Stephens County Hazard Mitigation Plan

August 2019

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CHAPTER ONE: INTRODUCTION

1.1 Overview of Planning Area

This is a hazard mitigation plan update for Stephens County. Stephens County is located in south-central (Oklahoma) and is bordered by six counties; Grady County to the north, Garvin County to the northeast, Carter County to the southeast, Jefferson County to the south, Cotton County to the southwest, and Comanche County to the northwest. Stephens County contains eight incorporated communities and nine school districts, which participated in the plan. Total land area of Stephens County is 891 square miles.

The primary economy for Stephens County is the petroleum industry. Halliburton and Duncan Regional Hospital are the dominant sources of income in Stephens County. Government Services is the second largest source of income in Stephens County, with the majority of income located in the city of Duncan. Equally significant, employers within Stephens County are located in the city of Duncan, which employs nearly 3100 residents.

The population of Stephens County is approximately 44,600. Duncan, which serves as the county seat, is the most heavily populated with approximately 23,400 residents. Marlow is the second most heavily populated with 4,662. Comanche with 1,663, and Bray with 1,209. Central High has a population of 1,199, and Velma and Loco are the least populated towns in Stephens County, with approximately 600 residents in Velma and 120 in Loco.

There are 26 public schools in Stephens County with a total of 8,326 students, PK-12. Duncan having 3,162 (PK-12) Marlow having 1,456 students (PK-12), Comanche with 1,062 (PK-12), Velma with 487 (PK-12), Empire with 476 (PK-12), Central with 432 (PK-12), Bray/Doyle with 371 (PK-12), and Grandview with 154 students (PK-8). Red River Technology Center has 528 students enrolled this year.

1.2 Participating Jurisdictions

The following jurisdictions are participating in this plan:

Stephens County
City of Duncan
City of Comanche
City of Marlow
Town of Bray
Town of Central
Town of Empire
Town of Loco
Town of Velma
Bray Public School
Central Public School
Comanche Public School
Empire Public School
Duncan Regional Hospital
Grandview Public School
Marlow Public School
Velma-Alma Public School
Red River Technology Center

The term “Planning Area” refers to the participating jurisdictions previously listed.

CHAPTER TWO: PLANNING PROCESS

2.1 Overview of Planning Process

The Stephens County Hazard Mitigation Planning Committee was formed to provide guidance during the preparation of this plan. The committee worked toward limiting the loss of life and property and the associated costs from natural and man-made hazards through cost effective recommendations of publicly accepted, prioritized, and multi objective actions. Committee participants provided local history, reviewed NCDC data, addressed and analyzed issues of cost versus health/safety, and made recommendations to the plan. The committee discussed these items in open meetings, approved the plan, and provided their recommendations to the Stephens County Commissioners for plan approval.

The Stephens County Hazard Mitigation Plan was developed during a series of meetings and outreach methods from August 2017 to January 2018. Due to their unique mitigation needs, the Stephens County Emergency Manager held a separate meeting with school representatives in August 2017.

2.2 Planning Committee Members

Name	Title	Jurisdiction Represented	Contribution to Planning Process
Gary Curtis	Emergency Management Director	Duncan/Stephens County	Planning Committee POC.
Gary Curtis	LEPC (Local Emergency Planning Committee) Chairman	Stephens County	Provided estimated loss information for identified hazards.
Kreg Murphee	District 1 Commissioner	Stephens County	Assembled public comments from Stephens County and provided county capabilities assessment through County EM
Todd Churchman	District 2 Commissioner	Stephens County	Assembled public comments from Stephens County and provided county capabilities assessment through County EM
Russell Morgan	District 3 Commissioner	Stephens County	Assembled public comments from Stephens County and provided county capabilities assessment through County EM
Jimmy Pryor	Floodplain Administrator	Stephens County	Provided flood hazard data, mitigation actions, repetitive loss data, and NFIP participation information
Tera Mathis	Emergency Management Coordinator/Floodplains Administrator	Duncan	Provided flood hazard data, mitigation actions, repetitive loss data, and NFIP participation information
Sammy Richardson	Mayor	Bray	Provided hazard information, mitigation actions, and capabilities assessment.
Julie Mckinney	Mayor	Central High	Provided hazard information, mitigation actions, and capabilities assessment.
Smokey Dobbins	Mayor	Comanche	Provided hazard information, mitigation actions, and capabilities assessment.
Perry Brinegar	Mayor	Empire	Provided hazard information, mitigation actions, and capabilities assessment.

2.2 Planning Committee Members, cont.'

Name	Title	Jurisdiction Represented	Contribution to Planning Process
Margie Fondren	Mayor	Loco	Provided hazard information, mitigation actions, and capabilities assessment.
Jeff Prater	Mayor	Marlow	Provided wildfire data and mitigation action items.
Jimmy Castor	Mayor	Velma	Provided wildfire data and mitigation action items.
David W. Eads	Superintendent	Bray School District	Provided school district hazard information, mitigation actions, and capability assessment. Assembled public comments from school district staff.
Kevin Dyes	Superintendent	Central High School District	Provided school district hazard information, mitigation actions, and capability assessment. Assembled public comments from school district staff.
Julie Bills	Superintendent	Comanche School District	Provided school district hazard information, mitigation actions, and capability assessment. Assembled public comments from school district staff.
Justin Smith	Superintendent	Empire School District	Provided school district hazard information, mitigation actions, and capability assessment. Assembled public comments from school district staff.
Gary Wade	Superintendent	Grandview School System	Provided school district hazard information, mitigation actions, and capability assessment. Assembled public comments from school district staff.
George Coffmon, Jr.	Superintendent	Marlow School District	Provided school district hazard information, mitigation actions, and capability assessment. Assembled public comments from school district staff.
Raymond Rice	Superintendent	Velma School District	Provided school district hazard information, mitigation actions, and capability assessment. Assembled public comments from school district staff.
Dennis Loafman	Superintendent	Red Rive Technology Center	Provided school district hazard information, mitigation actions, and capability assessment. Assembled public comments from school district staff.
Taylor Rhoades	Emergency Manager	Duncan Regional Hospital	Provided input on biological hazard information, possible mitigation actions, and capability assessment.

2.3 Other Stakeholders

Organizations and agencies contacted were:

Neighboring Communities, Businesses, and Non-Profit Agencies Contacted

Name	Title	Agency Represented	How Agency Was Invited	Contributions to Plan
Paul Tucker	Emergency Manager	Carter County	Countyem100@sbcglobal.net	Provided information on county capabilities and aid agreements.
Michael Merritt	Emergency Manager	Comanche County	em@comanchecounty.us	Provided information on county capabilities and aid agreements.
Lori Hedges	Emergency Manager	Cotton County	Lori.hedges2625@yahoo.com	Provided information on county capabilities and aid agreements.
David Johnson	Emergency Manager	Garvin County	garvincoem@gmail.com	Provided information on county capabilities and aid agreements.
Dale Thompson	Emergency Manager	Grady County	gradyema@gmail.com	Provided information on county capabilities and aid agreements.
Ron Weatherly	Emergency Manager	Jefferson County	jeffersonokem@gmail.com	Provided information on county capabilities and aid agreements.

State and Federal Agencies Contacted

Name	Title	Agency Represented	How Agency Was Invited	Contributions to Plan
Matt Rollins Michael Bradford	HM Department Manager HM Planner	OEM	Phone	Provided guidance on plan requirements.
Richard Smith	Chief Meteorologist	National Weather Service	Email	Provided climatological data.

2.4 Public Involvement

All public meetings were designed to encourage and invite input from private citizens and local officials. The public was invited to attend all planning committee meetings held at the Red River Technology Center located at 3300 West Bois D'arc in Duncan, Oklahoma. The agenda for each meeting was posted according to the Oklahoma's Open Meeting Law. Each meeting was advertised in the local newspaper, posted at local libraries, and posted on each community's website.

Feedback received from the public proved valuable in the development of the plan. Based on feedback, the top three public priorities are: 1) additional warning devices for remote communities, 2) improved warning communication methods, and 3) increased education and training on hazards.

2.5 Plans, Documents, and Literature Reviewed

During plan development, the Stephens County Hazard Mitigation Planning Committee reviewed various plans and studies for information regarding hazards, disaster history, and potential impacted areas.

2.5.1 Literature and Resources Reviewed

Agency/Document	Relevant Information Used
National Climatological Data Center (NCDC)	Hazard occurrences from 2005-2017.
US Geological Survey on Earthquakes, dated 7/4/17	Data on increased seismic activity across OK.
US Census Bureau Population Data, dated 7/1/2016	Population data for Stephens County.
Oklahoma State University Agricultural Extension Service	Data on agricultural and ranching revenue from 2008.
Oklahoma State Department of Transportation	Data on county and US Highway routes was used when evaluating mitigation action items.

2.5.2 Plans Reviewed

Plan Title	Relevant Information Used
Oklahoma Hazard Mitigation Plan	Hazard definitions, previous occurrence data, disaster history, and State goals.
Stephens County Emergency Operations Plan, 8/2017	Capability Assessment.
Capital Improvement Plans	Information was reviewed and integrated into the mitigation action items and critical facilities list.
National Engineering Manual (Part 503, subpart D - Dam Safety	Information was reviewed and integrated into the capability assessment, risk assessment, and mitigation strategy.
School Emergency Action Plans	Wildfire extent, probability, and fuel sources.
Local Records	Evacuation Routes, high risk areas, and vulnerable populations.
Comprehensive Plans	Capability Assessment.

2.5.3 Additional Information on Plans Used

Three dams in Stephens County is designated as high risk. This dam is classified high risk by the Oklahoma Water Resources Board.

2.5.4 Capital Improvement Plan

Stephens County currently utilizes capital improvement planning to guide development in the County. After the County officially adopts the Hazard Mitigation Plan, these existing mechanisms, which are updated annually, will have hazard mitigation strategies integrated into them.

After adoption of the Mitigation Plan, the County will suggest that local municipalities address natural hazards in their respective planning processes. Specifically, one of the goals in the Mitigation Plan directs County and local governments to protect life and property from natural disasters and hazards. The County Commissioners' office will conduct periodic review of the County's amendments, and provide technical assistance to other local municipalities in implementing these requirements.
Any capital improvement planning that occurs in the future will also contribute to the goals in the Hazard Mitigation Plan. The respective emergency manager will work with the capital improvement planners to secure high-hazard areas for low risk uses.

2.6 Continued Public Involvement

While the Hazard Mitigation Planning Committee represents the public to some extent, the public will be able to directly comment on and provide feedback about the plan. Stephens County is dedicated to generating public interest in the updates of the County Hazard Mitigation Plan. Efforts to do so may include:

1. Distributing information about the existence and purpose of the Hazard Mitigation Plan to community groups, units of County government, and other public gatherings.

2. Questionnaires periodically being made available to the public to collect information on what mitigation activities the citizens would like to see implemented.

3. Posting information about the Hazard Mitigation Plan on the Stephens County Web page, along with an email address for questions and input.

Meeting notices will be posted in accordance with the policies for open meetings at the Stephens County Court House, which is located in Duncan, OK. An ad in the local newspapers, official legal notice, will inform the public about the meetings. These meetings will provide the public a forum where residents can express their concerns, opinions, or ideas about the Plan. Citizen's comments and concerns will be discussed at the annual evaluation to determine if changes to the plan need to be made.
Listed below is the address and phone number of the County Emergency Management Director who is responsible for keeping track of public comments on the plan. Copies of the plan will be kept at the County Department of Emergency Management and at the County Clerk's office, where the public can review the plan. The public will also be invited to, and included in, the Hazard Mitigation Planning Committee's annual evaluation of the plan. This meeting will provide the public with a forum for which they can express their concerns, opinions, or ideas about the plan.

Stephens County Department of Emergency Management
Stephens County Courthouse
Duncan, OK
(580) 255-3411

2.7 Plan Update Review, Evaluation, and Implementation

Upon final approval, the Stephens County Hazard Mitigation Plan will be monitored, evaluated, and updated by the Stephens County Emergency Manager. He/she will accomplish this by working with the Stephens County Local Emergency Planning Committee (LEPC) and the Stephens County Hazard Mitigation Planning Committee. The Stephens County Emergency Manager will serve as the primary point of contact, and will be responsible for coordinating all meetings related to this plan.

Once a year, or as needed following local disaster events, the Stephens County Hazard Mitigation Committee will meet to discuss the effectiveness of the plan. Each participating jurisdiction will provide a brief summary of how the plan met, or did not meet, its specific mitigation needs. These revelations can then be incorporated into the Stephens County plan. In addition, each jurisdiction's representative will be responsible for seeking out grant funding opportunities.

The plan update process will begin eighteen months prior to plan expiration, and the plan will be updated every five years.

2.8 Plan update agreement

Stephens County will ensure that a regular review and update of the Stephens County Multi-Hazard Mitigation Plan occurs. The Hazard Mitigation Planning Committee (HMPC) will continue to meet on A semi-annual basis, or as conditions warrant, to oversee and review updates and revisions to the plan.
The Stephens County Emergency Manager will continue to head the Staff Technical Advisory Committee, which will be updated and resubmitted to the State Hazard Mitigation Officer for review and approval by the State and FEMA.
Monitoring the Plan- Monitoring of the Plan, the Action Plan, and Mitigation Measures is the responsibility of the Emergency Manager. Departments responsible for implementation of the Action Plan and the Mitigation Measures will update their Progress Reports on an annual basis, and report to the HMPC on progress and/or impediments to progress of the mitigation measures.
Evaluating the Plan- The Stephens County Multi-Hazard Mitigation Plan will be continually evaluated by the Project Manager, and a report will be made to the HTv1PC twice each year.
The Evaluation will assess:

- Adequacy of adopted Goals and Objectives in addressing current and future expected conditions;
- Whether the nature and magnitude of risks have changed;
- Appropriateness of current resources allocated for implementation of the Plan;
- To what extent the outcomes of the Mitigation Measures occurred as expected;
  Whether agencies, departments and other partners participated as originally anticipated. Updating the Plan- The Stephens County Multi-Hazard Mitigation Plan will be updated according to the following schedule:

1. Revise and Update – the County will incorporate revisions to the plan document identified during the monitoring and evaluation period, as well as items identified in the previous Crosswalk.

2. Submit for Review – the revised plan will be submitted to ODEM and FEMA for review and approval no later than six months prior to the end of the performance period.

3. Final Revision and Adoption – if necessary, the plan will be revised per ODEM and FEMA remarks, adopted by the Stephens County governing body and the updated plan sent to FEMA prior to the expiration of the 5-year approval period

3.1 Introduction

Natural disasters fall into five (5) major categories: atmospheric, geological, hydrological, extraterrestrial, and biological. Natural disasters have resulted in enormous intangible losses and have had a profound effect on the population's resilience.

During development of this plan, the Stephens County Hazard Mitigation Planning Committee identified hazards that are historical, typical, and possible within the planning area. These hazards were identified by incorporating Stephens County Hazard Vulnerability Assessment data, planning committee input, public feedback, review of current Flood Insurance Rate Map (FIRM) data, and through research of past disaster declarations.

3.2 List of Identified Hazards

Stephens County Hazards

Hazard	Jurisdictions Affected 16 possible
Lightning	All Jurisdictions
Hail	All Jurisdictions
Tornado	All Jurisdictions
High Wind	All Jurisdictions
Winter Storm	All Jurisdictions
Flood	Duncan, Bray, Comanche, Velma, Marlow
Extreme Heat	All Jurisdictions
Wildfire	All Jurisdictions
Drought	All Jurisdictions
Dam Failure	Stephens County Non-Incorporated
Earthquake	All Jurisdictions

In addition to the hazards listed above, the (Oklahoma) Hazard Mitigation Plan also includes expansive soils, subsidence, and landslides as potential hazards. These three hazards were **not** included in the Stephens County Hazard Mitigation plan for the following reasons:

a) The soil found in Stephens County consists of a low percentage of clay, which eliminates the potential for expansive soils.

b) Lack of clay in the soil also reduces the exposure to subsidence, along with a fairly stable water table and no mining activities within the planning area.

c) Stephens County consists of flat terrain and is not at risk for landslides.

3.3 Disaster History

Stephens County Federally-Declared Disaster History from 2007 to 2017

Disaster #	Declaration Date	Incident Type
DR-4530	April 5, 2020	Covid-19 Pandemic
DR-4453	July 12, 2019	Server Storms, Tornadoes, and Flooding
DR-4274	July 15, 2016	Severe Storms and Flooding
DR-4222	May 26, 2015	Severe Storms, Tornadoes, Straight-line Winds, and Flooding
DR-1985	May 13, 2011	Severe Winter Storm and Snowstorm
DR-1883	March 05, 2010	Severe Winter Storm
DR-1876	February 25, 2010	Severe Winter Storm
DR-1846	June 19, 2009	Wildfires
DR-1723	August 31, 2007	Severe Storms, Flooding, and Tornadoes
DR-1718	August 24, 2007	Server Storms, Tornadoes, and Flooding
DR-1712	July 07, 2007	Severe Storms, Flooding, and Tornadoes
DR-1678	February 01, 2007	Severe Winter Storm

3.4 Hazard Probability Rating

The probability rating in the hazards below is based on the following criteria:

High = Event probable in next year
Medium = Event probable in next 3 years
Low = Event probable in next 5 years
Very Low = Event probable in next 10 years

Based on history and using the previously mentioned probability statements, probability was quantified as follows:

High = Event has 1 in 1 year chance of occurring ……. 100%
Medium = Event has 1 in 3 years chance ……. 33%
Low = Event has 1 in 5 years chance ……. 20%
Very Low = Event has 1 in 10 years chance …….. 10%

Which result in the following ranges of probability:

High = greater than 33%
Medium = greater than 20%, but less than or equal to 33%
Low = greater than 10%, but less than or equal to 20%
Very Low = 10% or less

Example: Stephens County has had 158 Hail events recorded in the last 58 years.
158 / 58 =2.724 x 100% = 272%, which would make it "HIGH."

3.4.1 Stephens County Hazard Rating Matrix

#	Hazard	Rating
1	Lightning	Medium
2	Hail	High
3	Tornadoes	High
4	High Winds	High
5	Winter Storms	High
6	Flood Events	High
7	Extreme Heat	High
8	Wildfire	High
9	Drought	High
10	Dam Failure	Low

3.5 Profiled Hazards

3.5.1 Lightning

Description

Lightning is a discharge of intense atmospheric electricity, accompanied by a vivid flash of light, from one cloud to another or from a cloud to the ground. Lightning is formed by the separation of positive and negative charges that occur when ice crystals collide high up in a thunderstorm cloud. As lightning passes through the atmosphere, the air immediately surrounding it is heated, causing the air to expand rapidly. The resulting sound wave produces thunder.

Location

Lightning affects the entire planning area.

Extent

According to information provided by the Tulsa, OK National Weather Service (NWS) office, cloud-to-ground (CG) lightning is classified as either negative or positive. Positive CG flashes make up approximately 5-10% of the total CG lightning. Positive CG flashes typically originate in the upper portion of thunderstorms. This increases the distance between the charge region within the cloud and the earth. Stronger charge is needed to overcome the electric potential of this distance compared to negative CG flashes, which originate lower in the cloud. The result is that positive CG flashes have a higher peak current compared to negative CG flashes. Positive CG flashes may have a peak current 10x that of a negative CG flash.

The National Weather Service explained that positive CG flashes are often observed as far away as 10 miles or more from the main precipitation area of a thunderstorm due to the location of the upper charge region. This poses an extra fire danger, and can catch people who are outdoors off guard.

Once in contact with an object on the ground, a CG flash can have multiple return strokes, (this looks like a flickering flash), a continuous current, (this looks like a steady flash), or a combination of these two. Continuous current is more destructive and leads to a greater chance of fire. This is because the electricity remains in contact with an object for a longer period of time, allowing for greater heat to build up. (Lightning can be as hot as 50,000 degrees Fahrenheit.) Positive CG flashes predominantly have continuous currents and are more likely to cause damage than negative CG flashes, due to the likelihood of continuous and high peak currents. It is important to remember that all lightning can cause damage.

Based on the information provided by the National Weather Service, Stephens County and its participating jurisdictions consider the following lightning events to be minor/major:

Minor severity: Any lightning strike that does not cause injury, death, or property damage.

Major severity: Any lightning strike that causes injury, death, or property damage

Previous Occurrences

Probability of Future Events

The probability of damaging lightning events in the planning area is **MEDIUM**.

Impact and Vulnerability

People, buildings, schools, trees, electrical systems and equipment, and electrical components are all vulnerable to a lightning strike. A few of the impacts of a lightning strike could include injury or death, structural damages, fire, downed electrical lines, and power loss to electrical substations.

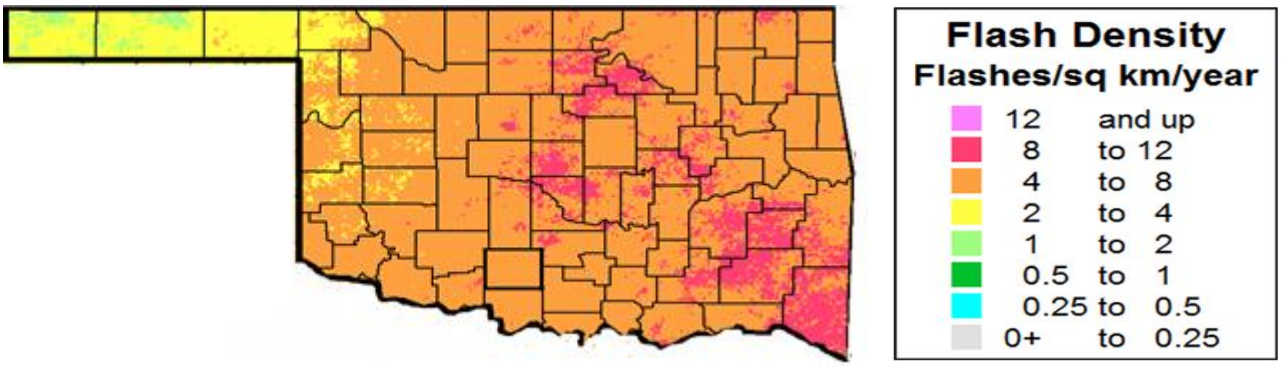
The greatest vulnerability to lightning in the planning area is the potential loss of human life. Property damage can also occur to structures, electrical equipment, water wells, etc. Anyone outdoors during a thunderstorm is exposed to, and at risk of, injury from lightning. Most people are injured or killed by lightning when participating in some form of outdoor recreation during a lightning event.

None of the school districts in Stephens County have lightning detection systems in place. In general, school officials will cancel outdoor events if lightning becomes a concern, although that system is vulnerable to varying perceptions of the severity of a lightning event.

After visiting with the NWS out of Norman, the following information was gathered. There has been no fatalities or damages reported from lightning, but as the following description and map shows, there is a vulnerability to lightning throughout our jurisdictions.

Location	St.	Date	Time	Type	Dth	Inj	PrD	CrD
DUNCAN	OK	07/07/1996	23:00	Lightning	0	0	0.00K	0.00K
DUNCAN	OK	05/25/1997	17:25	Lightning	0	0	10.00K	0.00K
MARLOW	OK	08/19/1997	01:56	Lightning	0	0	40.00K	0.00K
DUNCAN	OK	08/10/1998	18:00	Lightning	0	0	0.50K	0.00K
DUNCAN	OK	06/24/1999	16:25	Lightning	0	0	3.00K	0.00K
MARLOW	OK	08/05/1999	16:30	Lightning	0	0	75.00K	0.00K
CORUM	OK	08/23/1999	19:30	Lightning	0	0	0.20K	0.00K
VELMA	OK	08/27/1999	01:30	Lightning	0	0	1.00K	0.00K
COMANCHE	OK	10/04/1999	07:00	Lightning	0	0	3.00K	0.00K
COMANCHE	OK	08/05/2003	16:00	Lightning	0	0	20.00K	0.00K
Totals:					0	0	152.70K	0.00K

The following map shows cloud-to-ground flash density for eight years in the Oklahoma. There is a great deal of detail to be found within this map at 2-kilometer (1.24 mile) resolution. The highest flash density exceeds 12 flashes per square kilometer per year in some of the areas. An additional area of high flash density is in eastern Oklahoma where storms that form during the afternoon move east during the evening and grow into squall lines and other large thunderstorm complexes. There is a minimum over Oklahoma and surrounding areas in July and August as a persistent subtropical high often dominates. Storms over the Plains form in the afternoon to the west, and move eastward to result in nighttime peaks. This map copied from Vaisala Imaging.



3.5.2 Hail

Description

Hail is a form of solid precipitation that consists of balls or irregular lumps of ice, which are individually called hailstones. Hail formation requires an atmospheric environment of strong, upward moving air, called an updraft, within the subfreezing region of a thunderstorm cloud. Large hail stones greater than an inch in diameter (quarter size), can result from a severe thunderstorm and require a very powerful updraft to form. Most large hail is the product of supercell thunderstorms, which have a sustained rotating updraft that moves growing hailstones a long distance through the height of the cloud before falling to the ground.

Location

Hail affects the entire planning area.

Extent

Stephens County and all participating jurisdictions use the Hail Diameter/Description Scale when considering hail severity.

Minor severity: Any hail 1” or below.

Major severity: Any hail 1 1/4” and above.

Hail Diameter/Description Scale

Hail Diameter (Inches)	Description
1/4”	Pea
1/2”	Small Marble
3/4”	Penny or Large Marble
7/8”	Nickel
1”	Quarter
1 1/4”	Half Dollar
1 1/2”	Walnut or Ping Pong Ball
1 3/4”	Golf Ball
2”	Hen’s Egg
2 1/2”	Tennis Ball
2 3/4”	Baseball
3”	Teacup Size
4”	Grapefruit
4 1/2”	Softball

Previous Occurrences

Hail Events from 2007 to 2017

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
MARLOW	10/14/2007	21:01	Hail	1.00 in.	0	0	0.00K	0.00K
MARLOW	10/14/2007	21:12	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	02/11/2008	21:02	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	02/11/2008	21:05	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	02/11/2008	21:15	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	02/11/2008	21:18	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	02/11/2008	21:23	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	02/11/2008	21:30	Hail	1.00 in.	0	0	0.00K	0.00K
LOCO	03/31/2008	13:20	Hail	1.75 in.	0	0	0.00K	0.00K
BRAY	04/07/2008	19:47	Hail	1.00 in.	0	0	0.00K	0.00K
MARLOW	11/05/2008	17:22	Hail	1.75 in.	0	0	0.00K	0.00K
MARLOW	02/10/2009	17:16	Hail	1.75 in.	0	0	0.00K	0.00K
MARLOW	03/30/2009	19:31	Hail	1.00 in.	0	0	0.00K	0.00K
LAKE FUQUA DAM	03/30/2009	20:13	Hail	1.25 in.	0	0	0.00K	0.00K
VELMA	04/11/2009	19:44	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	05/13/2009	22:32	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	05/13/2009	22:35	Hail	2.00 in.	0	0	0.00K	0.00K
VELMA	05/13/2009	23:00	Hail	1.00 in.	0	0	0.00K	0.00K
VELMA	05/13/2009	23:08	Hail	2.00 in.	0	0	0.00K	0.00K
VELMA	08/05/2009	16:05	Hail	1.00 in.	0	0	0.00K	0.00K
VELMA	08/05/2009	16:10	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	09/21/2009	15:20	Hail	1.00 in.	0	0	0.00K	0.00K
VELMA	10/08/2009	16:28	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	01/20/2010	21:05	Hail	1.00 in.	0	0	0.00K	0.00K
CORUM	04/06/2010	21:53	Hail	1.50 in.	0	0	0.00K	0.00K
VELMA	04/06/2010	22:22	Hail	1.75 in.	0	0	0.00K	0.00K
SUNRAY	04/06/2010	23:10	Hail	1.25 in.	0	0	0.00K	0.00K
CORUM	05/10/2010	16:03	Hail	1.75 in.	0	0	0.00K	0.00K
COMANCHE	05/10/2010	16:06	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	05/19/2010	17:49	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	05/19/2010	17:58	Hail	1.75 in.	0	0	0.00K	0.00K
BRAY	04/22/2011	19:11	Hail	1.75 in.	0	0	0.00K	0.00K
BRAY	04/22/2011	19:23	Hail	2.50 in.	0	0	0.00K	0.00K
BRAY	04/22/2011	20:09	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	04/22/2011	20:13	Hail	1.25 in.	0	0	0.00K	0.00K
DUNCAN	04/22/2011	20:20	Hail	1.75 in.	0	0	0.00K	0.00K
CORUM	04/22/2011	20:36	Hail	1.75 in.	0	0	0.00K	0.00K
CORUM	04/22/2011	21:13	Hail	1.00 in.	0	0	0.00K	0.00K
MARLOW	04/22/2011	23:40	Hail	1.75 in.	0	0	0.00K	0.00K

LOCO	04/24/2011	00:59	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	05/01/2011	08:15	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	05/31/2011	02:55	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	06/20/2011	17:45	Hail	1.25 in.	0	0	0.00K	0.00K
COMANCHE	06/20/2011	17:46	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	06/20/2011	17:48	Hail	1.75 in.	0	0	0.00K	0.00K
MARLOW	10/22/2011	19:58	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	10/22/2011	21:15	Hail	1.00 in.	0	0	0.00K	0.00K
LOCO	10/22/2011	21:17	Hail	1.75 in.	0	0	0.00K	0.00K
COMANCHE	10/22/2011	21:20	Hail	1.75 in.	0	0	0.00K	0.00K
MARLOW	04/19/2012	19:29	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	05/28/2012	17:29	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	05/28/2012	17:36	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	05/28/2012	17:40	Hail	1.75 in.	0	0	0.00K	0.00K
MARLOW	05/28/2012	17:45	Hail	1.75 in.	0	0	0.00K	0.00K
VELMA	05/29/2012	22:33	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	05/29/2012	23:01	Hail	1.00 in.	0	0	0.00K	0.00K
MARLOW	07/14/2012	18:35	Hail	1.00 in.	0	0	0.00K	0.00K
MARLOW	07/14/2012	18:40	Hail	1.75 in.	0	0	0.00K	0.00K
EMPIRE CITY	07/14/2012	19:02	Hail	1.00 in.	0	0	0.00K	0.00K
SUNRAY	03/09/2013	13:35	Hail	1.00 in.	0	0	0.00K	0.00K
SUNRAY	03/09/2013	20:38	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	04/17/2013	21:30	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	05/08/2013	19:30	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	05/20/2013	13:02	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	05/20/2013	22:26	Hail	1.25 in.	0	0	0.00K	0.00K
EMPIRE CITY	05/20/2013	22:34	Hail	1.75 in.	0	0	0.00K	0.00K
BRAY	05/30/2013	16:09	Hail	1.00 in.	0	0	0.00K	0.00K
BRAY	05/30/2013	16:12	Hail	1.75 in.	0	0	0.00K	0.00K
BRAY	05/30/2013	16:27	Hail	4.25 in.	0	0	15.00K	0.00K
BRAY	04/13/2014	16:35	Hail	1.75 in.	0	0	0.00K	0.00K
VELMA	04/27/2014	07:09	Hail	1.00 in.	0	0	0.00K	0.00K
CORUM	05/07/2014	19:18	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	05/07/2014	19:57	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	05/07/2014	20:02	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	05/07/2014	20:04	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	05/07/2014	20:08	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	07/01/2014	16:57	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	03/25/2015	19:32	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	03/25/2015	19:36	Hail	1.00 in.	0	0	0.00K	0.00K
VELMA	03/25/2015	20:15	Hail	1.00 in.	0	0	0.00K	0.00K
LOCO	05/07/2015	14:39	Hail	1.00 in.	0	0	0.00K	0.00K
LOCO	05/09/2015	11:31	Hail	1.00 in.	0	0	0.00K	0.00K

DUNCAN	05/09/2015	12:20	Hail	1.25 in.	0	0	0.00K	0.00K
LOCO	05/09/2015	12:31	Hail	1.00 in.	0	0	0.00K	0.00K
CORUM	05/09/2015	18:24	Hail	1.50 in.	0	0	0.00K	0.00K
CORUM	05/09/2015	18:25	Hail	1.50 in.	0	0	0.00K	0.00K
DUNCAN	05/09/2015	18:34	Hail	1.75 in.	0	0	0.00K	0.00K
COMANCHE	05/09/2015	18:41	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	05/09/2015	18:42	Hail	1.25 in.	0	0	0.00K	0.00K
COMANCHE	05/09/2015	18:48	Hail	2.75 in.	0	0	0.00K	0.00K
SUNRAY	05/09/2015	19:10	Hail	1.75 in.	0	0	0.00K	0.00K
CORUM	05/19/2015	16:26	Hail	1.00 in.	0	0	0.00K	0.00K
EMPIRE CITY	05/19/2015	16:35	Hail	1.75 in.	0	0	0.00K	0.00K
EMPIRE CITY	05/19/2015	16:37	Hail	1.00 in.	0	0	0.00K	0.00K
COMANCHE	05/26/2015	17:56	Hail	1.25 in.	0	0	0.00K	0.00K
EMPIRE CITY	05/26/2015	17:59	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	05/26/2015	18:00	Hail	1.25 in.	0	0	0.00K	0.00K
DUNCAN	05/26/2015	18:04	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	04/10/2016	22:51	Hail	1.12 in.	0	0	0.00K	0.00K
VELMA	04/29/2016	16:15	Hail	1.50 in.	0	0	0.00K	0.00K
COMANCHE	05/11/2016	21:25	Hail	2.00 in.	0	0	0.00K	0.00K
COMANCHE	05/11/2016	21:25	Hail	1.00 in.	0	0	0.00K	0.00K
COMANCHE	05/11/2016	21:25	Hail	1.75 in.	0	0	0.00K	0.00K
SUNRAY	05/11/2016	21:33	Hail	1.00 in.	0	0	0.00K	0.00K
DUNCAN	05/11/2016	21:40	Hail	1.75 in.	0	0	0.00K	0.00K
BRAY	05/27/2016	16:38	Hail	2.00 in.	0	0	0.00K	0.00K
VELMA	05/27/2016	17:08	Hail	1.00 in.	0	0	0.00K	0.00K
COMANCHE	04/16/2017	15:40	Hail	1.00 in.	0	0	0.00K	0.00K
EMPIRE CITY	05/18/2017	18:05	Hail	1.50 in.	0	0	0.00K	0.00K
DUNCAN	05/27/2017	19:00	Hail	2.75 in.	0	0	0.00K	0.00K
MARLOW	05/27/2017	19:02	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	05/27/2017	19:04	Hail	1.75 in.	0	0	0.00K	0.00K
DUNCAN	05/27/2017	19:13	Hail	1.75 in.	0	0	0.00K	0.00K
Totals:					0	0	15.00K	0.00K

Probability of Future Events The probability of hail events in the planning area is **HIGH**.

Impact and Vulnerability

Hail is capable of causing considerable damage to crops, buildings, and vehicles, and occasionally death to farm animals. While large hail poses a threat to people caught outside in a storm, it seldom causes loss of human life.

3.5.3 Tornado

Description

Tornados are violently rotating columns of air that reach from the bottom of a cumulonimbus cloud to the ground. Tornados are found in severe thunderstorms, but not all severe thunderstorms produce tornados. While all tornados touch both the ground and the bottom of a cloud, it is possible for only part of the tornado to be visible. A tornado may be on the ground for only a few seconds, or last for over an hour. They can appear in a variety of shapes and sizes, ranging from thin, rope-like circulations to large, wedge-shapes greater than one mile in width. However, a tornado's size is not necessarily related to its wind speed. The strongest tornados can have wind speeds in excess of 200mph. In Oklahoma, most tornados occur between 3PM and 9PM, during the months of March through May, but may occur anytime the necessary atmospheric conditions of wind shear, lift, instability, and moisture are present.

Location

Tornados affect the entire planning area.

Extent

The Fujita Scale has been used to rate tornados since its development in 1971. In 2007 the scale was further developed into the Enhanced Fujita Scale, which has been used since. Tornado wind speeds are estimated after-the-fact based on the damage they produce.

Stephens County and all participating jurisdictions use the Enhanced Fujita Scale when considering tornado severity.

The Enhanced Fujita Tornado Scale

The enhanced Fujita tornado scale was created by Fujita Scale Enhancement Project between 2000 and 2004. The enhanced Fujita scale still uses the same basic principles as the original Fujita scale. There are six categories of tornadoes, 0 to 5. Wind speeds were revised and it also adds more type of structures and vegetation, expands degrees of damage, and better accounts for variables such as differences in construction quality. Below is a brief description of each type of tornado on the Fujita scale.

EF0 Tornado

- Wind speeds between 65 to 85 mph (104 to 137 km/h)
- Light damage
- Broken branches; shallow rooted trees pushed over; some chimney damage

EF1 Tornado

- Wind speeds between 86 to 110 mph (138 to 177 km/h)
- Moderate damage
- Surface damage to roofs; mobile homes pushed off foundation; moving vehicles pushed off the road.

EF2 Tornado

- Wind speeds between 111 to 135 mph (178 to 217 km/h)
- Significant damage
- Frame houses have roof torn off; mobile homes complete destroyed; train boxcars overturned; large trees snapped or uprooted; smaller debris turned into missiles.

EF3 Tornado

- Wind speeds between 136 to 165 mph (218 to 266 km/h)
- Severe damage
- Roofs completely torn off well-constructed buildings, along with some walls, majority of trees uprooted, trains overturned, vehicles lifted off the ground.

EF4 Tornado

- Wind speeds between 166 to 200 mph (267 to 322 km/h)
- Devastating damage.
- Well-constructed houses are completely destroyed; structures with weak foundations blown away; vehicles could be throne; large debris become flying missiles.

EF5 Tornado

- Wind speeds greater than 200 mph (322+ km/h)
- Incredible damage
- Most structures severely damaged or completely destroyed, vehicles can become flying missiles.

Previous Occurrences

Tornado Events from 2010 to 2017

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	22.00K	0.00K
BRAY	STEPHENS CO.	OK	05/10/2010	16:20	CST-6	Tornado	EF1	0	0	0.00K	0.00K
LOCO	STEPHENS CO.	OK	05/10/2010	16:50	CST-6	Tornado	EF0	0	0	0.00K	0.00K
MARLOW	STEPHENS CO.	OK	05/20/2013	13:58	CST-6	Tornado	EF0	0	0	0.00K	0.00K
MARLOW	STEPHENS CO.	OK	05/20/2013	14:07	CST-6	Tornado	EF1	0	0	20.00K	0.00K
LAKE FUQUA DAM	STEPHENS CO.	OK	04/13/2014	16:58	CST-6	Tornado	EF0	0	0	0.00K	0.00K
LAKE FUQUA DAM	STEPHENS CO.	OK	04/13/2014	17:05	CST-6	Tornado	EF0	0	0	0.00K	0.00K
MARLOW	STEPHENS CO.	OK	05/08/2016	18:03	CST-6	Tornado	EFU	0	0	0.00K	0.00K
EMPIRE CITY	STEPHENS CO.	OK	05/18/2017	18:00	CST-6	Tornado	EF0	0	0	2.00K	0.00K
Totals:								0	0	22.00K	0.00K

Probability of Future Events

The probability of tornados in the planning area is **HIGH**.

Impact and Vulnerability

Every structure in the planning area is vulnerable to tornados. Loss of utility service can affect large segments of the population for long periods of time. Economic losses to homeowners and businesses can be devastating. Cascading effects of power loss may include loss of water and sewer services, inability to fuel vehicles, and food spoilage, adding new challenges to disaster-stricken communities.

In our most heavily populated areas of Duncan, Marlow, and Comanche, approximately 25% of residences have safe rooms installed. In Central, Empire, Velma, and Bray areas approximately 20% of residences have safe rooms installed. In 2014, Stephens County received an Individual Safe Room Grant which resulted in the installation of approximately 120 safe rooms.

In 2017 Stephens County surveyed schools in order to evaluate their ability to protect students and staff during a tornado. Of the organizations that responded, 100% reported having a severe weather emergency action plan and only 20% had public safe rooms. This is a particular vulnerability for the citizens of Stephens County.

Most public school structures within the planning area could withstand an EF0 event, however, more serious tornado events could cause serious structural damage which could also impact school operations.

Many efforts have been made to protect all students of Stephens County. Schools in Duncan, Empire, Central, Marlow, Velma, and Bray all have safe rooms on campus.

3.5.4 High Wind

Description

High winds can result from thunderstorms, strong cold front passages, or gradient winds between high and low pressure. Damaging winds are often called "straight-line" winds to differentiate the damage they cause from tornado damage. Downdraft winds are a small-scale column of air that rapidly sinks toward the ground, usually accompanied by precipitation as in a shower or thunderstorm. A downburst is the result of a strong downdraft associated with a thunderstorm that causes damaging winds near the ground.

Location

High wind affects the entire planning area.

Extent

The Beaufort wind scale is used to measure wind classifications between 1 and 12. Stephens County and its participating jurisdictions use this scale when considering high wind severity:

Minor Severity: Beaufort Scale #9 or below.

Major Severity: Beaufort Scale #10 or above.

Beaufort Wind Chart – Estimating Winds Speeds

Beaufort Number	MPH Range	MPH Average	Terminology	Description
0	0	0	Calm	Calm. Smoke rises vertically.
1	1-3	2	Light air	Wind motion visible in smoke.
2	4-7	6	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	11	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13-18	15	Moderate breeze	Dust and loose paper is raised. Small branches begin to move.
5	19-24	22	Fresh breeze	Smaller trees sway.
6	25-31	27	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult.
7	32-38	35	Near gale	Whole trees in motion. Some difficulty when walking into the wind.
8	39-46	42	Gale	Twigs broken from trees. Cars veer on road.
9	47-54	50	Severe gale	**Light structure damage.**
10	55-63	60	Storm	**Trees uprooted. Considerable structural damage.**
11	64-73	70	Violent storm	**Widespread structural damage.**
12	74-95	90	Hurricane	**Considerable and widespread damage to structures.**

Webpage: http://www.weather.gov/iwx
Twitter: @nwsiwx
Facebook: NWSNorthernIndiana

Previous Occurrences

High Wind Events from 2007 to 2016

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	56.00K	0.00K
STEPHENS	STEPHENS	OK	02/24/2007	13:25	CST-	High	50 kts.	0	0	43.00K	0.00K
STEPHENS	STEPHENS	OK	01/29/2008	09:00	CST-	High	56 kts.	0	0	5.00K	0.00K
STEPHENS	STEPHENS	OK	01/29/2008	10:00	CST-	High	56 kts.	0	0	8.00K	0.00K
STEPHENS	STEPHENS	OK	04/15/2011	16:00	CST-	High	50 kts.	0	0	0.00K	0.00K
Totals:								0	0	56.00K	0.00K

Probability of Future Events

The probability of high winds in the planning area is **HIGH**.

Impact and Vulnerability

Damages from high winds may exceed those caused by tornados. Structural impacts might include window and roof damage, and inundation of facilities by heavy rain. In addition to structural issues, high winds can also affect electrical and other utilities with service outages due to power lines grounding out or being knocked down. Transportation can be disrupted with the loss of stop lights and street lights, and dangerous cross winds could make travel difficult. Wind-driven debris can penetrate windows, roofs, and even reinforced masonry walls, posing a threat to both property and occupants.

The potential for injury or property damage due to flying debris exists in all jurisdictions, but increases in population-dense areas and areas that are under construction/development. Given the high volume of population and housing development, Duncan, Marlow, Comanche, Velma, including all school districts have the potential to be the most affected by damaging high wind events.

3.5.5 Winter Storm

Description

Winter Storm can refer to a combination of winter precipitation, including snow, sleet and freezing rain. A severe winter storm can range from freezing rain or sleet to moderate snow over a few hours to blizzard conditions and extremely cold temperatures that last several days.

Blowing snow is wind-driven snow that reduces visibility and causes significant drifting. Blizzards occur when falling and blowing snow combine with high winds of 35 mph or greater, reducing visibility to near zero.

Freezing rain is precipitation that falls, as liquid, into a layer of freezing air near the surface. When the precipitation makes contact with the surface, it forms into a coating or glaze of ice and even a small accumulation can cause a significant hazard.

Sleet is frozen precipitation that has melted by falling through a warm layer of the atmosphere and then refreezes into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and can accumulate like snow and cause a hazard to motorists.

Ice storms are extended freezing rain events, lasting several hours to sometimes days, when the freezing rain accumulates a thick enough glaze on surfaces to damage trees, utility lines, and cause major travel hazards. Ice loads on overhead power lines, combined with windy conditions, may cause the lines to "gallop." This forceful motion often causes the lines to break away from the connectors and poles, resulting in widespread power failure.

Wind Chill is used to describe the relative discomfort and danger to people from the combination of cold temperatures and wind. The wind chill chart below from the National Weather Service shows the apparent temperature derived from both wind speed and temperature.

Location

Winter storms affect the entire planning area.

Extent

Wind Chills in Stephens County can reach -19 as shown on the National Weather Service Wind Chill Chart below. A typical winter storm in Stephens County will deposit 1-3 inches of snow, accompanied by sleet and ice. A severe winter storm is one that drops 4 or more inches of snow during a 12-hour period, or 6 or more inches during a 24-hour span. Ice accumulations of only ½ inch can immobilize the town and cause damage to infrastructure. As little as 2 inches of snow combined with strong winds can cause blizzard conditions.

An index scale used by the utility industry to anticipate impact and damage of an icing event to transmission lines is the Sperry-Piltz Ice Accumulation Index (SPIA). As a tool for risk management and winter weather preparedness, the index uses National Weather Service forecast parameters to predict the spatial coverage, total ice accumulation, and potential damage from ice storms.

Since there are many different types of winter storm occurrences, there are multiple factors which contribute to the severity of a winter storm event. Stephens County and its participating jurisdictions use the Sperry-Piltz Ice Accumulation Chart as an indicator of winter storm severity:

Minor Severity: 1 or below on the Sperry-Piltz Ice Accumulation Chart.

Major Severity: 2 or above on the Sperry-Piltz Ice Accumulation Chart.

NWS Windchill Chart

Wind (mph)	Temperature (°F)																	
Calm	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	19	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

The Sperry-Piltz Ice Accumulation Index, or "SPIA Index" – Copyright, February, 2009

ICE DAMAGE INDEX	DAMAGE AND IMPACT DESCRIPTIONS
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
4	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

Previous Occurrences

Winter Storm Events from 2007 to 2016

Date	Disaster #	Location	Information/Damages

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	20.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	01/12/2007	16:00	CST-6	Winter		0	0	20.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	01/26/2009	08:00	CST-6	Winter		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	01/31/2011	20:00	CST-6	Winter		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	02/01/2011	00:00	CST-6	Winter		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	02/09/2011	00:00	CST-6	Winter		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	12/05/2013	13:00	CST-6	Winter		0	0	0.00K	0.00K
Totals:								0	0	20.00K	0.00K

Probability of Future Events

The probability of winter storms in the planning area is **HIGH**.

Impact and Vulnerability

Winter storms can range from accumulating snow and/or ice over just a few hours to blizzard conditions with blinding wind-driven snow that can last several days. The aftermath from a damaging winter storm can continue to impact a region for weeks and even months. Economic losses can occur to livestock producers and any business in the affected areas. Water systems being shut down or frozen can disrupt social services, schools, homes, and businesses. Carbon monoxide poisoning is always a possibility as homeowners and businesses use alternative heat sources to keep warm. Personal health can be affected in a variety of ways including mental and physical stress, and frostbite.

Historically, power outages due to downed lines have occurred in both urban and rural areas of Stephens County, and have lasted for periods of days to weeks. As a result, electric utilities have contingency plans and mutual aid agreements with neighboring utility providers. These plans identify priority facilities such as hospitals that need power service restored as quickly as possible. As new lines are considered and/or replacement lines are needed, the providers should thoroughly investigate underground lines.

The primary impact of winter storms on school districts in Stephens County is school closure, sometimes for extended periods of time. Therefore, school districts should have plans for early dismissal of students, as well as protection of buildings from the effects of extreme cold during periods of inaccessibility.

3.5.6 Flood

Description

River flooding is when a river rises to its flood stage and spills over the banks. The amount of flooding is usually a function of the amount of precipitation in an area, the amount of time it takes for rainfall to accumulate, previous saturation of local soils, and the terrain around the river system. A river located in a broad, flat floodplain will often overflow to create shallow and persistent flood waters in an area that do not recede for extended periods of time. The excess water can be from snowmelt or rainfall far upstream. Flood effects can be local, impacting a neighborhood or community; or very large, affecting entire river basins and multiple states.

Floods in Stephens County usually come in two forms: riverine and sheet flooding. Riverine flooding occurs when a stream becomes so full as to overflow onto adjacent lands. Sheet flooding occurs when excessive rainfall exceeds the design capabilities of drainage facilities and ponding occurs.

Location

All of the planning area is vulnerable to flooding.

Extent

Severity of flooding is determined by several factors including rainfall intensity, duration, and location. Topography and ground cover are contributing factors for floods. The extent of flooding in Stephens County will be determined by the Zone A, 100 year flood hazard areas on the FIRM maps. The maximum observed in Stephens County is four feet in major drainage systems. Major flood depths for participating municipalities are included below.

Stephens County and its participating jurisdictions consider the following flood events to be minor/major:

Minor Severity: Rainfall of 1” per hour, or a river that stays within the river’s banks.

Major Severity: Rainfall above 2” per hour, or more than 1” on saturated ground, or a river rise that overflows the banks of the river.

27 FLOOD event(s) were reported in **Stephens County, Oklahoma** between **03/30/2007** and **06/30/2017**

Previous Occurrences **Flooding Events from 2007 to 2017**

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
COMANCHE	STEPHENS CO.	OK	03/30/2007	13:45	CST-6	Flash Flood		0	0	0.00K	0.00K
DUNCAN	STEPHENS CO.	OK	03/30/2007	14:00	CST-6	Flash Flood		0	0	0.00K	0.00K
DUNCAN	STEPHENS CO.	OK	05/26/2007	19:00	CST-6	Flash Flood		0	0	10.00K	0.00K
DUNCAN	STEPHENS CO.	OK	05/27/2007	02:10	CST-6	Flash Flood		0	0	0.00K	0.00K
DUNCAN	STEPHENS CO.	OK	05/27/2007	05:00	CST-6	Flash Flood		0	0	0.00K	0.00K
MARLOW	STEPHENS CO.	OK	06/15/2007	12:29	CST-6	Flash Flood		0	0	0.00K	0.00K
DUNCAN	STEPHENS CO.	OK	06/26/2007	06:10	CST-6	Flash Flood		0	0	0.00K	0.00K
COMANCHE	STEPHENS CO.	OK	06/26/2007	06:15	CST-6	Flash Flood		0	0	0.00K	0.00K
DUNCAN	STEPHENS CO.	OK	06/28/2007	19:00	CST-6	Flash Flood		0	0	0.00K	0.00K
COMANCHE	STEPHENS CO.	OK	04/29/2009	08:15	CST-6	Flash Flood		0	0	0.00K	0.00K
VELMA	STEPHENS CO.	OK	05/08/2015	19:11	CST-6	Flash Flood		0	0	0.00K	0.00K
MARLOW	STEPHENS CO.	OK	05/09/2015	12:33	CST-6	Flash Flood		0	0	0.00K	0.00K
MARLOW	STEPHENS CO.	OK	05/09/2015	12:35	CST-6	Flash Flood		0	0	0.00K	0.00K

MARLOW	STEPHENS CO.	OK	05/09/2015	13:29	CST-6	Flash Flood		0	0	100.00K	0.00K
DUNCAN	STEPHENS CO.	OK	05/09/2015	18:50	CST-6	Flash Flood		0	0	0.00K	0.00K
MARLOW	STEPHENS CO.	OK	05/16/2015	20:09	CST-6	Flash Flood		0	0	0.00K	0.00K
SUNRAY	STEPHENS CO.	OK	05/28/2015	19:01	CST-6	Flash Flood		0	0	0.00K	0.00K
DUNCAN	STEPHENS CO.	OK	05/28/2015	19:22	CST-6	Flash Flood		0	0	0.00K	0.00K
DUNCAN	STEPHENS CO.	OK	06/17/2015	16:30	CST-6	Flash Flood		0	0	0.00K	0.00K
LOCO	STEPHENS CO.	OK	06/18/2015	11:00	CST-6	Flash Flood		0	0	0.00K	0.00K
VELMA	STEPHENS CO.	OK	06/18/2015	11:00	CST-6	Flash Flood		0	0	0.00K	0.00K
VELMA	STEPHENS CO.	OK	06/18/2015	11:00	CST-6	Flash Flood		0	0	0.00K	0.00K
ALMA	STEPHENS CO.	OK	06/18/2015	11:00	CST-6	Flash Flood		0	0	0.00K	0.00K
DUNCAN	STEPHENS CO.	OK	06/12/2016	08:08	CST-6	Flash Flood		1	0	0.00K	0.00K
BRAY	STEPHENS CO.	OK	06/12/2016	09:53	CST-6	Flash Flood		0	0	0.00K	0.00K
DUNCAN	STEPHENS CO.	OK	11/02/2016	20:30	CST-6	Flash Flood		0	0	0.00K	0.00K
COMANCHE	STEPHENS CO.	OK	06/30/2017	20:04	CST-6	Flash Flood		0	0	5.00K	0.00K
Totals:								1	0	115.00K	0.00K

Probability of Future Events

The probability of flood events occurring in Stephens County is **HIGH**.

Impact and Vulnerability

Stephens County, Marlow and Comanche have flood plain ordinances, which regulate the issuing of building permits within flood zones. Construction in floodplain is restricted by the County's floodplain program. Any future buildings or infrastructure must be built according to floodplain regulations. Since improvements have been directed away from flood plains, an estimated of 118 structures were found to be located in flood zones within the planning area. Geographic Information Software (GIS) was used to help associate population and housing with flood zones to obtain this estimate.

When compared to Stephens County's total population, this resulted in less than 1% of the population living within a flood zone. Stephens County and cooperating jurisdictions have no residential structures designated as repetitive loss structures. Stephens County Emergency Management concludes that County citizens who live in affected areas are aware of the dangers, thus resulting in the low human casualty rate. With early warning from the National Weather Service, Stephens County is able to activate response personnel in a timely manner to prevent loss of life with a minimal loss to property.

Secondary Hazards.

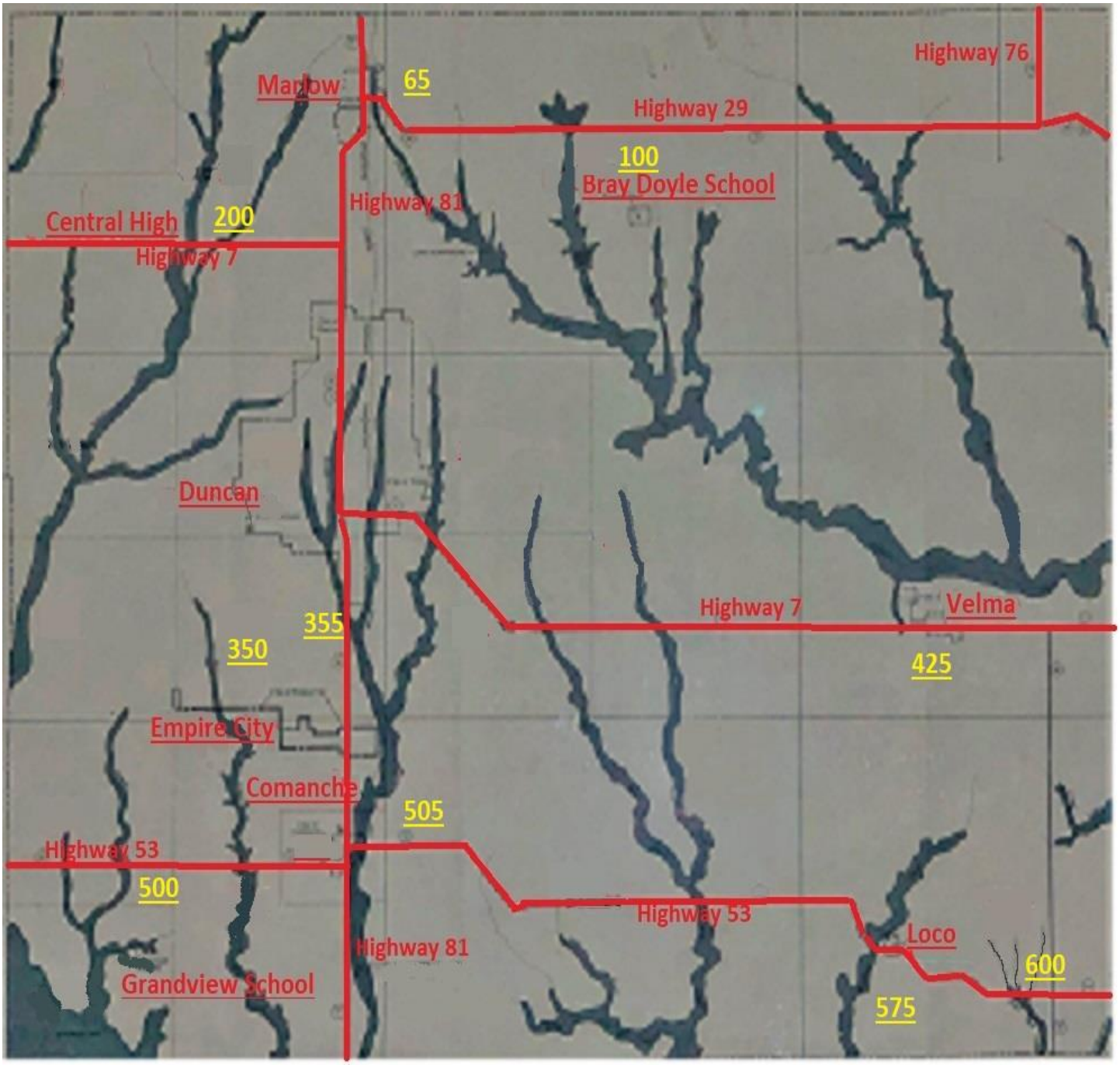
Secondary hazards include transportation disruptions, dam failure, dispersion of contaminants, and threatened water supplies. Hazardous materials (and other possible sources of contaminants) are not identified in the area but may need to be addressed in updates to this plan

Overall Summary of Vulnerability and Impacts.

In Stephens County spring and fall rains can result in a rise in the County's rivers and creeks resulting in floods that vary in intensity. Severity of flooding is determined by several factors including rainfall intensity, duration and location. Flash floods are most likely to close small roads and some major highways within Stephens County. Flood plain ordinances have limited the growth within the flood plains and as a result it is estimated that less than 1% of the County's population live in a flood zone. There are no repetitive loss structures in Stephens County or cooperating jurisdictions. There are 5 repetitive loss properties in the City of Duncan and 1 in the City of Comanche. The County's roadways, bridges, and some farmland remain most vulnerable to floods. The impact is during times of flooding and inundation, roads become impassible and emergency response becomes

very limited. Roads that become impassible create a financial and time hardship to citizens; school districts and others in that they must find alternate routes around flooded areas.

3.5.7 Vulnerable Streets and Roadways to flooding Map



The following page specifies the streets and roadways that have historic flooding.

3.5.8

FLOOD PRONE STREET INDEX

NOTE TO USER

This index provides a list of all streets shown on the Flood Insurance Rate Map (FIRM) that are partially or totally within Special Flood Hazard Area.

APACHE AVENUE----------65
ARAPAHOE AVENUE----------65
ASH STREET----------65,505
BROWN AVENUE----------505
BUNCH STREET----------505
CHEROKEE AVENUE----------65
CHEYENNE AVENUE----------65
CHICKASAW AVENUE----------65
CHURCH AVENUE----------505
EIGHTH STREET----------505
FIFTH STREET----------505
FIRST STRRET----------425,505
FOURTH STREET----------505
GILKEY AVENUE----------65
HICKORY AVENUE----------505
HILL AVENUE----------505
JARBOE AVENUE----------65
MARTIN----------65
MCNEESAVENUE----------65
NABOR AVENUE----------65
NINTH STREET----------505
NORTH AVENUE----------505
OAK AVENUE----------505
PATTERSON AVENUE----------505
PAYNE AVENUE----------65
PEARSON----------505

SECOND STREET----------505
SEMINOLE AVENUE----------65
SEVENTH STREET----------505
SIXTH STREET----------505

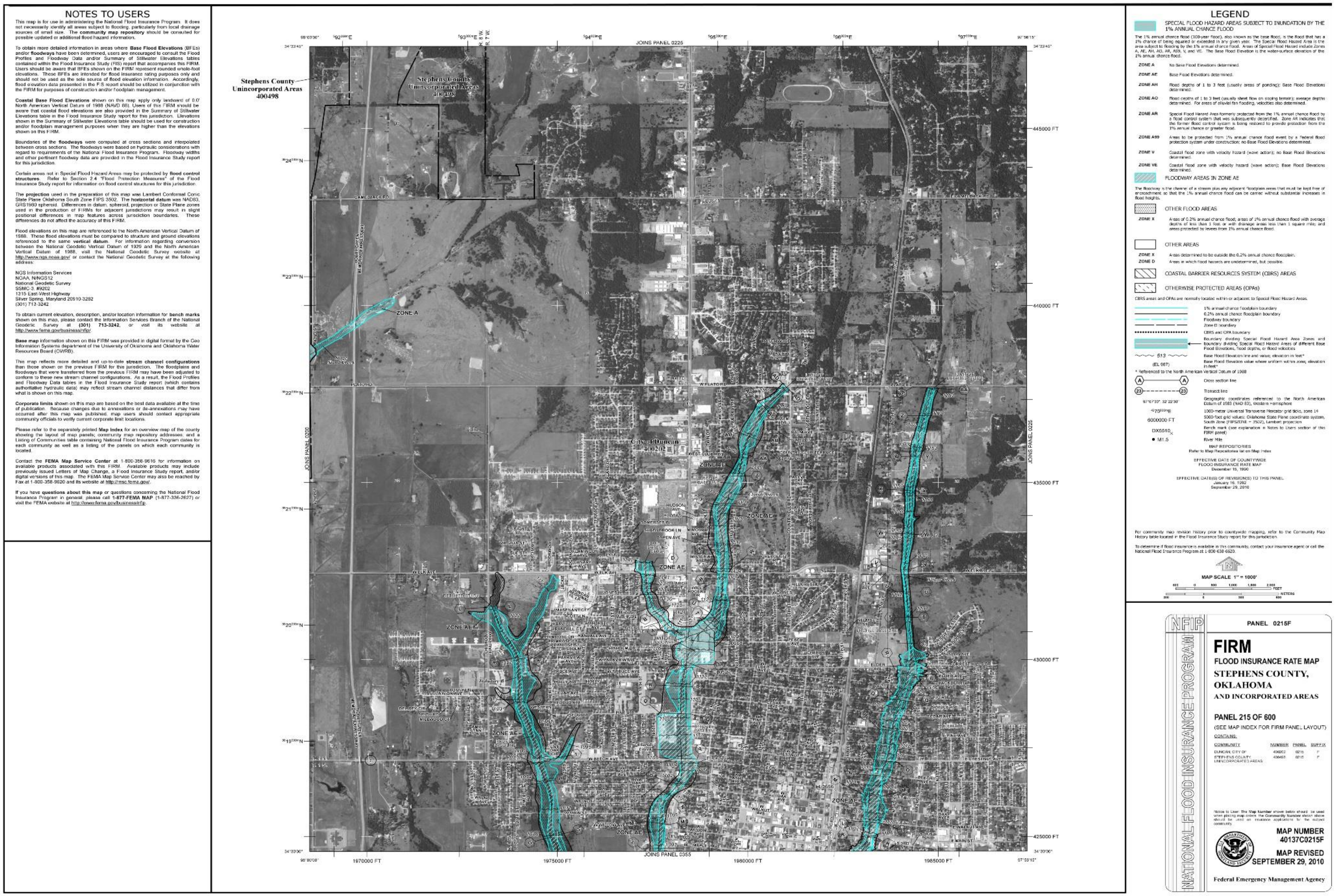
STATE ROUTE 7----------200,425
STATE ROUTE 29----------65,100
STATE ROUTE 53----------500,505,600
STATE ROUTE 89----------600
STATE ROUTE 29 ----------100

STEEL AVENUE----------65
TENTH STREET----------505
THIRD STREET----------505
U.S. ROUTE 81----------65,355
WADE AVENUE----------65
WALNUT AVENUE----------505
WALNUT STREET----------65
WILSON STREET----------505

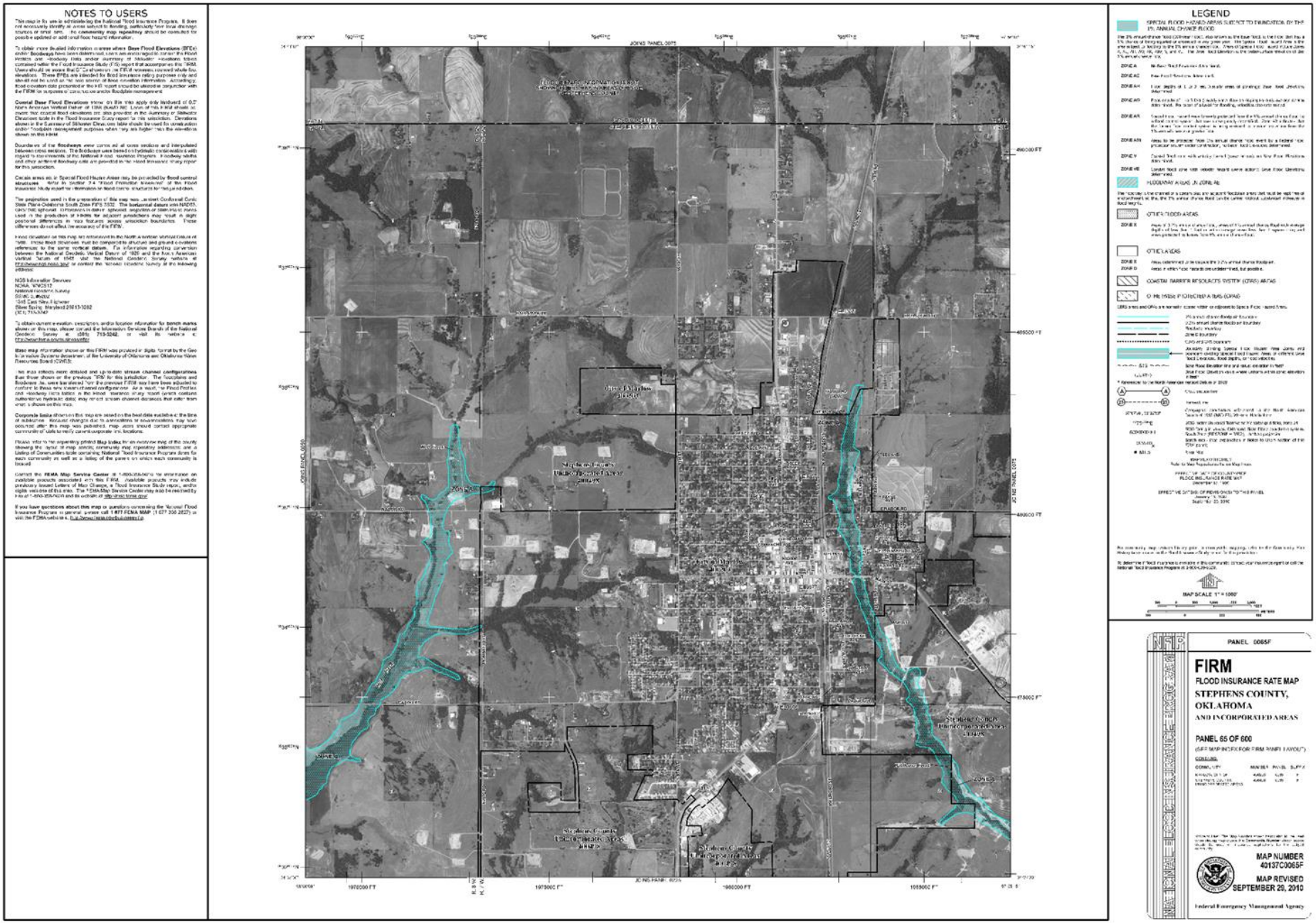
LISTING OF COMMUNITIES

COMMUNITY NAME	NUMBER	PANEL #s
***BRAY**	**400536**	**100**
COMANCHE	**405376**	**505**
DUNCAN	**400202**	**215**
***EMPIRE CITY**	**400520**	**350**
LOCO	**400521**	**575**
MARLOW	**400203**	**65**
VELMA	**400447**	**425**

Panel 215 City of Duncan



Panel 65 City of Marlow



Panel 100 Town of Bray

NOTES TO USERS

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Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Lambert Conformal Conic State Plane Oklahoma South Zone FIPS 3502. The horizontal datum was NAD83, GRS 1980 spheroid. Differences in datum, spheroid, projections or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at http://www.ngs.noaa.gov/INFO/.

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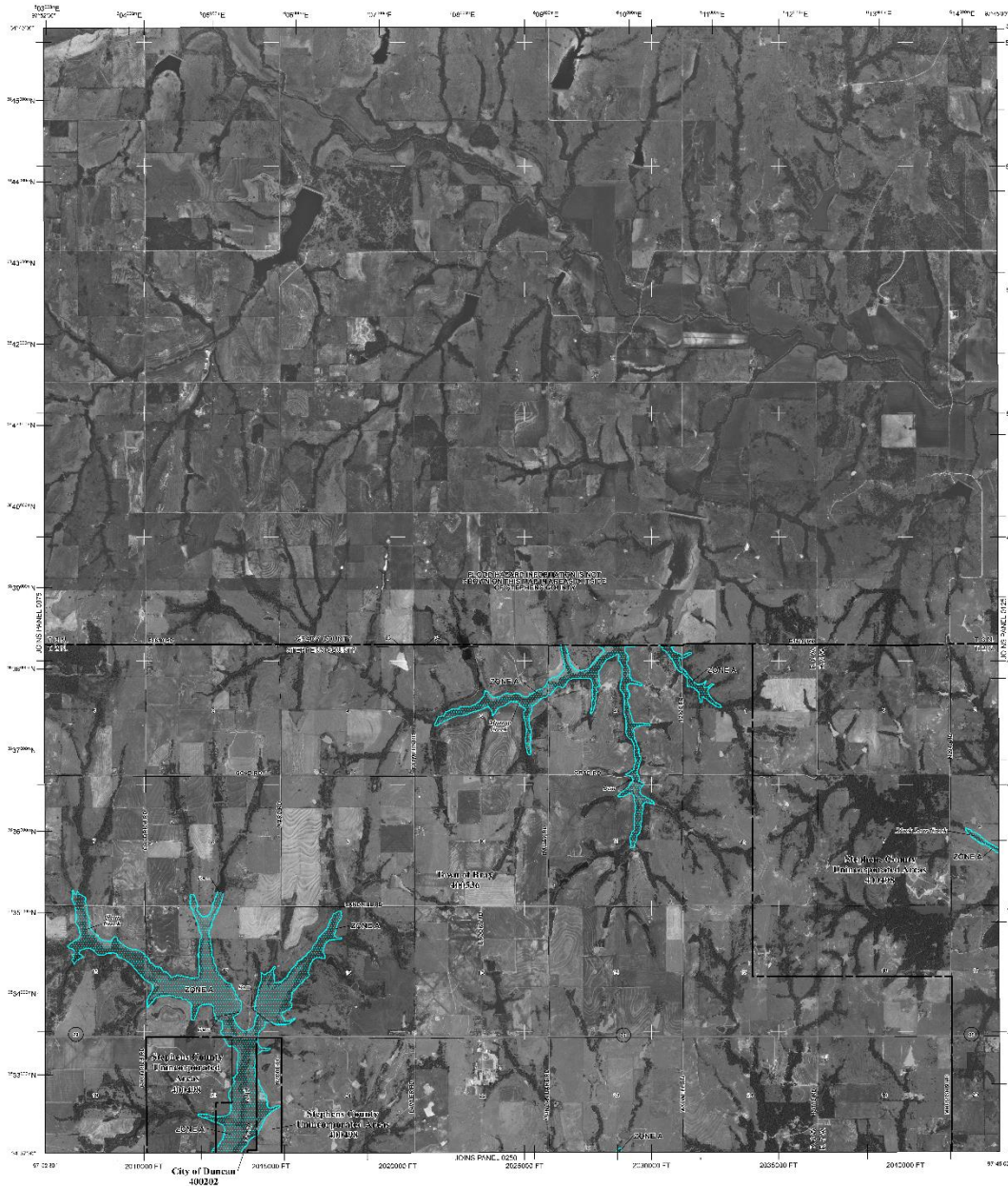

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood, also known as the base flood) is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, V, A1-A30, AE, AH, AO, AR, A99, V1-V30, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Area to be protected from the 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally either adjacent to or within Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
Base Flood Elevation line and value; elevation in feet*
(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*
* Referenced to the North American Vertical Datum of 1988
(A) — (A) Cross section line
(23) — (23) Transect line
97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD83) Western Hemisphere
4275000 FT 630000 FT DRAINAGE AREA Smaller area between floodplain boundaries
• M1.5 River mile
MAP REPOSITORIES
Refer to Map Repositories list on Map Index
EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 16, 1980
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
January 16, 1981
September 29, 2010

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

PANEL 0100F

FIRM

FLOOD INSURANCE RATE MAP
STEPHENS COUNTY, OKLAHOMA
AND INCORPORATED AREAS

PANEL 100 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BRAY, TOWN OF	400458	0100	F
DUNCAN, CITY OF	400202	0100	F
STEPHENS COUNTY, UNINCORPORATED AREAS	400143	0100	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
40137C0100F

MAP REVISED
SEPTEMBER 29, 2010

Federal Emergency Management Agency

Panel 200 Hwy 7 and Central High

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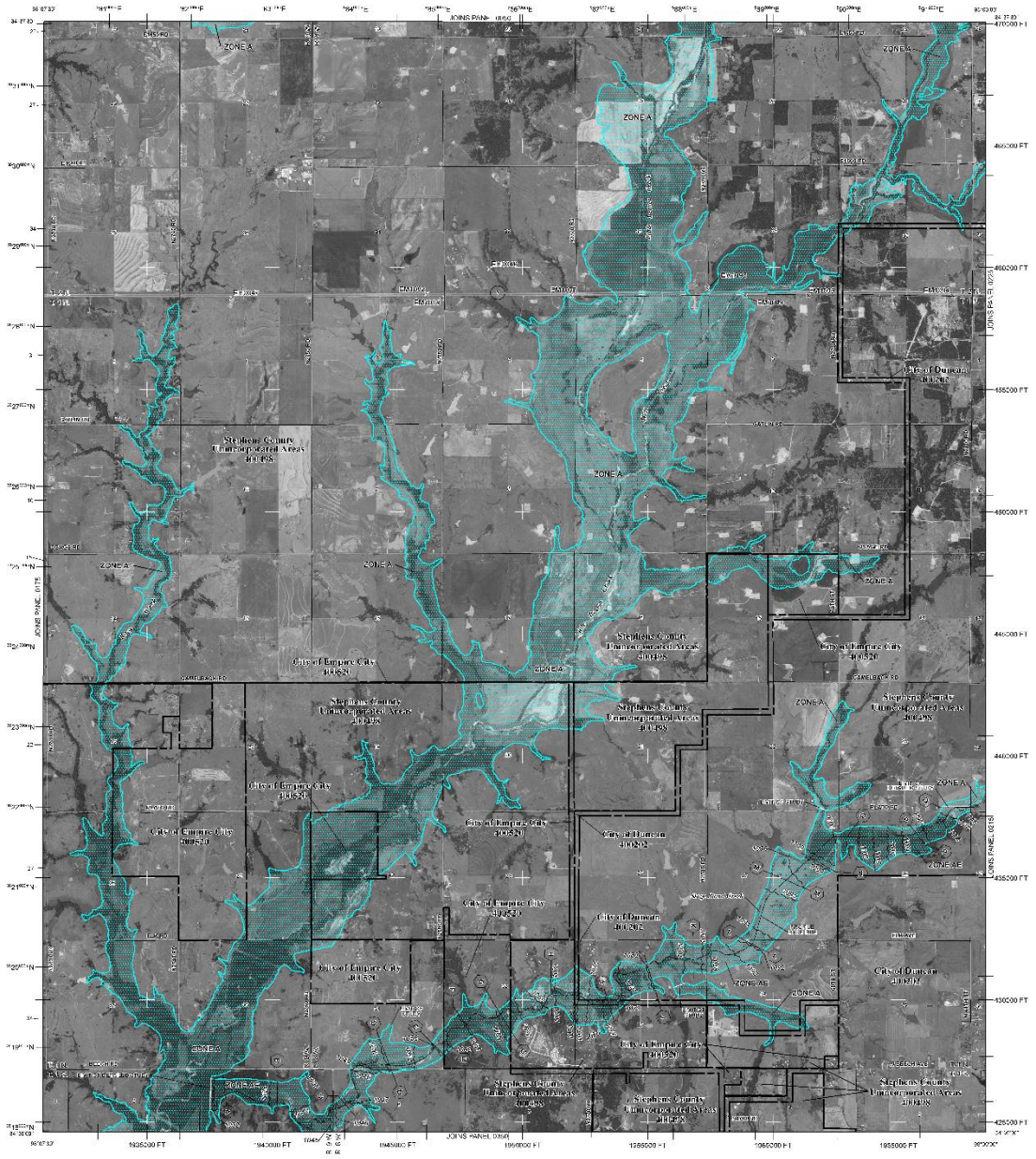

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ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

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ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depth of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are generally depicted on FIRMs with diagonal black lines.

1% annual chance flood plain boundary
0.2% annual chance flood plain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas (zones and subzones) and Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
(EL 987) — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A) — (A) Cross section line
(23) — (23) Transect line
97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), West Longitude and North Latitude
4275000 FT — UTM grid ticks and zone 14 Universal Transverse Mercator (UTM) grid values, Oklahoma State Plane coordinate system, South Zone (FIPS ZONE 3502), in feet survey ft.
6200000 FT
DRAIN
MH — Manhole
• M1.5 — Elevation reference mark

MAP AND FLOOD DATA
Refer to Map Repositories for Map Dates

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 1986

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
January 3, 1986
September 29, 2010

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0200F

FIRM

FLOOD INSURANCE RATE MAP

STEPHENS COUNTY, OKLAHOMA

AND INCORPORATED AREAS

PANEL 200 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
STEPHENS COUNTY	400232	0200	F
CITY OF DUNCAN	400236	0200	F
CITY OF EMPIRE CITY	400237	0200	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
40137C0200F

MAP REVISED
SEPTEMBER 29, 2010

Federal Emergency Management Agency

Panel 350 Empire City

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Lambert Conformal Conic State Plane Oklahoma South Zone FIPS 3502. The **horizontal datum** was NAD83, GRS 1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical **datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at http://www.ngs.noaa.gov/cgi-bin/ngs.prl

Base map information shown on this FIRM was provided in digital format by the Geo Information Systems department of the University of Oklahoma and Oklahoma Water Resources Board (OWRB).

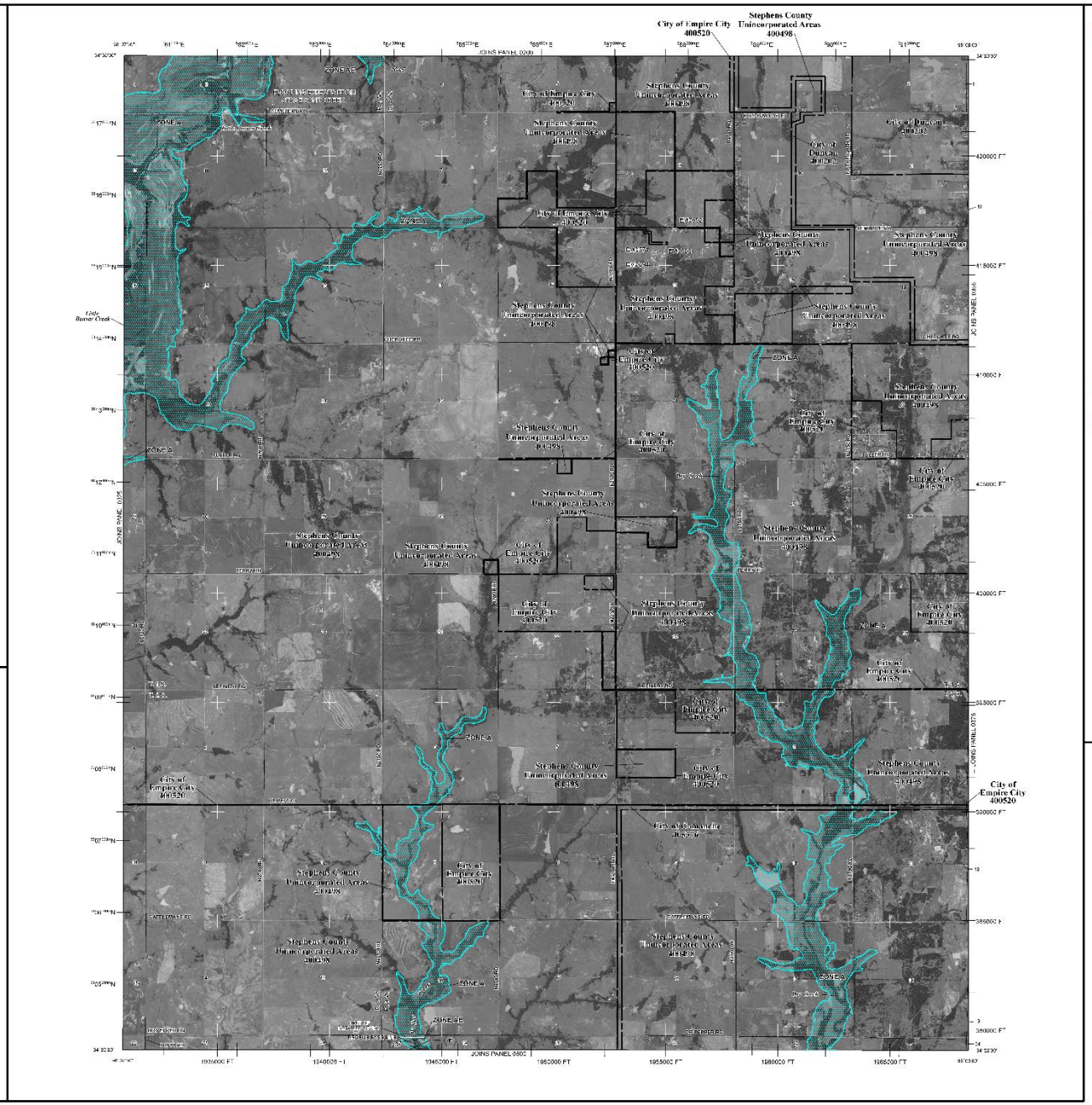
This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contain authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood, also known as the base flood) is the flood that has a 1% chance of being equaled or exceeded in any year. The Special Flood Hazard Area is the area subject to flooding in the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, and V. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special flood hazard area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depth of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas (Zones AE and AH, and Zones AE and AO, or Zone AE) of different Base Flood Elevations, flood depths, or flood velocities.
(EL 987) Base Flood Elevation line and value; elevation in feet*
(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A) — (A) Cross section line
(23) — (23) Transect line
97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000 mE 620000 FT (DRAIN) 5 M.S. UTM zone and grid ticks: Oklahoma State Plane coordinate system, South Zone (FIPS ZONE 3502), in feet and grid ticks
Spot elevation: Elevation in feet to the nearest tenth of a foot (NGVD 29)

MAP AND FLOOD DATA
Refer to Map Explanation for Flood Data

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 1986

EFFECTIVE DATES OF REVISIONS TO THIS PANEL
January 3, 1989
September 29, 2010

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

PANEL 0350F

FIRM

FLOOD INSURANCE RATE MAP

STEPHENS COUNTY, OKLAHOMA

AND INCORPORATED AREAS

PANEL 350 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
[illegible]	400[illegible]	0350	F
[illegible]	400[illegible]	0350	F
[illegible]	400[illegible]	0350	F
STEPHENS COUNTY UNINCORPORATED AREAS	400498	0350	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
40137C0350F

MAP REVISED
SEPTEMBER 29, 2010

Federal Emergency Management Agency

Panel 425 Town of Velma

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Lambert Conformal Conic State Plane Oklahoma South Zone FIPS 3502. The horizontal datum was NAD83, GRS 1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at http://www.ngs.noaa.gov/cgi-bin/ngs.prt

Base map information shown on this FIRM was provided in digital format by the Geo Information Systems department of the University of Oklahoma and Oklahoma Water Resources Board (OWRB).

This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways, if any, have been delineated using the previous FIRM, may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

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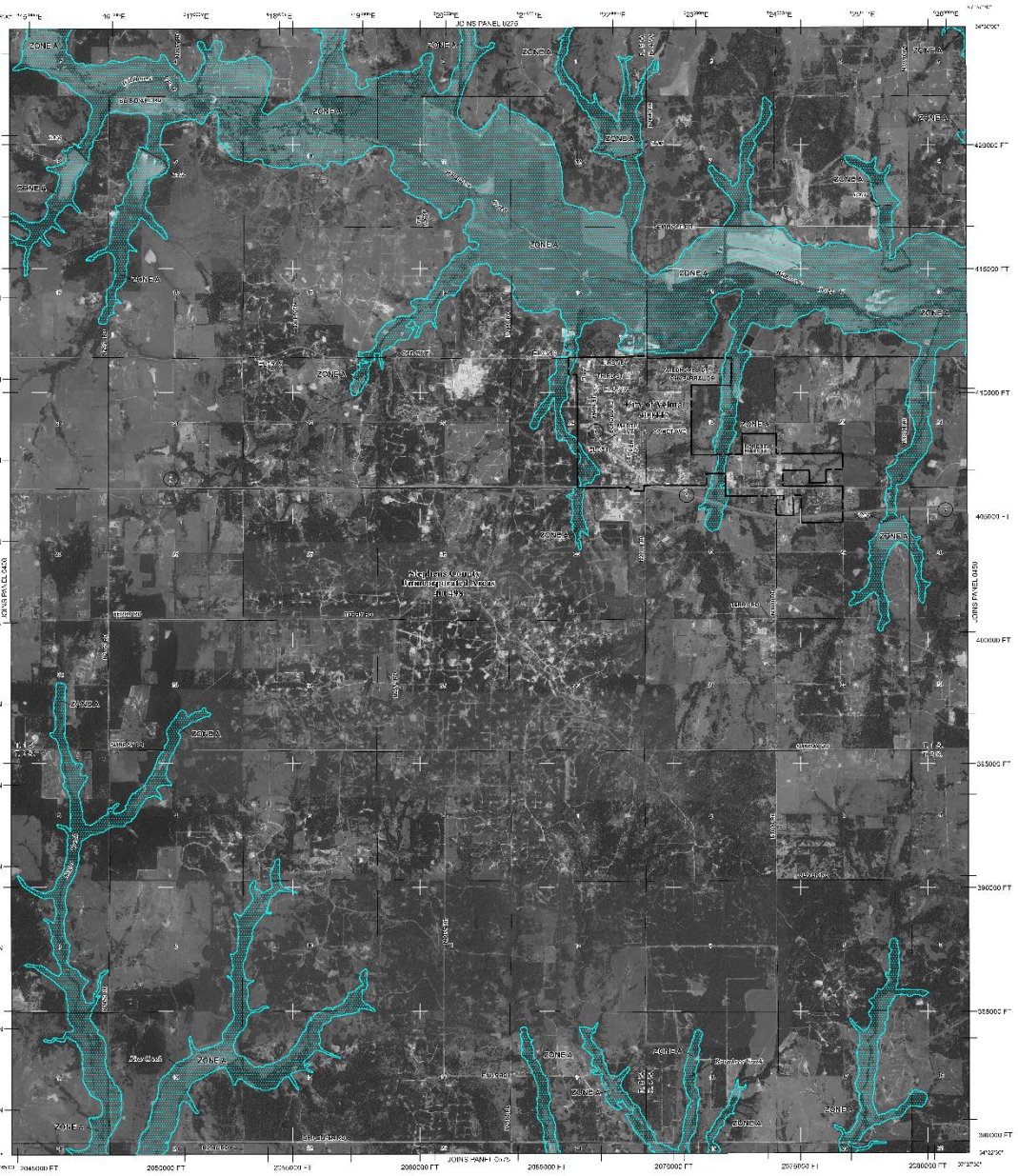

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding in the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Formerly protected areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Areas to be protected from 1% annual chance flood event by a federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depth of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance flood/Special Flood Hazard Area boundary
0.2% annual chance flood/Zone X boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas (Zones and subzones) and Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

Cross section line
Transect line
GEOGRAPHIC COORDINATES referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
1000-meter Universal Transverse Mercator grid values, zone 14
5000-foot grid values: Oklahoma State Plane coordinate system, South Zone (FIPSZONE 3502), Lambert projection
Bench mark (see explanation in Notes to Users section of this FIRM panel)
River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 1986

EFFECTIVE DATES OF REVISIONS TO THIS PANEL
January 3, 1986
September 29, 2010

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

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MAP SCALE 1" = 2000'

PANEL 0425F

FIRM

FLOOD INSURANCE RATE MAP

STEPHENS COUNTY, OKLAHOMA

AND INCORPORATED AREAS

PANEL 425 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
STEPHENS COUNTY, UNINCORPORATED AREAS	400375	0425	F
VELMA, CITY OF	400481	0425	F

MAP NUMBER
40137C0425F

MAP REVISED
SEPTEMBER 29, 2010

Federal Emergency Management Agency

NFIP NATIONAL FLOOD INSURANCE PROGRAM

Panel 500 Hwy 53 & Grandview School

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updates or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

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Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Lambert Conformal Conic State Plane Oklahoma South Zone FIPS 3502. The **horizontal datum** was NAD83, GRS 1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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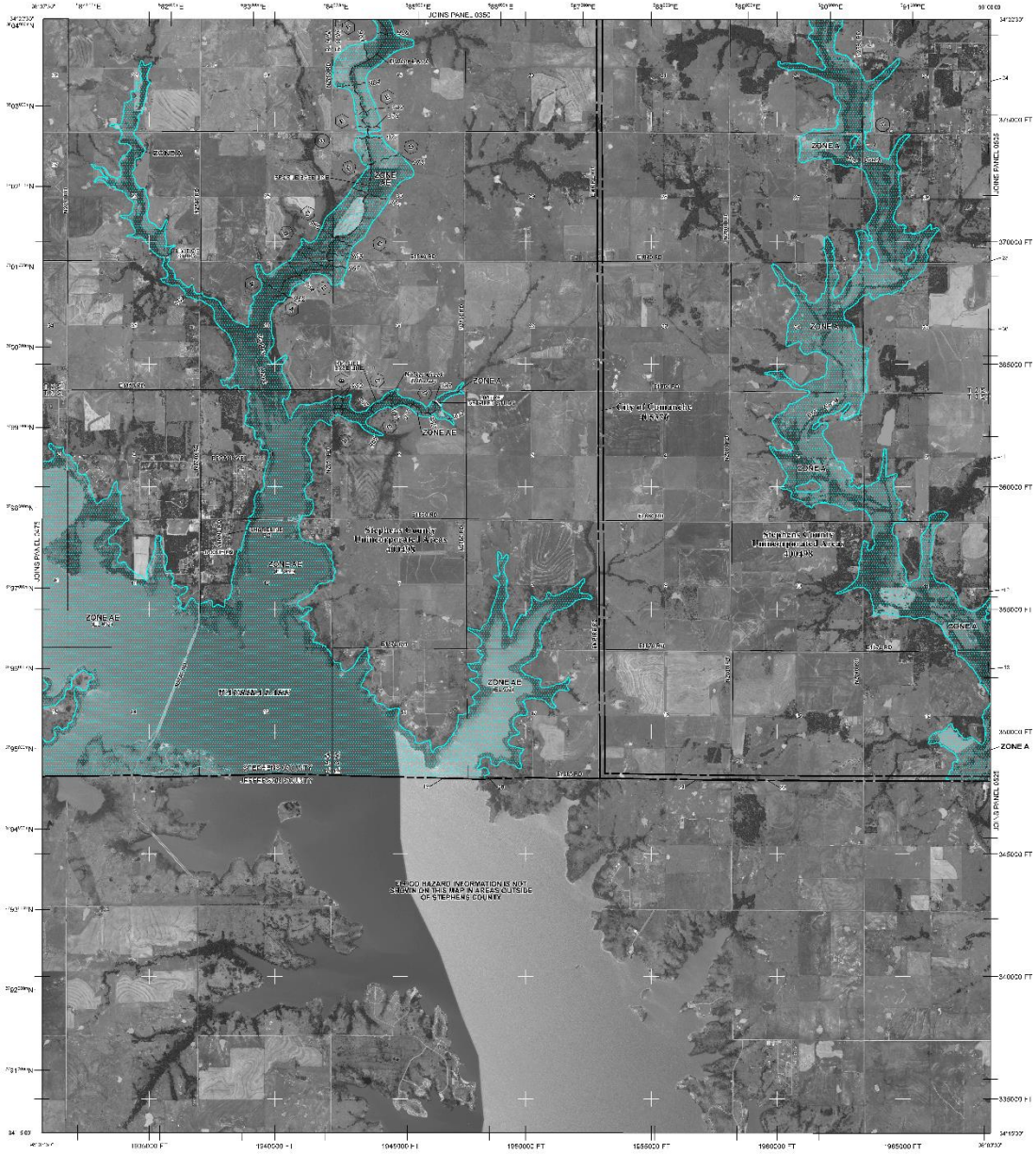
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special flood hazard area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

(EL 987) — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A) — (A) Cross section line

(23) — (23) Transect line

97° 07' 30.00" / 32° 22' 30.00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

4275000 FT — 3000-foot grid values, Oklahoma State Plane Coordinate System, South Zone (FIPS 3502), Lambert projection

DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)

• M1.5 — River mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 1986

EFFECTIVE DATES OF REVISIONS TO THIS PANEL
January 3, 2007
September 29, 2010

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0500F

FIRM

FLOOD INSURANCE RATE MAP

STEPHENS COUNTY, OKLAHOMA

AND INCORPORATED AREAS

PANEL 500 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COMANCHE, CITY OF	400 [illegible]	0500	F
STEPHENS COUNTY (UNINCORPORATED AREAS)	400 [illegible]	0500	F

NOTICE TO USER: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
40137C0500F

MAP REVISED
SEPTEMBER 29, 2010

Federal Emergency Management Agency

Panel 65 City of Comanche

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Lambert Conformal Conic State Plane Oklahoma South Zone FIPS 3502. The **horizontal datum** was NAD83, GRS 1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical **datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at http://www.ngs.noaa.gov/INFO/.

Base map information shown on this FIRM was provided in digital format by the Geo Information Systems department of the University of Oklahoma and Oklahoma Water Resources Board (OWRB).

This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contain authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

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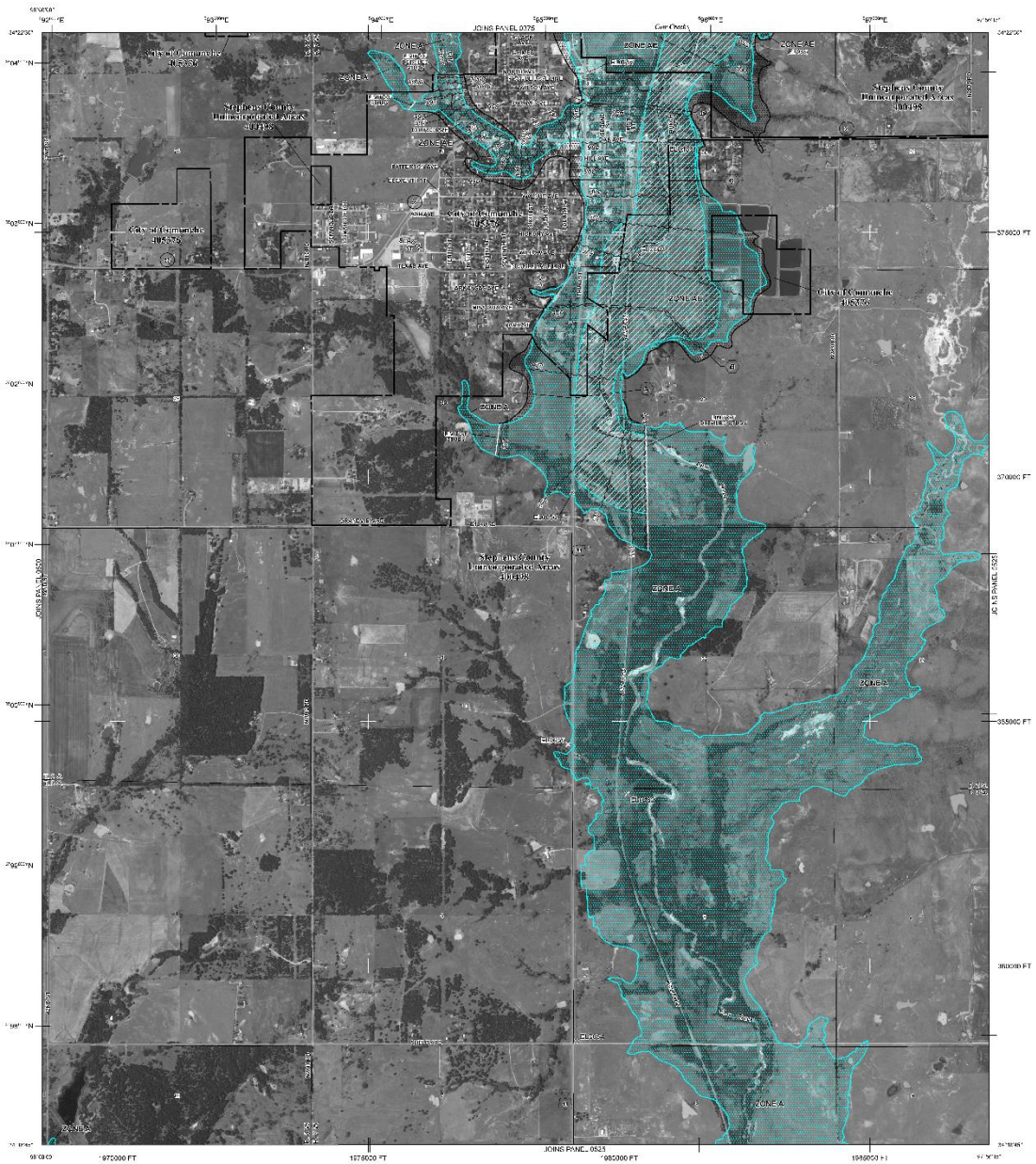
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any year. The Special Flood Hazard Area is the area subject to flooding in the 1% annual chance flood. Zones of Special Flood Hazard include Zones A, V, A1-A30, AE, A99, AH, V1-V30, VE. The Zone Xkey (shaded) is the moderate/shallow area subject to the 1% annual chance flood.

- ZONE A — No Base Flood Elevations determined.
- ZONE AE — Base Flood Elevations determined.
- ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR — Special flood hazard area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99 — Areas to be protected from 1% annual chance flood event by a federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
- ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance flooding as a result of levee failure
- 0.2% annual chance flood boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas (zones and subzones) and Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- (A)—(A) — Cross section line
- (23)———(23) — Transect line
- 97°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), West Zone in feet
- 4275000 FT — 600000 FT — Flood zone boundary intersection with Universal Transverse Mercator grid values, Zone 14
- 5000-foot grid ticks: Oklahoma State Plane coordinate system, South Zone (FIPS ZONE 3502), Lambert projection
- DRAWER — Scale bar — Map panel number
- M1.5 — Map title

MAP AND FLOOD DATA
Refer to Map Explanatory Notes on Map Index.

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 1985

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
January 5, 1990
September 29, 2010

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0505F

FIRM

FLOOD INSURANCE RATE MAP

STEPHENS COUNTY, OKLAHOMA

AND INCORPORATED AREAS

PANEL 505 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
STEPHENS COUNTY	400013	0505	F
COMANCHE, CITY OF	400458	0505	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
40137C0505F

MAP REVISED
SEPTEMBER 29, 2010

Federal Emergency Management Agency

Panel 575 Town of Loco

NOTES TO USERS

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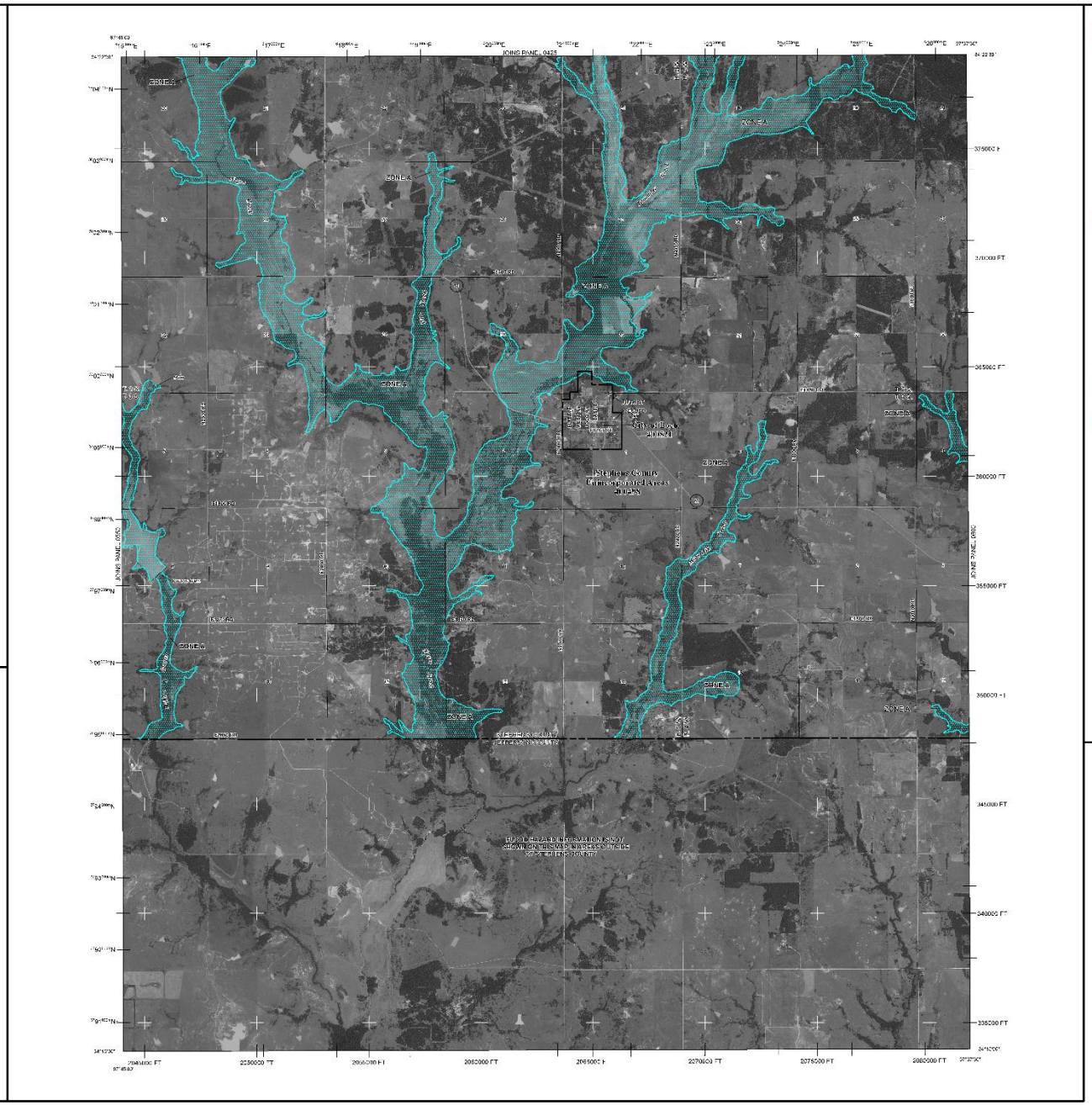

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding in the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, and V. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special flood hazard area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Areas to be protected from 1% annual chance flood event by a federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depth of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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1% annual chance flood boundary
0.2% annual chance flood boundary
floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas (zones and subzones) and Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
(EL 987) — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A) — (A) Cross section line
(23) — (23) Transect line
97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), West Longitude and North Latitude
4275000 FT — UTM grid ticks and zone 14 coordinates
6200000 FT — Ticks delineating Universal Transverse Mercator (UTM) grid zones, zone 14 shown on this map, which covers Stephens County, Oklahoma. Ticks are based on North American Datum of 1983 (NAD 83)
DRAINAGE AREA — Watershed boundary or drainage area delineation
• M1.5 — Bench mark (see explanation in Notes to Users section of this FIRM panel)

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 1985

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
January 3, 1986
September 29, 2010

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MAP SCALE 1" = 2000'

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0575F

FIRM

FLOOD INSURANCE RATE MAP

STEPHENS COUNTY, OKLAHOMA

AND INCORPORATED AREAS

PANEL 575 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOCO, TOWN OF	400577	0575	F
STEPHENS COUNTY, UNINCORPORATED AREAS	400408	0575	F

NOTICE TO USER: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
40137C0575F

MAP REVISED
SEPTEMBER 29, 2010

Federal Emergency Management Agency

Panel 600 Hwy 53

NOTES TO USERS

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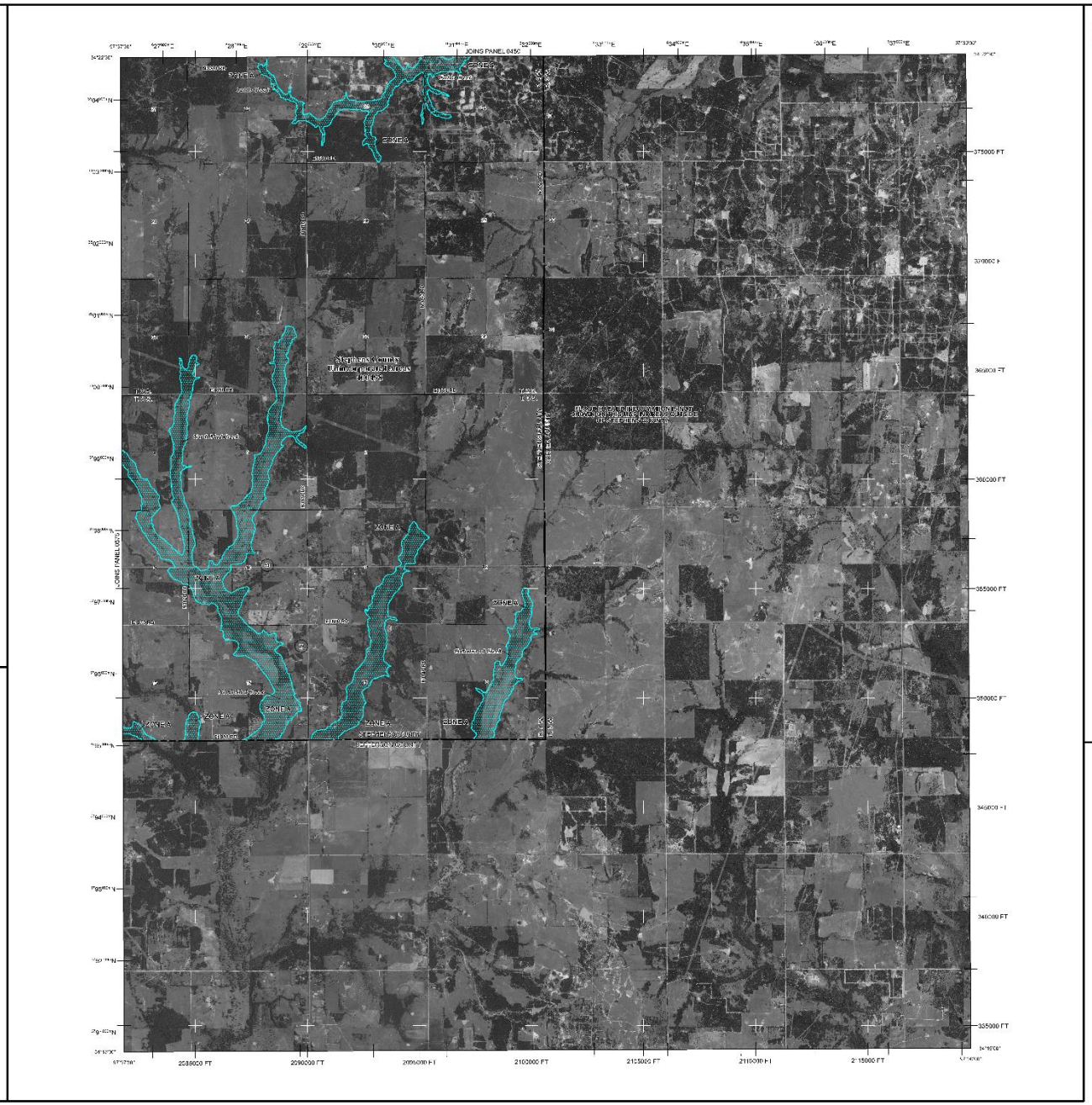

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any year. The Special Flood Hazard Area is the area subject to flooding in the 1% annual chance flood. Zones of Special Flood Hazard include Zones A, V, A1-A30, AE, AH, AO, AR, A99, V1-V30, VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special flood hazard area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Areas to be protected from the 1% annual chance flood by a federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas (zones and subzones) depicting Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A) — (A) Cross section line
(23) — (23) Transect line
97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), 95-foot Map Grid
7375000 FT Ticks value for Universal Transverse Mercator grid values, zone 14
6200000 FT Ticks value for State Plane Coordinate system, South Zone (FIPS 3502) in feet
DRAIN Drainage Area or Drainage Basin boundary
• M1.5 Bench mark (see explanation in Notes to Users section of this FIRM panel)

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 1986

EFFECTIVE DATES OF REVISIONS TO THIS PANEL
January 3, 1986
September 29, 2010

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MAP SCALE 1" = 2000'

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0600F

FIRM

FLOOD INSURANCE RATE MAP

STEPHENS COUNTY, OKLAHOMA

AND INCORPORATED AREAS

PANEL 600 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
STEPHENS COUNTY UNINCORPORATED AREAS	400408	0600	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
40137C0600F

MAP REVISED
SEPTEMBER 29, 2010

Federal Emergency Management Agency

3.5.7 Extreme Heat

Description

Summertime temperatures routinely climb above the 100-degree mark, which can create very uncomfortable conditions when combined with high dew point. Temperatures that hover 10 degrees or more above the average heat temperature for an area, and last for several days or longer is one measure of extreme heat. In addition, humid or muggy conditions can persist and air quality can deteriorate during the summer when a dome of high atmospheric pressure creates a temperature inversion that traps a stagnant air mass near the ground.

Location

Extreme heat affects the entire planning area.

Extent

There are no uniform set of attributes that define extreme heat, although the NOAA/NWS Heat Index is widely used to gauge disorders due to prolonged heat exposure.

Stephens County and its participating jurisdictions consider the following extreme heat events to be minor/major:

Minor Severity: Any temperature below 105 degree F.

Major Severity: Any temperature above 105 degree F.

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution Extreme Caution Danger Extreme Danger

Previous Occurrences.

In a normal year, approximately 175 Americans die from extreme heat. Between 1936 and 1975, nearly 20,000 people succumbed to the effects of heat and solar radiation. From 1979-1999, excessive heat exposure caused 8,015 deaths in the United States. On average approximately 400 people die each year from exposure to heat. In Oklahoma, July is generally the hottest month of the year, followed by August. Stephens County had five additional extreme heat events recorded by the National Climatic Data Center (NCDC) from January 1, 1950 through December 31, 2008 causing ten thousand dollars of property damage.

Oklahoma								
Location or County	**Date**	**Time**	**Type**	**Mag**	**Dth**	**Inj**	**PrD**	**CrD**
1	06/27/1994	1200	Excessive Heat	N/A	0	0	0	0
2 OKZ039	07/20/1998	11:00 AM	Excessive Heat	N/A	1	0	0	0
2 OKZ004>048 - 050>052	07/04/2001	12:00 AM	Excessive Heat	N/A	8	0	0	0
4 OKZ004>048 - 050>052	07/16/2006	12:00 PM	Heat	N/A	10	100	0	0
5 OKZ004>048 - 050>052	08/01/2006	12:00 AM	Heat	N/A	8	0	10K	0
				TOTALS:	29	100	10K	0

Probability of Future Events.
According to the Oklahoma Climatological Survey, Stephens County averages 19 days per year of daytime high temperatures greater than 100° F. Therefore, extreme temperatures are highly likely to occur within Stephens County.

Vulnerability.
In Stephens County young children, elderly people and those who are sick or overweight are more likely to become victims to extreme heat. Other conditions that can limit the ability to regulate temperature include fever, dehydration, heart disease, mental illness, poor circulation, sunburn, prescription drug use and alcohol use. Another segment of the population at risk is those whose jobs consist of strenuous labor outside. Livestock and crops can also become stressed, decreasing in quality or in production during times of extreme heat. All future buildings and infrastructure are vulnerable to extreme heat.

Secondary Hazards.
Extreme high temperatures can cause water shortages, increase fire danger, and prompt excessive demands for energy. Another secondary hazard is air pollution in summer months resulting from consistent high temperatures and reduced airflows.

Overall Summary of Vulnerability and Impacts.
Stephens County can expect to experience extreme heat every summer as extreme heat is dependent on temperature and humidity. High temperatures and high humidity can result in dangerous conditions that expose people to an increased risk of heat stroke and other heat related illnesses. The most vulnerable population is the elderly, young children and those who are sick, overweight, or who work outside. Extreme heat can also cause stress on livestock and other agricultural productions. With periods of extended extreme heat, water supplies are exhausted, roads are damaged and crops fail. The impact of extreme heat ranges from increased medical problems and loss of life to loss of income for farmers and ranchers and increased expense to Stephens County for additional road and bridge repairs.

3.5.8 Wildfire

Description

A wildfire is an uncontrolled fire in a rural or wilderness area. The majority of wildfires in Oklahoma occur in the late fall through winter and into early spring, which coincides with dormant vegetation and low precipitation. A wildfire often begins unnoticed and can spread quickly, lighting brush, trees, and structures. There are three different classes of wildfires. A surface fire is common in grasslands, or areas with open vegetation, and can spread quickly. A ground fire is a dense, very hot fire that has a thick fuel source and significantly damages the soil health where it occurs. Crown fires are those that move by jumping along the tops of trees. Wildfires often begin unnoticed, but are usually signaled by dense smoke that fills the area for miles around.

Location

Wildfire affects the entire planning area.

Extent

The Keetch-Byram Drought Index is useful for indicating the likelihood of wildfire based on soil moisture conditions. The National Fire Danger Rating System is used to convey the relative potential over a large area for fires to ignite, spread, and require suppression action.

The Burning Index is a short-term response to meteorological factors. The burning index includes real-time observations of temperature, relative humidity, wind speed and solar radiation. It applies those factors to a vegetation model, which includes the "relative greenness," (a satellite-derived measure of the health of the vegetation), and fuel models for native vegetation. This vegetation model is comprised of 1-kilometer grids across Oklahoma. The model uses these inputs to produce four indices: Spread Component, Energy Release Component, Ignition Component, and Burning Index. Burning Index is a synthesis of the Spread and Energy Release components, and infers fire line intensity and flame length. The higher the number, the more difficult it is to fight a wildfire.

Stephens County and its participating jurisdictions use the Burning Index as an indicator of wildfire severity:

Minor Severity: A Fire Line Intensity of < or = 500**.**

Major Severity: A Fire Line Intensity of >500

The Keetch-Byram Drought Index with Fire Danger Rating Data Incorporated	
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

Fire Danger Rating System		
Rating	**Basic Description**	**Detailed Description**
CLASS 1: Low Danger (L) COLOR CODE: Green	fires not easily started	Fuels do not ignite readily from small firebrands. Fires in open or cured grassland may burn freely a few hours after rain, but wood fires spread slowly by creeping or smoldering and burn in irregular fingers. There is little danger of spotting.
CLASS 2: Moderate Danger (M) COLOR CODE: Blue	fires start easily and spread at a moderate rate	Fires can start from most accidental causes. Fires in open cured grassland will burn briskly and spread rapidly on windy days. Woods fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel – especially draped fuel -- may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.
CLASS 3: High Danger (H) COLOR CODE: Yellow	fires start easily and spread at a rapid rate	All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High intensity burning may develop on slopes or in concentrations of fine fuel. Fires may become serious and their control difficult, unless they are hit hard and fast while small.
CLASS 4: Very High Danger (VH) COLOR CODE: Orange	fires start very easily and spread at a very fast rate	Fires start easily from all causes and immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics - such as long-distance spotting - and fire whirlwinds, when they burn into heavier fuels. Direct attack at the head of such fires is rarely possible after they have been burning more than a few minutes.
CLASS 5: Extreme (E) COLOR CODE: Red	fire situation is explosive and can result in extensive property damage	Fires under extreme conditions start quickly, spread furiously and burn intensely. All fires are potentially serious. Development into high-intensity burning will usually be faster and occur from smaller fires than in the Very High Danger class (4). Direct attack is rarely possible and may be dangerous, except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions, the only effective and safe control action is on the flanks, until the weather changes or the fuel supply lessens.
Source: http://www.wfas.net/content/view/34/51/		

The Burning Index

Flame Length (ft)	Fire Line Intensity (BTU/ft/s)	Interpretations
4 (BI<40)	**<100**	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold fire.
4-8 (BI=40-80)	**100-500**	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot hold fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8-11 (BI=80-110	**500-1,000**	Fires may present serious control problems; torching out, crowning, and spotting. Control efforts at fire head will probably be ineffective.
>11 (BI>110)	**>1,000**	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

Source: Oklahoma State Hazard Mitigation Plan

Previous Occurrences

Wildfire Events from 2005 to 2006

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	4	1.000M	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	11/27/2005	12:00	CST	Wildfire		0	4	1.000M	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	12/01/2005	00:00	CST	Wildfire		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	03/01/2006	11:00	CST	Wildfire		0	0	0.00K	0.00K
Totals:								0	4	1.000M	0.00K

None of the school districts participating in this plan reported damages from previous wildfire events.

Probability of Future Events

The probability of wildfire in the planning area is **HIGH**

Impact and Vulnerability

Periods of drought, dry conditions, high temperatures, and low humidity set the stage for wildfires. The sparsely populated tall grassed range lands are capable of experiencing large sweeping fires. Ironically, fire suppression is capable of creating larger fire hazards, because live and dead vegetation is allowed to accumulate in areas where fire has been excluded.

According to the National Park Service, the majority of wildfires are human caused. Lightning strikes are another leading cause of wildfires. Other sources of ignition include railroads, catalytic converters on automobiles, and spontaneous ignition of hay bales. When wild lands are destroyed by fire, the resulting erosion can cause heavy silting of streams, rivers, and reservoirs. Serious damage to aquatic life, irrigation, and power production then occurs.

Mitigation and rapid emergency response are the most effective activities for reducing the impact of wildfires. Volunteer fire departments operate under a collaborative mutual aid in order to provide fire and emergency response when demand exceeds local capability. Stephens County also participates in Fire Warning Device Give Away Programs.

Bray, Comanche, Duncan, Empire City, Loco, Marlow and Velma are vulnerable to Wildfire to different degrees as indicated on the WUI maps located in Appendix 2.

3.5.9 Drought

Description

A drought is a period of drier-than-normal conditions. If dry weather persists and water supply problems develop, the dry period can become a drought.

Location

Drought affects the entire planning area.

Extent

Drought conditions can be monitored through the U.S. Drought Monitor. This tool monitors rainfall trends and determines how harsh drought impacts might be. In addition to providing an effective comparison between the lack of rainfall versus normal rainfall values, it also assesses drought based on agriculture and reservoir conditions as well. There are five categories on the Drought Monitor; D0 (abnormally dry), D1 (moderate drought), D2 (severe drought), D3 (extreme drought), and D4 (exceptional drought). It should be noted that the Drought Monitor focuses on broad-scale conditions, and local conditions may vary.

The Palmer Drought Severity Index (PDSI) is another tool used to measure the duration and intensity of the long-term drought-inducing circulation patterns. Long-term drought is cumulative, so the intensity of drought during the current month is dependent on the current weather patterns plus the cumulative patterns of previous months. Since weather patterns can change almost literally overnight from a long-term drought pattern to a long-term wet pattern, the PDSI can respond fairly rapidly. (Source: National Climatic Data Center https://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/palmer.html)

PDSI data can be obtained at the National Climate Prediction Center, http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml

Stephens County and its participating jurisdictions use the U.S. Drought Monitor when considering drought severity:

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current 2017-03-21	7.21	92.79	80.56	46.04	3.17	0.00
Last Week 2017-03-14	9.91	90.09	74.21	41.16	3.17	0.00
3 Months Ago 2016-12-20	11.94	88.06	72.83	42.47	3.14	0.00
Start of Calendar Year 2016-12-27	5.63	94.37	72.32	45.73	3.14	0.00
Start of Water Year 2016-09-27	57.82	42.18	19.04	3.05	0.00	0.00
One Year Ago 201603-22	65.15	34.85	14.26	0.00	0.00	0.00

Minor Severity: A reading of D2 or below. **Major Severity**: A reading of D3 or above.

U.S. Drought Monitor – Oklahoma

Source: U.S. Drought Monitor,
http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?OK

Palmer Drought Severity Index

	< -4.0	Extreme Drought
	-3.99 to -3.0	Severe Drought
	-2.99 to -2.0	Moderate Drought
	-1.99 to -1.0	Mild Drought
	-0.99 to -0.5	Incipient Drought
	-0.49 to 0.49	Near Normal
	0.5 to 0.99	Incipient Moist Spell
	1.0 to 1.99	Moist Spell
	2.0 to 2.99	Unusual Moist Spell
	3.0 to 3.99	Very Moist Spell
	> 4.0	Extreme Moist Spell

Previous Occurrences

Drought Events from 2007 to 2015

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	01/01/2007	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	02/01/2009	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	03/01/2009	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	04/01/2009	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	02/22/2011	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	03/01/2011	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	04/01/2011	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	05/01/2011	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	06/01/2011	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	07/01/2011	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	08/01/2011	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	09/01/2011	00:00	CST-6	Drought		0	0	0.00K	0.00K

STEPHENS (ZONE)	STEPHENS (ZONE)	OK	10/01/2011	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	12/01/2011	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	01/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	02/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	03/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	07/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	08/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	09/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	10/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	11/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	12/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	01/01/2013	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	02/01/2013	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	03/01/2013	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	04/01/2013	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	05/01/2013	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	06/01/2013	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	07/01/2013	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	08/01/2013	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	09/01/2013	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	10/01/2013	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	11/01/2013	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	12/01/2013	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	01/01/2014	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	02/01/2014	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	03/01/2014	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	04/01/2014	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	05/01/2014	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	06/01/2014	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	07/01/2014	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	08/01/2014	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	09/01/2014	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	10/01/2014	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	11/01/2014	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	12/01/2014	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	01/01/2015	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	02/01/2015	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	03/01/2015	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	04/01/2015	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	05/01/2015	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	09/01/2015	00:00	CST-6	Drought		0	0	0.00K	0.00K
STEPHENS (ZONE)	STEPHENS (ZONE)	OK	10/01/2015	00:00	CST-6	Drought		0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Probability of Future Events

The probability of drought in the planning area is **HIGH**.

Impact and Vulnerability

Drought impacts all communities within Stephens County. Hot weather during the summer increases demand and subsequent use of supplies, as well as evaporation. In turn, increased water demand can stress many smaller and/or antiquated delivery and treatment facilities to the point of collapse. Prolonged drought has a much greater impact on rural communities, which usually rely on smaller watersheds that are especially vulnerable during such periods.

The most direct impact of drought is economic rather than loss of life or destruction of property. The Stephens County economy is partially dependent on agriculture. The towns of Empire, Bray, Central, and Loco produce a variety of crops, to include corn, wheat, oats, alfalfa, and prairie hay. Some cotton is raised but it is neither stable, nor as profitable, as in the counties farther south. There are also some orchards where peaches, apples, grapes, and berries are grown, and there are four large-scale cattle ranching facilities among both towns. Approximately 80% of the total land area and 40% of the Empire, Central High, Bray, and Loco workforce is in farming and ranching. A long-term drought has the potential to cause widespread economic decline due to crop loss, crop damage, and risk to animal health.

One of the other potential impacts of drought is a decrease in the public water supply. This primarily affects the population-dense locations of Duncan, Marlow, Comanche, Velma, could result in mandated water conservation steps to include a ban on washing cars or watering lawns. In smaller communities, reduced flow in rivers and streams can also have a significant impact on the water amount allowed for municipal use.

Stephens County, through Soil Conservation, OSU Extension Services and other agencies, has policies to implement during a drought event.

The greatest concern for school districts is water supply during periods of extreme drought, because cracked soil on athletic fields and playgrounds poses a risk to students. Schools in Stephens County have their own wells to mitigate the effects of drought.

3.5.10 Dam Failure

Description

A dam is an artificial barrier usually constructed across a stream channel to impound water. Timber, rock, concrete, earth, steel or a combination of these materials may be used to build the dam. In Stephens County, many dams are situated on private property, but are subjected to State regulation. A dam that impounds water in the upstream area is referred to as a reservoir. The amount of water impounded is measured in acre-feet. An acre-foot is the volume of water that covers an acre of land to a depth of one foot. As a function of upstream topography, even a very small dam may impound or detain acre-feet of water. Two factors influence the potential severity of a full or partial dam failure: the amount of water impounded, and the density, type, and value of development and infrastructure located downstream.

Stephens County Dams.

DAM NAME		OWNER
	High	Stephens County Conservation District
	High	Stephens County Conservation District
	High	City of Duncan
	Significant	Stephens County Conservation District

Location of High Hazard Dams.

Cow Creek Site-15	Latitude:	34° 22’ 56” N	Longitude:	-97° 58’ 31” W
Cow Creek Site-25a	Latitude:	34° 31’ 13” N	Longitude:	-97° 48’ 34” W
Comanche Lake Dam	Latitude:	34° 22’ 65” N	Longitude:	-97° 53’ 43” W
Wildhorse Creek Site 014	Latitude:	34° 27’ 47” N	Longitude:	-97° 35’ 52” W

Extent

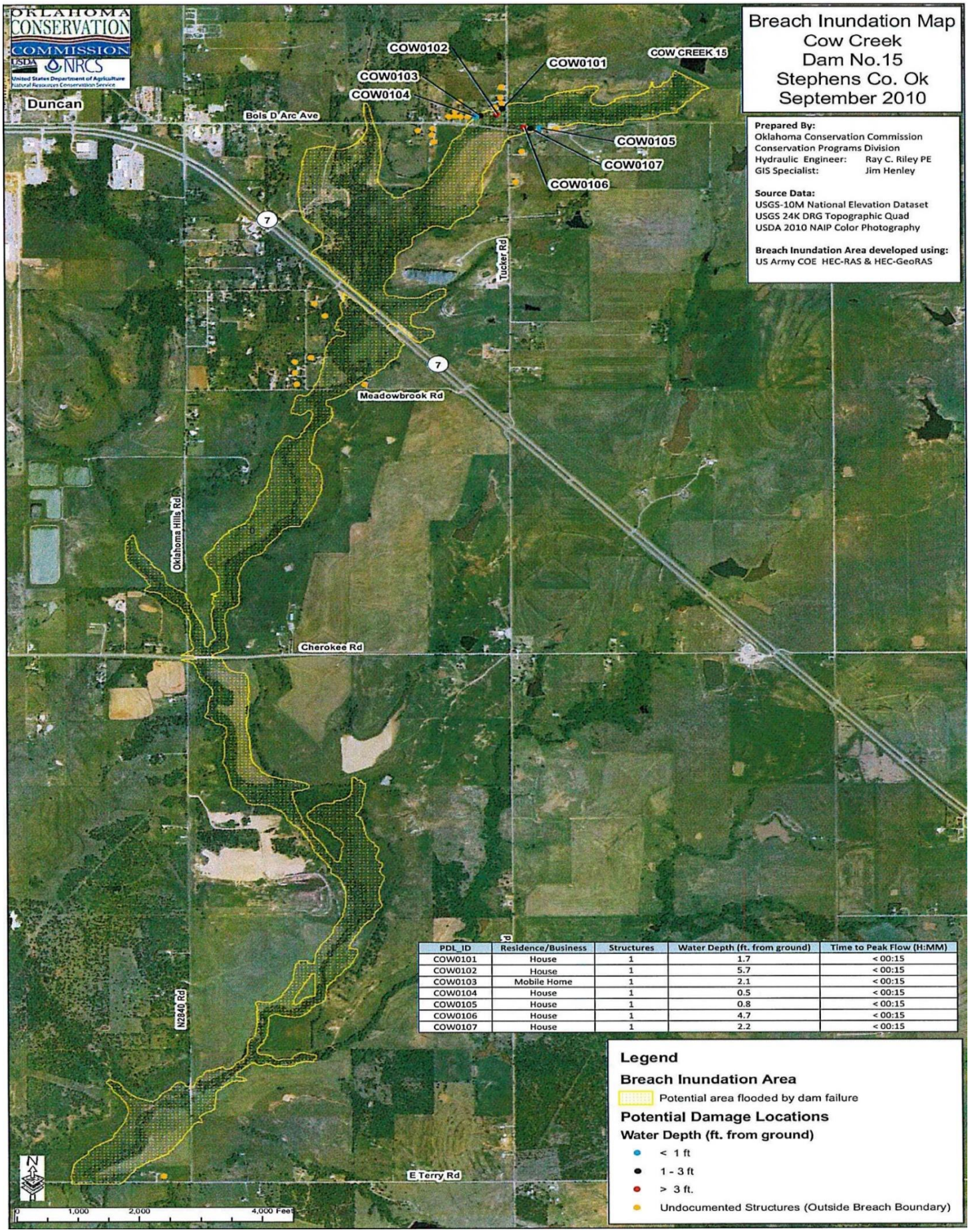
Dam failures have not occurred in any years between 1954 and 2018.
Damages to personal property are estimated at $0.00.

One dam in Stephens County is designated as high risk. This dam is classified high risk by the Oklahoma Water Resources Board using criteria established by The Ad Hoc Interagency committee on Dam Safety for Science, Engineering and Technology. The guidelines were prepared in response to a Presidential memorandum of April 23, 1977, and were published on June 25, 1979. Reference: National Engineering Manual (Part 503, subpart D - Dam Safety).

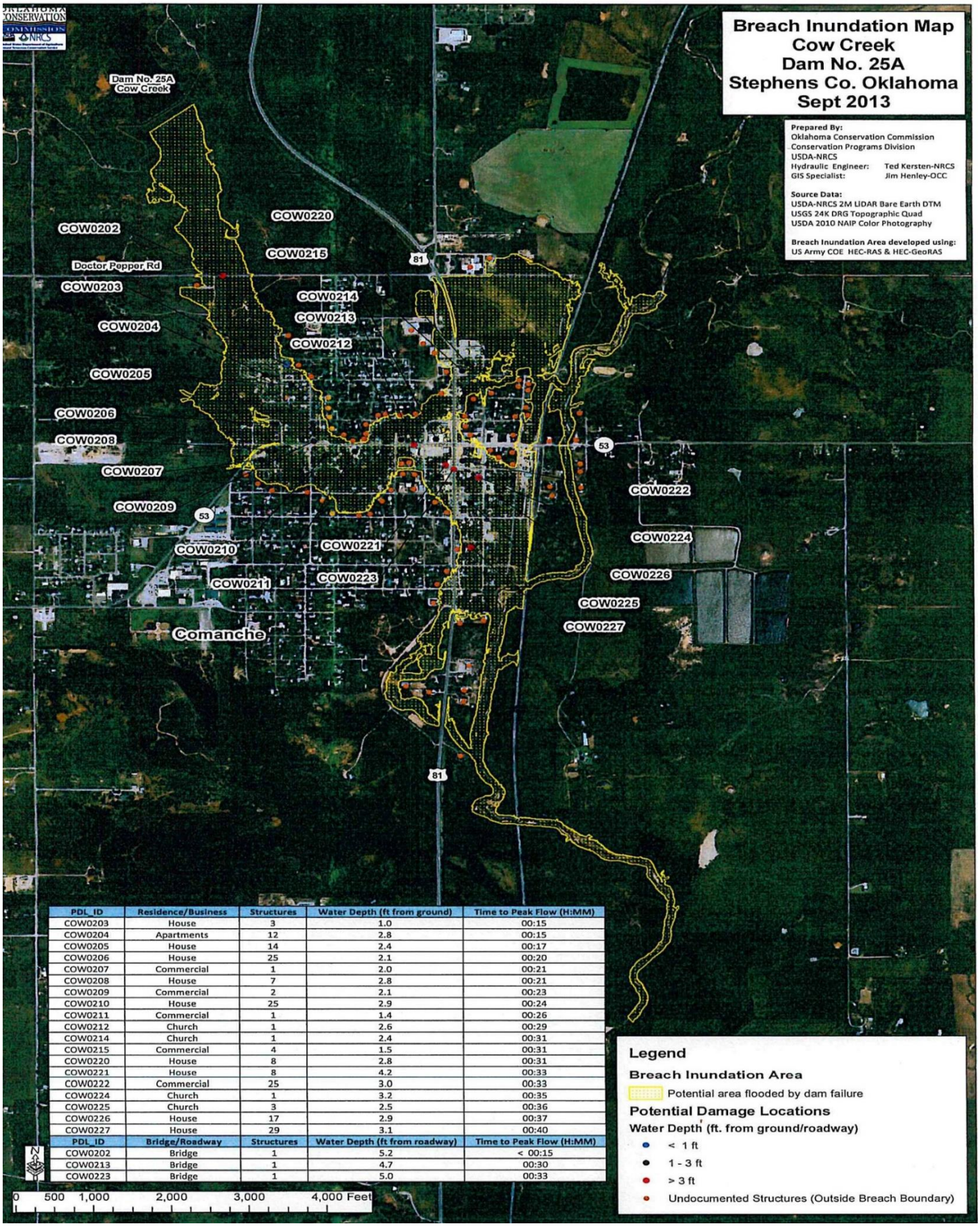
Significant hazard structures are so designated because of potential loss of life on roadways and/or loss of bridges. Two dams in Stephens County meet this classification.

Hazard classifications used by the Oklahoma Water Resources Board (OWRB) to identify dams are based upon their location and the population density located downstream from the structures.

Probability of Future Events The probability of dam failure events in the planning area is UNLIKELY.

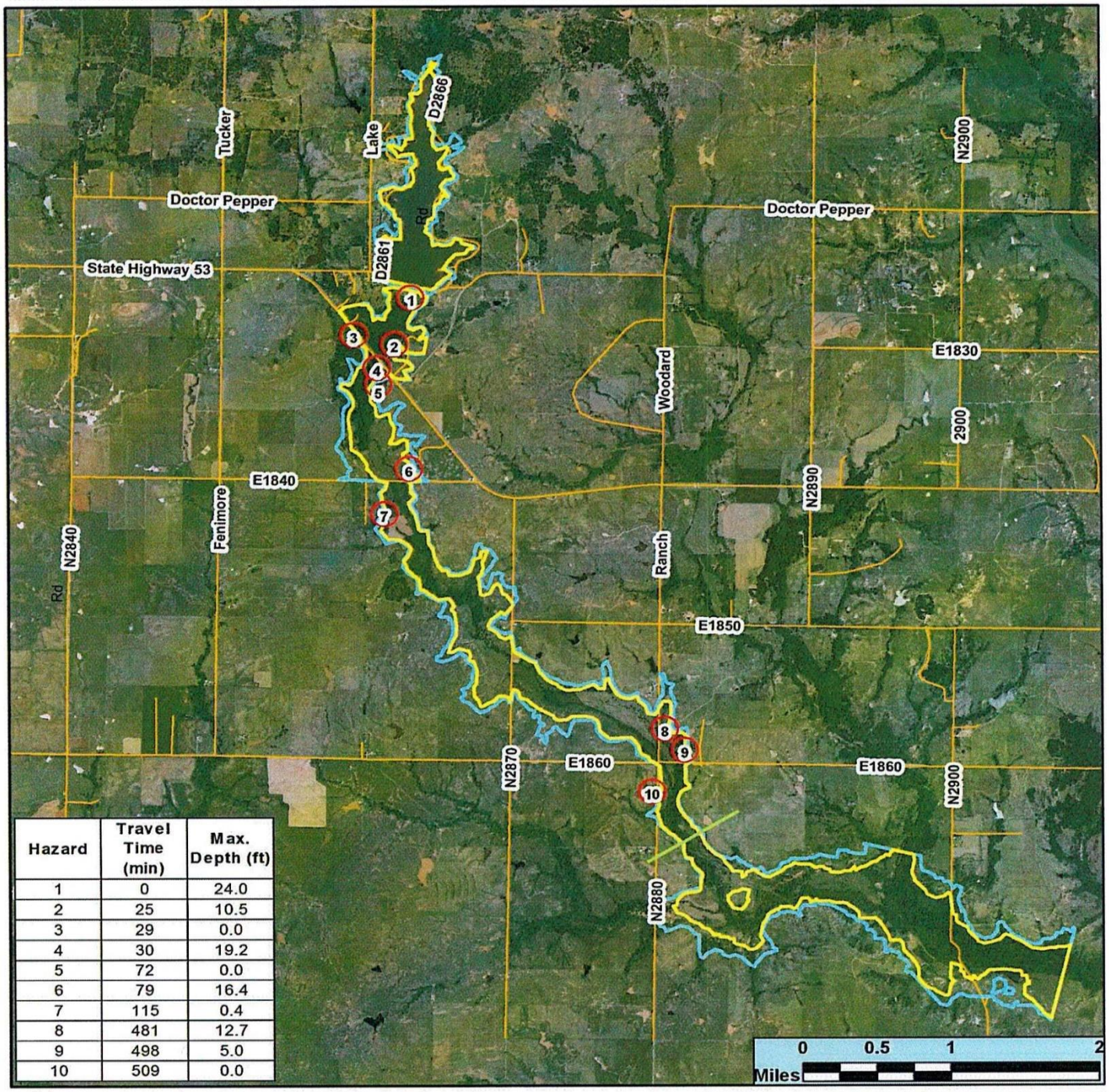


PDL_ID	Residence/Business	Structures	Water Depth (ft. from ground)	Time to Peak Flow (H:MM)
COW0101	House	1	1.7	< 00:15
COW0102	House	1	5.7	< 00:15
COW0103	Mobile Home	1	2.1	< 00:15
COW0104	House	1	0.5	< 00:15
COW0105	House	1	0.8	< 00:15
COW0106	House	1	4.7	< 00:15
COW0107	House	1	2.2	< 00:15



PDL_ID	Residence/Business	Structures	Water Depth (ft from ground)	Time to Peak Flow (H:MM)
COW0203	House	3	1.0	00:15
COW0204	Apartments	12	2.8	00:15
COW0205	House	14	2.4	00:17
COW0206	House	25	2.1	00:20
COW0207	Commercial	1	2.0	00:21
COW0208	House	7	2.8	00:21
COW0209	Commercial	2	2.1	00:23
COW0210	House	25	2.9	00:24
COW0211	Commercial	1	1.4	00:26
COW0212	Church	1	2.6	00:29
COW0214	Church	1	2.4	00:31
COW0215	Commercial	4	1.5	00:31
COW0220	House	8	2.8	00:31
COW0221	House	8	4.2	00:33
COW0222	Commercial	25	3.0	00:33
COW0224	Church	1	3.2	00:35
COW0225	Church	3	2.5	00:36
COW0226	House	17	2.9	00:37
COW0227	House	29	3.1	00:40
PDL_ID	**Bridge/Roadway**	**Structures**	**Water Depth (ft from roadway)**	**Time to Peak Flow (H:MM)**
COW0202	Bridge	1	5.2	< 00:15
COW0213	Bridge	1	4.7	00:30
COW0223	Bridge	1	5.0	00:33

Comanche Lake Breach Inundation Zone



Hazard	Travel Time (min)	Max. Depth (ft)
1	0	24.0
2	25	10.5
3	29	0.0
4	30	19.2
5	72	0.0
6	79	16.4
7	115	0.4
8	481	12.7
9	498	5.0
10	509	0.0

Sunny-Day Breach Limits

Design Flood Breach Limits

Potential Hazards

Breach Inundation Limit

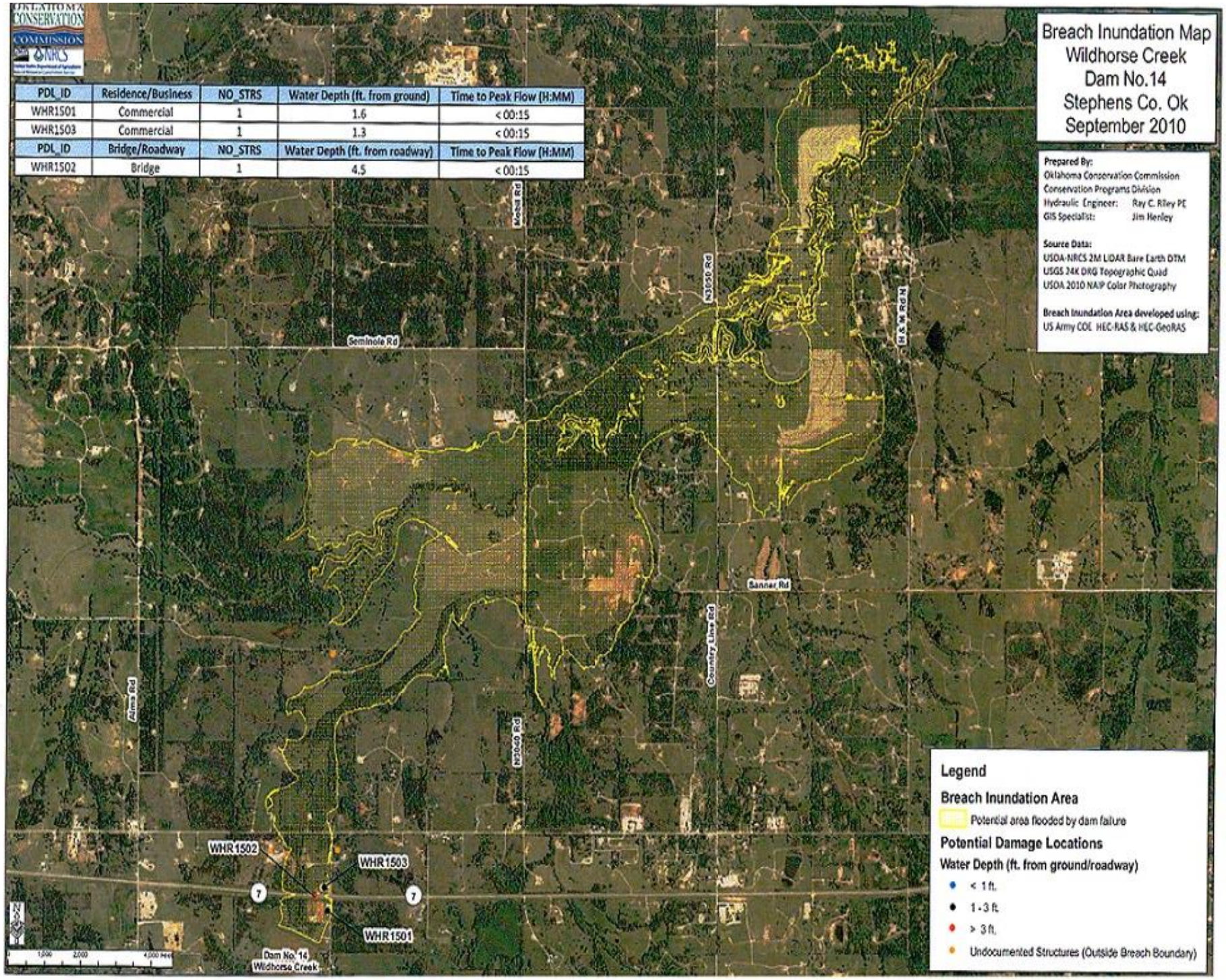
N
W E
S

NIDID: OK13279

County: Stephens

Legal Location: Sec 24 - T02S - R07W

Lat/Long: 34.36688, -97.88797



PDL_ID	Residence/Business	NO_STRS	Water Depth (ft. from ground)	Time to Peak Flow (H:MM)
WHR1501	Commercial	1	1.6	< 00:15
WHR1503	Commercial	1	1.3	< 00:15
PDL_ID	Bridge/Roadway	NO_STRS	Water Depth (ft. from roadway)	Time to Peak Flow (H:MM)
WHR1502	Bridge	1	4.5	< 00:15

Hazard	Loss of Life	Economic Loss (property)
Low	None (no probable future development)	Minimal (undeveloped, occasional structure or agriculture)
Significant	None (potential for future development exists)	Appreciable (notable agriculture, industrial or structural)
High	Yes (dam failure would likely result in loss of life)	Excessive (extensive community, industrial or agriculture)

The OWRB coordinates the Oklahoma Dam Safety Program to ensure the safety of all dams in Stephens County, especially those that could impact downstream life and property.

The Oklahoma Water Resources Board coordinates the Oklahoma Dam Safety Program to ensure the safety of the three dams in Stephens County, especially those that could impact downstream life and property.

The program requires inspections every five and three years for low and significant hazard structures, respectively. It requires annual inspection of Stephens County's high-hazard dam.

Should the dam experience a partial failure or a major seepage releasing one foot of water or less into the swash zone this would be considered a minor event. This release would flow through the agriculture area only and crops would survive. The water would flow on to the nearby creek. A major dam failure classified as a severe event releasing one or more feet of water into the swash zone will ruin crops but flow on to the nearby creek causing no other damage.

Because many of these dams are old structures and, as a result, require periodic repair, the OWRB requires submittal and subsequent approval of plans and specifications prior to dam modifications. Staff also coordinates periodic training sessions and workshops on dam safety issues and regulations for dam owners and engineers. The NRCS offers technical assistance in the construction of small farm ponds and related structures.

3.5.11 Earthquake

Description

An earthquake occurs when two blocks of the earth suddenly slip past one another. The surface where they slip is called the fault or fault plane. The location below the earth's surface where the earthquake starts is called the hypocenter, and the location directly above it on the surface of the earth is called the epicenter.

Most earthquakes occur as the result of slowly accumulating pressure that causes the ground to slip abruptly along a geological fault plane on or near a plate boundary. The resulting waves of vibration within the earth create ground motion at the surface that vibrates in a very complex manner.

Location

Earthquakes affect the entire planning area.

Extent

The size of an earthquake can be expressed quantitatively as a magnitude and the local strength of shaking as intensity. The inherent size of an earthquake is expressed using a magnitude. The following Richter Scale is the most commonly used scale.

The Richter Scale

Magnitude	Mercalli	Description	Earthquake Effects
2	I	Instrumental	Not felt except by a very few under especially favorable conditions.
	II	Feeble	Felt only by a few persons at rest, especially on upper floors of buildings.
3	III	Slight	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
	IV	Moderate	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
4	V	Rather Strong	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5	VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
	VII	Very Strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
6	VIII	Destructive	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
7	IX	Ruinous	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
	X	Disastrous	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
8	XI	Very Disastrous	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
	XII	Catastrophic	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Source : http://earthquake.usgs.gov/learn/topics/mercalli.php

Stephens County and its participating jurisdictions consider the following earthquake events to be minor/major:

Minor Event: An earthquake that registers as magnitude 3.9 or below.

Major Earthquake Event: An earthquake that registers as magnitude 4.0 or above.

Previous Occurrences

Earthquake Events from 2002 to 2015

Date	Magnitude	Depth	Location
3/12/2002	2.2 mag	3.1	5 mi from Loco
5/19/2005	2.5 mag	3.1	6 mi from Comanche
1/1/2013	2.8 mag	3.1	6 mi from Loco
4/28/2014	2.6 mag	3.1	3 mi from Velma
4/28/2014	2.5 mag	3.1	2 mi from Velma
4/28/2014	2.5 mag	3.1	3 mi from Velma
4/29/2014	2.5 mag	3.1	4 mi from Velma
4/29/2014	2.7 mag	3.1	3 mi from Velma
6/21/2014	2.7 mag	3.1	11 mi from Bray
9/22/2014	3.6 mag	3.1	16 mi from Bray
11/4/2014	2.6 mag	3.1	9 mi from Bray
7/17/2015	2.7 mag	3.1	11 mi from Duncan

Probability of Future Events

The probability an earthquake occurring in Stephens County is **MEDIUM.**

Impact and Vulnerability

Earthquake damage can range from minor cracks in walls to collapse of buildings and roadways. Secondary impacts can include fires from ruptured pipelines, and catastrophic infrastructure failure leading to death, destruction, and long-term displacement of business and commerce within affected areas.

Although Stephens County is in the geographic area of under the 3% peak ground acceleration (PGA) with a 10% chance of being exceeded over 50 years, it has seen a statistical uptick in earthquake activity over the past ten years.

Despite the absence of injection well activity in Stephens County, the issue of whether it leads to increased seismic activity is the subject of intense scrutiny which will be monitored by the mitigation team.

Most facilities in Stephens County have not been constructed to withstand an earthquake, nor have residents been educated on what they can do to prevent injury from an earthquake event.

CHAPTER FOUR: MITIGATION STRATEGY

4.1 Capabilities Assessment

Each community has a unique set of capabilities, including authorities, policies, programs, staff, and funding, and resources to accomplish mitigation and reduce long- term vulnerability. By reviewing the existing capabilities in each jurisdiction, the planning committee identified capabilities that currently reduce disaster losses or could be used to reduce losses in the future.

School Districts completed a capability assessment in November 2017, and those that participated has information included at the end of this section.

4.1.1 Existing Institutions, Plans, and Ordinances

The checkmark (√) indicates that the jurisdiction reported to have the authority to implement the specified regulatory tool and that the tool is currently in place.

Jurisdiction	Building Code	Zoning Ordinance	Subdivision Ordinance	Special Purpose Ordinance	Growth Management Ordinance	Site Plan Review Requirements	Comprehensive Plan	Capital Improvement Plan	Economic Development Plan	Emergency Response Plan	Post-Disaster Recovery Plan
Stephens County		√						√		√	√
Bray									√	√	
Central										√	
Comanche	√	√	√	√		√	√	√	√	√	√
Duncan	√	√	√	√		√	√	√	√	√	√
Empire										√	√
Marlow	√	√				√		√	√	√	√
Loco										√	
Velma				√			√	√	√	√	

Legal and Regulatory Capabilities

Subdivision ordinances offer an opportunity to account for natural hazards prior to the development of land as they formulate regulations when the land is subdivided. Subdivision design that incorporates mitigation principles can reduce the exposure of future development to hazard events.

Building Code

Building codes regulate construction standards and are developed for specific geographic areas of the country. They consider the type, frequency, and intensity of hazards present in the region. Structures built to applicable building codes are inherently resistant to many hazards such as

strong winds, floods, and earthquakes, up to certain levels of severity. Due to the location-specific nature of the building codes, they are very valuable tools for mitigation.

Zoning Ordinance

Zoning is a useful tool to consider when developing a mitigation strategy. It can be used to restrict new development, require low-density development, and designate specific uses, (e.g. recreational), in hazard-prone areas. Private property rights must be considered, but enacting a zoning ordinance can reduce or potentially eliminate damages from future hazard events. According to the State Multi-Hazard Mitigation Plan, all local communities in the State are encouraged to incorporate mitigation standards in zoning and land use ordinances.

Subdivision Ordinance

Subdivision ordinances offer an opportunity to account for natural hazards prior to the development of land as they formulate regulations when the land is subdivided. Subdivision design that incorporates mitigation principles can reduce the exposure of future development to hazard events.

Special Purpose Ordinance

A special purpose ordinance is a form of zoning in which specific standards dependent upon the special purpose or use must be met. For example, many special purpose ordinances include basic development requirements such as setbacks and elevations. The community's floodplain management ordinance may be a special purpose ordinance. The special purpose ordinance is a useful mitigation technique particularly when implemented to reduce damages associated with flooding.

Growth Management Ordinance

Growth management ordinances are enacted as a means to control the location, amount, and type of development in accordance with the larger planning goals of the jurisdiction. These ordinances often designate the areas in which certain types of development is limited and encourage the protection of open space for reasons such as environmental protection and limitation of sprawl.

Site Plan Review Requirements

Site plan review requirements are used to evaluate proposed development prior to construction. An illustration of the proposed work, including its location, site elevations, exact dimensions, existing and proposed buildings, and many other elements are often included in the site plan review requirements. The site plan reviews offer an opportunity to incorporate mitigation principles, such as ensuring that the proposed development is not in an identified hazard area and that appropriate setbacks are included.

Comprehensive Plan

A comprehensive plan is a document which illustrates the overall vision and goals of a community. It serves as a guide for the community's future and often includes anticipated demographics, land use, transportation, and actions to achieve desired goals. Integrating mitigation concepts and policies into a comprehensive plan provides a means for implementing initiatives through legal frameworks, and also enhances the opportunity to reduce the risk posed by hazard events.

Capital Improvement Plan

Capital Improvement Plans schedule the capital spending and investments necessary for public improvements such as school, roads, libraries, and fire services. These plans can serve as an

important mechanism to manage development in identified hazard areas through limited public spending.

Economic Development Plan

Economic development plans offer a comprehensive overview of the local or regional economic state, establish policies to guide economic growth, and include strategies, projects, and initiatives to improve the economy in the future. Economic Development Plans, similar to Capital Improvement Plans, offer an opportunity to reduce development in hazard prone areas by encouraging economic growth in areas less susceptible to hazard events.

Emergency Response Plan

Emergency Response Plans provide an opportunity for local governments to anticipate an emergency and plan the response accordingly. In the event of an emergency, a previously established Emergency Response Plan can reduce negative effects of an event by pre-determining the responsibilities and means by which resources are deployed.

Post-Disaster Recovery Plan

A post disaster recovery plan guides the physical, social, environmental, and economic recovery and reconstruction procedures after a disaster. Hazard mitigation principles are often incorporated into post-disaster recovery plans in order to reduce repetitive disaster losses. The post disaster recovery plan is included as a chapter of the comprehensive plan.

4.1.2 Administrative and Technical Capability

The ability of a local government to develop and implement mitigation projects, policies, and programs is contingent upon its staff and resources. Administrative capability is determined by evaluating whether there are an adequate number of personnel skilled in surveying and Geographic Information Systems.

Administrative and Technical Capability										
Jurisdiction	**Planner(s) or Engineer(s) with knowledge of land development and management practices**	**Engineer(s) or professional(s) trained in construction practices related to buildings and fire**	**Planner(s) or Engineer(s) with an understanding of natural and/or human caused hazards**	**Floodplain Manager**	**Surveyors**	**Staff with education or expertise to assess the communities vulnerability to hazards**	**Personnel skilled in GIS and/or HAZUS**	**Scientists familiar with the hazards of the community**	**Emergency Manager**	**Grant writers**
Stephens County	√	√	√	√		√			√	√
Bray						√				√
Central										
Comanche				√						
Duncan	√	√	√	√	√	√	√		√	√

Empire	√			√		√	√			√
Marlow				√		√	√	√	√	√
Loco										
Velma					√				√	√

The checkmark (√) indicates that the local government reported that they maintain a staff position for the given function.

Staffing Resources

Having a planner or engineer trained in land development, construction practices, or one who understands natural or man-made hazards are great resources to a community. Having their level of knowledge and expertise will help in the process of assessing and mitigating risks while limiting risk to new development or redevelopment.

Floodplain Management

By employing floodplain management, the jurisdiction can protect its citizens against much of the devastating financial loss resulting from flood disasters. Careful local management of development in the floodplains results in construction practices that can reduce flood losses and the high costs associated with flood disasters to all levels of government.

Surveyors

Surveyors gather information that is needed by the city engineers or city projects that involve development or redevelopment. A surveyor records geographic conditions and man-made features as they currently exist. Other noted information might include: terrain, drainage, property boundaries and ownership, soil condition, and other physical features.

GIS/HAZUS

Geographical Information Systems (GIS) and HAZUS are powerful resources that the jurisdictions can be used to identify important facts about the community. HAZUS is methodology for estimating potential losses from earthquakes and floods. HAZUS uses GIS technology to estimate physical, economic, and social impacts of disasters.

Emergency Manager

An emergency manager performs administrative and technical work in the development, implementation, and coordination of the community's emergency management program. This position also acts as the authority in disaster recovery efforts, oversees the disaster training, exercises and public awareness programs, and performs related duties as assigned.

4.1.3 Financial Capabilities

Jurisdiction	Financial Capability							
	Capital Improvements Project Funding	Authority to levy taxes for specific purposes	Water, Sewer, Gas, or Electric service Fees	Incur fees for new development	Incur debt through general obligation funds and/or special tax bonds	Community Development Block Grant	Federal funding programs	State funding programs
Stephens County	√	√		√	√		√	√
Bray		√		√	√		√	√
Central					√			
Comanche	√		√	√	√	√		
Duncan	√	√	√		√			√
Empire	√				√	√	√	√
Loco								
Marlow	√		√			√	√	√
Velma	√	√	√				√	√

4.1.4. Education and Outreach Capabilities

Education & Outreach Capability						
Jurisdiction	**Local citizen groups/Non-profit organizations willing to assist with mitigation activities**	**Ongoing public education or information programs**	**Natural disaster or safety related programs**	**StormReady Certification**	**Firewise Communities Certification**	**Public-Private partnership initiatives addressing disaster-related issues**
Bray-Doyle Public Schools	√	√	√			
Central High Public Schools		√				√
Comanche Public Schools		√	√			
Empire Public Schools	√		√			
Duncan	√	√	√			√
Grandview Public Schools	√					
Marlow Public Schools	√	√	√			√
Red River Technology Center	√	√	√			
Velma Public Schools	√	√	√			

StormReady

StormReady is a national voluntary program, administered through the National Weather Service, which gives communities the skills and education needed to cope with and manage potential weather-related disasters, before and during the event. The program encourages communities to take a new pro-active approach.

Firewise

Firewise communities are those that have taken appropriate measures to become more resistant to wildfire structure damage. Firewise techniques include minimizing the risk of home ignition by carefully landscaping around residential structures such as thinning trees and brush and choosing fire-resistant plants, selecting ignition-resistant building materials, and positioning structures away from slopes.

4.1.5 Opportunities for Public Education and Outreach

Education opportunities exist for disseminating emergency preparedness information to diverse populations. The following entities and/or capabilities were identified in Stephens County:

- Agribusiness organizations (OSU Extension, Future Farmers of America, CO-OPs)
- Amateur radio organizations
- Annual calendar promotions – National Preparedness month, Fire Prevention Week
- Business/fraternal groups (Lions, Rotary, Optimists, Odd Fellows, Masons, Veterans of Foreign Wars, American Legion)
- Chambers of Commerce
- Coalition meetings
- Direct mailing pieces
- FEMA and other free online training venues
- Insurance groups
- Local Emergency Planning Committees (LEPC)
- National Weather Service storm spotter training
- Neighborhood Watch Programs
- Point of Sale (POS) sites
- Parent-Teacher Organizations
- Public education campaigns
- Public lecture series, seminars. Webinars, demonstrations
- Public Service Announcement (PSAs) and other media campaigns
- Schools/student organizations
- Special events (rodeo, county fair, health fairs, street shows)
- Town Hall meetings or topic specific public forums
- Tribal gatherings
- Utility companies
- Volunteer Organizations Active in Disaster
- Web sites, public white boards, Facebook® pages
- Wednesday newspaper inserts or display advertising
- Youth groups (Scouting, and entrepreneurial groups).

4.1.6 School District Capability Assessment

School Districts were asked to provide information on their capabilities as they relate to those outlined for each participating jurisdiction. Each School Superintendent answered the following questions:

1. Has your school district had positive responses to bond issues?
2. Based on population, is the school district population growing or declining?
3. Has the school district taken any measures to protect students during hazard events?
4. List any damages your school has experienced during the last 10 years due to weather events or natural disaster.

Duncan Public Schools

1. Has your school district had positive responses to bond issues?
   Yes
2. Based on population, is the school district population growing or declining?
   Our enrollment numbers have been slowly declining over the past ten years. Within the last four we have seemed to vary only slightly and saw some increases in enrollment. However, this year due to COVID we have dropped enrollment drastically. We do anticipate the majority returning at some point. Our enrollment this year is 3162.
3. Has the school district taken any measures to protect students during hazard events?
   Yes, Duncan performs fire drills, tornado drills, and evacuation drills. Also, Duncan has designated Safe Rooms that can accommodate the students, and the staff.
4. List any damages your school has experienced during the last 10 years due to weather events or natural disaster:
   Over the past couple of years, we have had roof, fence, and tennis court damage due to wind and hail.

Empire Public Schools

1. Has your school district had positive responses to bond issues?
   Yes, our school district passed a construction bond in January, 2017 to upgrade facilities. The bond was for $1,100,000.
2. Based on population, is the school district population growing or declining?
   Our school district is growing. I 15-16, Empire had approximately 475 students, in 16-17 546 students, and in the current school year Empire has 540 students.
3. Has the school district taken any measures to protect students during hazard events?
   Yes, Empire performs fire drills, tornado drills, and evacuation drills. Also, Empire has constructed a Safe Room that can accommodate the students, the staff, and the community.

4. List any damages your school has experienced during the last 10 years due to weather events or natural disaster:
   In 2017, Empire Public Schools had exterior damage to roofs and buildings due to a hail storm.
   In 2016, Empire Public Schools had numerous windows, exterior damage, roof damage, and some flooding due to a hail storm and rain.
   In 2014, Empire Public Schools had damage to trees from an ice storm.

Marlow Public Schools

1. Has your school district had positive responses to bond issues?
   Yes, recently passed a 14-million-dollar bond to upgrade facilities.
2. Based on population, is the school district population growing or declining?
   Enrollment is steady.
3. Has the school district taken any measures to protect students during hazard events?
   Yes, the school district built safe rooms for all students and staff at our new elementary facilities.
4. List any damages your school has experienced during the last 10 years due to weather events or natural disaster:
   Ice storm, wind storms, flooding, hail and other weather-related events have happened to Marlow Public Schools, with thousands of dollars in damages.

Velma Public Schools

1. Has your school district had positive responses to bond issues? **Yes**
2. Based on population, is the school district population growing or declining? **Declining**
3. Has the school district taken any measures to protect students during hazard events? **Yes**
4. List any damages your school has experienced during the last 10 years due to weather events or natural disaster: **None**

Bray-Doyle Public Schools

1. Has your school district had positive responses to bond issues?
   Yes, we passed a bond to build a new High School, purchase a laptop for every student in grades 8-12, and purchase 4 new school busses (totaling 3.5 million dollars) by a 72% margin in 2015.
2. Based on population, is the school district population growing or declining?
   It has remained steady for the past 2 years.
3. Has the school district taken any measures to protect students during hazard events?
   We have built an F-5 rated tornado shelter large enough to hold all students and staff.
4. List any damages your school has experienced during the last 10 years due to weather events or natural disaster:
   We had to do a total roof replacement on all buildings due to softball size hail. We also replaced bus windows and building windows from the same storm. We have had some flooding and wind damage from tornadic activity.

Central High Public Schools

1. Has your school district had positive responses to bond issues?
   Yes, we have passed three consecutive bond issues. The most recent passed February 14, 2012 and was a $4.1 million bond to build a new gymnasium.
2. Based on population, is the school district population growing or declining?
   Holding steady the last two years around 400 students.
3. Has the school district taken any measures to protect students during hazard events?
   Yes, Central High School performs fire, tornado, and evacuation drills. We also have a safe room on campus to accommodate everyone.
4. List any damages your school has experienced during the last 10 years due to weather events or natural disaster:
   2016-Central High School had exterior and interior damage due to flood 2014-Central High School had exterior and tree damage due to ice storm Central High has also experienced wind and hail damage from time to time.

Comanche Public Schools

1. Has your school district had positive responses to bond issues? **Yes**
2. Based on population, is the school district population growing or declining? **Declining**
3. Has the school district taken any measures to protect students during hazard events? **Yes**
4. List any damages your school has experienced during the last 10 years due to weather events or natural disaster:
   Wind and hail damage – 2017 and 2015

Grandview Public Schools

1. Has your school district had positive responses to bond issues?
   Yes, in the past, but our evaluation is so low it's hard to do anything.
2. Based on population, is the school district population growing or declining? **Holding steady.**
3. Has the school district taken any measures to protect students during hazard events?
   Yes, the district performs emergency drills.
4. List any damages your school has experienced during the last 10 years due to weather events or natural disaster: **None**

Red River Technology Center

1. Has your school district had positive responses to bond issues? **N/A**
2. Based on population, is the school district population growing or declining? **Fluctuating**
3. Has the school district taken any measures to protect students during hazard events?
   Emergency Plans, drills, and improved alert and alarm systems
4. List any damages your school has experienced during the last 10 years due to weather events or natural disaster: **Damage due to severe hail storms**

4.1.7 Conclusion

The capability assessment finds that Stephens County and the participating jurisdictions of Duncan, Comanche, Marlow, Velma, and Empire City collectively have a significant level of legal, technical, and fiscal tools and resources necessary to implement hazard mitigation strategies. All of the jurisdictions have the legal capabilities, ordinances, and codes in place that have the potential to reduce loss due to a disaster. The jurisdictions, including school districts, have a range of staff who have knowledge about hazards and their impacts. While some jurisdictions lack an Emergency Manager in their community, the Stephens County Emergency Management Department can provide assistance.

The jurisdictions which include Duncan, Marlow, Comanche, and Velma have financial resources that can be used towards mitigation. Most of those resources are Capital Improvement funds or tax bonds.

All communities in Stephens County have local citizen groups that are willing to assist in emergency management efforts. While most jurisdictions participate in the safety related school programs and none of the jurisdictions are a Firewise community. Stephens County solely utilize burn bans. These jurisdictions can expand their capabilities by implementing wildfire plans.

The Stephens County Planning Committee put a significant amount of effort into making this plan a useful document. Because the information in this plan is relevant and was developed by the planning team members directly, the plan will be more easily integrated into the plans and ordinances listed in this section. The Emergency Manager for the county and each respective jurisdiction will provide a copy of this plan to parties responsible for other planning processes in

the planning area. This document can be integrated into other plans when determining future growth areas, Capital Improvement projects, building code and ordinance proposals, and prioritizing local funds.

4.2 NFIP Participation

Stephens County has been a National Flood Insurance Program (NFIP) Community since December 15, 1990, CID # 400498, and has adopted a Flood Damage Prevention Ordinance that restricts development in floodplain areas, through a building development permit system. A copy of this ordinance may be found at the Stephens County Courthouse Office of the County Commissioners.

The City of Duncan is the Stephens County Seat and has been a participant in the NFIP since December 15, 1990, CID # 400202. The City of Marlow has been participating in the NFIP since December 15, 1990, CID #400203. The City of Comanche has been participating in the NFIP since December 15, 1990, CID # 405376. The Town of Empire City has been participating in the NFIP since March 15, 2017, CID # 400520. Each jurisdiction has in place a Flood Damage Prevention Ordinances which are reviewed annually for compliance. In addition, each jurisdiction provides reference material on flood hazards, flood insurance, and proper construction measures to all builders and residents applying for building permits. The Towns of Bray, Central, Loco, and Velma are not participants in the NFIP.

There are 0 Repetitive Loss and 0 Severe Repetitive Loss Properties in Stephens County.

4.3 Mitigation Goals

During the update of the Stephens County Hazard Mitigation Plan the goals were reviewed and were found to be adequate for the update of the plan**:**

Goal 1: To increase countywide ability to communicate and respond quickly and efficiently to disasters.
Goal 2: To enhance public awareness and understanding of hazard mitigation.
Goal 3: To reduce repetitive flooding in flood-prone areas of Stephens County.
Goal 4: To develop and educate responders and health care providers regarding mitigated measures for specific hazards.
Goal 5: To enhance pre-disaster and prevention activities.

4.4 Action Items

Mitigation Action Types:

Local Plans and Regulations: Using authorities, policies, and codes to influence development.

Structure/ Infrastructure Projects: Modifying or removing infrastructure to mitigate hazard.

Natural System Protection: Minimizing damage by preserving natural system functions.

Education and Awareness Programs: Informing citizens on how to mitigate hazards.

5% Projects: Actions not quantifiable by a Benefit Cost Analysis, (i.e., sirens, generators, etc.).

Note: See FEMA *Local Mitigation Planning Handbook*, March 2013, page 6-4, for a more complete explanation of mitigation action types. Plans must include a comprehensive range of mitigation action items for each hazard and the jurisdiction impacted by the hazard. A comprehensive range is defined as at least two different types of mitigation action types per hazard.

Action Item 1	**Additional County-Wide Outdoor Warning Devices**
Hazard(s) Addressed	Tornado, Flood, High Wind, Lighting, Hail, Dam Failure, Earthquakes*
Mitigation Action Type	5%
Jurisdiction(s)	Stephens County, and all participating jurisdictions
Action	Purchase and install additional outdoor warning devices for the incorporated communities in order to supplement current devices. The Emergency Management Directors should review the effectiveness of the current warning devices and upgrade as needed. Some current devices are not reaching all areas of the communities as growth has caused expansion beyond the capabilities of the original devices. Current systems need additional capability to warn communities of more than one hazard.
Responsible Party	Mayor of each town
Potential Implementation Timeline	Ongoing as funding becomes available
Cost	$30,000 per unit, 10 units county wide (total=$300,000)
Potential Funding Sources	HMGP, Community Budget, REAP funds, Dept. of Agriculture and Dept. of Public Safety

Action Item 2	**Public Education and Awareness Campaign**
Hazard(s) Addressed	All hazards listed in plan*
Mitigation Action Type	Education and Awareness Programs
Jurisdiction(s)	Stephens County, All Public Schools, Duncan, Marlow, Velma, Comanche, Loco, Bray Empire City, and Central
Action	Prepare a public education and awareness campaign, distributing awareness and safety literature through utility inserts and to school children to take to home. This should include information on all hazards identified in this plan.
Responsible Party	Stephens County Department of Emergency Management
Potential Implementation Timeline	On going
Cost	$50,000
Potential Funding Sources	County/Community Budgets, HMGP, Ok Forestry, REAP

Action Item 3	**Erosion Assistance on County Roads**
Hazard(s) Addressed	Flood, Hail, Tornados, Winter Storm
Mitigation Action Type	Structure and Infrastructure Projects
Jurisdiction(s)	Stephens County Entire Planning Area
Action	Apply rip-rap to several county road locations and bridges to prevent deterioration of the roadbeds and bridge slopes. Heavy rains frequently cause erosion of the roads and bridge walls.
Responsible Party	Stephens County
Potential Implementation Timeline	1 year
Cost	$200,000
Potential Funding Sources	County Budget, REAP, HMGP

Action Item 4	**Construct Safe Room in County Schools**
Hazard(s) Addressed	Flood, Hail, Tornados, Winter Storm
Mitigation Action Type	Structure and Infrastructure Projects
Jurisdictions	Empire PS, Central PS, Marlow PS, Duncan PS, Velma PS, Comanche PS, Grandview PS, Bray PS
Action	Build a safe room for each listed school as they are able to apply
Responsible Party	School District Superintendent
Potential Implementation Timeline	Ongoing as funding allows
Cost	$500,000
Potential Funding Sources	School Bond Issues, HMGP

Action Item 5	**Upgrade Construction Technique for Future Buildings**
Hazard(s) Addressed	Lightning, Hail, Tornado, High Winds, Winter Storm
Mitigation Action Type	Local Plans and Regulations
Jurisdiction(s)	Stephens County and all participating jurisdictions
Action	Use hail and wind resistant construction techniques when constructing new critical facilities. This will reduce loss of life and property, and continued operability of facilities during weather events. A continuous load path will also strengthen the integrity of facilities during winter storm events.
Responsible Party	Stephens County Department of Emergency Management, Mayor of each participating jurisdictions, and superintendent of each school district.
Potential Implementation Timeline	24 months
Cost	$8,000
Potential Funding Sources	Budget, HMPG

Action Item 6	**Purchase and Installation of Generators to Power Critical Facilities**
Hazard(s) Addressed	Winter Storms, Tornados, High Wind, Lightning, Drought, Flood, Extreme Heat
Mitigation Action Type	5%
Jurisdiction(s)	Stephens County and all participating jurisdictions
Action	Install generators at critical facilities in Stephens County such as the Stephens County Courthouse, County Barns rural water districts, shelters, etc.
Responsible Party	County Commissioners, Stephens County Department of Emergency Management
Potential Implementation Timeline	36-48 months
Cost	$250,000 (Aggregate Cost)
Potential Funding Sources	HMGP, County Budget, REAP, OWRB

Action Item 7	**Tree Management**
Hazard(s) Addressed	Winter Storms
Mitigation Action Type	Natural Systems Protection
Jurisdiction(s)	Stephens County and all participating jurisdictions Duncan, Comanche, Loco, Velma, Empire City, Bray, Central, and Marlow
Action	Work with all Stephens County utility providers and citizens to develop and implement programs to keep trees from threatening utility infrastructure, lives, and property.
Responsible Party	Stephens County, and the Mayor of all participating Cities and Towns
Potential Implementation Timeline	Stephens County Budget, HMGP
Cost	$100,000
Potential Funding Sources	Stephens County Budget, HMGP

Action Item 8	**Individual safe room grant for citizens of Stephens County**
Hazard(s) Addressed	High Wind, Tornado
Mitigation Action Type	Structure and Infrastructure Projects
Jurisdiction(s)	Stephens County
Action	Construct individual safe rooms as recipients are chosen
Responsible Party	Citizens and Emergency Management of Stephens County
Potential Implementation Timeline	2 years, or when funds run out.
Cost	$500,000
Potential Funding Sources	HMPG, Recipient of Safe Room

Action Item 9	**Lightning Detection Systems and Warning System**
Hazard(s) Addressed	Lightning
Mitigation Action Type	5%
Jurisdiction(s)	Bray PS, Central High PS, Comanche PS, Empire PS, Grandview PS, Marlow PS, Duncan PS, Comanche PS
Action	Purchase and install lightning detection and warning system, allowing local and school officials to move spectators indoors when lightning threatens.
Responsible Party	Stephens County Department of Emergency Management, PS Superintendents
Potential Implementation Timeline	36 months
Cost	$20,000
Potential Funding Sources	HMPG, School Budgets, County Budget

Action Item 10	**Dam Failure and Flood Evacuation and Shelter Sheltering**
Hazard(s) Addressed	Dam failure and flood*
Mitigation Action Type	Local Plans and Regulations
Jurisdiction(s)	Stephens County
Action	Incorporate evacuation routes and procedures for the areas affected by dam failure or flood, and establish dry area shelter locations within the Stephens County.
Responsible Party	Stephens County Department of Emergency Management
Potential Implementation Timeline	2 years
Cost	$10,000
Potential Funding Sources	Oklahoma River Dam Authority, OWRB, or owner of Dam

Action Item 11	**NOAA All Hazard Radio's for Critical Facilities**
Hazard(s) Addressed	Drought, Earthquakes, Extreme Heat, Flood, Hailstorm, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Dam Failure
Mitigation Action Type	5%
Jurisdiction(s)	All participating jurisdictions
Action	Purchase and supply NOAA all hazard radios to all local government buildings, schools, and critical facilities.
Responsible Party	Stephens County Department of Emergency Management
Potential Implementation Timeline	36 months
Cost	$10,000
Potential Funding Sources	HMPG, School Budgets, County Budget

Action Item 12	**Research for Records of Lightning Events**
Hazard(s) Addressed	Drought
Mitigation Action Type	5%
Jurisdiction(s)	Entire planning area
Action	To complete the data deficiency referenced addressed in 3.5.1
Responsible Party	Stephens County Department of Emergency Management
Potential Implementation Timeline	36 months
Cost	TBD
Potential Funding Sources	County Budget

Action Item 13	**EMERGENCY NOTIFICATION SERVICE**
Hazard(s) Addressed	Drought, Earthquakes, Extreme Heat, Flood, Hailstorm, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Dam Failure
Mitigation Action Type	5%
Jurisdiction(s)	All participating jurisdictions
Action	Purchase Emergency Notification service that notifies all citizens via phone, email, and text of any all hazard emergencies as they occur.
Responsible Party	Stephens County Department of Emergency Management
Potential Implementation Timeline	36 months
Cost	$20,000
Potential Funding Sources	HMPG, County Budget

4.5 Action Item Prioritization

The Stephens County Hazard Mitigation Planning Committee reviewed, analyzed, and prioritized the action items using the Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) Method. This enabled the committee to ensure that an appropriate Cost Benefit performance was maintained. The mitigation goals previously listed were determined to have the greatest benefit in hazard reduction to the county. This priority remains the same from the previous plan, and will be readdressed in the five-year update to account for any growth and development in the planning area.

STAPLEE Evaluation

Category	Evaluation
Social	Members of Local, County and State Government were members of the Hazard Mitigation Planning Committee and had input throughout the planning process. It must be noted that many small town political leaders are also business or professional persons. Existing community plans were used wherever possible.
Technical	The following persons/agencies were consulted as to the technical feasibility of the various projects: Stephens County Commissioners, Oklahoma State University Extension Service, Soil Conservation Service, Stephens County Health Departments. All comments and suggestions received were incorporated into the prioritization.
Administrative	Staffing for proper implementation of the plan will rely on existing members of the various agencies involved. It is the opinion of the committee that current staffing levels are insufficient, and this is due to budget constraints. Technical assistance is available from various State agencies. Some local jurisdictions have incorporated hazard mitigation efforts into their Capital Improvement Plans. The Local Emergency Planning Committee in Stephens County, led by the Stephens County Emergency Management Director, has agreed to an annual review and assessment of the plan and its progress. Operations costs are under discussion by the relevant department heads.
Political	A representative of the Stephens County Commissioners and each local government, several Mayors or his/her representatives), attended the HMPC meetings and were consulted on all aspects of the Plan.
Legal	Members of the HMPC discussed legal issues with the County Commissioners, and it was their opinion that no significant legal issues were involved in the projects that were selected by the HMPC.
Economic	Economic issues were the predominant issues discussed by all concerned. Each entity felt the projects selected would help the community be better prepared for a disaster and would have a positive effect, including attracting additional business and recreation to the area. Funding for the various projects was the major concern as local budgets were not capable of fulfilling the needs due to the economic down turn. Reliance on outside grants will be relied on heavily for completion of projects. A cost benefit analysis was prepared and used in determining the feasibility of each project. Some communities felt it would require a bond issue to fulfill the project, while others felt that the funds could be raised by cutting funding to other projects or relying on grant assistance.
Environmental	Oklahoma Department of Environmental Quality, State Forestry Service, and the Oklahoma Water Resources Board were all consulted on the various action items proposed. They determined there would be no negative impact.

*** See Section 2.8: Plan Update Agreement**

4.6 Integration of Data, Goals, and Action Items

The Stephens County Hazard Mitigation Plan will be incorporated into all jurisdictions on multiple levels. To begin with, the mitigation goals and action items will be posted onto the Stephens County website to begin the process of public "buy-in." This is an important first step in educating the public on the benefits of hazard mitigation and encouraging communities to invest in proposed projects.

The tables listed in sections 4.1.1, 4.1.2, 4.1.3, and 4.1.4 outline the planning mechanisms that Stephens County, and all jurisdictions have to incorporate hazard mitigation data, goals, and action items. This plan will be reviewed annually by local governments to look for opportunities for hazard mitigation into existing Emergency Action Plans, Capital Improvement Plans, building codes, and local regulations.

Stephens County, Marlow, Comanche, Empire, Velma, Central, Bray, and Loco will evaluate all applicable mitigation action items annually to determine which ones can be incorporated into proposed bond issues.

CHAPTER FIVE: PLAN UPDATE PRIORITIZATION AND REVIEW

5.1 Changes in Jurisdictional Development

Stephens County and participating jurisdictions experienced some changes in development since the previous plan. There has been a slight increase in population and new housing growth over the past three years in Duncan, Marlow, and Bray areas.

Empire saw an increase in enrollment, while Comanche and Velma PS has experienced a slight decrease in enrollment. Marlow, and Central PS holding steady in enrollment.

5.2 Status of Previous Mitigation Action Items

Action Items Accomplished

Action Item	Hazard Mitigated	Jurisdiction Impacted
Upgrade of warning devices	Tornado	Empire
Safe room installed	Tornado, high wind, hail	Empire, Central, Marlow, Velma

5.3 Changes in Jurisdictional Priorities

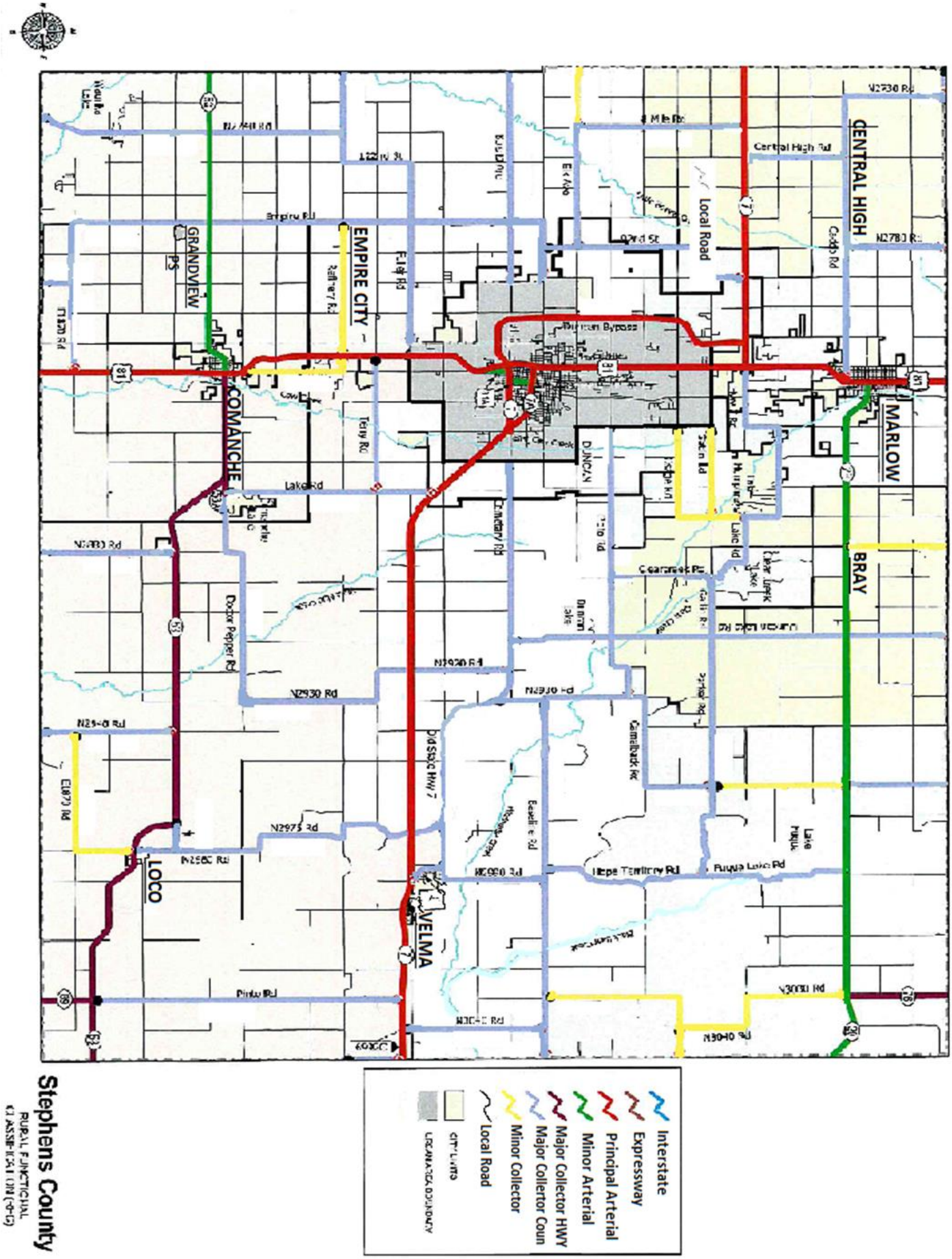
Due to the complexities of having saferooms accessible to the public there has been more emphasis placed on the installation of individual saferooms and an increase in education towards sheltering in place. All jurisdictions have begun encouraging homeowners and landlords to install individual saferooms. The intent is to reduce the road traffic during a hazardous weather event and to encourage residents to shelter-in-place.

In addition, Stephens County and all participating jurisdictions have also experienced a increased interest in education on earthquakes due to the increase of earthquake activity. This hazard was not included in the 2010-2015 HMP. Although no damage has been reported, the community is interested in receiving more education as to how earthquake damage can be mitigated. Other priorities from the previous HMP remain the same. These priorities were deferred and are included in this plan.

5.4 Conclusion

The Stephens County Planning Committee understands that regular evaluation of this plan, to include the action items listed, will guarantee that this plan serves as a useful tool for all participating jurisdictions. The public also has a vital role to serve in this process. We will continually review this plan through public meeting and participation through the Local Emergency Planning Community Meetings as well as our Stephens County Events Committee.

APPENDIX 1

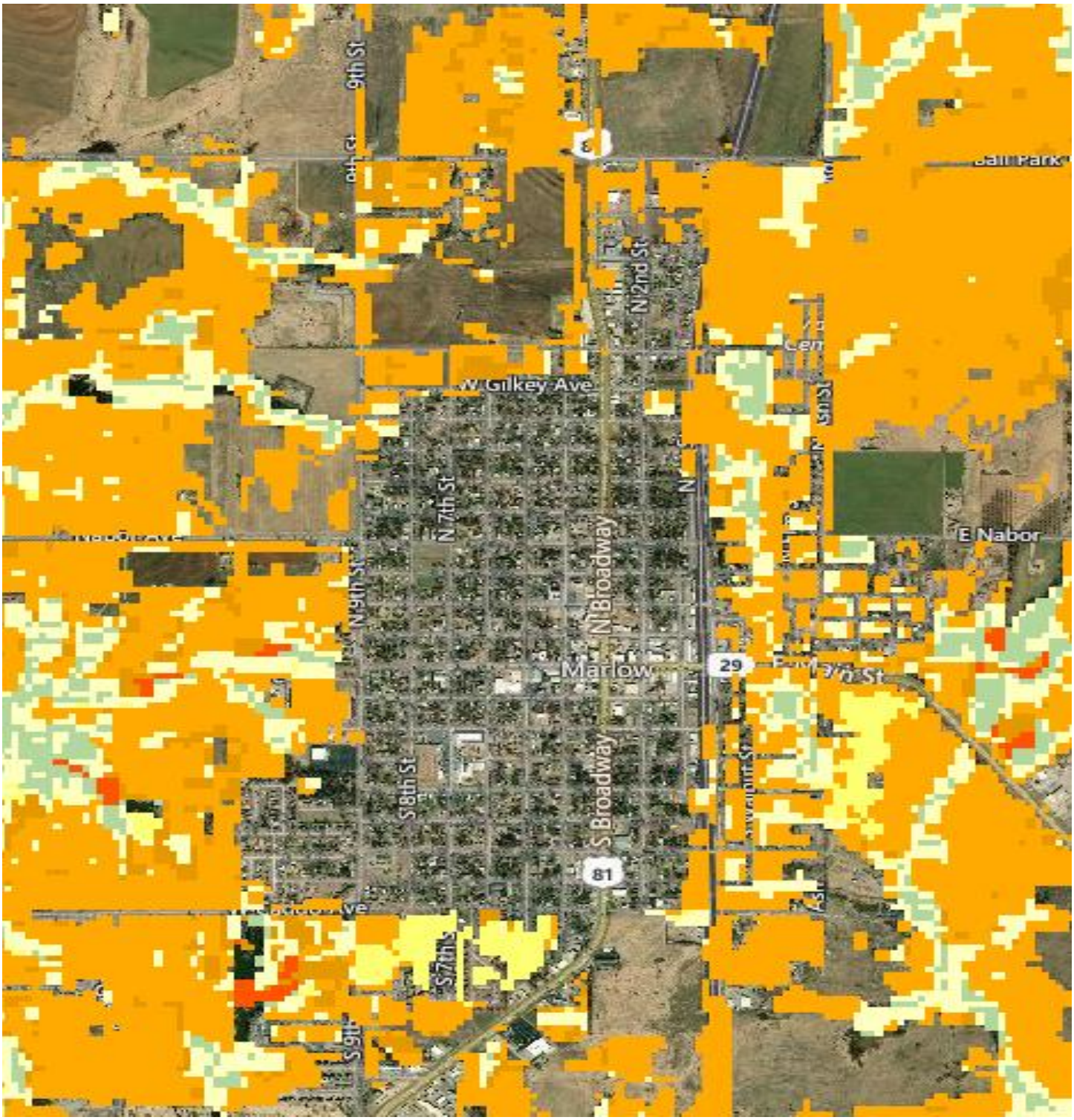

CENTRAL HIGH
MARLOW
BRAY
EMPIRE CITY
GRANDVIEW
COMANCHE
LOCO
VELMA
DUNCAN
Local Road
Interstate
Expressway
Principal Arterial
Minor Arterial
Major Collector HWY
Major Collertor Coun
Minor Collector
Local Road
CITY LIMITS
URBANIZED BOUNDARY
Stephens County
RURAL FUNCTIONAL
CLASSIFICATION (2010)

APPENDIX 2

THIS LEGEND IS USED BY THE SOUTHERN GROUP OF STATES IN THE MAPS FOLLOWING THIS PAGE AS AN URBAN INTERFACE WILDFIRE RISK ASSESSMENT

Fire Danger Rating System		
Rating	**Basic Description**	**Detailed Description**
1-LOWEST	MINIMAL WILDFIRE IMPACTS	Consider implementing wildfire mitigation strategies to better protect your home and property
1.5	MINIMAL TO LOW WILDFIRE IMPACTS	Consider implementing wildfire mitigation strategies to better protect your home and property.
2-LOW	LOW WILDFIRE IMPACTS	Consider implementing wildfire mitigation strategies to better protect your home and property
2.5	LOW TO MODERATE WILDFIRE IMPACTS	Take action towards implementing wildfire mitigation strategies to better protect you home and property.
3-MODERATE	MODERATE DIRECT WILDFIRE IMPACTS	Take action towards implementing wildfire mitigation strategies to better protect you home and property.
3.5	MODERATE TO HIGH WILDFIRE IMPACTS	Take action towards implementing wildfire mitigation strategies to better protect you home and property.
4-HIGH	HIGH WILDFIRE IMPACTS	Take action now towards implementing wildfire mitigation strategies to better protect you home and property.
4.5	VERY HIGH WILDFIRE IMPACTS	Take action nowtowards implementing wildfire mitigation strategies to better protect you home and property.
5-HIGHEST	HIGHEST WILDFIRE IMPACTS	Take action nowtowards implementing wildfire mitigation strategies to better protect you home and property.

APPENDIX 2

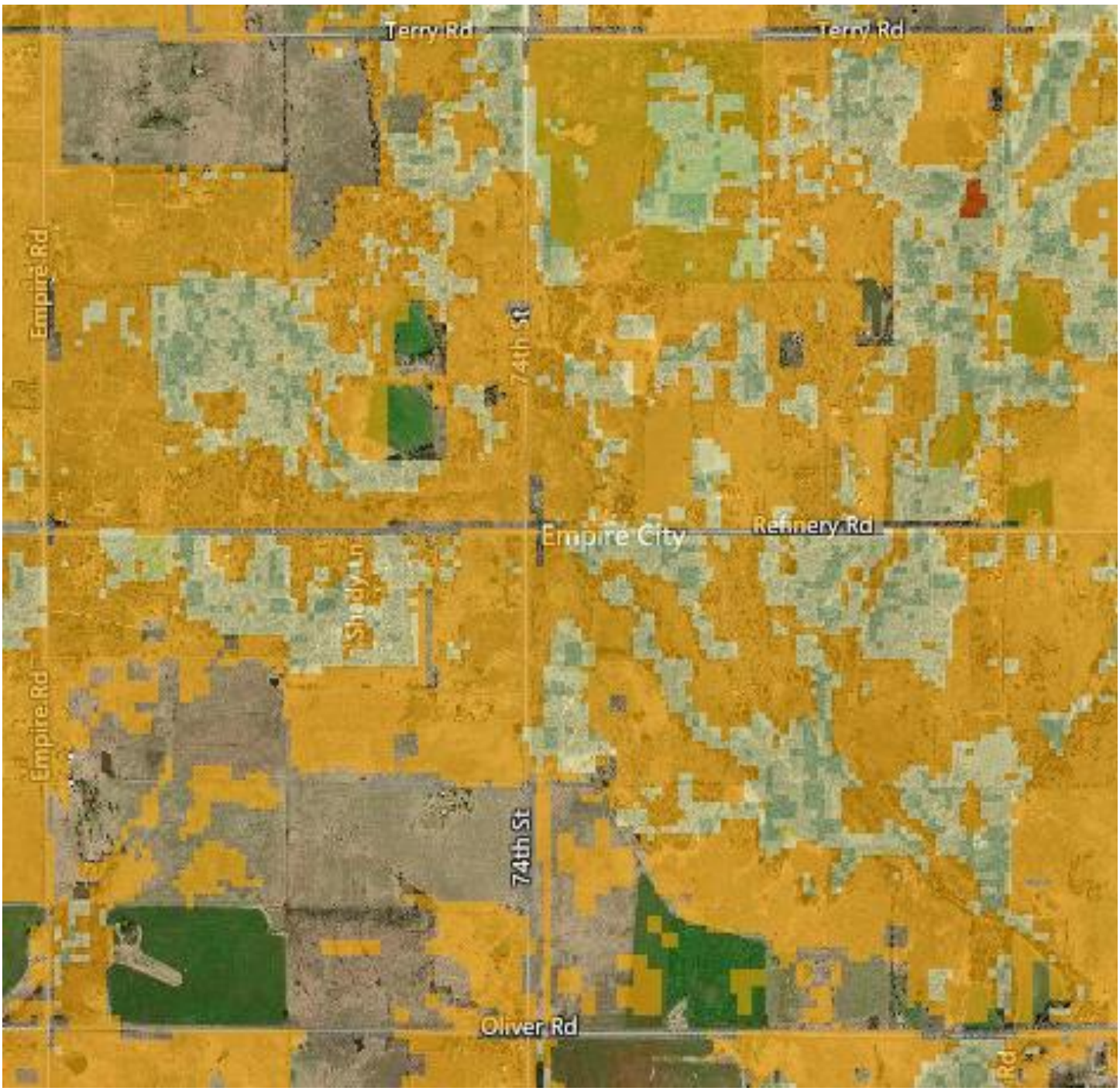


Marlow, Oklahoma
34.64767 N -97.95768

Consider implementing wildfire mitigation strategies to better protect your home and property.

MODERATE WILDFIRE
FIRE IMPACT W,SW,NE

APPENDIX 2

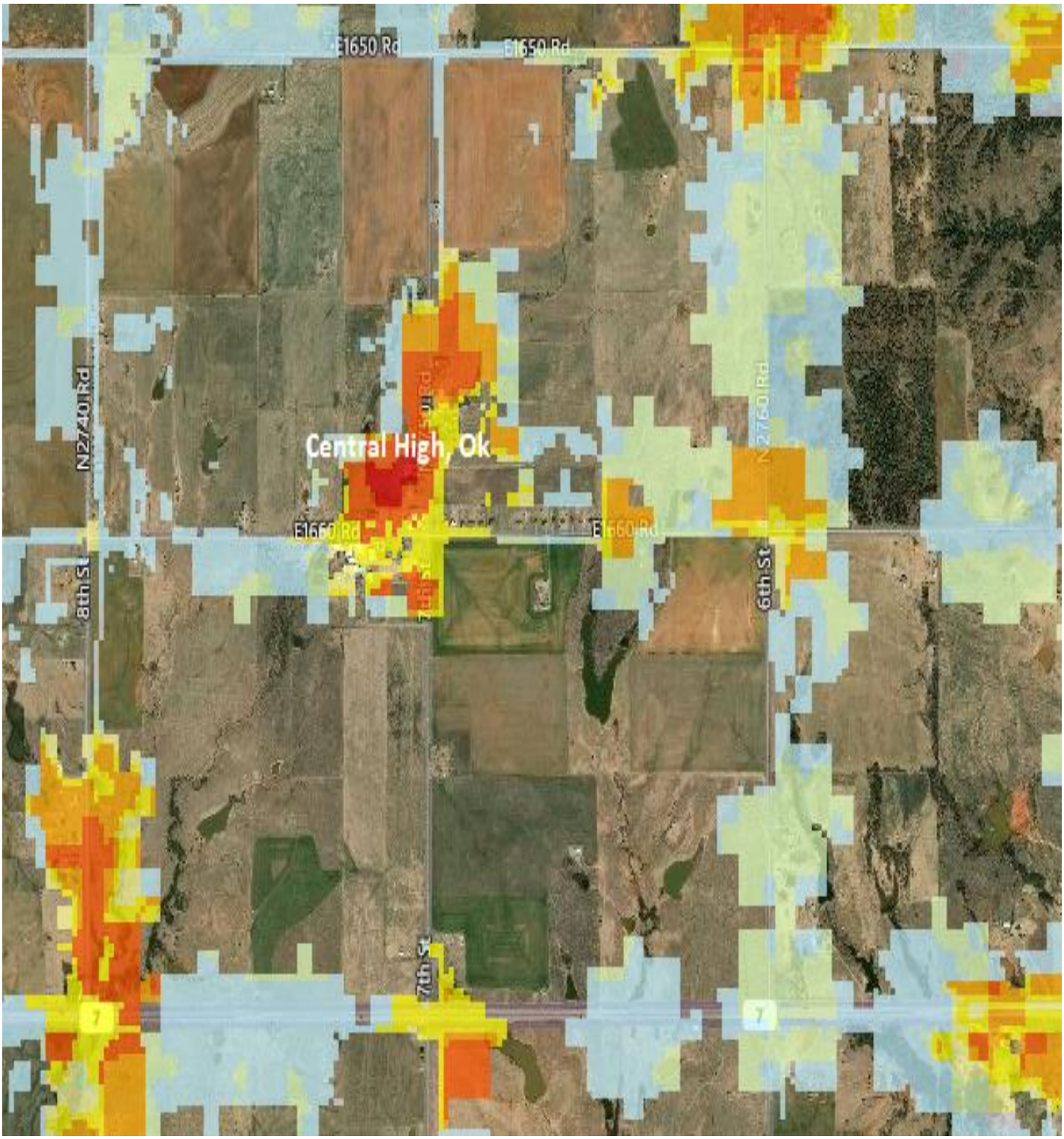


EMPIRE CITY, Oklahoma
34.4497 -97.9748

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

MODERATE WILDFIRE IMPACTS N,S,E,W

APPENDIX 2

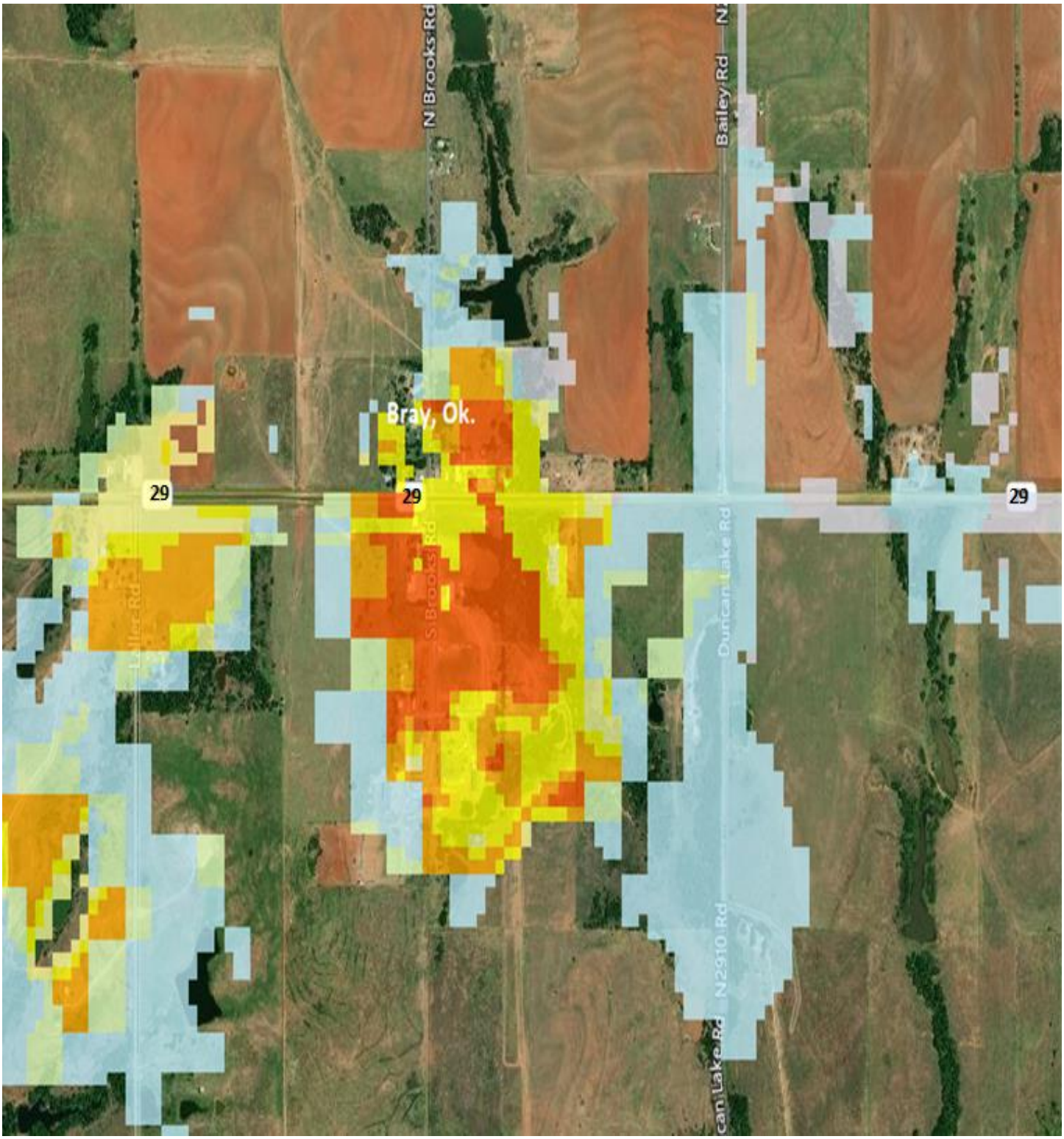


Central High, Oklahoma
34.62315 N, -98.08976 W

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

MODERATE TO HIGH WILDFIRE IMPACTS FROM THE N, S

APPENDIX 2

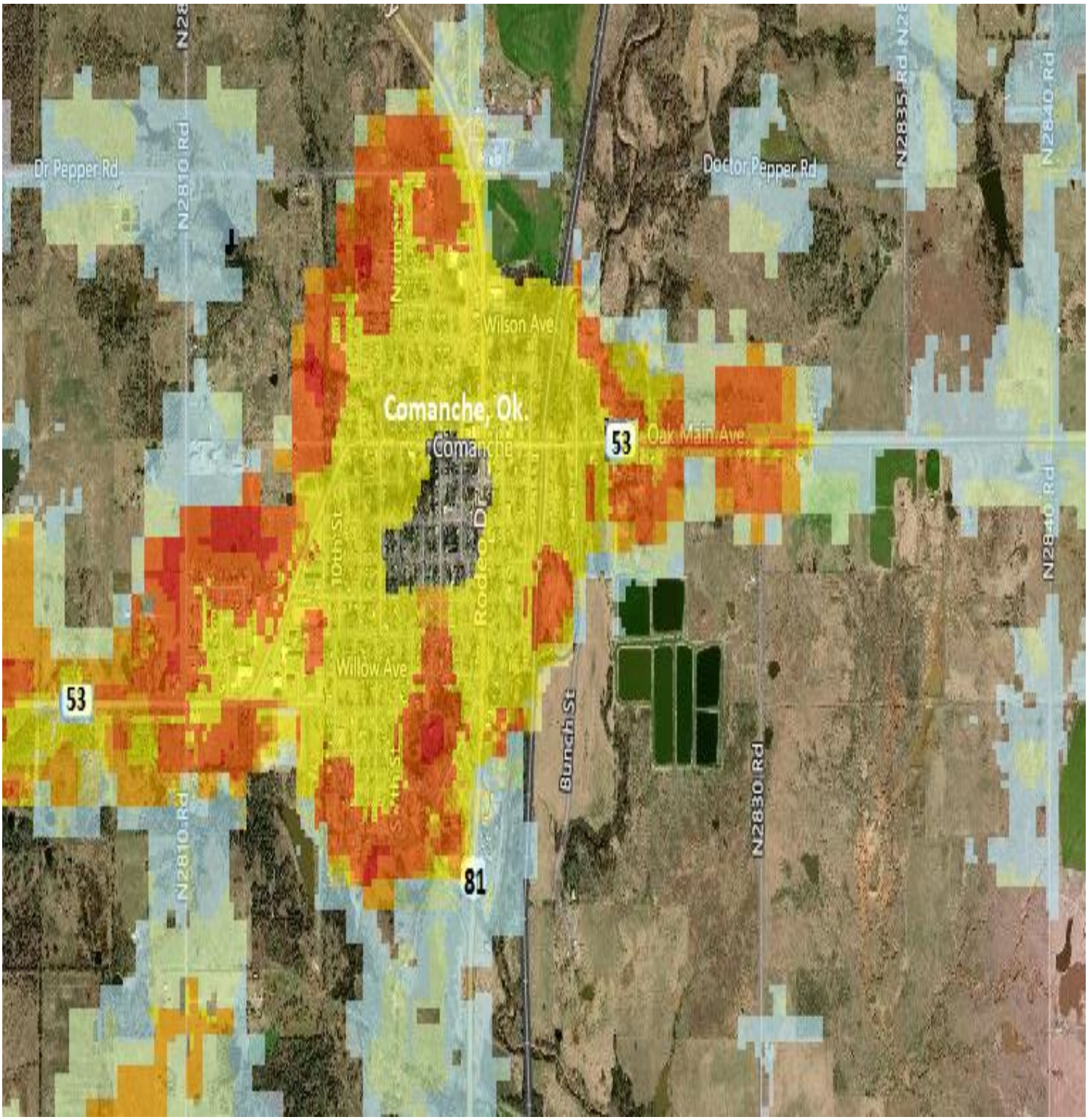


BRAY, Oklahoma
34.6379, -97.8178

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

MODERATE FROM THE NORTH TO HIGH WILDFIRE IMPACTS MAINLY SOUTH

APPENDIX 2

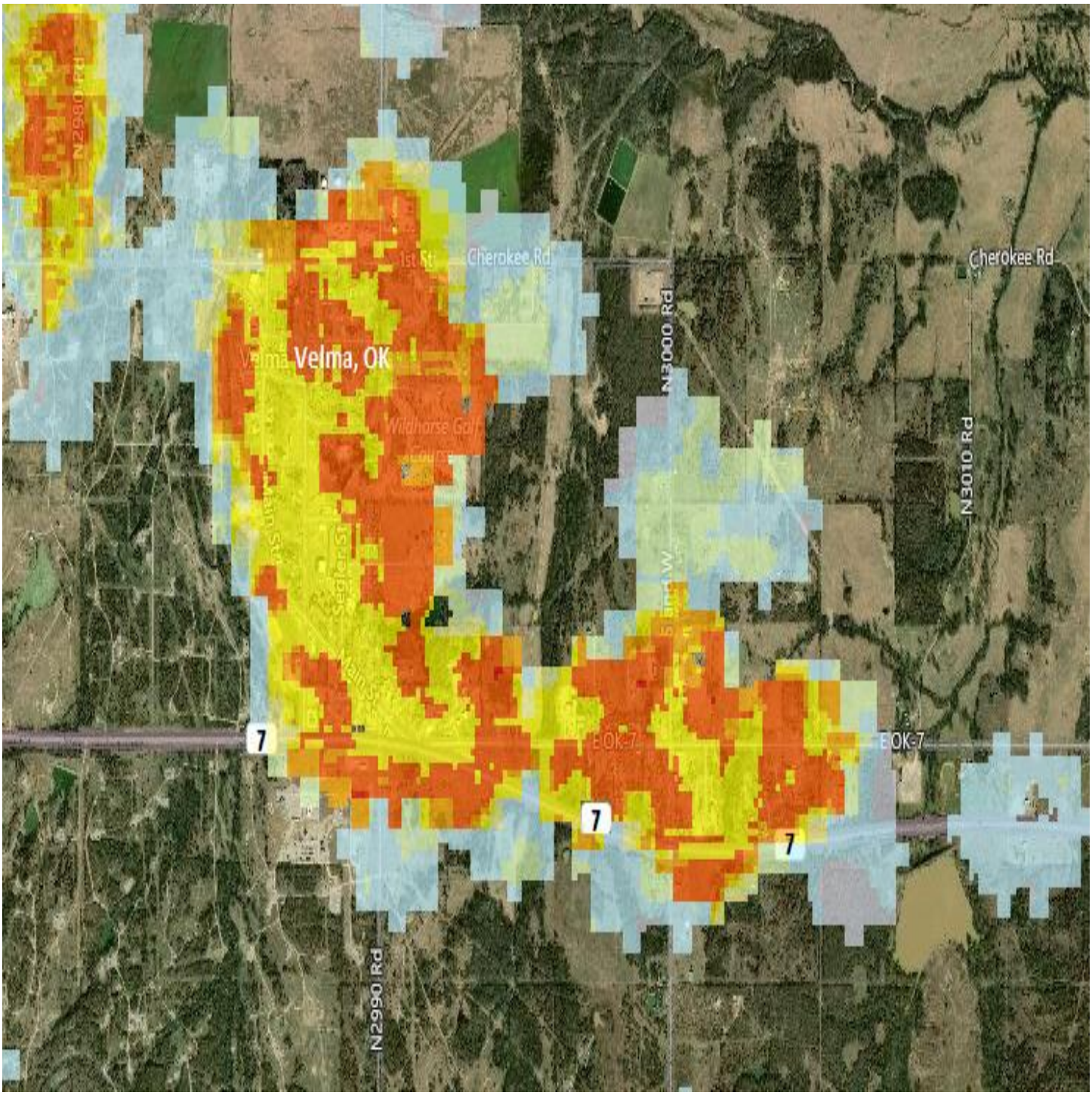


COMANCHE, Oklahoma
34.3670,-97.9671

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

LOW TO MODERATE WILDFIRE IMPACTS N, E, W, WITH HIGHER FROM SOUTH

APPENDIX 2

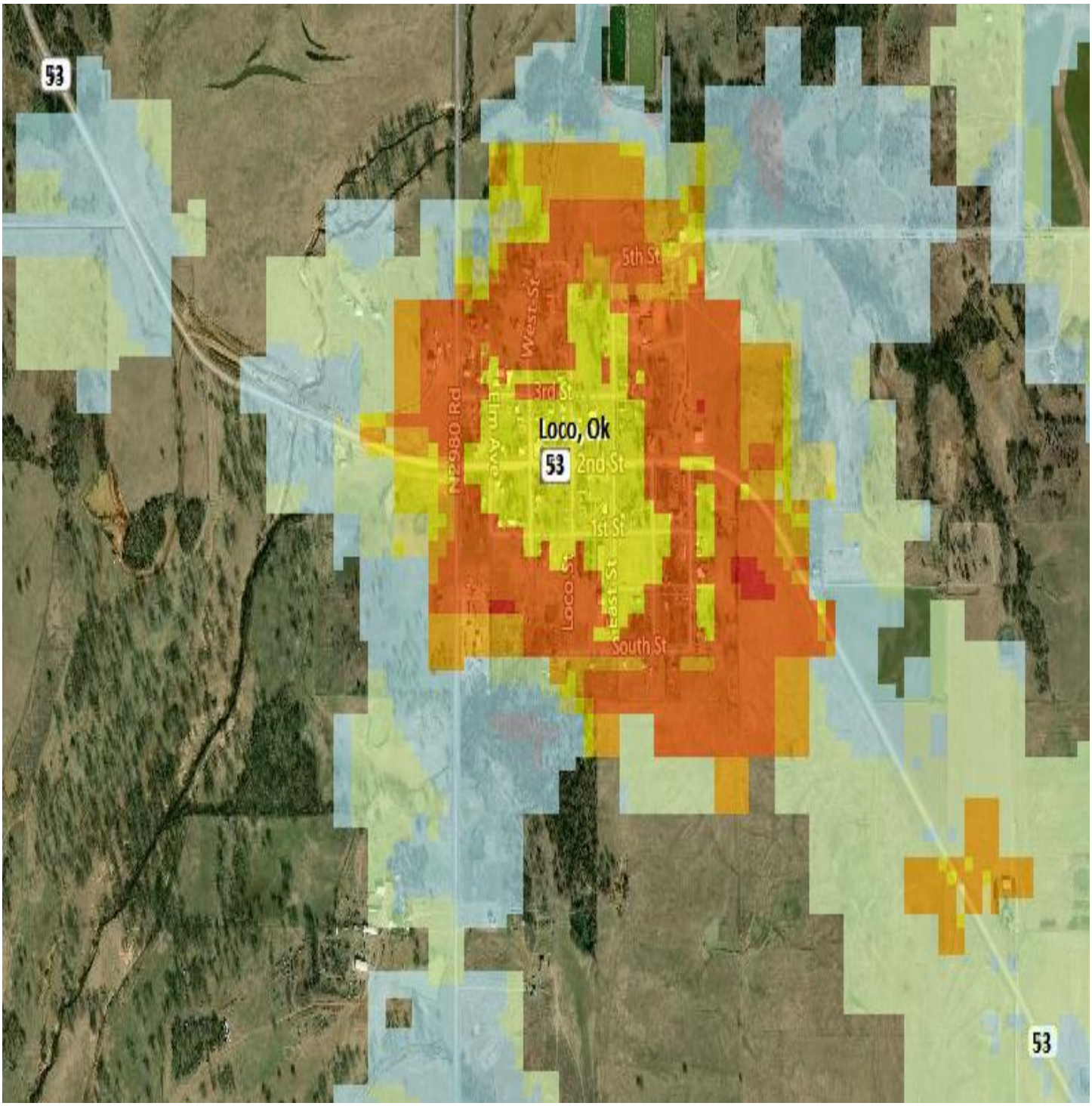


Velma, Oklahoma
34.46058, -97.67381

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

MODERATE WILDFIRE IMPACTS POSSIBLE FROM N,S,E

APPENDIX 2



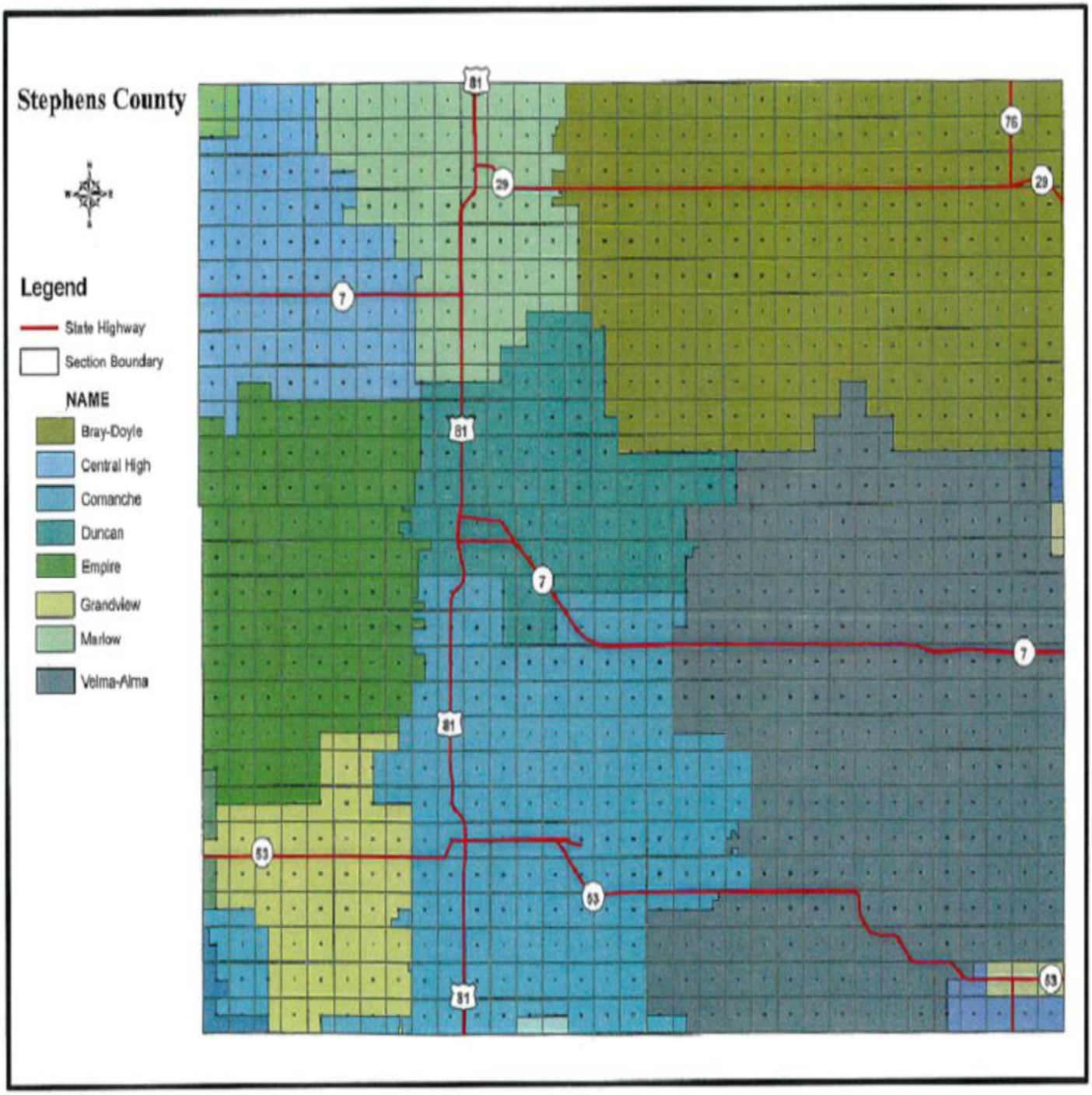
Loco, Oklahoma
34.32783, -97.67706

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

MODERATE WILDFIRE IMPACTS N, S, E, W

APPENDIX 2

STEPHENS COUNTY SCHOOL DISTRICTS



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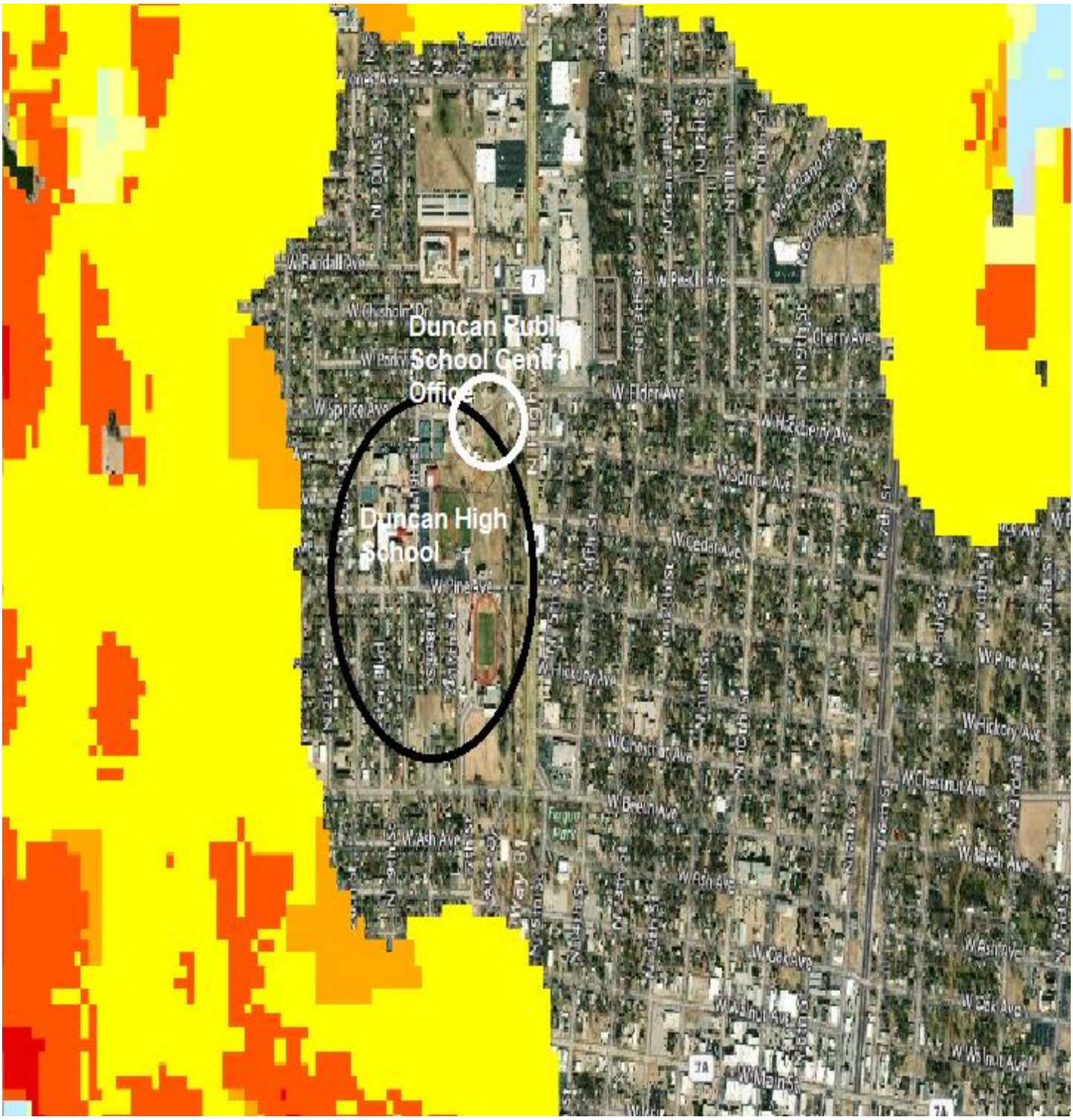
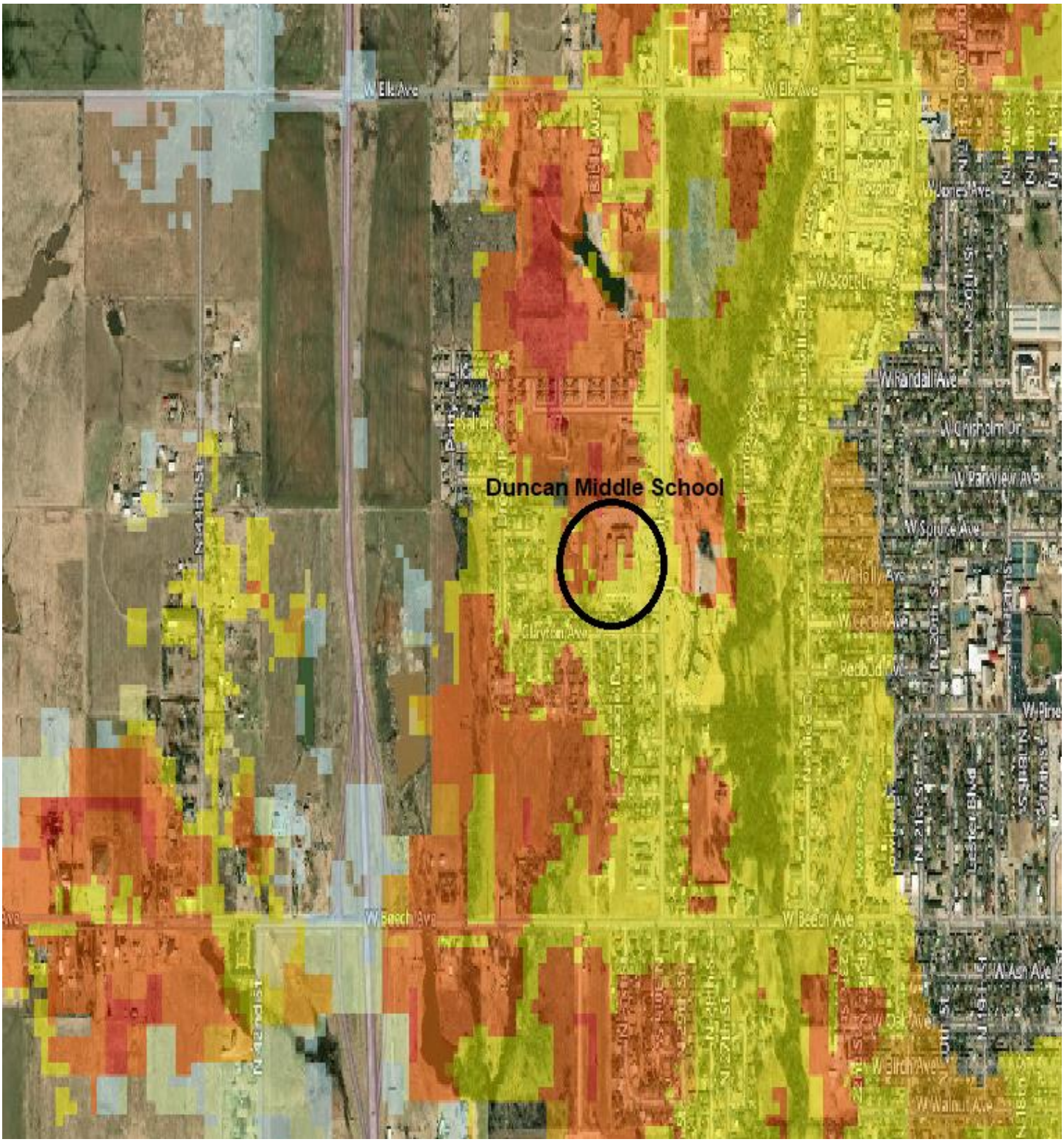


Duncan High School
34.520292, -07.963083
Duncan Public Schools Central Office
W,N,S34.513547, -97.969546

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

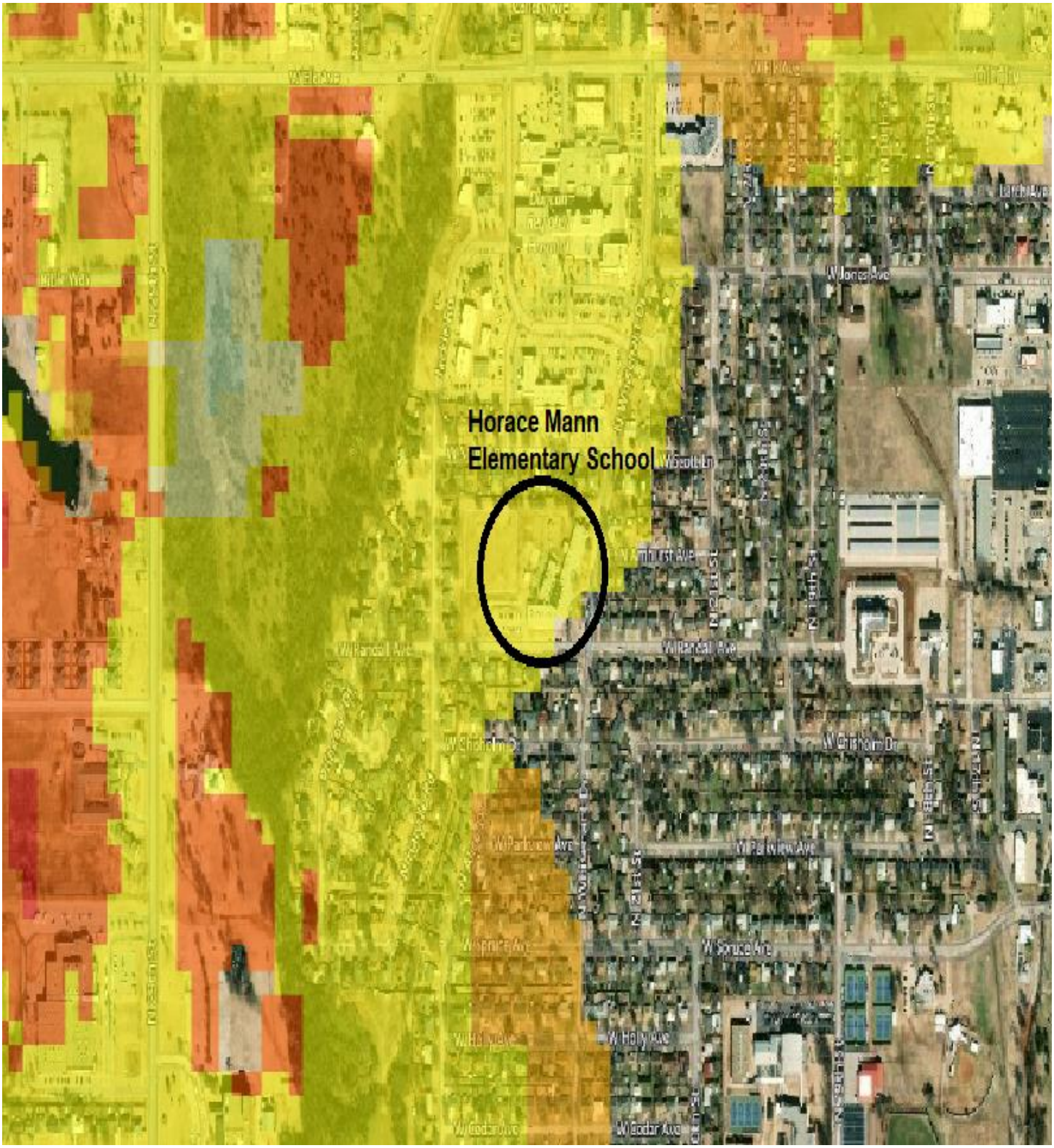
LOW TO MODERATE WILDFIRE IMPACTS MAINLY

APPENDIX 2



Duncan Middle School **34.5133, -97.9863**	**Take action towards implementing wildfire mitigation strategies to better protect your home and property.**	**WILDFIRE IMPACTS** **LOW TOMODERATE** **N,S,E,W**

APPENDIX 2



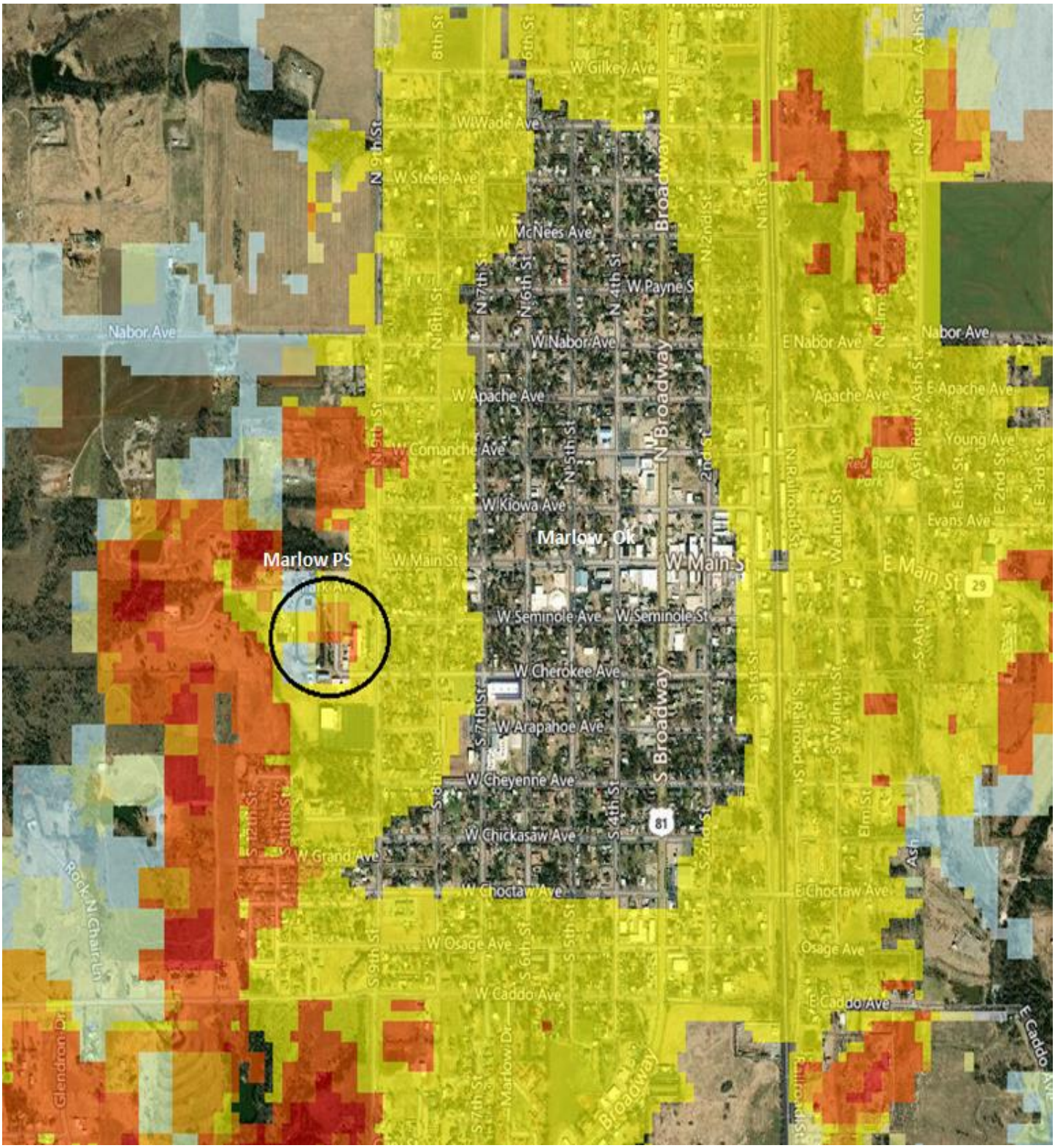
Horace Mann Elementary School
34.517076, -97.976741

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

LOW TO MODERATE WILDFIRE IMPACTS MAINLY N,W,S

APPENDIX 2

APPENDIX 2

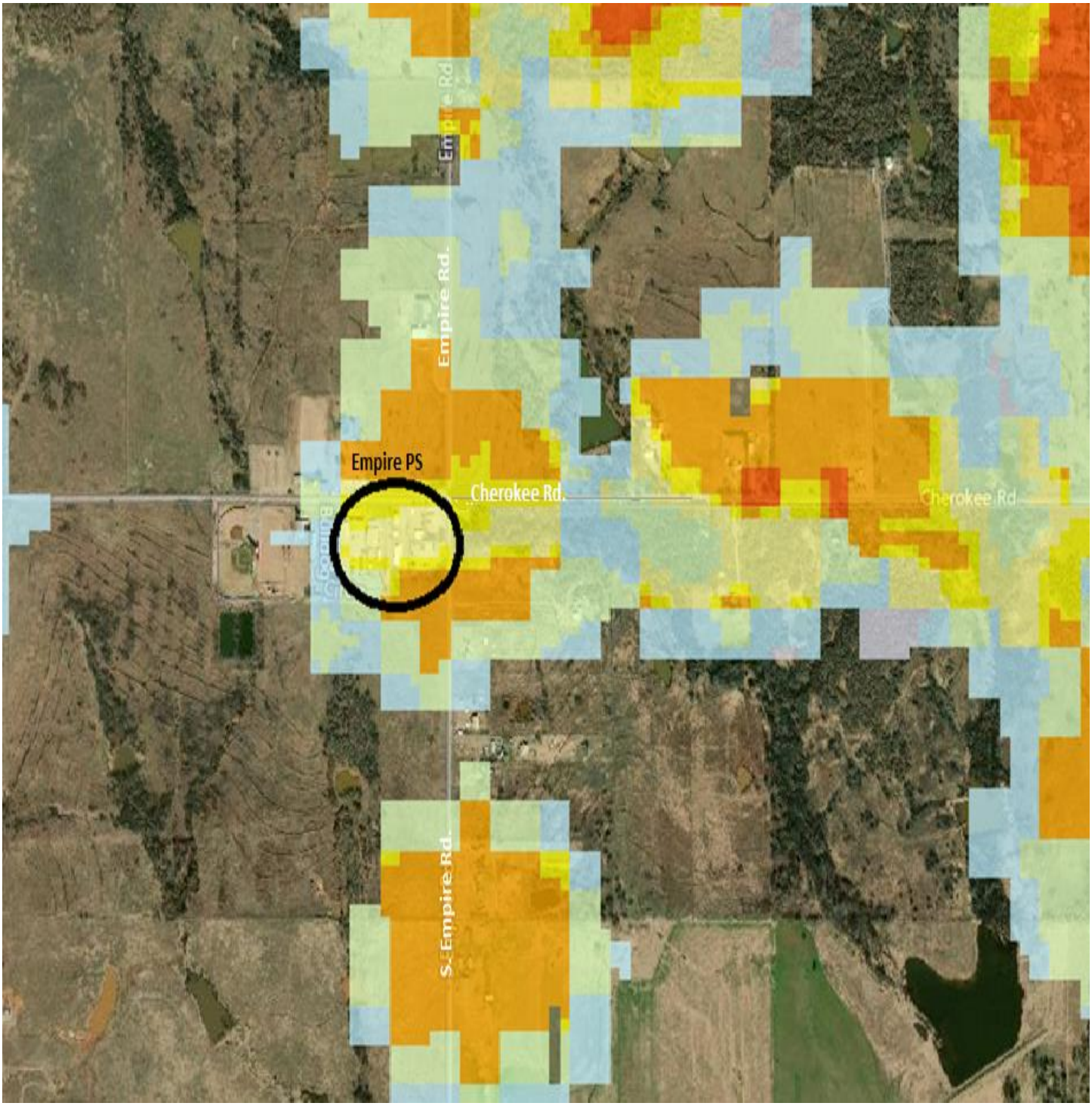


Marlow Public Schools
34.6960, -97.9683

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

LOW TO MODERATE WILDFIRE IMPACTS W

APPENDIX 2

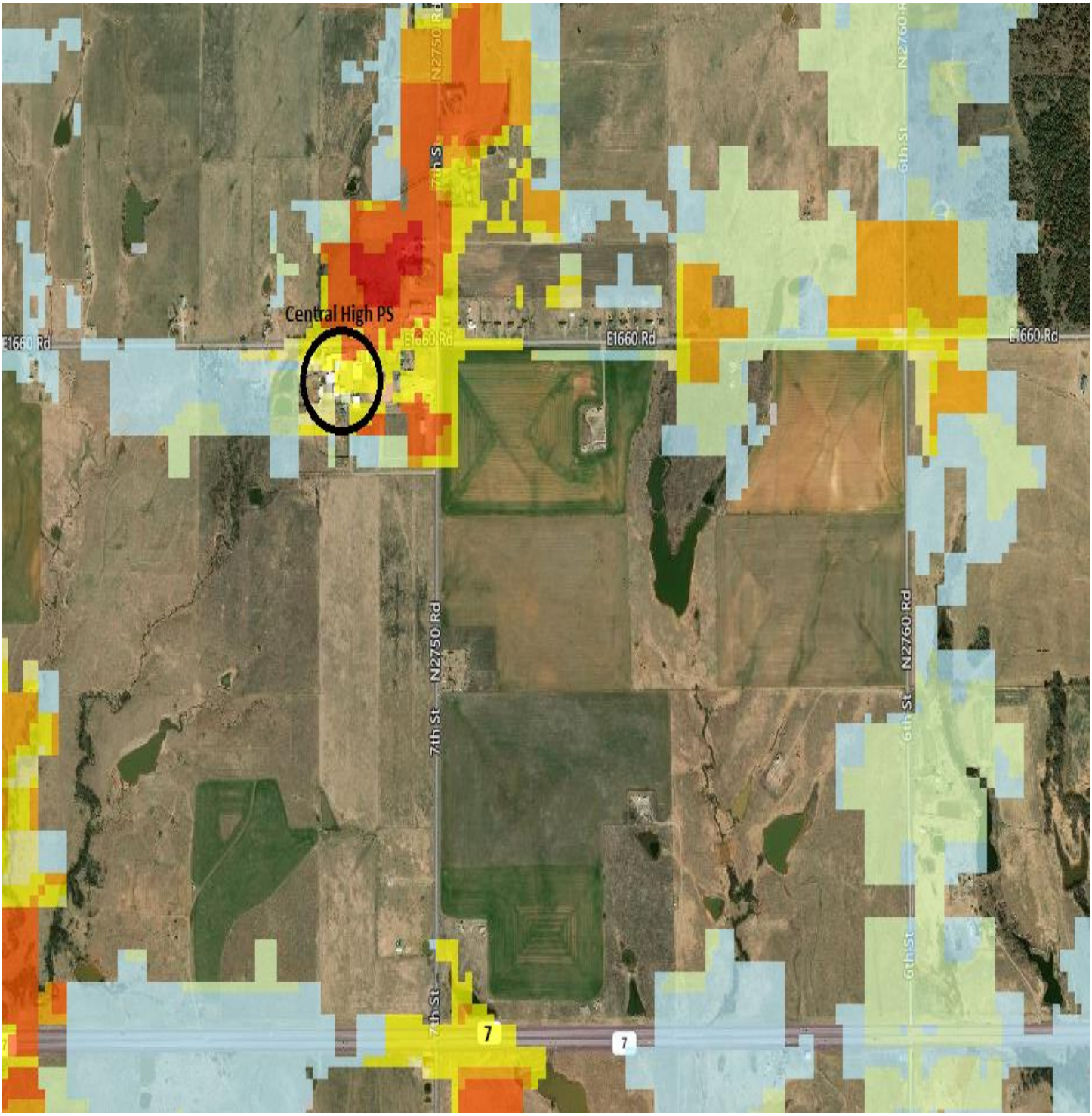


Empire Public Schools
34.4631, -98.0544

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

LOW TO MODERATE WILDFIRE IMPACTS MAINLY N, S

APPENDIX 2



Central High Public School
34.4636, -98.0525

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

MODERATE TO HIGH WILDFIRE IMPACTS MAINLY FROM NORTH

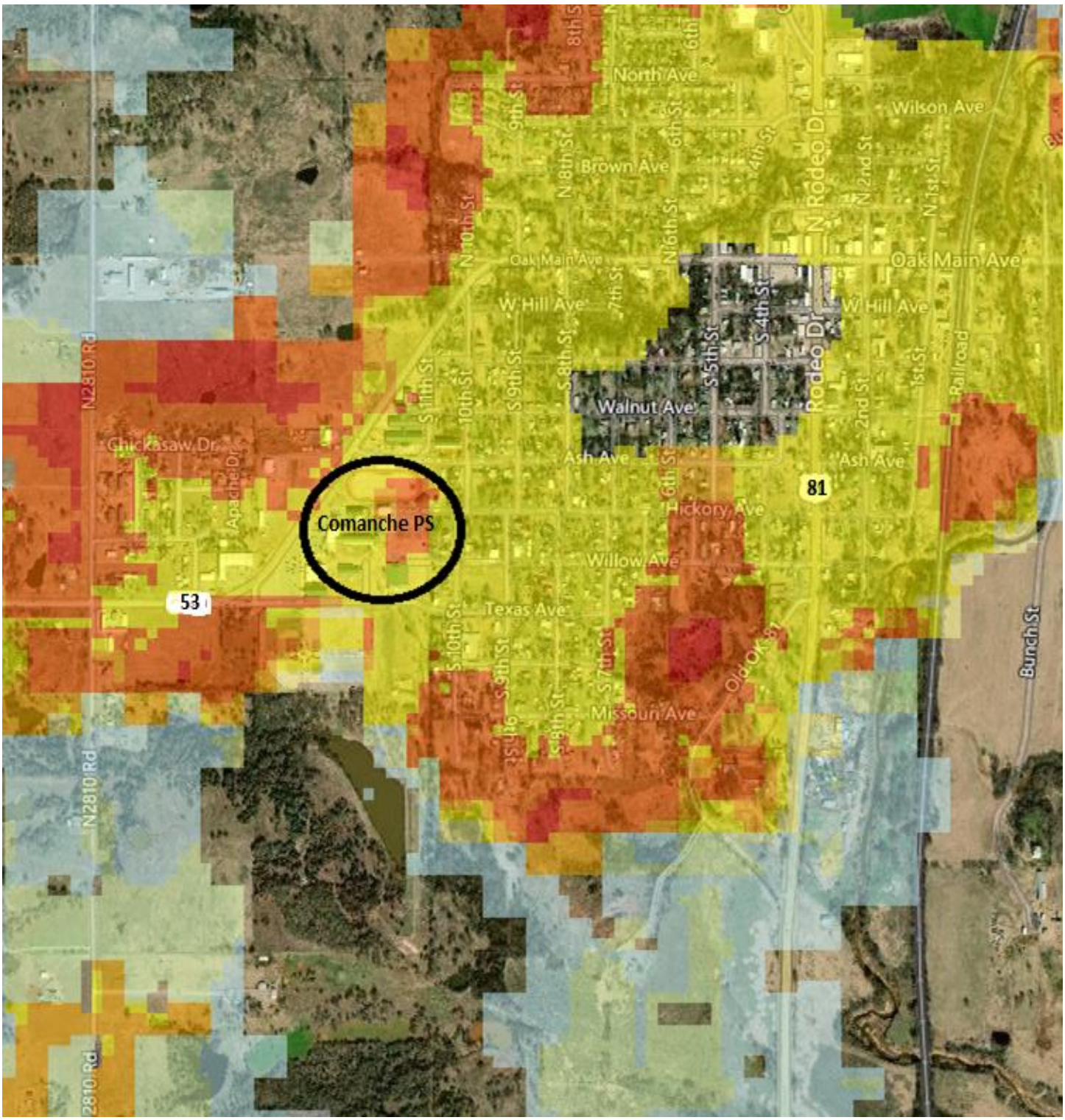
APPENDIX 2

Bray Public School
34.6335, -97.8175

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

MODERATE WILDFIRE IMPACTS FROM N,S,E,W

APPENDIX 2

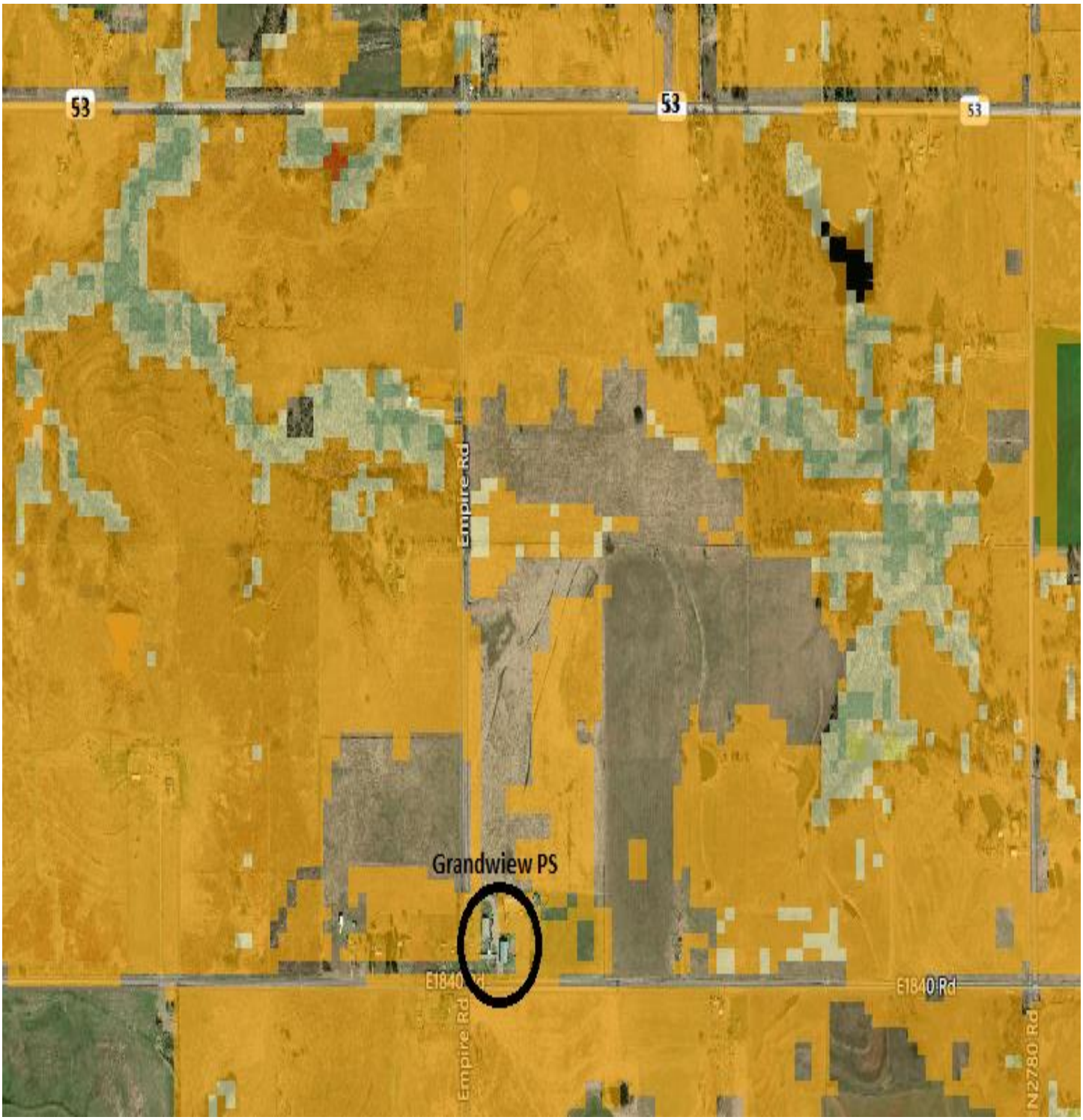


Comanche Public School
34.3636, -97.9741

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

LOW TO MODERATE WILDFIRE IMPACTS MAINLY WEST, LOWER N,S,E

APPENDIX 2

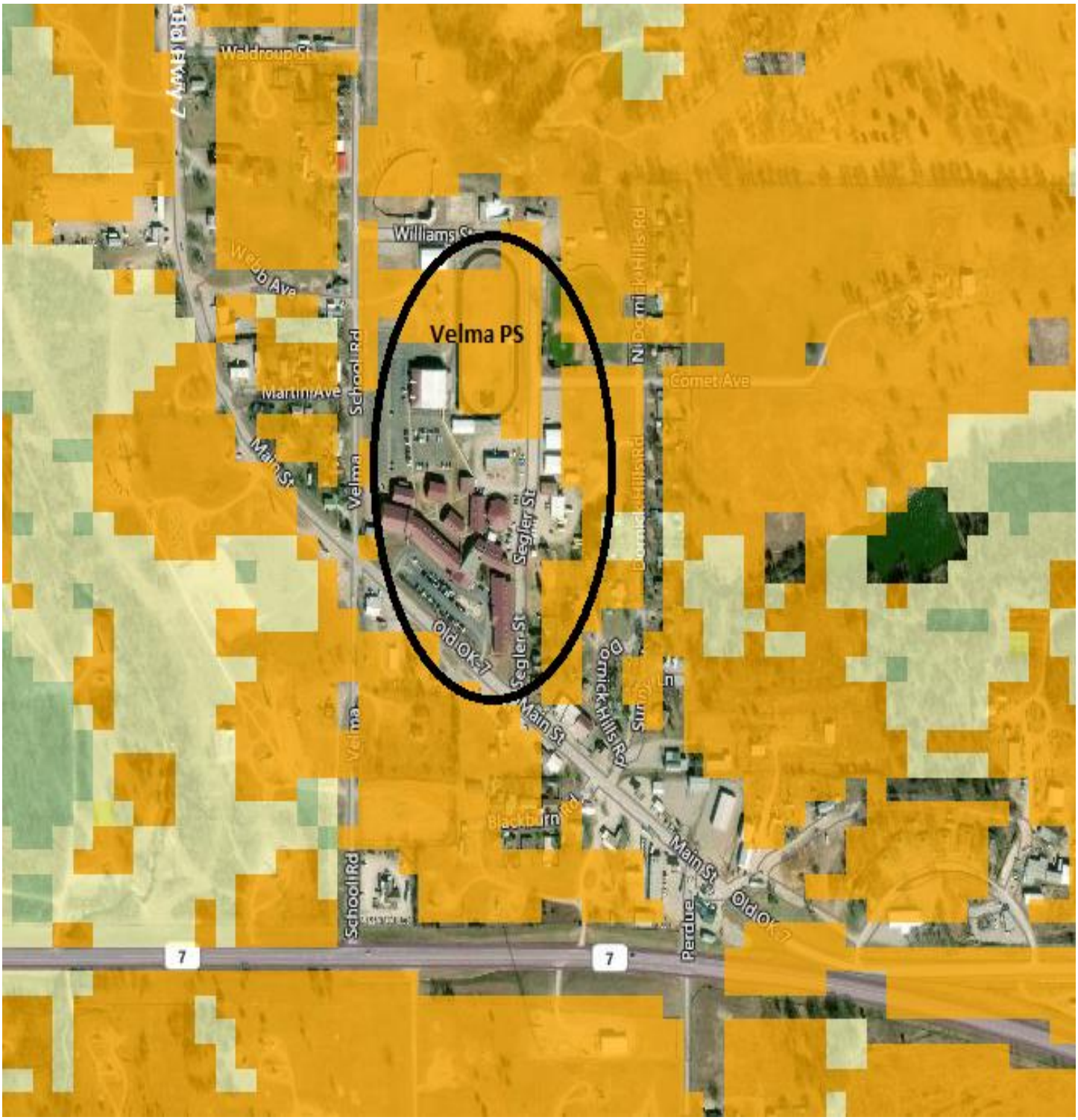


Grandview Public School
34.3483, -98.0507

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

MODERATE WILDFIRE IMPACTS N, S, E, W

APPENDIX 2



Velma Public School
34.4526, -97.6699

Take action towards implementing wildfire mitigation strategies to better protect your home and property.

MODERATE WILDFIRE IMPACTS
__SW, NE

APPENDIX 3

STEPHENS COUNTY
LOCATION OF
CRITICAL FACILITIES

Grandview School
-98° 3'4.187" W
34°20'53.961" N

Comanche School
-97°58'34.59" W
34°21'47.244" N

Comanche Water Supply
-97°57'54.393" W
34°21'47.244" N

Comanche City Hall/Fire Dept.
-97°57'48.857" W
34°22'22.457" N

Velma City Hall
-97°40'15.378" W
34°27'7.547" N

Velma Fire Station
-97°40'15.324" N
34°27'6.244" N

Velma School
-97°40'113.24" W
34°27'10.191" N

Loco Fire Dept.
-97°40'51.234" W
34°19'45.405" N

Marlow City Hall
-97°57'19.657" W
34°38'51.345" N

Marlow Fire Dept.
-97°57'21.109" W
34°38'55.131" N

Marlow School Bldg # 1
-97°58'3.614" W
34°38'38.649" N

Marlow School Bldg # 2
-97°58'5.406" W
34°38'41.894" N

Marlow School Bldg # 3
-97°58'3.471" W
34°38'45.309" N

Marlow School Bldg # 4
-97°57'47.519" W
34°38'36.493" N

Marlow School Bldg # 5
-97°57'42.177" W
34°38'48.611" N

Marlow School Bldg # 6
-97°57'37.516" W
34°38'50.237" N

Doyle Fire Dept.
-97°37'58.62" W
34°37'38.31" N

Bray School
-97°49'1.792" W
34°37'59.514" N

Central High Fire Dept.
-98°5'26.155" W
34°36'28.32" N

Central High School
-98°5'32.178" W
34°36'29.178" N

Empire Fire Dept.
-98°3'11.178" W
34°27'47.612" N

Marlow School Bldg # 1
-97°58'3.614" W
34°38'38.649" N

Marlow School Bldg # 2
-97°58'5.406" W
34°38'41.894" N

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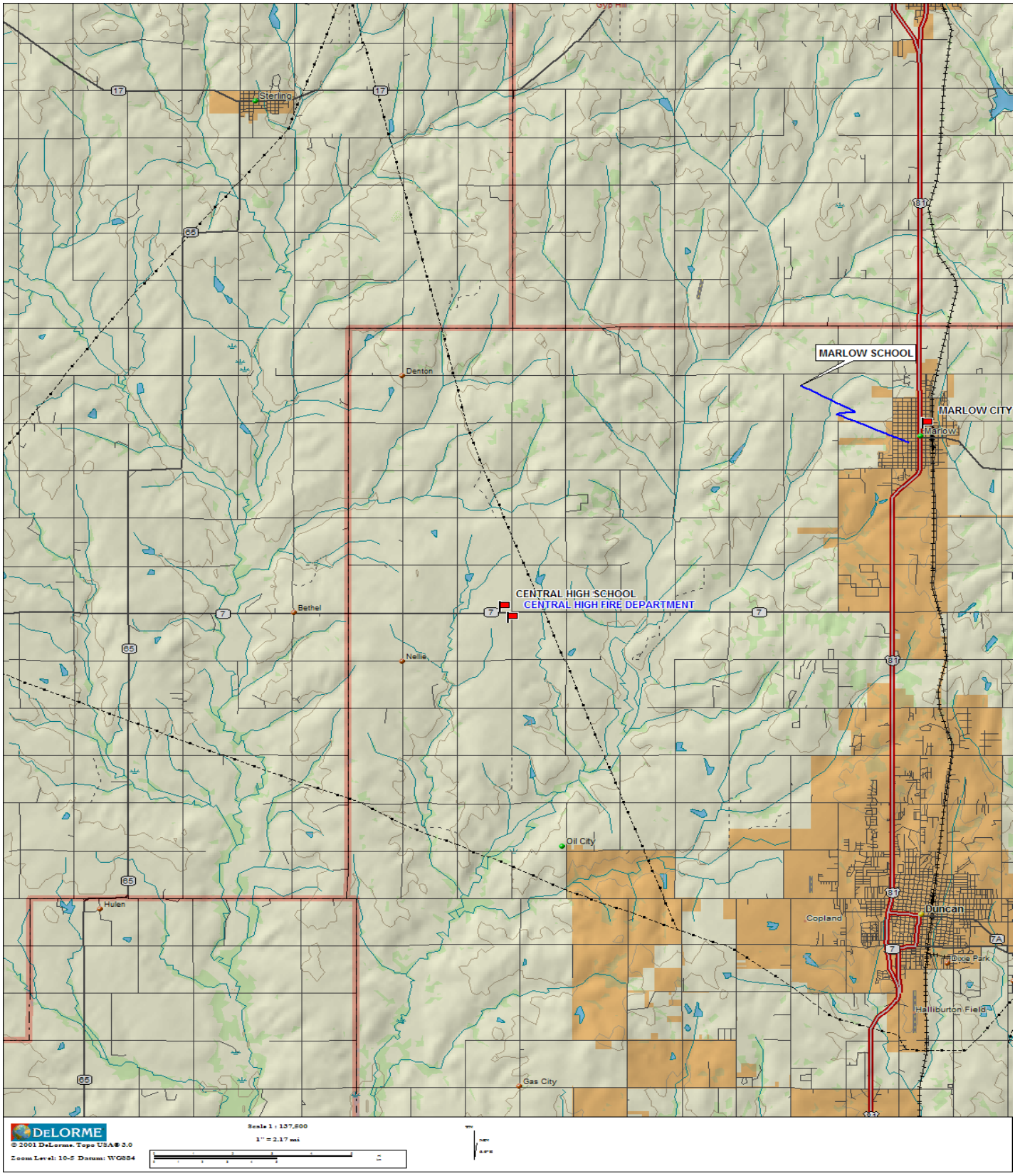
34°36'28.32" N

Central High School
-98°5'32.178" W
34°36'29.178" N

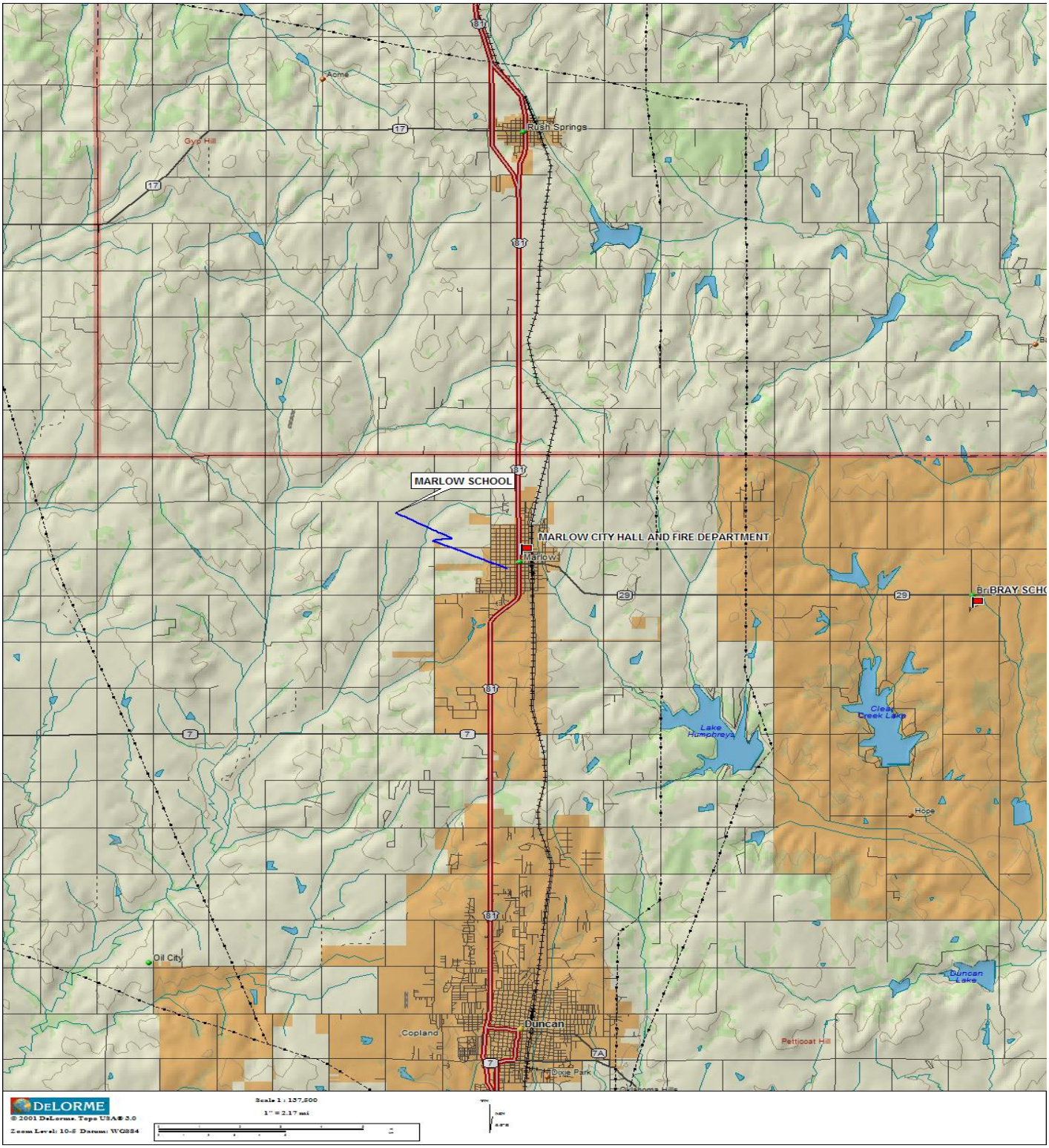
Empire Fire Dept.
-98°3'11.178" W
34°27'47.612" N

Empire School
-98°3'18.076" W
34°27'48.01" N

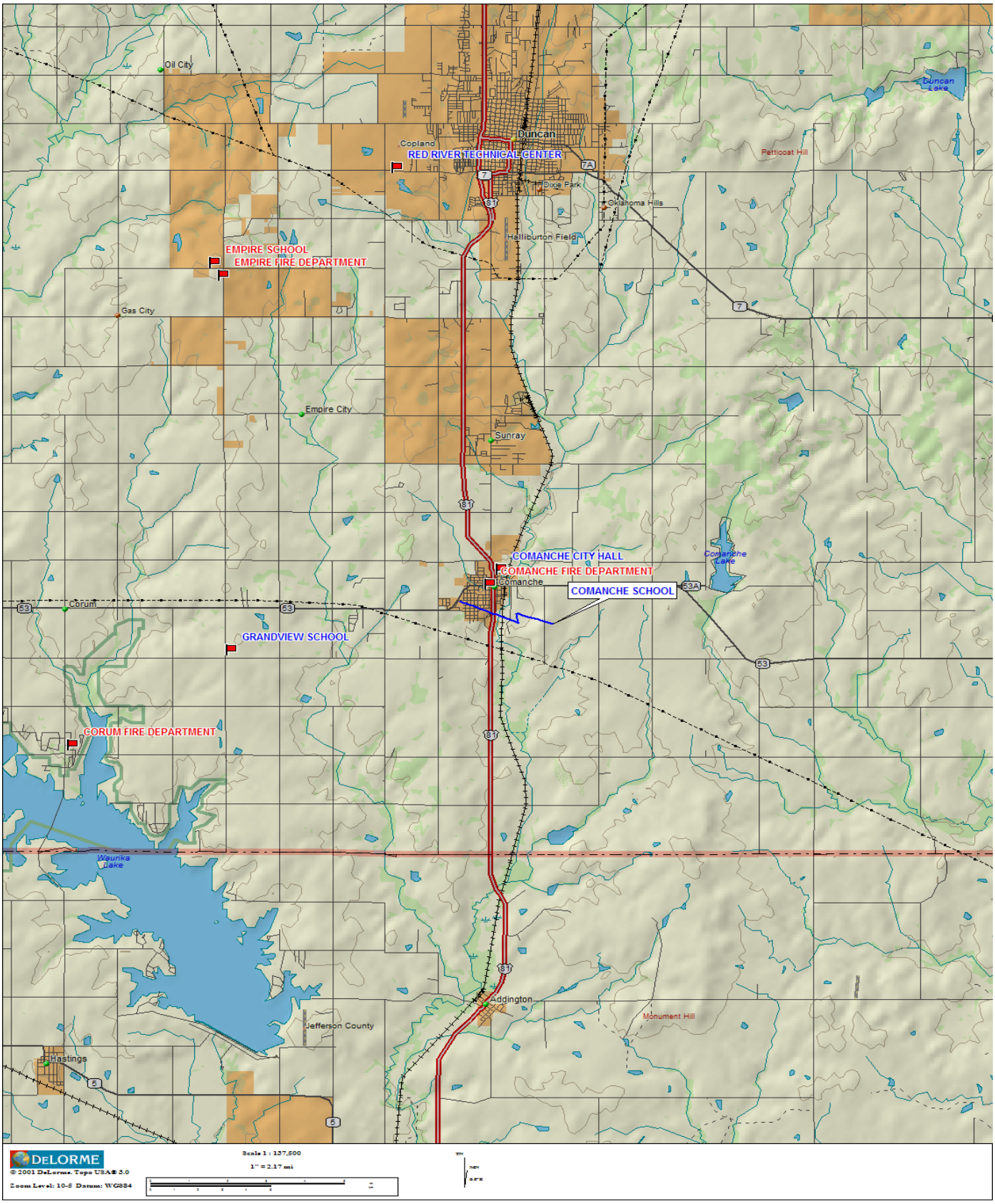
APPENDIX 3
CRITICAL FACILITY MAPS



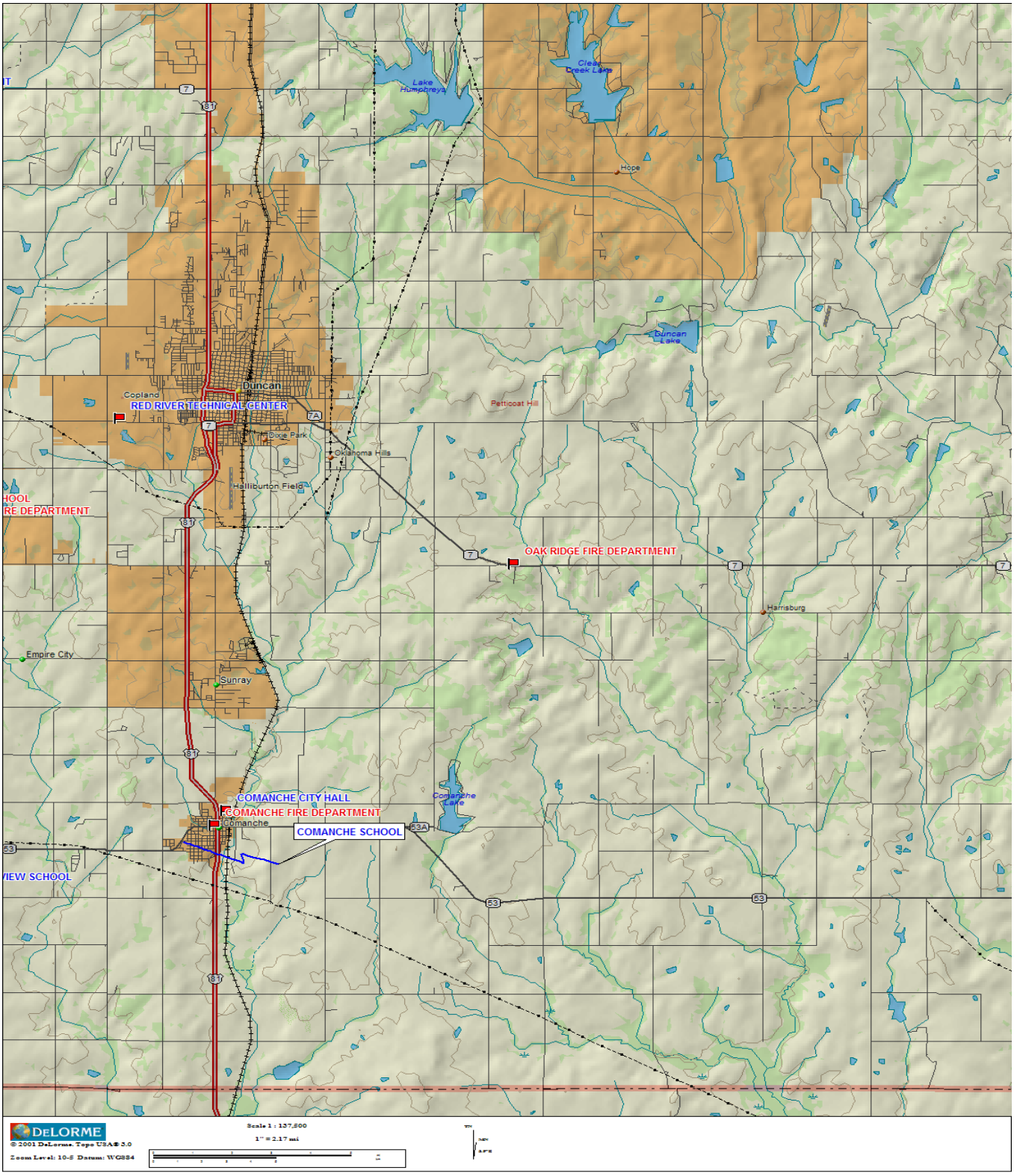
APPENDIX 3
CRITICAL FACILITY MAPS



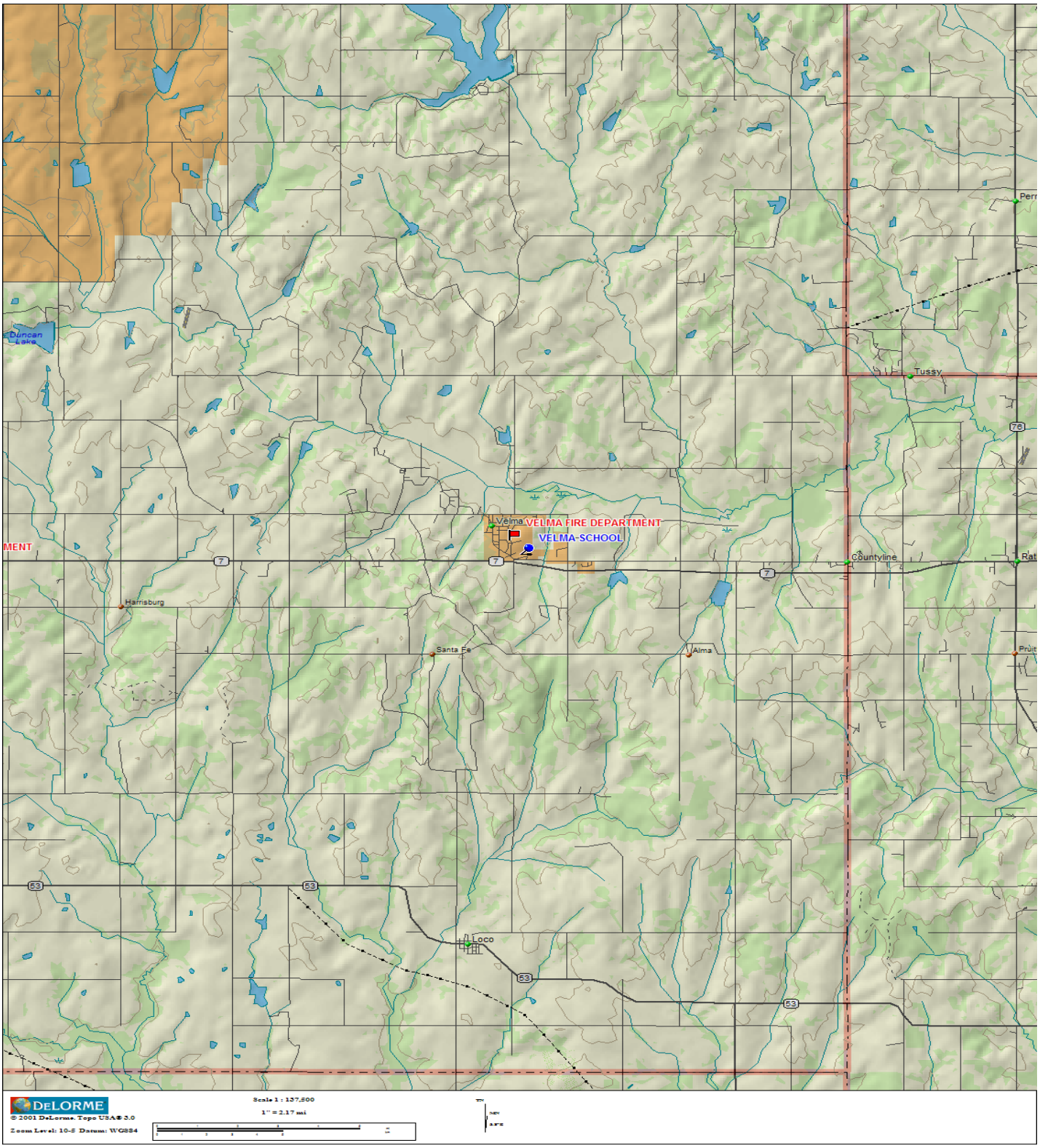
APPENDIX 3
CRITICAL FACILITY MAPS



APPENDIX 3
CRITICAL FACILITY MAPS



APPENDIX 3
CRITICAL FACILITY MAPS



APPENDIX 4

RESOLUTION DOCUMENTS FROM JURISDICTIONS

RESOLUTION

RESOLUTION 2019-23

STATE OF OKLAHOMA

COUNTY OF STEPHENS

WHEREAS, on this 13 day of May, 2019 the County Commissioners of Stephens County met in regular session with the following members present Todd Churchman (Chairman) Russell Morgan (Member) Kreg Murphree (Member) and Jenny Moore County Clerk.

MOTION was made by Todd Churchman and seconded by Russell Morgan that the Multi-Jurisdiction Natural Hazard Mitigation Plan for Stephens County, Oklahoma be adopted.

Dated this 13 day of May, 2019

Jenny Moore
COUNTY CLERK

X _____ CHAIRMAN

X Russell Morgan
MEMBER

X _____
MEMBER

COUNTY CLERK COUNTY, OK STEPHENS

APPENDIX 4

RESOLUTION NUMBER 437

A RESOLUTION OF THE CITY OF MARLOW OF STEPHENS COUNTY, OKLAHOMA, ADOPTING THE STEPHENS COUNTY MULTI-JURISDICTION NATURAL HAZARD MITIGATION PLAN

WHEREAS, the Stephens County Commissioners has worked with the Stephens County Emergency Management to prepare and adopt a Multi-Jurisdiction Natural Hazard Mitigation Plan; and

WHEREAS, the City of Marlow of Stephens County, being a legal entity in the State of Oklahoma and being located in Stephens County, Oklahoma, petitioned the Board of County Commissioners of Stephens County for inclusion into the Multi-Jurisdiction Natural Hazard Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED by the City Council of the City of Marlow, Stephens County, Oklahoma:

Section 1. Adoption of Plan.

The City of Marlow adopts the Stephens County Multi-Jurisdiction Natural Hazard Mitigation Plan.

PASSED, APPROVED AND ADOPTED THIS 28TH DAY OF MAY 2019.

By: _____

By: Betty L. Mackey

APPENDIX 4

RESOLUTION NUMBER 2019-1

A RESOLUTION OF THE TOWN OF VELMA OF STEPHENS, OKLAHOMA, ADOPTING THE STEPHENS COUNTY MULTI-JURSIDICTION NATURAL HAZARD MITIGATION PLAN.

WHEREAS, the Stephens County Commissioners has worked with the Stephens County Emergency Management to prepare and adopt a Multi-Jurisdiction Natural Hazard Mitigation Plan: and

WHEREAS, the Town of Velma of Stephens County, being a legal entity in the State of Oklahoma and being located in Stephens County, Oklahoma, petitioned the Board of County Commissioners of Stephens County for inclusion into the Multi-Jurisdiction Natural Hazard Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED by the Town Board of Trustees of the Town of Velma, Stephens County, Oklahoma:

Section 1. **Adoption of Plan.**

The Town of Velma adopts the Stephens County Multi-Jurisdiction Natural Hazard Mitigation Plan.

PASSED, APPROVED AND ADOPTED THIS 29 **DAY OF** May.

By:_____
Mayor

BY:_____
Town Clerk

APPENDIX 4

RESOLUTION NUMBER 5-21-19

A RESOLUTION OF THE TOWN OF EMPIRE CITY OF STEPHENS, OKLAHOMA, ADOPTING THE STEPHENS COUNTY MULTI-JURSIDICTION NATURAL HAZARD MITIGATION PLAN.

WHEREAS, the Stephens County Commissioners has worked with the Stephens County Emergency Management to prepare and adopt a Multi-Jurisdiction Natural Hazard Mitigation Plan: and

WHEREAS, the Town of Empire City of Stephens County, being a legal entity in the State of
Oklahoma and being located in Stephens County, Oklahoma, petitioned the Board of County Commissioners of Stephens County for inclusion into the Multi-Jurisdiction Natural Hazard Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED by the Town Board of Trustees of the Town of Empire City, Stephens County, Oklahoma:

Section 1. Adoption of Plan.

The Town of Empire City adopts the Stephens County Multi-jurisdiction Natural Hazard Mitigation Plan.

PASSED, APPROVED AND ADOPTED THIS 5/21/2019

By: Perry J. Bainiga Jr **DAY OF** 5-21-2019

BY: Irma Ramirez

APPENDIX 4

RESOLUTION NUMBER 329-19

A RESOLUTION OF THE MAYOR AND CITY COUNCIL OF THE CITY OF COMANCHE, STEPHENS, OKLAHOMA ADOPTING THE STEPHENS COUNTY MULTI-JURSIDICTION NATURAL HAZARD MITIGATION PLAN.

WHEREAS, the Stephens County Commissioners has worked with the Stephens County Emergency Management to prepare and adopt a Multi-Jurisdiction Natural Hazard Mitigation Plan: and

WHEREAS, the City of Comanche of Stephens County, being a legal entity in the State of
Oklahoma and being located in Stephens County, Oklahoma, petitioned the Board of County Commissioners of Stephens County for inclusion into the Multi-Jurisdiction Natural Hazard Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED by the Mayor and City Council, Stephens County, Oklahoma:

Section 1. **Adoption of Plan.**

PASSED AND APPROVED by the City Council of the City of Comanche, Stephens County, Oklahoma this 11th **Day of** June **2019.**

PASSED, APPROVED AND ADOPTED THIS 11th day of June, 2019

By:_____ **DAY OF** 06-11-2019
Mayor

BY:_____
City Clerk

CITY OF COMANCHE
SEAL
STEPHENS COUNTY, OKLA.

APPENDIX 4

RESOLUTION NUMBER 060619

A RESOLUTION OF THE TOWN OF BRAY OF STEPHENS, OKLAHOMA, ADOPTING THE STEPHENS COUNTY MULTI-JURSIDICTION NATURAL HAZARD MITIGATION PLAN.

WHEREAS, the Stephens County Commissioners has worked with the Stephens County Emergency Management to prepare and adopt a Multi-Jurisdiction Natural Hazard Mitigation Plan: and

WHEREAS, the Town of Bray of Stephens County, being a legal entity in the State of Oklahoma and being located in Stephens County, Oklahoma, petitioned the Board of County Commissioners of Stephens County for inclusion into the Multi-Jurisdiction Natural Hazard Mitigation Plan.
NOW, THEREFORE BE IT RESOLVED by the Town Board of Trustees of the Town of Bray, Stephens County, Oklahoma:

Section 1. Adoption of Plan.

The Town of Bray adopts the Stephens County Multi-jurisdiction Natural Hazard Mitigation Plan.

PASSED, APPROVED AND ADOPTED THIS June 6, 2019

By: Sammy Richardson **DAY OF** 6-6-19

BY: Sonya Cummings, Clerk

APPENDIX 4

RESOLUTION NUMBER 6-3-19

A RESOLUTION OF THE SCHOOL BOARD OF MARLOW, STEPHENS COUNTY, OKLAHOMA ADOPTING THE STEPHENS COUNTY MULTI-JURSIDICTION NATURAL HAZARD MITIGATION PLAN.

WHEREAS, the Stephens County Commissioners has worked with the Stephens County Emergency Management to prepare and adopt a Multi-Jurisdiction Natural Hazard Mitigation Plan; and

NOW, THEREFORE BE IT RESOLVED by the School Board of Marlow, Stephens County, Oklahoma:

Section 1. Adoption of Plan.

The School Board hereby adopts the inclusion in said Stephens County Multi-Jurisdiction Natural Hazard Mitigation Plan.

PASSED, APPROVED and ADOPTED THIS 3rd **DAY OF** June,

By: _____

APPENDIX 4

RESOLUTION NUMBER 5/13/2019

A RESOLUTION OF THE SCHOOL BOARD OF RED RIVER TECHNOLOGY CENTER, STEPHENS COUNTY, OKLAHOMA ADOPTING THE STEPHENS COUNTY MULTI-JURSIDICTION NATURAL HAZARD MITIGATION PLAN.

WHEREAS, the Stephens County Commissioners has worked with the Stephens County Emergency Management to prepare and adopt a Multi-Jurisdiction Natural Hazard Mitigation Plan; and

NOW, THEREFORE BE IT RESOLVED by the School Board of Red River Technology Center, Stephens County, Oklahoma:

Section 1. Adoption of Plan.

The School Board hereby adopts the inclusion in said Stephens County Multi-Jurisdiction Natural Hazard Mitigation Plan.

PASSED, APPROVED and ADOPTED THIS 13 **DAY OF** May, 2019,

By: Dave Allen

APPENDIX 4

RESOLUTION NUMBER 051619

A RESOLUTION OF THE SCHOOL BOARD OF CENTRAL HIGH, STEPHENS COUNTY, OKLAHOMA ADOPTING THE STEPHENS COUNTY MULTI-JURSIDICTION NATURAL HAZARD MITIGATION PLAN.

WHEREAS, the Stephens County Commissioners has worked with the Stephens County Emergency Management to prepare and adopt a Multi-Jurisdiction Natural Hazard Mitigation Plan; and

NOW, THEREFORE BE IT RESOLVED by the School Board of Central High, Stephens County, Oklahoma:

Section 1. Adoption of Plan.

The School Board hereby adopts the inclusion in said Stephens County Multi-Jurisdiction Natural Hazard Mitigation Plan.

PASSED, APPROVED and ADOPTED THIS 16th **DAY OF** May, 2019,

By:_____

APPENDIX 4

RESOLUTION NUMBER HM-1

A RESOLUTION OF THE SCHOOL BOARD OF COMANCHE, STEPHENS COUNTY, OKLAHOMA ADOPTING THE STEPHENS COUNTY MULTI-JURSIDICTION NATURAL HAZARD MITIGATION PLAN.

WHEREAS, the Stephens County Commissioners has worked with the Stephens County Emergency Management to prepare and adopt a Multi-Jurisdiction Natural Hazard Mitigation Plan; and

NOW, THEREFORE BE IT RESOLVED by the School Board of Comanche, Stephens County, Oklahoma:

Section 1. Adoption of Plan.

The School Board hereby adopts the inclusion in said Stephens County Multi-Jurisdiction Natural Hazard Mitigation Plan.

PASSED, APPROVED and ADOPTED THIS 14th **DAY OF** May,

By: Charlie Day

APPENDIX 4

RESOLUTION NUMBER 5/28/2019

A RESOLUTION OF THE SCHOOL BOARD OF EMPIRE, STEPHENS COUNTY, OKLAHOMA ADOPTING THE STEPHENS COUNTY MULTI-JURSIDICTION NATURAL HAZARD MITIGATION PLAN.

WHEREAS, the Stephens County Commissioners has worked with the Stephens County Emergency Management to prepare and adopt a Multi-Jurisdiction Natural Hazard Mitigation Plan; and

NOW, THEREFORE BE IT RESOLVED by the School Board of Empire, Stephens County, Oklahoma:

Section 1. Adoption of Plan.

The School Board hereby adopts the inclusion in said Stephens County Multi-Jurisdiction Natural Hazard Mitigation Plan.

PASSED, APPROVED and ADOPTED THIS 28th **DAY OF** May 2019,

By:_____

APPENDIX 4

RESOLUTION NUMBER 5-13-19

A RESOLUTION OF THE SCHOOL BOARD OF VELMA-ALMA, STEPHENS COUNTY, OKLAHOMA ADOPTING THE STEPHENS COUNTY MULTI-JURSIDICTION NATURAL HAZARD MITIGATION PLAN.

WHEREAS, the Stephens County Commissioners has worked with the Stephens County Emergency Management to prepare and adopt a Multi-Jurisdiction Natural Hazard Mitigation Plan; and

NOW, THEREFORE BE IT RESOLVED by the School Board of Velma-Alma, Stephens County, Oklahoma:

Section 1. Adoption of Plan.

The School Board hereby adopts the inclusion in said Stephens County Multi-Jurisdiction Natural Hazard Mitigation Plan.

PASSED, APPROVED and ADOPTED THIS 13 **DAY OF** May, 2019,

By: _____

APPENDIX 4

Town of Central

APPENDIX 4

Town of Loco

APPENDIX 4

Bray-Doyle PS

APPENDIX 4
Grandview PS

APPENDIX 5

Stephens County
Multi-Hazard Mitigation Plan
Maintenance Agreement

Stephens County will ensure that a regular review and update of the Stephens County Multi-Hazard Mitigation Plan occurs. The Hazard Mitigation Planning Committee (HMPC) will continue to meet on a semi-annual basis, or as conditions warrant, to oversee and review updates and revisions to the plan. The Stephens County Emergency Manager will continue to head the Staff Technical Advisory Committee, which will monitor and oversee the day-to-day implementation of the plan. The plan will be updated and resubmitted to the State Hazard Mitigation Officer for review and approval by the State and FEMA.

Monitoring the Plan- Monitoring of the Plan, the Action Plan, and Mitigation Measures is the responsibility of the Emergency Manager. Departments responsible for implementation of the Action Plan and the Mitigation Measures will update their Progress Reports on an annual basis, and report to the HMPC on p ogress and/or impediments to progress of the mitigation measures.

Evaluating the Plan- The Stephens County Multi-Hazard Mitigation Plan will be continually evaluated by the Project Manager, and a report will be made to the HTv1PC twice each year. The evaluation will assess:

- Adequacy of adopted Goals and Objectives in addressing current and future expected conditions;
- Whether the nature and magnitude of the risks have changed;
- Appropriateness of current resources allocated for implementation of the Plan;
- To what extent the outcomes of the Mitigation Measures occurred as expected;

Whether agencies, departments and other partners participated as originally anticipated. Updating the Plan- The Stephens County Multi-Hazard Mitigation Plan will be updated according to the following schedule:

1. Revise and Update- the County will incorporate revisions to the plan document identified during the monitoring and evaluation period, as well as items identified in the previous Crosswalk.
2. Submit for Review- the revised plan will be submitted to ODEM and FEMA for review and approval no later than six months prior to the end of the performance period.
3. Final Revision and Adoption- if necessary, the plan will be revised per ODEM and FEMA remarks, adopted by the Stephens County governing body and the updated plan sent to FEMA prior to the expiration of the 5-year approval period.

Gary D. Curtis

Stephens County
Emergency Management

Appendix 6
Supporting Documents

STEPHENS COUNTY EMERGENCY MANAGEMENT

Stephens County Courthouse

101 South Eleventh St.

Room 107

, Oklahoma 73533

Telephone 580-255-3411 or 4951

Oct. 28,2016

Reference: Stephens County Hazardous Mitigation Plan

Stephens County is in the process of checking the possibilities of writing our own Hazardous Mitigation Plan. We are setting up a meeting with the State OEM representatives in regards to their assistance in this matter in the form of a grant. We are currently working under the last State approved mitigation plan. Our plans are to have one written and approved by or in early 2018.

Sincerely,

Gary Ball

Director

-Stephens County Emergency Management

stcoem@stephenscountyok.org

(580) 255-3411 w

(580) 255-4951 Fax

Stephens County Technical Assistance Visit

April 11, 2017

Name	Agency	Email
Sue Homola	OEM	Susan.homola@oem.ok.gov
Jim Rosser	OEM	James.rosser@oem.ok.gov
Gary Curtis	SCEM	stcoem@stephenscountyok.org
Gary Ball	SCEM	stcoem@stephenscountyok.org
Christa Sparks	SCEM	stcoem@stephenscountyok.org
Jimmy Pryor	SCEM	Jimmypryor@sbcglobal.net
Start Time:	**1000**	
End Time:	**1130**	

Meeting Notes:

The Stephens County Hazard Mitigation Plan Update will be written by Stephens County personnel, using the grant DR4222, #27.

During the meeting we discussed the Hazard Mitigation Plan Example, "Faux County Plan," going through each section to explain further. The plan writing and review timeline was discussed, as was the grant period of performance timeline. It was determined that the grant timeline needs to be managed earlier than the plan writing and review timeline in order to ensure reimbursement within the period of performance.

Another issue we discussed was how to keep the jurisdictions engaged in the plan process. One method discussed was for Stephens County personnel to outline what information they needed from each jurisdiction before the first planning meeting, so that a fill-in sheet can be given to each jurisdiction at the first meeting. This helps define the process for everyone and establishes clear expectations on what information is needed from each jurisdiction. This also keeps the plan process on-track.

After Meeting Action: To follow up with Stephens County on grant In-Kind rate calculation.

Planning Committee members' manhours and mileage can be used for In-Kind documentation. You can also use manhours and mileage for any other required expert personnel needed to develop plan. This also counts for committee members and expert personnel who attend public meetings. The attending public cannot be included in this calculation.

There are 2 different methods to determine manhour rate:

1) Using the standard OK volunteer hour rate of $21.50 per hour, calculated from the following website: http://www.independentsector.org/resource/the-value-of-volunteer-time/ No other documentation is required to use this rate.

2) Using the hourly pay rate of the planning committee member/expert personnel. When using this rate OEM will require a written/signed statement by the planning committee member/expert personnel stating what their hourly rate is. A notification from their respective Human Resources office or county clerk will also be acceptable.

How to determine mileage:

Mileage can be calculated by using the OK State Mileage Rate, which is currently at 0.44 cents per mile. It can be found on the OK.gov website:

https://www.ok.gov/conservation/Financial_Management_Human_Resources_Division/Financial_Management_and__Human_Resources_-_Mileage_and_Per_Diem_Rates.html

ACKNOWLEDGEMENT .

IN LOCAL HAZARD MITIGATION PLAN

FROM: Town of Comanche
Mr. Smokey Dobbins
500 N. Rodeo Drive
Comanche, OK 73529

TO: -STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse 101 South Eleventh St. Room 107
, Oklahoma 73533

[X] This will confirm that the jurisdiction shown above has agreed to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We request that our agency be named as a participant in that multi-jurisdictional Hazard Mitigation Plan.

[ ] This will confirm that the jurisdiction shown above has chosen NOT to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We acknowledge that our agency will NOT BE named as a participant in that multijurisdictional hazard Mitigation plan.

Mayor
August 8, 2017

Mayor Dobbins designates Heath Roden, Fire Chief, as Comanche's city representati

ENTS:

BY: Dennis Dobbins

COMMENTS:

ACKNOWLEDGEMENT

.

IN LOCAL HAZARD MITIGATION PLAN

FROM: City o Marlow
Mr. Brad Boles
I [5 North 2nd
Marlow, OK 73055

: Mayor

8-22-17

TO: -STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse 101 South Eleventh St. Room 107
, Oklahoma 73533

[X] This will confirm that the jurisdiction shown above has agreed to participate in the planning project to update the Stephens County Hazard Mitigation Plan, We request that our agency be named as a participant in that multi-jurisdictional Hazard Mitigation Plane

[ ] This will confirm that the jurisdiction shown above has chosen NOT to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We acknowledge that our agency will NOT BE named as a participant in that multijurisdictional hazard mitigation plan.

COMMENTS:

BY: Brad Boles

natne)

ACKNOWLEDGEMENT OF INTENT TO PARTICIPATE.

IN LOCAL HAZARD MITIGATION PLAN

FROM: Town of Empire
Mr. Perry Brinegar 276935 E. 1760 Road
, OK 73533

TO: -STEPHENS COUNTY EWRGENCY MANAGEMENT
Stephens County Courthouse 101 South Eleventh St. Room 107
, Oklahoma 73533

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Perry J. Brinegar Jr.

BY: PERRY J. BRINEGAR JR.

COMMENTS:

ACKNOWLEDGEMENT OF INTENT TO PARTICIPATE.

IN LOCAL HAZARD MITIGATION PLAN

FROM: Town of Loco
Mrs. Margie Fondren
P.O. Box 27
Loco, OK 73442

TO: Dlh4CAN-STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse 101 South Eleventh St. Room 107

: Mayor

9-19-17

, Oklahoma 73533

This will confirm that the jurisdiction shown above has agreed to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We request that our agency be named as a participant in that multi-jurisdictional Hazard Mitigation Plan.

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Margie Fondren

BY: Margie Fondren
(printed name)

17/THU02: 41 PM City of Velma 580-444-2159 P. 001/001

ACKNOWLEDGEMENT OF INTENT TO PARTICIPATE

IN LOCAL HAZARD MITIGATION PLAN

FROM: Town of Velma Mr.
Winston Dumas
P.O. Box 447
Velma, OK 73491

TO: -STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse 101 South Eleventh St. Room 107
, Oklahoma 73533

☒ This will confirm that the jurisdiction shown above has agreed to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We request that our agency be named as a participant in that multi-jurisdictional Hazard Mitigation Plan.

☐ This will confirm that the jurisdiction shown above has chosen NOT to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We acknowledge that our agency will NOT BE named as a participant in that multijurisdictional hazard mitigation plan.

COMMENTS: _

BY: Winston Dumas

ACKNOWLEDGEMENT OF INTENT TO PARTICIPATE.

Mayor

8-8-17

IN LOCAL HAZARD MITIGATION PLAN

FROM: Bray Public Schools Mr. David Eads 1205 South Brooks Road

Marlow, OK 73055

TO: -STEPHENS COUNTY Etv1ERGENCY MANAGEMENT
Stephens County Courthouse 101 South Eleventh St. R001n 107
, Oklahoma 73533

[X] This will confirm that the jurisdiction shown above has agreed to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We request that our agency be named as a participant in that multi-jurisdictional Hazard Mitigation Plan.

[ ] This will confirm that the jurisdiction shown above has chosen NOT to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We acknowledge that our agency will NOT BE named as a participant in that multijurisdictional hazard mitigation plan.

COMMENTS:

BY: David Eads

ACKNOWLEDGEMENT OF INTENT TO PARTICIPATE.

: Superintendent

8-14-17

IN LOCAL HAZARD MITIGATION PLAN

FROM: Central High Public Schools

Mr. Bennie Newton

Rt. 3 Box 249

Marlow, OK 73055

TO: -STEPHENS COUNTY EMERGENCY MANAGEMENT

Stephens County Courthouse 101 South Eleventh St. Room 107

, Oklahoma 73533

[X] This will confirm that the jurisdiction shown above has agreed to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We request that our agency be named as a participant in that multi-jurisdictional Hazard Mitigation Plan.

[ ] This will confirm that the jurisdiction shown above has chosen NOT to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We acknowledge that our agency will NOT BE named as a participant in that multijurisdictional hazard mitigation plan.

Bennie Newton, Supt.

BY: Bennie Newton

COMMENTS:

ACKNOWLEDGEMENT OF INTENT TO PARTICIPATE.

Superintendent

Sept. 20, 2017

IN LOCAL HAZARD MITIGATION PLAN

Comanche Public Schools

Mr. Terry Davidson 1030 Ash Avenue

Comanche, OK 73529

TO: -STEPHENS COUNTY EMERGENCY MANAGEMENT

Stephens County Courthouse 101 South Eleventh St. Room 107

, Oklahoma 73533

☑ This will confirm that the jurisdiction shown above has agreed to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We request that our agency be named as a participant in that multi-jurisdictional Hazard Mitigation Plan.

☐ This will confirm that the jurisdiction shown above has chosen NOT to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We acknowledge that our agency will NOT BE named as a participant in that multijurisdictional hazard mitigation plan.

BY: TERRY DAVIDSON

COMMENTS:

TITLE: Superintendent

DATE: 8/8/2017

ACKNOWLEDGEMENT OF INTENT TO PARTICIPATE.

IN LOCAL HAZARD MITIGATION PLAN

Empire Public Schools

Mrs. Vicki Davison

~~9450 West Cherokee~~ 276803 E. 1760 Rd

, OK 73533

TO: -STEPHENS COUNTY EMERGENCY MANAGEMENT

Stephens County Courthouse 101 South Eleventh St. Room 107

, Oklahoma 73533

[X] This will confirm that the jurisdiction shown above has agreed to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We request that our agency be named as a participant in that multi-jurisdictional Hazard Mitigation Plan.

[ ] This will confirm that the jurisdiction shown above has chosen NOT to participate in the planning project to update the Stephens County Hazard Mitigation Plan. We acknowledge that our agency will not be named as a participant in that multijurisdictional hazard mitigation plan.

Vicki Davison

COMMENTS: BY: Vicki Davison

: Superintendent

9-18-17

ACKNOWLEDGEMENT OF INTENT TO PARTICIPATE.

IN LOCAL HAZARD MITIGATION PLAIN

Grandview Public Schools

Mr. Gary Wade
Rt. I Box 105
Comanche, OK 73529

TO: -STEPHENS COUNTY EMERGENCY MANAGEMENT

Stephens County Courthouse 101 South Eleventh St. Room 107

, Oklah01na 73533

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Gary Wade

BY: Gary Wade
(printed name)

TITLE: Superintendent

DATE: 9-18-17

ACKNOWLEDGEMENT OF INTENT TO PARTICIPATE.

IN LOCAL HAZARD MITIGATION PLAN

Marlow Public Schools

Mr. George Coffman 106 South 6th
Marlow, OK 73055

TO: -STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse 101 South Eleventh St. Room 107

, Oklahoma 73533

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COMMENTS: BY: George E. Coffman Jr

ACKNOWLEDGEMENT OF INTENT TO PARTICIPATE.

: Supt.

8-28-17

IN LOCAL HAZARD MITIGATION PLAN

FROM: Red River Technology Center
Mr. Dennis Loafman
3300 West Bois D' Arc Ave
, OK 73533

TO: -STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse 101 South Eleventh St. Room 107
, Oklahoma 73533

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BY: Dennis Leatman

COMMENTS:

DUNCAN-STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse
101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
Stephens County District #1 County Commissioner
Attn: Mr. David McCarley

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. David McCarley

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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October 10th & October 12th, 2017
6:30 p.m.
Room #106
Red River Technology Center
3300 West Bois D'Arc
Duncan, OK 73533

December 5th & 7th, 2017
6:30 p.m.
10th- Room #112
12th- Room #106
Red River Technology Center

Thank you for your time and assistance in considering being a part of this planning project. Should you have questions regarding this project, please feel free to contact Gary Curtis at 580-255-3411 or via email at stcoem@stephenscountyok.org

Yours truly, Gary Ball

Gary Ball

DUNCAN-STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse
101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
Stephens County District #2 County Commissioner
Attn: Mr. Todd Churchman

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. Todd Churchman

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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Yours truly, Gary Ball

Gary Ball

DUNCAN-STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse
101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
Stephens County District #3 County Commissioner
Attn: Mr. Dee Bowen

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. Dee Bowen

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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Yours truly, Gary Ball

Gary Ball

DUNCAN-STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse
101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
Carter County
Attn: Mr. Paul Tucker
107 SW 1st Street, Annex #1
Ardmore OK 73401

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. Paul Tucker

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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Yours truly, Gary Ball

Gary Ball

DUNCAN-STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse
101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
Comanche County
Attn: Mr. Michael Merritt
315 SW 5th Rm 107
Lawton OK 73501

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. Michael Merritt

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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Yours truly, Gary Ball

Gary Ball

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Stephens County Courthouse
101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
Cotton County
Attn: Mr. Kesto Simpson
301 North Broadway
Walters OK 73572

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. Kesto Simpson

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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Yours truly, Gary Ball

Gary Ball

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101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
Garvin County
Attn: Mr. H.D. Ramming
204 W. McClure, Suite 204
Pauls Valley OK 73075

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. H.D. Ramming

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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Yours truly, Gary Ball

Gary Ball

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101 South Eleventh St.
Room 107
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Telephone 580-255-3411 or 4951

July 26th, 2017
Grady County
Attn: Mr. Dale Thompson
P.O. Box 339
Chickasha OK 73018

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. Dale Thompson

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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Gary Ball

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Stephens County Courthouse
101 South Eleventh St.
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Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
Jefferson County
Attn: Mr. Jimmy B. Gallaher
220 N. Main
Waurika OK 73573

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. Jimmy Gallaher

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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Yours truly, Gary Ball

Gary Ball

DUNCAN-STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse
101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
Duncan Regional Hospital
Attn: Patty Wininger
1407 Whisenant Dr.
Duncan OK 73533

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Attn: Patty Wininger

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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Yours truly, Gary Ball
Gary Ball

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Stephens County Courthouse
101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
US Army Corp of Engineers
Attn: Project Manager
5900 Waurika Dam Road
Waurika OK 73573

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Attn: Project Manager

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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101 South Eleventh St.
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Telephone 580-255-3411 or 4951

July 26th, 2017
Chickasaw Nation
Attn: Janet Milburn
1911 West Plato Road
Duncan OK 73533

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Attn: Janet Milburn

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Yours truly, Gary Ball

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Stephens County Courthouse
101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
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July 26th, 2017
Red Cross
Attn: Shelly Webb
1006 Northwest Blvd
Ardmore OK 73401

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Attn: Shelly Webb

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Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
Stephens County Health Dept.
Attn: Lorraine S. Acevedo
405 South Washington
Ardmore OK 73401

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Attn: Lorraine S. Acevedo

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

The Stephens County Board of County Commissioners has unanimously agreed to provide the matching funds necessary to complete the plan in accordance with an application submitted for HMGP funding. This will provide the 25% local match required by Federal regulations.

We invite you to participate in this planning process. The only contribution on your behalf will be your time. We will have two meetings and our planning team will request input from you regarding projects you wish to have included in the plan. We have chosen two dates for each of our meetings, please know that you only need to attend one of the two meetings in October & one of the two meetings in December.

October 10th & October 12th, 2017
6:30 p.m.
Room #106
Red River Technology Center
3300 West Bois D'Arc
Duncan, OK 73533

December 5th & 7th, 2017
6:30 p.m.
10th- Room #112
12th- Room #106
Red River Technology Center

Thank you for your time and assistance in considering being a part of this planning project. Should you have questions regarding this project, please feel free to contact Gary Curtis at 580-255-3411 or via email at stcoem@stephenscountyok.org

Yours truly, Gary Ball

Gary Ball

DUNCAN-STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse
101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

September 15, 2017
Velma Public Schools
Attn: Mr. Raymond Rice
901 Main Street
Velma, OK 73491

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. Raymond Rice:

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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Enclosed is a form which confirms your agreement to work with us and be included in the Stephens County Hazard Mitigation Plan. Please complete the form and return it by October 1st 2017. Our application is at the FEMA regional office pending their receipt of these participation forms.

Thank you for your time and assistance in considering being a part of this planning project. Should you have questions regarding this project, please feel free to contact Gary Curtis at 580-255-3411 or via email at stcoem@stephenscountyok.org

Yours truly, Gary Ball

Gary Ball

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Stephens County Courthouse
101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
Bray Public Schools
Attn: Mr. David Eads
1205 South Brooks Road
Marlow, OK 73055

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. David Eads:

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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Yours truly, Gary Ball

Gary Ball

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Stephens County Courthouse
101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
Marlow Public Schools
Attn: Mr. George Coffman
106 South 6th
Marlow, OK 73055

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. George Coffman:

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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July 26th, 2017
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Attn: Mr. Raymond Rice
901 Main Street
Velma, OK 73491

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

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Stephens County Courthouse
101 South Eleventh St.
Room 107
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Telephone 580-255-3411 or 4951

July 26th, 2017
Red River Technology Center
Attn: Mr. Dennis Loafman
3300 West Bois D' Arc Ave
Duncan, OK 73533

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. Dennis Loafman:

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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Yours truly, Gary Ball

Gary Ball

DUNCAN-STEPHENS COUNTY EMERGENCY MANAGEMENT
Stephens County Courthouse
101 South Eleventh St.
Room 107
Duncan, Oklahoma 73533
Telephone 580-255-3411 or 4951

July 26th, 2017
Town of Bray
Attn: Mr. Sammy Richardson
1205 South Brooks Road
Marlow OK 73055

Re: HMGP Application for Multi-Jurisdictional Multi-Hazard Mitigation Plan

Mr. Sammy Richardson:

This letter is prepared to advise you that Stephens County has begun the process to update the local Hazard Mitigation Plan in accordance with 44 CFR 201. This Federal Regulation requires that all local jurisdictions must have (or be included in) a Hazard Mitigation Plan in order to receive certain funding from the federal government. That funding includes the availability of Hazard Mitigation funds for a number of mitigation projects, including (l) storm sirens; (2) community safe rooms; (3) individual safe rooms for homes; (4) generators for critical facilities (including your emergency service providers). In addition, schools are now eligible for a variety of project funds, but in order to be eligible, they must participate in a plan.

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Yours truly, Gary Ball

Gary Ball

Natural Hazard Mitigation Plan Working Group Meeting

Red River Technology Business Center

6:30 P.M. October 12, 2017

6:31

The meeting was called to order by Gary Curtis. Introductions were made and the purpose of the meeting was explained.

In Attendance were: Jimmy Pryor, Gary Ball, Gary Curtis, Camden Dennard, Heath Roden, Sara Jones, Sammy Richardson & David Eads

Gary Curtis gave a overview of Chapter 1&2 of the HMP

7:21

Gary Curtis shifted over into an overview of Chapter 3

Chickasaw nation citizens can have a storm shelter put in place for no cost if they own there home.

Comanche has had a change in Mayor

7:21

Meeting closed

Stephens County

Hazard Mitigation Planning Meeting Notice

Red River Technology Center, BIS Building, Room B108/110

3300 West Bois D' Arc, Duncan, Ok 73533

5 & 7 December 2017 – 6:30

Welcome / Introductions	Gary Curtis 12/5 – 12/7
Chapter Four – Mitigation Strategy	Gary Curtis
Chapter Five – Plan Maintenance Process	Gary Curtis
Overview	Gary Curtis
Conclusion	Gary Curtis

Gary Curtis

Gary Curtis, Deputy Dir. SCOEM

12-1-17

Date

STATE OF OKLAHOMA
STEPHENS COUNTY
RECORDED OR FILED
2017 DEC -1 AM 10: 07
BOOK
JENNIFER JONES
COUNTY CLERK
BY DEPUTY

PROOF OF PUBLICATION
IN THE DISTRICT COURT
STEPHENS COUNTY
STATE OF OKLAHOMA

PUBLIC MEETING NOTICE
SS: FINAL HAZARD MITIGATION
PLANNING MEETING
Case No: PO-2726

I, CRYSTAL CHILDERS, of lawful age, being duly sworn upon oath, deposes and says: That (s)he is the Ad Manager of The Duncan Banner, a daily newspaper printed and published in the city of Duncan, County of Stephens, and State of Oklahoma, and has personal knowledge of the facts herein stated.

That a printed notice, copy of which is hereto attached, was published in the regular and entire issue of said newspaper and **1 WEEK** (s), the first publication thereof being made on **WEDNESDAY** the **6** day of **DECEMBER, 2017** and last publication on____the ___day of **__, 2017** And that said notice was published In each successive issue of said paper between the dates of the first and last publication of said notice.

That said newspaper has been continuously and uninterruptedly published in said county during a period of more than one hundred and four (104) weeks, consecutively and immediately prior to the first publication of the attached notice or advertisement: that the same is published in the English language, and has a paid general circulation within the county aforesaid; that it has entrance into the United States mails as second-class mail matter, and is delivered to the United States mails in the city and county where published: that said newspaper comes within all of the prescriptions and requirements of Senate Bill No. 47 of the 19th Oklahoma Legislature, page 85, Session Laws of 1943; Chapter four (4) 25 O.S. Supp. 1943, Sec. 106 and 108, and meets all other requirements of the laws of the State of Oklahoma with reference to legal publication

Publication fee: **$90.80**

AD MANAGER

Subscribed and sworn to before me this **6** day of **DECEMBER**, 2017

NOTARY PUBLIC # 07008385
My commission expires September 11, 2019

PAULA R. BLAIR
Notary Public
State of Oklahoma
Commission # 07008385 Expires 09/11/19

Stephens County
Final Hazard Mitigation
Planning Meeting
Notice
Red River Technology
Center, BIS Building,
Room B108/110
3300 West Bois D'Arc,
Duncan, OK 73533
5 & 7 December 2017
@ 6:30 PM

Stephens County - SIGN IN SHEET

Hazard Mitigation Team Planning Meeting

Date: (December 5, 2017)

Meeting site courtesy: **(Red River Technology Center)** **Location: (3300 West Bois D'Arc, Duncan, Oklahoma 73533)**

Please Print Entries

	NAME	AGENCY	Email
1	Jerome McCalvin	City of Marlow	jmccalvin@cityofmarlow.com
2	Kyle Jarman	City of Central High	a_kyle_jarman@yahoo.com
3	Dennis Loftman	Red River Technology Center	dloftman@rrtc.edu
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Natural Hazard Mitigation Plan Working Group Meeting
Red River Technology Business Center
6:30 December 5, 2017

6:35

The meeting was called to order by Gary Curtis. Introductions were made and the purpose of the meeting was explained.

In attendance were: Gary Curtis, Camden Dennard, Jerome McCalvin, Kyle Jarman, and Dennis Loafman.

Gary Curtis explained the current status of the plan and reasoning for the Mitigation Strategy for the plan. He explained that stakeholders roles in the plan and the need for the documentation to be returned in a timely manner.

Gary Curtis then began explaining the need for the maintenance process to help assure that the plan will always have the next plan in place.

Gary Curtis asked for questions on the plan, and with none being brought up, began going over the plan as a whole.

Gary closed out the meeting explaining that the proposed time period for the construction of the plan would be around late spring or early summer. He thanked everyone for their attendance and looked forward to date of the completion of the plan construction.

The meeting was closed at 7:15

Stephens County - SIGN IN SHEET

EMERGENCY MANAGEMENT
Duncan-Stephens County, Okla.

Hazard Mitigation Team Planning Meeting

Date: (December 7, 2017)

Meeting site courtesy: **(Red River Technology Center)** **Location: (3300 West Bois D'Arc, Duncan, Oklahoma 73533)**

Please Print Entries

	NAME	AGENCY	Email
1	Jimmy Pryor	Stephens EM	jimmypryor@sbcglobal.net
2	Chris Munn	Stephens Co. Health Dept	chrism@health.ok.gov
3	Heath Roden	City of Comanche	heathroden@cityofcomanche.com
4	Chloe Lewis	Comanche County	cc-em@sbcglobal.net
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Natural Hazard Mitigation Plan Working Group Meeting
Red River Technology Business Center
6:30 December 7, 2017

6:32

The meeting was called to order by Jimmy Pryor. Jimmy introduced the staff and all attendees.

In attendance were: Jimmy Pryor, Gary Curtis, Camden Dennard, Chris Munn, Heath Roden, and Chloe Lewis.

Jimmy Pryor turned the meeting over to Gary Curtis.

Gary Curtis discussed the plan and it's current status. He spoke on Chapter 4, Mitigation Strategy and how it is used to build the plan for each jurisdiction. He explained that stakeholders roles in the plan and the need for the documentation to be returned in a timely manner.

Gary Curtis then explained the need for the maintenance process to help assure that the plan will always have the next plan in place before the plan expires. He explained the need for the plan and consequences of not having an approved plan in place.

Gary Curtis asked for questions on the plan, and with none being brought up, began going over the plan as a whole.

Gary closed out the meeting explaining that the proposed time period for the construction of the plan would be around late spring or early summer. He thanked everyone for their attendance and looked forward to date of the completion of the plan construction.

The meeting was closed at 7:12