City of Claremore, OK

Multi-Jurisdictional Multi-Hazard Mitigation Plan Update - 2012

Participating Jurisdictions:

City of Claremore
Claremore Public Schools

November 21, 2012

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Chapter 1: Introduction

1.1 About the Plan

This document is the first phase of a multi-hazard mitigation plan for the City of Claremore. It is a strategic planning guide developed in fulfillment of the Hazard Mitigation Grant Program requirements of the Federal Emergency Management Agency (FEMA), according to the Stafford Disaster Relief and Emergency Assistance Act. This act provides federal assistance to state and local governments to alleviate suffering and damage from disasters. It broadens existing relief programs to encourage disaster preparedness plans and programs, coordination and responsiveness, insurance coverage, and hazard mitigation measures.

This plan is developed in accordance with guidance from, and fulfills requirements for the Hazard Mitigation Grant Program (HMGP). The plan addresses natural hazards and hazardous materials events.

1.1.1 Purpose

The purpose of this plan is to:

1. Assess the ongoing hazard mitigation activities in the City of Claremore (Chapter 1)
2. Outline the Planning Process used by the City of Claremore in completing a Multi-Hazard Mitigation Plan (Chapter 2)
3. Identify and assess the hazards that may pose a threat to citizens and property (Chapter 3)
4. Evaluate mitigation measures that should be undertaken to protect citizens and property (Chapter 4)
5. Outline a strategy for implementation of mitigation projects (Chapter 5)
6. Plan Maintenance and Adoption (Chapter 6)

The objective of this plan is to provide guidance for city-wide hazard mitigation activities for the next five years. It will ensure that the City of Claremore and other partners implement activities that are most effective and appropriate for mitigating natural hazards and hazardous materials incidents.

1.1.2 Scope

The scope of the City of Claremore Multi-Hazard Mitigation Plan is city-wide. It addresses natural hazards deemed to be a threat to the citizens of the City of Claremore, as well as

hazardous-materials events. Both short-term and long-term hazard mitigation opportunities are addressed beyond existing federal, state, and local funding programs.

The jurisdictions participating in this plan are the City of Claremore and the Claremore Public Schools. The Claremore Public Schools has seven campuses.

City of Claremore	104 S Muskogee	Claremore
Claremore High School	201 E Stuart Rossa	Claremore
Will Rogers Jr High	1915 N Florence	Claremore
Catalayah Elementary	2700 King Rd	Claremore
Claremont Elementary	318 E 7th St	Claremore
Roosa Elementary	2001 N Sioux	Claremore
Westside Elementary	2600 Holly Rd	Claremore
Alternative Learning Center	101 W 11th St	Claremore

1.1.3 Authority

Section 409 of the *Robert T. Stafford Disaster Relief and Emergency Assistance Act*, (Public Law 93-288, as amended), Title 44 CFR, as amended by Section 102 of the *Disaster Mitigation Act of 2000*, provides the framework for state and local governments to evaluate and mitigate all hazards as a condition of receiving federal disaster assistance. A major requirement of the law is the development of a hazard mitigation plan.

1.1.4 Funding

Funding for the City of Claremore Multi-Hazard Mitigation Plan was provided by a grant from the Federal Emergency Management Agency (FEMA) and Oklahoma Emergency Management (OEM). A 75% FEMA grant through the OEM, with a 25% local share. The Hazard Mitigation Grant Program grant was grant number FEMA 1917-DR-OK-009.

1.1.5 Goals

The goals for the City of Claremore Multi-Hazard Mitigation Plan were developed by the City of Claremore staff and Claremore Hazard Mitigation Planning Committee (CHMPC), with input from adjacent jurisdictions, agencies, and interested citizens. The local goals were developed taking into account the hazard mitigation strategies and goals of the federal and state governments.

National Mitigation Strategy and Goal

FEMA has developed ten fundamental principles for the nation's mitigation strategy:

1. Risk reduction measures ensure long-term economic success for the community as a whole, rather than short-term benefits for special interests.
2. Risk reduction measures for one natural hazard must be compatible with risk reduction measures for other natural hazards.

3. Risk reduction measures must be evaluated to achieve the best mix for a given location.
4. Risk reduction measures for natural hazards must be compatible with risk reduction measures for technological hazards, and vice versa.
5. All mitigation is local.
6. Emphasizing proactive mitigation before emergency response can reduce disaster costs and the impacts of natural hazards. Both pre-disaster (preventive) and post-disaster (corrective) mitigation is needed.
7. Hazard identification and risk assessment are the cornerstones of mitigation.
8. Building new federal-state-local partnerships and public-private partnerships is the most effective means of implementing measures to reduce the impacts of natural hazards.
9. Those who knowingly choose to assume greater risk must accept responsibility for that choice.
10 Risk reduction measures for natural hazards must be compatible with the protection of natural and cultural resources.

FEMA's goal is to:

1. Substantially increase public awareness of natural hazard risk so that the public insists on having safer communities in which to live and work
2. Significantly reduce the risk of loss of life, injuries, economic costs, and destruction of natural and cultural resources that result from natural hazards

State of Oklahoma Mitigation Strategy and Goals

The State of Oklahoma has developed a Strategic All-Hazards Mitigation Plan to guide all levels of government, business, and the public to reduce or eliminate the effects of natural, technological, and man-made disasters. The goals and objectives are:

1. Improve government recovery capability.
2. Provide pre- and post-disaster recovery guidance.
3. Protect public health and safety.
4. Reduce losses and damage to property and infrastructure.
5. Preserve natural and cultural resources in vulnerable areas.
6. Preserve the environment.
7. Focus only on those mitigation measures that are cost-effective and provide the best benefit to communities.

The key measures to implement these goals include:

1. Enhance communication between state and federal agencies and local governments to facilitate post-disaster recovery and pre- and post-disaster mitigation.
2. Coordinate federal, state, local, and private resources to enhance the preparedness and mitigation process.
3. Ensure consistency between federal and state regulations.
4. Protect critical facilities from hazards.
5. Support legislation that protects hazardous areas from being developed.

The City of Claremore's Goal

To improve the safety and well-being of the citizens residing and working in the City of Claremore by reducing the potential of death, injury, property damage, environmental and other losses from natural and technological hazards

Goals for mitigation of each of the hazards are presented in Chapter 4

1.1.6 Point of Contact

The primary point of contact for information regarding this plan is:

Sean Douglas
Emergency Management Director
City of Claremore
104 S Muskogee
Claremore, OK 74017
Telephone: (918) 341-2365
Fax: (918) 341-0955
e-mail: sdouglas@claremorecity.com

The secondary point of contact is:

Daryl Golbek
Public Works Director
City of Claremore
104 S Muskogee
Claremore, OK 74017
Telephone: (918) 341-2066
Fax: (918) 341-0955
e-mail: dgolbek@claremorecity.com

2012 Plan Update Contractor was:

INCOG
2 W Second Street, #800
Tulsa, OK 74103
Office: (918) 584-7526

The INCOG project manager for the plan update contract was John McElhenney

1.2 Community Description

Like most cities in the region, the City of Claremore is faced with a variety of hazards, both natural and man-made. In recent history, winter storms, drought, extreme heat, floods, and tornados have made the national headlines. Any part of the city may be impacted by high winds, hail, wild fires, hazardous materials events, and other hazards. In some hazards such as flooding and expansive soils, the areas most at risk have been mapped and delineated.

City of Claremore is located Rogers County, in the northeastern part of the State of Oklahoma.

1.2.1 Geography

Latitude:	36.32N
Longitude:	95.61W

City of Claremore, located in northeast Oklahoma, is accessed primarily by SH-66, SH 20, and SH 88. Claremore is the county seat of Rogers County. The City of Claremore encompasses approximately 12.3 square miles. Map Number 1 in Appendix 1 is a location map of the City of Claremore.

1.2.2 Climate

Claremore lies at an elevation of 597 feet above sea level. The City of Claremore is far enough south in latitude to miss the extreme cold of winter. The climate is essentially continental characterized by rapid changes in temperature. The winter months are usually mild, with temperatures occasionally falling below zero, but only for a very short time. Temperatures of 100 degrees or higher are often experienced from late July to early September. January's average low temperature is 21.2 degrees Fahrenheit and July's average high temperature is 92.8 degrees Fahrenheit. The City of Claremore will receive a wide variety of precipitation throughout any given year. It averages 39.4 inches of rainfall.

1.2.3 History

The City of Claremore was incorporated in 1883, prior to Oklahoma statehood in 1907. The town's name came from an Osage chief called "Gra-moi." French traders in the area pronounced his name as "Clairmont," which means "mountain with a clear view." The name of Claremore changed from Clermont to its present spelling in 1882.

1.2.4 Population and Demographics

According to the 2010 US Census, the 2010 the City of Claremore population was 18,581. In 2000, the City population was 15,873, an increase of 17.1% over the ten years; making an annual growth rate of 1.6%. The median age of the City of Claremore population is 36, with 16.9% of the population being 65 or greater, according to the U.S. Bureau of the Census. Older populations are more vulnerable to certain hazards, such as extreme heat and cold. A map, showing the age 65 and older areas, is shown in Map Number 2 in Appendix 1. Low-income populations are also more vulnerable to extreme temperatures; low-income areas are shown in Map Number 3 in Appendix 1. The City of Claremore demographic data is shown in Table 1-1.

Table 1-1:
City of Claremore Demographic Data
Source: 2010 Census

Subject	Number
Total Population	18,581
65 years and older (16.9%)	3,140
Poverty Status, in 2009 (individuals) (11.9%)	2,211

According to the Rogers County Assessor's Office 2011 records, there are 8853 parcels in the City, and 7584 parcels with improvements, with an assessed improvement value of approximately $800,000,000. Numbers of parcels with improvements (buildings, garages, pools, storage, etc.) and improvement values, by type are shown in the table below.

Table 1-2:
City of Claremore Housing Property Types by Assessed Values
Source: Rogers County Assessor's Office

Category	Number of Structures	Structure Value ($$)
Residential	6670	542,164,103
Commercial	885	253,589,262
Agricultural	29	3,336,277
Total	7584	799,089,642

1.2.5 Local Utilities--Lifelines

Lifelines are defined as those infrastructure facilities that are essential to the function of the community and the well being of its residents. They generally include transportation and utility systems. Transportation systems include interstate, US, and state highways, rail, waterways, ports and harbors, and airports. Utility systems include electric power, gas and liquid fuels, telecommunications, water, and wastewater. The following table shows utilities and the companies or sources that supply each one for the City of Claremore.

Table 1-3:
Utility Suppliers for the City of Claremore

Utility	Supplier
Electric	City of Claremore, Verdigris Valley
Water	City of Claremore
Sewage Treatment	City of Claremore
Natural Gas	ONG
Telephone	AT&T

1.2.6 Economy

According to the 2010 U.S. Census, the City of Claremore's population age 20 and over was 13,427. In 2000, there are 7,368 people in the labor force and 2.0% are unemployed. Of the people employed, 76.7% are salary and private-wage workers, 16.5% are government workers, and 6.4% are self-employed in unincorporated businesses. The median household income in 2000 was $34,547.

1.2.7 Industry

Principle employment occupations in the City of Claremore include education, health and social services, manufacturing, retail, transportation and warehousing, and professional and public administration.

1.2.8 Future Development

The State of Oklahoma is growing at 1.0% annually. The City of Claremore's annual growth rate is 1.3%. Growth, development and redevelopment in the City of Claremore are estimated to continue at this same pace. Primary growth areas are to the south of the City.

Growth Trends

Oklahoma Department of Commerce estimates that the City of Claremore will continue to grow at 1.3% per year over the next five years. Development activity is expected to continue in the south.

1.3 Regulatory Framework

This section contains a summary of the current ordinances for land use, zoning, subdivision, floodplain in the City of Claremore that were reviewed by the Claremore Hazard Mitigation Planning Committee. It also lists the current building codes and fire insurance rating.

1.3.1 Comprehensive Planning and Zoning

The City of Claremore has a comprehensive plan, zoning code, and subdivision regulations. The City of Claremore Planning Commission oversees planning and zoning in the City of Claremore. The Zoning Code and Subdivision Regulations, and input by the City Planning and Zoning staff, were utilized as a reference in the development of this Hazard Mitigation Plan.

The City of Claremore Zoning Code, last updated on March 21, 2011, is administered by City staff.

The City of Claremore Subdivision Regulations, adopted 2001, is administered by the City of Claremore Planning Commission to review, approve and disapprove plats for the subdivision of land within the City of Claremore.

1.3.2 Floodplain Management

The City of Claremore participates in the National Flood Insurance Program (NFIP). The City enforces its flood damage prevention ordinance. The City's floodplain management regulations and mapping were utilized as a resource and reference in the development of this Hazard Mitigation Plan.

1.3.3 Building Codes

The City of Claremore uses the International Building Code, published by BOCA, as well as supplemental ordinances which cover areas where the International Codes are inadequate or vague. This information was used as a reference in preparing this Hazard Mitigation Plan.

1.3.4 Fire Protection and Insurance

The City of Claremore has a professional paid full time fire department. The City's ISO rating is 3. Primary factors related to the ISO rating involve how the department responds to alarms and notifies its personnel; the supply and distribution of water in the area; staffing; training and equipment. Fire Department statistics and information were used as a reference in preparing this Hazard Mitigation Plan and are discussed in more detail in Chapter 3: Wildfires.

1.4 Existing Hazard Mitigation Programs

In an effort to address hazards that impact the city, the City of Claremore has identified existing plans and procedures for informing people about protection measures and warning the public of impending threats. The review of existing plans is important in the preparation of this hazard mitigation plan.

1.4.1 Emergency Operations Plans

The City of Claremore has adopted an Emergency Operations Plan (EOP) in 2011. The Claremore Public Schools also have an EOP, adopted in 2012.

1.4.2 Capital Improvement Plan

The Capital Improvement Plan (CIP) is the principle method of scheduling and financing future capital needs, and part of those needs could address hazard mitigation actions. Major updates to the CIP should occur periodically and the plan should receive a minor review during the annual budgeting process. The City of Claremore does have a CIP. The CIP was last updated in 2012. Projects on their CIPs could have a positive impact upon the community's ability to mitigate and respond to hazard events. Projects on their current CIP include:

Purchase Asphalt Overlay Equipment
Purchase Street Sweeper
JM Davis Road Widening
Develop Soccer Complex
Storm Siren Narrow Banding

The Claremore Public Schools have a CIP. It was last updated in 2006.

Chapter 2:

The Planning Process

2.1 Documentation of the Planning Process

The City of Claremore Multi-Hazard Mitigation Plan is a city-wide effort to coordinate the City of Claremore's multi-hazard planning, development, and mitigation activities. The Indian Nations Council of Governments (INCOG) was responsible for overall coordination and preparation of the plan, aided by the City of Claremore staff and representatives of the Claremore Public Schools.

A mitigation plan is the product of a rational thought process that reviews the hazards, quantifies their impacts on the city, identifies alternative mitigation activities, and selects those activities that will work best for the jurisdiction.

This plan addresses the following hazards

1. Floods
2. Tornados
3. High Winds
4. Lightning
5. Hailstorms
6. Severe Winter Storms
7. Extreme Heat
8. Drought
9. Expansive Soils
10. Wildfires
11. Earthquakes
12. Hazardous Materials Events
13. Dam Breaks

The approach for the City of Claremore multi-hazard mitigation plan update followed a ten-step process, based on the guidance and requirements of FEMA. The ten steps are described below.

2.1.1 Step One: Organize to Prepare the Plan

An open public process was established to give all sections in the City of Claremore and individuals and agencies in the City's regional area interested in hazard mitigation issues, an opportunity to become involved in the planning process and make their views known. Citizens and community leaders; information from cities, counties, regional, state, and federal agencies; and professionals active in hazard mitigation planning provide important input in the development of the plan.

The planning process was conducted by the Claremore Hazard Mitigation Planning Committee (CHMPC), made of representatives of the participating jurisdictions.

The CHMPC was supported by the city staff. INCOG staff worked with the committee for this hazard mitigation plan update. The City and INCOG staff met several times during the planning process; attended all meetings of the CHMPC and meetings with elected officials. All of the CHMPC meetings were posted at the City Hall and in other public places, including the City's Emergency Management Office, and were open to the public.

The CHMPC met at the Claremore City Hall during the planning process to review progress, identify issues, receive task assignments, and advise the City and INCOG staff dedicated to updating the plan. Local research and input was provided by committee members and the INCOG staff provided a regional hazard mitigation perspective and direct access to state and federal hazard information resources and led the preparation of draft planning documents. INCOG staff outlined the plan and prepared a draft. Committee members selected the hazards to investigate, provided specific City information, conducted the public hazard awareness survey, evaluated mitigation activities, and selected the action plan projects. INCOG staff then prepared the final plan update for review. A list of CHMPC members and meetings are shown in Table 2-1. The agendas, minutes, and sign-in sheets for these meetings are included in Appendix 2.

Table 2–1:
Claremore Hazard Mitigation Planning Committee

Sean Douglas (1)	City of Claremore Emergency Mgmt	Emergency Mgmt Director
Mickey Perry	City of Claremore City Council	Mayor
Matt Wilson	City of Claremore Fire Department	Deputy Chief
Daryl Golbek	City of Claremore Administration	City Manager
Art Andrews	City of Claremore Administration	Development Services Supervisor
Ron Easterling	City of Claremore Public Works	Floodplain Administrator
Paul Fowler	Claremore Public Schools	Director of Operations
Mark Ogle	American Red Cross	Service Center Director
Leonard Szopinski	Rogers State University	Physical Plant Director
Christine Davis	Hillcrest Claremore Hospital	Service Coordinator
Dell Davis	Claremore Chamber of Commerce	Chief Executive Officer
John McElhenney	INCOG	Senior Civil Engineer

(1) Committee Chairman

Table 2–2:
Committee Meetings and Activities

Date	*Activity*
First meeting 9-12-2012	CHMPC meeting at the City Hall to discuss the overall need for a plan, the jurisdictions to be included in the update, the planning process and plan outline, discussed the hazard identification and assessment issues and begin review of Draft Plan. Developed a hazard awareness survey.
Second meeting 10-10-2012	CHMPC meeting at the City Hall to review the hazard awareness survey, review the hazard profiles, discuss mitigation goals and objectives, and discuss mitigation activities and the ranking process.
Third meeting 11-07-2012	CHMPC meeting at the City Hall to review the selection of mitigation activities for the City and the School District. Also discuss the plan maintenance of the plan, and the adoption process.
Fourth meeting 12-12-2012	CHMPC meeting at the City Hall to receive comments from other communities and agencies, and Committee recommendation to approve plan.
Fifth meeting 01-07-2013	City of Claremore City Council Meeting. The public hearing was held and the updated multi-jurisdictional multi-hazard mitigation plan was presented to the City Council.

2.1.2 Step Two: Involve the Public

An open to the public planning process was again utilized by the City in this plan update process. In addition to the CHMPC, the staff team undertook additional projects to inform the public of this effort and to solicit their input. All meetings of the CHMPC were publicly posted. A hazard awareness survey was developed and circulated by CHMPC members and by the City at large to solicit community input on hazard awareness and assessment of their level of concern. Feedback from these surveys was important to the development of the plan. 94 responses were received. A copy of the survey and summary of the responses are included in Appendix 4. Public comments were also invited through a public hearing. A public hearing was held on January 7, 2013 to solicit public comments before final plan update approval. A copy of the notice advertising the public hearing is included in Appendix 2.

2.1.3 Step Three: Coordinate with Other Agencies and Organizations

As part of the plan update process and to collect data on the hazards that impact the City of Claremore, staff reviewed information sources: public agencies, private organizations, and businesses that contend with natural hazards. These sources included printed documents and internet web sites. The agencies and organizations included FEMA, the Corps of Engineers, the US Geological Survey, INCOG, Rogers County, the State Department of Environmental Quality, the National Climatic Data Center, the National Oceanic and Atmospheric Administration, the Claremore Dailey Progress, the Tulsa World, and the Natural Resource Conservation Service. FEMA mapping, when combined with aerial data and historic data from the National Climatic

Data Center proved to be crucial to hazard identification and impact. The following list of agencies was invited to comment on a draft of the updated plan prior to approval. A sample letter requesting such comments is included in Appendix 3.

Federal
US Army Corps of Engineers
Natural Resource Conservation Service (NRCS)
US Fish and Wildlife Service

National Non-Profit
American Red Cross

State
Oklahoma Department of Emergency Management
Oklahoma Water Resources Board
Oklahoma Conservation Commission
Oklahoma Department of Wildlife Conservation
Oklahoma Department of Environmental Quality

Regional
Indian Nation Council of Governments (INCOG)

County
Rogers County

City
City of Catoosa

Business
Hillcrest Hospital - Claremore

Academia
Claremore Public Schools

Non-Profit
Chamber of Commerce

Coordination with other city planning efforts is critical to the success of the Multi-Hazard Mitigation Plan updates. The planning process utilized for the initial plan was followed for the 2012 update. The CHMPC used information included in the most current version of the City's Comprehensive Plan, Emergency Operations Plan, FIRM Maps, Building Codes and City Ordinances as part of the update process. The City Staff provided information in regard to the utilization of the initial Multi-Hazard Mitigation Plan as a resource for integrating Action Plan Activities and other plan information into other City planning activities. Through participation in the CHMPC, the Claremore School District provided valuable information to the plan update process.

2.1.4 Step Four: Assess the Hazard

The staff team collected data on the hazards from available sources. Hazard assessment is included in Chapter 3, with the discussion of each hazard.

Table 2-3 lists the various hazards that affects the City of Claremore, describes how they were identified, and why they were identified.

Table 2–3:
How and Why Hazards Were Identified

Hazard	*How Identified*	*Why Identified*
Floods	• Review of FEMA and City and County floodplain maps • Buildings in the floodplains • Historical floods and damages	• 547 parcels in the City are located in the floodplain • Over $ 41 million of structures at risk
Tornados	• Review of recent disaster declarations • Input from Emergency Manager • Consensus of Emergency Management Advisory Committee • Review of data from the NCDC	• Claremore is located in "Tornado Alley" • Claremore is a risk.
High Winds	• National Weather Service data • Loss information provided by NCDC	• High wind-related events in occur in Claremore
Lightning	• NCDC information and statistics	• Thunder and lightning occur regularly throughout the County. • Claremore is a risk.
Hailstorms	• National Climatic Data Center	• Anecdotal evidence suggests hail damage accounts for the highest residential insurance claims. • Entire City is at risk.
Severe Winter Storms	• Review of past Disaster Declarations • Input from City Emergency Management	• Claremore experienced a severe snow and ice event in 2011, bringing the City to a halt. • Severe snow and ice events seem to occur annually.
Extreme Heat	• Anecdotal evidence from committee • Review of data from NCDC • Recent summers have seen above average temperatures	• Local community service organizations have made heat- related deaths a high priority. • Extreme heat is extremely dangerous to the elderly and infirm.
Drought	• Historical vulnerability to drought, the "Dust Bowl" era • Drought and water shortages in adjacent communities in recent years	• Need to ensure adequate long- term water resources for the City
Expansive Soils	• Input from INCOG • Review of NRSC data	• Damage to buildings from expansive soils is difficult after it is built. • Can be mitigated with building code provisions.

Table 2–3: How and Why Hazards Were Identified (continued)

Hazard	*How Identified*	*Why Identified*
Wildfires	• Input from City Fire Department	• Continuing loss of life and property due to fires • Other hazard (winds, heat, drought) compound this hazard
Earthquakes	• Historic records of area earthquakes • Input from Oklahoma Geological Survey • Input from USGS • Anecdotal evidence from committee	• No major earthquakes • Anecdotal evidence suggest mild events occur but go unreported
Dam Break	• OWRB Dam Safety Program • Review of FIRM maps	• 30 dams in Rogers County are listed in the Dam Safety Program. One in the City. • Claremore Lake Dam is classified as High Hazard.
Hazardous Materials Events	• Input from ODEQ • Input from the Claremore Fire Department	• EHS sites within the City • Major traffic ways expose the City to potential traffic way hazardous materials incidents

2.1.5 Step Five: Assess the Problem

The hazard data was analyzed in light of what it means to public safety, health, buildings, transportation, infrastructure, critical facilities, and the economy. City and INCOG staff prepared several analyses using INCOG's geographic information system. The discussion of the problem assessment is addressed for each hazard in Chapter 3.

DAMAGE ESTIMATION METHODOLOGY

The following methodologies were used in the development of damage cost estimated for buildings and contents for flooding and tornado/high wind damage, used in the City of Claremore's Multi-Hazard Mitigation Plan and Update.

Structure Value: The value of the buildings within the City of Claremore was obtained from the Rogers County Assessor's office.

Contents Value: Value of contents for all buildings was estimated using FEMA 386-2 *Understanding Your Risks*. Table, page 3-11, "Contents Value as Percentage of Building Replacement Value".

2.1.6 Step Six: Set Goals

Hazard mitigation goals and objectives for the City of Claremore were developed by the CHMPC to guide the development of the plan. The hazard mitigation goals and objectives for the City are listed in Chapter 4.

2.1.7 Step Seven: Review Possible Activities

A wide variety of measures that can affect hazards or the damage from hazards were examined. The mitigation activities were organized under the following six categories. A more detailed description of each category is located in "Chapter 4: Mitigation Strategies."

1. **Preventive activities**—Zoning, building codes, city ordinances
2. **Structural Projects**—Levees, reservoirs, channel improvements
3. **Property protection**—Acquisition, retrofitting, insurance
4. **Emergency service**—Warning, sandbagging, evacuation
5. **Public information and education—**Outreach projects and technical assistance

2.1.8 Step Eight: Draft an Action Plan

The City and the CHMPC reviewed the list of recommended actions in the initial City of Claremore Multi-Hazard Mitigation Plan. The City reported to the committee the projects that were completed. Potential future hazard mitigation activities were reviewed and discussed by the committee. The City then selected mitigation projects and activities for the City to include in this update; for each project or activity identified for this update, it identified the party responsible for implementing the task, estimated the cost of the project, identified potential funding sources, and determined the target completion date for each activity. Each participating jurisdiction did the same for their own jurisdiction. Once all the jurisdiction's action plans were drafted, they were inserted into the final draft of the City multi-hazard mitigation plan update.

2.1.9 Step Nine: Adopt the Plan

The CHMPC reviewed the final draft approved the final plan and submitted it to the City of Claremore City Council and the Claremore Public School Board of Education, for adoption.

2.1.10 Step Ten: Implement, Evaluate, and Revise

Adoption of the Multi-Hazard Mitigation Plan is only the beginning of this effort. City offices, other agencies, and private partners will proceed with implementation. The CHMPC will monitor progress, evaluate the activities, and annually recommend revisions to the action items. This process will involve quarterly meetings in which the CHMPC will monitor progress on the Action Plan and review other mitigation actions for inclusion in the Action Plan for Years 2 through 5. This monitoring and review process will also be coordinated so as to provide input into other appropriate county and community planning efforts specifically updates to the City's Capital Improvement Plan and the City's Annual Budget.

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Chapter 3:

Risk Assessment and Vulnerability Analysis

3.1 Identifying Hazards

There were 13 hazards investigated by the CHMPC. These were considered to be all the relevant hazards, following the committee's hazard information search. Hazard identification was discussed at the initial hazard mitigation planning meetings on September 12, 2012.

The hazards facing Claremore Public School are the same hazards facing the City. The School's buildings are all within the Claremore corporate limits. Therefore, the School's risk and vulnerability from the hazards are included in the City of Claremore's risk and vulnerability analysis. A map showing the location of the schools' buildings being within the Claremore city limits is shown on Map Number 1A in Appendix 1. As will be discussed in Section 3.2.1.2, the location of the flood hazard extends onto the City of Claremore, but does not extend onto any of the Claremore School campuses; therefore, the flood hazard does not pose a specific risk to the School. And as will be discussed in Section 3.2.13.3, the dam break hazard does not include the Claremore Public Schools' campuses; therefore, the dam break hazard does not pose a specific risk to the School.

The hazards are listed in Table 2.2. The table lists each hazard, the items that were considered in how the hazard was identified, and why each hazard was identified. Hazard information was obtained from the City Emergency Management, City Officials, County records, regional planning agency (INCOG), flood insurance rate maps, NOAA, and public input.

3.2 Profiling Hazard Events

This section provides a profile of each hazard. In this section, the letter "X", when included in a subsection identification label, refers to a specific hazard's subsection, as follows:

X=1 Flood Hazard
X=2 Tornado Hazard
X=3 High Winds Hazard
X=4 Lightning Hazard
X=5 Hail Storm Hazard
X=6 Winter Storm Hazard
X=7 Heat Hazard
X=8 Drought Hazard
X=9 Expansive Soils Hazard
X=10 Wildfire Hazard
X=11 Earthquake Hazard
X=12 Hazardous Material Hazard
X=13 Dam Break

Subsection 3.2.X.1 describes each hazard, subsection 3.2.X.2 identifies the location of the hazard, subsection 3.2.X.3 identifies the extent (such as severity or magnitude) of the hazard, subsection

3.2.X.4 provides information on previous occurrences, subsection 3.2.X.5 discusses the probability of future occurrences, and subsection 3.2.X.6 discusses vulnerability and impact. Each hazard affects the county as a whole, except floods, expansive soil and dam breaks which are location specific.

3.2.1 Flood Hazard

3.2.1.1 Flooding is defined as the accumulation of water within a water body and the overflow of the excess water onto adjacent lands. The floodplains are the lands adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that is susceptible to flooding.

3.2.1.2 The location of the flood hazard in the City of Claremore is its regulatory floodplain, as defined by the City's Flood Insurance Rate Maps (FIRMs). The regulatory floodplain lies in several watersheds within the City. The flood hazard is shown on Map Number 5 in Appendix 1.

The City of Claremore has specific flooding hazard at the following locations:

a)	Cat Creek at Ne-Mar Channel Improvements on Will Rogers Blvd	$51,654
b)	Greenbrier Detention Pond between Jay and Chanbers	$2,819,287
c)	Springbrook Subdivision Channel Improvements	$117,000
d)	West 19th Street Storm Sewer (100-yr capacity)	$596,404
e)	Acquire Residences along Robin Road at Cat Creek (cost is City's portion)	$126,000
f)	Westwind Court Channel at Cat Creek (100-yr capacity)	$297,064
g)	Cat Creek Tributary at Hwy 20 & Dupont (Channel Extension)	$67,185
h)	Acquire Residences north of Archer Ct btw Brady and Chambers (cost is City's portion)	$88,500
i)	Lowry Road Culvert Replacement on Lowry btw Industrial and SH 66.	$1,244,472
j)	Reavis Road to the south of 14th Street	$192,000

The Claremore Public School's campuses, as listed in Chapter 1, are not in the regulatory floodplain. Therefore, the Claremore Public Schools are not considered at risk from the flood hazard and do not have flood hazard concerns.

3.2.1.3 The severity of a flood is determined by several factors; including, rainfall intensity, duration, and location, and ground cover imperviousness and degree of saturation. The magnitude of the flood hazard is the regulatory floodplain. Both City and School use the regulatory floodplain to measure of the extent of the flood hazard.

The regulatory floodplain is defined as the area inundated by the runoff from the rainfall having a one-percent chance of occurring in any given year. Although flooding is an identified hazard, the effects have been minimal except for a few locations in the City. The regulatory floodplain is identified in the City's Flood Insurance Rate Maps (FIRMs) as Zone A and Zone AE. The following chart describes the FIRM's flood zones.

Table 3-1

FLOOD ZONES

Zone A	The 100-year or Base Floodplain. There are seven types of A zones:	
	A	The base floodplain mapped by approximate methods, i.e., BFEs are not determined. This is often called an unnumbered A zone or an approximate A zone.
	A1-30	These are known as numbered A zones (e.g., A7 or A14). This is the base floodplain where the firm shows a BFE (old format).
	AE	The base floodplain where base flood elevations are provided. AE zones are now used on new format FIRMs instead of A1-30 zones.
	AO	The base floodplain with sheet flow, ponding, or shallow flooding. Base flood depths (feet above ground) are provided.
	AH	Shallow flooding base floodplain. BFE's are provided.
	A99	Area to be protected from base flood by levees or Federal flood protection systems under construction. BFEs are not determined.
	AR	The base floodplain that results from the de-certification of a previously accredited flood protection system that is in the process of being restored to provide a 100-year or greater level of flood protection
Zone V and VE	**V**	The coastal area subject to velocity hazard (wave action) where BFEs are not determined on the FIRM.
	VE	The coastal area subject to velocity hazard (wave action) where BFEs are provided on the FIRM.
Zone B and Zone X (shaded)	Area of moderate flood hazard, usually the area between the limits of the 100-year and the 500-year floods. B zones are also used to designate base floodplains or lesser hazards, such as areas protected by levees from the 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile.	
Zone C and Zone X (unshaded)	Area of minimal flood hazard, usually depiction FIRMs as exceeding the 500-year flood level. Zone C may have ponding and local drainage problems that do not warrant a detailed study or designation as base floodplain. Zone X is the area determined to be outside the 500-year flood.	
Zone D	Area of undetermined but possible flood hazards.	

3.2.1.4 Historically, the City has recognized flooding as a hazard. The City joined the National Flood Insurance Program (NFIP) in 1987, adopting a Flood Damage Prevention Resolution, and requiring that all future development be built one foot above the 100-year base flood elevation. According to the National Climatic Data Center, from 2006 through 2011, the City of Claremore has had three flood events. The City floodplain administrator reports they are seven repetitive loss structures in the City that are insured through the National Flood Insurance Program. All seven are single family residential structures.

The Claremore Schools have not had a flood occurrence in the same time frame.

Appendix 6 summarizes previous occurrences of this hazard for the City.

3.2.1.5 The probability of future flooding from the regulatory floodplain is statistically a one-percent chance of occurring in any given year, the 100-year floodplain. The City requires all new development to develop in compliance with their flood damage prevention ordinance. Therefore, new development will not cause an increase in the flood hazard by not increasing the hazard on to adjacent property and building new structures above the regulatory flood elevation; both provisions of the ordinance. So the probability of future flood damage should not increase with future development. According to the likelihood rating from Appendix 6, the likelihood of a flood hazard in the City is "highly likely". The School's likelihood is "unlikely" in that all school areas are outside the regulatory floodplain and they have not had an occurrence in the five year time frame.

3.2.1.6 Flooding can take many forms including river floods (riverine) and creeks and flash floods. The most likely event for serious flooding would be flash flooding due to storm water drainage backup caused by a large amount of rain from a thunderstorm. Flash floods occur with little or no warning and can reach peak flow within a few minutes. Waters from flash floods move with great force and velocity and can roll boulders, tear out trees, destroy buildings, and sweep away bridges. These walls of water generally carry large amounts of debris. Most flood deaths are due to flash floods.

The low-lying areas in the flood plains would be more susceptible to flooding. Roadways in the area are vulnerable and have a history of having to be closed during flooding events. This can cause what is usually temporary interruptions to the highway and road system and has the potential to isolate a community for a period of time. Water Wells, houses, utility lines and sewer systems are damaged by flood waters. This causes the citizens to be without power, homes and in many cases people must be relocated to other areas.

Table 3-2
CONTRIBUTING FACTORS TO THE FLOOD HAZARD

Factor	Effect
Precipitation Rate	The most obvious contributing factor. As the rate of precipitation increases, so too does its ability to outpace the ability of the watershed to absorb it. This is the dominant factor in flash flooding events, and can overwhelm any or all of the following factors.
Training Echoes	Storm cells that follow each other (much like box cars on a train) can repeatedly deposit large amounts of water on the same watershed, overwhelming its ability to handle runoff.
Slope of Watershed	Steeper topography (hills, canyons, etc.) will move runoff into waterways more quickly, resulting in a quicker, flashier response to precipitation.
Shape of Watershed	Longer, narrower watersheds will tend to "meter out" runoff so that water arrives from down shed (nearer to the mouth of the stream) areas faster than from up shed areas. In watersheds that are more square or circular than elongated, runoff tends to arrive in the main stem at the same time, intensifying the response. This factor becomes more significant with larger watersheds.
Saturation of Soils	Saturated or near-saturated soils can greatly reduce the rate at which water can soak into the ground. This can increase runoff dramatically.
Hardened Soils	Extremely dry soils can develop a pavement or "crust" that can be resistant to infiltration. This is especially true in areas of recent wildfire, where plant oils or resins may cause the soil to be even more water-resistant.
Urbanization	The urban environment usually intensifies the response to heavy precipitation. The two dominant urban factors are: 1) increased pavement coverage, which prevents infiltration and dramatically increases runoff; and 2) Urban systems are designed to remove water from streets and byways as quickly as possible. This accelerates the natural response to precipitation by placing runoff in waterways much more quickly.
Low-water crossings	The vast majority of flash flood related deaths occur in vehicles. Many of these deaths occur at low-water crossings where the driver is unaware of the depth of the water or the consequences of driving into it.

It is estimated that 547 parcels of property are in the 100 year floodplain, 375 with improvements. It is unknown the number of people that reside in these residences; these structures are valued at approximately $41 million dollars.

A typical flood hazard would be an event where rainfall causes runoff to exceed the creek channel capacity spilling runoff into the floodplain fringe, the area between the creek channel and the

edge of the regulatory floodplain. This area of inundation would still be regulated by the City's Flood Damage Prevention Ordinance where new buildings are protected under the ordinance and older structures are addressed below in section 3.2.1.4. The worst case flood event would be where rainfall occurs causing runoff to exceed the regulatory floodplain, thereby inundating areas and possibly structures outside the areas regulated by the Flood Damage Prevention Ordinance, the ordinance adopted by the City of Claremore. Both the City of Claremore and the Claremore Schools consider the regulatory floodplain the extent of the flood hazard.

As described in the flood hazard location section, 3.2.1.2, none of the school sites are in regulatory floodplain, so none of the school sites are impacted by the flood hazard.

3.2.2 Tornado Hazard

3.2.2.1 A tornado is a rapidly rotating vortex or funnel of air extending to the ground from a cumulonimbus cloud. When the lower tip of a vortex touches earth, the tornado becomes a force of destruction. The path width of a tornado is generally less than a half-mile, but the path length can vary from a few hundred yards to dozens of miles. A tornado moves at speeds from 30 to 125 mph, but can generate winds exceeding 300 mph.

3.2.2.2 The City of Claremore is located in Rogers County, in the northeast part of Oklahoma. The following figure obtained from the FEMA web site shows central Oklahoma, along with the area around Fort Worth Texas, to be the area of highest number of recorded tornados per area in the country.

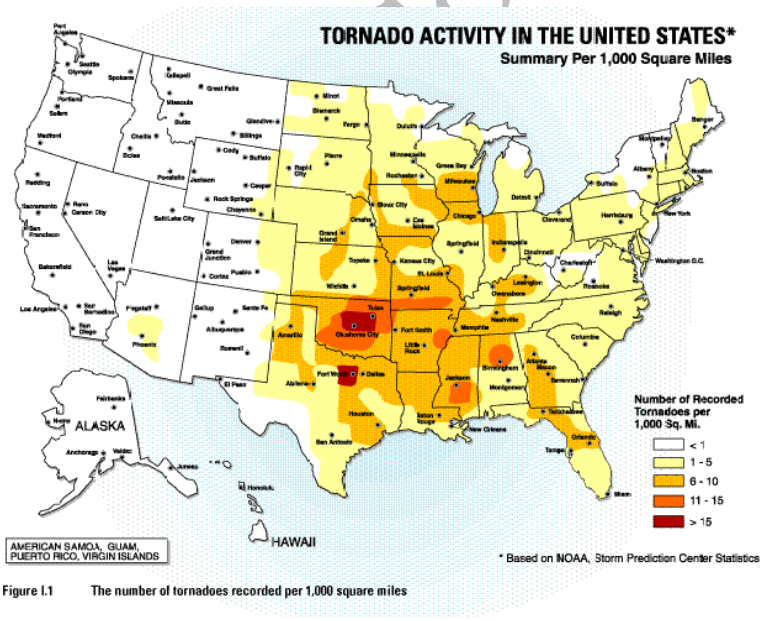


Figure I.1 The number of tornadoes recorded per 1,000 square miles

Within the City, no area of the City is at any more or less risk from the tornado hazard.

For the Claremore Public School's campuses, as listed in Chapter 1, no area at any more or less risk from the tornado hazard.

3.2.2.3 The severity of tornados is measured on the Fujita Tornado Scale (see below). Both City and School use this scale to measure the extent of the hazard. Almost 70% of all tornados are measured F0 and F1 on the Fujita Tornado Scale, causing light to moderate damage, with wind speeds between 40 and 112 miles per hour. F4 and F5 tornados are considerably less

frequent, but are the big killers. 67 percent of all tornado deaths were caused by F4 and F5 storms, which represent only 1% of all tornados.

Table 3-3
FUJITA TORNADO SCALE

Category	Wind Speed (mph)	Damage
F0	Gale tornado (40-72)	**Light:** Damage to chimneys, tree branches, shallow-root trees, sign boards
F1	Moderate tornado (73-112)	**Moderate:** Lower limit is beginning of hurricane wind speed—surfaces peeled off roofs, mobile homes pushed off foundations or overturned, cars pushed off roads
F2	Significant tornado (113-157)	**Considerable:** Roofs torn off frame houses, mobile homes demolished, boxcars pushed over, large trees snapped or uprooted, light-object missiles generated
F3	Severe tornado (158-206)	**Severe:** Roofs and some walls torn off well-constructed houses, trains overturned, most trees in forest uprooted, cars lifted off the ground and thrown
F4	Devastating tornado (207-260)	**Devastating:** Well-constructed houses leveled, structures with weak foundations blown off some distance, cars thrown and large missiles generated
F5	Incredible tornado (261-318)	**Incredible:** Strong frame houses lifted off foundations and carried considerable distance to disintegrate, automobile-sized missiles fly through the air in excess of 100 yards, trees debarked

On February 1, 2007, the Fujita scale was decommissioned in favor of the more accurate Enhanced Fujita Scale, which replaces it. None of the tornados recorded on or before January 31, 2007 will be re-categorized. Therefore maintaining the Fujita scale will be necessary when referring to previous events.

Table 3-4:
ENHANCED FUJITA TORNADO SCALE

Enhanced Fujita Category	Wind Speed (mph)	Potential Damage
EF0	65-85	**Light damage:** Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	86-110	**Moderate damage:** Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	**Considerable damage:** Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	**Severe damage:** Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	**Devastating damage:** Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.

EF5	>200	**Incredible damage:** Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd); high-rise buildings have significant structural deformation; incredible phenomena will occur.

3.2.2.4 Map Number 6 in Appendix 1 shows past tornado events. According to the National Climatic Data Center, from 1950 through 2010, there were eight tornados in and around the Claremore area, one inside the city limits, in 1989. From 2006 through 2011, there were no tornados in Claremore or the Claremore area. The Claremore School campuses had not had a tornado occurrence in the same time frame.

Appendix 6 summarizes previous occurrences of this hazard.

3.2.2.5 Meteorological conditions have not changed, so future tornado events should occur at the same probability as previous events. No area of the City is any more or less at risk from the tornado hazard. According to the likelihood rating from Appendix 6, the likelihood of a tornado hazard in the City is "unlikely". None of the Claremore School campuses are also any more or less at risk from the tornado hazard. There likelihood rating of a tornado hazard is also "unlikely".

3.2.2.6 The City of Claremore, and the Claremore School campuses being within the City, are located in what is considered an active part of tornado alley. Every structure in the City is vulnerable to tornados. Structures, automobiles, persons, agriculture, and utilities can sustain damage from tornados. Utility service outages can affect large segments of the population for long periods of time. Economic losses from homeowners and businesses alike can be devastating. Food spoilage with lack of refrigeration, gas pumps not operating, and daily life activities can all come to a halt. People displaced from homes that are damaged and destroyed also create a new set of challenges with the basics of food, shelter and clothing.

On the lower end, damage from an F0 tornado with winds from 40-72 mph can result in destruction of road signs, tall structures, trees, and possible damage to shingled roofs. Mid –range F2 and F3 tornados with winds from 113-206 mph will result in considerable damage. Roofs will be torn off structures, mobile homes completely demolished, most trees and plant life destroyed, objects as big as cars thrown small distances (as well as other light missiles being generated), and trains being blown over can result from these storms. The worst case is the F5 tornado with winds from 261-318 mph. Total destruction will occur in the path of the tornados, which have been up to ½ mile wide in the past. Homes, automobiles, appliances, outbuildings, and anything outdoors can be picked up and thrown long distances as large missiles. Most plant life including lawns, shrubs and trees are completely destroyed.

Utility infrastructure such as power lines, substations, water towers, and water wells, are vulnerable and can be severely damage or destroyed from a tornado. Emergency vehicles responding to the devastated areas can have trouble responding due to down power lines and debris in roadways. Livestock is vulnerable during tornado events and are often killed since there is little protection for the animals on the open range. People caught in the path of a tornado who don't take shelter have the potential of being injured or killed. Residents most vulnerable to tornados are those living in mobile homes.

Historically the tornado will move in a southwest to northeast direction, but can move in any direction. Consequently, vulnerability of humans and property is difficult to evaluate since the tornados form at different strengths, in random locations, and create narrow paths of destruction.

Advances in meteorology and the use of Doppler radar allow efficient prediction of tornado formation before they occur. A network of storm watchers attempt to identify funnel clouds and report to various networks to alert the population. Even though these advances have significantly improved the available response time, tornados can still occur unexpectedly and without warning.

Utilizing storm spotters and early warning systems, City residents can take appropriate precautions during these events. As a result, casualty rates are low. The popularity of mobile/manufactured housing has increased susceptibility of existing structures to tornados. The use of better building techniques, tie-down systems and the availability of storm shelters all help mitigate losses in the City.

A typical tornado hazard would be an EF0 event, as defined in Table 3-4 above, the Enhanced Fujita Tornado Scale. The worst case tornado hazard would be an EF5 event, as defined in Table 3-4 above.

3.2.3 High Wind Hazard

3.2.3.1 Wind is defined as the motion of air relative to the earth's surface. Extreme windstorm events are associated with cyclones, severe thunderstorms, and accompanying phenomena such as tornados and downbursts. Winds vary from zero at ground level to 200 mph in the upper atmospheric jet steam at 6 to 8 miles above the earth's surface. The mean annual wind speed in the mainland United States is reported by FEMA to be 8 to 12 mph, with frequent speeds of 50 mph and occasional wind speeds of greater than 70 mph. Oklahoma wind speeds average 10 miles per hour.

3.2.3.2 The location of this hazard is uniform over the entire City area. No areas of the City, including the Claremore Schools campuses, are any more of less at risk from a high wind hazard than another.

3.2.3.3 The magnitude of the high wind hazard is categorized on various wind scales, such as the Beaufort, Saffir-Simpson, and the Fujita measurement scales. Both the City and the Claremore Schools use these scales to measure the extent of the hazard. The tables below containing the Beaufort and Saffir-Simpson scales show that there is little consensus of opinion as to what wind speeds produce various damages. (The Fujita Scale is shown in the section 3.2.2, "Tornado Hazard"). The National Weather Service (NWS) issues Severe Thunderstorm Warnings whenever a thunderstorm is forecast to produce wind gusts to 58 miles per hour (50 knots) or greater and/or hail one inch in diameter or larger. Hail size increased from ¾ inch to one inch on January 5, 2010, for warning issues. The hail hazard will be addressed in Section 3.2.5.

Table 3-5
BEAUFORT SCALE

Force	Wind Speed (mph)	Damages
9	47-54	**Strong gale:** Chimneys blown down, slate and tiles torn from roofs
10	55-63	**Whole gale:** Trees broken or uprooted
11	64-75	**Storm:** Trees Uprooted, cars overturned
12	75+	**Severe Storm:** Devastation is widespread, Buildings destroyed

Table 3-6
SAFFIR-SIMPSON SCALE

Category	Wind Speed (mph)	Storm Surge (feet)	Damages
1	74-95	4- 5	**Minimal:** Trees, shrubbery, unanchored mobile homes, and some signs damaged, no real damage to structures
2	96-110	6-8	**Moderate:** Some trees toppled, some roof coverings damaged, major damage to mobile homes
3	111-130	9-12	**Extensive:** Large trees are toppled, some structural damage to roofs, mobile homes destroyed, structural damage to small homes and utility buildings
4	131-155	13-18	**Extreme:** Extensive damage to roofs, windows, and doors, roof systems on small buildings completely fail, some curtain walls fall
5	155+	18+	**Catastrophic:** Roof damage is considerable and widespread, window and door damage is severe, extensive glass failure, entire buildings could fall

3.2.3.4 According to the National Climatic Data Center, the City has had 17 recorded high winds events during the period of 2006 through 2011, causing an estimated $80,000 in property damage. The Claremore Schools did not report damage from these events in the City.

Appendix 6 summarizes previous occurrences of this hazard.

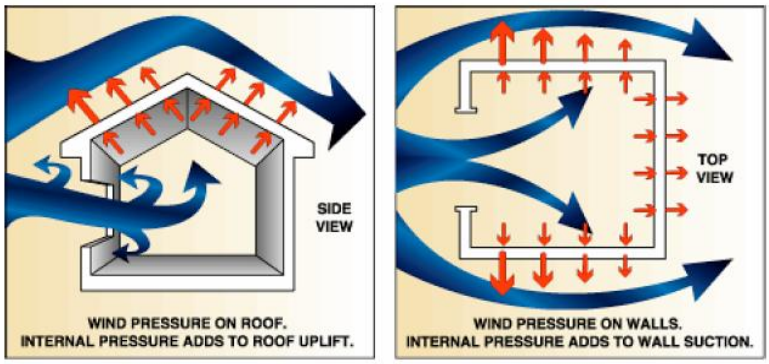
3.2.3.5 The majority of the United States is at some risk of high wind hazards, including the City of Claremore and the Claremore Schools. Meteorological conditions have not changed so future events should occur at the same probability as the previous events. According to the likelihood rating from Appendix 6, the likelihood of a high wind hazard in the City is "highly likely". And also for the Claremore Schools because they are within the City.

3.2.3.6 Property damage and loss of life from windstorms are increasing due to a variety of factors. Use of manufacturing housing and mobile homes is on an upward trend, and this type of structure provides less resistance to wind than conventional construction. With the deteriorating condition of older homes, and the increased use of aluminum-clad mobile homes, and poorly designed homes, the impacts of wind hazards will likely continue to increase.

Winds are always part of severe storms such as tornados and blizzards, but do not have to accompany a storm to be dangerous. Down-slope windstorms, straight-line winds, and microbursts can all cause death, injury, and property damage. Very little available data exists separate from thunderstorms or tornado data. Any efforts made to mitigate for tornados or thunderstorm winds should address the hazard of high winds.

Extreme winds can cause several kinds of damage to a building. The diagram below shows how extreme winds affect a building and helps explain why these winds cause buildings to fail. Wind speeds, even in these extreme wind events, rapidly increase and decrease. An obstruction, such as a house, in the path of the wind causes the wind to change direction. This change in wind direction increases pressure on parts of the house. The combination of increased pressures and fluctuating wind speeds creates stress on the house that frequently causes connections between building components to fail. For example, the roof or siding can be pulled off or the windows can be pushed in.

Diagram of Windstorm Effects



Buildings that fail under the effects of extreme winds often appear to have exploded, giving rise to the misconception that the damage is caused by unequal wind pressures inside and outside the building. This misconception has led to the myth that during an extreme wind event, the windows and doors in a building should be opened to equalize the pressure. In fact, opening a window or door allows wind to enter a building and increases the risk of building failure.

Damage can also be caused by flying debris (referred to as windborne missiles). If wind speeds are high enough, missiles can be thrown at a building with enough force to penetrate windows, walls, or the roof. For example, an object such as a 2" x 4" wood stud weighing 15 pounds, when carried by a 250-mph wind, can have a horizontal speed of 100 mph and enough force to penetrate most common building materials used in houses today. Even a reinforced masonry wall will be penetrated unless it has been designed and constructed to resist debris impact during extreme winds. Because missiles can severely damage and even penetrate walls and roofs, they threaten not only buildings but the occupants as well.

In addition to structural issues, high winds can affect electrical and other utilities with service outages. Power lines can ground out or knocked down causing loss of electrical service. Travel can be disrupted with the loss of stop lights, street lights and dangerous cross winds making travel difficult. There could also be loss of water, sewer, and communications abilities.

A typical high wind hazard would be a Saffir-Simpson Scale category 1 event, as defined in Table 3-6 above, the Saffir-Simpson Scale. The worst case high wind hazard would be a Saffir-Simpson Scale category 5 event, as defined in Table 3-6 above.

3.2.4 Lightning Hazard

3.2.4.1 Lightning is a discharge of atmospheric electricity, accompanied by a vivid flash of light, from a thunderstorm, frequently from one cloud to another, sometimes from a cloud to the earth. The sound produced by the electricity passing rapidly through the atmosphere causes thunder.

Within the thunderstorm clouds, rising and falling air causes turbulence which results in a buildup of a static charge. The negative charges concentrate in the base of the cloud. Since like charges repel, some of the negative charges on the ground are pushed down away from the surface, leaving a net positive charge on the surface. Opposite charges attract, so the positive and negative charges are pulled toward each other. This first, invisible stroke is called a stepped leader. As soon as the negative and positive parts of the stepped leader connect there is a conductive path from the cloud to the ground and the negative charges rush down it causing the visible stroke. Thunder is caused by extreme heat associated with the lightning flash. In less than

a second, the air is heated from 15,000 to 60,000 degrees. When the air is heated to this temperature, it rapidly expands. When lightning strikes very close by, the sound will be a loud bang, crack or snap. Thunder can typically be heard up to 10 miles away. During heavy rain and wind this distance will be less, but on quiet nights, when the storm is many miles away, thunder can be heard at longer distances.

3.2.4.2 The location of this hazard is uniform over the entire City area. No areas of the City, including the Claremore Schools campuses, are any more of less at risk from a lightning hazard than another.

3.2.4.3 The City of Claremore and the Claremore Schools consider any lightning event that causes major property damage or death to be a major severity and a minor severity is lightning strikes that cause little property damage and no injuries.

The type of lightning is a measure of the severity of the lightning hazard. Cloud-to-ground is the more severe type is terms of potential cause of damage. The table below from the National Climatic Data Center shows the types and frequency categories of lightning. The more severe type of lightning; coupled with an increased frequency, pose a greater lightning hazard.

Table 3-7
TYPE OF LIGHTNING

Type	Contraction	Definition
Cloud to Ground	CG	Lightning occurring between cloud and ground.
In Cloud	IC	Lightning occurring within the cloud.
Cloud to Cloud	CC	Streaks of lightning reaching from one cloud to another.
Cloud to Air	CA	Streaks of lightning which pass from a cloud to the air, but do not strike the ground.

Table 3-8
FREQUENCY OF LIGHTNING

Frequency	Contraction	Definition
Occasional	OCNL	Less than 1 flash per minute.
Frequent	FRQ	About 1 to 6 flashes per minute
Continuous	CONS	More than 6 flashes per minute.

3.2.4.4 For the City of Claremore, the National Climatic Data Center (NCDC) reports no lightning events during the six year period from 2006 through 2011. With the frequent wind and thunderstorm activity the City experiences, it is certain that lightning strikes occurred, but were just not recorded. The Claremore Schools, being within the City, reported no lightning events during the same time frame.

Appendix 6 summarizes previous occurrences of this hazard.

3.2.4.5 Meteorological conditions have not changed so future events should occur at the same probability as the previous events. According to the likelihood rating from Appendix 6, the likelihood of a lightning hazard in Claremore is "unlikely", and the same for the Claremore Schools.

3.2.4.6 Lightning strikes can also cause high-voltage power surges that have the ability to seriously damage equipment and valuable data if surge protection devices are not installed properly. Property damage from power surges and resulting fires can destroy not only the electronics in private homes, but data stored electronically.

A typical lightning hazard would be lightning that stays in the air, not touching the ground. The worst case lightning event would be a cloud to ground lightning type where the lightning strikes a large public gathering location, which could result in mass causalities.

The largest vulnerability to lightning 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 and at risk of injury from lightning. Most people are injured or killed by lightning will participating in some form of recreation. Some of the area swimming pools and water parks are installing early warning devices for the danger of lightning strikes. Damage to trees and homes would generally be under $1,000 if a strike did occur.

3.2.5 Hail Storm Hazard

3.2.5.1 Hail is frozen water droplets formed inside a thunderstorm cloud. They are formed during the strong updrafts of warm air and downdrafts of cold air, when the water droplets are carried well above the freezing level to temperatures below 32 deg F, and then the frozen droplet begins to fall, carried by cold downdrafts, and may begin to thaw as it moves into warmer air toward the bottom of the thunderstorm. This movement up and down inside the cloud, through cold then warmer temperatures, causes the droplet to add layers of ice and can become quite large, sometimes round or oval shaped and sometimes irregularly shaped, before it finally falls to the ground as hail.

3.2.5.2 The location of this hazard is uniform over the entire City area. No areas of the City, including the Claremore Schools, are any more of less at risk from the hail storm hazard than another.

3.2.5.3 The severity of damage caused by hail storms depends on the hailstone sizes (average and maximum), number of hailstones per unit area, and associated winds. The magnitude of a hail storm is as follows.

Table 3-9
HAILSTONE SIZES

Diameter	Example	Diameter	Example
1/4 inch	Pea	1 ¾ inches	Golf Ball
1/2 inch	Marble	2 ½ inches	Tennis Ball
3/4 inch	Penny	2 ¾ inches	Baseball
7/8 inch	Nickel	3 inches	Tea Cup
1 inch	Quarter	4 inches	Grapefruit
1 ½ inches	Ping Pong Ball	4 ½ inches	Softball

The National Weather Service (NWS) issues Severe Thunderstorm Warnings whenever a thunderstorm is forecast to produce wind gusts of 58 miles per hour (50 knots) or greater and/or hail size one inch in diameter or larger. Prior to January 5, 2010 the criteria for hail was ¾ inch or larger.

Both the City and the Claremore Schools use the hailstone size as a measure of the extent of the hail hazard.

3.2.5.4 According to the National Climatic Data Center, the City of Claremore has had 12 hail hazard events of hail diameter ¾ inch and greater during the period from 2006 through

2011. The Claremore Schools did not report any hail hazard occurrence is their areas during this same time frame.

Appendix 6 summarizes previous occurrences of this hazard.

3.2.5.5 Meteorological conditions have not changed so future events should occur at the same probability as the previous events. According to the likelihood rating from Appendix 6, the likelihood of a future hail hazard in the City of Claremore is "highly likely", and the same for the Claremore Schools because they are within the City.

3.2.5.6 The impact of the hazard can range from damage through destruction of structures and personal property to bodily injury, depending on the diameter. The National Climatic Data Center has reported hail in the City up to 1 ¼ inches in diameter.

A typical hail storm hazard would be hailstones that are noticeable but cause no damage. The worst case hail storm event would be a hail storm event where the hailstones exceed the maximum diameter reported by a recording agency such as the National Climatic Data Center, causing wide-spread structure damage and at a time of a large public outdoor gathering causing injuries to persons not under cover of a substantial structure.

Vulnerability is difficult to evaluate since hail occurs in random locations and creates relatively narrow paths of destruction. Hail is capable of causing considerable damage to crops, buildings, and vehicles, and occasionally death to farm animals. Hail can also strip leaves and small limbs from non-evergreen trees. While large hail poses a threat to people caught outside in a storm, it seldom causes loss of human life.

- Costs and losses to agricultural and livestock producers
- Reduced yields and crop loss
- Injuries or loss of livestock
- Damage to barns and other farm buildings
- Damage to trees resulting in increased susceptibility to disease
- Urban, residential, and commercial
- Damage to buildings
- Roofs
- Windows
- Damage to automobiles, trucks, trains, airplanes, etc.
- Disruptions to local utilities and services
- Power
- Communications
- Transportation

Past storms in the City of Claremore have showed crops losses from slight damage of less than 10% production loss to total devastation of the crop with 100% loss. Damage to vehicles can range from several hundred dollars to total loss of the vehicle. At times when large parking lots or dealerships get hit, losses can be in the millions of dollars. Loss from a major hailstorm damaging automobiles and structures in a larger city could total in the tens of millions of dollars.

3.2.6 Winter Storm Hazard

3.2.6.1 All winter storms are accompanied by cold temperatures and blowing snow, which can severely reduce visibility. 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. An ice storm occurs when freezing rain falls from clouds and freezes immediately on impact. All winter storms make driving and walking extremely hazardous. The aftermath of a winter storm can impact a community or region for days, weeks, and even months. Storm effects such as extreme cold, flooding, and snow accumulation can cause hazardous conditions and hidden problems for people in the affected area. People can become stranded on the road or trapped at home, without utilities or other services. Residents, travelers and livestock may become isolated or stranded without adequate food, water and fuel supplies. The conditions may overwhelm the capabilities of a local jurisdiction. Winter storms are considered deceptive killers as they indirectly cause transportation accidents, and injury and death resulting from exhaustion/overexertion, hypothermia and frostbite from wind chill, and asphyxiation; house fires occur more frequently in the winter due to the lack of proper safety precautions while using home heating equipment.

3.2.6.2 The location of this hazard is uniform over the entire City area. No areas of the City, including the Claremore Schools, are any more of less at risk from the winter storm hazard than another.

3.2.6.3 A winter storm can range from moderate snow (2 to 4 inches over 12 to 24 hours) to blizzard conditions (4 to 6 inches over 12 to 24 hours) with high winds, freezing rain or sleet, heavy snowfall with blinding wind-driven snow and extremely cold temperatures that lasts several days. Some winter storms may be large enough to affect several states while others may affect only a single community. All winter storms are accompanied by cold temperatures and blowing snow, which increases the severity of the winter storm.

The Balthrop Ice Scale attempts to quantify the severity of the winter storm hazard. The scale is shown in Table 3-10.

Table 3-10
THE BALTHROP ICE SCALE

Level	Cause	Effect
Level 1; Nuisance Event, No Major Impact	Freezing rain and sleet, but little ice accumulation. Roads not hazardous. Ice forming on grass.	Little to no effect on the State of Oklahoma.
Level 2; Minor Event, Caution Advised	No measurable ice. Black ice on roads and bridges. Winter Weather Advisory.	Untreated roadways and bridges may become hazardous and slick. Livestock may need additional supplemental feed.
Level 3; Major Event, Isolated Emergency Conditions in the State of Oklahoma	Ice accumulations of ¼ to ½ inches. Reduced visibility. Winter Storm Warning.	Widespread hazardous road conditions. Travel discouraged. Isolated power outages because of down power lines from ice accumulations. Tree damage. Livestock loss potential increases. Supplemental feed necessary.
Level 4; Extreme Event, The State of Oklahoma Under Full State of Emergency	Crippling event. Winds over 35 mph. Little to no visibility. Ice accumulations of more than ½ inch. Blizzard Warning.	Road conditions hazardous to impassable. People and livestock isolated. Widespread power and utility outages. Infrastructure damage. High potential for loss of livestock. Structures threatened from accumulating ice. Communications infrastructure lost from ice accumulation. May be a long lasting event.

Both the City and the Claremore Schools use this scale to measure the extent of the hazard.

3.2.6.4 According to the National Climatic Data Center, 17 snow and ice events were reported in the City of Claremore from 2006 through 2011, causing an estimated $70,000,000 of property damage. The total areas affected within the City were not reported, but estimated to have affected large areas of the City, including the Claremore School campuses.

Appendix 6 summarizes previous occurrences of this hazard.

3.2.6.5 Meteorological conditions have not changed so future events should occur at the same probability as the previous events. According to the likelihood rating from Appendix 6, the likelihood of a winter storm hazard in the City of Claremore is "highly likely". And also for the Claremore Schools because they are within the City.

3.2.6.6 A typical winter storm hazard would be a Level 1 event, as defined by the Balthrop Ice Scale, a nuisance event. The worst case winter storm hazard would be a Level 4 event, where transportation is stopped, widespread power outages, livestock loss is likely, and the duration may be long.

The City of Claremore is affected periodically by heavy snow and ice that cause damage. Trees and power lines fall due to the weight of ice and snow causing damage to their surroundings as well as blocking streets and roads. Icy roads cause accident rates to increase and impair the ability for emergency vehicles to respond which can result in more injuries and a higher loss of life.

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, frostbite or related injuries and inability to travel for care.

Cold waves pose a variety of threats to individuals and communities. The list below summarizes some of the most common impacts of cold waves.

- Costs and losses to livestock producers
  - Loss of livestock due to exposure
  - Greater mortality due to Increased vulnerability to disease
  - Increased feed costs
  - Reduced milk production
  - Cost of supplemental water for livestock if onsite ponds and streams are frozen
  - Machinery and farm vehicles that will not operate in cold weather
- Urban, residential, and commercial impacts
  - Availability of water for municipal use due to frozen and burst water lines
  - Homes with alternative energy sources
  - House fires from overburdened chimneys
  - Carbon monoxide poisoning from exhaust produced by heaters and generators
  - Vehicles that will not operate in cold weather
  - Cost of keeping transportation lines clear of ice and snow
- Health

    - Mental and physical stress in the form of "cabin fever"
    - Frostbite and hypothermia
    - Disruption of services
    - Government offices and schools closed
    - Garbage collection halted
- General economic effects
    - Revenue loss from lost production in business and industry
    - Negative impact of economic multipliers
    - Higher energy costs
    - Damage to animal species
    - Loss of wildlife, particularly if cold wave is coupled with prolonged snow cover that makes sources of food unavailable
    - Greater mortality due to Increased vulnerability to disease
    - Loss of trees and woody shrubs that are not hardy enough to survive prolonged exposure to cold temperatures, especially when soil moisture is low
    - Pollution from increased energy production

A major winter storm can be lethal. Preparing for cold weather conditions and responding to them effectively can reduce the dangers caused by winter storms.

Mitigating ice storm damage must be a joint effort by City, private land owners, and corporate entities, including the Claremore School District. The City owns and operates the electric system in the City. Ordinances that require the maintenance of trees and shrubs surrounding the area of electric and telephone wires are a first step toward mitigating ice storm damage. Aggressive public education programs must be in place to alert people to the possible damages to their and other's property. Even corporations such as Oklahoma Gas and Electric do not have the man-power or financial resources to maintain all their lines. Regular trimming by all levels of participants can substantially reduce the damage caused by future events.

3.2.7 Heat Hazard

3.2.7.1 Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks are defined as extreme heat. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility. Drought occurs when a long period passes without substantial rainfall. A heat wave combined with a drought is a very dangerous situation.

3.2.7.2 The location of this hazard is uniform over the entire City area. No areas of the City, including the Claremore School campuses, are any more of less at risk from the heat hazard than another.

3.2.7.3 The severity of the extreme heat is dependent on a combination of temperature and humidity. High temperatures, when combined with high humidity can put an area in the "Extreme Danger" category on the National Weather Service Heat Index scale. When extreme heat is combined with drought, excessively dry hot conditions that contribute to a high risk of life-threatening heat-related illnesses may result. The heat index is a measure of the severity of a heat hazard. The heat index can be related to a range of specific heat disorders. The City of Claremore can experience heat index reading into the heat stroke range.

Table 3-11
HEAT INDEX

Temperature (F) versus Relative Humidity (%)						
°F	90%	80%	70%	60%	50%	40%
80	85	84	82	81	80	79
85	101	96	92	90	86	84
90	121	113	105	99	94	90
95		133	122	113	105	98
100			142	129	118	109
105				148	133	121
110						135

HI	Possible Heat Disorder:
80°F - 90°F	Fatigue possible with prolonged exposure and physical activity.
90°F - 105°F	Sunstroke, heat cramps and heat exhaustion possible.
105°F - 130°F	Sunstroke, heat cramps, and heat exhaustion likely, and heat stroke possible.
130°F or greater	**Heat stroke highly likely with continued exposure.**

Both the City and the Claremore Schools use this scale to measure the extent of the hazard.

3.2.7.4 According to the National Climatic Data Center, from 2006 through 2011, the City of Claremore, including the Claremore School campus areas, did not experience an extreme heat event; however, 11 such events were recorded in the County during this same time period. No structural damage was recorded for the heat hazard.

Appendix 6 summarizes previous occurrences of this hazard.

3.2.7.5 Meteorological conditions have not changed so future events should occur at the same probability as the previous events. According to the likelihood rating from Appendix 6, the likelihood of a heat hazard in Rogers County is "highly likely" and the CHMPC determined that is an appropriate probability for the City and the Claremore Schools.

3.2.7.6 A typical heat hazard would be to persons experiencing temperatures reaching 90 degrees, as described in Table 3-11 above. The elderly population is most at risk from this high heat hazard. The worst case heat hazard event would be to persons exposed to temperatures exceeding 130 degrees where heat stroke is likely.

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.

Heat kills by pushing the human body beyond its limits. Under normal conditions, the body's internal thermostat produces perspiration that evaporates and cools the body. However, in extreme heat and high humidity, evaporation is slowed and the body must work extra hard to maintain a normal temperature.

Most heat disorders occur because the victim has been overexposed to heat or has over exercised for his or her age and physical condition. Other conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality.

Extreme heat can have a serious economic impact on a community. Increased demand for water and electricity may result in shortages of resources. Moreover, damage to food supplies may occur as the heat damages agricultural crops and livestock are susceptible to heat related injuries or death.

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. When temperatures reach 90 degrees and above, people and animals are more likely to suffer sunstroke, heat cramps, and heat exhaustion.

Another extreme heat hazard is air pollution. During summer months, consistent high temperatures and stagnant airflow patterns cause a build-up of hydrocarbons to form a dome-like ceiling over large cities. The abundance of factories, automobiles, lawn equipment, and other internal combustion machines emit high particulate matter that builds and worsens with the increase in temperature. The resulting stagnant, dirty, and toxic air does not move away until a weather front arrives to disperse it. When the particulate matter reaches a pre-determined level, an ozone alert is issued for the Tulsa area and implementation measures are undertaken to reduce the use of cars and the output of the offending chemicals. Ozone alerts usually include advisories for the elderly and those with breathing difficulties to stay indoors in air-conditioned environments.

Extreme heat can have a structural impact. Roads can buckle during times of extreme heat. Tar becomes soft and can allow concrete to settle, creating gaps and uneven surfaces. Extreme heat leads to rapid evaporation of ponds and lakes, depleting water sources used by both farmers and the community. Often times, residents use additional water during extreme heat to counter the drying of soils and prevent vegetation from dying. This additional strain on water systems can lead to low water pressure, and can cause water shortages when firefighters are trying to save property and brush land dried out by the extreme heat.

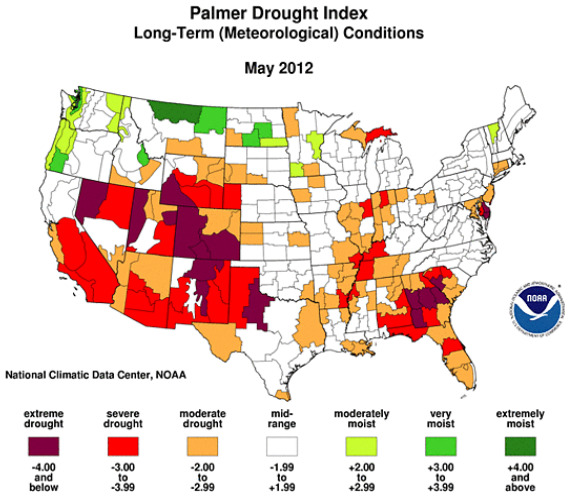
3.2.8 Drought Hazard

3.2.8.1 A drought is a period of drier-than-normal conditions that results in water-related problems. Precipitation (rain or snow) falls in uneven patterns across the country. When no rain or only a small amount of rain falls, soils can dry out and plants can die. When rainfall is less than normal for several weeks, months, or years, the flow of streams and rivers declines, water levels in lakes and reservoirs fall, and the depth to water in wells decreases. If dry weather persists and water supply problems develop, the dry period can become a drought. The first evidence of drought usually is seen in records of decreased rainfall. Within a short period of time, the amount of moisture in soils can begin to decrease. The effects of a drought on flow in streams and rivers or on water levels in lakes and reservoirs may not be noticed for several weeks or months. Water levels in wells may not reflect a shortage of rainfall for a year or more after the drought begins. A period of below-normal rainfall does not necessarily result in drought conditions. Some areas of the United States are more likely to have droughts than other areas. In humid, or wet, regions, a drought of a few weeks is quickly reflected in a decrease in soil moisture and in declining flow in streams. In arid, or dry, regions, such as Oklahoma, people rely on ground water and water in reservoirs to supply their needs. They are protected from short-

term droughts, but may have severe problems during long dry periods because they may have no other water source if wells or reservoirs go dry.

3.2.8.2 The location of this hazard is uniform over the entire City area. No areas of the City, including the Claremore Schools, are any more of less at risk from the drought hazard than another.

3.2.8.3 The Palmer Drought Index was developed in the 1960s and uses temperature and rainfall information in a formula to determine dryness. It has become the semi-official drought severity index. The Palmer Index is most effective in determining long term drought; a matter of several months. It uses a 0 as normal, and drought is shown in terms of minus numbers; for example, minus 2 is moderate drought, minus 3 is severe drought, and minus 4 is extreme drought. NOAA has used this index to classify the drought hazard through the continental United States. As of May, 2012, Claremore was in the mid range severity range of the Palmer Drought Index. The national map showing the May 2012 Palmer Drought Index is shown below.



Both the City and the Claremore Schools use this scale to measure the extent of the hazard.

3.2.8.4 One of the greatest natural disasters in U.S. history and the most severe and devastating to Oklahoma was the decade-long drought in the 1930s that has become known as the Dust Bowl. Reaching its peak from 1935 through 1938, high temperatures and low rainfall combined to destroy crops and livestock. High winds literally blew the land away, causing massive soil erosion. Hundreds of small rural communities were ruined and about 800,000 people were displaced. The total expenditure by the American Red Cross for drought relief in Oklahoma in 1930-1931 was the third largest ever in the nation.

According to the National Climatic Data Center, there have been no drought events in the City of Claremore, thus including the Claremore School campuses, from 2006 through 2011, but eight recorded events in Rogers County during this same time period.

Appendix 6 summarizes previous occurrences of this hazard.

3.2.8.5 Meteorological conditions have not changed so future events should occur at the same probability as the previous events. According to the likelihood rating from Appendix 6, the likelihood of a heat hazard in Rogers County is "highly likely" and the CHMPC determined that is an appropriate probability for the City and the Claremore Schools.

3.2.8.6 A typical drought hazard would be a mid-range to moderate Palmer Drought Index, where some form of voluntary water rationing would be encouraged but not required, and the only damage would be to under watered lawns. The worst case drought hazard event would be a Palmer Drought index of negative 4.00 and below, an extreme drought, where it lasts for months to years.

Droughts increase the wildfire hazard and reduce the water supply. Lack of fresh water is damaging to livestock and crops. Another problem associated with drought is stale water. Areas of stale water are known to produce deadly bacteria.

Drought impacts in a number of ways, spanning all regions, and is capable of affecting the economy as well as the environment. Specific impacts can include

- reduced crop, rangeland;
- increased livestock and wildlife mortality rates;
- reduced income for farmers and agribusiness;
- increased fire hazard;
- reduced water supplies for municipal/industrial, agricultural and power uses;
- damage to fish and wildlife habitat;
- increased consumer prices for food;
- reduced tourism and recreational activities;
- unemployment;
- reduced tax revenues because of reduced expenditures; and
- foreclosures on bank loans to farmers and businesses.

The most direct impact of drought is economic rather than loss of life or immediate destruction of property. While drought impacts in Oklahoma are numerous and often dependent upon the timing and length of individual drought episodes, the greatest impacts of drought are usually experienced in the agricultural community. In addition to the obvious direct losses of both crop and livestock production due to a lack of surface and subsurface water, drought is frequently associated with increases in insect infestations, plant disease, and wind erosion.

Of course, one of the most significant potential impacts of drought relates to public water supply. The City of Claremore's water source is Claremore Lake. Droughts reduce lake levels, such as Claremore Lake, which impacts the amount of water available for municipal use. There may be a take water conservation steps such as limiting or stopping lawn watering and washing vehicles.

Water shortages can also affect fire fighting capabilities in both urban and rural settings through reduced water flows and pressures. Most droughts dramatically increase the danger of wildfires. Although droughts are most associated with summer and high temperatures, droughts can impact the City during winter months.

3.2.9 Expansive Soils Hazard

3.2.9.1 Soils and soft rock that tend to swell or shrink due to changes in moisture content are commonly known as expansive soils. Changes in soil volume present a hazard primarily to structures built on top of expansive soils. The most extensive damage occurs to highways and streets. The effect of expansive soils are most prevalent in regions of moderate to high precipitation, where prolonged periods of drought are followed by long periods of rainfall. Expansive soils can be recognized either by visual inspection in the field or by conducting

laboratory analysis. Shales, clay shales, and residual soils containing smectite often have a characteristic "popcorn" texture, especially in semiarid areas.

3.2.9.2 The Natural Resources Conservation Service (NRCS) has identified the soils in Claremore. The expansive tendency of a soil is a function of its shrink-swell potential. The locations of these types of soils are shown on Map Number 7 in Appendix 1.

The soil data for Claremore is part of the soil data for Rogers County that is from the State Soil Geographic (STATSGO) data base. The STATSGO data base is designed for multi-county resource planning, and is not detailed enough for interpretations at the City level. The soil maps for STATSGO are compiled by generalizing the more detailed Soil Survey Geographic (SSURGO) data base. The STATSGO data base should not be used for spatial analysis; however, it is shown in Map Number 7 for a general location of expansive soils throughout the City.

Overlaying the Claremore corporate limits on the soils properties map, the majority of the City is on soils with the high shrink swell potential. The school sites are all on soils with the high shrink swell potential. Therefore, both the City and the Schools should continue to take this expansive soils hazard risk into consideration in future development.

3.2.9.3 The NRCS sorts this shrink-swell potential soil property in the City of Claremore, including the Claremore School areas, into five categories; very low, low, moderate, high, and very high. This is the range of magnitude of an expansive soils hazard. Shrink-swell potential categories are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The categories are very low, a change of less than 1%; low, 1 to 3%; moderate, 3 to 6%; high, 6 to 9%; and very high, greater than 9%. Map Number 7 in Appendix 1 illustrates the majority of the City is in the high shrink-swell potential.

3.2.9.4 No information is available for the Claremore area on how expansive soils have damaged structures. This hazard develops gradually and thus not usually reported, largely because a catastrophic expansive soils hazard event has not occurred. This is for the City of Claremore and the Claremore Schools.

3.2.9.5 The soils' properties have not changed so future occurrences of soils expansion and contraction will continue. An estimate of future occurrences is rated as "unlikely", shown in the Likelihood Rating field in the Hazard Summary Table in Appendix 6, because no data is reported for this hazard, both for the City of Claremore and the Claremore School areas.

3.2.9.6 The impact of expansive soils is to foundations of structures, and occurs slowly over time, compared to a tornado. Structures with foundations such as homes and businesses, concrete slabs in driveways and sidewalks, and parking lots, are at risk to this hazard. Asphalt surfaces such as highways and runways could be affected. These structures are affected because expansive soils cause uneven settlement of the soil under the structures' foundations. This causes cracking and damage to the foundation and structure above the foundation, such as a building's wall and a road's pavement.

A typical expansive soils hazard would be to structures built in areas of high shrink-swell potential that were not built with any foundation displacement protection, such as post-tension reinforcing in foundations. The worst case expansive soils hazard event would be to structures as described above, but during extreme and extended drought conditions where the soils dry out to such a depth causing voids to occur which would increase the circumstances for foundations to deflect causing foundation and structure damage.

Due to the generalized soils information, specific site analyses cannot be made for certain to determine if the City and the school sites may have high and very high shrink-swell potential soils to be impacted by. Therefore, mitigation actions will be recommended to better quantify this hazard for each site.

3.2.10 Wildfire Hazard

3.2.10.1 Wildfires are defined as the uncontrolled burning of highly vegetated areas, usually in forests and wooded areas. Grass fires in the Claremore area pose a problem every year.

Wildfires are often referred to as grass fires in the City of Claremore. The amount of control the fire department has on the burning vegetated area is a factor in calling the fire a wildfire. Also, the size of the burning vegetated area is a factor; a small area of burning vegetation is often referred to as a grass fire while a large area of burning vegetation is called a wildfire. Both size and control are factors in how this hazard is named, but specific criteria as when to refer to burning vegetation as a wildfire have not been established.

3.2.10.2 According to Claremore Fire Department, fire locations are more frequent around the boundary of the City. This area is referred to as the wildland-urban interface. The amount of risk to this hazard can vary by location. The wildland-urban interface is where the main risk and vulnerability is to this wildfire hazard. This interface is defined as the area ½ mile either side of a community's corporate limits. Locations in the community inside the ½ mile wildland-urban interface are at less risk primarily due to the reduction of vegetated area because of the community's homes, structures, and infrastructure. Areas outside the wildland-urban interface have a lower risk from the hazard because they are away from the populated areas. When applying the ½ mile buffer to the City of Claremore, there is an area inside this wildland-urban interface. The City of Claremore wildland-urban interface is shown on Map Number 8 in Appendix 1.

Two of the school campuses are located in the ½ mile wide wildland urban interface (Claremont Elementary School and Westside Elementary School) and five are located inside the City's wildland-urban interface (Will Rogers Jr High, Claremore High, Alternative Learning Center, Catalayah Elementary and Roosa Elementary Schools). The school campuses are located in the ½ mile wide wildland-urban interface are at higher risk than the schools inside the wildland-urban interface.

3.2.10.3 The extent of a hazard is the strength or magnitude of the hazard; a scale or way to quantify the magnitude of the hazard. For wildfires, there is no established scale like there is for tornados with their Enhanced Fujita Scale or for earthquakes with their Richter Scale.

The City's susceptibility to a wildfire is dependent upon seasonal environmental factors such as current and antecedent weather (including wind velocity and humidity), fuel types, moisture, temperature, and live and dead vegetation. Changes in these factors raise or lower the fire danger rating throughout the county.

3.2.10.4 In Claremore area, the City's Fire Department responds to numerous grass fires every year. From 2006 through 2011, the Claremore Fire Department responded to 191 grass fires.

Appendix 6 summarizes previous occurrences of this hazard.

3.2.10.5 The Claremore Fire Department hare continuing campaigns to educate the public on the causes and effects of fires. However, all fires cannot be prevented so this hazard will continue. The likelihood rating for wild fires in the City is "highly likely". This estimate of future occurrences is taken from the Likelihood Rating scale in the Hazard Summary Table in Appendix 6. And also for the Claremore School areas.

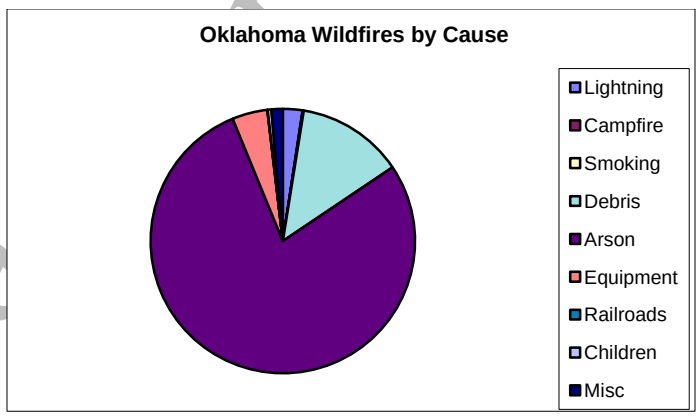
3.2.10.6 A typical wildfire hazard would be a grass fire, in which the City Fire Department is dispatched to put out the fire before it causes any damage to crops, structures, or persons. The worst case wildfire scenario would be an event that could not be controlled before it overwhelms the City, causing damage to facilities, structures, and persons.

The number of structures in the City's wildland-urban interface, the area more vulnerable to a wildfire than the interior of the community, is shown in section 3.3.11 and the damage estimate for those structures is shown in section 3.4.6.

Periods of drought, dry conditions, high temperatures, and low humidity set the stage for wildfires. People start more than four out of every five wildfires, usually as debris burns, arson, or carelessness.

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.

This vulnerability to wildfire results in over 18,000 wildfires in the State each year. These fires burn about 300,000 acres. Over 97% of these wildfires are human caused. In fact, Oklahoma's fire risk is more closely associated with the presence of people than with fire danger or fuel types. Since human activity accounts for such a high percentage of the wildfires, there is limited opportunity for mitigation through public awareness and education.



Arson is also a large proportion of the percentage of wildfires. Based on the above data, Oklahoma has a high probability of future hazard events. On average, fires kill nearly 5,500 Americans each year. Over 30,000 people are injured in fires annually. In the United States, someone dies in a fire every 40 minutes. Most often, victims are children or the elderly. Nearly 25 percent of the fires that kill young children are started by children playing with fire. Approximately 1,300 senior citizens die in fires annually. Approximately three-quarters of all fire fatalities occur in residential dwellings. Each year in the US, fire causes over $2 billion worth of damage to homes.

3.2.11 Earthquake Hazard

3.2.11.1 An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates. Earthquakes strike suddenly, without warning. Earthquakes can occur at any time of the year and at any time of the day or night. On a yearly basis, 70 to 75 damaging earthquakes occur throughout the world. Estimates of losses from a future earthquake in the United States approach $200 billion. There are 45 states and territories in the United States at moderate to very high risk from earthquakes, and they are located in every region of the country. California experiences the most frequent damaging earthquakes; however, Alaska experiences the greatest number of large earthquakes—most located in uninhabited areas. The largest earthquakes felt in the United States were along the New Madrid Fault in Missouri, where a three-month long series of quakes from 1811 to 1812 included three quakes larger than a magnitude of 8 on the Richter scale. These earthquakes were felt over the entire Eastern United States, with Missouri, Tennessee, Kentucky, Indiana, Illinois, Ohio, Alabama, Arkansas, and Mississippi experiencing the strongest ground shaking.

3.2.11.2 The faults most likely to affect Oklahoma are the New Madrid Fault, centered in the Missouri Bootheel region, and the Meers Fault, located in southwestern Oklahoma near Lawton. The distance from the Missouri Bootheel region to Claremore is approximately 330 miles, and the distance from the Meers fault region to Claremore is approximately 200 miles.

3.2.11.3 The severity of an earthquake is expressed by the Richter Sccale. The Richter Scale, is a measure of the amplitude of the seismic waves. The Richter Scale, named after Dr. Charles F. Richter of the California Institute of Technology, is the best known scale for measuring the magnitude of earthquakes. The scale is logarithmic. An earthquake of magnitude 2 is the smallest earthquake normally felt by people. Earthquakes with a Richter value of 6 or more are commonly considered major; great earthquakes have magnitude of 8 or more on the Richter scale.

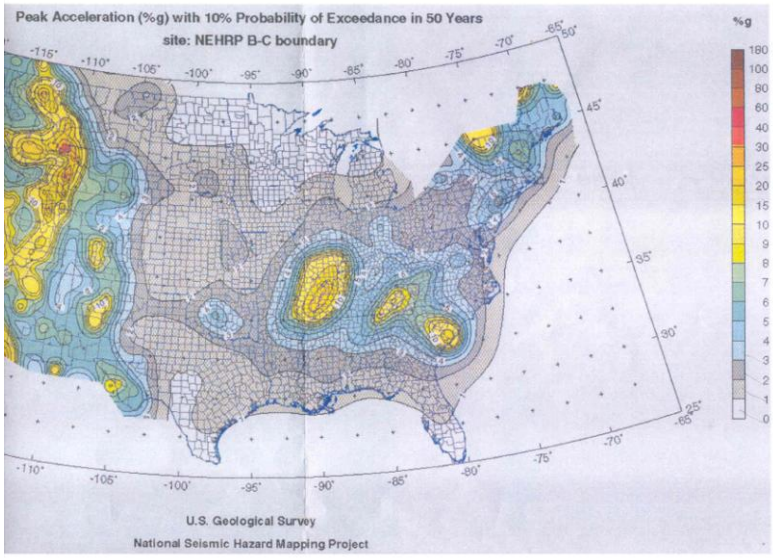
Table 3-12
THE RICHTER SCALE

Magnitude	Description
1 to 3	Recorded on local seismographs, but generally not felt.
3 to 4	Often felt, with little to no damage reported.
5	Felt widely, slight damage near epicenter.
6	Damage to poorly constructed buildings and other structures within 10 kms.
7	"Major" earthquake. Causes serious damage up to 100 km (recent Taiwan, Turkey, Kobe, Japan, Iran and California earthquakes).
8	"Great" earthquake, great destruction, loss of life over several 100 km (1906 San Francisco, 1949 Queen Charlotte Islands).
9	Rare great earthquake, major damage over a large region over 1000 km (Chile 1960, Alaska 1964, and west coast of British Columbia, Washington, Oregon, 1700)

Both the City and the Claremore Schools use this scale to measure the extent of the hazard.

The CHMPC considers an earthquake of magnitude 4 and below on the Richter Scale to be a minor severity earthquake, and an earthquake greater than a magnitude 4 on the Richter Scale to be of major severity for both the City of Claremore and the Claremore Schools.

The USGS National Seismic Hazard Mapping, shown below, shows Rogers County and Claremore in the 2%g (peak acceleration), 10% probability of exceedance in 50 years area. According to the FEMA 386-2, "Understanding Your Risks", Step 1; areas with 2%g peak acceleration or less have a relatively low seismic risk, and an earthquake risk assessment is not warranted.



3.2.11.4 According to the National Climatic Data Center, there have been no earthquake events in Rogers County from 2006 through 2011, and therefore none in Claremore. On November 5, 2011, the state experienced its largest and third largest earthquakes in state history. A 4.8 magnitude earthquake occurred near Prague at about 2:12 am, and then a 5.6 magnitude earthquake occurred near Sparks at about 10:53 pm. Both earthquakes were centered in Lincoln County, a county southwest of Claremore in central Oklahoma. The later earthquake surpassed the then largest earthquake in state history, a 5.5 magnitude earthquake near El Reno on April 9, 1952.

3.2.11.5 However, most earthquakes in the state are not felt. The most likely major earthquake event that could impact the area would probably originate in the New Madrid Fault Zone, which has been relatively quiet for 150 years. Seismologists estimate the probability of a 6 to 7 magnitude earthquake in the New Madrid area in the next 50 years to be higher than 90%.

According to the National Climatic Data Center, there have been no earthquake events in Rogers County from 2006 through 2011; a likelihood rating of "unlikely". This probability is appropriate for Claremore and the Claremore Schools. The estimate of future occurrences is shown in the Likelihood Rating field in the Hazard Summary Table in Appendix 6.

3.2.11.6 A typical earthquake event would be a magnitude 1 to 4 on the Richter Scale, which would be largely unfelt and no damage. The worst case earthquake hazard would be a magnitude 9 on the Richter Scale, causing a large amount of structure damage and personal injury over a large area.

All structures, homes, businesses and transportation infrastructure are vulnerable to an earthquake. Earthquakes occurring near the County can still impact the County. Timely notification of events can allow residents to take precautions in the event of aftershocks

3.2.12 Hazardous Material Hazard

3.2.12.1 Hazardous materials are chemical substances that, if released or misused, can pose a threat to the environment or human health. These chemicals are used in industry, agriculture, medicine, research, and consumer goods. Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. These substances are most often released as a result of transportation accidents or chemical accidents at plant sites. In the State of Oklahoma, communities are required to list facilities that either use or store Extremely Hazardous Substances (EHS) in their Emergency Operations Plans (EOP). EHS facilities are a subset of the Tier 2 facilities; and like the Tier 2 facilities, EHS facilities are reported annually to the Oklahoma Department of Environmental Quality by the users. The EHS facilities are incorporated into the Claremore plan update.

3.2.12.2 The EHS facilities within the City of Claremore are listed in the following table, and shown on Map Number 9 in Appendix 1. There are no EHS sites at the Claremore School campuses.

Table 3-13
CLAREMORE EHS SITES

Facility Name	**Address**
AT&T Claremore	313 W Patti Page Blvd
City of Claremore WTF	1450 E Blue Starr Dr
City of Claremore WWTF	1500 S Choctaw
Cox Communications – Claremore	2331 Holly Rd
Tarby of Delaware	2205 E Anderson Blvd

3.2.12.3 The extent of the hazardous material hazard in Claremore is the EHS fixed location sites. The sites include buildings or property where EHS materials are manufactured or stored, and are regulated nationally under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) by the U.S. Environmental Protection Agency (EPA), and in Oklahoma by the Department of Environmental Quality.

3.2.12.4 For the evaluation of previous occurrences of hazardous material events, traffic accidents with gasoline spills were included in the number of hazardous material events experienced by the City, in addition to responding to incidents at EHS facilities. The City Fire Department responded to 405 hazardous material spills during the 2006 through 2011 time frame.

Table 3-14
NUMBER OF HAZARDOUS MATERIAL SPILL RUNS PER YEAR

Year	Haz-Mat Runs
2006	44
2007	84
2008	65
2009	62
2010	77
2011	73
Total	

Appendix 6 summarizes previous occurrences of this hazard.

3.2.12.5 Chemicals and hazardous materials are used throughout our society today, and will continue to be used in the future. As such, Claremore will continue to be exposed to this hazard. The likelihood rating for hazardous material events for the City and the Claremore Schools is "highly likely". This estimate of future occurrences is taken from the Likelihood Rating scale in the Hazard Summary Table in Appendix 6.

3.2.12.6 Many parts of the City are susceptible to hazardous materials events due to the high number of highly traveled roads and highways. Potential impacts include disruptions in transportation if highways are shut-down. Local businesses and residences can be affected by the roads being closed. Soils and waterways could become contaminated by spills. The City will follow its emergency operations plan in the event of any hazardous material event.

A typical hazardous material hazard scenario would be an automobile accident where gasoline (which is not an EHS) is spilled and the local fire department responds. The worst case scenario would be responding to facility that contains a hazardous material that has not been properly documented so the responders may not be properly prepared for the hazardous material they would be encountering. The quantity of a hazardous substance is not the sole factor in the severity of a hazardous material event. Location, weather, population, topography, vegetation all could be factors in the event's severity. But one gallon of gasoline spilled on a flat, impervious surface on a calm dry day in an unpopulated area would constitute an event of minor severity, where a tanker truck carrying a hazardous substance rupturing near a waterway on a hill in a populated area would constitute an event of major severity.

3.2.13 Dam Break Hazard

3.2.13.1 A dam is defined as a barrier constructed across a watercourse for the purpose of storage, control, or diversion of water. Dams typically are constructed of earth, rock, concrete, or mine tailings.

A dam break is the collapse, breach, or other failure resulting in downstream flooding. Dam breaks are primarily caused by hydrologic or structural deficiencies. A hydrologic deficiency is inadequate spillway capacity, caused by excessive runoff from a large amount of precipitation. Structural deficiencies include seepage, erosion, cracking, sliding, and overturning, mainly caused by the age of a dam and lack of maintenance.

3.2.13.2 The Oklahoma Water Resources Board (OWRB) coordinates the Oklahoma Dam Safety Program to ensure the safety of dams in the state. OWRB categorized dams into three categories; low hazard, significant hazard, and high hazard. The dams listed in Table 3-15 are the three high hazard category dams, as inventoried in the Oklahoma Water Resources Board 2011 Dam Safety Program, in Rogers County. Their locations are shown in Map Number 10 in Appendix 1.

Table 3-15
ROGERS COUNTY HIGH HAZARD DAMS IN THE OKLAHOMA DAM SAFETY PROGRAM

NAME	CREEK/RIVER	CITY	HAZARD CATEGORY
Claremore Lake Dam	Dog Creek	Claremore	H
Oologah Lake Dam	Verdigris River	Oologah	H
Stone Canyon Dam	Elm Creek	Owasso	H

The Claremore Lake dam is within the City of Claremore, on Dog Creek. A Claremore Lake dam break would affect properties in the along the eastern side of the City, downstream of the dam. A dam break of the other two dams would not be located on any part of Claremore.

None of the Claremore School campuses are downstream from Claremore Lake dam so this hazard is not applicable to the Claremore Schools.

An emergency action plan (EAP) is required by the OWRB for all high hazard category dams. An element of the EAP is an inundation map showing the area inundated in the event of its dam break. For the Claremore Lake dam, its inundation map is shown as Map Number 11 in Appendix 1.

3.2.13.3 The Oklahoma Water Resources Board (OWRB) coordinates the Oklahoma Dam Safety Program to ensure the safety of more than 4,500 dams in the state that falls within its jurisdiction. The dam safety program categorizes dams into three hazard categories; high, significant, and low. This would be the measure of the extent of the hazard. The OWRB defines these categories as follows. Low hazard dams are those where a break would result in no probable loss of human life and low economic losses. Significant hazard dams are those dams where a break would result in no probable loss of human life but can cause economic or disruption of lifeline facilities. High hazard dams are those dams where a break will probably cause loss of human life.

3.2.13.4 According to the National Climatic Data Center, there have been no dam break events in Claremore and Rogers County from 2006 through 2011.

3.2.13.5 Never say never, but continued dam inspection and proper maintenance should continue to keep these dams from failing. Communities that use impoundments from dams for a water source are responsible for any required maintenance. Claremore contracts with a private engineering firm to annually inspect its dams as required and report to the Oklahoma Water Resources Board. According to the NCDC, and the City, there have been no dam breaks in Rogers County from 2006 through 2011; a likelihood rating of "unlikely" and is appropriate for the City of Claremore. The likelihood of future hazard event occurrences are shown in the Likelihood Rating field in the Hazard Summary Table in Appendix 6.

3.2.13.6 The worst case scenario of this dam break hazard would be an unexpected break of the dam, so emergency personnel could not effectively notify people downstream of the dam of the impending event. The Claremore Lake dam emergency action plan shows 73 structures in the Claremore Lake Dam break inundation area, 16 inside the City.

None of the Claremore School campuses are in the inundation area, so not impacted by the dam break hazard.

The Claremore Lake dam also impounds water for the City's water supply. If a break occurs, the potential exists to have a greatly reduced water supply for a long period of time for the City. Obviously the impact of this would be devastating. The economic impact of such an event on the City would be large.

The initial hazard classifications are based upon current conditions, including population and land-use patterns below the dams. Such conditions can shift over time, such that a structure that is not considered high-hazard may receive such designation in the future, should, for example, dwellings built within the floodplain below the dam. Other high-hazard dams may have such designation lowered should land-use patterns change, reducing the threat of loss to life or

property. Mitigation aspects, such as relocations of vulnerable properties, can reduce the number and magnitude of high-hazard dams. To protect vulnerable populations the State of Oklahoma and Claremore, the following law is in place:

State Law 785:25-7. Warning and evacuation plans.

- Owners of existing or proposed dams classified as high hazard, regardless of the size of such dams, and any other dam as determined by the Board, shall provide an adequate warning system and written evacuation plan to protect downstream lives and property, with a written description of said system and written evacuation plan to be approved by and filed with the local Civil Defense authorities.
- Additionally, the written description of the warning system and approved evacuation plan shall be filed with the Board.

3.3 Assessing Vulnerability: Identifying Assets for the City of Claremore

This section describes vulnerability in terms of the type and number of existing buildings and critical facilities in the hazard location. The vulnerability analysis utilized FEMA publication 386-2, "Understanding Your Risks," Step 3, in order to determine the building value and contents value to determine a total value per building at risk from the hazard.

The Rogers County Assessor classifies properties into three (3) types; residential, commercial, and agricultural. A value for each property with a structure was determined by the assessor. The contents value was determined as a percentage of the building value, based on the Contents Value table in FEMA 386-2, Step 3.

The following table shows this information for all buildings in the City of Claremore. This table will be referred to for all hazards that do not vary by location throughout the City.

Table 3-16
TOTAL BUILDINGS IN CITY

Category	Number of Structures	Structure Value ($$)
Residential	6670	542,164,103
Commercial	885	253,589,262
Agricultural	29	3,336,277
Total	7584	799,089,642

Flood hazards, dam break hazards, and hazards from expansive soils are the only three hazards that vary in magnitude in a pre-determined location. The City's May 18, 1989 tornado path was analyzed in the tornado hazard section. For these hazards, GIS models were used to determine the buildings in a hazard location when the hazard's location data is available as discussed in the hazard's vulnerability assessment section to follow.

For each hazard, the assets (buildings) at risk from that hazard are tabularized in each hazard's section, or refer to the above table. The total number of buildings at risk, the building type, the building value, its contents value, and the total value is shown. These tables follow the format in FEMA 386-2, worksheets 3a "Inventory Assets".

This assessment also analyses the critical facilities at risk from each hazard. Where a hazard varies by location, these facilities' locations are shown in relation to the hazard on a separate map. Information on mobile homes is not tracked by the Rogers County Assessor; therefore, it is not included in the Claremore vulnerability assessment.

Facilities that are classified to be critical by the City of Claremore are listed in the following table, and shown on Map Number 4 in Appendix 1. These facilities are critical to the City in they provide public safety and emergency response services to the public in the event of a hazard occurrence or they are necessary to preserve welfare and quality of life to the community.

Table 3-17
CRITICAL FACILITIES

TYPE	NAME	ADDRESS
City Government	City of Claremore City Hall	104 S Muskogee
Fire Department	City of Claremore Fire Department	104 S Muskogee
Police Dept	City of Claremore Police Dept	200 W 1st St
County Govt	Rogers County Courthouse	219 S Missouri Ave
County Govt	Rogers County Assessor	219 S Missouri Ave
County Govt	Rogers County Emergency Mgmt	219 S Missouri Ave
County Govt	Rogers County Sherriff	201 S Cherokee
Water/Wastewater	Claremore Water Treatment Facility	1450 E Blue Starr Dr
Water/Wastewater	Claremore Wastewater Facility	1500 S Choctaw Ave
Electric	Claremore Generation Facility	Ramm Rd
School	Claremore High School	201 E Stuart Roosa
School	Will Rogers Jr High	1915 N Florence
School	Catalayah Elementary	2700 King Rd
School	Claremont Elementary	318/ E 7th St
School	Roosa Elementary	2001 N Sioux
School	Westside Elementary	2600 Holly Rd
School	Alternative Learning Center	101 W 11th St
School	Rogers State University	1701 W. Will Rogers
Child Care	Zebra Stripes at Catalayah Elementary	2700 King Rd
Child Care	Zebra Stripes at Claremont Elementary	318/ E 7th St
Child Care	Zebra Stripes at Roosa Elementary	2001 N Sioux
Child Care	Zebra Stripes at Westside Elementary	2600 Holly Rd
Child Care	Bright Beginnings	2550 Holly Rd
Child Care	Greenbrier Learning Center	602 S Wortman
Child Care	Kurtain Klimbers	1201 W Country Club Rd
Child Care	Blue Starr Kid Ranch	1059 W. Blue Starr
Child Care	Card Head Start	1701 N Lynn Riggs
Child Care	Claremore Children Center	1220 Reavis Rd
Child Care	North Star Learning Center	13832 E SH 20
Hospitals	Claremore Regional Hospital	1202 N Muskogee
Elderly Care	Claremore Nursing Home	920 E 16th St
Elderly Care	Veterans Center	3001 W Blue Starr Dr
Elderly Care	Wood Manor	2800 Hickory St

3.3.1 Flood Hazard

There are seven repetitive loss structures in the City of Claremore that are insured through the National Flood Insurance Program. All seven are single family residential structures. Damaged structures are rebuilt in conformance with the City's flood damage prevention ordinance. As grants funds become available, the regulating jurisdiction is working with the property owner to remove the structure from the floodplain. For all structures at risk from a flood hazard, those buildings on property intersecting the regulatory floodplain is summarized below.

Table 3-18
TOTAL BUILDINGS IN REGULATORY FLOODPLAIN

	Number of Buildings	Building Value ($$)	Contents Value ($$)	Total Value ($$)
Residential	309	26,618,266	13,309,133	39,927,399
Commercial	55	14,186,618	14,186,618	28,373,236
Agricultural	11	813,521	813,521	1,627,042
Total	375	41,618,405	28,309,272	69,927,677

Map Number 12 in Appendix 1 also shows the location of the critical facilities in relation to the flood hazard. There are no critical facilities located on property intersecting the regulatory floodplain.

Any future building in a flood hazard will be built in conformance with the City's Flood Damage Prevention Ordinance as part of the City's membership in the NFIP; therefore, future buildings will not be considered by FEMA as at risk from the regulatory floodplain.

3.3.2 Tornado Hazard

On May 18, 1989, an F-1 tornado touched down in the City of Claremore, in the northeast part of the City, as shown on Map Number 13 in Appendix. The tornado ran a path along the ground in a northeasterly direction for 3.2 miles to outside the City. The tornado path's width of destruction was reported to be approximately 100 feet. The tornado caused one injury and no fatalities. To illustrate the structures at risk if this tornado occurred today, the current buildings within this tornado's path of destruction were determined and their building, contents, and total value were estimated. This estimate is shown in the following table.

Table 3-19
BUILDINGS IN TORNADO SCENARIO

Type	Number of Buildings	Building Value ($$)	Contents Value ($$)	Total Value ($$)
Residential	6	$ 730,710	365,355	1,096,065
Commercial	5	911,539	911,539	1,823,078
Agricultural	0	--	--	--
Total	11	1,624,249		2,919,143

The critical facilities are also shown on Map Number 13; there are no facilities within this tornado path.

3.3.3 Dam Break Hazard

The OWRB Dam Safety Program requires all high hazard category dams to prepare an emergency action plan (EAP) which would make a determination on the number of structures and infrastructure in each dam's dam break inundation area. The EAP for the Claremore Lake dam shows 73 structures in the inundation area; vulnerable to this hazard event, 16 of these are inside the City and none of these are Claremore School campuses.

Table 3-20
CLAREMORE STRUCTURES IN THE CLAREMORE LAKE DAM INUNDATION AREA

	Number of Buildings	Building Value ($$)	Contents Value ($$)	Total Value ($$)
Residential	16	3,017,717	1,508,809	4,526,576
Commercial	0	0	0	0
Agricultural	0	0	0	0
Total	16	3,017,717	1,508,809	4,526,576

3.3.4 High Wind Hazard

All areas, and all buildings, in the City are at equal risk from this hazard. The total number of buildings, and value, in the City is shown in the table at the beginning of this section.

3.3.5 Lightning Hazard

All areas, and all buildings, in the City are at equal risk from this hazard. The total number of buildings, and value, in the City is shown in the table at the beginning of this section.

3.3.6 Hail Storm Hazard

All areas, and all buildings, in the City are at equal risk from this hazard. The total number of buildings, and value, in the City is shown in the table at the beginning of this section.

3.3.7 Winter Storm Hazard

All areas, and all buildings, in the City are at equal risk from this hazard. The total number of buildings, and value, in the City is shown in the table at the beginning of this section.

3.3.8 Heat Hazard

All areas, and all buildings, in the City are at equal risk from this hazard. The total number of buildings, and value, in the City is shown in the table at the beginning of this section.

3.3.9 Drought Hazard

All areas, and all buildings, in the City are at equal risk from this hazard. The total number of buildings, and value, in the City is shown in the table at the beginning of this section.

3.3.10 Expansive Soils Hazard

The properties at risk from this hazard are properties located on high and very high shrink-swell potential soil types. The locations of expansive soils are shown in Map Number 7 in Appendix 1. As discussed in the profile of the expansive soil hazard, the soil information is too generalized to adequately perform a spatial analysis to determine the number of properties and buildings at risk from high and very high shrink-swell potential soil. However, the general location of properties at risk from expansive soils hazard is shown on Map 7 in Appendix 1.

Structures with foundations such as homes and businesses, concrete slabs in driveways and sidewalks, and parking lots are vulnerable to this hazard because expansive soils cause the ground under the foundations to settle unevenly. Asphalt surfaces such as highways and runways could be affected. This causes cracking and damage to the foundation and structure above the foundation, such as buildings wall and a road's pavement.

3.3.11 Wildfire Hazard

The areas in Claremore in the wildland-urban interface are at higher risk from a wildfire so are more vulnerable. The areas inside the City's wildland-urban interface can be at less risk, so less vulnerable to a wildfire. Two of the school campuses are located in the ½ mile wide wildland urban interface (Claremont Elementary School and Westside Elementary School) and five are located inside the City's wildland-urban interface (Will Rogers Jr High, Claremore High, Alternative Learning Center, Catalayah Elementary and Roosa Elementary Schools). The school campuses are located in the ½ mile wide wildland-urban interface are at higher risk than the schools inside the wildland-urban interface.

Table 3.-21 shows the numbers of structures within the City of Claremore's wildland-urban interface.

Table 3-21
STRUCTURES IN THE WILDLAND-URBAN INTERFACE

Type	# of Structures
Residential	3702
Commercial	171
Agricultural	23

Fires can also destroy non structural assets such as agriculture, vegetation, and vehicles. Vulnerability of these non-structural assets, both in identifying these assets and estimating their damage potential was not quantified.

3.3.12 Earthquake Hazard

All areas, and all buildings, in the County are at equal risk from this hazard. The total number of buildings, and value, in the County is shown in the table at the beginning of this section. Vulnerabilities include all structures, homes, businesses and transportation infrastructure.

3.3.13 Hazardous Material Hazard

The public is most at risk from hazardous materials when they are being transported. The City has defined the major transportation routes and is shown in Map Number 15 in Appendix 1.

3.4 Assessing Vulnerability: Estimating Potential Losses for the City of Claremore

For each hazard, an analysis was done to determine the potential dollar losses to vulnerable buildings identified in Section 3.3. The analysis followed the methodology discussed in FEMA 386-2, step 4, and the format of FEMA 386-2 worksheet #4 "Estimate Losses" where applicable.

The flood hazard and the hypothetical tornado analyses identified structures with varying amounts of damage. The wildfire hazard section totaled structures and damages within the City-s wildland-urban interface.

3.4.1 Flood Hazard

For the flood hazard, for this planning exercise, all structures on property intersecting the regulatory floodplain are evaluated at one foot below the base flood elevation. (Actual first floor elevations were not surveyed and the best available topography has 10 foot contour intervals making windshield surveys plus and minus five feet.) Using FEMA 386-2, part 4, building damage with one foot of flood depth is estimated to be 14 percent of the building value, and content damage is estimated to be 21 percent of the building value.

Table 3-22
DAMAGE ESTIMATE WITH ONE-FOOT FLOOD DEPTH

Type	Number of Buildings	Building Value ($$)	Building Damage Value ($$)	Contents Damage Value ($$)	Total Damage Value ($$)
Residential	309	26,618,266	3,726,557	5,589,836	9,316,393
Commercial	55	14,186,618	1,986,127	2,979,190	4,965,316
Agricultural	11	813,521	113,893	170,839	284,732
Total	375	41,618,405	5,826,577	8,739,865	14,566,442

3.4.2 Tornado Hazard

For the tornado hazard analysis, the path and impact area of the F-1 tornado to hit the City of Claremore in 1989 is depicted in Map Number 13 in Appendix 1. As discussed in Section 3.3.2, the current buildings at risk from this tornado were determined. The FEMA 386-2 literature states there are no standard loss estimation models and tables for tornados. Therefore, all buildings within this tornado's impact area were estimated to be destroyed. The potential loss from this tornado today is shown in the following table.

Table 3-23
TOTAL BUILDINGS IN TORNADO SCENARIO

Type	Number of Buildings	Building Value ($$)	Contents Value ($$)	Total Value ($$)
Residential	6	$ 730,710	365,355	1,096,065
Commercial	5	911,539	911,539	1,823,078
Agricultural	0	--	--	--
Total	11	1,624,249	1,276,894	2,919,143

3.4.3 Dam Break Hazard

The Claremore Lake dam EAP shows 16 structures in the City in the dam break inundation area. However, the EAP does not estimate the depth of the water impacting each of these structures. Therefore, for this hazard mitigation plan, the 16 structures in the City impacted by the Claremore Lake dam break hazard are evaluated at two feet of depth below the water surface elevation. This is one foot more than the vulnerability analysis for the flood hazard because the hazard from a dam break could occur as a surge of water rather than just rising water; therefore, it could cause more damage and that is accounted for in greater damage estimate percentages for two feet deep. Using FEMA 386-2, part 4, building damage with two feet of flooding depth is estimated to be 22% of the building value and the content damage is estimated to be 33% of the building value.

Table 3-24
DAMAGE ESTIMATE WITH ONE-FOOT FLOOD DEPTH

Type	Number of Buildings	Building Value ($$)	Building Damage Value ($$)	Contents Damage Value ($$)	Total Damage Value ($$)
Residential	16	3,017,717	663,898	995,847	1,659,744
Commercial	0	0	0	0	0
Agricultural	0	0	0	0	0
Total	16	3,017,717	663,898	995,847	1,659,744

3.4.4 Hazardous Material Hazard

The locations of the critical facilities in relation to the hazardous material locations and the major transportation routes are shown in Map Number 16 in Appendix 1.

3.4.5 Expansive Soils

The potential damage to structures and infrastructure located on high and very high shrink-swell potential soils is dependent on the design of its foundation and quality of the construction of the foundation. Both factors were beyond the scope of this multi-hazard mitigation plan. Pre-defined damage estimates based on a percentage of the structure value are not available because of the wide variation of the factors involved in a foundation's stability. Structures with foundations such as homes and businesses, concrete slabs in driveways and sidewalks, and parking lots, are vulnerable to this hazard because expansive soils causes the ground under foundations to settle unevenly. Asphalt surfaces such as highways and runways could be affected. This causes cracking and damage to the foundation and structure above the foundation, such as building's wall and a road's pavement.

3.4.7 Wildfires

For this vulnerability analysis of wildfires, the structures within the City's wildland-urban interface were inventoried and value estimated from the County Assessor database. The contents of the structure were estimated based on the structure value and total value is the sum of the structure's value and its contents value. For this planning process, the structure is considered a total loss if burned by the wildfire and the estimated value of the loss due to the wildfire is the total value, and also shown in Table 3-25.

Table 3-25
WILDLAND-URBAN INTERFACE DAMAGE ESTIMATE

Type	# of Structures	Value of Structures $$	Value of Contents $$	Total Value $$
Res	3702	337,958,666	168,979,333	506,937,999
Comm	171	124,456,996	124,345,996	248,691,992
Ag	23	3,088,897	3,088,897	6,177,794

3.4.8 All Other Hazards

The magnitude of the damage to structures from all the other hazards does not vary by location. The total building and content value for all structures in City is totaled and shown in the table in the beginning of Section 3.3.

3.3A Assessing Vulnerability: Identifying Assets for Claremore Schools

This section describes vulnerability in terms of the number of existing school buildings in the hazard location. The vulnerability analysis utilized FEMA publication 386-2, "Understanding Your Risks," Step 3, in order to determine the building value and contents value to determine a total value per building at risk from the hazard.

The school buildings are on the seven school campuses. The building value was estimated by the school. The contents value was determined as a percentage of the building value, based on the Contents Value table in FEMA 386-2, Step 3.

The following table shows this information for the buildings. This table will be referred to for all hazards that do not vary by location.

Table 3-16a
SCHOOL BUILDINGS

School	Number of Buildings	Buildings Value ($$)
Claremore High School	15	30,756,000
Will Rogers Jr High	1	9,532,000
Catalayah Elementary	1	9,126,000
Claremont Elementary	4	6,635,000
Roosa Elementary	4	5,693,000
Westside Elementary	2	5,856,000
Alternative Learning Center	1	2,100,000

Flood hazards, dam break hazards, wildfire hazard, and hazards from expansive soils are the only four hazards that vary in magnitude in a pre-determined location. However, as discussed in the risk analysis (section 3.2), the school campuses are not in the flood hazard or dam break hazard areas so are not applicable to the Claremore Schools. The City's May 18, 1989 tornado path was analyzed in the tornado hazard section of the City's vulnerability analysis. For these hazards, GIS models were used to determine the buildings in a hazard location when the hazard's location data is available as discussed in the hazard's vulnerability assessment section to follow.

For each hazard, the buildings at risk from that hazard are tabularized in each hazard's section, or referred to the above table. The total number of buildings at risk, the building value, its contents value, and the total value is shown. These tables follow the format in FEMA 386-2, worksheets 3a "Inventory Assets".

The school buildings are classified as critical facilities in this plan.

3.3A.1 Flood Hazard

There are seven repetitive loss structures in the City of Claremore that are insured through the National Flood Insurance Program. All seven are single family residential structures. Damaged structures are rebuilt in conformance with the City's flood damage prevention ordinance. As grants funds become available, the regulating jurisdiction is working with the property owner to remove the structure from the floodplain.

None of the school campuses are located in the regulatory floodplain and the campuses do not have problems from floods; therefore, the flood hazard is not applicable to the Claremore Schools.

3.3A.2 Tornado Hazard

On May 18, 1989, an F-1 tornado touched down in the City of Claremore, in the northeast part of the City, as shown on Map Number 13 in Appendix. The tornado ran a path along the ground in a northeasterly direction for 3.2 miles to outside the City. The tornado path's width of destruction was reported to be approximately 100 feet. The tornado caused one injury and no fatalities. To illustrate the buildings at risk if this tornado occurred today, the current buildings within this tornado's path of destruction were determined and their building, contents, and total value were estimated. This estimate is shown in the following table.

Table 3-19
BUILDINGS IN TORNADO SCENARIO

Type	Number of Buildings	Building Value ($$)	Contents Value ($$)	Total Value ($$)
Residential	6	$ 730,710	365,355	1,096,065
Commercial	5	911,539	911,539	1,823,078
Agricultural	0	--	--	--
Total	11	1,624,249		2,919,143

The critical facilities are also shown on Map Number 13; there are no facilities within this tornado path.

The school campuses have not been hit by a tornado and are not in the path of the City's one tornado.

3.3A.3 Dam Break Hazard

The OWRB Dam Safety Program requires all high hazard category dams to prepare an emergency action plan (EAP) which would make a determination on the number of structures and infrastructure in each dam's dam break inundation area. The EAP for the Claremore Lake dam shows 73 structures in the inundation area; vulnerable to this hazard event, 16 of these are inside the City and none of these are Claremore School campuses.

Table 3-20
CLAREMORE STRUCTURES IN THE CLAREMORE LAKE DAM INUNDATION AREA

	Number of Buildings	Building Value ($$)	Contents Value ($$)	Total Value ($$)
Residential	16	3,017,717	1,508,809	4,526,576
Commercial	0	0	0	0
Agricultural	0	0	0	0
Total	16	3,017,717	1,508,809	4,526,576

Since the school campuses are not in the Claremore Lake dam inundation area, this hazard is not applicable to the Claremore Schools.

3.3A.4 High Wind Hazard

All areas, and all buildings, in the City, and therefore the Claremore School campuses, are at equal risk from this hazard. The school buildings and value are shown in the table at the beginning of this section.

3.3A.5 Lightning Hazard

All areas, and all buildings, in the City, and therefore the Claremore School campuses, are at equal risk from this hazard. The school buildings and value are shown in the table at the beginning of this section.

3.3A.6 Hail Storm Hazard

All areas, and all buildings, in the City, and therefore the Claremore School campuses, are at equal risk from this hazard. The school buildings and value are shown in the table at the beginning of this section.

3.3A.7 Winter Storm Hazard

All areas, and all buildings, in the City, and therefore the Claremore School campuses, are at equal risk from this hazard. The school buildings and value are shown in the table at the beginning of this section.

3.3A.8 Heat Hazard

All areas, and all buildings, in the City, and therefore the Claremore School campuses, are at equal risk from this hazard. The school buildings and value are shown in the table at the beginning of this section.

3.3A.9 Drought Hazard

All areas, and all buildings, in the City, and therefore the Claremore School campuses, are at equal risk from this hazard. The school buildings and value are shown in the table at the beginning of this section.

3.3A.10 Expansive Soils Hazard

The properties at risk from this hazard are properties located on high and very high shrink-swell potential soil types. The locations of expansive soils are shown in Map Number 7 in Appendix 1. As discussed in the profile of the expansive soil hazard, the soil information is too generalized to adequately perform a spatial analysis to determine the number of properties and buildings at risk from high and very high shrink-swell potential soil. However, the general location of properties at risk from expansive soils hazard is shown on Map 7 in Appendix 1.

Overlaying the school campus locations over the soils map does show the campuses are on areas of high shrink swell soils.

School buildings with foundations concrete slabs in driveways and sidewalks, and parking lots are vulnerable to this hazard because expansive soils cause the ground under the foundations to settle unevenly. Asphalt surfaces could be affected. This causes cracking and damage to the foundation and structure above the foundation, such as building's wall and a road's pavement.

3.3A.11 Wildfire Hazard

The areas in Claremore in the wildland-urban interface are at higher risk from a wildfire so are more vulnerable. The areas inside the City's wildland-urban interface can be at less risk, so less vulnerable to a wildfire. Two of the school campuses are located in the ½ mile wide wildland urban interface (Claremont Elementary School and Westside Elementary School) and five are located inside the City's wildland-urban interface (Will Rogers Jr High, Claremore High, Alternative Learning Center, Catalayah Elementary and Roosa Elementary Schools). The school campuses are located in the ½ mile wide wildland-urban interface are at higher risk than the schools inside the wildland-urban interface.

Table 3.-21 shows the numbers of structures within the City of Claremore's wildland-urban interface.

Table 3-21
SCHOOL BUILDINGS IN THE WILDLAND-URBAN INTERFACE

School	Number of Buildings
Claremont Elementary	6,635,000
Westside Elementary	5,856,000

3.3A.12 Earthquake Hazard

All areas, and all buildings, in the City, and therefore the Claremore School campuses, are at equal risk from this hazard. The school buildings and value are shown in the table at the beginning of this section.

3.3A.13 Hazardous Material Hazard

The school is most at risk from hazardous materials when they are being transported. The City has defined the major transportation routes and is shown in Map Number 15 in Appendix 1. These do not run adjacent to the school campuses.

3.4A Assessing Vulnerability: Estimating Potential Losses for Claremore Schools

For each hazard, an analysis was done to determine the potential dollar losses to vulnerable buildings identified in Section 3.3. The analysis followed the methodology discussed in FEMA 386-2, step 4, and the format of FEMA 386-2 worksheet #4 "Estimate Losses" where applicable.

The flood hazard and the hypothetical tornado analyses identified structures with varying amounts of damage. The wildfire hazard section totaled structures and damages within the City-s wildland-urban interface.

3.4A.1 Flood Hazard

None of the school campuses are located in the regulatory floodplain and the campuses do not have problems from floods; therefore, the flood hazard is not applicable to the Claremore Schools.

3.4A.2 Tornado Hazard

For the tornado hazard analysis, the path and impact area of the F-1 tornado to hit the City of Claremore in 1989 is depicted in Map Number 13 in Appendix 1. As discussed in Section 3.3.2, the current buildings at risk from this tornado were determined. The FEMA 386-2 literature states there are no standard loss estimation models and tables for tornados. Therefore, all buildings within this tornado's impact area were estimated to be destroyed. The potential loss from this tornado today is shown in the following table.

Table 3-23
TOTAL BUILDINGS IN TORNADO SCENARIO

Type	Number of Buildings	Building Value ($$)	Contents Value ($$)	Total Value ($$)
Residential	6	$ 730,710	365,355	1,096,065
Commercial	5	911,539	911,539	1,823,078
Agricultural	0	--	--	--
Total	11	1,624,249	1,276,894	2,919,143

The school campuses have not been hit by a tornado and are not in the path of the City's one tornado.

3.4A.3 Dam Break Hazard

Since the school campuses are not in the Claremore Lake dam inundation area, this hazard is not applicable to the Claremore Schools.

3.4A.4 Hazardous Material Hazard

The locations of the critical facilities in relation to the hazardous material locations and the major transportation routes are shown in Map Number 16 in Appendix 1. The school campuses are not located adjacent to these routes.

3.4A.5 Expansive Soils

The potential damage to school buildings and infrastructure located on high and very high shrink-swell potential soils is dependent on the design of its foundation and quality of the construction of the foundation. Both factors were beyond the scope of this multi-hazard mitigation plan. Pre-defined damage estimates based on a percentage of the structure value are not available because of the wide variation of the factors involved in a foundation's stability. Structures with foundations such as homes and businesses, concrete slabs in driveways and sidewalks, and parking lots, are vulnerable to this hazard because expansive soils causes the ground under foundations to settle unevenly. Asphalt surfaces such as highways and runways could be affected. This causes cracking and damage to the foundation and structure above the foundation, such as building's wall and a road's pavement.

3.4A.7 Wildfires

For this vulnerability analysis of wildfires, the structures within the City's wildland-urban interface were inventoried and value estimated from the County Assessor database. The contents of the structure were estimated based on the structure value and total value is the sum of the structure's value and its contents value. For this planning process, the structure is considered a total loss if burned by the wildfire and the estimated value of the loss due to the wildfire is the total value, and also shown in Table 3-25.

Table 3-25
SCHOOL BUILDINGS IN THE WILDLAND-URBAN INTERFACE DAMAGE ASSESSMENT

School	Number of Buildings	Value of Buildings	Value of Contents	Total Value
Claremont Elementary	4	6,635,000	869,000	7,504,000
Westside Elementary	2	5,856,000	761,000	6,617,000

3.4A.8 All Other Hazards

The magnitude of the damage to school buildings from all the other hazards does not vary by location. The total school buildings and content values is shown in the table in the beginning of Section 3.3A.

3.5 Assessing Vulnerability: Analyzing Development Trends

This section discusses the community's vulnerability in terms of a general description of land use and development trends so that mitigation options can be considered in future land use decisions. Three areas were analyzed. These are the types of existing and proposed land uses, development densities in the hazard areas, and anticipated changes in land use

3.5.1 The Rogers County Assessor assigns three land use categories for the county. These are residential, commercial, and agricultural. Land use changes can occur, and are initiated by the property owner, usually to accommodate a new development. The City's Board of Adjustment reviews each change request, and takes into account hazards and hazard prone areas in ruling on any land use change request.

3.5.2 There are 8853 parcels of property in City. Of these, 1050 are undeveloped. And of these 1050 undeveloped parcels, 72 are in the regulatory floodplain; 50 residential, 12 commercial, and 10 agricultural. Map Number 17 in Appendix 1 shows this information. It must be noted that no new building development will be added to the flood hazard because any new building will conform to the City's Flood Damage Prevention Ordinance, which the City will continue to vigorously enforce. It will be recommended to all new construction to investigate the shrink-swell potential of its soils, and design and construct the foundation with the soils' properties as a consideration.

3.5.3 Anticipated changes in land use, i.e., new subdivision development, are expected to occur throughout the City, primarily in the southern part and the northern part of the City along State Highway 66, and on the western side around the College.

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Chapter 4: Mitigation Strategies

This chapter identifies the hazard mitigation goals set by the City of Claremore and the Claremore Public Schools, and discusses the mitigation projects or measures to be taken to achieve those goals.

4.1 Hazard Mitigation Goals

4.1.1 Mission Statement

To create a disaster-resistant community and improve the safety and well-being of the citizens of the City of Claremore by reducing deaths, injuries, property damage, environmental losses, and other losses from natural and technological hazards in a manner that advances community goals, quality of life, and results in a more livable, viable, and sustainable community.

The mission statement and goals were determined by the committee at their initial meetings. Specific objectives were developed during the risk assessment phase and evaluated again as potential action steps were considered.

4.1.2 Specific Goals and Objectives

Goal 1 General: To protect vulnerable populations and critical facilities from hazards.

Objectives:

1. Minimize the loss of life and damage to property and infrastructure from natural and man-made disasters.
2. Increase public awareness of risks from hazards and implement measures that can be taken to protect families and property from disasters.
3. Reduce the risk and effects of hazards and minimize disruption in the City.
4. Identify and protect vulnerable populations from natural and man-made hazards.
5. Identify and protect critical City and community facilities from hazards so that they can continue their missions in the event of a disaster.

Goal 2 Flood Hazard: To reduce the risk of flood hazard in the City of Claremore.

Objectives:

1. Identify buildings at risk from the 100-year regulatory flood.
2. Ensure that development does not increase flooding downstream or have off-site adverse impacts.
3. Identify and maximize the natural and beneficial uses of the floodplain.
4. Implement the best flood control measures to reduce vulnerability of flood-prone properties.

Goal 3 Tornado Hazard: To reduce the risk from tornados in the City of Claremore

Objectives:

1. Encourage building of individual safe rooms and storm shelters.
2. Educate and encourage the building trades industry about construction standards that are adequate to withstand frequent high winds.

Goal 4 Hailstorm Hazard: To reduce the risk from hailstorms in the City of Claremore.

Objectives:

1. Promote construction of hail resistant roofs.

Goal 5 Lightning Hazard: To reduce the risk from lightning in the City of Claremore.

Objectives:

1. Reduce loss of life and property, and injury due to lightning by increased public awareness of measures to prevent and reduce damage, including warnings.

Goal 6 Winter Storm Hazard: To reduce the hazards from winter storms in the City of Claremore.

Objectives:

1. Reduce property loss and community disruption due to severe winter cold and ice storms.

Goal 7 High Winds Hazard: To reduce the risk from high winds in the City of Claremore.

Objectives:

1 Educate and encourage the building trades industry about construction standards that are adequate to withstand frequent high winds.

Goal 8 Drought Hazard: Reduce the economic impact of drought hazards to the City of Claremore.

Objectives:

1. Reduce damage to property and building foundations due to drought by improving building codes.

Goal 9 Wildfire Hazard: To reduce the threat of wildfire hazards and their financial impact in the City of Claremore.

Objectives:

1. Develop a City-wide fire response and support group to facilitate the provisioning of water to fires during large fires.

Goal 10 Expansive Soil Hazard: Reduce structure's susceptibility to soil movement.

Objectives:

1. Reduce damage to property and building foundations due to expansive soils by improving building codes.

Goal 11 Earthquake Hazard: To reduce the risk from earthquakes in the City of Claremore.

Objectives:

1. Educate and encourage the building trades industry about earthquake resistant construction.

Goal 12 Hazardous Materials Hazard: To reduce the risk from hazardous material storage facilities around the City of Claremore.

Objectives:

1. Protect the public from exposure from hazardous materials events from sites within the community.

Goal 13 Dam Break Hazard: To reduce the risk of a dam break hazard in the City of Claremore.

Objectives:

1. Identify dams that could impact the City.
2. Identify areas at risk.

Goal 14 Extreme Heat: To reduce the risk from extreme heat in the City of Claremore.

Objectives:

- Lessen injury and potential loss of life to citizens during periods of extreme heat through education.

4.2 Mitigation Categories

There are several types of measures that communities and individuals can use to protect themselves from, or mitigate the impacts of, natural and man-made hazards. Mitigation measures, for purposes of this study, fall into the following categories:

Preventive Measures
Structural Projects
Property Protection
Emergency Services
Public Information and Education

4.2.1 Preventive Measures

Preventive measures are designed to keep certain conditions from occurring or getting worse. The objective is to ensure that **new** development does not increase damages or loss of life and that new construction is protected from those hazards. Preventive measures are usually administered by building, zoning, planning, and code enforcement offices. They typically include planning, zoning, building codes, and floodplain development regulations and storm water management.

The first two measures, planning and zoning, work to keep damage-prone development out of the hazardous or sensitive areas. Comprehensive Plan's prepared by the City identify areas that are sensitive to urban development. Zoning Ordinances regulates development by dividing the City into zones or districts and setting development criteria for each zone or district. A zoning ordinance is considered the primary tool to implement the comprehensive plan's guidelines for how land should be developed.

The next two measures, floodplain development regulations and storm water management. Claremore participates in the National Flood Insurance Program (NFIP). The NFIP sets minimum requirements for subdivision regulations and building codes. Storm water management regulations require developers to mitigate any increase in runoff due to their development. Building codes require a level of new construction standards for new building construction.

4.2.1.1 Preventative Activities

1. Planning and zoning help Claremore develop proactively so that the resulting infrastructure is laid out in a coherent and safe manner.
2. Building codes for foundations, sprinkler systems, masonry, and structural elements such as roofs and the exterior building envelope are prime mitigation measures for occurrences of floods, tornados, high winds, extreme heat and cold, and earthquakes.
3. Participation in the NFIP and using floodplain ordinances and subdivision regulations to regulate floodplain development is beneficial for Claremore.
4. Tree trimming adjacent to overhead power lines and placing new lines underground would help in preventing power outages during winter ice storms.
5. Better information about hazardous materials in the City and being transported through the City is desired for safety and contingency planning.

4.2.2 Structural Projects

Structural projects are usually designed by engineers or architects, constructed by both the public and private sector, and maintained and managed by governmental entities. Structural projects traditionally include storm water detention reservoirs, levees and floodwalls, channel modifications, and drainage and storm sewer improvements.

4.2.2.1 Structural Activities

- Crossing and roadway drainage improvements must take into account additional detention or run-off reduction.
- Drainage and storm sewer improvements carry runoff from smaller, more frequent storms.
- Drainage system maintenance is an ongoing project of removing debris that decreases the effectiveness of detention ponds, channels, ditches, and culverts.

4.2.3 Property Protection Measures

Property protection measures are used to modify **existing** buildings or property subject to damage from various hazardous events. Property protection measures are normally implemented by the property owner. However, in some cases, technical and financial assistance can be provided by a governmental agency. Property protection measures from flooding typically include acquisition and relocation, flood-proofing, building elevation, and barriers. Property protection measures from other natural hazards include retrofitting, reinforced foundations, enhanced building codes with emphasis on the exterior building envelope, anchoring of roof and foundation, installation of safe rooms, hail resistant roofing, and insurance.

4.2.3.1 Property Protection Activities

Floods

- Dry flood proofing (making walls watertight so floodwaters cannot get inside)
- Wet flood proofing (letting the water in and removing everything that could be damaged by a flood)
- Installing drain plugs, standpipes or backflow valves to stop sewer backup

Tornado

- Constructing an underground shelter or in-building "safe room"
- Securing roofs, walls and foundations with adequate fasteners or tie downs
- Strengthening garage doors and other large openings

High Winds

- Installing storm shutters and storm windows
- Burying utility lines
- Installing/incorporating backup power
- supplies

Hailstorms

- Installing hail resistant roofing materials

Lightning

- Installing lightning rods and lightning surge interrupters
- Burying utility lines
- Installing/incorporating backup power supplies

Winter Storms

- Adding insulation
- Relocating water lines from outside walls to interior spaces
- Sealing windows
- Burying utility lines
- Installing/incorporating backup power supplies

Extreme Heat and Drought

- Adding insulation
- Installing water saver appliances, such as shower heads and toilets

Wild Fires

- Replacing wood shingles with fire resistant roofing
- Adding spark arrestors on chimneys
- Landscaping to keep bushes and trees away from structures
- Installing sprinkler systems
- Installing smoke alarms

General Measures

From the above lists, it can be seen that certain approaches can help protect from more than one hazard. These include:

- Strengthening roofs and walls to protect from wind and earthquake forces
- Bolting or tying walls to the foundation protect from wind and earthquake forces
- and the effects of buoyancy during a flood
- Adding insulation to protect for extreme heat and cold
- Anchoring water heaters and tanks to protect from ground shaking and flotation
- Burying utility lines to protect from wind, ice and snow
- Installing backup power systems for power losses during storms
- Installing roofing that is hail resistant and fireproof

Insurance has the advantage that, as long as the policy is in force, the property is protected and no human intervention is needed for the measure to work. Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the National Flood Insurance Program (NFIP). Flood insurance coverage is provided for buildings and their contents damaged by a "general condition of surface flooding" in the area.

4.2.4 Emergency Service Measures

Emergency services measures protect people during and after a hazard event. Locally, these measures are coordinated by the emergency management agencies of the individual communities. Measures include preparedness, threat recognition, warning, response, critical facilities protection, and post-disaster recovery and mitigation.

Threat recognition is the key. The first step in responding to a flood, tornado, storm or other natural hazard is knowing that one is coming. Without a proper and timely threat recognition system, adequate warnings cannot be disseminated.

After the threat recognition system tells the police department and/or City Emergency Management that a hazard is coming, the next step is to notify, **or warn**, the public and staff of other agencies and critical facilities. The following are the more common warning media:

- Outdoor warning sirens
- Sirens on public safety vehicles
- NOAA Weather Radio
- Commercial or public radio or TV stations
- Cable TV emergency news inserts
- Telephone trees
- Door-to-door contact
- Mobile public address systems

Just as important as issuing a warning is telling people what to do. A warning program should have a public information aspect. People need to know the difference between a tornado warning (when they should seek shelter in a basement) and a flood warning (when they should stay out of basements).

4.2.4.1 Emergency Services Activities

The protection of life and property is the foremost important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

Response Activities

- Activating the emergency operations room (Emergency Management)
- Closing streets or bridges (Sheriff/Police/City or Public Works)
- Shutting off power to threatened areas (OG&E/AEP/City and Rural Co-ops)
- Holding children at school/releasing children from school (School District)
- Passing out sand and sandbags (City or Public Works)
- Ordering an evacuation (Commission Chairman or Mayor)
- Opening evacuation shelters (Red Cross)
- Monitoring water levels (City or Public Works)

- Security and other protection measures (Sheriff or Police)

After a disaster, communities should undertake activities to protect public health and safety, facilitate recovery, and prepare people and property for the next disaster. This is commonly referred to as Post-Disaster Recovery and Mitigation.

Recovery Activities
- Patrolling evacuated areas to prevent looting
- Providing safe drinking water
- Monitoring for diseases
- Vaccinating residents for tetanus
- Clearing streets
- Cleaning up debris and garbage
- Regulating reconstruction to ensure that it meets all code requirements, including the NFIP's substantial damage regulations

Mitigation Activities
- Conducting a public information effort to advise residents about mitigation measures they can incorporate into their reconstruction work
- Evaluating damaged public facilities to identify mitigation measures that can be included during repairs
- Acquiring substantially or repeatedly damaged properties from willing sellers
- Planning for long term mitigation activities
- Applying for post-disaster mitigation funds

Overall Emergency Service Activities
- Using solid, dependable threat recognition systems is first and foremost in emergency services.
- Following a threat recognition, multiple or redundant warning systems and instructions for action are most effective in protecting citizens.
- Good emergency response plans that are updated yearly ensure that well-trained and experienced people can quickly take the appropriate measures to protect citizens and property.
- To ensure effective emergency response, critical facilities protection must be part of the plan.
- Post-disaster recovery activities include providing neighborhood security, safe drinking water, appropriate vaccinations, and cleanup and regulated reconstruction.

4.2.5 Public Information and Education Measures

Successful public information and education measures involve both public and private sectors. Public information and education activities advise and educate citizens, property owners, renters, businesses, and local officials about hazards and ways to protect people and property from them. Public information activities are among the least expensive mitigation measures, and at the same time are often the most effective thing a community can do to save lives and property. All mitigation activities begin with public information and education.

Many benefits stem from providing map information to inquirers. Residents and businesses that are aware of the potential hazards can take steps to avoid problems and reduce their exposure to flooding, dam break or releases, hazardous materials events, and other hazards that have a geographical distribution. These mapped hazards are included in this Hazard Mitigation study,

and are discussed below. Flood Insurance Rate Maps (FIRMS) and Flood Hazard Boundary maps are available to show the flood zones for each property. Flood insurance is always recommended for those properties subject to flooding, especially for those in Flood Zone A.

Hazardous materials sites, listed in the Oklahoma Department of Environmental Quality's EHS list, are shown on Map Number 10 in Appendix 1, and are listed in Section 3.2.12. Transportation routes frequently used in the transport of hazardous materials include State Highway (SH) 20, SH 66, and SH 88. Two railroads run through the City. High-pressure pipeline locations have been suppressed by the Federal government since 9/11.

Public Libraries located in the City are a place for residents to seek information on hazards, hazard protection, and protecting natural resources. Historically, libraries have been the first place people turn to when they want to research a topic. Interested property owners can read or check out handbooks or other publications that cover their situation. The libraries also have their own public information campaigns with displays, lectures, and other projects, which can augment the activities of the local government.

4.2.5.1 Public Information and Education Activities

- There are many ways that public information programs can be used so that people and businesses will be more aware of the hazards they face and how they can protect themselves.
- Most public information activities can be used to advise people about all hazards, not just floods.
- Other public information activities require coordination with other organizations, such as schools and real estate agents.
- There are several area organizations that can provide support for public information and educational programs.

4.3 Research, Review, and Prioritization

A wide range of literature searches and other sources were researched to identify mitigation measures for each hazard. Measures were identified to ascertain those that were most appropriate for the City of Claremore. The public involvement process included a citizen hazard mitigation questionnaire. 94 responses were received. The survey and summary of the responses are included in Appendix 4. The public involvement process also included holding open meetings for all committee meetings; and a public hearing on January 7, 2013.. A list of potential mitigation measures was prepared by staff and presented to the committee to stimulate debate and discussion.

The committee reviewed the mitigation activities. The committee incorporated the criteria and principles of the STAPLE+E project evaluation method in their consideration of the mitigation activities. While not referred to by name at the time of the mitigation activity review, the intent of the method was used. An explanation of each STAPLE+E criteria item is as follows:

S: Social	Mitigations actions are acceptable to the City or School if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the City's social and cultural values.
T: Technical	Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.
A: Administrative	Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
P: Political	Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support for the action.
L: Legal	It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
E: Economic	Budget constraints can significantly deter the implementation of mitigation actions. It is important to evaluate whether an action is cost-effective before an action is implemented.
E: Environmental	Sustainable mitigation actions that do not have an adverse effect on the environment, that comply with environmental regulations, and that are consistent with the City's environmental goals, have mitigation benefits while being environmentally sound.

Among the factors discussed for each activity was its economic impact on the City. A cost-benefit analysis was not done for each activity under consideration, but the committee decided to have a formal cost-benefit evaluation done for any selected activity that would follow the requirements of the funding source when funds are being sought and the CHMPC would look for actions with a benefit greater than its cost.

While the committee did not select projects for the City and the School, it did offer recommendations. The City of Claremore and the Claremore Public School selected their own mitigation actions, with the criteria as outlined in this section

The potential social impact, implementation capabilities (City work force), and potential funding availability for each activity, and the other STAPLE+E criteria principles were considered in prioritizing the activities. The City's action plan will take into the above factors and include at least two projects for each hazard.

Chapter 5:
Action Plan

The City of Claremore has again reviewed and analyzed the risk assessment studies for the natural hazards and hazardous material events that may impact their jurisdiction. The City also reviewed the list of recommended actions or projects the City included in their previous plan to identify actions that had been completed, and what other actions should be continued, deferred, or cancelled. The results of this review are shown in Table 5-1.

Table 5-1
STATUS OF MITIGATION ACTIONS FROM PREVIOUS PLAN

Action Plan #	Action Description	Progress on Action	Recommendation for the Action
1	Evaluate and build a 911 center and emergency operations facility	started	continue
2	Build safe rooms at government critical facilities	none	continue
3	Develop routes for the transport of hazardous materials	none	remove
4	Implement a fee-in-lieu storm water detention, and have built regional storm water detention facilities	regional detention	fee in lieu of
5	Install street addresses on all buildings and curbs	started	continue
6	Create a comprehensive all-hazards mitigation strategy for the public, including building partnerships among government, civic groups, and businesses	none	remove from plan, implement internally
7	Prepare a city wide master drainage plan	completed	none
8	Develop a storm water utility fee for city maintenance of drainage ways , to fund drainage projects, and to implement the NDPES phase 2 permit program	none	remove

As part of the plan update process, this chapter includes the mitigation actions the City of Claremore selected to achieve the mitigation goals. The mitigation actions included at least two (2) specific mitigation actions per hazard. The City also selected non-mitigation actions relating to hazard prevention and communications for their own planning purposes. For each action, the hazard type it would be targeting is identified, the type of action is shown, the lead agency is identified, an anticipated time schedule and estimated cost is shown, identification of the possible funding sources are made, and the type of work product and expected outcome is discussed. Once funding is sought for an action, a detailed benefit/cost analysis will be done and will follow the requirements of the funding source.

The Claremore Public Schools also identified an action plan. It also identified at least two (2) specific mitigation actions per hazard to achieve the mitigation goals. Claremore Public Schools also selected non-mitigation actions relating to hazard prevention and communications for their

own planning purposes. Each action included information on the same eight points as discussed in the previous paragraph.

Mitigation Actions and Activities for each of the participating jurisdictions.

The CHMPC has reviewed and analyzed the risk assessment studies for all of the identified natural hazards and hazardous material events. Both the City and the School were equally concerned about each identified hazard and have reviewed the mitigation strategies listed in Chapter 4. The Claremore Schools are not considered at risk from the flood and dam break hazards because these two hazards are location specific and so not extend onto the campus properties as discussed in Sections 3.2.1.2 and 3.2.13.3.

The following tables identify which mitigation action is associated with each hazard for the City and the School. Both jurisdictions also selected non-mitigation actions to be in their action plan, but only the mitigation actions are included in the table.

Table 5-2
MITIGATION ACTIONS PER HAZARD

Hazard Type	City of Claremore	Claremore Public Schools
Flood	1-2-15	----
Tornado	1-2-5-7-12-12-15-27-28	4-7-8
High Winds	1-2-5-7-12-13-15-27-28	4-7-8
Lightning	1-2-13-15-16	2-4-7-8
Hail	1-2-7-12-12-15-17-27	4-7
Winter Storm	1-2-28	2-6-7
Extreme Heat	1-2	6-7
Expansive Soils	2-4-13	8-9
Drought	1-2-3-23	1-7-8
Wildfire	1-2-5-13-15	2-4-7-8
Earthquake	1-2-5-13-15	2-4-7-8
Hazardous Material Events	1-2-15-26	4-7-8
Dam Break	1-2-15	----

The City of Claremore has reviewed and analyzed the risk assessment studies for the natural hazards and hazardous material events that may impact their jurisdiction. They reviewed the mitigations activities listed in Chapter 4, incorporated the criteria and principles of the STAPLE+E project evaluation method in their consideration of the mitigation activities, and prioritized the activities as was detailed in Section 4.3. Once funding is sought, a detailed benefit/cost analysis will be done and will follow the requirements of the funding source.

Action Item #1

Title	Installation of NOAA weather radios in City facilities
Hazard(s) Targeted	Floods, tornados, high winds, lightning, hail, winter storms, extreme heat, drought, wildfires, earthquakes, dam breaks, hazard material events
Project Type	Mitigation
Lead and participating agencies	City emergency management
Time schedule	FY14
Estimated Cost	$100 per radio
Funding source	Local and/or grants
Work product	Purchase and install NOAA weather radios in City facilities
Expected outcome	To provide an increased awareness and improved warning for approaching hazard events and hazard notification at City facilities

Action Item #2

Title	Develop an "all media program", including the City's web page, to educate the City residents about mitigating the risk of life and property associated with the occurrence of hazards
Hazard(s) Targeted	Floods, tornados, high winds, lightning, hail, winter storms, extreme heat, drought, expansive soils, wildfires, earthquakes, dam breaks, hazard material events
Project Type	Mitigation
Lead and participating agencies	City emergency management
Time schedule	FY14
Estimated Cost	$25,000
Funding source	Local and/or grants
Work product	Dissemination of information about mitigating the risk associated with hazards
Expected outcome	City residents become less at risk and less vulnerable from hazards

Action Item #3

Title	Installation of water saving fixtures in all City facilities
Hazard(s) Targeted	Drought
Project Type	Mitigation
Lead and participating agencies	City building operations
Time schedule	FY14
Estimated Cost	$50-$500 per fixture, depending on the fixture mitigated
Funding source	Local and/or grants
Work product	Installation of water saving fixtures
Expected outcome	Reduction in the amount of water used at each fixture

Action Item #4

Title	Map expansive soils risk area
Hazard(s) Targeted	Expansive soils
Project Type	Mitigation
Lead and participating agencies	City Public Works
Time schedule	FY14
Estimated Cost	$200,000
Funding source	Local and/or grants
Work product	Develop detailed soils maps
Expected outcome	Identification of the soils' construction properties, including shrink-swell potential, to insure proper foundation design and construction of future improvements and buildings

Action Item #5

Title	Bury overhead power lines to make them more hazard resistant
Hazard(s) Targeted	Earthquakes, tornados, high winds, winter storms, wildfire
Project Type	Mitigation
Lead and participating agencies	City Electric Department
Time schedule	FY14-21
Estimated Cost	$10,000,000
Funding source	Grants
Work product	Bury overhead power lines
Expected outcome	Minimize power outages because hazards can bring down overhead power lines and poles

Action Item #6

Title	Construct an Emergency Operations Center
Hazard(s) Targeted	Floods, tornados, high winds, lightning, hail, winter storms, extreme heat, wildfires, earthquakes, dam breaks, hazard material events
Project Type	Preparation
Lead and participating agencies	City Emergency Management
Time schedule	FY2014
Estimated Cost	Not determined
Funding source	Local/Grants
Work product	A stand alone emergency operation center facility
Expected outcome	A stand alone facility with equipment and resources dedicated to emergency management

Action Item #7

Title	Safe rooms at City facilities, including the Community Center
Hazard(s) Targeted	Tornados, high winds, hail
Project Type	Mitigation
Lead and participating agencies	City Administration
Time schedule	FY2014
Estimated Cost	$2,000,000
Funding source	Local/Grants
Work product	Safe Rooms
Expected outcome	Provide places to shelter in place at City facilities.

Action Item #8

Title	Develop a fee in lieu regulation instead of storm water detention
Hazard(s) Targeted	Floods
Project Type	Regulations
Lead and participating agencies	City Administration
Time schedule	FY2014
Estimated Cost	$10,000
Funding source	Local/Grants
Work product	Implement regulations allowing fee in lieu of storm water detention
Expected outcome	Provide alternatives for land developers to contribute to a fund to construct regional detention facilities instead of building individual storm water detention facilities.

Action Item #9

Title	Installation of placards on buildings showing their address
Hazard(s) Targeted	Floods, wildfires, dam breaks, hazard material events
Project Type	Preparation
Lead and participating agencies	Public Works
Time schedule	FY2014
Estimated Cost	$75,000
Funding source	Local/Grants
Work product	Labeling all buildings with their address
Expected outcome	So emergency responders can positively locate emergency request calls

Action Item #10

Title	Extend Master Drainage Plan to include fence line
Hazard(s) Targeted	Flood
Project Type	Preparation
Lead and participating agencies	Public Works
Time schedule	FY2014
Estimated Cost	$100,000
Funding source	Local/Grants
Work product	A comprehensive storm water master drainage plan
Expected outcome	Provide better information on flood hazards in areas where the City is considering annexation.

Action Item #11

Title	Formalize maintenance plan/procedures for storm water system
Hazard(s) Targeted	Flood
Project Type	Maintenance
Lead and participating agencies	Public Works
Time schedule	FY 2014
Estimated Cost	$10,000
Funding source	Local/Grants
Work product	Standard maintenance protocols for the City storm sewer system
Expected outcome	Improved maintenance standards to make the storm sewer system function to its capacity

Action Item #12

Title	An ordinance to require shelters/safe areas in new public and private buildings
Hazard(s) Targeted	Tornado, high winds, hail
Project Type	Mitigation
Lead and participating agencies	City Administration
Time schedule	FY 2014
Estimated Cost	$10,000
Funding source	Local/Grants
Work product	City safe room/shelter ordinance
Expected outcome	To insure all new buildings have a shelter to withstand tornados and high wind events

Action Item #13

Title	Improve building construction standards
Hazard(s) Targeted	tornados, high winds, lightning, hail, expansive soils, wildfires, earthquakes
Project Type	Mitigation
Lead and participating agencies	City Administration
Time schedule	FY 2014
Estimated Cost	$10,000
Funding source	Local/Grants
Work product	Hazard mitigation building standards
Expected outcome	Insure buildings are built to withstand hazards

Action Item #14

Title	Encourage shelter/safe room construction at high hazard areas such as mobile home parks and apartment complexes
Hazard(s) Targeted	Tornado
Project Type	Preparation
Lead and participating agencies	City Administration
Time schedule	FY 2014
Estimated Cost	$10,000
Funding source	Local/Grants
Work product	Promotion of the concept to build safe rooms at mobile home parks and apartment complexes
Expected outcome	Mobile homes typically do not have tornado resistant areas so on site facilities are warranted, and safe rooms at apartment complexes can shelter a large number of people on site.

Action Item #15

Title	Additional emergency warning sirens to cover large outdoor gathering areas
Hazard(s) Targeted	Floods, tornados, high winds, lightning, hail, wildfires, earthquakes, dam breaks, hazard material events
Project Type	Mitigation
Lead and participating agencies	Emergency management
Time schedule	FY 2014
Estimated Cost	$100,000
Funding source	Local/Grants
Work product	Additional emergency warning sirens
Expected outcome	Better overall city wide coverage

Action Item #16

Title	Lightning protection systems for city facilities and private critical facilities
Hazard(s) Targeted	Lightning
Project Type	Mitigation
Lead and participating agencies	Electric Department
Time schedule	FY 2014
Estimated Cost	$15,000 per bldg
Funding source	Local/Grants
Work product	Installation of lightning protection systems
Expected outcome	Protection of buildings and their electrical equipment from lightning strikes and power surges

Action Item #17

Title	Inside storage of all city vehicles, five structures
Hazard(s) Targeted	Hail
Project Type	Mitigation
Lead and participating agencies	Public Works
Time schedule	FY 2014
Estimated Cost	$100,000
Funding source	Local/Grants
Work product	Shelters for all city vehicles when not in service
Expected outcome	Provide the ability to park all city vehicles in shelters (garages, buildings) when they are not manned.

Action Item #18

Title	Encourage planning/education for large outdoor gatherings
Hazard(s) Targeted	Hail
Project Type	Preparation
Lead and participating agencies	City Administration
Time schedule	FY 2014
Estimated Cost	$10,000
Funding source	Local/Grants
Work product	Have pre-planned safety procedures from hail hazards for large outdoor gatherings
Expected outcome	To lessen the potential of injuries when a hail hazard develops at the time of a large outdoor gathering

Action Item #19

Title	Designate emergency routes/procedures in ordinance or policy
Hazard(s) Targeted	Winter storms
Project Type	Preparation
Lead and participating agencies	Emergency management
Time schedule	FY 2014
Estimated Cost	$10,000
Funding source	Local/Grants
Work product	Designated emergency routes/procedures
Expected outcome	To maintain traffic flow through the City during snow and ice conditions

Action Item #20

Title	Update ordinances to require snow removal for facilities requiring emergency access
Hazard(s) Targeted	Winter storms
Project Type	Preparation
Lead and participating agencies	Public works
Time schedule	FY 2014
Estimated Cost	$10,000
Funding source	Local/Grants
Work product	Ordinances to require snow removal at facilities that require emergency access, even during severe winter storms
Expected outcome	Insure there are clear avenues of ingress and egress for emergency vehicles at facilities that require emergency access.

Action Item #21

Title	Prepare facilities for use as possible warming shelters
Hazard(s) Targeted	Winter storms
Project Type	Preparation
Lead and participating agencies	Emergency management
Time schedule	FY 2014
Estimated Cost	Not determined, depends on the facility
Funding source	Local/Grants
Work product	List of warming shelters
Expected outcome	Identification of warming facilities for citizens displaced during severe winter storms

Action Item #22

Title	Prepare facilities for use as possible cooling shelters
Hazard(s) Targeted	Heat
Project Type	Preparation
Lead and participating agencies	Emergency management
Time schedule	FY 2014
Estimated Cost	Not determined, depends on faciltiy
Funding source	Local/Grants
Work product	List of cooling shelters
Expected outcome	Identification of cooling facilities for citizens displaced during extreme heat events

Action Item #23

Title	Construction of additional water supply storage capacity
Hazard(s) Targeted	Drought
Project Type	Mitigation
Lead and participating agencies	Public works
Time schedule	FY 2014
Estimated Cost	$3,500,000
Funding source	Local/Grants
Work product	Construction of additional water storage facilities
Expected outcome	To maintain an acceptable supply of water to city residents during periods of drought

Action Item #24

Title	Adopt Wildland/Urban Interface programs and procedures
Hazard(s) Targeted	Wildfires
Project Type	Preparation
Lead and participating agencies	Fire Department
Time schedule	FY 2014
Estimated Cost	$10,000
Funding source	Local/Grants
Work product	City Wildland/Urban Interface programs and procedures
Expected outcome	Have programs and procedures in place for building in the wildland/urban interface.

Action Item #25

Title	Reactivate/revitalize the Local Emergency Planning Commission for hazard material event response
Hazard(s) Targeted	Hazardous Materials
Project Type	Preparation
Lead and participating agencies	Emergency management
Time schedule	FY 2014
Estimated Cost	$10,000
Funding source	Local/Grants
Work product	Have a functioning Local Emergency Planning Commission
Expected outcome	Have the resources of an established commission dedicated to emergency planning

Action Item #26

Title	Strengthen/formalize evacuation and warning procedures
Hazard(s) Targeted	Hazardous Materials
Project Type	Mitigation
Lead and participating agencies	Emergency management
Time schedule	FY 2014
Estimated Cost	$10,000
Funding source	Local/Grants
Work product	Have evacuation and warning procedures in place
Expected outcome	Have up to date and ready to use procedures in place for public evacuations and warnings to the public

Action Item #27

Title	Incorporate an EOC into the Fire Administration/Senior Center Facility being renovated for such purposes. Include emergency power capabilities to increased structural requirements to allow for its use as a storm shelter for the occupants of the facility.
Hazard(s) Targeted	Tornado, high winds, hail
Project Type	Mitigation
Lead and participating agencies	City Administration
Time schedule	FY 2014
Estimated Cost	$60,000 for equipment
Funding source	Local/Grants
Work product	Storm shelter
Expected outcome	Construct a safe room for the occupants of the Fire Administration/Senior Center Facility

Action Item #28

Title	Installation of emergency power to the Water Treatment Plant
Hazard(s) Targeted	Tornado, high winds, winter storms
Project Type	Mitigation
Lead and participating agencies	Public works
Time schedule	FY 2014
Estimated Cost	$250,000
Funding source	Local/Grants
Work product	Emergency power to the water treatment plant
Expected outcome	Installation of an emergency power source at the water treatment plant for use when the primary source to interrupted so the plant can maintain operation

Action Item #29

Title	Improve interoperability and redundancy in radio communications for emergency responders
Hazard(s) Targeted	Floods, tornados, high winds, lightning, hail, winter storms, wildfires, earthquakes, dam breaks, hazard material events
Project Type	Preparation
Lead and participating agencies	Emergency management
Time schedule	FY 2014
Estimated Cost	$100,000
Funding source	Local/Grants
Work product	Effective radio communications for first responders
Expected outcome	Insure that all first responders can properly communicate with each other during a time of emergency

The Claremore Public Schools has reviewed and analyzed the risk assessment studies for the natural hazards and hazardous material events that may impact their jurisdiction. They reviewed the mitigations activities listed in Chapter 4, incorporated the criteria and principles of the STAPLE+E project evaluation method in their consideration of the mitigation activities, and prioritized the activities as the City did as was detailed in Section 4.3.

Action Item #1

Title	Water saving fixtures
Hazard(s) Targeted	Drought
Project Type	Mitigation
Lead Agency	Claremore Schools Building Operations
Time schedule	FY 2014
Estimated Cost	$50 to $500 per fixture
Funding source	Local/Grants
Work product	Installation of water saving fixtures in School facilities
Expected outcome	Reduce the amount of water used in all times of the year, including times of drought

Action Item #2

Title	Backup generators
Hazard(s) Targeted	Winter storms, lightning, earthquake, wildfires
Project Type	Mitigation
Lead Agency	Claremore Schools Building Operations
Time schedule	FY 2014
Estimated Cost	$50,000.00
Funding source	Local/Grants
Work product	Purchase and installation of two backup generators
Expected outcome	Provide power for facilities when the primary power is out. One generator for the school facilities on the east side of the City, and one for the west facilities.

Action Item #3

Title	Snow removal equipment and sand spreaders
Hazard(s) Targeted	Winter storms
Project Type	Preparation
Lead Agency	Claremore Schools Building Operations
Time schedule	FY 2014
Estimated Cost	$250,000
Funding source	Local/Grants
Work product	Acquisition of snow removal equipment and sand spreaders
Expected outcome	Equipment to bring school facilities back into operation after winter storms

Action Item #4

Title	Outdoor warning systems
Hazard(s) Targeted	Tornado, high wind, lightning, hail, wildfire, earthquake, hazardous material event
Project Type	Mitigation
Lead Agency	Claremore Schools Building Operations
Time schedule	FY 2014
Estimated Cost	$25,000.00
Funding source	Local/Grants
Work product	Outdoor loud speakers
Expected outcome	Systems to provide immediate notification to students and staff outside of the school buildings of approaching hazards

Action Item #5

Title	2-way radios for all school buildings
Hazard(s) Targeted	Tornado, high wind, hail, wildfires, hazardous material events
Project Type	Communication
Lead Agency	Claremore Schools Building Operations
Time schedule	FY 2014
Estimated Cost	$2,500.00
Funding source	Local/Grants
Work product	2-way radios
Expected outcome	Communication equipment for staff out in the school facilities to hazard response coordinators when inspecting facilities during and after hazard events

Action Item #6

Title	Energy efficient windows
Hazard(s) Targeted	Heat, winter storm
Project Type	Mitigation
Lead Agency	Claremore Schools Building Operations
Time schedule	FY 2014
Estimated Cost	$5,000.00 per window
Funding source	Local/Grants
Work product	Energy efficient windows
Expected outcome	Improved energy efficiency in the school buildings. Keeps the heat out better during extreme heat events and keeps the cold out during the cold of the winter

Action Item #7

Title	Installation of NOAA weather radios in School facilities
Hazard(s) Targeted	Tornados, high winds, lightning, hail, winter storms, extreme heat, drought, wildfires, earthquakes, hazard material events
Project Type	Mitigation
Lead Agency	Claremore Schools Building Operations
Time schedule	FY14
Estimated Cost	$100 per radio
Funding source	Local and/or grants
Work product	Purchase and install NOAA weather radios in School facilities
Expected outcome	To provide an increased awareness and improved warning for approaching hazard events and hazard notification at School facilities

Action Item #8

Title	Develop an "all media program" to educate the school staff, students, and parents about mitigating the risk of life and property associated with the occurrence of hazards
Hazard(s) Targeted	Tornados, high winds, lightning, hail, winter storms, extreme heat, drought, expansive soils, wildfires, earthquakes, hazard material events
Project Type	Mitigation
Lead Agency	Claremore Schools Building Operations
Time schedule	FY14
Estimated Cost	$25,000
Funding source	Local and/or grants
Work product	Dissemination of information about mitigating the risk associated with hazards
Expected outcome	School staff, students, and parents residents become less at risk and less vulnerable from hazards

Action Item #9

Title	Map expansive soils risk area
Hazard(s) Targeted	Expansive soils
Project Type	Mitigation
Lead Agency	Claremore Schools Building Operations
Time schedule	FY14
Estimated Cost	$100,000
Funding source	Local and/or grants
Work product	Develop detailed soils maps
Expected outcome	Identification of the soils' construction properties, including shrink-swell potential, to insure proper foundation design and construction of future improvements and buildings at each school site

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Chapter 6:

Plan Maintenance and Adoption

This chapter includes a discussion of the plan maintenance process and documentation of the adoption of the plan by the Claremore Hazard Mitigation Planning Committee and the City of Claremore City Commission.

6.1 Monitoring, Evaluating, Updating the Plan

The City Manager and the Emergency Management Director will oversee the day-to-day implementation of the plan. Monitoring will include getting quarterly reports from the agencies and departments involved in the mitigation activities as to their progress in implementing the projects included the Action Plan that fall within that agency's or department's scope of responsibility.

The Claremore Hazard Mitigation Planning Committee will also evaluate the mitigation plan on an annual basis. The evaluation shall include reviewing the goals and objectives of the mitigation plan for any changes. The evaluation will also include a review of the hazards in the plan to determine if the risks or hazard locations have changed. The Claremore Hazard Mitigation Planning Committee will complete and provide an annual evaluation to the City Commission summarizing the accomplishments of the mitigation activities. In the action plan, the Claremore Hazard Mitigation Planning Committee will review the items identified to implement each action plan activity for their appropriateness, and report problems to the City Commission. These implementation items include the responsible agency to oversee the mitigation activity, the time schedule, and the funding source.

The Claremore Hazard Mitigation Planning Committee will make a comprehensive update to the Multi-Hazard Mitigation Plan within five years, from the approval date, as per FEMA requirements, and will be re-submitted to OEM and FEMA for approval as required.

6.2 Incorporating the Multi-Hazard Mitigation Plan

The City of Claremore Multi-Hazard Mitigation Plan has been adopted by the City of Claremore City Commission as a guide to City-wide mitigation activities. Appropriate Action Plan activities will be incorporated into the planning process, and in the annual City budget. As stated in section 6.1, the City Manager and the Emergency Management Director will oversee the day-to-day implementation of the plan.

They will work with the CHMPC to monitor how mitigation activities are incorporated into other City plans. Members of the CHMPC are also Department Heads charged with the responsibility of updating and enforcing key plans and policies of the City. The City of Claremore currently has a capital improvement plan to guide development and future improvements. These plans have mitigation strategy components in them, and the City will incorporate any approved the

mitigation plan strategies into those plans when the particular plan is updated. All plans are updated as needed by the City. The inspections department enforces the building codes in the City of Claremore. After adoption of the mitigation plan, the inspections department will continue to enforce the building codes on new construction. Selection of future CIP projects will include consideration of the goals and objectives of the mitigation plan.

6.3 Public Involvement

The City of Claremore is committed to involving the public directly in updating and maintaining the Multi-Hazard Mitigation Plan. Copies of the Plan will be available at the City of Claremore Emergency Management Office and at the City Hall. Input from citizens will be encouraged, particularly at the annual evaluation to the City of Claremore City Commission. Commission meetings and their agendas are posted and open to the public where the public is invited to comment on this or any agenda item. At any time of the year, comments can be made directly to the City Manager and the Emergency Management Director.

Appendix 1: Mapping

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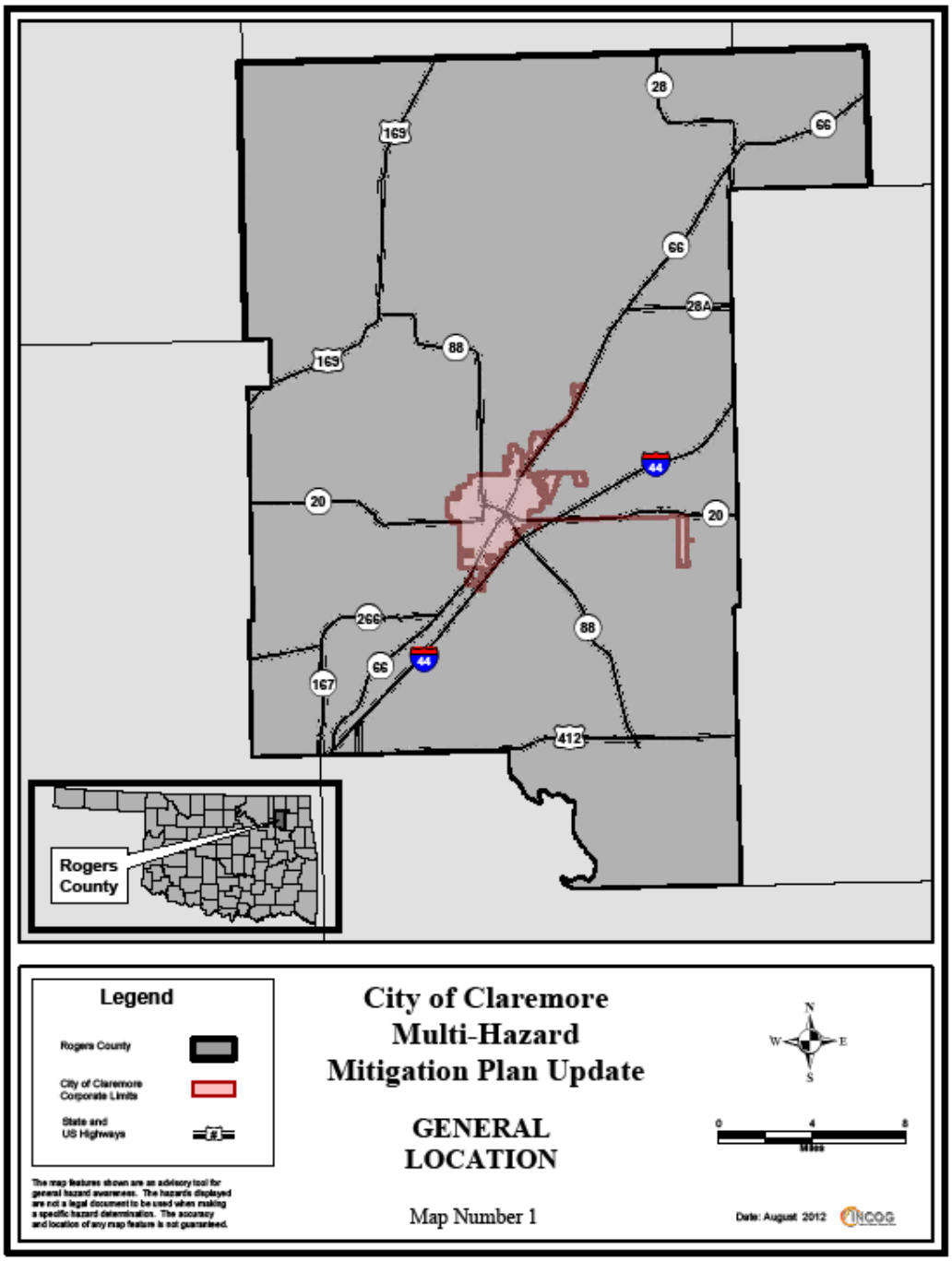
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167
412
Rogers County
Legend
Rogers County
City of Claremore Corporate Limits
State and US Highways
The map features shown are an advisory tool for general hazard awareness. The hazards displayed are not a legal document to be used when making a specific hazard determination. The accuracy and location of any map feature is not guaranteed.
City of Claremore
Multi-Hazard
Mitigation Plan Update
GENERAL
LOCATION
Map Number 1
N
W
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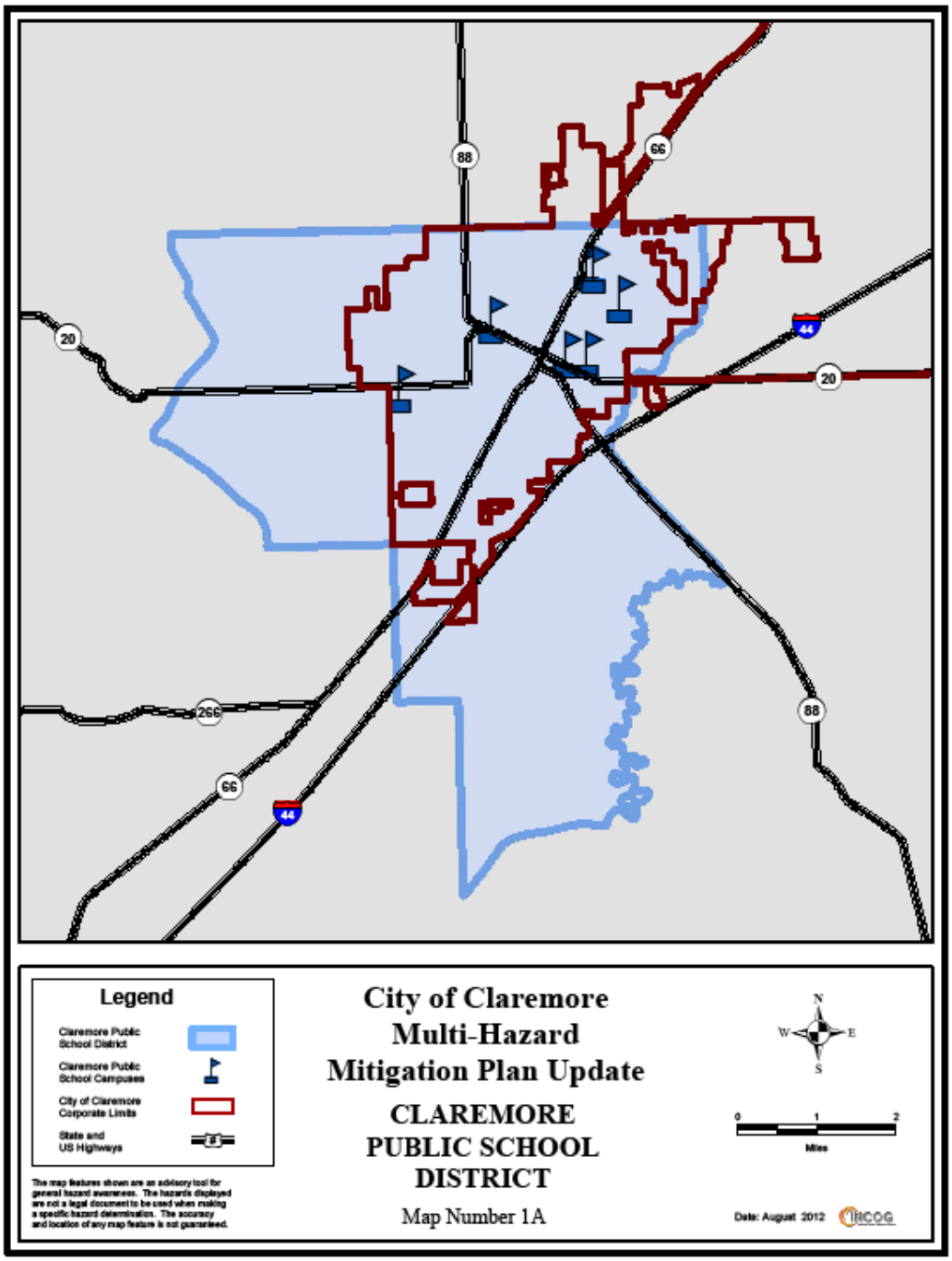
0
4
8
Miles
Date: August 2012
INCOG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266
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Legend
Claremore Public School District
Claremore Public School Campuses
City of Claremore Corporate Limits
State and US Highways
The map features shown are an advisory tool for general hazard awareness. The hazards displayed are not a legal document to be used when making a specific hazard determination. The accuracy and location of any map feature is not guaranteed.
City of Claremore
Multi-Hazard
Mitigation Plan Update
CLAREMORE
PUBLIC SCHOOL
DISTRICT
Map Number 1A
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W
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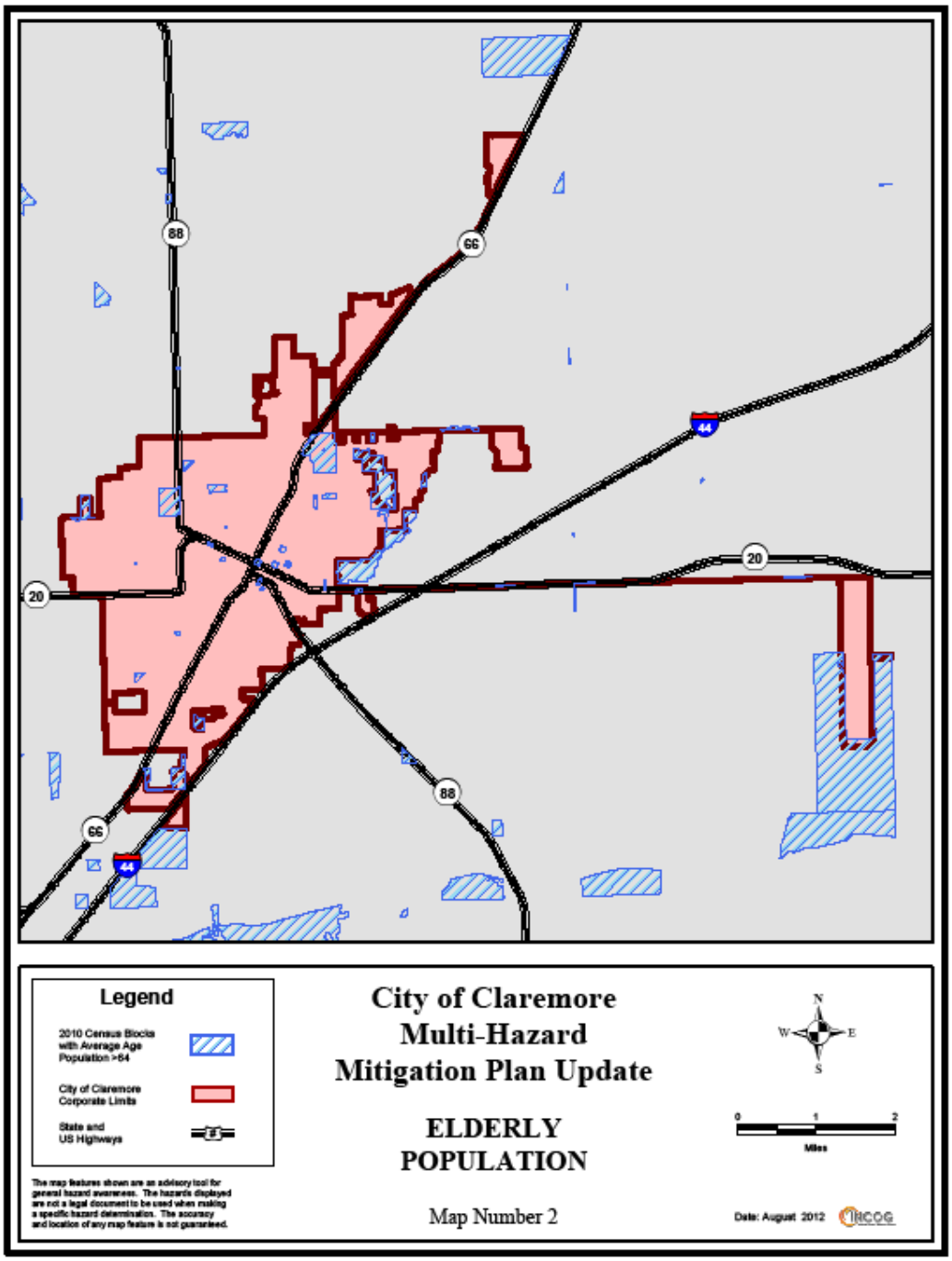
1
2
Miles
Date: August 2012
INCOG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Legend
2010 Census Blocks with Average Age Population >64
City of Claremore Corporate Limits
State and US Highways
City of Claremore
Multi-Hazard
Mitigation Plan Update
ELDERLY
POPULATION
Map Number 2
N
W
E
S
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1
2
Miles
Date: August 2012
INCOG
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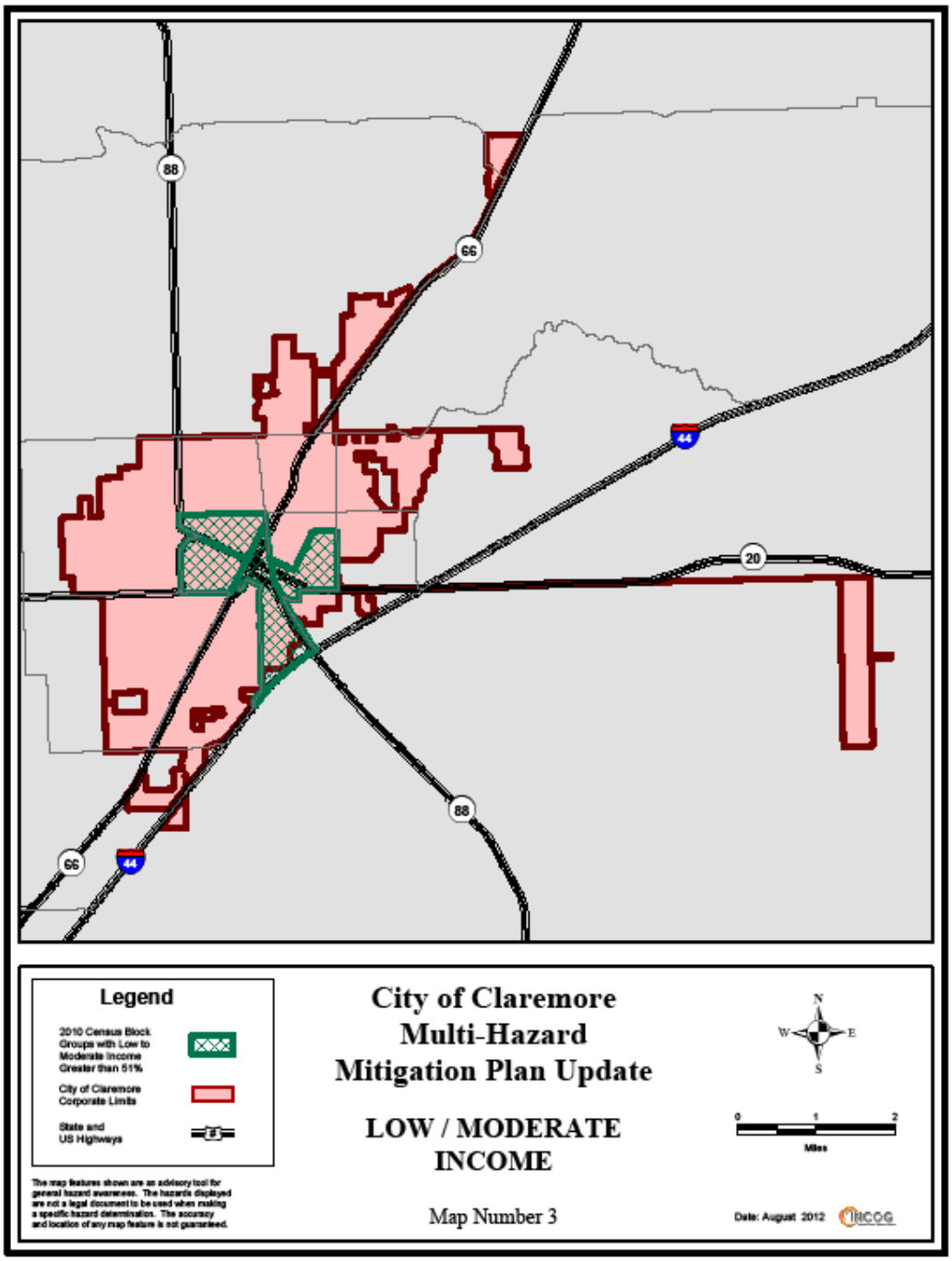
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2010 Census Block Groups with Low to Moderate Income Greater than 51%
City of Claremore Corporate Limits
State and US Highways
The map features shown are an advisory tool for general hazard awareness. The hazards displayed are not a legal document to be used when making a specific hazard determination. The accuracy and location of any map feature is not guaranteed.
City of Claremore
Multi-Hazard
Mitigation Plan Update
LOW / MODERATE
INCOME
Map Number 3
N
W
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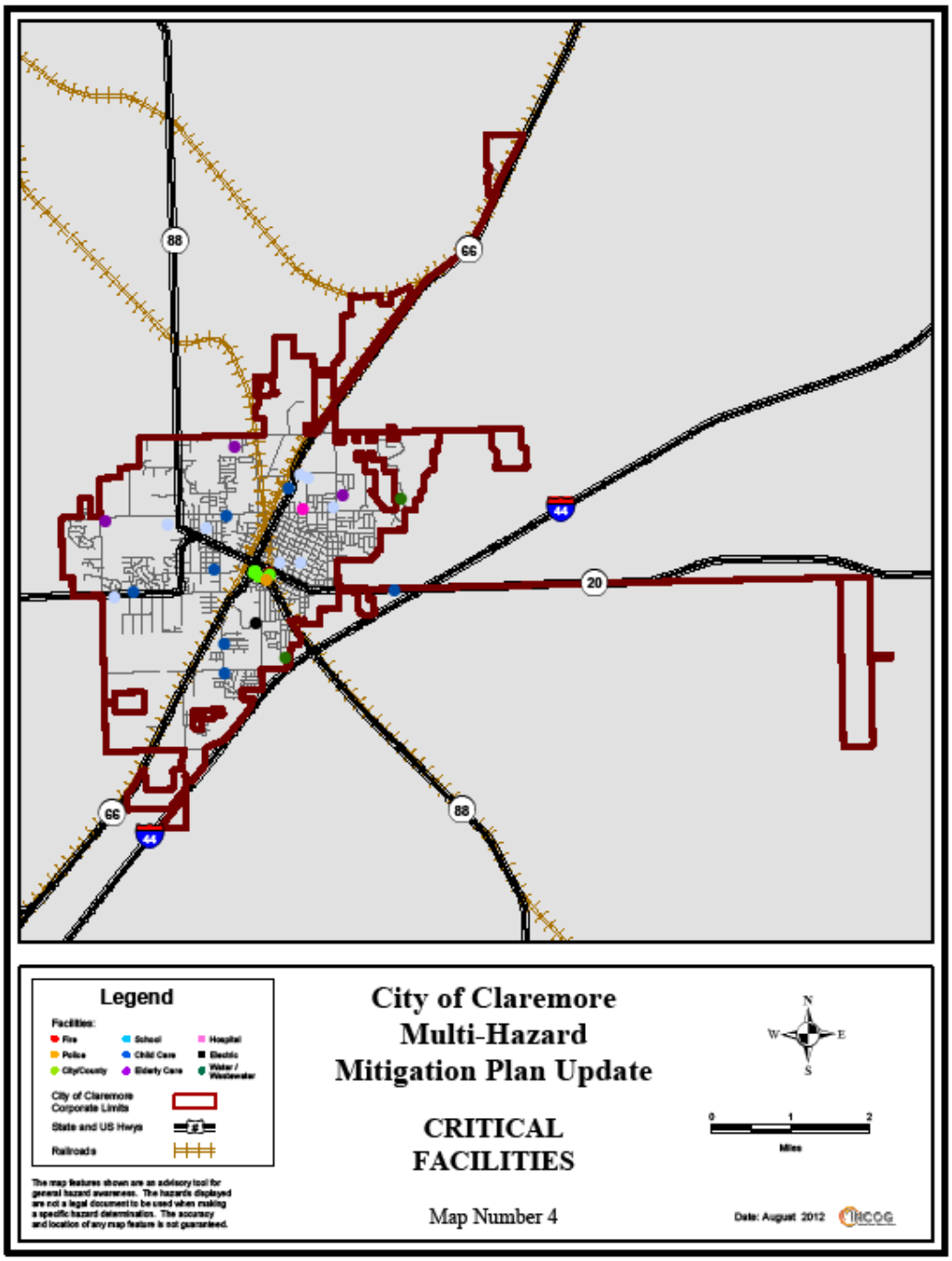
Miles
Date: August 2012
INCOG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Facilities:
Fire
School
Hospital
Police
Child Care
Electric
City/County
Elderly Care
Water / Wastewater
City of Claremore Corporate Limits
State and US Hwys
Railroads
The map features shown are an advisory tool for general hazard awareness. The hazards displayed are not a legal document to be used when making a specific hazard determination. The accuracy and location of any map feature is not guaranteed.
City of Claremore
Multi-Hazard
Mitigation Plan Update
CRITICAL
FACILITIES
Map Number 4
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W
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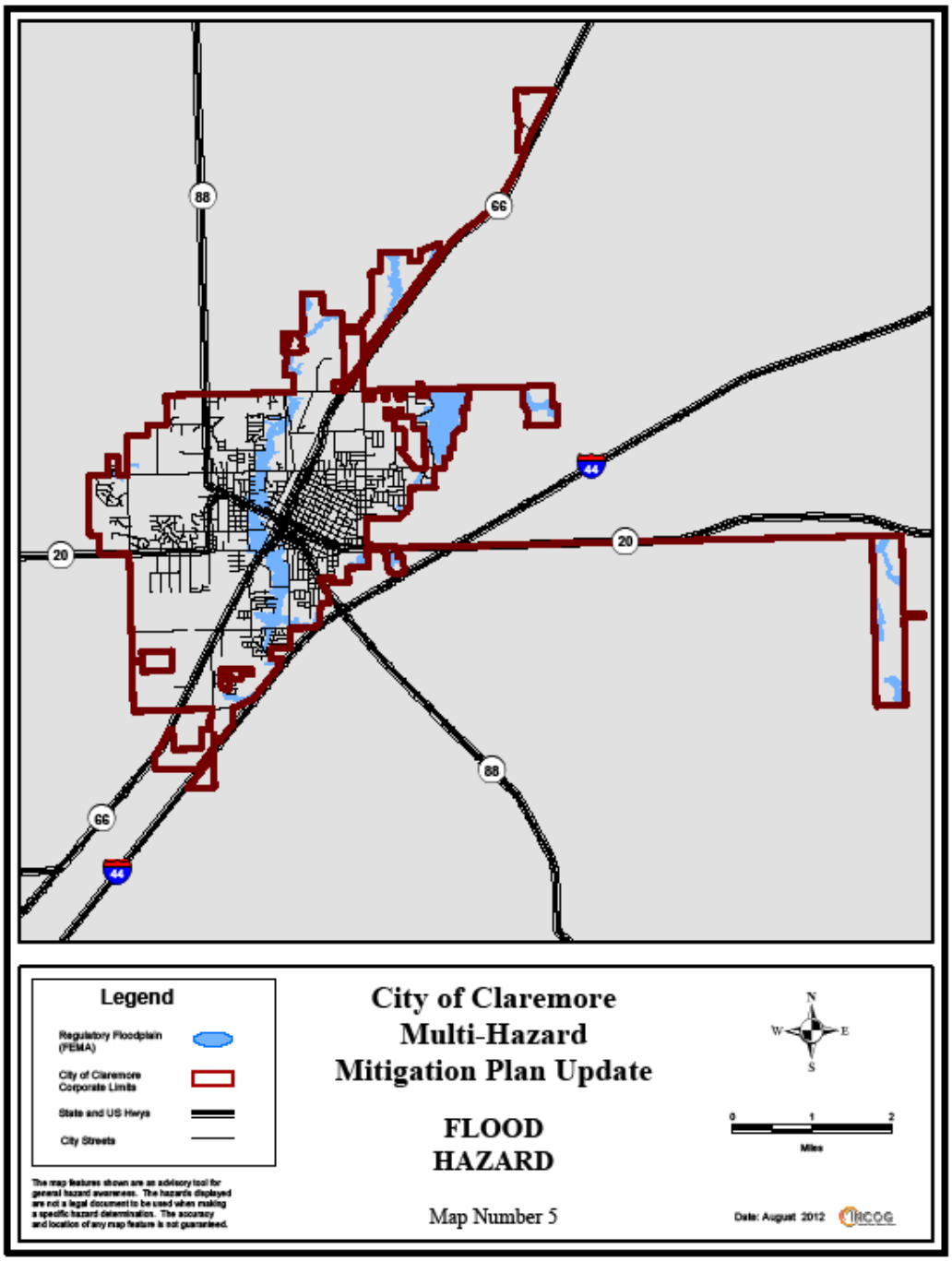
0
1
2
Miles
Date: August 2012
INCOG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Regulatory Floodplain (FEMA)
City of Claremore Corporate Limits
State and US Hwys
City Streets
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City of Claremore
Multi-Hazard
Mitigation Plan Update
FLOOD
HAZARD
Map Number 5
N
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2
Miles
Date: August 2012
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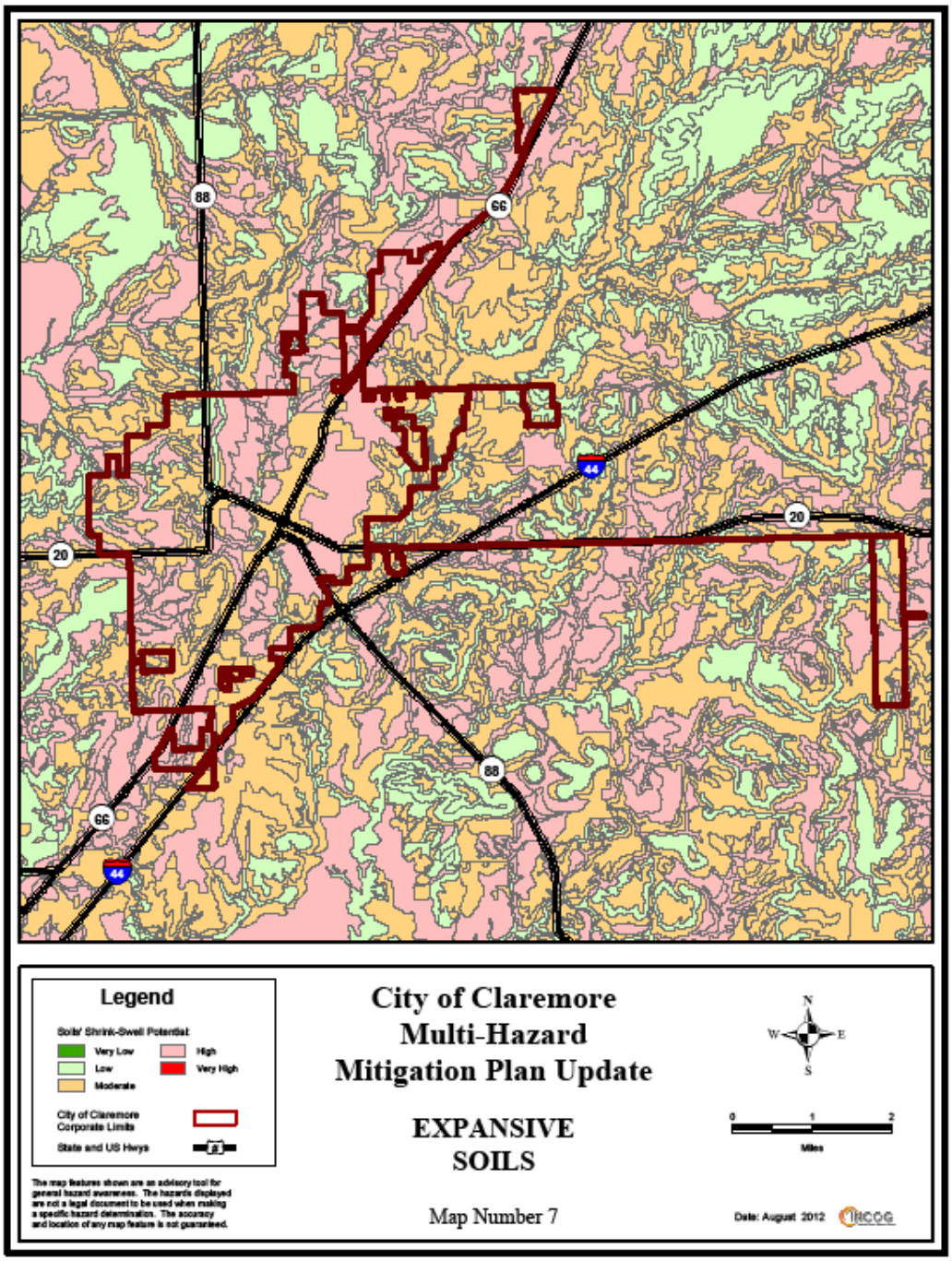
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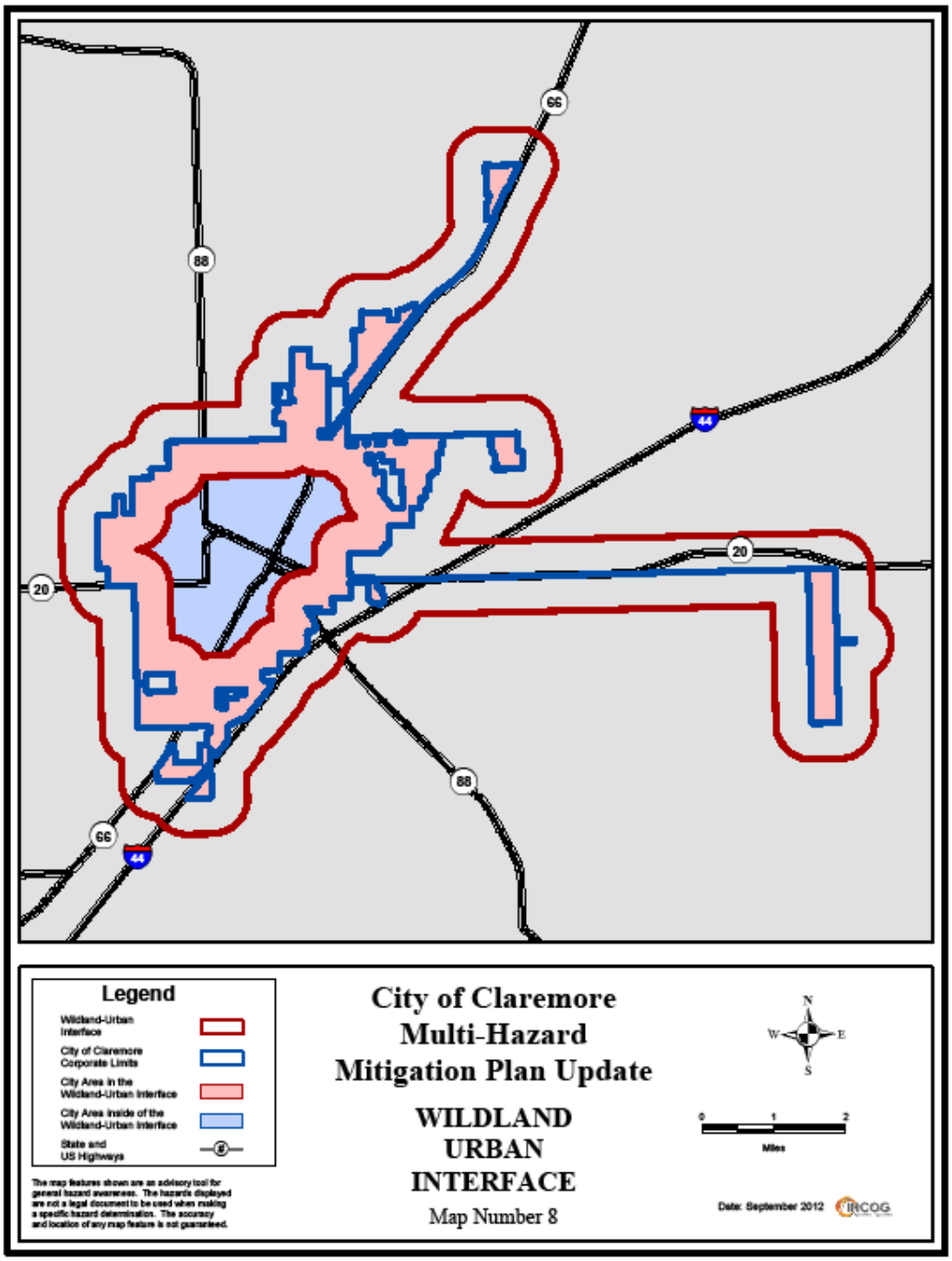
Soils' Shrink-Swell Potential
Very Low
Low
Moderate
High
Very High
City of Claremore Corporate Limits
State and US Hwys
The map features shown are an advisory tool for general hazard awareness. The hazards displayed are not a legal document to be used when making a specific hazard determination. The accuracy and location of any map feature is not guaranteed.
City of Claremore
Multi-Hazard
Mitigation Plan Update
EXPANSIVE
SOILS
Map Number 7
N
W
E
S
0
1
2
Miles
Date: August 2012
INCOG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Wildland-Urban Interface
City of Claremore Corporate Limits
City Area in the Wildland-Urban Interface
City Area inside of the Wildland-Urban Interface
State and US Highways
The map features shown are an advisory tool for general hazard awareness. The hazards displayed are not a legal document to be used when making a specific hazard determination. The accuracy and location of any map feature is not guaranteed.
City of Claremore
Multi-Hazard
Mitigation Plan Update
WILDLAND
URBAN
INTERFACE
Map Number 8
N
W
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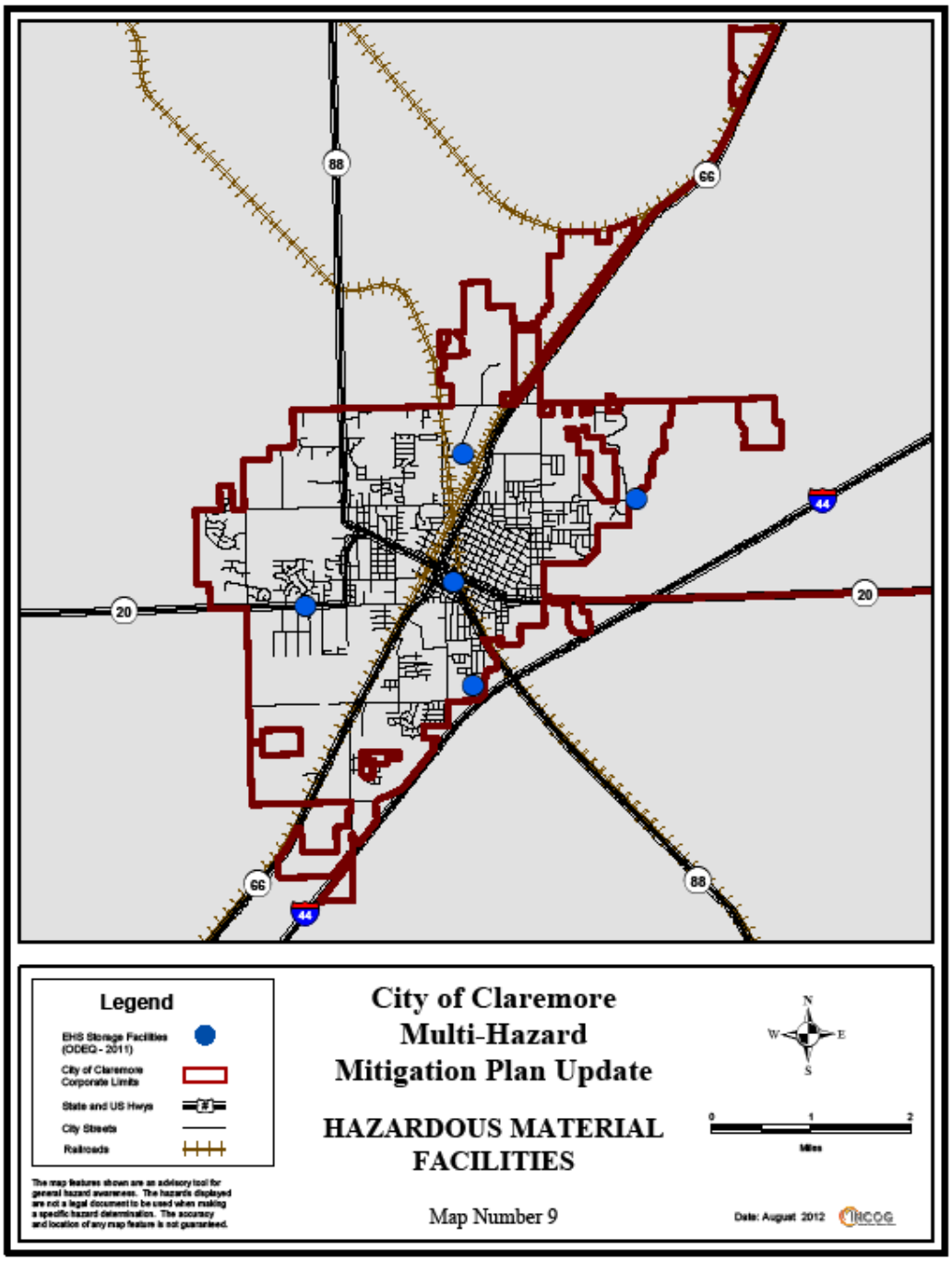
2
Miles
Date: September 2012
INCOG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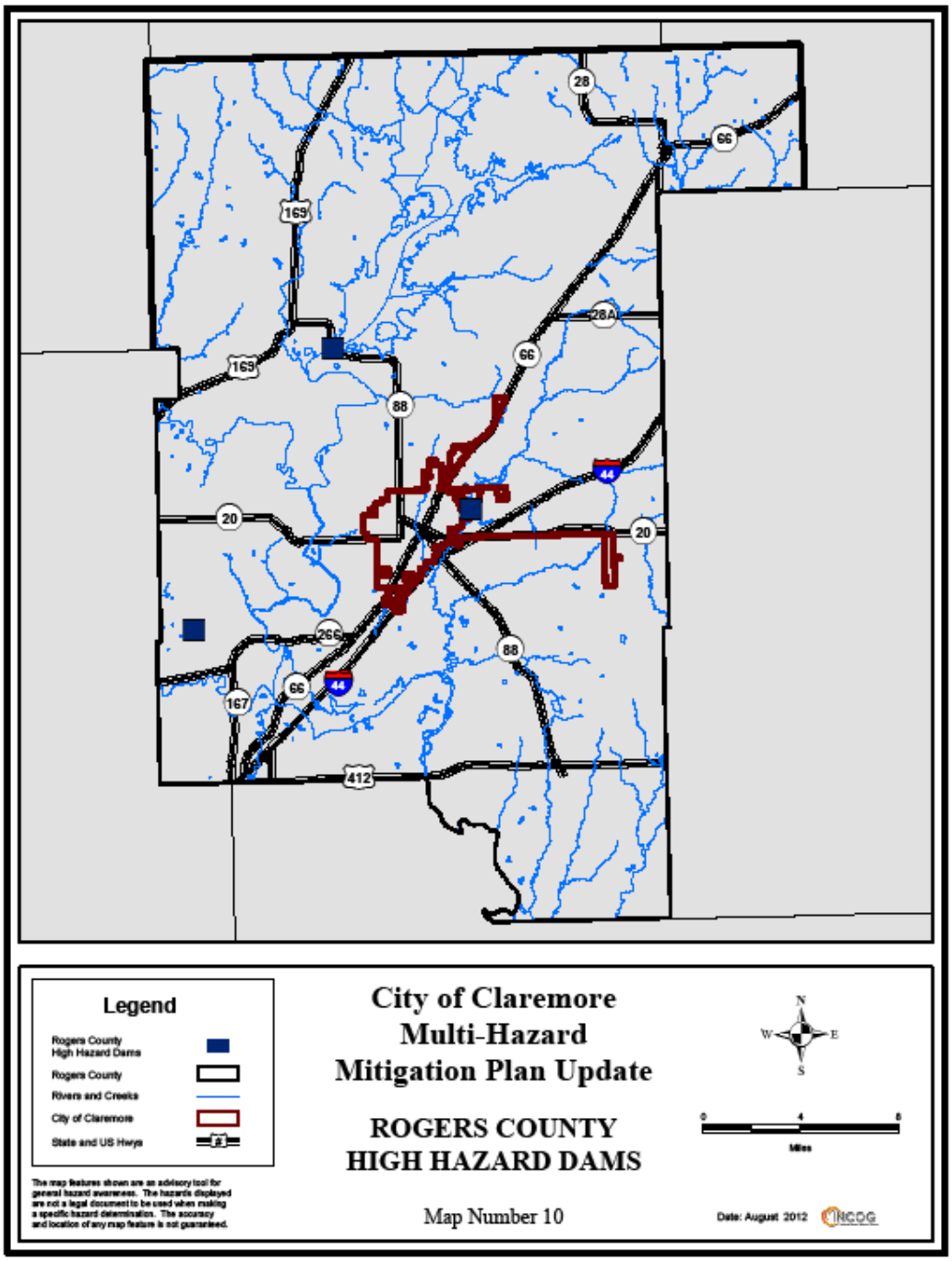
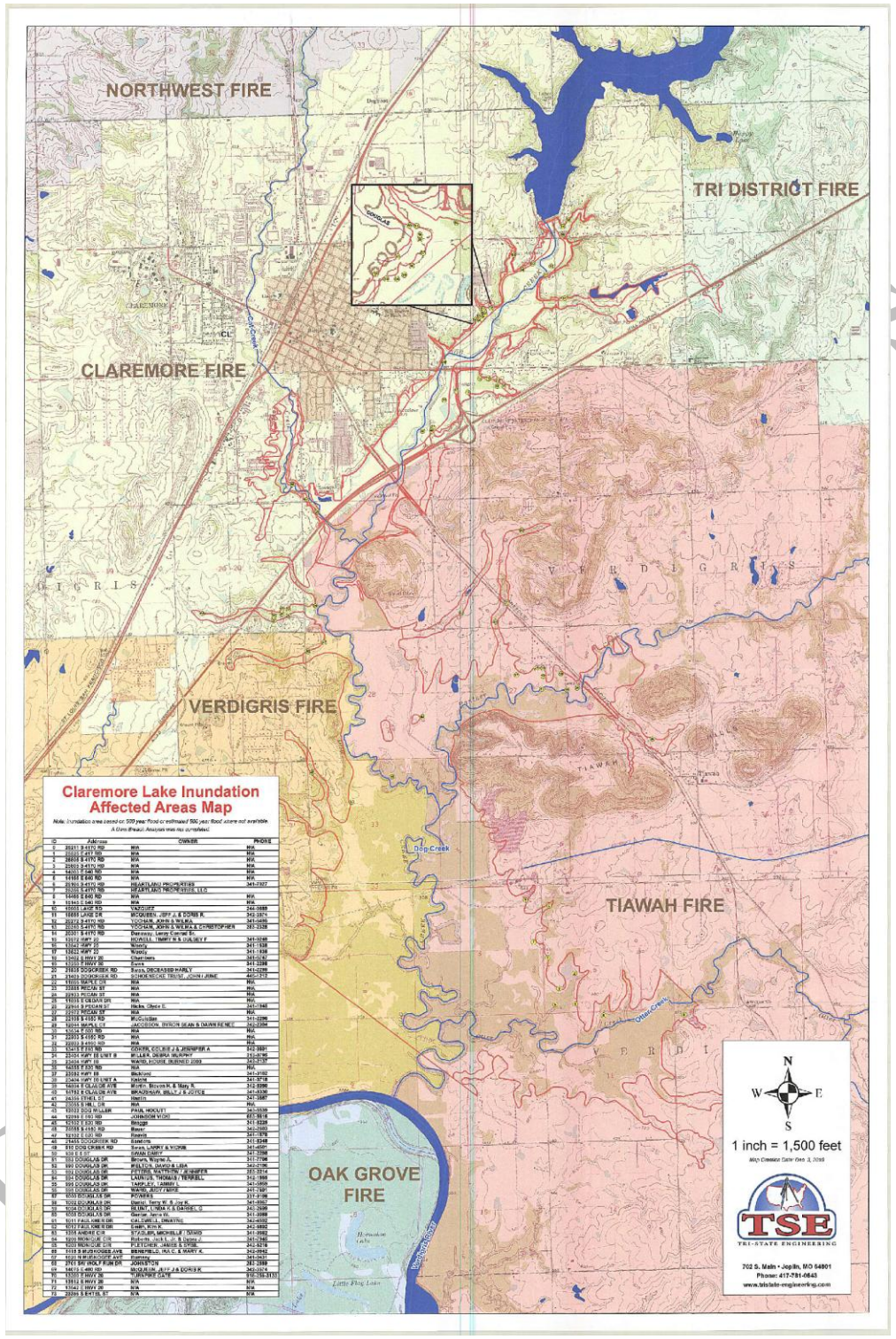
EHS Storage Facilities (ODEQ - 2011)
City of Claremore Corporate Limits
State and US Hwys
City Streets
Railroads
The map features shown are an advisory tool for general hazard awareness. The hazards displayed are not a legal document to be used when making a specific hazard determination. The accuracy and location of any map feature is not guaranteed.
City of Claremore
Multi-Hazard
Mitigation Plan Update
HAZARDOUS MATERIAL FACILITIES
Map Number 9
N
W
E
S
0
1
2
Miles
Date: August 2012
INCOG


28
66
169
28A
169
66
88
44
20
20
266
88
66
44
167
412
Legend
Rogers County High Hazard Dams
Rogers County
Rivers and Creeks
City of Claremore
State and US Hwys
The map features shown are an advisory tool for general hazard awareness. The hazards displayed are not a legal document to be used when making a specific hazard determination. The accuracy and location of any map feature is not guaranteed.
City of Claremore
Multi-Hazard
Mitigation Plan Update
ROGERS COUNTY
HIGH HAZARD DAMS
Map Number 10
N
W
E
S
0
4
8
Miles
Date: August 2012
INCOG



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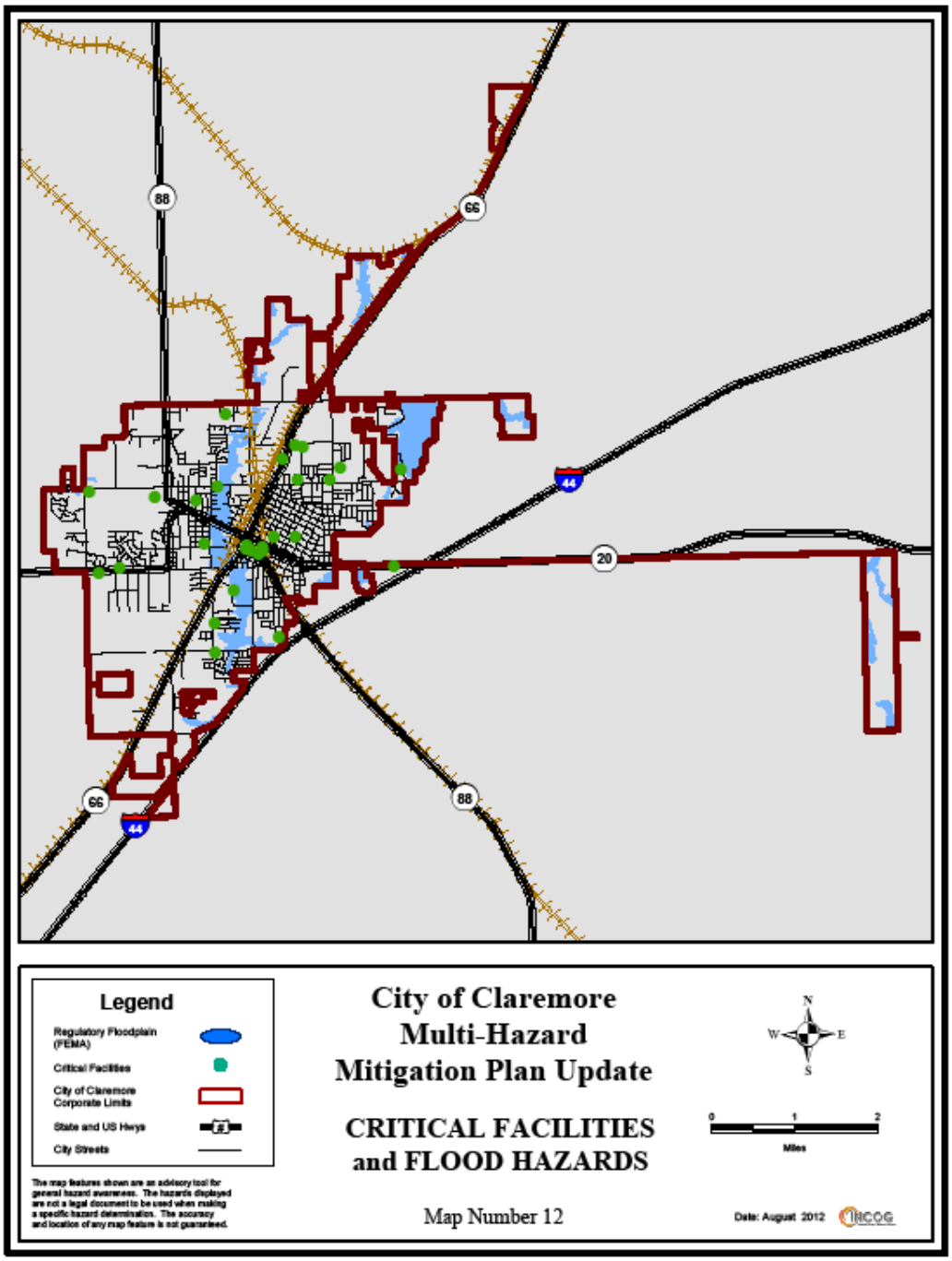
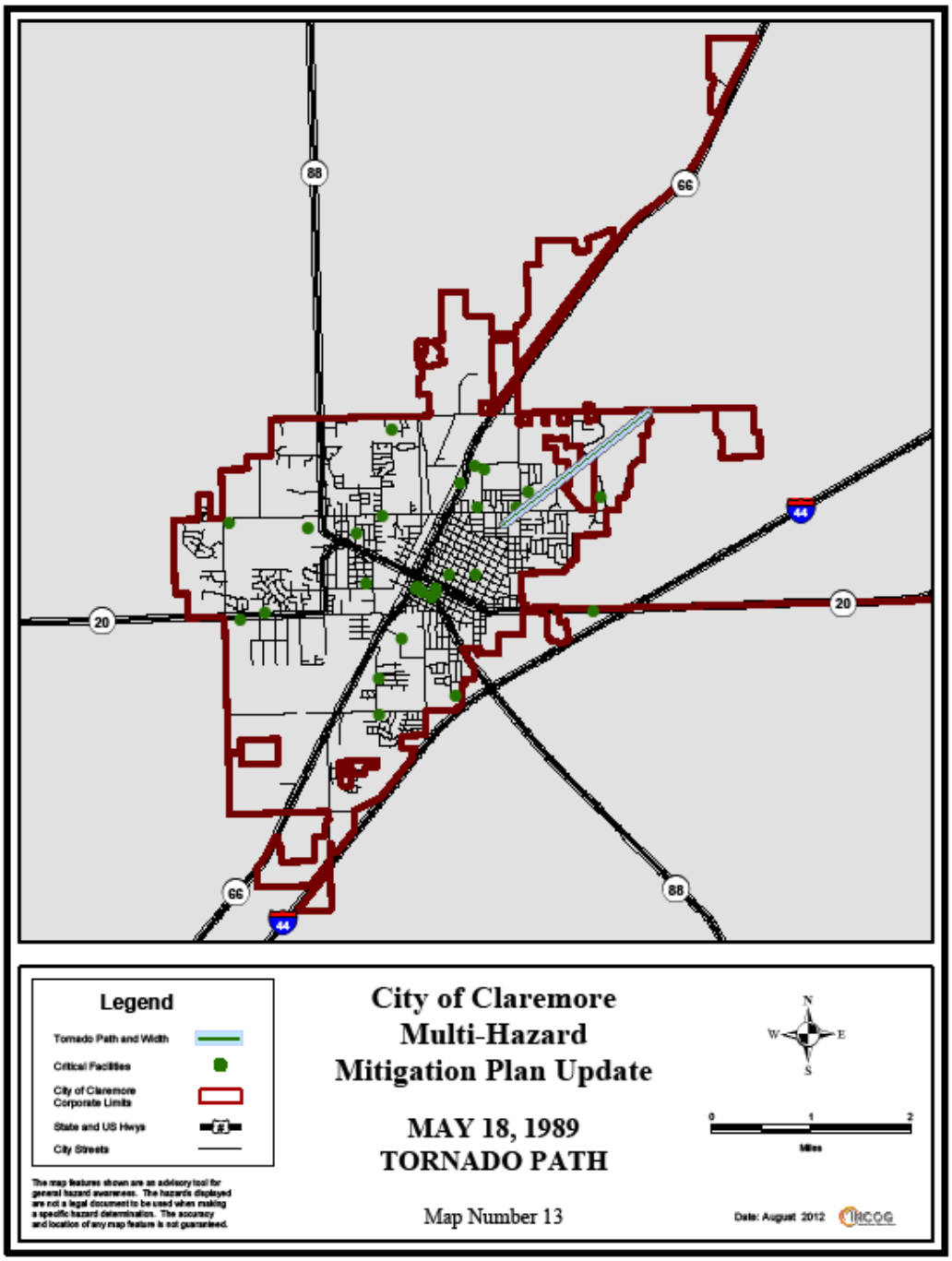
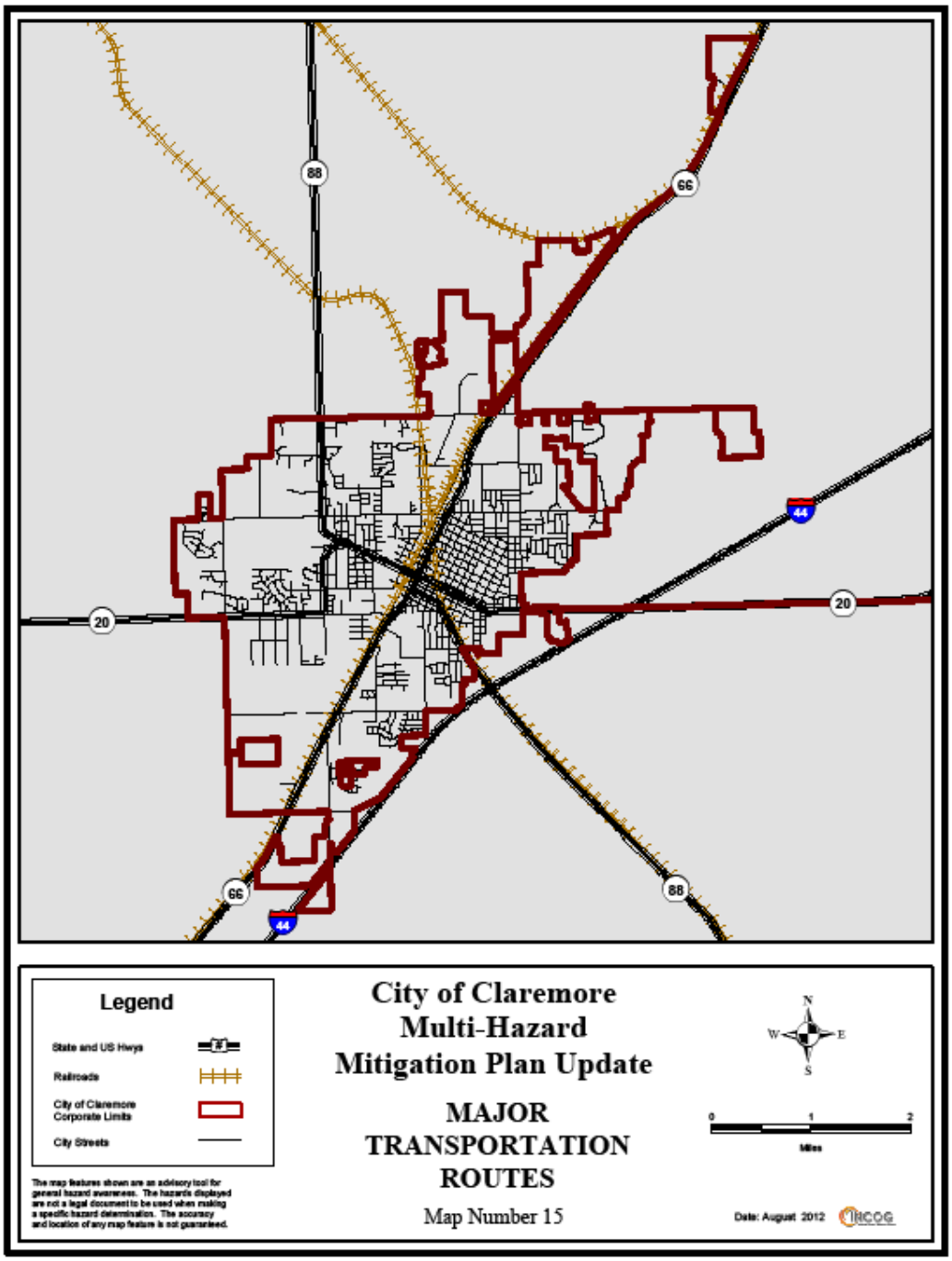
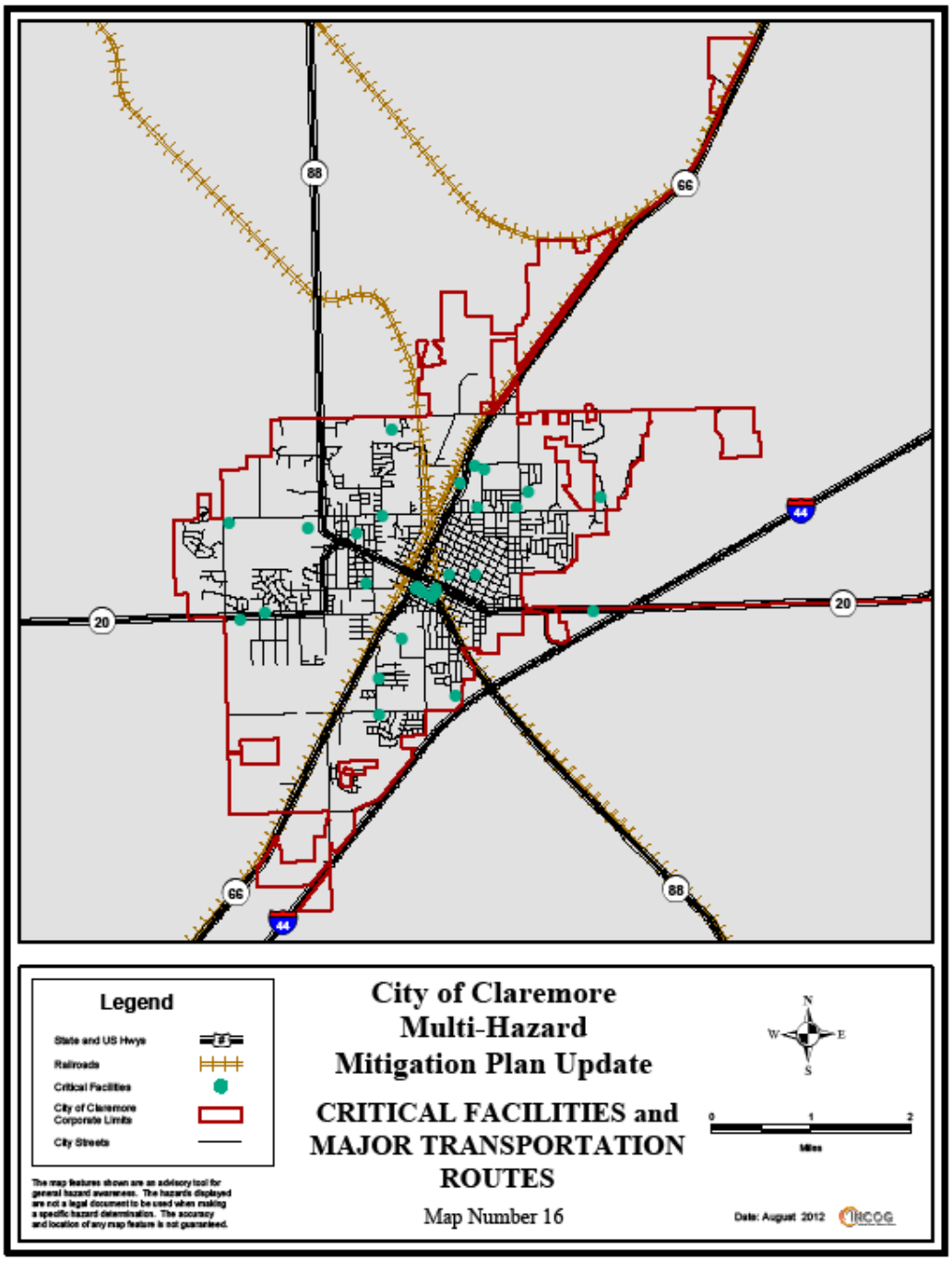
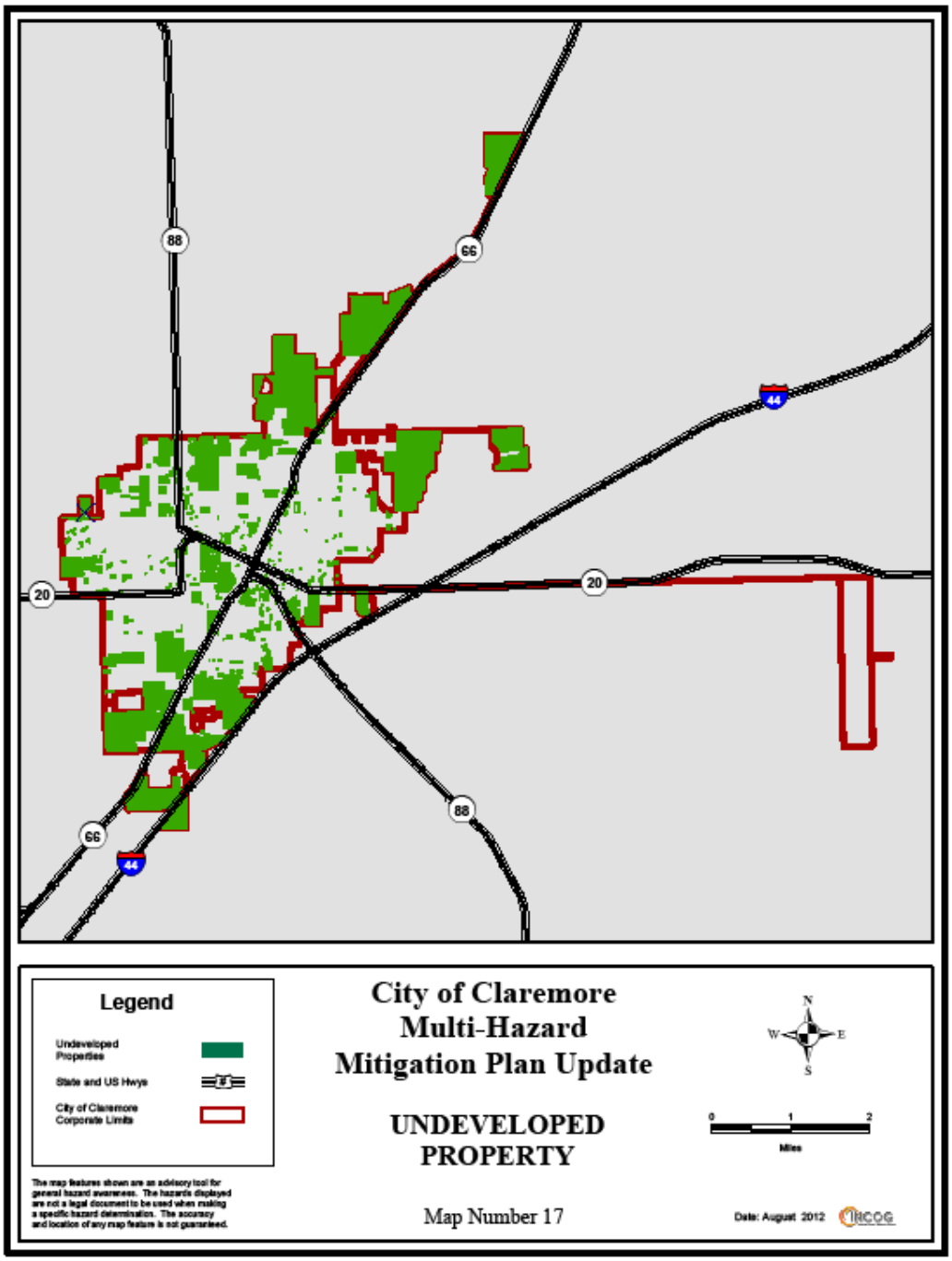

88
66
44
20
66
44
88
Legend
Regulatory Floodplain (FEMA)
Critical Facilities
City of Claremore Corporate Limits
State and US Hwys
City Streets
The map features shown are an advisory tool for general hazard awareness. The hazards displayed are not a legal document to be used when making a specific hazard determination. The accuracy and location of any map feature is not guaranteed.
City of Claremore
Multi-Hazard
Mitigation Plan Update
CRITICAL FACILITIES
and FLOOD HAZARDS
Map Number 12
N
W
E
S
0
1
2
Miles
Date: August 2012
INCOG


88
66
44
20
20
66
44
88
Legend
Tornado Path and Width
Critical Facilities
City of Claremore Corporate Limits
State and US Hwys
City Streets
The map features shown are an advisory tool for general hazard awareness. The hazards displayed are not a legal document to be used when making a specific hazard determination. The accuracy and location of any map feature is not guaranteed.
City of Claremore
Multi-Hazard
Mitigation Plan Update
MAY 18, 1989
TORNADO PATH
Map Number 13
N
W
E
S
0
1
2
Miles
Date: August 2012
INCOG

Map number 14 reserved for future use


88
66
44
20
20
66
44
88
Legend
State and US Hwys
Railroads
City of Claremore Corporate Limits
City Streets
The map features shown are an advisory tool for general hazard awareness. The hazards displayed are not a legal document to be used when making a specific hazard determination. The accuracy and location of any map feature is not guaranteed.
City of Claremore
Multi-Hazard
Mitigation Plan Update
MAJOR
TRANSPORTATION
ROUTES
Map Number 15
N
W
E
S
0
1
2
Miles
Date: August 2012
INCOG


88
66
44
20
20
66
44
88
Legend
State and US Hwys
Railroads
Critical Facilities
City of Claremore Corporate Limits
City Streets
The map features shown are an advisory tool for general hazard awareness. The hazards displayed are not a legal document to be used when making a specific hazard determination. The accuracy and location of any map feature is not guaranteed.
City of Claremore
Multi-Hazard
Mitigation Plan Update
CRITICAL FACILITIES and MAJOR TRANSPORTATION ROUTES
Map Number 16
N
W
E
S
0
1
2
Miles
Date: August 2012
INCOG


88
66
44
20
20
88
66
44
Legend
Undeveloped Properties
State and US Hwys
City of Claremore Corporate Limits
City of Claremore
Multi-Hazard
Mitigation Plan Update
UNDEVELOPED
PROPERTY
Map Number 17
N
W
E
S
0
1
2
Miles
Date: August 2012
INCOG

Blank

Appendix 2:
Committee Meetings

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Meeting Notice
Claremore Multi-Jurisdictional Multi-Hazard Mitigation Plan Update Meeting

Claremore has received a grant from the Oklahoma Department of Emergency Management to update the Claremore multi-jurisdictional multi-hazard mitigation plan. The initial meeting in the planning process to update the Claremore multi-jurisdictional multi-hazard mitigation plan will be held September 12, 2012, at 2:00 pm at the City of Claremore City Council Chambers, 104 S Muskogee, Claremore, OK. Topics planned to be discussed include the need for a multi-jurisdictional multi-hazard mitigation plan, the jurisdictions to be involved, establishment of a committee to facilitate the update of the Claremore multi-jurisdictional multi-hazard mitigation plan, review of the introduction to the plan and the planning process. All Claremore citizens are invited. Contacts for this update of the Claremore multi-jurisdictional multi-hazard mitigation plan can be made to Sean Douglas, Claremore Emergency Management Director, at 918-341-1325 or to John McElhenney, INCOG, at 918-584-7526.

City of Claremore Hazard Mitigation Plan Update Meeting

City Council Chambers
104 S Muskogee
Claremore, OK

September 12, 2012
2:00 pm

Meeting Agenda

1. Call to order.
2. Introductions.
3. Discussion on the need for a multi-hazard mitigation plan.
4. Discussion on the involvement of the jurisdictions participating in the plan.
5. Establishment of a committee to facilitate the update of the City of Claremore Muld-Jurisdictional Multi-Hazard Mitigation Plan, and select a chairman.
6. Review the introduction to the plan. Gather general information on each jurisdiction.
7. Review the planning process. Discuss the required planning process for the plan update, and prepare a general population hazard awareness survey and determine how to disseminate and collect the survey.
8. Summarize the information needed from each jurisdiction.
9. Set date and time for next meeting.
10. Adjourn.

Posted : August 29, 2012 10:00 am by: Sarah Sharp

Meeting #1 Attendance

Name	Jurisdiction
Sean Douglas	City of Claremore Emergency Mgmt
Mickey Perry	City of Claremore City Council
Matt Wilson	City of Claremore Fire Department
Daryl Golbek	City of Claremore Administration
Art Andrews	City of Claremore Administration
Ron Easterling	City of Claremore Public Works
Paul Fowler	Claremore Public Schools
Mark Ogle	American Red Cross
Leonard Szopinski	Rogers State University
Christine Davis	Hillcrest Claremore Hospital
Dell Davis	Claremore Chamber of Commerce
John McElhenney	INCOG

Meeting #1 Minutes

City of Claremore Hazard Mitigation Plan Update Meeting
City Council Chambers, 104 S Muskogee, Claremore, OK
September 12, 2012

Meeting Minutes

The meeting was called to order by Claremore Emergency Management Director Sean Douglas at 2:00 pm.

Introductions were made around the room.

John McElhenney, INCOG, discussed the need for a hazard mitigation plan; to better understand the hazards that may affect the City area, to identify actions that could mitigate each hazard, and to make the City of Claremore and Claremore Public Schools eligible for the hazard mitigation grant program.

John McElhenney discussed how the City and the School would provide the information about their jurisdictions that would be included in the plan.

The committee was formed to update the plan comprising of City department personnel, representatives of the Claremore Public Schools, Rogers State University, American Red Cross, Claremore Regional Hospital, Claremore Chamber of Commerce, and INCOG. The committee named Claremore Emergency Management Director, Sean Douglas, as the Committee Chairman.

John McElhenney distributed a draft of the introduction section of the plan; general information about the City and about the Claremore Public Schools, and reviewed it with the committee.

John McElhenney distributed a draft of the planning process section of the plan; the 10 step process of updating the plan, and reviewed it with the committee.

John McElhenney distributed a draft of a survey to collect information on the public's general hazard awareness and level of concern with the hazards in the Claremore area. The committee accepted it as written. The survey will be made available at City Hall, Claremore Schools Administrative Offices, and at Rogers State University. The survey will be taken during the week of September 17-24, and returned to Mr. Douglas. INCOG will summarize the survey responses for review at the next meeting.

John McElhenney summarized the information needed from the City and the School.

Sean Douglas set the next committee meeting for October 10, 2012, at 2:00 pm, at the Claremore City Hall.

Sean Douglas adjourned the meeting at 3:30 pm.

Meeting Notice
Claremore Hazard Mitigation Plan Update Meeting

Claremore has received a grant from the Oklahoma Department of Emergency Management to update the Claremore Multi-Jurisdictional Multi-Hazard Mitigation Plan. The next meeting in the planning process to update the Claremore multi-jurisdictional multi-hazard mitigation plan will be held on October 10, 2012, at 2:00 pm at the Claremore City Hall, 104 S Muskogee, Claremore, OK. Topics planned for discussion include reviewing the general hazard awareness survey, the plan's section on the City's risk and vulnerability to the hazards and the plan's section on mitigation strategies. All Claremore citizens are invited. Contacts for this update of the Claremore multi-jurisdictional multi-hazard mitigation plan can be made to Sean Douglas, Claremore Emergency Management Director, at 918-341-1325 or to John McElhenney, INCOG, at 918-584-7526.

Posted at: City Hall

Posted Date: October 2, 2012

Posted by: Sarah Sharp

City of Claremore Hazard Mitigation Plan Update Meeting

City Council Chambers
104 S Muskogee
Claremore, OK

October 10, 2012
2:00 pm

Meeting Agenda

1. Call to order.
2. Introductions.
3. Review and Approve minutes of September 12, 2012 committee meeting.
4. Discuss outstanding data to complete Chapter 1.
5. Present general population hazard awareness survey.
6. Review draft of Chapter 3, Risk and Vulnerability Analysis.
7. Review draft of Chapter 4, Mitigation Strategies.
   a. Discuss goals and objectives of the hazards' mitigation actions.
   b. Discuss mitigation activities. Identify activities for each jurisdiction.
8. Set date and time for next meeting.
9. Adjourn.

Meeting #2 Attendance

Name	Jurisdiction
Sean Douglas	City of Claremore Emergency Mgmt
Mickey Perry	City of Claremore City Council
Matt Wilson	City of Claremore Fire Department
Daryl Golbek	City of Claremore Administration
Art Andrews	City of Claremore Administration
Ron Easterling	City of Claremore Public Works
Paul Fowler	Claremore Public Schools
Mark Ogle	American Red Cross
Leonard Szopinski	Rogers State University
Dell Davis	Claremore Chamber of Commerce
John McElhenney	INCOG

Meeting #2 Minutes

City of Claremore Hazard Mitigation Plan Update Meeting
City Council Chambers
104 S Muskogee
Claremore, OK

Minutes of the October 10, 2012 Meeting

1. The meeting was called to order at 2:00 pm.

2. There were no new committee members so no introductions were needed.

3. The minutes of the September 12, 2012 were approved as written.

4. John McElhenney discussed the revisions to Chapter 1. The dates for the City's zoning code were added. The dates for the City's and School's CIPs were added; the City's CIP projects were added.

5. The results of the general population hazard awareness survey were distributed. 94 responses were received. Droughts were the hazard of most concern and dam breaks were the hazard of least concern.

6. The draft of Chapter 3, the risk and vulnerability analysis was distributed. John McElhenney summarized the chapter, and specifically highlighted the list of critical facilities. Committee members offered additional facilities to be added to the list.

7. A draft of chapter 4, mitigation strategies, was distributed. John McElhenney summarized the goals and objectives of mitigation strategies for each hazard. John McElhenney then discussed the categories of mitigation activities, and examples of specific mitigation activities.

   John McElhenney said the City and School are required to identify at least two mitigation activities per hazard to include in their respective plan. He then distributed a list of OEM suggested mitigation actions for reference.

   The new list of mitigation actions will try to be drafted by October 26.

8. The next meeting of the Claremore hazard mitigation planning committee was set for Wednesday, November 7, 2012, at 2 o-clock in the afternoon, back here at the Claremore City Hall.

9. The committee meeting was adjourned at 3:45 pm.

Meeting #3 Notice

Meeting Notice
Claremore Hazard Mitigation Plan Update Meeting

Claremore has received a grant from the Oklahoma Department of Emergency Management to update the Claremore Multi-Jurisdictional Multi-Hazard Mitigation Plan. The next meeting in the planning process to update the Claremore Multi Jurisdictional Multi Hazard Mitigation Plan will be held November 7, 2012, at 2:00 pm at the Claremore City Hall, 104 S Muskogee, Claremore, OK. Topics planned for discussion will include the mitigation activities proposed by the jurisdictions for inclusion in the updated plan, and the requirements for adopting the updated plan by each participation jurisdiction. All Claremore citizens are invited. Contacts for this update to the Claremore Multi-Jurisdictional Multi-Hazard Mitigation Plan can be made to Sean Douglas, Claremore Emergency Management at 918-341-1325 or to John McElhenney, INCOG at 918-584-7526.

Posted Location: City Hall

Posted Date: 11/2/12

Posted by: Sarah Sharp

Meeting #3 Agenda

City of Claremore Hazard Mitigation Plan Update Meeting
City Council Chambers
104 S Muskogee
Claremore, OK

November 7, 2012

2:00 pm

Meeting Agenda

1. Call to order.
2. Introductions.
3. Review and Approve minutes of October 10, 2012 committee meeting.
4. Review of draft of Chapter 5; Action Plan of Mitigation Projects. Discuss any outstanding data needed to complete Chapter 5.
5. Review of draft of Chapter 6; Plan Maintenance and Adoption.
6. Develop a request for comments on the final draft of the plan update letter.
7. Set date and time for next meeting.
8. Adjourn.

Meeting #3 Attendance

Name	Jurisdiction
Sean Douglas	City of Claremore Emergency Mgmt
Mickey Perry	City of Claremore City Council
Matt Wilson	City of Claremore Fire Department
Daryl Golbek	City of Claremore Administration
Art Andrews	City of Claremore Administration
Mark Ogle	American Red Cross
Leonard Szopinski	Rogers State University
John McElhenney	INCOG

City of Claremore Hazard Mitigation Plan Update Meeting

City Council Chambers
104 S Muskogee
Claremore, OK

Minutes of the November 7, 2012 Meeting

1. The meeting was called t o order at 2:00 pm.

2. There were no new committee members so no introductions were needed.

3. The minutes of the October 10, 2012 were approved as written.

4. The committee reviewed the proposed City mitigation items and made changes as needed.

5. The committee reviewed the plan maintenance chapter on keeping the plan current, updating the plan regularly, incorporating mitigation actions into other plan, and keeping the public involved.

6. The committee reviewed a draft of a letter to be sent in interested parties inviting comments on the final draft of the Claremore hazard plan update.

7. The committee recommended holding a public hearing to receive comments from the public on the Claremore hazard plan update prior to the January City Council meeting.

8. The next planning meeting will be on December 12, 2012 at 2:00 pm.

9. The meeting was adjourned at 3:20 pm

Meeting #4 Notice

Claremore Hazard Mitigation Plan Update Meeting

City Council Chambers
104 S Muskogee
Claremore, OK

December 12, 2012
2:00 pm

1. Call to order.
2. Introductions.
3. Discussion and approval of November 7, 2012 meeting minutes.
4. Receive comments from agencies and neighboring communities.
5. Discuss any outstanding items from the jurisdictions.
6. General discussion on the entire draft plan.
7. Discussion and action to recommend approval of the update to the Claremore multi-hazard mitigation plan to the City of Claremore and the Claremore Public School.
8. Discussion on the next steps in the planning process
9. Set date and time for next meeting, if needed.
10. Adjourn.

Meeting #4 Attendance

Name	Jurisdiction

Meeting #4 Minutes

Public Hearing Notice

Blank

Appendix 3:

Sample Comment Letter

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City of Claremore
104 S Muskogee
Claremore, OK 74017

November 21, 2012

Richard Brierre
Executive Director
INCOG
2 West Second Street, #800
Tulsa, OK 74103

RE: City of Claremore Multi-Hazard Mitigation Plan Update

Dear Mr. Brierre:

The Oklahoma Department of Emergency Management and the Federal Emergency Management Agency have awarded the City of Claremore a Hazard Mitigation Grant Program grant to update their Multi-Hazard Mitigation Plan for the City. The Multi-Hazard Mitigation Plan identifies and assesses natural hazards and hazardous materials events in the City and outlines a strategy that identifies actions to mitigate those hazards.

The planning process began in September 2012, and the final draft of the updated plan is now under review by the planning committee. The final draft of the updated plan is available for public review at the INCOG web site, www.incog.org / Community and Economic Development, or at the City of Claremore Emergency Management office, 104 S Muskogee, Claremore, OK, during normal business hours.

You are invited to participate in the review process and make recommendations. The next meeting in the planning process is to be held on December 12, 2012, at 2:00 pm at the Claremore City Hall. You are welcome to attend and present your comments, or submit them to me prior to the meeting.

If you have any questions or comments, please contact me at (918) 341-1325 or John McElhenney, INCOG, at (918) 584-7526.

Sincerely,

Sean Douglas
Emergency Management Director

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Appendix 4: Questionnaire

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HAZARD MITIGATION SURVEY

The City of Claremore is in the process updating its Multi-Hazard Mitigation Plan. This plan is a strategic planning guide to reduce the impact of natural hazards and hazardous material events on the City. This survey is intended to understand the citizen's awareness and level of concern of hazards that could impact the Claremore area.

For each of the following hazards, please circle the corresponding number indicating how concerned you are about these hazards.

HAZARD	Very Concerned	Concerned	Somewhat Concerned	Not Concerned
Dam Breaks	**3**	**2**	**1**	**0**
Drought	**3**	**2**	**1**	**0**
Earthquakes	**3**	**2**	**1**	**0**
Expansive Soils	**3**	**2**	**1**	**0**
Extreme Heat	**3**	**2**	**1**	**0**
Floods	**3**	**2**	**1**	**0**
Hailstorms	**3**	**2**	**1**	**0**
Hazardous Materials Events	**3**	**2**	**1**	**0**
High Winds	**3**	**2**	**1**	**0**
Lightning	**3**	**2**	**1**	**0**
Severe Winter Storms	**3**	**2**	**1**	**0**
Tornados	**3**	**2**	**1**	**0**
Wildfires	**3**	**2**	**1**	**0**
Other Hazard: _____	**3**	**2**	**1**	**0**
Other Hazard: _____	**3**	**2**	**1**	**0**

If you have any comments, suggestions, or additional concerns, please note them on the back of this survey.

Survey Results

Hazard	Average Survey Score
Dam Break	0.6
Drought	2.3
Earthquakes	0.9
Expansive Soils	0.8
Extreme Heat	1.9
Floods	1.5
Hailstorms	1.5
Haz Mat Events	1.4
High Winds	1.7
Lightning	1.4
Severe Winter Storms	2.0
Tornados	2.1
Wildfires	1.9

Scoring:

Not concerned = 0 point (minimum score per hazard)
Somewhat concerned = 1 points
Concerned = 2 points
Very concerned = 3 points (maximum score per hazard)

Results:

94 Responses
Hazard of Most Concern is Drought
Hazard of Least Concern is Dam Break

Appendix 5:
Plan Adoption Resolutions

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Claremore Public Schools

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Appendix 6:
Hazard Summary

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Natural Hazard Assessments

Each hazard is assigned a likelihood rating based on the criteria and methods described below.

Likelihood of Event "Rating" is based on the following definitions	
Highly likely (HL)	Event is probable within the calendar year.
Likely (L)	Event is probable within the next three years.
Occasional (O)	Event is probable within the next five years.
Unlikely (UL)	Event is possible within the next ten years.

Based on History, and using the information described above, Likelihood of Event is "Quantified" as follows:		
Highly Likely (HL)	Event has 1 in 1 year chance of occurring	1/1 = 100%
Likely (L)	Event has 1 in 3 years chance of occurring	1/3 = 33%
Occasional (O)	Event has 1 in 5 years chance of occurring	1/5 = 20%
Unlikely (UL)	Event has 1 in 10 years chance of occurring	1/10 = 10%

Which results in the following "Ranges" of Likelihood:
Event is "Highly Likely" to occur – History of events is greater than 33%.
Event is "Likely" to occur – History of events is greater than 20%, but less than or equal to 33%.
Event could "Occasionally" occur – History of events is greater than 10%, but less than or equal to 20%.
Event is "Unlikely," but is possible of occurring – History of events is less than 10%.

Example: NWS-NCDC records show that 38 tornados were reported in Example County between 01/01/1950 and 12/31/2003. 38 events divided by 53 years = 0.72(72%) which would make future occurrences "Highly Likely" to happen.

This table's format, categories, and the criteria for completing the table, was supplied by the Oklahoma Department of Emergency Management, 06/29/2004.

Hazard Summary
City of Claremore / Rogers County
Summary of Hazards for the City of Claremore Multi-Hazard Mitigation Plan

Hazard Event	History	Estimated Total Dollar Loss ($$)	Average Cost Per Event ($$)	Likelihood Percentage	Likelihood Rating
Floods	3 city events, 2006 thru 2011	0	0	3/6=50%	HL
Tornado	zero city events, 2006 thru 2011			0/6=0%	UL
High Wind	17 city events, 2006 thru 2011	80000	4706	17/6>100%	HL
Lightning/Thunderstorm	zero city events, 2006 thru 2011			0/6=0%	UL
Hailstorms	12 city events, 2006 thru 2011	0		12/6>100%	HL
Winter Storms (1)	13 county events, 2006 thru 2011	70000000	5384615	13/6>100%	HL
Extreme Heat (1)	11 county events, 2006 thru 2011	0		11/6>100%	HL
Drought (1)	8 county events, 2006 thru 2011	0		8/6>100%	HL
Expansive Soils (2)	zero county events, 2006 thru 2011			0/6=0%	UL
Wildfire	191 city events, 2006 thru 2011			>100%	HL
Earthquake (2)	zero county events, 2006 thru 2011			0/6=0%	UL
Hazmat Events	405 city events, 2006 thru 2011			>100%	HL
Dam Break (2)	zero county events, 2006 thru 2011			0/6=0%	UL

Note: where zero events or zero dollar amounts are shown, this means there was no data reported for the hazard event.

1. Countywide data
2. No events reported in County; therefore, none in City

Last Page.