WHEREAS, the City of Groom participated in the updating of the Carson County Hazard Mitigation Plan which includes the City of Groom

NOW, THEREFORE, be it resolved by the City Council of the City of Groom, Texas, that:

1. The City hereby adopts the 2013 updated Carson County Mitigation Action Plan which will have a five-year lifespan from the date upon which the update is finally approved by FEMA.
2. The City's Mitigation Action Team representative(s) is hereby instructed to participate in the annual review of the updated plan, ensuring that any proposed revisions to the City's portion of the Carson County Mitigation Action Plan are presented to the City Council for consideration of approval.
3. The City agrees to take such other official action as may be deemed reasonable and necessary to carry out the goals, objectives and mitigation actions of the updated Carson County Mitigation Action Plan which pertain to the City.

CONSIDERED AND APPROVED THIS _____ DAY OF _____, 2014.

_____
Joe Homer, Mayor
City of Groom, Texas

ATTEST:

_____
Mary Sue Lisle, City Secretary
City of Groom, Texas

RESOLUTION NO: _____

A RESOLUTION BY THE CITY COUNCIL OF THE CITY OF PANHANDLE, TEXAS, ADOPTING THE 2013 UPDATED CARSON HAZARD MITIGATION PLAN

WHEREAS, certain areas of the Carson County, Texas, are vulnerable and subject to a variety of natural hazards which pose a potential threat to the welfare, safety and property of the City's residents; and,

WHERAS, to the extent practical, the City of Panhandle intends to prepare for and mitigate against such hazards; and,

WHEREAS, under the Disaster Mitigation Act of 2000 (P.L. 106-390), as of November 1, 2004, the Federal Emergency Management Agency (FEMA) now requires that local jurisdictions maintain a FEMA-approved Hazard Mitigation Plan as a condition of receiving certain Federal mitigation grant funding; and,

WHEREAS, the City of Panhandle participated in the updating of the Carson County Hazard Mitigation Plan which includes the City of Panhandle

.

NOW, THEREFORE, be it resolved by the City Council of the City of Panhandle, Texas, that

1. The City hereby adopts the 2013 updated Carson County Mitigation Action Plan which will have a five-year lifespan from the date upon which the update is finally approved by FEMA.
2. The City's Mitigation Action Team representative(s) is hereby instructed to participate in the annual review of the updated plan, ensuring that any proposed revisions to the City's portion of the Carson County Mitigation Action Plan are presented to the City Council for consideration of approval.
3. The City agrees to take such other official action as may be deemed reasonable and necessary to carry out the goals, objectives and mitigation actions of the updated Carson County Mitigation Action Plan which pertain to the City.

CONSIDERED AND APPROVED THIS _____ DAY OF _____, 2014.

_____
Dan Looten, Mayor
City of Panhandle, Texas

ATTEST:

_____
Ronni Wilburn, City Secretary
City of Panhandle, Texas

RESOLUTION NO: _____

A RESOLUTION BY THE CITY COUNCIL OF THE CITY OF SKELLYTOWN, TEXAS, ADOPTING THE 2013 UPDATED CARSON HAZARD MITIGATION PLAN

WHEREAS, certain areas of the Carson County, Texas, are vulnerable and subject to a variety of natural hazards which pose a potential threat to the welfare, safety and property of the City's residents; and,

WHERAS, to the extent practical, the City of Skellytown intends to prepare for and mitigate against such hazards; and,

WHEREAS, under the Disaster Mitigation Act of 2000 (P.L. 106-390), as of November 1, 2004, the Federal Emergency Management Agency (FEMA) now requires that local jurisdictions maintain a FEMA-approved Hazard Mitigation Plan as a condition of receiving certain Federal mitigation grant funding; and,

WHEREAS, the City of Skellytown participated in the updating of the Carson County Hazard Mitigation Plan which includes the City of Skellytown

NOW, THEREFORE, be it resolved by the City Council of the City of Skellytown, Texas, that:

1. The City hereby adopts the 2013 updated Carson County Mitigation Action Plan which will have a five-year lifespan from the date upon which the update is finally approved by FEMA.
2. The City's Mitigation Action Team representative(s) is hereby instructed to participate in the annual review of the updated plan, ensuring that any proposed revisions to the City's portion of the Carson County Mitigation Action Plan are presented to the City Council for consideration of approval.
3. The City agrees to take such other official action as may be deemed reasonable and necessary to carry out the goals, objectives and mitigation actions of the updated Carson County Mitigation Action Plan which pertain to the City.

CONSIDERED AND APPROVED THIS _____ DAY OF _____, 2014.

_____
Ralph Tice, Mayor
City of Skellytown, Texas

ATTEST:

_____
Sandra K. Perry, City Secretary
City of Skellytown, Texas

RESOLUTION NO: _____

A RESOLUTION BY THE CITY COUNCIL OF THE CITY OF WHITE DEER, TEXAS, ADOPTING THE 2013 UPDATED CARSON HAZARD MITIGATION PLAN

WHEREAS, certain areas of the Carson County, Texas, are vulnerable and subject to a variety of natural hazards which pose a potential threat to the welfare, safety and property of the City's residents; and,

WHERAS, to the extent practical, the City of White Deer intends to prepare for and mitigate against such hazards; and,

WHEREAS, under the Disaster Mitigation Act of 2000 (P.L. 106-390), as of November 1, 2004, the Federal Emergency Management Agency (FEMA) now requires that local jurisdictions maintain a FEMA-approved Hazard Mitigation Plan as a condition of receiving certain Federal mitigation grant funding; and,

WHEREAS, the City of White Deer participated in the updating of the Carson County Hazard Mitigation Plan which includes the City of White Deer

NOW, THEREFORE, be it resolved by the City Council of the City of White Deer, Texas, that:

1. The City hereby adopts the 2013 updated Carson County Mitigation Action Plan which will have a five-year lifespan from the date upon which the update is finally approved by FEMA.
2. The City's Mitigation Action Team representative(s) is hereby instructed to participate in the annual review of the updated plan, ensuring that any proposed revisions to the City's portion of the Carson County Mitigation Action Plan are presented to the City Council for consideration of approval.
3. The City agrees to take such other official action as may be deemed reasonable and necessary to carry out the goals, objectives and mitigation actions of the updated Carson County Mitigation Action Plan which pertain to the City.

CONSIDERED AND APPROVED THIS _____ DAY OF _____, 2014.

_____
Jayson Smith, Mayor
City of White Deer, Texas

ATTEST:

_____
Katrina Warminski, City Secretary
City of White Deer, Texas

ATTACHMENT 2

Carson County Household Natural / Hazards Preparedness Survey
December 2013 Survey Results

Number of Survey Respondents: **28**

Below is a summary of residential responses received to Carson County's all-county natural hazards/preparedness survey.

		YES	NO
Q1	Have you or someone in your household experienced a natural disaster in the past 5 years?	50.0%	50.0%

Q2	If YES, what type of natural disasters was experienced? (please check all that apply)	% of Response
	Tornado	35.7%
	Drought	78.6%
	Earthquake	0.0%
	Flood	0.0%
	Wildfire	57.1%
	Hail	64.3%
	Thunderstorm	64.3%
	Winter Storm	64.3%

Q3	How concerned are you personally about the following natural disasters affecting your County?	Not Concerned	Somewhat Concerned	Concerned	Very Concerned	Extremely Concerned
	Tornado	42.9%	35.7%	14.3%	7.1%	0.0%
	Drought	39.3%	42.9%	14.3%	0.0%	0.0%
	Hail	28.6%	32.1%	32.1%	3.6%	0.0%
	Earthquake	3.6%	0.0%	3.6%	28.6%	57.1%
	Flood	3.6%	3.6%	10.7%	28.6%	46.4%
	Wildfire	53.6%	32.1%	10.7%	3.6%	0.0%
	Thunderstorm	35.7%	21.4%	25.0%	10.7%	7.1%
	Winter Storm	28.6%	32.1%	21.4%	10.7%	7.1%
	Other (please specify):	0.0%	0.0%	50.0%	50.0%	0.0%

Q4	How prepared do you feel you are for the following hazards effecting your County?	Not Prepared	Somewhat Prepared	Prepared	Very Prepared	Extremely Prepared
	Tornado	10.7%	17.9%	46.4%	14.3%	10.7%
	Drought	0.0%	7.1%	35.7%	32.1%	21.4%
	Hail	3.6%	3.6%	64.3%	25.0%	3.6%
	Earthquake	0.0%	0.0%	10.7%	14.3%	71.4%
	Flood	0.0%	0.0%	32.1%	14.3%	50.0%
	Wildfire	3.6%	14.3%	35.7%	28.6%	17.9%
	Thunderstorm	7.1%	10.7%	57.1%	17.9%	7.1%
	Winter Storm	3.6%	17.9%	42.9%	32.1%	0.0%
	Other (please specify)	0.0%	0.0%	0.0%	0.0%	0.0%

		YES	NO
Q5	Have you ever received information about how to make your family and home safer from natural disasters?	67.9%	32.1%

Q6	If yes, how recently?	% of Response
	Within the last 6 months	21.1%
	Between 6 and 12 months	36.8%
	Between 1 and 2 years	36.8%
	Between 2 and 5 years	0.0%
	5 years or more	5.3%

Q7	If Yes, where did you receive the information about how to make your family and home safer from natural disasters?	% of Response
	News Media	42.1%
	Government Agency	15.8%
	Insurance Agent or Company	5.3%
	Utility Company	10.5%
	University	26.3%
	American Red Cross	0.0%
	Other Non-Profit Organization	0.0%
	Other (please specify)	0.0%

Q8	Who would you most trust to provide you with information about how to make your family and home safer from natural disaster? (Please check all that apply)	% of Response
	News Media	29.6%
	Government Agency	18.5%
	Insurance Agent or Company	22.2%
	Utility Company	22.2%
	University	63.0%
	American Red Cross	51.9%
	Other Non-Profit Organization	22.2%
	Other (please specify) Local emergency management, Fire Dept.	7.1%

Q9	What is the most effective way for you to receive information about how to make your family and home safer from natural disasters? (Please check all that apply)	% of Response
	Newspaper	25.9%
	Television	51.9%
	Radio	37.0%
	Schools/University	25.9%
	Outdoor Advertisements (billboards, etc.)	11.1%
	Books	3.7%
	Mail	40.7%
	First Responder Groups	37.0%
	Internet	74.1%
	Social Media (Facebook, twitter, etc.)	37.0%
	Brochure	40.7%
	Public Meetings	22.2%
	Magazine	7.4%
	Other (Please specify) National Weather Service	7.4%

Q10	To assist in communicating information to County/City Residents about how to better prepare for a natural disaster, which of the following phrases do you think is easier to understand? (Please check only one)	% of Response
	Natural Disaster Readiness	37.0%
	Disaster Preparedness	25.9%

Q10	To assist in communicating information to County/City Residents about how to better prepare for a natural disaster, which of the following phrases do you think is easier to understand? (Please check only one)	% of Response
	Emergency Preparedness	37.0%
	Natural Hazard Risk Reduction	0.0%
	Other (Please specify)	0.0%

Q11	In the following list, please check those activities that you have done in your household, plan to do in the near future, have not done, or are unable to do. (Please check one answer for each preparedness activity)	Have Done	Plan to Do	Not Done	Unable to Do
	I understand how I will be informed of an emergency or disaster (NOAA All-Hazards Weather Radio, Local Media, Internet Based Services, Mass Notification Systems, Outdoor Warning Sirens)	89.3%	10.7%	0.0%	0.0%
	Attend meetings or received written information on natural disasters or emergency preparedness?	57.1%	21.4%	21.4%	0.0%
	Talked with members in my household about what to do in case of a natural disaster or emergency?	67.9%	25.0%	7.1%	0.0%
	Developed a "Household/Family Emergency Plan" in order to decide what everyone role would be?	32.1%	32.1%	35.7%	0.0%
	Prepared a "Disaster Supply Kit" (stored water, food, batteries, or other emergency supplies)	25.0%	39.3%	35.7%	0.0%
	In the last year, has anyone in your household been trained in first aid or CPR?	53.6%	17.9%	25.0%	3.6%

Q12	Building a disaster supply kit, receiving first aid training and developing a household/family emergency plan are inexpensive activities that require a personal time commitment. How much time (per year) are you willing to spend on preparing yourself/your household for a natural disaster or emergency event?	% of Response
	0-1 Hours	3.6%
	2-3 Hours	35.7%
	4-7 Hours	28.6%
	8-15 Hours	10.7%
	16+ Hours	21.4%
	Other (Please specify)	0.0%

Q13	What steps, if any, have you or someone in your household taken to prepare for a natural disaster? Have you stored or stocked up on: (Check all that apply)	% of Response
	Food	25.0%
	Water	35.7%
	Flashlight(s)	67.9%
	Battery-powered radio	39.3%
	Medical Supplies (First Aid Kit)	42.9%
	Fire Extinguisher	53.6%
	Smoke Detector on each level of the house	85.7%
	Prepared a Disaster Supply Kit	14.3%
	Received First Aid/CPR Training	64.3%
	Made a fire escape plan	42.9%
	Developed a reconnection plan: Where to go and who to call	21.4%
	Discussed utility shutoffs	14.3%
	Food	25.0%
	Water	35.7%
	Flashlight(s)	67.9%
	Other (please explain)	0.0%

Q14	Have you developed a household plan for……	% of Response
	Evacuation and Reunification	25.0%
	Utility Shutoff	20.8%
	Wildfire Action Plan - Ready, Set, Go	20.8%
	Take Shelter for Severe Weather	91.7%
	Winter Storm Preparedness	70.8%
	Shelter-In-Place for Hazardous Materials	20.8%

Q15	Do you have any of the following items or strategies in place at your home?	% of Response
	Defensible space for wildfire threats	8.3%
	Fire-resistant building materials	8.3%
	Storm Cellar	66.7%
	Safe Room	16.7%
	Other (please specify)	16.7%

		YES	NO
Q16	If you chose a shelter from above, did you receive a grant or rebate for the installation of that shelter?	7.1%	92.9%

		YES	NO
Q17	Does your household have insurance coverage for flood events?	32.1%	67.9%

Q18	If NO, what is the main reason your household does not have insurance for flood events? (Please check only one)	% of Response
	Not located in a floodplain	88.9%
	Too expensive	0.0%
	Not necessary	5.6%
	Never considered it	5.6%
	Deductibles too high/not worth it	0.0%
	Not familiar with it/don't know about it	0.0%
	Other (please specify) Not sure	5.6%

		YES	NO
Q19	Did you consider the possible occurrence of natural hazards when you bought/moved into your current home?	48.1%	51.9%

		YES	NO
Q20	Would you be willing to spend more money on a home that had features that made it more disaster resistant?	82.1%	17.9%

Q21	How much more money are you willing to spend to better protect your family and home from natural disasters? (Check only one)	% of Response
	$5,000 and above	23.1%
	$2,500 - $4,999	26.9%
	$1,000 - $2,499	15.4%
	$500 - $999	0.0%
	$100 - $499	3.8%
	Less than $100	0.0%
	Nothing	0.0%
	Don't know	30.8%
	Other (please specify)	0.0%

Q22	Which of the following incentives, if any, would motivate you to take additional steps to better protect your family and home from a natural disaster? (Check all that apply)	% of Response
	Insurance discount	71.4%
	Low interest rate loan	53.6%
	Lower new home construction costs	25.0%
	Mortgage discount	42.9%
	Tax break or incentive	82.1%
	None	7.1%
	Other (Please explain)	0.0%

Q23	Please indicate your age	% of Response
	18 - 24	0.0%
	25 - 30	3.6%
	31 - 45	32.1%
	46 - 59	46.4%
	60 - 70	17.9%
	71+	0.0%

		Male	Female
Q24	Respondent's Gender	60.7%	39.3%

Q25	How long have you lived in this County?	% of Response
	Less than one year	3.6%
	1 - 5 years	7.1%
	5 - 9 years	17.9%
	10 - 19 years	25.0%
	20 years or longer	46.4%

		YES	NO
Q26	Do you have access to the internet at your home?	96.4%	3.6%

		Landline	Cell
Q27	Please indicate your primary mode of communication?	14.3%	85.7%

		YES	NO
Q28	If you chose cell phone, do you use the texting option?	92.3%	7.7%

		Own	Rent
Q29	Do you own or rent your home?	92.9%	7.1%

ATTACHMENT 3

MAT Meeting Documentation

The primary jurisdictions involved in the Carson County MAT meeting process included: Carson County, the City of Groom, the City of Panhandle, the City of Skellytown and the City of White Deer

The Carson County MAT met on several different occasions during the development of the 2013 plan. Agendas were provided for meetings #1 and #5 (shown on the following pages). The intervening meeting was conducted without the benefit of an agenda but that discussion focused solely on identifying/refining each participating jurisdiction's array of hazard mitigation actions.

The meetings were held using two different mediums to make it as convenient as possible for the MAT members to participate in the MAP update process. Face-to-face meetings were held at the County Courthouse. WebEx or GoTo meetings were held in combination with the face-to-face sessions when certain members were unable to travel to a central location. In those instances, as part of the public meeting notice posted by the participating jurisdiction, the public was invited to sit in with the MAT member as a GoTo meeting participant. No members of the public accepted the invitation to participant in either the face-to-face or GoTo meetings.
During the TDEM and/or FEMA plan review process, the Carson County MAT was reconvened as needed to discuss and act on the comments or change requests made by the TDEM and/or FEMA plan reviewer.

Once the 2013 MAP update was approved by FEMA, the governing bodies of each of the primary jurisdictions met to consider the final adoption of the plan in a public meeting setting. The meetings were posted in accordance with the Texas Open Meetings Act requirements (Texas Government Code Chapter 551).

PANHANDLE REGIONAL PLANNING COMMISSION

November 22, 2010

The Honorable Lewis Powers
Judge, Carson County
PO Box 369
Panhandle, TX 79068-0369

RE: Regional Hazard Mitigation Plan Update Project

Dear Judge Powers:

The PRPC has received the resolution indicating the County's willingness to participate in the above-referenced project and so, we're now initiating the planning process. Early next week, I'll contact you and ask you to recommend 2–3 individuals who can represent the County on the county-level Mitigation Action Team. I'll need to get their names, daytime phone numbers and email addresses, if possible.

The Mitigation Action Team or MAT is the group that will direct the PRPC in updating your planning area's mitigation action plan. During the course of the plan update process, the MAT will likely meet 3-4 times at a central location in the County. Between meetings, the MAT members will be reviewing the various draft components of the mitigation action plan; some of those elements will be rather detailed and lengthy.

It's important that the County be well represented on the MAT because we'll be developing a unique set of mitigation action strategies for the County; those strategies need to be appropriate to your needs. Also, the time spent by these individuals on the MAT will generate the in-kind match needed to meet the County's pro-rata share of the regional planning project costs.

The types of individuals suited for MAT service would include:

- The County Road Superintendent
- The Director of Public Works
- The Local Building Official/Code Officer
- The Local Public Health Officer
- A Member of the Local Governing Body
- A Local Utilities Representative
- School (ISD) or College Representative
- The County Fire Marshall/Local Fire Chief
- The Floodplain Administrator
- An Appraisal District Representative
- The Sheriff/Police Chief
- The Emergency Management Coordinator
- The City Manager and/or designee

School / college representatives are new additions to the MAT teams with this update process. FEMA recently stated that schools, colleges and universities will be eligible to apply for its Hazard Mitigation Assistance grants provided they participate in the updating of their planning area's hazard mitigation plans. So we'll be encouraging them to participate on their local MAT as possible.

415 West Eighth Avenue
P.O. Box 9257
Amarillo, TX 79105
(806) 372-3381
(806) 373-3268 (fax)
www.theprpc.org

Printed on Recycled Paper

I'm sending this letter to you in advance of the follow-up phone call you'll be receiving to give you some time to consider who you might recommend for service on the MAT. To help you in that regard, here is a list of the individuals that participated on your planning area's MAT team when the County's original hazard mitigation plan was developed back in 2006.

- Brenda Vermillion, Carson County – Hazard Mitigation Coordinator/EMC
- Lewis Powers, Carson County – County Judge
- Donita Davis, Carson County Appraisal District – Chief Appraiser
- Joe Homer, City of Groom – Mayor
- Tony Tredwell, City of Groom – Fire Chief
- Loren Brand, City of Panhandle – City Manager
- Rob Roach, City of Panhandle – Police Chief
- Jeff Cartwright, City of Panhandle – Public Works Director
- Larry Brown, City of Skellytown – City Councilman
- Donna Davis, City of Skellytown – City Clerk
- Cindy Cook, City of Skellytown – City Secretary
- Anita Haiduk, City of White Deer – City Administrator
- Tam Terry, City of White Deer – City Marshall
- Terry Sargent, City of White Deer – Fire Chief
- Candy Reeves, Valor Telecommunications – Local Technician
- Sammy Mercer, XCEL, - Field Representative
- Benny Baker, Atmos Energy, Town Operator (Panhandle)

If you should have any questions or need anything at all, please give me a call at (806) 374-3381. Thank you.

Sincerely,

Kimberlee Smith
Regional Programs Specialist

Cc:
Brenda Vermillion, EMC
Carson County

PANHANDLE
REGIONAL
PLANNING
COMMISSION

NOTICE OF MEETING

The first meeting of the Carson County Hazard Mitigation Action Team (MAT) will be held at 9:30 a.m., on Friday, February 18, at the War Memorial Building in Panhandle, TX, located at 500 Main Street.

AGENDA

1. **CALL TO ORDER**

2. **INTRODUCTIONS**

3. **HISTORY OF THE CARSON COUNTY HAZARD MITIGATION PLAN**

   Presentation by PRPC Staff

4. **HAZARD MITIGATION PLANNING OVERVIEW**

   Presentation by PRPC Staff

5. **RESPONSIBILITIES OF THE MAT MEMBERS**

   Brief discussion on the role the Mitigation Action Team members fill in the development of the Hazard Mitigation Plan, including the Mitigation Action Plan (MAP).

6. **DESCRIPTION OF THE HAZARD MITIGATION PLAN COMPONENTS**

   I. Sectoring
   II. Hazard Identification
   III. Identifying Vulnerability
   IV. Hazard Prioritization
   V. The FEMA Crosswalk & the Mitigation Action Plan
   VI. Approval Process
   VII. Review Process

7. **GUIDELINES GOVERNING THE DEVELOPMENT OF THE PLAN**

   A basic introduction to the various documents that must be considered in the development of a FEMA-approvable Mitigation Action Plan; these will include: DEM21, FEMA 386-1, DMA 2000 and the FEMA Crosswalk.

8. **SELECTION OF THE HAZARD MITIGATION COORDINATOR**

   FEMA recommends that the Mitigation Action Team be led by an individual serving in the capacity of the MAT Hazard Mitigation Coordinator. The MAT is encouraged to take action on the election of one of its team members to fill this role.

9. **MAT MEMBER CONTRIBUTIONS TO MATCHING REQUIREMENTS**

   Presentation by PRPC staff on how to complete Time and Compensation Forms

415 West Eighth Avenue
P.O. Box 9257
Amarillo, TX 79105
(806) 372-3381
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10. DISCUSSION ON APPROACHES TO SECTORING

Group discussion on the matter of Sectoring; the initial step in the Hazard Mitigation Planning Process

11. MISCELLANEOUS

General discussion on Hazard Mitigation Planning issues not covered under a previous agenda item.

12. ADJOURN

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NOTICE OF MEETING

The second meeting of the Carson County Hazard Mitigation Action Team (MAT) will be held at 9:30 a.m., on Monday, March 7, 2011, at the War Memorial Building in Panhandle, TX, located at 500 Main Street.

AGENDA

1. **CALL TO ORDER**

2. **MINUTES**

3. **WELCOME TO MEMBERS OF THE PUBLIC**

4. **UPDATE ON HAZARD IDENTIFICATION SECTION OF THE HAZARD ANALYSIS**

   Discussion regarding the methods and information sources utilized in the hazard identification update process.

5. **HAZARD ANALYSIS**

   PRPC Staff will present and seek input concerning the development of the Hazard Analysis through a discussion of the methods applicable in the creation of required probabilities.

6. **MITIGATION ACTION PLANS (MAP)**

   PRPC Staff will present an overview of the components within the Mitigation Action Plan (MAP).

7. **UPDATE ON FEMA REQUIREMENTS**

   Discussions regarding the Hazard Mitigation Plan criteria which must be meet in order to gain FEMA approval.

8. **PREVIEW OF ANALYSIS OF HISTORICAL HAZARD MITIGATION EFFORTS**

   Beginning discussion on the effectiveness of previously implemented mitigation measures and current mitigation-related policies, plans, practices, and programs

9. **MISCELLANEOUS**

   General discussion on Hazard Mitigation Planning issues not covered under a previous agenda items.

10. **ADJOURN**

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NOTICE OF MEETING

The third meeting of the Carson County Hazard Mitigation Action Team (MAT) will be held at 9:30 a.m., on Tuesday, March 29, 2011, at the War Memorial Building in Panhandle, TX, located at 500 Main Street.

AGENDA

1. **CALL TO ORDER**

2. **MINUTES**

3. **UPDATE ON THE HAZARD ANALYSIS**

   Presentation of the current draft of the Hazard Analysis

4. **REVIEW OF HAZARD ANALYSIS BOUNDED-RISK SECTIONS**

   Discussion concerning the special requirements when addressing the flood, wildfire, and dam failure sections within the Hazard Analysis

5. **MITIGATION ACTION PLANS (MAP)**

   PRPC Staff will present an overview of the components within the Mitigation Action Plan (MAP)

6. **REVIEW OF MAP SECTION ON EXISTING MITIGATION MEASURES**

   Discussion regarding the any existing plans which may be relevant to hazard mitigation

7. **REVIEW OF MAP SECTION ON ANALYSIS OF DEVELOPMENT**

   Discussion regarding the analysis of development within the planning area as it pertains to hazard mitigation.

8. **UPDATE ON FEMA REQUIREMENTS**

   Discussions regarding the Hazard Mitigation Plan criteria which must be meet in order to gain FEMA approval.

9. **MISCELLANEOUS**

   General discussion on Hazard Mitigation Planning issues not covered under a previous agenda items.

10. **ADJOURN**

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NOTICE OF MEETING

A meeting of the Carson County Hazard Mitigation Action Team will be held at 9:30 a.m., on Tuesday, April 12, 2011 , at the War Memorial Building in Panhandle, TX, located at 500 Main Street.

AGENDA

1. **CALL TO ORDER**

2. **MINUTES**

3. **UPDATE ON THE HAZARD ANALYSIS & MITIGATION ACTION PLAN**

   Presentation of the current draft of the Hazard Analysis and Mitigation Action Plan

4. **HAZARD MITIGATION PLAN APPROVAL PROCESS**

   Discussion concerning the requirements and stages of the Hazard Mitigation Approval Process

5. **UPDATE ON FEMA REQUIREMENTS**

   Discussion regarding the Hazard Mitigation Plan criteria which must be meet in order to gain FEMA approval

6. **MITIGATION ACTION PLAN STAPLEE FORM**

   PRPC Staff will present an overview of the components within the Mitigation Action Plan STAPLEE Form and its components.

7. **MITIGATION ACTION PLAN STRATEGIES (DEFFERED ACTIONS)**

   Discussion regarding the any existing plans which may be relevant to hazard mitigation.

8. **MITIGATION ACTION PLAN STRATEGIES**

   Discussion regarding the analysis of development within the planning area as it pertains to hazard mitigation.

9. **MISCELLANEOUS**

   General discussion on Hazard Mitigation Planning issues not covered under a previous agenda items.

10. **ADJOURN**

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NOTICE OF MEETING

A meeting of the Carson County Hazard Mitigation Action Team will be held at 9:30 a.m., on Thursday, June 30, 2011, at the War Memorial Building in Panhandle, TX, located at 500 Main Street.

AGENDA

1. **CALL TO ORDER**

2. **MINUTES**

3. **PRESENTATION OF THE COMPLETED HAZARD ANALYSIS & MITIGATION ACTION PLAN**

   Presentation of the final draft of the Hazard Analysis and Mitigation Action Plan

4. **HAZARD MITIGATION PLAN APPROVAL PROCESS**

   Discussion concerning the requirements and stages of the Hazard Mitigation Approval Process

5. **HAZARD MITIGATION IMPLEMENTATION PROCESS**

   Discussion regarding the Hazard Mitigation Plan criteria which must be meet in order to gain FEMA approval

6. **HAZARD MITIGATION ANNUAL AND 5-YEAR REVIEW PROCESS**

   PRPC Staff will present an overview of the components within the Mitigation Action Plan STAPLEE Form and its components.

7. **PUBLIC INVOLVEMENT IN REVIEW PROCESSES**

   Discussion regarding the analysis of development within the planning area as it pertains to hazard mitigation.

8. **MISCELLANEOUS**

   General discussion on Hazard Mitigation Planning issues not covered under a previous agenda items.

9. **ADJOURN**

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NOTICE OF MEETING

A meeting of the Carson County Hazard Mitigation Action Team will be held at 9:30 a.m., on Tuesday, March 19, 2014. This will be a virtual meeting with host sites located throughout the County including: 1) Groom City Hall in Groom, TX, located at 203 Broadway Ave; 2) Panhandle City Hall in Panhandle, TX, located at 1 Main Street; 3) Skellytown City Hall in Skellytown, TX, located at 500 Chamberlain St; 4) White Deer City Hall in White Deer, TX, located at 317 S. Main Street; and 5) Carson County Law Enforcement Center; Room 211 in Panhandle, TX, located at 201 Highway 60.

AGENDA

1. **CALL TO ORDER**

   Roll call by Carson County MAT Lead, Brenda Vermillion

2. **OVERVIEW OF WORK COMPLETED WITH THE CURRENT PLAN REVISION**

   Report by PRPC staff and Carson County MAT Lead

3. **PRESENTATION OF THE REVISED HAZARD ANALYSIS & MITIGATION ACTION PLAN**

   Presentation of the revised draft of the Hazard Analysis and Mitigation Action Plan

4. **JURISDICTIONAL REVIEW OF THE REVISED MITIGATION STRATEGIES**

   Participating jurisdictions each review their current mitigation strategies to ensure they're appropriate and properly presented

4. **HAZARD MITIGATION PLAN APPROVAL PROCESS**

   Discussion concerning the process of State and Federal plan review and approval

5. **CONSIDER RESUBMISSION OF THE DRAFT PLAN FOR STATE REVIEW**

   Take action on approving the resubmission of the draft plan for review by the Texas Division of Emergency Management (TDEM) and ultimately, by the Federal Emergency Management Agency (FEMA)

6. **CONSIDER PROCESS FOR HANDLING SUBSEQUENT REVIEW COMMENTS FROM TDEM AND/OR FEMA**

   Take action on allowing PRPC staff/Carson County MAT Lead to respond to comments/ requests for revisions that may come from the TDEM and/or FEMA review process

7. **MISCELLANEOUS**

   General discussion on Hazard Mitigation Planning issues not covered under a previous agenda items.

8. **ADJOURN**

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PRESS RELEASE **For Immediate Release**:
Contact Brenda Vermillion at (806) 537-5395

CARSON COUNTY HAZARD MITIGATION PLAN UPDATE

Carson County – In , the Carson County Judge received notice from the Texas Division of Emergency Management (TDEM) that the last draft of the 2013 Carson County Hazard Mitigation Plan Update submitted for TDEM and Federal Emergency Management Agency (FEMA) review had been provisionally approved. That notice nearly concludes an effort that has taken over two years to complete.

The first Carson County Mitigation Plan was finally approved by TDEM/FEMA in December 2006. In order for the jurisdictions in Carson County to remain eligible to receive FEMA hazard mitigation grant funding in the future, it has to be updated and re-approved by FEMA every five years.

The plan is a multi-jurisdictional plan that uniquely serves Groom, Panhandle, Skellytown, White Deer and Carson County and identifies appropriate hazard mitigation opportunities suitable to each jurisdiction. The purpose of plan is to identify actions and resources which can help to reduce or eliminate the severity of natural hazards impacts, those to which the County is disposed to, on people and property.

In order for the plan to be finally approved by TDEM/FEMA, each of the jurisdictions that participated in the development of the plan update will now have to adopt the plan. During the next two months, Groom, Panhandle, Skellytown, White Deer and Carson County will each conduct a local public hearing before considering the adoption of the plan. Notices will be posted in each jurisdiction as to the date/time of their hearing. The notice will also include the locations were the plan can be accessed for public review.

The plan lists all the members that participated on the Carson County Mitigation Action Team (MAT). Each of these individuals devoted a great deal of time and energy to the update process. It's not easy to develop a plan that will satisfy all of FEMA's standards but the Carson County MAT members stayed with the process through to the end.

* * * * *

ATTACHMENT 4

SECTION VIII – RESOURCES

A variety of source documents and records were used in developing this plan. Listed below are several of the documents that were not cited in the plan but which nevertheless, were referenced during the planning process and indirectly contributed to the plan.

1) *"ABOUT DERECHOS"; Facts About Wind Storms*
Web site: http://www.spc.noaa.gov/misc/AbtDerechos/derechofacts.htm

2) *Bureau of Reclamation, U.S. Department of the Interior.*
Website: www.usbr.gov

3) *Federal Emergency Management Agency (FEMA).*
Website: www.fema.gov

4) *National Climatic Data Center (NCDC),* U.S. Department of Commerce, National Oceanic and Atmospheric Administration
Website: http://www.ncdc.noaa.gov/

5) *National Drought Mitigation Center,* University of Nebraska-Lincoln
Website: http://drought.unl.edu/

6) *National Severe Storms Laboratory (NSSL),* U.S. Department of Commerce, National Oceanic and Atmospheric Administration
Website: www.nssl.noaa.gov

7) *National Weather Service (NWS),* U.S. Department of Commerce, National Oceanic and Atmospheric Administration
Website: www.nws.noaa.gov

8) *State of Texas Hazard Mitigation Plan: 2010-2013*
Website: http://www.txdps.state.tx.us/dem/documents/txHazMitPlan.pdf

9) *Storm Prediction Center (SPC),* U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service
Website: www.spc.noaa.gov

10) *The Tornado Project,* St. Johnsbury, Vermont
Website: www.tornadoproject.com

11) *Texas Tech University Weather,* Lubbock, Texas
Website: http://Dept.s.ttu.edu/weweb/research/debrisimpact/reports/dds.pdf

12) *United States Geological Survey (USGS),* U.S. Department of the Interior
Website: www.usgs.gov

The list on the following page acknowledges references cited in the plan but whose websites were not provided as part of the plan.

[i] Information regarding the Population and Demographics of Carson County
Source: Texas Association of Counties at http://www.txcip.org/tac/census/profile.php?FIPS=48359

[ii] Information pertaining to Ethnicity in Carson County; 2010 US Census Bureau Statistics
Source: http://www.prpc.cog.tx.us/Demographics/default.html

[iii] Information regarding the Population and Demographics of Carson County
Source: Texas Association of Counties at http://www.txcip.org/tac/census/profile.php?FIPS=48359

[iv] Information regarding the Projections of Population Change in Carson County
Source: http://txsdc.utsa.edu/Data/TPEPP/Projections/DownloadCounty5Year.aspx

[v] Information regarding Occupational Employment in Carson County
Source: http://www.txcip.org/tac/census/CountyProfiles.php

[vi] **Ibid**. Source: http://www.txcip.org/tac/census/CountyProfiles.php

[vii] **Ibid**. Source: http://www.txcip.org/tac/census/CountyProfiles.php

[viii] **Ibid**. Source: http://www.txcip.org/tac/census/CountyProfiles.php

[ix] **Ibid**. Source: http://www.txcip.org/tac/census/CountyProfiles.php

[x] Information regarding Climate conditions in Carson County
Source: http://www.clrsearch.com/Sitemap/Texas/

[xi] **Ibid**. Source: http://www.clrsearch.com/Sitemap/Texas

[xii] Drought History in Texas
Source: http://earlywarn.blogspot.com/search?q=drought+history+in+texas

[xiii] History of Earthquakes in the Texas Panhandle
Source: http://www.srh.noaa.gov/images/ama/research/earthquakes.pdf

[xiv] Earthquake History for Carson County
Source: http://earthquaketrack.com/r/texas-panhandle/recent

[xv] 50-Year Probability of Earthquakes in Carson County
Source: https://geohazards.usgs.gov/eqprob/2009/index.php

[xvi] Regional Hazard Assessment on Earthquakes
Source http://www.ig.utexas.edu/research/seismology/TXEQ/panhandle.html

[xvii] Institute for Geophysics Panhandle Regional Earthquake Hazard Assessment
Source: http://www.ig.utexas.edu/research/seismology/hazardtx.htm