



CANADIAN COUNTY

# Town of Calumet Oklahoma

## 2012 Multi-Hazard Mitigation Plan Update



**Flanagan & Associates, LLC**  
Planning Consultants

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# ***Acknowledgements***

The Town of Calumet Multi-Hazards Mitigation Plan Update was made possible by a Hazard Mitigation Grant through Oklahoma Emergency Management from the Federal Emergency Management Agency, and local funding from Canadian County.

The Plan was prepared under the direction of the Canadian County Commissioner's Office, with the participation and assistance of numerous agencies, organizations, and individuals, including:

## **Calumet Board of Trustees**

Mayor/President ..... Michael Crowley  
Trustee ..... Mark Stanke  
Trustee ..... Barbara Johnson  
Trustee ..... Pat Morris  
Trustee ..... John Morris

## **Hazard Mitigation Advisory Committee**

Canadian County Emergency Manager ..... Jerry Smith  
Canadian County Floodplain  
Administrator and GIS Manager ..... Amy Brandley  
Calumet Police Chief ..... Joe Garland  
Calumet Public Works ..... Greg Hall

## F.1 Calumet

The Town of Calumet is located in northwest Canadian County in central Oklahoma, 10 miles from the Canadian County Seat of El Reno and approximately 35 miles west of Oklahoma City, the State Capital, as shown in the Locator Map Figure F.1-1.

### Section 1 Introduction

#### 1.1 Geography

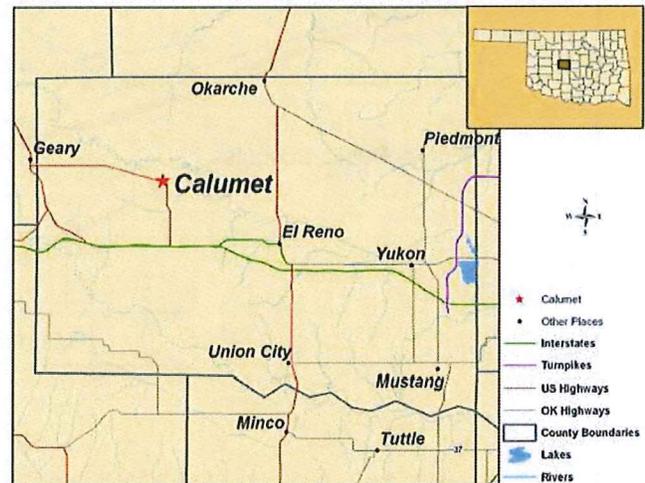
**Latitude:** 356404N

**Longitude:** 980707W

**GNIS ID:** 1090810

The total incorporated land area of Calumet is 1.28 square miles, as shown in the Base Map in Figure F.1-2. The Town is about 1.5 miles south of the North Canadian River, at elevation 1,380, 35 feet above the River, which flows southeast through the area at elevation 1,345. An oxbow lake left by an earlier bend in the course of the River is at elevation 1,360, about one-half mile north of Calumet.

Figure F.1-1 Town of Calumet Locator Map



#### 1.2 History

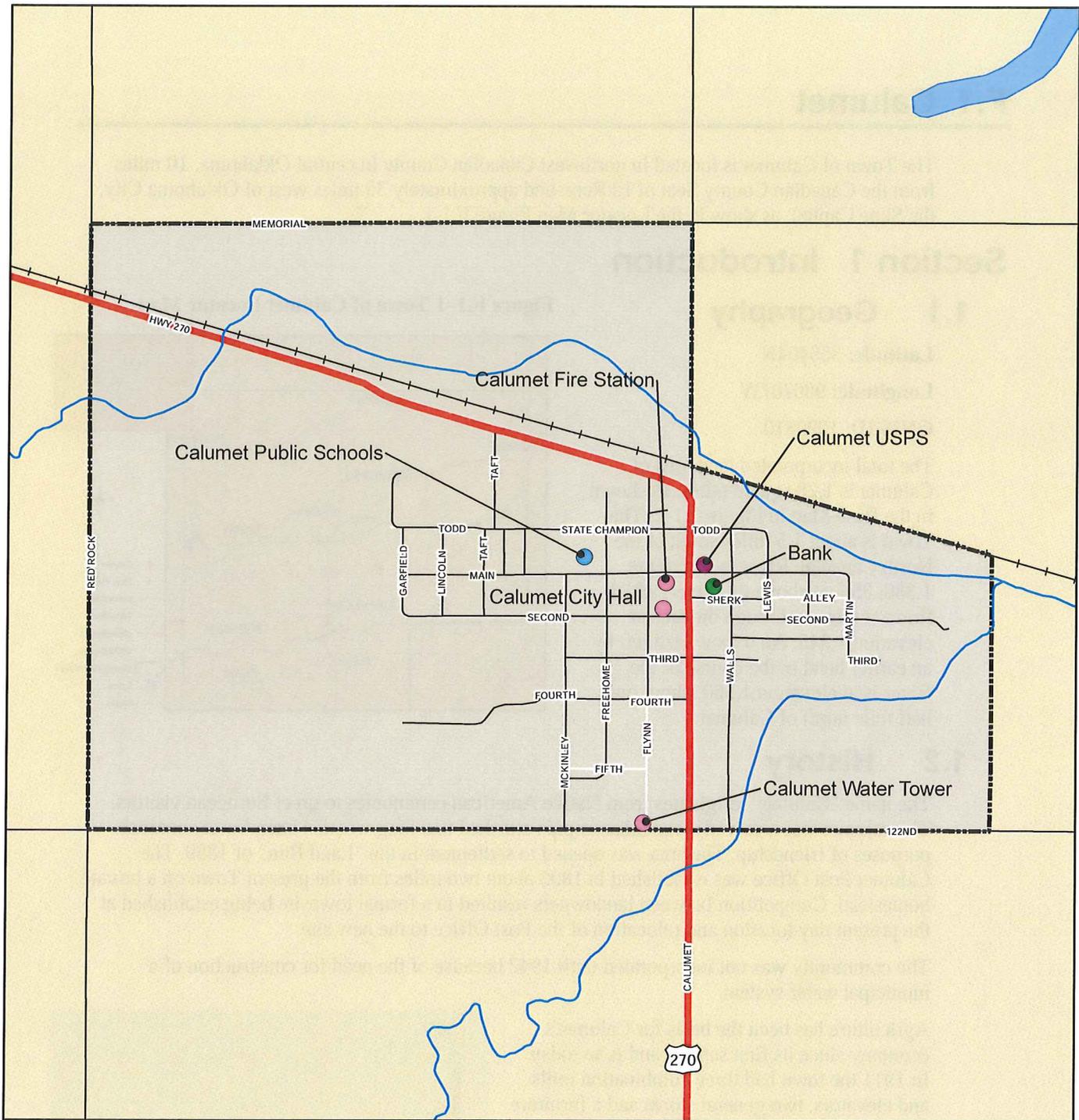
The name "Calumet" originates from Native American ceremonies to greet European visitors. The calumet was a carved stone tobacco pipe attached to a long wooden stem for ceremonial purposes of friendship. The area was opened to settlement in the "Land Run" of 1889. The Calumet Post Office was established in 1893 about two miles from the present Town on a private homestead. Competition between landowners resulted in a formal townsite being established at the present day location and relocation of the Post Office to the new site.

The community was not incorporated until 1942 because of the need for construction of a municipal water system.

Agriculture has been the basis for Calumet's economy since its first settlers and is so today. In 1911 the town had three combination mills and elevators, two general stores and a furniture and hardware store. U.S. Highway 66 ran through Calumet from the 1920's until it was relocated 1932. The Chicago Rock Island and Pacific Railroad operated through Calumet from about 1900 until its closure in 1975. In the 1970s and early 1980s Calumet experienced a brief oil and gas boom that ended with the oil price collapse of the late 1980s.



Calumet, Oklahoma



### LEGEND

- |                     |                 |
|---------------------|-----------------|
| Interstate          | City Government |
| Primary Highways    | Federal         |
| Secondary Highways  | Financial       |
| Local or Rural Road | Public Schools  |
| Water               |                 |
| City Limits         |                 |

0 0.1 0.2 Miles



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## Figure F.1-2

## Town of Calumet

## Basemap

## 1.3 Demographics

The Town of Calumet had a 2010 Census population of 507. Table F.1-1 provides demographic information identifying populations who may be among the community's most vulnerable weather and other hazards.

A map, showing the distribution of the population aged 65 and older, is presented in Figure F.1-3 and the distribution of individuals living in poverty in Figure F.1-4.

**Table F.1-1 Town of Calumet Demographics**

Group	2010	Percent
Total Population	507	100.0%
5 years of age and younger	42	8.3%
65 years of age and older	64	12.6%
Individuals at or below the poverty level (2009)	106	20.9%

Source: U.S. Census Bureau

### Ethnicity

- White – 400 (78.9%)
- Native American – 69 (13.6%)
- African American – 0 (0.0%)
- Hispanic – 20 (3.9%)
- Asian – 2 (0.4%)

## 1.4 Lifelines

See Chapter 1.2.6 for an explanation of Lifelines.

### Calumet Utility Systems

#### Electric Service

Oklahoma Gas and Electric Company (OG&E)

#### Water Service

Calumet's water supply is provided by the Calumet Public Works Authority. Calumet PWA serves a population of 507 in a 10-square mile area. The PWA draws its water from North Canadian River alluvial aquifers. Its facilities include two active and two inactive wells, a storage tower, a standpipe and a chlorination station. The wells produce about 50,000 gallons per day a (gpd).

#### Natural Gas Source

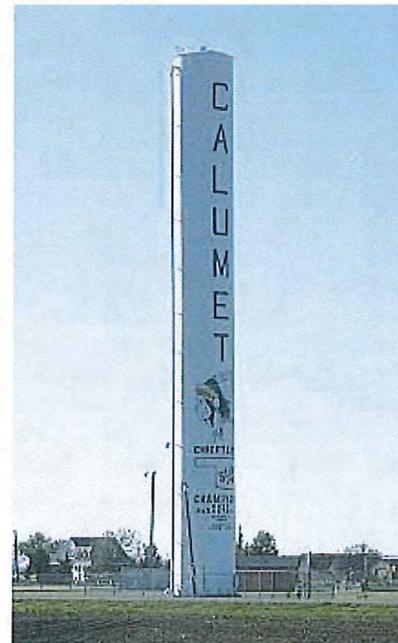
Oklahoma Natural Gas Company (ONG)

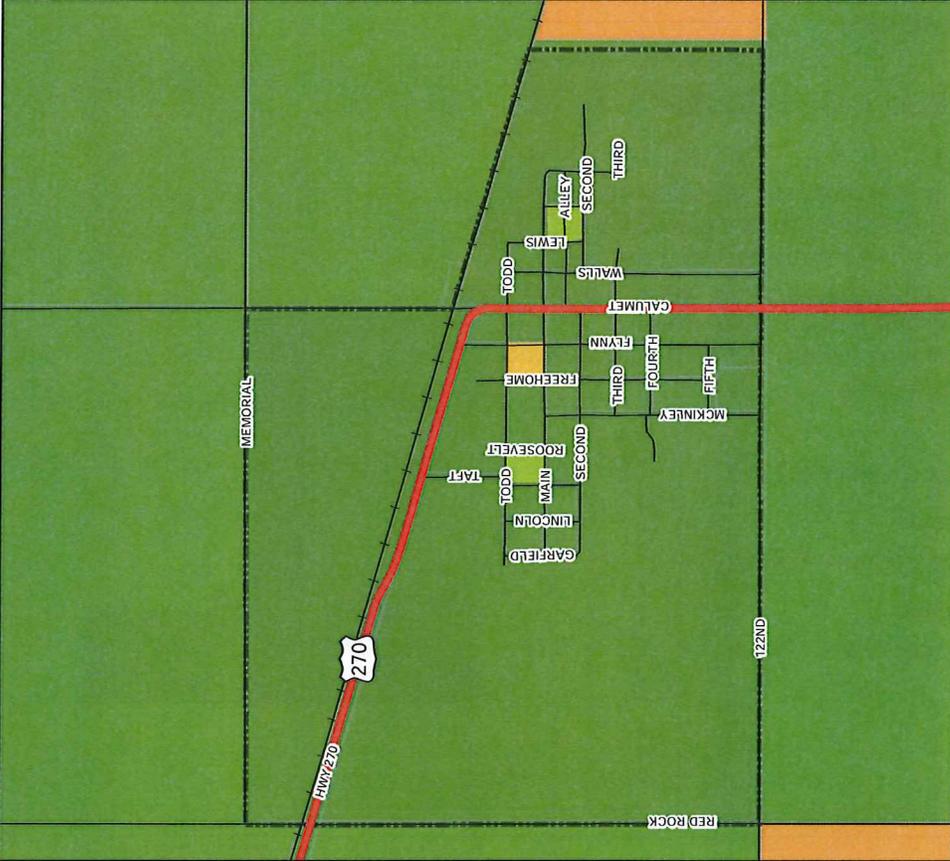
#### Wastewater Treatment

Town of Calumet Public Works Authority

#### Telephone and Internet

Pioneer Telephone Cooperative





**Figure F.1-3:** *Town of Calumet  
Percent of People Over age 65*

**Percent 65**

- 0-25%
- 26-50%
- 51-75%
- 76-100%

**Boundaries**

- calumet\_city\_limits
- Canadian County
- Statewide Counties

**Transportation**

- Interstate
- US Highway
- State Highway
- Turnpike
- Local or Rural Road
- Railroads

0 0.25 0.5 Miles



**Figure F.1-4:** *Town of Calumet  
Percent of People Living Below the Poverty Line*

**Percent Poverty**

- 0.0 - 3.8%
- 3.9 - 11.5%
- 11.6 - 20.4%
- 20.5 - 37.5%

**Boundaries**

- calumet\_city\_limits
- Canadian County
- Statewide Counties

**Transportation**

- Interstate
- US Highway
- State Highway
- Turnpike
- Local or Rural Road
- Railroads

0 0.25 0.5 Miles

## **Transportation Systems**

### **Highways and Major Roads**

US Highway 270 runs directly through Calumet, entering the Town from the south then curving northwestward paralleling the AT&L Railroad out of Town.

Five miles south of Town and US 270 connects to Interstate 40, a major east-west transportation corridor.

### **Railroads**

The AT&L Railroad is a short line carrier primarily of grain on a 40-mile track between from Watonga, Oklahoma through Calumet to El Reno. The AT&L also owns a 10-mile branch from Bridgeport, Oklahoma that connects to its line in Calumet. These lines are busiest during the wheat harvest, carrying grain from Blaine and Canadian counties to El Reno, where the line connects with the Union Pacific Railroad which carries Oklahoma wheat to Gulf ports.

### **Airports**

- El Reno Regional Airport is a publicly-owned, municipal field four miles southwest of El Reno and 10 miles southeast of Calumet;
- El Reno Airport F99 is a privately-owned field on the west side of the Canadian Valley Technology Center El Reno Campus, about 10 miles southeast of Calumet;
- Harman Airport is a privately-owned field five miles east of Calumet, at Darlington Rd. and Brandley Rd.
- Will Rogers World Airport is on the southwest side of Oklahoma City, about 30 miles southeast of Calumet;
- Okarche Airport is a privately-owned field about 17 miles northeast of Calumet.

## **1.5 Economy**

Of the 357 people over the age of 18 in Calumet in the 2010 Census, 233 (or 60.8%) were employed, 18 (or 4.7%) were unemployed and 132 (or 34.5%) were not in the labor force.

Major employers in Calumet are Calumet Public Schools, Coffey Grain, Inc., Thermo Fluids, Inc. and Calumet Industries (five miles south of Town), along with various farms and cattle operations and oil and gas enterprises.

## **1.6 Development**

Although Calumet's population has declined by 28 (5.2%) since the 2000 Census, five new homes were built in town between 1995 and 2010. There is little anticipated new development in Calumet. However, from a Hazards Risk avoidance perspective, the safest area for new residential development is on the southwest side of Town. For more information, see F.1 Section 4.16 Town of Calumet Hazards Summary and Figure F.1-11.

### **Past Development**

In 2010 the Census Bureau reported 214 housing units, 187 were occupied and 27 were vacant.

According to the Canadian County Assessor's Office, there are 241 properties with improvements within the Town of Calumet, with an independently estimated of market value of \$10,662,708 as reflected in Table F.1-2.

**Table F.1–2 Town of Calumet Property Types and Estimated Values**

Type	No.	Estimated Market Value
Agricultural	12	\$247,879
Residential	182	\$6,163,528
Commercial	18	\$933,179
Exempt	29	\$331,812
Total	241	\$10,662,708

Source: Canadian County Assessor's Office

### Development Plans

As funding becomes available, Calumet will continue to improve the Town's infrastructures, such as water, sewer, and streets.

The Oklahoma City Metropolitan Area is growing at 1.3%, the same as the national growth rate. Comparatively, the State of Oklahoma is growing at 1.0% annually.

## 1.7 Critical Facilities

The Town of Calumet has designated facilities that are critical in nature to the health, welfare and safety of the Town's residents, businesses and economy. Table F.1-3 lists Calumet's critical facilities and Figure F.1-2 plots their locations.

**Table F.1–3 Town of Calumet Critical Facilities**

Map ID	Name	Address
Town Government		
1	Calumet Town Hall	118 W. 2nd Ave
2	Calumet Fire Station	116 W. Main St.
3	Calumet Water Tower	S. Flynn Ave. and 122nd St. NW
Federal Government		
4	Calumet USPS	105 E. Main St.
Public Schools		
5	Calumet Public Schools Campus	110 Freehome Ave.
Financial Institutions		
6	First National Bank of Calumet	112 E. Main St.

## Section 2 Existing Mitigation Strategies

**National Flood Insurance Program.** Calumet has been a participant in FEMA's National Flood Insurance Program (NFIP) since 1992. As of this writing, the NFIP indicates there are no policies in effect, and no repetitive loss properties in the Town of Calumet.

**Community Rating System.** Calumet does not participate in the National Flood Insurance Program's Community Rating System.

**Floodplain Management.** Calumet has adopted and strictly enforces FEMA's SFHA floodplain maps and standards. The Town also has strict drainage codes which require that any development not increase drainage problems either up or downstream, while encouraging natural drainage and environmental preservation.

**StormReady Program.** Calumet is not a StormReady community.

**FireWise Program.** Calumet does not participate in the FireWise Program.

**Building Codes.** Calumet has no building codes other than those associated with its NFIP Floodplain Management.

### Emergency Services

**Police.** Calumet has a Police Department staffed with one officer, who is also the Chief of Police.

**Calumet Volunteer Fire Department** is located at 116 W. Main. The department has 15 volunteers, four of whom are trained first responders. The Department has an ISO rating of 7 inside the community, 9 for structure fires located over 1,000 feet away from a hydrant, and 10 for calls to fires over 10 miles from the station. Calumet VFD has mutual support agreements with all surrounding fire districts, including El Reno and Okarche.

**Hospitals.** The closest hospital is Parkview Hospital in El Reno.

**Ambulance Service.** Parkview Hospital provides ambulance service for Calumet.



## Section 3 Planning Process

The CAC/TAC met monthly during the planning process to review progress, identify issues, receive task assignments, and advise the consultants. A list of CAC, TAC, and public meetings and dates is shown in Table F.1-4. Refer to Appendix C for meeting agendas.

Supporting the CAC is the Calumet Technical Advisory Committee (TAC), which includes representatives of departments that have roles in multi-hazard planning, response, protection, and mitigation. Most of the detail work was done by management teams consisting of the following:

### Town of Calumet Technical and Citizens' Advisory Committees



**Jerry Smith**  
*Canadian County Emergency Management Director*



**Amy Brandley**  
*Canadian County  
Floodplain Administrator, GIS Manager*

Studies in Social relations at Cornell University;  
Studies in Geography at Oklahoma University;  
OFMA – Secretary;  
Cameo Training; NIMS Training.

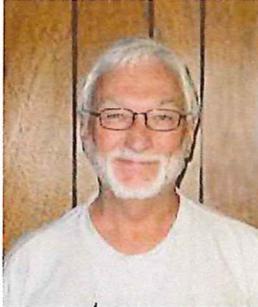


**Carrie Compton**  
*Calumet Public School  
K-12 Counselor*

Masters degree in Counseling and Education from Southwestern Oklahoma State University.

**Art Eccard**  
*Maple School District*

School Superintendent



**Joe Garland**  
*Calumet Police Department*

Chief of Police.

**Tammy Huffstutlar**  
*Calumet Public Schools*

Redlands Community College;  
O.K.F.Q.H. R., Board of Directors/Member;  
Heaston Community Church, Member.



**John Morris**  
*Canadian County District 3*  
*Heavy Equipment Operator*

Town of Calumet Board Member;  
Fire Fighter Training and Safety Officer;  
Emergency Manager.

**Keith Weldon**  
*Calumet Public Schools*  
*School Superintendent*

A.S. in General Education from Carl Albert State;  
B.A. in Elementary Education from Tabor College;  
M.S. in School Superintendent from Oklahoma State University;  
Calumet Chamber of Commerce – Vice President;  
Oklahoma School Assurance Group – Board Trustee.



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**Other participants:**

Greg Hall, Calumet Public Works  
Jimmy Smith, Calumet Schools

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The TAC met periodically during the year's planning process. TAC members also attended all meetings of the CAC and meetings with elected officials.

**Consultant:**

**Ronald D. Flanagan, CFM**  
*Principal Planner*

R.D. Flanagan & Associates  
Planning Consultants  
2745 E. Skelly Dr., Suite. 100  
Tulsa OK 74105

**Other entities involved in the development of the Mitigation Plan included:****Tulsa Partners, Inc**

TPi is a Tulsa-based non-profit that has been working since 1998 to develop public / private / non-profit collaborations to help create a disaster-resistant and sustainable community and improve the community's safety and well-being by reducing deaths, injuries, property damage, environmental and other losses from natural or technological hazards. Tulsa Partners provides expertise in the areas of community education and public involvement in the planning process.

**Table F.1-4 Calumet Hazard Mitigation Committee Meetings and Activities**

Date	Activity
January 5, 2009	FEMA Obligation Date for Canadian County Multi-Jurisdictional Multi-Hazard Mitigation Plan Update.
February 3, 2009	Project Start Date
February 3, 2009	Introductory Meeting with Canadian County Emergency Manager/Project Manager, Jerry Smith, to discuss Project Organization.
February 18, 2009	Introductory Meeting with Canadian County Community and School Officials to discuss HM Project.
April 7, 2009	Calumet Planning District Multi-Hazard Mitigation Team Staff Introductory/Organizational Meeting: Discuss Calumet HM Plan.
May 5, 2009	Calumet Hazard Mitigation Team Community Data Meeting: Reviewed maps and demographic data.
June 2, 2009	Meeting of TAC and CAC; Presentation, review, discussion of Lightning and Hail; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
September 1, 2009	Meeting of TAC and CAC; Presentation, review, discussion of Extreme Heat and Drought; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.

Date	Activity
October 6, 2009	Meeting of TAC and CAC; Presentation, review, discussion of Mass Communication, Earthquakes and Expansive Soils; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
November 3, 2009	Meeting of TAC and CAC; Presentation, review, discussion of Fires and Wildfires; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
December 1, 2009	Meeting of TAC and CAC; Presentation, review, discussion of Severe Winter Storms and Back-Up Generators; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
January 5, 2010	Meeting of TAC and CAC; Presentation, review, discussion of Hazardous Materials and Transportation Hazards; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
February 2, 2010	Meeting of TAC and CAC; Presentation, review, discussion of Flooding and Dam Failures; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
March 2, 2010	Meeting of TAC and CAC; Presentation, review, discussion of Tornadoes and High Winds; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
April 6, 2010	Meeting of TAC and CAC; Presentation, review, discussion of Hazards Review; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
October 17, 2012	Meet with Canadian County and it's jurisdictions to Prioritize Mitigation Measures

## Section 4 Natural and Man-Made Hazards

### Hazards

General natural hazards, such as Tornadoes, High Winds, Lightning, Hail, Winter Storms, Extreme Heat, Drought, and Earthquakes affect all communities in Canadian County randomly and equally, and are addressed in Chapter 4.

The Town of Calumet has identified certain facilities as critical to the health, safety and welfare of its citizens, business and economy. Table F.1-5 indicates, generally, the exposure of critical facilities to the 15 hazards covered by this Plan.

**Table F.1-5 Town Calumet Critical Facilities' Hazard Exposure**

Map ID	Name	Floods	Tornadoes	High Winds	Lightning	Hail	Winter Storms	Extreme Heat	Drought	Expansive Soils	Urban Fires	Wildfires	Earthquakes	Hazardous Material Sites	Dam Failures	Transportation Hazards
1	Calumet City Hall		X	X	X	X	X	X	X		X		X			X
2	Calumet Fire Station		X	X	X	X	X	X	X		X		X			X
3	Calumet Water Tower		X	X	X	X	X	X	X		X	X	X	X		X
4	Calumet USPS		X	X	X	X	X	X	X		X		X			X
5	Calumet Public Schools		X	X	X	X	X	X	X		X		X			X
6	First National Bank of Calumet		X	X	X	X	X	X	X		X		X			X

Table F.1-6 displays hazard information where there is community-specific data, as shown in the maps on the following pages.

**Table F.1-6 Town of Calumet Hazard Impact**

Hazard	Area (Sq. mi)	Improved Parcels	Estimated Market Value	Percent of Area Impacted	Impacted Population
Floods	0.34	52	\$982,521	27%	32
Highly Expansive Soils	0.227	18	\$467,288	18%	-
Wildfire	1.10	-	-	87%	-
Dam Failure	0.51	21	\$580,277	40%	17
Tier II Hazardous Materials, ¼ Mile	0.14	44	\$1,198,367	11%	63
Tier II Hazardous Materials, ½ Mile	0.44	189	\$9,051,326	35%	386
Transportation Hazardous Materials-Highway	0.67	220	\$10,004,49	53%	387
Transportation Hazardous Materials- Railroad	0.61	119	\$6,447,419	48%	298

## 4.1 Flood

### Location

The Town of Calumet is affected by floodwater backup along two unnamed tributaries of Sixmile Creek which pass along the north and east sides of town, and by the North Canadian River, which is about one mile north of town. The Canadian River floodplain in Calumet is used mostly for agriculture and ranching, but also includes sewage treatment ponds. The combined floodplains comprise 0.42 square miles, or 33% of the land within the Town Limits.

The floodplain of the two tributaries of Sixmile Creek at Calumet is generally at elevation 1,380. These tributaries have a drainage area of 1.26 square miles above Calumet. One critical facility, the western-end of Calumet Public Schools Campus, has been identified as being in the floodplain of the tributary on the north side of Town. Also within the floodplains are the sewage treatment lagoons on the east side of Town, a stretch of US Highway 270, the AT&L railway line, along with grain silos and other railway facilities, and a sewage lift station between Roosevelt Ave. and Freehome Ave.



August 2007 Flood of Record on Canadian River at Calumet

### Frequency

Calumet has experienced two flood events from 1991-2011. Given this frequency, the Town can expect flooding every 10 years and has a Moderate probability to the flood hazard.

### Extent/Severity

Calumet considers a flood event with a depth of less than three feet of water on a one story building to be a minor severity event and a flood event with a depth greater than three feet on a one story building to be a major severity event for both urban and flash flooding.

### Impact

The land parcels impacted by the 100-year flood are listed in Table F.1-7

In all, 20 residential structures, 17 commercial buildings, and 11 outbuildings are in the 100-year floodplain of Calumet. Most of the residential structures are mobile homes at the south end of Walls Ave. Two homes are at McKinley and Main St., and two more at the north ends of Freehome and Flynn Aves. Two of the commercial structures in the floodplain are at the south end of Walls Ave., and 15 are in the north end of town along the railroad tracks and US 270. Calumet has a High vulnerability to the Flood hazard. A flood event could cause damage to any of the structures located in the floodplain. Damage from floods includes not only structural damage but also loss of contents within the impacted property. US Highway 270 is located in the 100 year floodplain in Calumet. A flood event could cause Hwy 270 to be covered with water, which depending on how long it takes to dry can cause damage to the roadway itself. Also at risk in Calumet are persons who ignore barricades when the roads become flooded. Effort should be made to educate the public about the dangers of driving through floodwaters.

**Table F.1-7 Town of Calumet Parcels in 100 year Floodplain**

Type	No.	Estimated Value
Agricultural	9	\$169,920
Residential	32	\$484,839
Commercial	5	\$288,983
Exempt	6	\$38,779
Total	52	\$982,521

## History

The NCDC Storm Data site does not list any flood events for Calumet. It is known from other sources, however, that the Town has experienced significant flooding on at least two occasions in the past 20 years. These are summarized below.

### Historical Flooding Events in Calumet

- **May 10, 1993** – Flooding from the North Canadian River reached 21.12 feet in Calumet.
- **August 20, 2007** - The flood of record on the North Canadian River at Calumet occurred on August 20, 2007, the remnants of Hurricane Erin resulted in 8 to 9 inches of rain in Blaine, Caddo and Canadian Counties. The North Canadian River rose from 8.10 feet to 19.7 feet in Blaine County in four hours – a rate of about 3 feet per hour – 25 miles upstream. Rural flooding extended downstream to near Calumet. North of Calumet, there was 12 feet of flooding at the North Canadian River bridge. The North Canadian River at Calumet was one mile wide. Floodwaters impacted the trailer park along Walls Ave., inundated the sewage lagoons east of Town and the sewer lift station near the public schools campus, flooded the grain elevators along the AT&L railroad tracks, and washed out a Calumet water main 2.5 miles north of Town. I-40 southeast of Calumet was closed for six hours by nine feet of water. West of Calumet at Mayberry Rd., US Highway 270 was covered with three feet of water.

### Worst-Case Flooding Scenario for Calumet

The flood of record for the North Canadian River at Calumet was 22,000 cubic feet per second (cfs) on August 20, 2007. The 500-year flood event for this location is estimated to be 22,400 cfs. A flood of this magnitude would cause damage similar to the event of August 2007. Figure F.1-5 illustrates the 100 year floodplains in Calumet.

## Conclusion

*The Town of Calumet has a High vulnerability to and a Moderate probability of the Flood Hazard.* Over the past 20 years, progress has been made in protecting the lives and property of the citizens of the Canadian County from flooding. Calumet joined the National Flood Insurance Program in 1992, adopted floodplain ordinances, and required that all future development be built above the 100-year floodplain elevation. Much work remains to be done to make the Calumet safe from flooding. To protect citizens at risk from flooding, this study has identified several flood mitigation measures to be implemented by the Town of Calumet. These recommended projects, including, acquisition and removal of flood-prone properties, are discussed in Chapter 6.

## 4.2 Tornado

The climatological and geographical aspects of this hazard in Canadian County are discussed more fully in Chapter 4.2.

### Frequency

Calumet has experienced six tornado events from 1995-2011. Given this frequency, the Town can expect a tornado in its vicinity every 2.5 years.

### Extent/Severity

Calumet is exposed to tornadoes that do little damage (EF0 and EF1) to massive events that leave enormous destruction in their paths (EF4 and EF5). Calumet considers a minor severity tornado to be a tornado up to EF1 on the Fujita Scale and a major severity tornado to be a tornado greater than an EF1 on the Scale. Figure F.1-6 presents a potential tornado scenario.

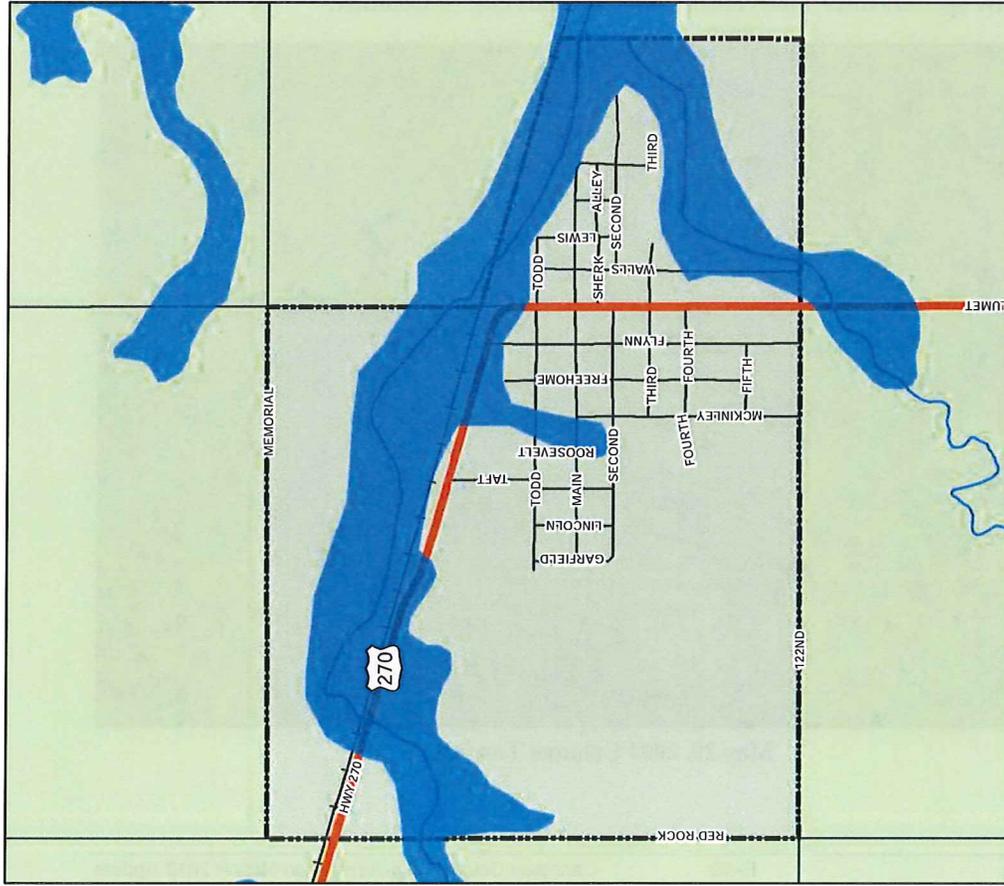


Figure F.1-5:  
Town of Calumet  
100yr Floodplains

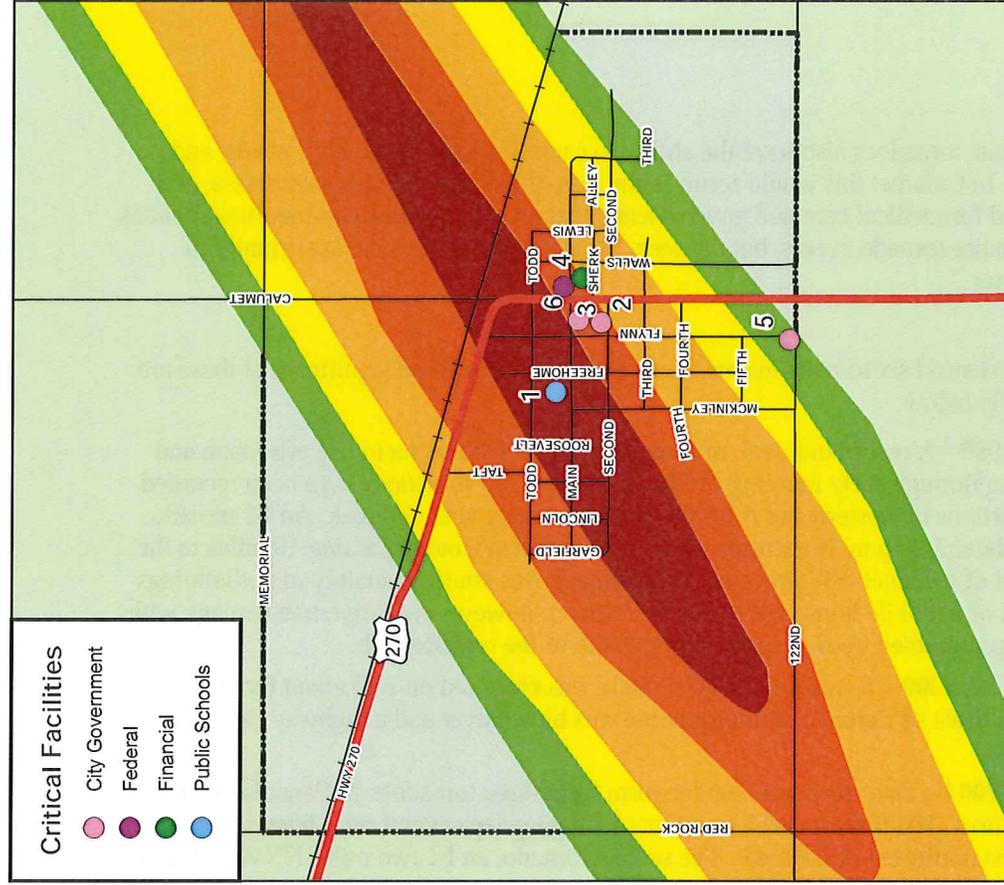
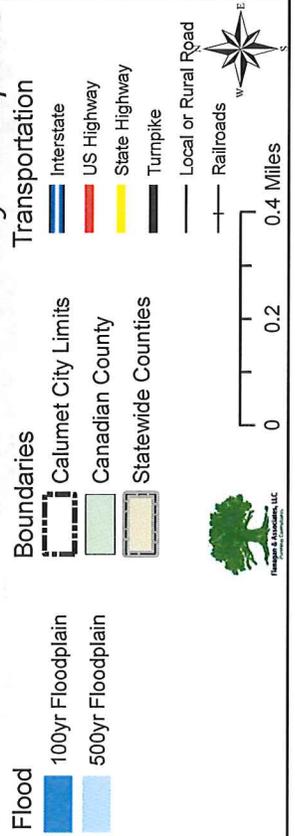
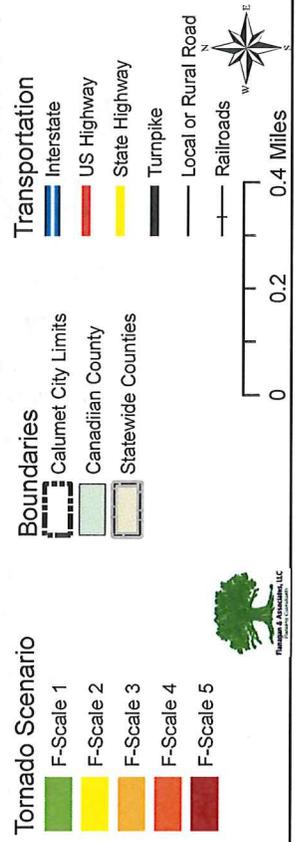


Figure F.1-6:  
Town of Calumet  
Tornado Scenario



## Impact

Storms that generate tornadoes also have the ability to cause lightning, hail, high winds, and flooding damage. In Calumet this would result in the loss of incomes, homes, businesses, and lives, and the need for medical care and government assistance. It can take communities decades to recover from major tornado events, but disasters present communities the opportunity to “**Build Back Better.**”

## History

Calumet has experienced six tornado events from 1995-2011. The more significant of these are summarized briefly below.

- **May 3, 1999** - A record outbreak of tornadoes struck Oklahoma in late afternoon and continuing through early morning of May 4. To date, 58 tornadoes have been recorded across portions of western and central Oklahoma during that outbreak. An F2 tornado formed about 7:30 p.m. in extreme northwest Canadian County passing 10 miles to the northwest of Calumet. F1-level structural damage was confined mainly to outbuildings and roofs of a mobile home and house in Calumet, however extensive tree damage with some large uprooted trees occurred along much of the tornado path.
- **October 22, 2000** - A short-lived F0 tornado was observed on I-40 about five miles south southeast of Calumet. A motor home was blown over and a highway sign torn off its post.
- **May 29, 2004** - One supercell thunderstorm form three tornadoes in Canadian County near Calumet. The first caused F1 and low-F2 damage to several rural homes about 10 miles west northwest of Calumet. The second tornado, an F1 two miles NNW of Calumet caused \$25,000 damage to two homes and an outbuilding. The third tornado formed 4.5 miles east northeast of Calumet and lifted four miles northwest of Concho. Damage was reported by spotters three miles north and four miles east of Calumet.



**May 29, 2004 Calumet Tornado**

- **May 24, 2011** – Two of seven tornadoes that began in Caddo County passed northeast across Canadian County creating EF4 and EF5 damage. Near Calumet, the greatest destruction occurred near the intersection of I-40 and US Highway 270.

**Worst-Case Tornado Scenario for Calumet**

For the Town of Calumet, a worst-case EF5 event would cause damage to 241 parcels and result in losses of \$10,329,010. Table F.1-8 displays the damages that could be expected during this type of event. All six critical facilities would be impacted.

**Table F.1–8 Calumet Tornado Scenario**

EF-Scale	Estimated Market Value	Damage Factor	Structure Damage	Contents Value	Contents Damage	Total Damage
1	\$286,994	0.1	\$28,699	\$143,497	\$14,350	\$43,049
2	\$802,510	0.4	\$321,004	\$401,255	\$160,502	\$481,506
3	\$2,577,916	0.8	\$2,062,333	\$1,288,958	\$1,031,166	\$3,093,499
4	\$2,487,114	1	\$2,487,114	\$1,243,557	\$1,243,557	\$3,730,671
5	\$4,174,476	1	\$4,174,476	\$2,087,238	\$2,087,238	\$6,261,714
<b>Totals</b>	<b>\$10,329,010</b>		<b>\$9,073,626</b>	<b>\$5,164,505</b>	<b>\$4,536,813</b>	<b>\$13,610,439</b>

**Conclusion**

*The Town of Calumet has a High vulnerability to and High probability of the Tornado hazard.* Oklahoma is in the most tornado-prone area of the United States, and all Canadian County communities are vulnerable to this hazard, including Calumet, which has experienced a tornado event in its area every 2.5 years. Losses can range from light damage to trees and roofs (EF0) to destruction of well-built homes and buildings (EF4 and EF5). Mobile homes and houses with crawl spaces are more susceptible to lift and therefore at the greatest risk of damage. Pre-disaster planning and corrective action can mitigate this vulnerability.

**4.3 High Wind**

The climatological and geographical aspects of this hazard in Canadian County are discussed more fully in Chapter 4.3.

**Frequency**

Calumet reported 11 high wind events from 1995 through 2010, or an average of one event every 1.3 years.

**Extent/Severity**

Calumet considers a minor severity wind force on the Beaufort Scale of 9 or less (55 mph), and a major severity wind force to be a wind force greater than 9 to be a major severity high wind storm.

**Impact**

The impact of this hazard can result in injury to people and damage to homes and businesses resulting in loss of income and revenues. The impact and vulnerability is addressed more fully in Chapter 4.

**History**

Calumet has reported high wind events 11 times from 1995 through 2010. A few of the more noteworthy are summarized below.

- **June 15, 1996** – 70-mph winds reported one mile northeast of Calumet.
- **October 8, 1997** – A severe thunderstorm that spawned three tornadoes crossed western and central Oklahoma. Calumet recorded 75-mph winds.
- **May 15, 1998** – Severe thunderstorms in central Oklahoma damaged a grain storage bin and destroyed a barn in Calumet. Damage was \$6,000.
- **June 8, 1998** - Severe thunderstorm winds (combined with golf ball-sized hail) blew out three windows in local homes and downed numerous trees, several billboards, and other signs south of Calumet. Damage was \$15,000.
- **July 21, 2000** – A grain bin at Calumet Industries was destroyed by high winds. Damage was \$150,000.

### Worst-Case High Wind Scenario for Calumet

For the Town of Calumet, a worst-case high wind event would impact 180 residences, 18 businesses, and nine agricultural properties, and result in total losses of \$35,672.31. Five critical facilities would be impacted: the Fire Station, the Public School Campus, City Hall, the U.S. Post Office, and First National Bank.

Table F.1-9 provides a summary of worst case scenario damages using wind speeds equivalent to the Fujita Scale.

**Table F.1-9 Calumet High Wind Worst-Case Scenario Damages**

EF-Scale Equivalent Wind Speed	Parcel Count	Damage Factor	Averaged Damage	Hospital Cost Factor	Hospital Costs	Debris Factor	Averaged Debris (yds.)	Utility Loss Factor	Utility Loss
<b>Residential Properties with Estimated Improvement Values</b>									
0	25	\$159.68	\$3,992.00	\$4.39	\$109.75	4.77	119.25	\$2.49	\$62.25
1	155	\$159.68	\$24,750.40	\$4.39	\$680.45	4.77	739.35	\$2.49	\$385.95
Total	-	\$159.68	\$0.00	\$4.39	\$0.00	4.77	0	\$2.49	\$0.00
<b>Commercial Properties with Estimated Improvement Values</b>									
0	2	\$159.68	\$319.36	\$4.39	\$8.78	4.77	9.54	\$2.49	\$4.98
1	16	\$159.68	\$2,554.88	\$4.39	\$70.24	4.77	76.32	\$2.49	\$39.84
Total	-	\$159.68	\$0.00	\$4.39	\$0.00	4.77	0	\$2.49	\$0.00
<b>Agricultural Properties with Estimated Improvement Values</b>									
0	7	\$159.68	\$1,117.76	\$4.39	\$30.73	4.77	33.39	\$2.49	\$17.43
1	2	\$159.68	\$319.36	\$4.39	\$8.78	4.77	9.54	\$2.49	\$4.98
Total	-	\$159.68	\$0.00	\$4.39	\$0.00	4.77	0	\$2.49	\$0.00
<b>Totals</b>									
-	207	-	\$33,053.76	-	\$908.73	-	987.39	-	\$515.43

### Conclusion

*Calumet is considered to have a High vulnerability to and High probability of the High Wind hazard.* Almost the entire United States has some risk of high wind events, but the factors that contribute most to wind-related deaths, injuries, and property damage are the structure type, quality of construction, and the state of deterioration of the buildings where people reside. Mobile homes, older homes, and poorly designed and constructed buildings are the most vulnerable. Uniform building codes for wind-resistant construction and demand for better quality construction practices would result in buildings being less susceptible to high winds.

## 4.4 Lightning

The climatological and geographical aspects of this hazard in Canadian County are discussed more fully in Chapter 4.4.

### Frequency

No lightning events are reported for Calumet on the NCDC Storm Data site. It can be assumed, however, that most, if not all, of the 11 thunderstorms reported for the community contained lightning – for the average of one event every 1.3 years.

### Extent/Severity

Based on the information provided by the National Weather Service, Chapter 4, Calumet considers a negative cloud-to-ground flash with multiple return strokes, that causes no loss of life or injury and less than \$1,000 in property damage, to be a minor severity lightning event; and a positive cloud-to-ground flash with a continuous or high peak current, that causes loss of life and/or injury and more than \$1,000 property damage, to be a major severity lightning event.

### Impact

The impact of this hazard could include people displaced from their homes, businesses being closed, and financial loss due to urban fire, wildfire and damaged electronic equipment.

### History

No damaging lightning events were recorded for Calumet in the NCDC database or by the jurisdiction.

### Conclusion

*Calumet has a High vulnerability to and High probability of the Lightning hazard.* No damaging lightning events were reported for Calumet in the NCDC database. Nevertheless, Canadian County is subject to about five severe thunderstorm events a year, all of which can carry damaging lightning. Electronic equipment, from personal computers to enterprise-level communications systems, can be seriously damaged by power surges from lightning. Surge protection should be included in any electronic system, especially those essential to for emergency response, to minimize the risk of damage from lightning.

## 4.5 Hail

The climatological and geographical aspects of this hazard in Canadian County are discussed more fully in Chapter 4.5.

### Frequency

During the period 1995 through 2010, Canadian County reported 105 separate hail events. Given this frequency, the communities of Canadian County can expect about seven hail events each year. Calumet, itself, reported 20 separate hail events from 1995 through 2010, for an average of 1.3 hail events per year.

### Extent/Severity

Calumet considers a minor severity hail storm to be a hail storm up to H2 on the Combined NOAA/TORRO Hailstorm Intensity Scale, and a major severity hail storm to be a hail storm greater than H2 on the NOAA/TORRO Hailstorm Intensity Scale.

### Impact

When hail hits, it can damage cars, shred roof coverings, and lead to water-damaged ceilings, walls, floors, appliances, and personal possessions. Large hailstones can also cause serious bodily

injury. However the impact of this hazard remains mainly financial, due to repairs to cars, roofs, walls and windows. The loss of crops and livestock can be devastating to farmers and the economy in lost revenues.

## History

During the period 1995 through 2010, Canadian County reported 105 separate hail events (after duplicate reports of the same storm have been removed). Calumet, itself, reported 20 separate hail events for this same period. There are no damage reports for any of these events. As hail damage increases sharply when stones reach 1.75 inches in diameter and higher, accompanied by high winds, Calumet experienced six potentially damaging hail events in this 15-year period. The largest hail fell in 1998.

- **June 13, 1998** – Hail 2.5 inches in diameter was reported at Calumet. Severe thunderstorm winds combined with tennis ball-sized hail blew windows out of three homes and downed numerous trees, several billboards, and other signage.

### Worst-Case Hail Scenario for Calumet

The largest hail stone reported in the County was 4.5 inches in diameter and fell at Okarche on August 17, 1994. The County's most damaging storm occurred on May 29, 2004, and involved hail 2.75 inches in diameter, also at Okarche. Storms of this size are random events and can hit any community in Canadian County. This particular storm caused \$500,000 damage to Okarche Public Schools and Police Department. A similar storm of this intensity could cause similar damage in Calumet.

## Conclusion

*Calumet has a High vulnerability to and High probability of the Hail hazard.* All crops are at risk and structures without hail resistant windows and roofing are subject to damage.

## 4.6 Severe Winter Storm

The climatological and geographical aspects of this hazard in Canadian County are discussed more fully in Chapter 4.6.

### Frequency

During the period 1995 through 2010, Canadian County reported 35 ice and snow events, or an average of 2.3 winter storms per year. It is assumed that Calumet has experienced the same number of storms. The County's winter storms are frequent but relatively brief – usually not more than 1 or 2 weeks in duration.

### Extent/Severity

Calumet considers a minor severity winter storm to be a Level 2 event or below (ice accumulation of less than ¼ inch—see Table 4-21), and a major severity event to be Level 3 and above (ice accumulation above ¼ inch) resulting in personal injury or death, water or power outages, travel disruptions, damage to private property and public infrastructure.

### Impact

The impact of a severe winter storm can affect a region for weeks and even months. Houses, roads, electrical poles and lines, water systems, people and livestock are all vulnerable to severe winter storms. Structures can be damaged from the weight of snow or ice, roads become slick and hazardous, electrical poles and lines break, people lose electricity and heat, water lines freeze and burst, and people and livestock are without water.

## Conclusion

*Calumet has a High vulnerability to and High probability of the Severe Winter Storm hazard.* Oklahoma is not regularly subjected to prolonged winter storms and is unprepared for extreme ice and snow. The costs of a one-week winter storm can be staggering to a small community. Severe winter storms can result in widespread and lengthy power outages and other infrastructure damage.

## 4.7 Extreme Heat

The climatological and geographical aspects of this hazard in Canadian County are discussed more fully in Chapter 4.7.

### Frequency

Canadian County reported four extreme heat events for the period 1996 through 2011, or an average of one every 3.7 years. None of the NCDC narratives mentions Calumet specifically. It is assumed that the community experienced the same number of events.

### Extent/Severity

Calumet considers minor severity extreme heat to generate a heat index of 95° F or less, and major severity extreme heat to generate a heat index greater than 95° F. (See Chapter 4.7.1 for an explanation and discussion of the Heat Index.)

### Impact

The impact of extreme heat is primarily the danger to people and the increased risk of wildfire and drought, power outages and water shortages. Muscle cramps, nausea, heat exhaustion, heat stroke, and death frequently result from extended periods of extremely high temperatures.

### History

During the period 1996 through 2011, Canadian County experienced four extreme heat events or an average of one every 3.7 years. The summer of 2011 broke all state records for the number of days that temperatures rose above 100°F. While most of Canadian County had to impose some form of water rationing during the summer, Calumet's water supply (which is drawn from its own groundwater wells rather than lakes) remained plentiful.

### Worst-Case Extreme Heat Scenario

A worst-case scenario for Calumet would be a repeat of the extreme heat event of 2011, but lasting three months, preceded by a period of drought, and complicated by high winds, wildfire, and blackouts due to widespread power failures. The possibility of heat-related fatalities, wildfires and water shortages during such an extended period of high heat are high.

## Conclusion

*Calumet has a High vulnerability to and High probability of the Extreme Heat hazard.* Because Oklahoma summers are almost always hot and humid, heat is something the citizens of Canadian County expect. However, extreme heat summers like 2011, when temperatures rose above 100°F on 56 days, worsened by drought and failed crops, are unusual even for Oklahomans and can result in staggering economic losses, heat-related illness, water shortages and electric grid failures. The hazard can be mitigated by notifications and warnings to vulnerable populations, the establishment of cooling rooms, utility cost assistance programs, back-up electric generation for critical facilities, Medical Reserve Corps training, and similar measures.

## 4.8 Drought

Drought has been a long-term hazard for the entire State of Oklahoma, one that recurs about every 15 years. The drought of the 1930s was a pivotal event in the State's history, displacing hundreds of thousands from the land in the southern plains and providing the impetus agricultural reform and massive investment in Oklahoma's water resources. The climatological and geographical aspects of this hazard in Canadian County are discussed more fully in Chapter 4.8.

### Frequency

As has been the case throughout Canadian County, Calumet has experienced four droughts from 1996 through 2011.

### Extent/Severity

The farms of Calumet are vulnerable to drought, as shown by the widespread crop failures and livestock sell-off of 2011. Calumet considers a minor severity drought to be a drought greater than a -2 on the Palmer Drought Index and a major severity drought to be a drought at -2 or lower on the Index. The Index goes from -4 to +4 with lower numbers indicating greater drought. (See Chapter 4.8.1 for an explanation of the Palmer Index).

### Impact

The most direct impact of drought is economic rather than loss of life or immediate destruction of property. Calumet is a predominantly agricultural community, surrounded by floodplain and dry-land farms. The second major industry is petroleum and gas extraction, scattered across the landscape. All the community's water is drawn from terrace aquifers along the River. Drought affects water levels for use by industry, agriculture, and individual consumers. During droughts crops do not mature, wildlife and livestock are undernourished, land values decrease, unemployment increases, and tax revenues decline. In addition, water shortages affect fire-fighting capabilities through reduced water flows and pressures. Drought can also affect power production and costs. Most droughts also increase the danger of wildland fires.

### History

Canadian County has experienced four droughts from 1996 to 2011. Photos from the 2011 drought indicate that western Canadian County was severely impacted. Agriculture being a primary element of the local economy, it is likely that Calumet would suffer greater impacts than the more populous areas to the east, whose economies are more urbanized and connected to the resources of the Oklahoma City economy and water system. Much of central Oklahoma, including Oklahoma City, was forced to resort to some form of rationing during the 2011 drought. Although the Town's local agricultural economy suffered, the community did not have to impose rationing for domestic use.



Canadian County corn crop withers in 2011 drought

### **Worst-Case Drought Scenario**

Almost all of western Canadian County’s water is drawn from groundwater wells, drilled into alluvial aquifers or terrace deposits of the North Canadian and Canadian Rivers. These groundwater resources have proven remarkably stable. However, in recent years there have been significant declines in water flows in the upper North Canadian, largely due to irrigation, stock ponds, and reservoirs. It is too early to say what the long-term impact of this decline will mean for Canadian County communities like Calumet. A worst-case scenario would be a drought as severe as that of 2011 extended over a two or three-year period, combined with catastrophically low flows on the North Canadian River and aquifer recharge.

### **Conclusion**

*Calumet has a High vulnerability to and Moderate probability of the Drought hazard.* The Town’s domestic water supplies have been remarkably stable, despite low flows in the North Canadian River in recent years. However, the overall economy of western Canadian County is heavily dependent on the agriculture – primarily dry-land farming and stock production – which is highly vulnerable to drought. Studies of the North Canadian River terrace aquifers indicate that they have adequate resources to endure at least three years of drought. It is less certain how well agricultural enterprises would fare during such an event.

## **4.9 Expansive Soils**

Expansive soils swell when subjected to moisture and shrink during droughts or extended periods of high heat and low precipitation. Such soils usually contain clay minerals that attract and absorb water. Expansive soils can damage structures and infrastructure, such as water and sewer mains. More information on this hazard is provided in Chapter 4.9.

### **Location**

Calumet is underlain predominantly by moderately expansive soils, with highly expansive soils beneath about 18% of the town, primarily along the unnamed north-side tributary of Sixmile Creek. Highly expansive soils underlie the grain and railway facilities north of US Highway 270 and the western portion of the Calumet Public Schools Campus. Table F.1-10 shows soil types for Calumet. A map depicting locations of Calumet’s expansive soils is presented in Figure F.1-7.

**Table F.1–10 Town of Calumet Expansive Soils**

<b>Expansive Potential</b>	<b>Area (sq. mi)</b>	<b>Percent of Land Area</b>
Very High	-	-
High	0.227	18%
Moderate	0.994	79%
Low	0.038	3%
<b>Total</b>	<b>1.263</b>	

Source: U.S. Department of Agriculture

### **Frequency**

There is no data concerning the amount of damage that has occurred in Calumet due to expansive soils, therefore no reliable frequency projections can be made.

### **Extent/Severity**

Calumet considers a shrink-swell level of Moderate and below based upon Natural Resources Conservation Service (NRCS) soil survey database to be of minor severity and a shrink-swell level of High or Very High based upon NRCS soil data base to be of major severity.

## **Impact**

The impact of this hazard occurs over time and affects structures and infrastructure. As a rule, houses and one-story structures are more vulnerable to damage than multi-story buildings, as the latter have enough mass to counter swelling soils. Expansive soils can result in costly repairs and reduce the value of the buildings that are affected. Normally, expansive soils do not cause injury or death, unless a structure weakened by cracks in foundation or walls were to collapse during an earthquake or other event. Residential structures located on Moderate to High expansive soils are most likely to be impacted by the hazard over time. The expansive soils hazard can cause structural damage resulting in costly repairs.

## **History**

There are no known reports of damage from expansive soils in Calumet.

## **Conclusion**

*Calumet has a Moderate vulnerability to and a Low probability of the Expansive Soils hazard.* Calumet is built almost entirely upon moderately expansive soils. However, several key structures are situated on highly expansive soils, in particular, the grain silos at the railway station and the westernmost part of the Calumet Public Schools Campus. Town planners should consider keeping areas of highly expansive soils free of development to minimize the impacts of this hazard.

## **4.10 Urban Fire**

Calumet is a compact farming town surrounded by agricultural lands and the floodplain of the North Canadian River. It is on US Highway 270 and the AT&L railroad. The Town's Volunteer Fire Department has 15 volunteers, four of whom are trained first responders. The Department has an urban ISO rating of 7, a 9 rating for structure fires over 1,000 feet from a hydrant, and 10 for fires over 10 miles from the station. Calumet VFD has mutual support agreements with all surrounding fire districts. Water supply and pressure has been adequate, even during the 2011 drought. The Wildfire hazard is discussed more fully in Chapter 4.10

### **Frequency**

From 2000 through 2009, Calumet reported 22 single family residential fires, six fires in mobile homes, three office fires, and four industrial/warehouse fires. None of the residential fires, incidentally, occurred inside the Town Limits of Calumet. Given this data, Calumet can expect 2.2 single family residential fires somewhere in the Calumet Fire District (a more than 150 square mile area) each year, and a mobile home fire every 1.6 years. A warehouse/industrial fire can be expected every 2.5 years, and an office fire every 3.3 years.

### **Extent/Severity**

Calumet considers a minor severity urban fire to be an urban fire that causes no loss of life or injury and/or \$5,000 or less in damages and, and a major severity urban fire to be an urban fire that results in loss of life or injury and/or more than \$5,000 in damages.

### **Impact**

The impact of urban fire can be death and injury to civilians or emergency personnel, damage to homes and businesses, and loss of employment and local revenue streams. The loss of homes, businesses and jobs can be devastating to families and communities. According to the Census Bureau, 26.1% of Calumet's homes were built prior to 1939, with most structures (55%) having been built before 1969. The community has 29 mobile homes. No homes are heated with wood.

## History

From 2000 through 2009, Calumet had 22 single family residential fires, six fires in mobile homes, three office fires, and four industrial/warehouse fires. These events are summarized in Table F.1-11. During this same period, there were three civilian injuries and four civilian deaths – the majority of them in 2005 involving traffic accidents on I-40, not from urban fire or wildfire. (The Fire Marshall data does not define the cause of injury or death in its data base.)

**Table F.1–11 Calumet Urban Fire Damages 2000-2009**

Year	Single Family		Apartment		Mobile Homes		Other Residential		Office/ Commercial		Warehouse/ Industrial		Total	
	No.	Dmg	No.	Dmg	No.	Dmg	No.	Dmg	No.	Dmg	No.	Dmg	No.	Dmg
2000	2	\$25,000	0	\$0	1	\$15,000	1	\$0	0	\$0	0	\$0	4	\$40,000
2001	2	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	2	\$0
2002	4	\$150,000	0	\$0	1	\$500	0	\$0	0	\$0	2	\$25,000	7	\$175,500
2003	2	\$60,000	0	\$0	1	\$10,000	0	\$0	2	\$0	1	\$10,000	6	\$80,000
2004	5	\$0	0	\$0	1	\$70,000	0	\$0	0	\$0	0	\$0	6	\$70,000
2005	1	\$25,000	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	1	\$25,000
2006	1	\$0	0	\$0	0	\$0	0	\$0	1	\$0	0	\$0	2	\$0
2007	3	\$51,000	0	\$0	1	\$5,000	0	\$0	0	\$0	0	\$0	4	\$56,000
2008	1	\$15,000	0	\$0	1	\$20,000	0	\$0	0	\$0	0	\$0	2	\$35,000
2009	1	\$0	0	\$0	0	\$0	0	\$0	0	\$0	1	\$40,000	2	\$40,000
Totals	22	\$326,000	0	\$0	6	\$120,500	1	\$0	3	\$0	4	\$75,000	36	\$521,500

Source: Oklahoma State Fire Marshal

## Conclusion

Calumet is a compact rural town with an aging housing stock, but with a skilled local volunteer fire department and adequate water supply with hydrants throughout the community. The VFD has mutual aid agreements with surrounding fire districts. The incidence of fire events in Calumet has been moderate, and no deaths from urban fires. *Calumet has a Moderate vulnerability to and High probability of the Urban Fire hazard.*

## 4.11 Wildfire

Wildfires are an increasing hazard in Oklahoma and other western states due to the popularity of residential living, including mobile homes, in the wildland/urban interface. For Calumet, wildfire is a threat to the economic base of the community – farming and ranching enterprises and oil and gas production facilities. The Wildfire hazard is discussed more thoroughly in Chapter 4.11.

### Location

As an agricultural area, Calumet's greatest vulnerability to wildfire is in June when the wheat crop has ripened and is standing yellow in the fields. June is not, however, the time of year most prone to wildfire, which is in late fall and winter. Agricultural land is usually plowed by the time the wildfire season arrives. Figure F.1-8 displays the areas of Calumet wildfire risk.

### Frequency

During the period 2000 through 2009, Calumet's VFD responded to 267 wildfires that burned 7,181 acres and caused \$339,800 damage. Given this data, Calumet can expect 26.7 wildfires each year that burn about 700 acres and cause \$24,789 in damage.

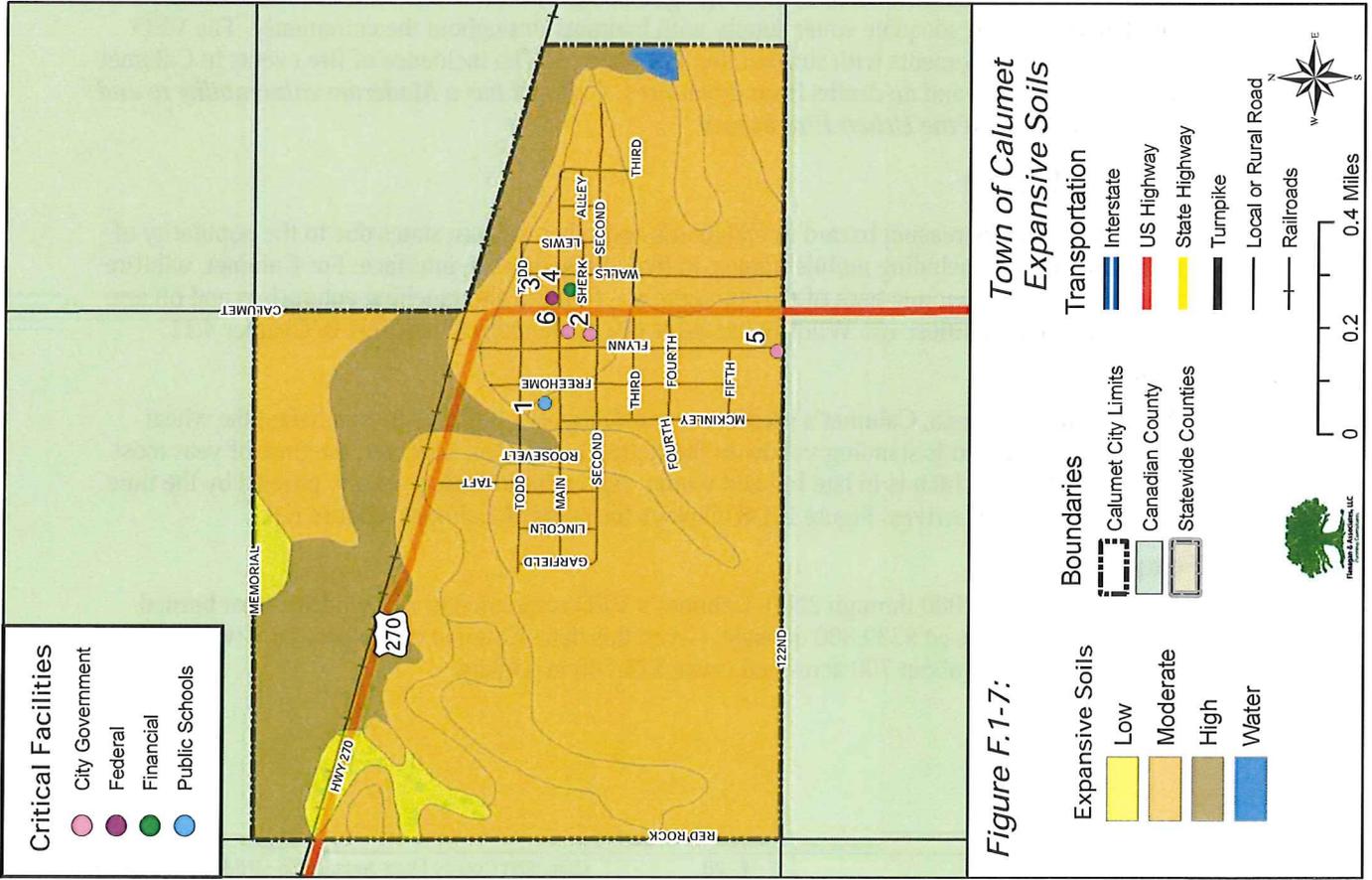


Figure F.1-7:

Town of Calumet  
Expansive Soils

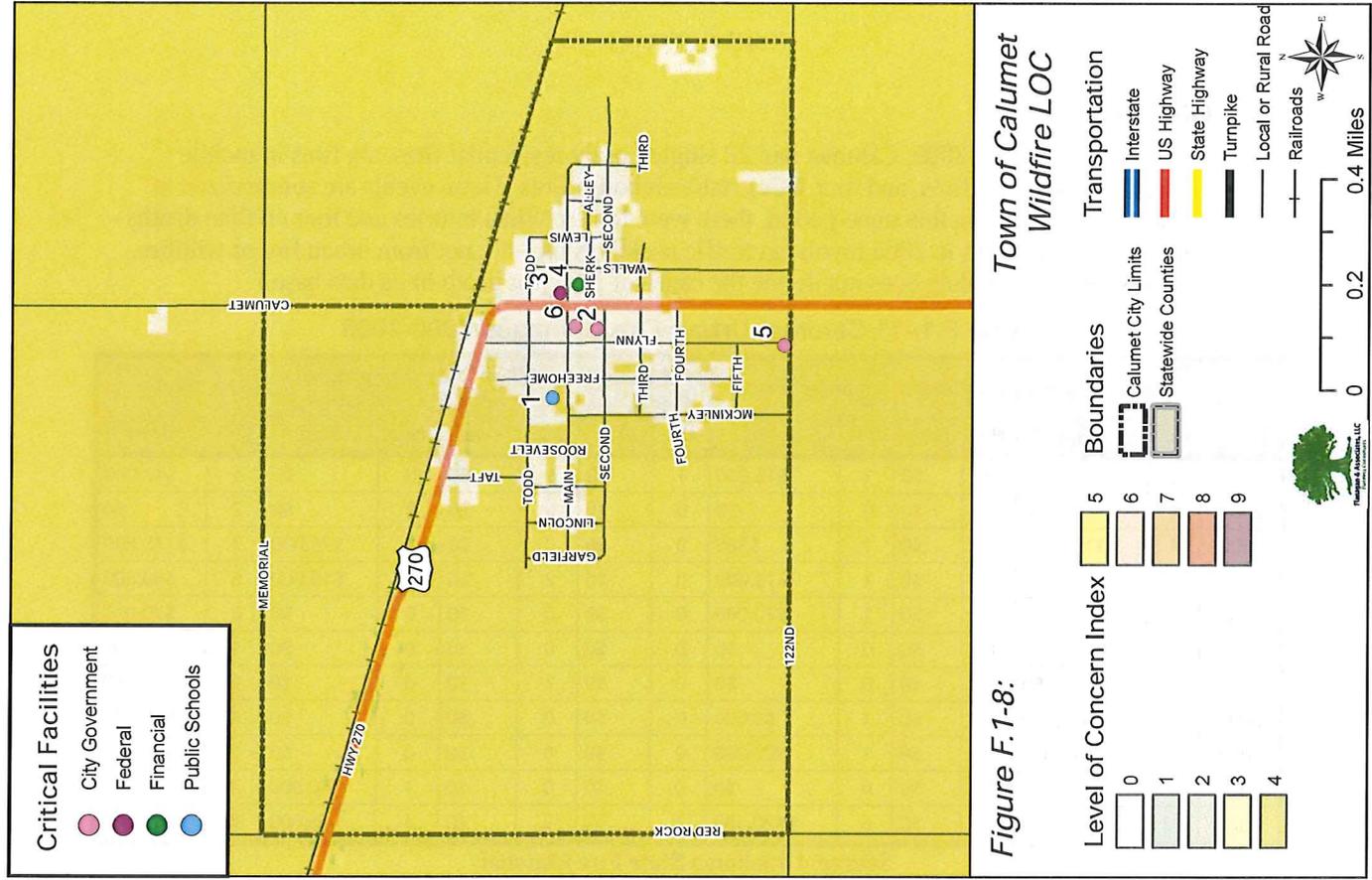


Figure F.1-8:

Town of Calumet  
Wildfire LOC

## Extent/Severity

Calumet considers minor severity conditions for the Wildfire hazard to be a reading of Moderate and below on the US Department of Agriculture Fire Danger Rating System, and major severity conditions for the Wildfire hazard to be above Moderate on USDA's Rating System.

## Impact

The impact of the Wildfire hazard can increase during times of drought, high wind and extreme heat. Wildfire can cause loss of life, homes and businesses, and devastating economic impacts to homeowners, ranchers and farmers, and to the community. In Calumet, the town's center has no to Low vulnerability to the wildfire hazard. One critical facility is located in an area with Moderate to High wildfire concern, the town's water tower. The water tower is located on a cement slab and secured with metal fencing. It is not likely a wildfire could cause any negative impacts on this critical facility; the greatest impact would be loss of access to the facility itself.

## History

In the same period, the Calumet VFD responded to 267 wildfires that burned 7,181 acres and caused \$339,800 in damage. According to the Calumet Fire Chief, extinguishing wildfires is the Department's primary activity. Most of these begin along the shoulders of US Highway 270. These events are summarized Table F.1-12.

**Table F.1-12 Calumet Wildfires 2000-2009**

Year	Runs	Acres Burned	Damages
2000	29	600	\$30,000
2001	21	160	\$12,800
2002	46	0	\$90,000
2003	25	1,000	\$80,000
2004	25	108	\$10,000
2005	20	100	\$0
2006	41	5,070	\$100,000
2007	16	70	\$0
2008	31	65	\$7,000
2009	13	8	\$10,000
Totals	267	7,181	\$339,800

Source: Oklahoma State Fire Marshal

## Worst-Case Wildfire Scenario

Calumet is a clustered community, buffered on the north by the AT&L railroad and US Highway 270, and surrounded by farmland. A worst-case wildfire for Calumet would be a wildfire that resulted in the injury or death of one person, either civilian or firefighter, destroyed four structures and/or resulted in economic damage to crops, farms and outbuildings, and oil and gas industry facilities.

## Conclusion

Calumet's location on a broad prairie that is subject to thunderstorms, lightning, high winds, drought and prolonged periods of extreme heat, make it an ideal environment for wildfires. Fortunately, most of the land surrounding the town is being put to agricultural uses, primarily to crops that come to maturity in June. By late fall and winter, the land has been plowed and planted. Based on the number of Wildfires that occurred in or around Calumet from 2000 to 2009 and *Calumet is considered to have a Moderate vulnerability to and Moderate probability of the Wildfire hazard*

## 4.12 Earthquake

Earthquakes are considered a general hazard that occurs more or less randomly and unpredictably throughout Canadian County. See Chapter 4-12 for more detail on the Earthquake hazard.

### Location

Calumet is located in an area of considerable low-level seismicity, west of the recently active Wilzetta fault in Lincoln County and north of the historically active Meers fault in southwestern Caddo County.

### Frequency

Canadian County has reported 39 earthquakes from 1995 through 2010. Nine of these tremors were within 5 miles of Calumet, but none was a "felt" event. Given this frequency, Calumet can expect a nearby tremor every 1.6 years.

### Extent/Severity

Calumet considers a minor severity earthquake to be an earthquake registering 4.8 magnitude or below on the Richter Scale and a major severity earthquake to be an earthquake registering above 4.8 magnitude on the Scale.

### Impact

The impact of this hazard depends on the intensity of the earthquake and the quality of construction in the area. The 5.6 magnitude Lincoln County earthquake in November 2011 caused damage to several homes and resulted in some highway buckling near the epicenter of the event. However, the earthquake toppled two brick towers on the historic Benedictine Hall (built in 1911) at St. Gregory's University Campus in Shawnee, Oklahoma, 20 miles away from the epicenter.

### History

As stated above, Canadian County experienced 28 earthquakes between 1995 and 2009, followed by cluster of 11 quakes on March 11-12, 2010. Nine of these events were within five miles of Calumet. Until the November 5, 2011 earthquake near Prague in Lincoln County, Canadian County held the state record for biggest historical quake – a 5.5 event near El Reno in 1952.

### Conclusion

*Calumet's has a Low vulnerability to and Low probability of the Earthquake hazard.*

## 4.13 Hazardous Materials

Hazardous materials are chemical substances that, if released or misused, can pose a threat to human health and/or to the environment as discussed in detail in Chapter 4.13.

### Location

There are two non-Extremely Hazardous Site (EHS) Tier II facilities in Calumet: Daugherty Brothers Propane and Thermo Fluids, Inc. These facilities are shown in Figure F.1-9.

### Frequency

There were no fixed-site hazardous materials incidents at Calumet from 1995 through 2010.

### Extent/Severity

Calumet considers a minor severity fixed-site hazardous materials incident to an incident that is unlikely to cause severe casualties, or meets or meets the definition of a "small spill" according to the most current edition of the *Emergency Response Guidebook*, and a major severity fixed-site

hazardous materials incident to be an incident that is likely to cause serious injury or death, or meets the definition of a "large spill" according to the most current edition of the *Guidebook*.

### **Impact**

Only one critical facility, the Calumet Water Tower, is within a quarter mile of either Daugherty Brothers or Thermo Fluids, Inc. There are 59 people, and 27 homes within Calumet's Town Limits that are within a quarter mile of the two sites, according to the Marplot analysis (which uses 2000 Census data). A fixed-site hazardous materials release can result in injury or loss of life, disrupted transportation systems, interrupted business operations and/or short-or long-term ecological damage or degradation.

### **History**

There have been no fixed-site hazardous materials incidents reported in Calumet.

### **Worst-Case Tier II Scenario**

The area of greatest risk, given the prevailing southerly winds in this area, would be a toxic materials release involving the Thermo Fluids facility at Walls Ave. and 122nd St. NW. Most at risk would be the mobile home park to the north of the facility, along S. Walls Ave.

### **Conclusion**

*Calumet is considered to have a Moderate vulnerability to and Low probability of the Fixed-Site Hazardous Materials hazard.*

## **4.14 Dam Failure**

Calumet is situated on the south side of the North Canadian River at elevation 1,380. Upstream are two dams that impound the North Canadian River or its tributaries: Fort Supply Lake Dam (on Wolf Creek) and Canton Lake Dam. Of these, only a failure of Canton Lake Dam would pose a hazard to Calumet, depending largely on the conditions of failure. Calumet is about 50 miles downstream from Canton Dam. Under conditions of a clear day failure or release, much of the surge would be absorbed into the floodplain, but under peak flood conditions it could inundate most of Calumet, including its critical facilities.

In 2006 the Corps began a seven-year multi-phase, \$4.7-million project to stabilize the existing spillway and install an auxiliary spillway channel. These improvements should render Calumet safe from the Dam Failure hazard for the near term.

### **Frequency**

There have been no dam failures on the North Canadian River system. However, emergency releases have taken place, such as in May 1951, when Canton Lake filled to capacity after several days of heavy rain, forcing the US Army Corps of Engineers to release of 80,000 cubic feet per second (cfs) into the River. While an actual failure of Canton dam is not expected, heavy rains from storms originating in the Gulf of Mexico or Gulf of California do occur regularly, but at unpredictable intervals, and could result in a massive emergency release similar to 1951.

### **Extent/Severity**

Calumet considers a minor severity dam event to be an extraordinary release that results in less than three feet of flooding on a one story building, and a major severity dam event to be a breach or failure that exceeds the capacity of the Dam's downstream riverbed immediately downstream from the dam and/or equates to (or exceeds) a 100- or 500-year flood and results in a depth of three feet of flooding or more on a one story building.

## Impact

A dam failure or emergency release can injure or kill people downstream, and damage or destroy homes, businesses, agriculture, and infrastructure. Failure can take place over a prolonged period, giving people time to prepare for the flood surge, or can be sudden with little to no warning time. Emergency releases can also cause catastrophic downstream flooding, as occurred in Tulsa and Bixby, Oklahoma in 1986. The greatest impact to Calumet would be from a dam failure during a flood of record, with the North Canadian already flowing at 22,000 cfs north of the Town. A dam break would inundate the Towns' grain elevators and other structures located on that site. A few residential and commercial structures North of I-270 would be impacted, the severity of impact would depend on release conditions. Notification plans of those persons living or working in the areas at risk of being impacted should be aware of potential risks and evacuation plans. As I-270 would be inundated in the northern area of Calumet, and driving through flooded water is a hazard in and of itself, alternate routes of evacuation should be identified.

## History

There have been no dam failures on the North Canadian River. However, there have been emergency releases, as discussed above and summarized below.

- **May 1951** - Canton Lake filled to capacity after several days of heavy rain, forcing the US Army Corps of Engineers to release of 80,000 cfs into the river.

### Worst-Case Dam Failure Scenario

A worst-case dam failure event for Calumet would be a breach of Canton Dam during peak flood conditions that released its 208,000 acre-feet into the North Canadian River channel, which would already be carrying 22,000 cfs. Such an event would result in a surge of water even greater than the 1951 flood and cause catastrophic damage to Calumet, its infrastructure and critical facilities, as well as to the surrounding farmland and oil and gas facilities.

## Conclusion

*Calumet has a High vulnerability to the Dam Failure hazard, although such an event is of Low probability.* Although a failure of Canton Dam is not likely, an emergency release under peak flood conditions similar to August 2007 could cause considerable damage to the Town.

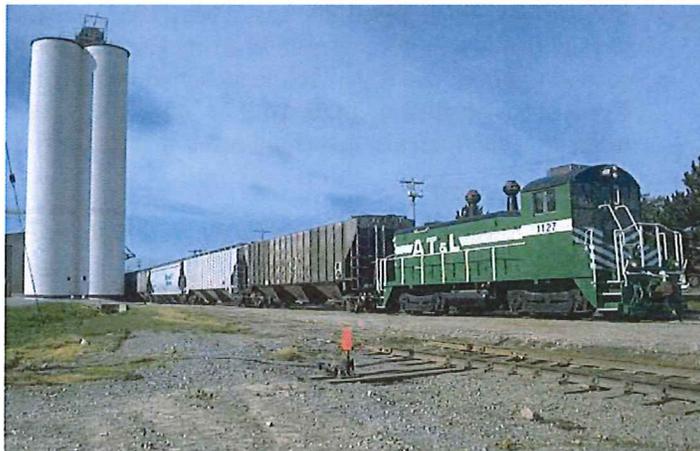
## 4.15 Transportation

Transportation incidents include those that occur on highways, railroads, airports and pipelines and result in injury and death, economic loss, or other major community disruption due to the involvement of hazardous or toxic materials as detailed in Chapter 4.15.

### Location

Two significant transportation corridors exist in Calumet which are reflected in Figure F.1-10. US Highway 270, enters the west boundary of the Town, runs for a mile, and then turns south and out of the Town Limits.

The AT&L railroad crosses Calumet from west to east on the north side of US 270. A one quarter mile transportation



The AT&L's periodic grain transport.

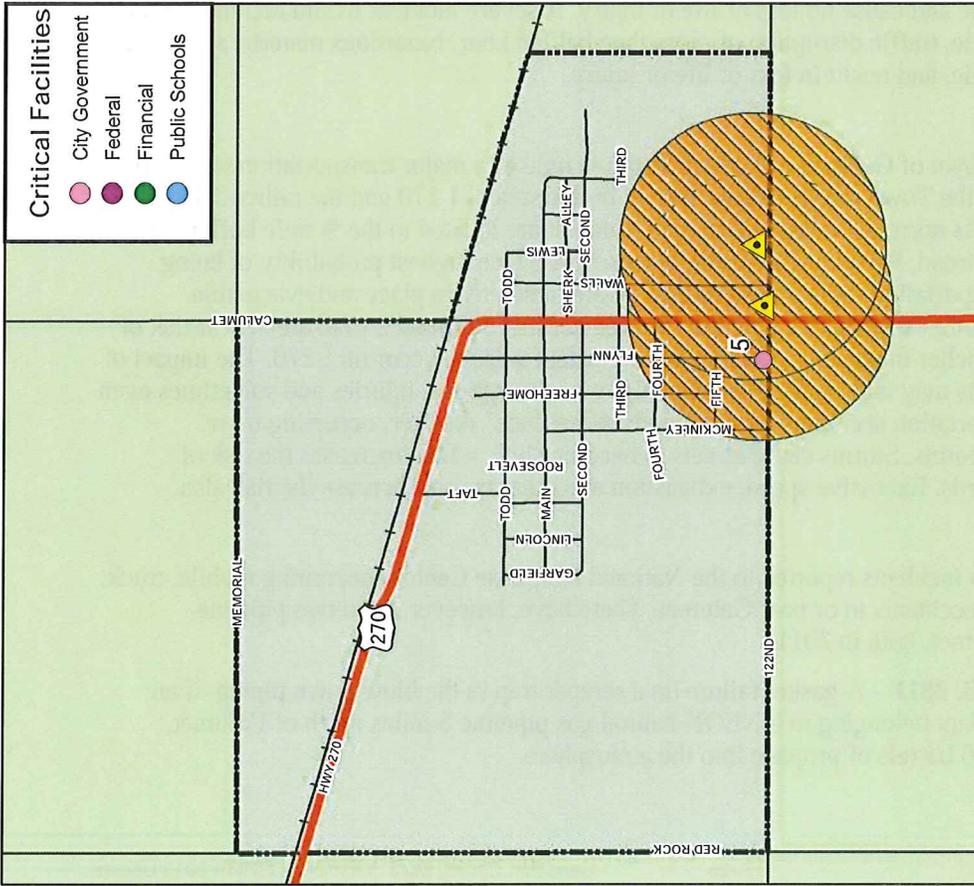


Figure F.1-9:

Town of Calumet  
Hazardous Material Sites

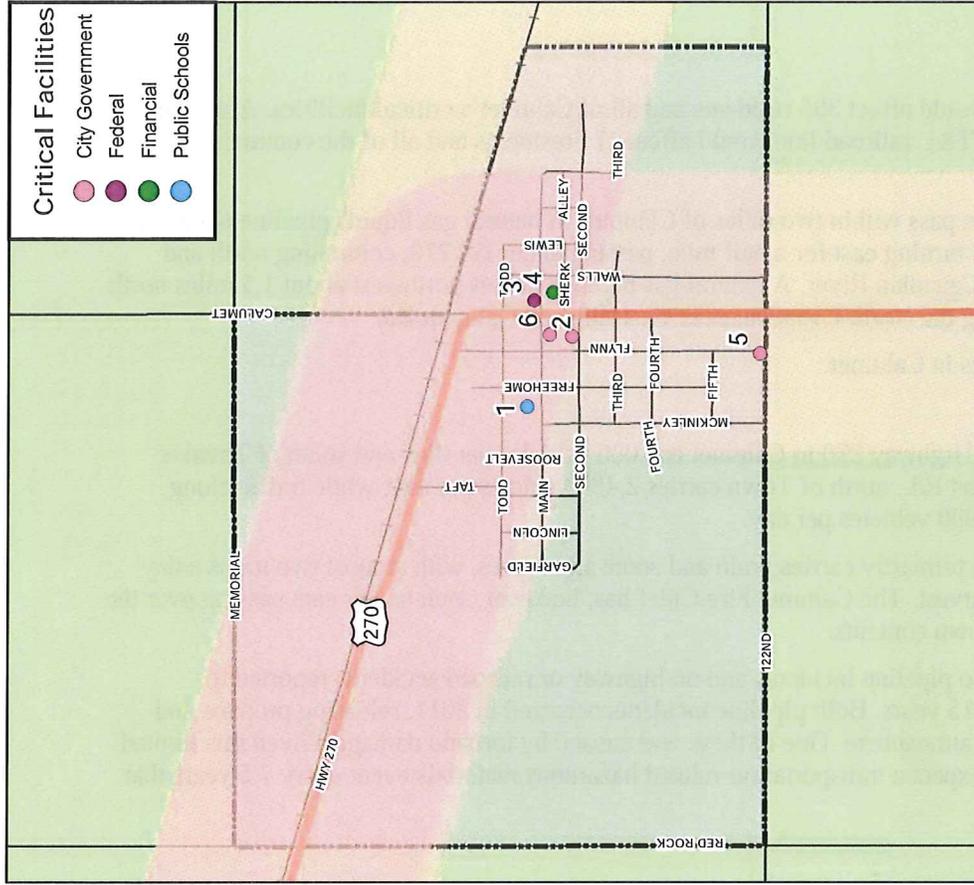


Figure F.1-10:

Town of Calumet  
Transportation Corridors

buffer for US 270 would affect 355 residents and all of Calumet's critical facilities. A similar buffer around the AT&L railroad line would affect 175 residents and all of the community's critical facilities.

Two major pipelines pass within two miles of Calumet. A natural gas liquids pipeline parallels Red Rat Rd., before turning east for a half mile, passing under US 270, continuing north and crossing the North Canadian River. A natural gas pipeline passes northwest about 1.5 miles north of Calumet, crossing the North Canadian near W. 150th and Calumet Rd.

There are no airports in Calumet.

## Frequency

Traffic flow on US Highway 270 in Calumet is 1,000 vehicles per day, and south of Town is 2,000. North Calumet Rd., north of Town carries 2,487 vehicles per day, while traffic along 122nd St. NW is 2,000 vehicles per day.

The AT&L railroad primarily carries grain and some aggregates, with at most two trains a day during the wheat harvest. The Calumet Fire Chief has, however, seen tanker cars passing over the railway, with unknown contents.

There have been two pipeline incidents and no highway or railroad accidents reported for Calumet in the last 15 years. Both pipeline incidents occurred in 2011, releasing propane and natural gas into the atmosphere. One of these was caused by tornado damage. Given this limited data, Calumet can expect a transportation-related hazardous materials event every 7.5 years that does little damage.

## Extent/Severity

Calumet considers minor transportation incidents to be those where detours are less than half a mile, traffic disruption lasts less than half an hour, and hazardous materials spills are contained within a quarter mile and cause no loss of life or injury. A severe incident would include detours exceeding half a mile, traffic disruption of more than half an hour, hazardous material spills that exceed a quarter mile, and result in loss of life or injury.

## Impact

Nearly the entire Town of Calumet is located within ¼ mile of a major transportation route. All critical facilities in the Town are within the ¼ mile buffer area of I-270 and the railroad. Nearly all residential parcels north of Railroad 2 road in Calumet are located in the ¼ mile buffer areas of I-270 and the railroad. Persons who reside in these areas face highest probability of being impacted by a transportation route and should be aware of shelter in place and evacuation procedures. Residential structures located in the area north of Railroad 2 road are also at risk of being required to shelter in place or evacuate if an incident were to occur on I-270. The impact of transportation events may include lost revenue, highway disruptions, injuries and sometimes even loss of life. Transportation accidents are frequently a "cascade" disaster, occurring more frequently during storms. Storms cause streets to become slick, which increases the risk of transportation hazards. Excessive speed, exhaustion and other causes increase the risk also.

## History

There have been no incidents reported to the National Response Center concerning mobile, truck, railroad or aircraft accidents in or near Calumet. There have, however, been two pipeline incidents near Calumet, both in 2011.

- **January 13, 2011** – A gasket failure on a scraper trap in the blow down piping of an injection plant belonging to ONEOK natural gas pipeline 5 miles north of Calumet, releasing 10 barrels of propane into the atmosphere.

- **May 24, 2011** – A tornado hit a natural gas metering station belonging to ONEOK Partners at 260 S. Courtney Rd., resulting in the release of 345,000 cubic feet of natural gas into the atmosphere.

#### **Worst-Case Transportation Scenario**

A worst-case transportation event for Calumet would be a volatile liquids tanker truck accident within the Town Limits, resulting in a spill or fire.

#### **Conclusion**

*The vulnerability to and probability of Calumet to the Transportation hazard is High.* Calumet has two major transportation corridors, US Highway 270 and the AT&L railroad, that pass through the community and natural gas and natural gas liquids pipelines pass near the community. There have been two releases of hazardous materials from these pipelines, both of them in 2011. While the incidence of transportation-related incidents has been low, the railroads, highways and pipelines all carry hazardous materials through the community.



### **4.16 Town of Calumet Hazards Summary**

Hazards that impact the entire County randomly and more or less equally include Tornadoes, High Winds, Lightning, Hail, Winter Storms, Extreme Heat, and Earthquakes. These common hazard events are addressed more fully in Chapter 4.

Site-specific hazards, unique to Calumet, identified and mapped in this section, include Floods, Dam Failures, Expansive Soils, Wildfires, Hazardous Materials, and Transportation.

The Hazards Composite Map, shown in Figure F.1-11, summarizes the areas of the community potentially impacted by these site-specific hazards.

The least hazardous future growth areas are located west of McKinley Ave. and south of 2nd St., as well as south of 122nd St. NW. No matter which direction Calumet's future growth takes, however, the wildland/urban interface areas will remain vulnerable to Wildfire. The floodplain areas to the north and east of town should be left as open-space. High Expansive Soils are generally located in these same floodplain areas. The entire community is vulnerable to Transportation Hazards from US Highway 270, the AT&L railroad and pipelines.

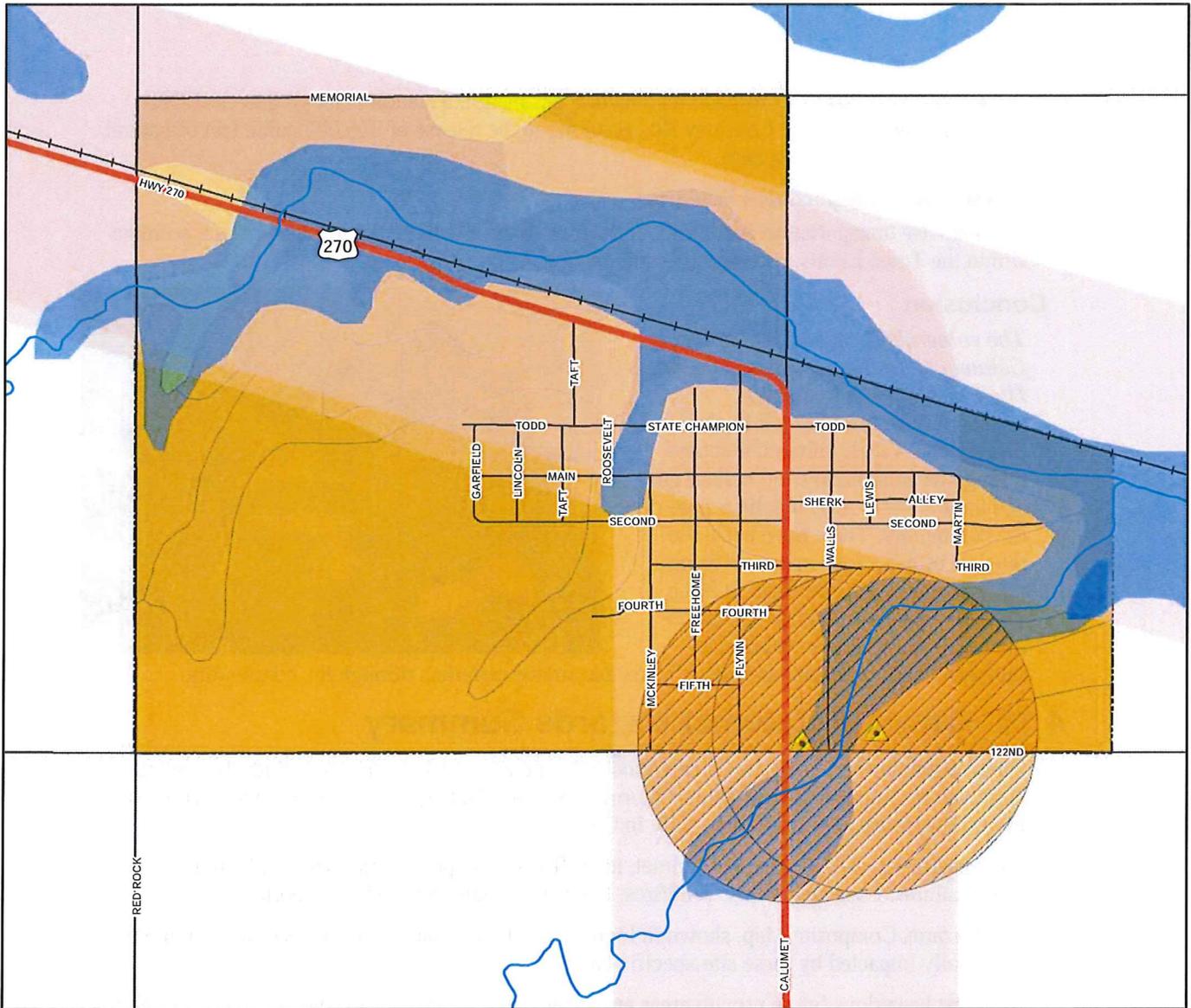


Figure F.1-11:

*Town of Calumet  
Hazard Analysis*

**Hazard Overlays**

- 2009 EHS Tier 2
- 2009 non EHS Tier 2
- Tier2 1/4mi Buffer
- 100yr Floodplain
- 500yr Floodplain
- Quarter Mile Transportation Buffer

**Expansive Soils**

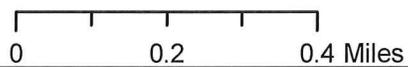
- Low
- Moderate
- High
- Water

**Transportation**

- Interstate
- US Highway
- State Highway
- Turnpike
- Local or Rural Road
- Railroads

**Boundaries**

- Calumet City Limits



## Section 5 Mitigation Strategy

This section provides a description of Calumet's ability to reduce potential losses, identified in Section 4, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools. Included in this section is a process by which Calumet incorporates the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvements, when appropriate. Goals and objectives of the Town of Calumet to reduce or avoid long-term vulnerabilities to the identified hazards are included in Chapter 5. A comprehensive range of specific actions and projects being considered to reduce the effects of each hazard are listed in Chapter 6, *Action Plan*.

### 5.1 Integration into Planning Mechanisms

The Town of Calumet, Oklahoma described the following process for implementing its hazard mitigation plan through existing planning mechanisms:

Upon formal adoption of the *Canadian County Multi-Jurisdictional Multi-Hazard Mitigation Plan*, mitigation goals will be incorporated into future versions of the *Canadian County Emergency Operations Plan*. The Director of Emergency Management is responsible for seeing to it that the plans are integrated with one another.

The Mayor and Director of Emergency Management are responsible for overseeing the implementation of the hazard mitigation plan and integration into other planning mechanisms once it has been adopted. Meetings of the Town Council and public hearings will provide an opportunity for local officials to report back on the progress made on the integration of mitigation planning elements into planning documents and procedures.

Calumet's *Capital Improvements Plan* was updated in 2012 under the direction of the Association of Central Oklahoma Governments (ACOG). The plan lays out improvement projects of high priority to Calumet. Upon adoption of this plan, the Mayor of Calumet may make recommendations for priority mitigation projects to be included in future updates of the *Capital Improvements Plan*. Calumet does not have a Capital Improvements Program; they rely on grant funding to implement improvement projects.

#### Integration of Previous Mitigation Plan

The *Town of Calumet Multi-Hazard Mitigation Plan* (2003) incorporated all pertinent existing plans during the update process. In addition, the *2003 Multi-Hazard Mitigation Plan* was integrated with the following plans and codes when appropriate:

- *Canadian County Emergency Operations Plan*
- *Calumet Public Schools Emergency Operations Plan*

#### Integration Highlights:

Ensuring consistency between the *Multi-Hazard Mitigation Plan* and existing plans.

Updating mitigation strategy goals and objectives to incorporate ideas from the *Calumet Capital Improvement Plan*.

### 5.2 Prioritization Process of Mitigation Measures

The Town of Calumet identified 42 mitigation measures, specific to their jurisdiction, during the *Canadian County Multi-Hazard Mitigation Plan Update* process. The mitigation measures will be prioritized using the STAPLEE process as recommended by FEMA, included in Chapter 5, Table 5-1. Complete detailed information for each mitigation measure is included in Chapter 6.

### **Changes in Hazard Mitigation Priorities**

The Town of Calumet identified and prioritized mitigation measures in the previously adopted *Town of Calumet Hazard Mitigation Plan (2003)*. In the previous plan, mitigation measures addressing the winter storm hazard and urban fires were of top priority to the Town of Calumet. Since the approval of the last plan update, priorities in Calumet have changed due to an increase in the occurrence of all hazards identified in this plan. Calumet placed public education and outreach measures at highest priority to the community, addressing all hazards, as to hopefully prevent the level of damage, lost of life, and injury during future natural and man-made hazard events.