



CANADIAN COUNTY

Town of Okarche, Oklahoma

2012 Multi-Hazard Mitigation Plan Update



Flanagan & Associates, LLC
Planning Consultants

Acknowledgements

The Town of Okarche 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:

Okarche Board of Trustees

Mayor/President Richard Raupe
Trustee Mike Mendel
Trustee Linda Miller

Hazard Mitigation Advisory Committee

Canadian County Emergency Manager Jerry Smith
Canadian County Floodplain
Administrator and GIS Manager Amy Brandley
Fire Chief/Water Superintendent Gary Baustert

F.4 Okarche

Okarche is located essentially on the county line between Canadian and Kingfisher Counties on U.S. Highway 81, 16 miles north of Interstate 40 and approximately 14 miles north of El Reno as depicted in Locator Map Figure F.4-1. Only about 26.7% of Okarche's population resides on the Canadian County side of the County Line, however, the greater part of the incorporated territory of Okarche is in Canadian County.

Section 1 Introduction

1.1 Geography

Latitude: 354333N

Longitude: 975835W

GNIS ID: 1096193

The Town of Okarche is located in north-central Canadian County and south-central Kingfisher County in central Oklahoma, approximately 30 miles northwest of Oklahoma City. Total land area within Okarche is less than two square miles. Figure F.4-2 is Base Map of the Town of Okarche.

1.2 History

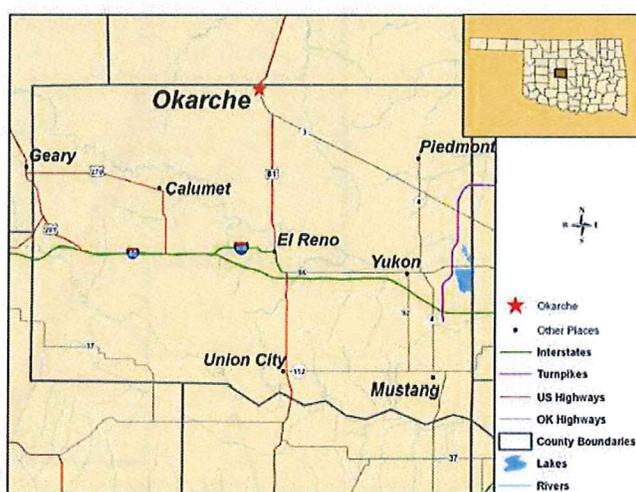
The name of Okarche was derived from the first letters of Oklahoma, Arapaho, and Cheyenne. Originally within the Cheyenne-Arapaho Reservation, the town originated with the construction of a depot by the Chicago, Kansas and Nebraska Railway, which built its Kansas-Texas line through the area in 1890 which was followed by the establishment of a Post Office in the same year. In 1891 the railroad was sold to the Chicago, Rock Island and Pacific system.

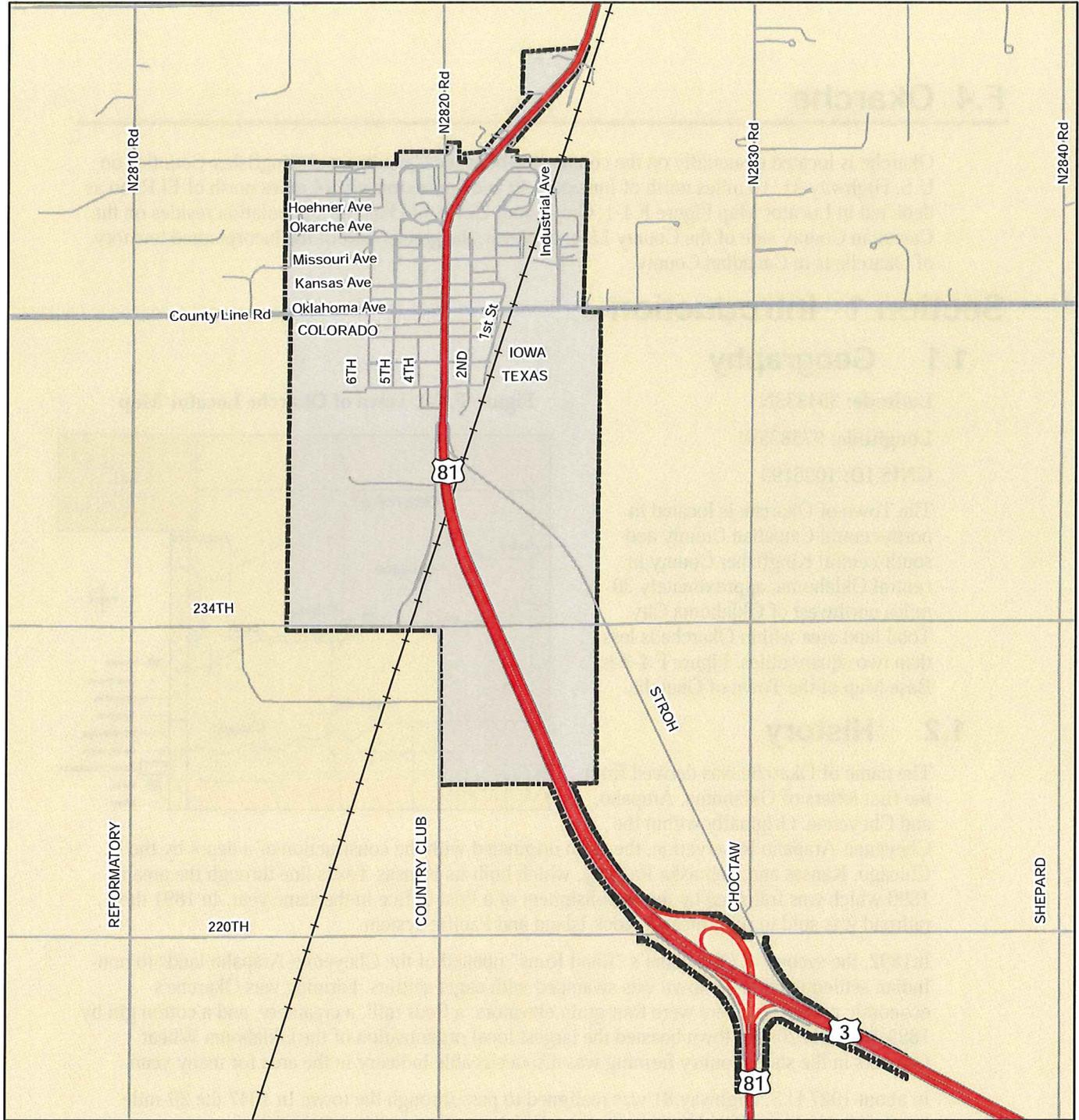
In 1892, the second of Oklahoma's "Land Runs" opened of the Cheyenne-Arapaho lands to non-Indian settlement and the town was swamped with eager settlers. Farming was Okarche's economic mainstay. There were four grain elevators, a flour mill, a creamery, and a cotton gin by 1899. In the 1920s the town boasted the largest local organization of the Oklahoma Wheat Growers in the state. Poultry farming was also a sizeable industry in the area for many years.

In about 1927 U.S. Highway 81 was realigned to pass through the town. In 1947 the 26-mile Northwest Highway (OK Highway 3) from Oklahoma City reached Okarche.

Discoveries and subsequent success in the North Okarche Field in the 1960s resulted in the construction of a Pan American gas plant 3.5 miles north of Town in 1962, further diversifying the local economy. With the upgrading of OK 3 to a 4-lane expressway, Okarche in 2011 is on the verge of becoming a bedroom community for the Oklahoma City Metro Area.

Figure F.4-1 Town of Okarche Locator Map





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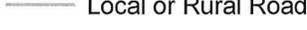
-  Interstate
 -  US Highways
 -  State Highway
 -  Freeway ramp
 -  Local or Rural Road
 -  City Limits
 -  Railroads
- 0 0.25 0.5 Miles
- 



Figure F.4-2
Town of Okarche
Basemap

1.3 Demographics

Okarche incorporated in 1905 and had 414 residents at Oklahoma statehood in 1907 and never topped 500 until the 1950 population stood at 532. Gas field developments caused the population to jump to 826 by 1970, and in 1980 the population topped 1,000 for the first time. The 2010 population was 1,215 – 325 of whom reside inside Canadian County. Table F.4-1 presents selected population information. Figure F.4-3 and Figure F.4-4 illustrate the persons over the age of 65 and persons living at or below the poverty level, respectively.

Table F.4-1 Town of Okarche Demographics

Group	Total	Percent
Total Population	1,215	100.0%
5 years of age and younger	91	7.5%
65 years of age and older	214	17.6%
Individuals living at or below the poverty status (2009)	49	4.0%

Source: US Census Bureau

Ethnicity:

- White – 1,128 (92.8%)
- American Indian – 28 (2.3%)
- African American – 7 (0.6%)
- Hispanic – 66 (5.4%)
- Asian – 0 (0.0%)
- Other race – 28 (2.3%)



U.S. Post Office, Okarche, Oklahoma

1.4 Lifelines

See Chapter 1.2.6 for description of Lifelines.

Okarche Utility Services

Electrical System

Oklahoma Gas and Electric Company and Cimarron Electric

Water Service

Okarche receives its water from three wells. The Okarche Water Authority has a distribution system, a chlorination station (treatment plant) and three sampling stations (one at each of well). Rural Canadian County in the Okarche area is served by Okarche Rural Water District. The two water systems are entirely separate. The Rural Water District draws from two wells and maintains a distribution system and sampling and chlorination stations (treatment plants) at each well.

Wastewater Treatment Service

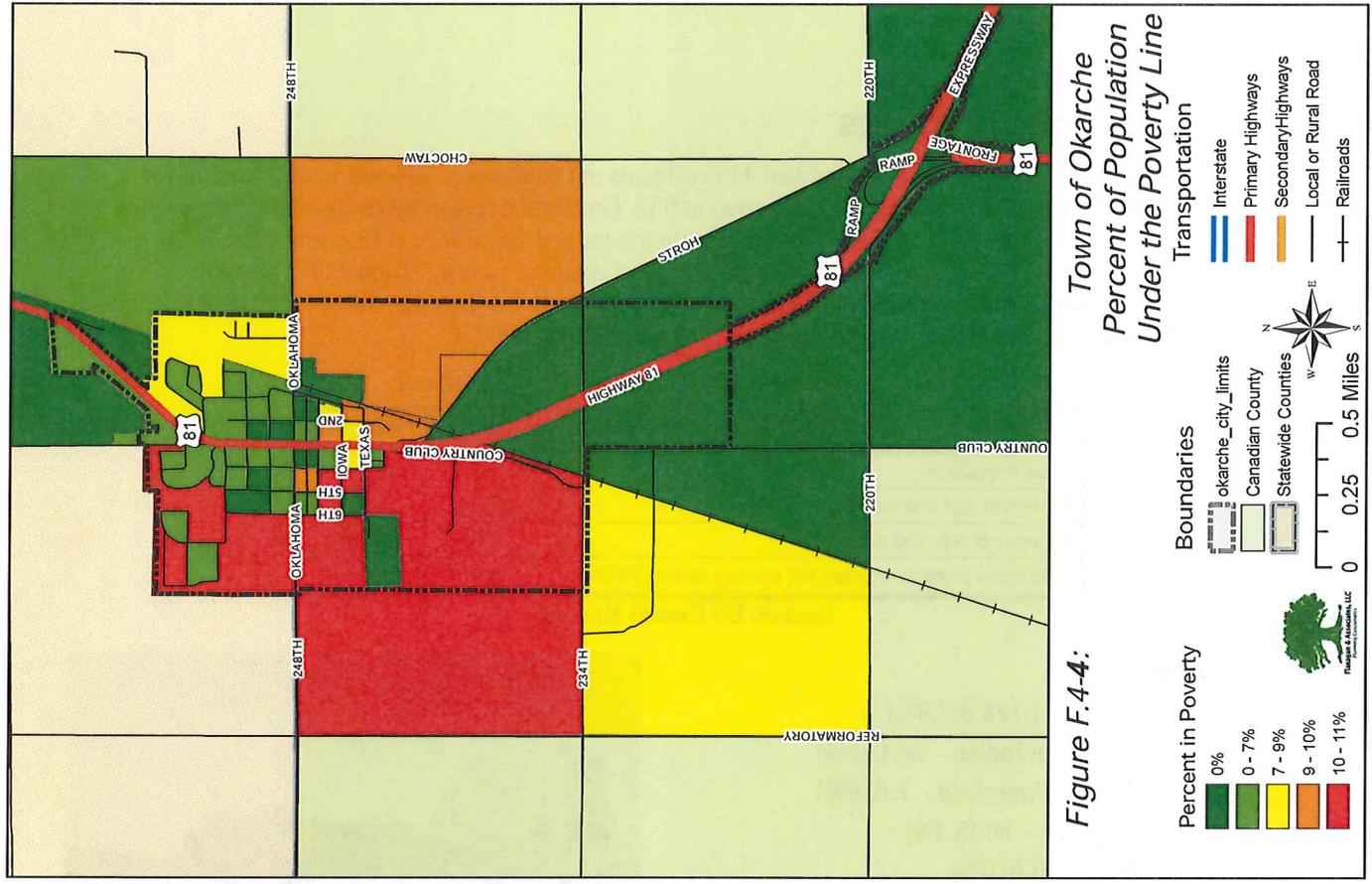
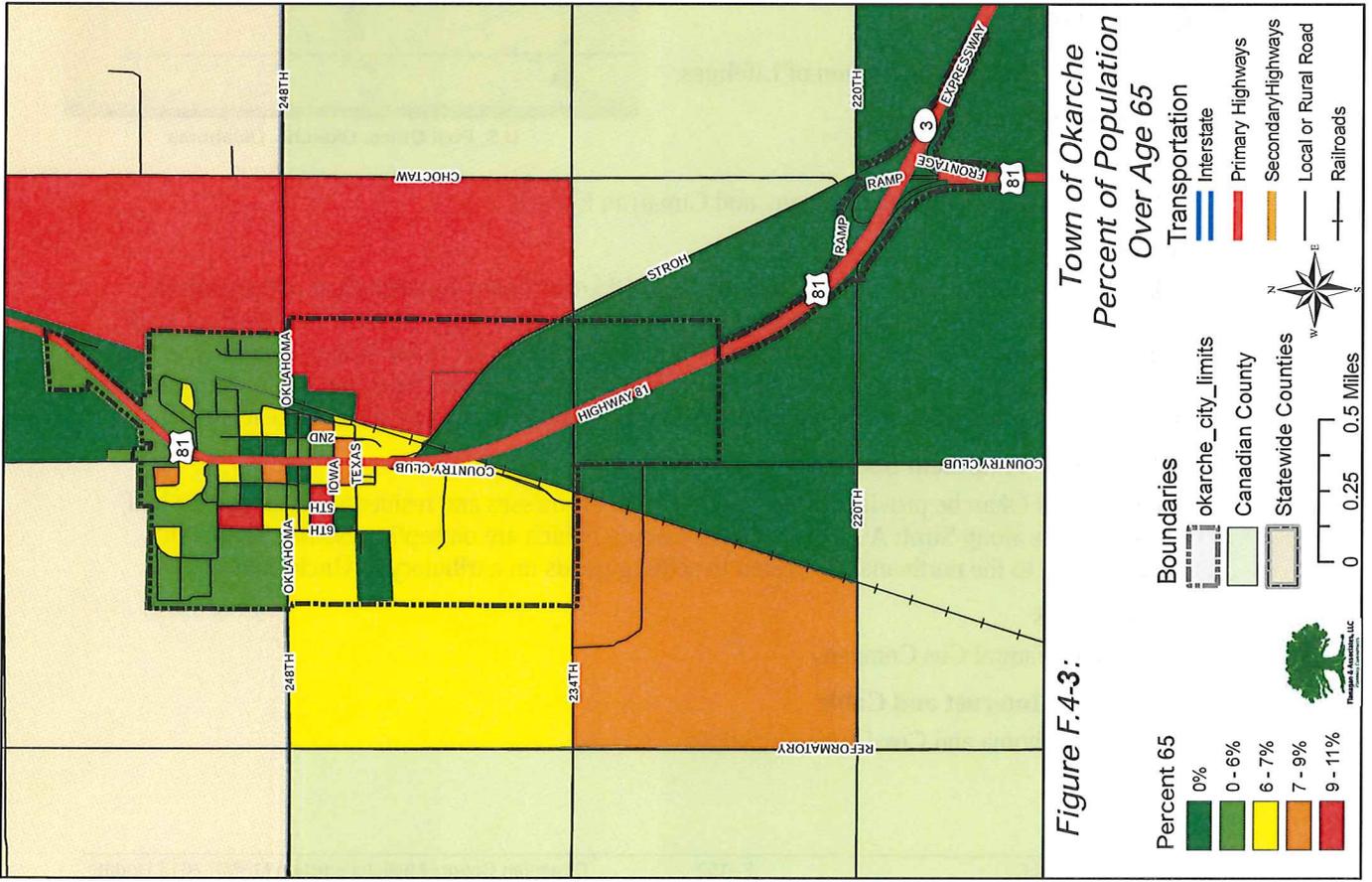
The Town of Okarche provides sewer service to all businesses and residents except for the half dozen houses along Stroh Ave. in Canadian County, which are on septic systems. The town's sewers drain to the north and are treated in settling ponds on a tributary to Uncle Johns Creek.

Natural Gas

Oklahoma Natural Gas Company

Telephone, Internet and Cable

AT&T Oklahoma and Cox Communications



Transportation Systems

Highways & Major Roads

- U.S. Highway 81 and OK Highway 3 (Northwest Expressway)
- County Line Rd. (Oklahoma Ave.)

Railroads

Union Pacific operates a north-south route through Okarche. As a rule, UP trains do not stop in Okarche. Primary shipments out of Oklahoma include cement aggregates, wheat, paper and petroleum products; tonnage brought into the state is predominantly coal, followed by cement aggregates and automobiles.

Airports

- Okarche Airport, private agricultural spraying field one mile east of Okarche;
- Wiley Post Airport – Approximately 20 miles southeast of Okarche;
- El Reno Regional Airport – 16 miles south of Okarche;
- El Reno Airport (F99) – 15 miles south of Okarche;
- Sundance Airpark, 16 miles southeast of Okarche;
- Okarche is also served by Will Rogers World Airport, Oklahoma City, which is approximately 39 miles southeast. See Chapter 1.2.6.

1.5 Economy

As of 2010, 896 people were over the age of 16 in Okarche. Of this number, 593 (or 66.2%) were employed and 18 (or 2%) were unemployed and 285 (or 31.8%) were not in the labor force. Of those in the labor force in the 2010 Census, 3.27% were unemployed. Most Okarche residents work outside of Okarche according to statistics that 62% of those employed reported a commute of 15 minutes or more.

Major employers include Temtrol Inc., a manufacturer of air handling units, coils and fans, located at 106 N. Industrial Blvd. in Kingfisher County; and OEM Systems, a firm specializing in custom fitting commercial vehicles and fuel conversion of vehicles to compressed natural gas, located at 201 W. Oklahoma Ave. and on Industrial Ave. and Oak St., also in Kingfisher County. The third largest employer in Okarche is the Okarche School District.

1.6 Development

According to the Census Bureau, 28.9% of Okarche's houses were built before 1939. All of Okarche's government facilities, including its public schools and industries are on the north side of Oklahoma Ave., in Kingfisher County. Almost all of the new housing developments are on the north side of town, west of the Union Pacific railroad tracks and north of Okarche Ave. Some very recent new home construction has been taking place on the south side of town, along Stroh Ave., near the junction of OK Highway 3 and US Highway 81.



A typical Okarche home

Past Development

According to the 2010 Census, the Town of Okarche (in both Canadian and Kingfisher counties) has a total of 481 housing units. Census and County Assessor data is shown in Tables F.4-2 and F.4-3.

Table F.4-2 Town of Okarche Housing Units, By Type

Housing Unit Type	2010
Single-family	496
Multi-family	21
Mobile homes	6
Boat, RV, van, etc.	0
Total housing units	523

Source: US Census Bureau

The Canadian County Assessor's Office reports 65 properties with improvements in the Town of Okarche *within Canadian County*, with an independently estimated market value of \$2,692,705. The numbers of properties with improvements, improvement type, and estimated market values of Okarche properties with Canadian County are shown in Table F.4-3. The Town's only mobile home park is located on the Canadian County side of the Town.

Table F.4-3 Town of Okarche Property Types and Estimated Values

Improvement Type	Number	Estimated Value
Agriculture	29	\$1,082,456
Residential	13	\$756,451
Commercial	8	\$472,016
Tax Exempt	15	\$381,782
Total	65	\$2,692,705

Source: Canadian County Assessor's Office

Development Plans

Okarche is growing predominantly northward in Kingfisher County, although some development is occurring in Canadian County along OK Highway 3 and Stroh Ave. The Town will likely increase in size and population *if the Oklahoma City Metropolitan Area continues to expand to the northwest*. Some planners envision Okarche becoming a terminus for one arm of a light rail system reaching out from Oklahoma City along the OK Highway 3 corridor. Over the long term, such a development could enhance Okarche's attractiveness as a commuter community. The present 2035 Intermodal Transportation Hub Study proposes a light rail line along OK Highway 3 as far as the Kilpatrick Turnpike in Yukon.

Okarche has been slow to develop as a bedroom community because it is primarily a farming community and land owners are reluctant to break up their farms into housing lots although they are not reluctant to express that opinion. Current residents like their small town, farming community atmosphere and are not eager to become a "bedroom" community to Oklahoma City.

1.7 Critical Facilities

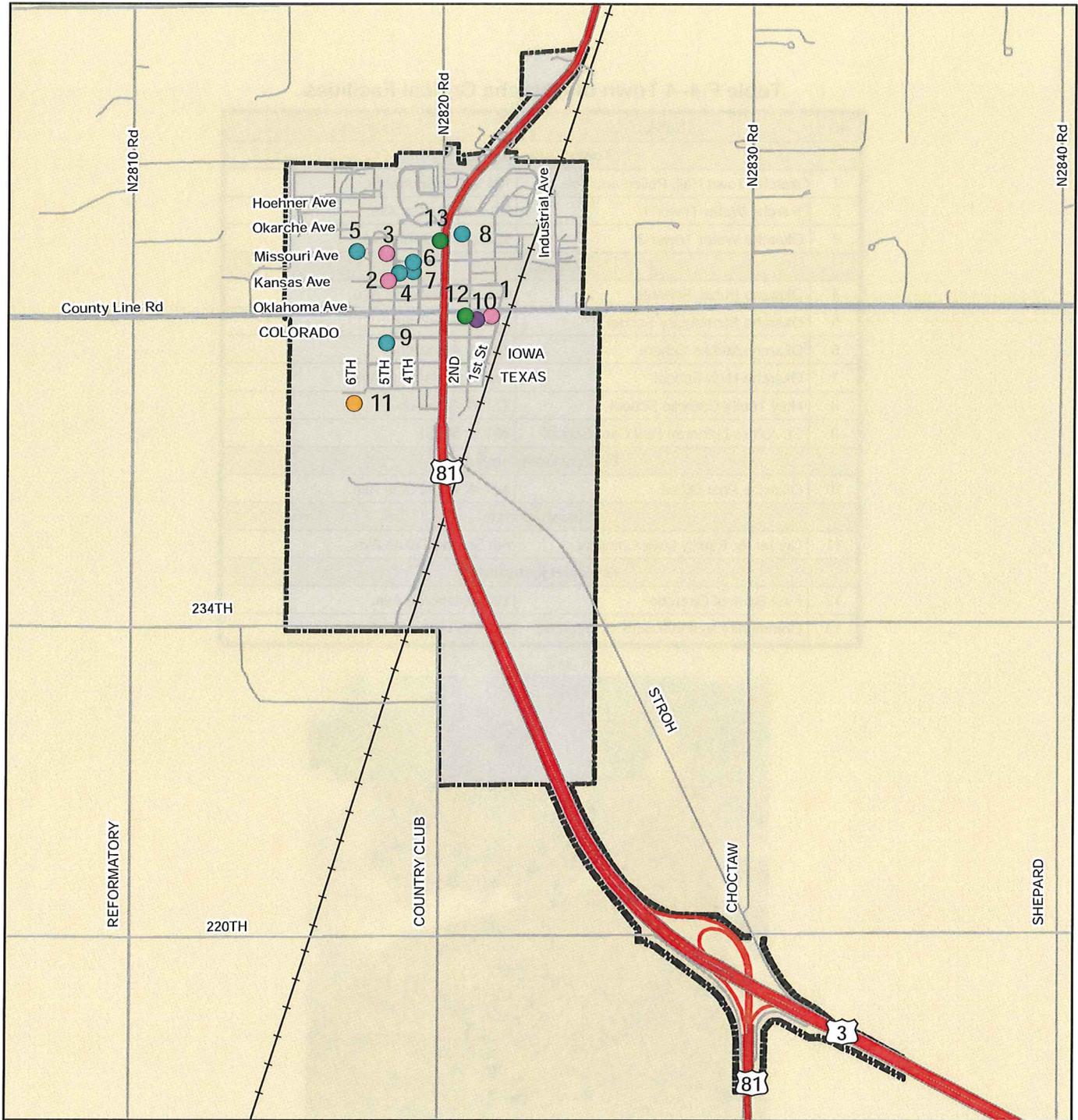
Okarche's critical facilities are primarily located in Kingfisher County (north of Oklahoma Ave.). However, the US Post Office and the Center for Family Love are in Canadian County. Okarche's critical facilities are listed in Table F.4-4 and located in Figure F.4-5.

Table F.4-4 Town of Okarche Critical Facilities

ID	Name	Address
Town Government		
1	Okarche Town Hall, Police and Fire	103 W. Oklahoma St.
2	Okarche Water Tower 1	5th and Kansas Ave.
3	Okarche Water Tower 2	5th and Okarche Ave.
Education		
4	Okarche Public Schools	632 W. Oklahoma Ave.
5	Okarche Elementary School	315 N. 6th Street
6	Okarche Middle School	205 N. 4th Street
7	Okarche High School	632 W. Oklahoma Ave.
8	Holy Trinity Catholic School	211 W. Missouri
9	St. John's Lutheran Day Care School	201 S. 5th St.
Federal Government		
10	Okarche Post Office	121 W. Oklahoma Ave.
Social Service		
11	Center for Family Love Campus	6th St. and Texas Ave.
Financial Institutions		
12	First Bank of Okarche	202 Oklahoma Ave.
13	Community National Bank of Okarche	653 US Highway 81



Holy Trinity Church, Okarche, Oklahoma



LEGEND

- | | |
|---------------------|-----------------|
| Interstate | City Government |
| US Highways | FEDERAL |
| State Highway | Public Schools |
| Freeway ramp | Financial |
| Local or Rural Road | Social Service |
| Railroads | |
| City Limits | |

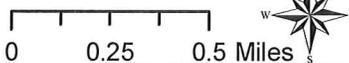


Figure F.4-5
Town of Okarche
Critical Facilities

Section 2 Existing Mitigation Measures

National Flood Insurance Program. The Town of Okarche does not participate in the National Flood Insurance Program. FEMA's Firm Map # 40073CIND0B of Aug 19, 2010 recognizes that Okarche is not in a SFHA.

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

StormReady Program. Okarche is not a StormReady community.

FireWise Program. Okarche participates in the FireWise Program.

Building Codes. The Town of Okarche has no building codes.

Emergency Services

Police Department. The Police Department has four sworn officers. The Town of Okarche is NIMS compliant.

Fire Department. Okarche's Fire Department has 20 volunteer fire fighters. Sixteen of its firefighters are trained EMTs and First Responders. The Department's ISO rating is 5 and the Department is NIMS compliant.

Ambulance Service. Ambulance service is provided by the Kingfisher Fire Department and Parkview Hospital of El Reno.

Hospitals. Hospitals nearby are Kingfisher Regional Hospital, a 25-bed facility with five physicians on staff, approximately seven miles away and Parkview Hospital in El Reno, with 48 beds and seven physicians, approximately 13 miles away.

Floodplain Management. The town of Okarche does not participate in FEMA's National Flood Insurance Program, although 100-year flood maps have been issued. In Canadian County a tributary of Uncle Johns Creek, near Stroh Ave., does have a mapped 100-year floodplain that begins on the Town's eastern boundary, but does not appear to be within the incorporated area.



Uncle John's Creek near the Okarche Town Limits

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.4-5. Refer to Appendix C for meeting agendas.

Supporting the CAC is the Okarche 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:

City of Okarche 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.



Gary Baustert
*Town of Okarche
Water Superintendent/Fire Chief*

Bachelors Degree in Agriculture from Oklahoma State University;
Okarche Volunteer Fire Department Chief;



Richard Raupe
Town of Okarche
Mayor – Town of Okarche.

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.



For a list of Okarche's Hazard Mitigation Committee Meetings and Activities, see Calumet's list of Hazard Mitigation Committee Meetings and Activities (Table F.1-4).

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 City of El Reno has identified certain facilities as critical to the health, safety and welfare of its citizens, business and economy. Table F.4-5 indicates, generally, the exposure of the critical facilities to the 15 hazards covered by this Plan.

Table F.4-5 Town of Okarche 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	Okarche Town Hall / Police / Fire		X	X	X	X	X	X	X		X	X	X	X		X
2	Okarche Water Tower #1		X	X	X	X	X	X	X		X		X	X		X
3	Okarche Water Tower #2		X	X	X	X	X	X	X		X		X	X		X
4	Okarche Public Schools		X	X	X	X	X	X	X		X		X	X		X
5	Okarche Elementary School		X	X	X	X	X	X	X		X		X			
6	Okarche Middle School		X	X	X	X	X	X	X		X		X	X		X
7	Okarche High School		X	X	X	X	X	X	X		X		X	X		X
8	Holy Trinity Catholic School		X	X	X	X	X	X	X		X		X	X		X
9	St John's Lutheran School		X	X	X	X	X	X	X		X		X	X		X
10	Okarche Post Office		X	X	X	X	X	X	X		X		X	X		X
11	Center for Family Love		X	X	X	X	X	X	X		X	X	X	X		
12	First Bank of Okarche		X	X	X	X	X	X	X		X		X	X		X
13	Community National Bank of Okarche		X	X	X	X	X	X	X		X		X	X		X

Table F.4-6 displays hazard information where there is community-specific data, as shown in the maps on the following pages.

Table F.4-6 Okarche Hazard Impacts

Hazard	Area (Sq. Mi.)	Improved Parcels	Value	Area Impacted	Impacted Population
Floods	N/A	N/A	N/A	N/A	N/A
Highly Expansive Soils	N/A	N/A	N/A	N/A	N/A
Very Highly Expansive Soils	N/A	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A	N/A
Dam Failure	N/A	N/A	N/A	N/A	N/A
Tier II Hazardous Materials ¼ Mile	0.48	15	\$662,797	26%	706
Tier II Hazardous Materials ½ Mile	1.02	35	\$1,434,869	56%	1,1011
Transportation - Highway	0.81	48	\$1,985,305	53%	676
Transportation - Railroad	0.97	38	\$1,744,976	44%	547

4.1 Flood

The climatological and geographical aspects of this hazard in Canadian County are discussed more fully in Chapter 4.1.

Location

A map of the floodplains located in and around Okarche is shown in Figure F.4-6.

Frequency

Okarche has experienced two flood events from 1995-2011. Given this frequency, the Town can expect a flood event every 7.5 years.

Extent/Severity

Okarche 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

There are no flood-prone properties within Okarche, except, perhaps four recently constructed homes on the north side of Stroh Ave., which back onto a tributary of Uncle Johns Creek. There is no designated floodplain mapped in this reach of the tributary.

History

Okarche has two entries in the NCDC data base, one listed under Kingfisher County and the other under Canadian County. Neither event occurred within the Town Limits.

- **May 16, 2003** – Water flowed across a county road one mile north of Okarche.
- **August 19, 2007** - Prong Bridge was closed east of Okarche due to water running overtopping it. The roadway was also closed near the Meyer Dairy Farm. Cars stalled in water that was flowing over US Highway 81 north of Okarche.

Worst-Case Flooding Scenario

At present there is no worst-case flooding scenario for Okarche.

Conclusion

Okarche has a Low vulnerability to and Low probability of the Flood hazard. Okarche is built on high ground, and has no designated flood-prone properties within the Town Limits. The flooding that has been reported for Okarche occurred outside of Town. This may change if the Town's future development trend is to the southeast along Stroh Ave. The houses on the north side of Stroh Ave. back onto a tributary to Middle Uncle John's Creek. Town Planners and those responsible for issuing building permits or conducting site inspections should take potential future flooding into consideration.

4.2 Tornado

Tornadoes are considered a common but random hazard that impacts Canadian County generally. Tornadoes are therefore covered more fully in Chapter 4.2.

Frequency

Canadian County has experienced 34 tornadoes between 1995 and 2011, the 2011 tornado being an EF5 tornado in May 2011. Okarche has reported two tornado events from 1995-2011. Given these frequencies, Okarche can expect a tornado every 7.5 years.

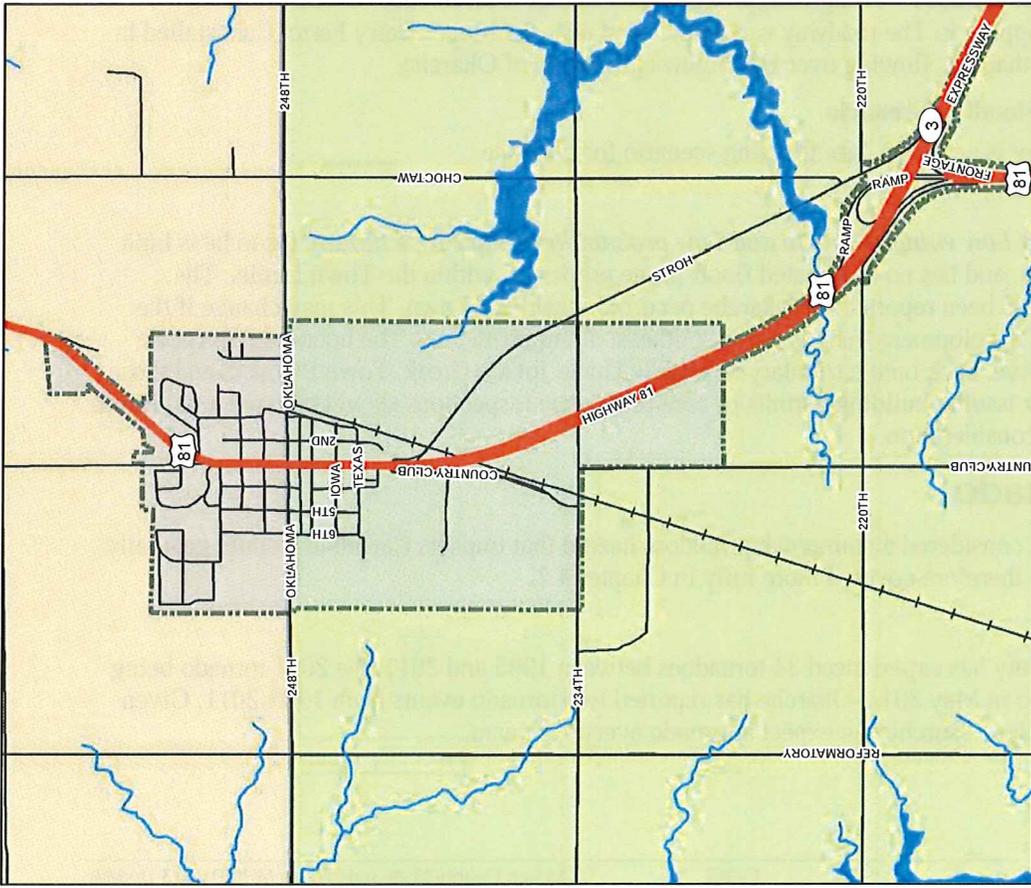


Figure F.4-6:
Town of Okarche
100yr Floodplains

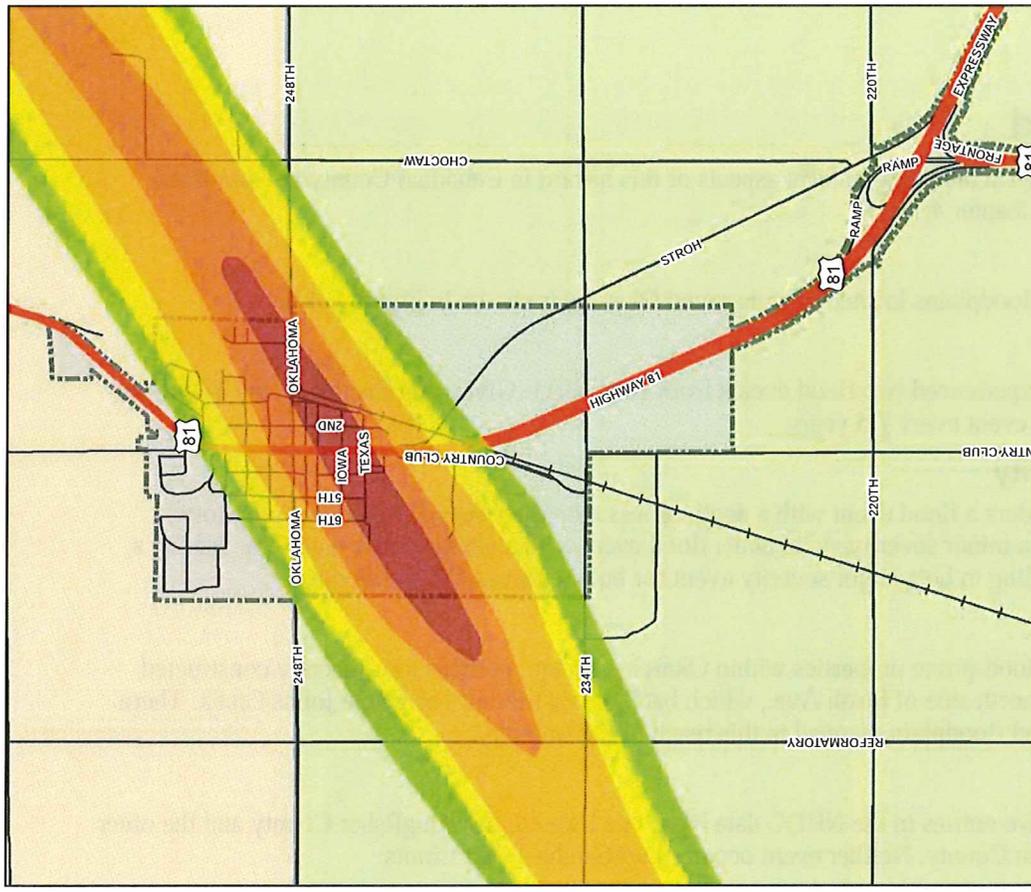
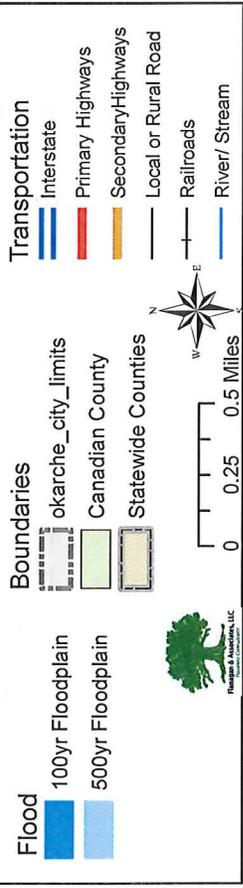
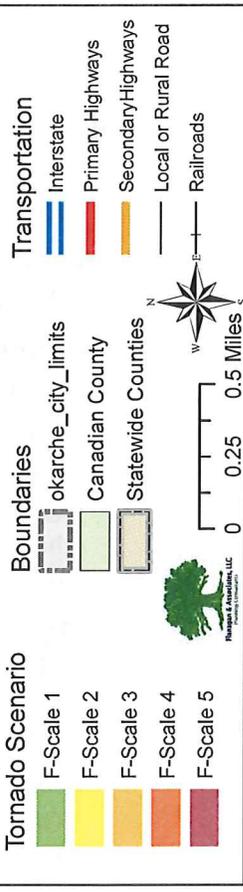


Figure F.4-7:
Town of Okarche
Tornado Scenario



Extent/Severity

Okarche considers a minor severity tornado to be a tornado of EF1 level or lower on the Fujita Scale, and a major severity tornado to be a tornado greater than an EF1 level.

Impact

Storms that generate tornadoes also have the ability to cause lightning, hail, high winds, and flooding. Tornadoes can result in injuries, loss life, and destruction of homes and businesses. They can also severely individual and community revenues, increase the need for medical care, and require government assistance to recover.

History

Okarche reported two tornadoes between 1995 and 2011 These are summarized briefly below.

Historical Tornadoes

- May 3, 1999** – One of the largest tornado outbreaks in Oklahoma history spawned 58 tornadoes, two of which touched down near Okarche. Both produced minimal damage in Canadian and Kingfisher Counties. The first, an F0 tornado, formed about 1.5 miles east of Okarche near the Canadian/Kingfisher County line and stayed on the ground for approximately four miles moving north-northeast. One barn was destroyed, while another was damaged. The second F0 tornado touched down within the Town of Okarche. Total damage was \$5,000.
- March 27, 2004** – An F0 tornado 10 yards wide and 150 yards long touched down briefly two miles south southwest of Okarche. No damage was reported.

Worst-Case Tornado Scenario

According to the 2010 Census, Okarche contained about 481 housing units. A worst-case EF5 event would damage all 481 structures and result in losses estimated at \$38,198,200. Estimated average repair cost of \$79,414 per structure (damages ranging anywhere from windows and roofs damaged to total destruction). All critical facilities would be impacted, as shown in Tables F.4-7 and F.4-8.

Table F.4-7 Town of Okarche Tornado Scenario

EF Scale	Estimated Market Value	Damage Factor	Structure Damage	Contents Value	Contents Damage	Total Damage
1	\$4,686,400	.10	\$468,640	\$2,343,200	\$117,160	\$585,800
2	\$6,302,400	.40	\$2,520,960	\$3,151,200	\$630,240	\$3,151,200
3	\$8,403,200	.80	\$6,722,560	\$4,201,600	\$1,680,640	\$8,403,200
4	\$9,211,200	1.0	\$9,211,200	\$4,605,600	\$4,605,600	\$13,816,800
5	\$8,160,800	1.0	\$8,160,800	\$4,080,400	\$4,080,400	\$12,241,200
Totals	\$36,764,000		\$27,084,160	\$18,382,000	\$11,114,040	\$38,198,200

Table F.4-8 Critical Facilities in Okarche Worst Case Tornado Scenario

Map ID	Name	Address
Town Government		
1	Okarche Town Hall, Police, Fire	103 W. Oklahoma St.
2	Okarche Water Tower 1	5th and Kansas Ave.
3	Okarche Water Tower 2	5th and Okarche Ave.

Map ID	Name	Address
Education		
4	Okarche Public Schools	632 W. Oklahoma Ave.
5	Okarche Elementary School	315 N. 6th Street
6	Okarche Middle School	205 N. 4th Street
7	Okarche High School	632 W. Oklahoma Ave.
8	Holy Trinity Catholic School	211 W. Missouri
9	St. John's Lutheran Day Care School	201 S. 5th St.
Federal Government		
10	Okarche USPS	121 W. Oklahoma Ave.
Social Service		
11	Center for Family Love Campus	6th St. and Texas Ave.
Financial Institutions		
12	First Bank of Okarche	202 Oklahoma Ave.
13	Community National Bank of Okarche	653 US Highway 81

Conclusion

Okarche has a High vulnerability to and High probability of the Tornado hazard. All Canadian County communities are highly vulnerable to this hazard, including Okarche, which has experienced two tornadoes from 1995 to 2010. Given this frequency, Okarche can expect a tornado every 7.5 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.

4.3 High Wind

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

Frequency

Between 1995 and 2011, Okarche experienced nine separate high wind events, or an average of one high wind event every 1.6 years

Extent/Severity

Okarche considers a wind force on the Beaufort Scale of 9 (55 mph) or below to be a minor severity wind force and a wind force of greater than 9 to be a major severity wind force

Impact

The impact of this hazard can result in injury and death to people, damage to homes and businesses, and cause loss of income and community revenues.

History

Okarche experienced nine high wind events between 1995 through 2010, only one of which was reported to have caused damage (\$130,000). Based on this data, Okarche can expect about \$14,000 in damages per event, or annual damages of \$8,600 from high winds. Some of these events are summarized below.

- **August 2, 1996** - Severe thunderstorm winds in and near Okarche brought major damage to the area. Three mobile homes were damaged or destroyed by severe thunderstorm winds, and two recreational vehicles and a cattle trailer were overturned. Three barns

were destroyed, roofs of schools were damaged, and numerous trees were split or uprooted. Damage was \$130,000.

- **March 7, 2000** – 60-mph winds reported at Okarche.
- **June 5, 2008** - Sustained winds were estimated near 60 mph for three to four minutes, with gusts of 70 to 80 mph.

Worst-Case High Wind Event

A worst-case high wind event would be a storm with winds of 130 to 150 mph, as struck Piedmont on May 24, 2011. Winds of this magnitude can accompany tornadoes and are often indistinguishable from them. Such extreme wind events can result in considerable damage to roofs, signage, trees and outbuildings.

Conclusion

Okarche has a High vulnerability to and High probability of the High Wind hazard. The Town can expect a high wind event every 1.6 years that does an average of \$14,400 damage. 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

Okarche can expect to experience about nine severe thunderstorm events a year, any one of which can carry potentially damaging lightning.

Extent/Severity

Based on the information provided by the National Weather Service, Chapter 4, Okarche 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

Lightning's impact can include people displaced from their homes, businesses being closed, and financial loss due to urban fire, wildfire and damaged electronic equipment and data files.

History

Okarche has reported no damaging lightning events within the Town.

Worst-Case Lightning Scenario

A worst-case lightning event for Okarche would be one that knocked out the electrical system and damaged or destroyed electronics at one or more of the Town's primary critical facilities.

Conclusion

Okarche has a High vulnerability to and High probability of the Lightning Hazard. Okarche can expect to experience about nine severe thunderstorm events a year, any one of which can carry potentially damaging lightning. Because of its exposure to thunderstorms, 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 all critical facilities to protect electronic systems which are essential in times of natural hazards.

4.5 Hail

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

Frequency

Between 1995 and 2010 Okarche reported 14 separate hail events for an average of about one event per year, with hail stones ranging in size from 0.75 to 4.5 inches in diameter.

Extent/Severity

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

Impact

Large hailstones can also cause serious bodily injury. Hail can damage cars, shred roof coverings, and lead to water damaged ceilings, walls, floors, appliances, and personal possessions. As a general rule, hail damage increases sharply when stones reach 1.75 inches (H5) in diameter and larger, accompanied by high winds. The impact of this hazard remains mainly financial, although during the harvest season damage to crops can be devastating to farmers and the local economy.

History

Okarche reported 14 separate hail events from 1995 through 2010, for an average of about one event per year. Seven of these events dropped hail 1.75 inches in diameter and larger. The largest hail event reported in Canadian County (4.5 inches) fell at Okarche on August 17 1994. The massive thunderstorm of May 23, 2011, which generated EF4 and EF5 tornadoes, resulted in six hail reports for that date. As a general rule, hail damage increases sharply when stones reach 1.75 inches in diameter and larger, if driven by high winds. Given this measure, Okarche has experienced seven potentially damaging hail events in the 15 years from 1995 through 2010, and can thus expect such an event once every two years.

- **August 17, 1994** – 4.5-inch, 2.75-inch and 2.5-inch hail reported at Okarche. Damage was \$100,000. The 4.5-inch hail fell four miles southeast of Okarche, causing half of the reported damage.
- **May 25, 1998** – A severe thunderstorm carrying 16 tornadoes moved through northern Kansas into central Oklahoma. Tennis ball-size hail (2.5 inches in diameter) damaged the wheat crop and numerous vehicles in Okarche. No damage figures were reported.
- **July 20, 2002** – 2.5-inch hail fell at Okarche.
- **May 29, 2004** – A super cell thunderstorm dropped 2.75-inch hail at Okarche, breaking the windshields of the town's Police Department cruisers and heavily damaging school buildings. In all, the hail broke 61 windows and 26 skylights. The school roof and four police vehicles were determined to be total losses. Several other homes and vehicles were also damaged. Losses were \$500,000.
- **May 23, 2011** – This severe thunderstorm which did great damage in Calumet, El Reno and Piedmont, also dropped 2.5 and 2.75-inch hail on Okarche. No damage reports are found in the NCDC data base, but the *Kingfisher Times and Free Press* reported that Okarche was hard hit by hail, damaging both structures and crops.

Worst-Case Hail Scenario

Canadian County's largest hail storm was the 4.5 inch event reported at Okarche in August 1994. The County's most damaging storm, however, occurred in May 2004, also at Okarche, which

resulted in \$500,000 damage. A worst-case event for Okarche would be a repeat of either of these events.

Conclusion

Okarche has a High vulnerability to and High probability of the Hail hazard. Okarche has been hit by hail 14 times in the period 1995 through 2010, with hail ranging from 0.75 to 4.5 inches in diameter, with seven potentially damaging hail storms. Okarche can expect a hail storm every year, and a potentially damaging hail event every two years.

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 Okarche has experienced the same number of storms.

Extent/Severity

Okarche considers a minor severity winter storm to be a Level 2 event or below (ice accumulation of less than $\frac{1}{4}$ inch—see Table 4-21), and a major severity event to be Level 3 and above (ice accumulation above $\frac{1}{4}$ inch) resulting in personal injury or death, water or power outages, travel disruptions, damage to private property and public infrastructure.



2002 Ice Storm in Okarche

Impact

The impact of a winter storm can affect a region for weeks and even months. People and livestock are susceptible to frostbite and death from exposure. Houses, roads, electrical poles and lines, and water systems, are all vulnerable to severe winter storms. Houses are damaged from the weight of snow or ice, roads buckle and or become slick and hazardous, electrical poles and lines break, and people lose electricity and heat, water lines freeze and burst, and people and livestock have no water.

History

During the period 1995 through 2010, Canadian County experienced 35 ice and snow events, or an average of 2.3 winter storms each year. Because of the general and widespread nature of winter storms, it can be reasonably assumed that Okarche has also experienced 35 ice and snow events during these years.

Worst-Case Winter Storm Scenario

A worst-case winter storm for Okarche would be winter storm that begins with an ice storm that cuts electric power to the community, followed by a week of subfreezing temperatures, freezing rain or snow fall, which impede the efforts of electrical crews to restore the grid and prevent essential emergency services from operating in a timely manner.

Conclusion

Okarche has a High vulnerability to and High probability of the Severe Winter Storm hazard. Oklahoma communities are often unprepared for extreme ice and snow storms which can wreak havoc on transportation networks, property, infrastructure and community services. The costs of a one-week winter storm can be (and have been) in the billions of dollars. 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. It is assumed that the community experienced the same number of events.

Extent/Severity

Okarche considers minor severity extreme heat to be extreme heat of 95°F or less on the NOAA Heat Index (see Chapter 4.7.1), and major severity extreme heat to be extreme heat of greater than 95°F on the NOAA Heat Index that lasts for more than two weeks.

Impact

The impact of extreme heat is primarily the danger to people and livestock and the increased risk of wildfire, 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. No NCDC reports mention Okarche, specifically, but it can be reasonably assumed that Okarche experienced the same number of extreme heat events as the rest of the County.

Worst-Case Extreme Heat Scenario

A worst-case scenario for Okarche would be a repeat of the extreme heat event of 2011, but lasting two 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

Okarche 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 the average high temperature was a record 86.8 degrees, worsened by drought and failed crops, are unusual even for Oklahomans and can result in heat-related illness, water shortages, electric grid failures and economic losses. The hazard can be mitigated by notifications and warnings to vulnerable populations, the establishment of cooling rooms, utility cost assistance and air conditioner loan programs, back-up electric generation for critical facilities, Medical Reserve Corps training, and similar measures.

4.8 Drought

The climatological and geographical aspects of this hazard in Canadian County are discussed more fully in Chapter 4.8.

Frequency

Okarche has experienced four droughts from 1996 through 2011. Given this data, the community can expect short-term drought every 4 years.

Extent/Severity

Okarche considers a minor severity drought to be greater than a -2 on the Palmer Drought Index and a major severity event to be -2 or lower. The Scale goes from -4 to +4, with lower numbers indicating greater drought. See Chapter 4-8 for a discussion of this and other drought indexes.

Impact

The most direct impact of drought is economic rather than loss of life or immediate destruction of property. Drought affects water levels for use by communities, 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

Okarche is primarily an agricultural community. Okarche receives its water from three wells about 13 miles west of town. Rural Canadian County in the Okarche area is served by Okarche Rural Water District, which draws from two wells. The two systems have their own treatment facilities, storage and distribution lines.

Photos from the 2011 drought indicate that Canadian County was severely impacted by this most recent drought event. Given that agriculture is one of the primary supports of the Okarche economy, it is likely that the town will experience relatively greater impacts from drought than the more populous communities to the east whose economies are more urbanized and connected to the Oklahoma City water system.

Worst-Case Drought Scenario

A worst-case scenario would be a drought as severe as that of 2011 extended over a two- or three-year period, combined with low flows on the North Canadian River and significantly reduced aquifer recharge.

Conclusion

Although Okarche's water supply has been adequate, its long-term vulnerability to and probability of the Drought Hazard is High. The North Canadian groundwater resources have proven remarkably stable, and are considered among the best aquifers in the state. The terrace aquifer from which Okarche draws water is fed both from the River and from a southwest trending groundwater aquifer. In recent years there have been significant declines in water flows in the upper reaches of the river, largely due to irrigation, stock ponds, and reservoirs. It is too early to assess what the long-term impact of this decline will mean for Canadian County communities like Okarche. To date the Town's water supply has not been significantly impacted by low flows in the North Canadian River, or by the 2011 drought. Groundwater recharge studies have indicated that withdrawals at a rate of 270 acre-feet per square mile can be made for up to 4.5 years even without recharge. Enough, that is, to survive most droughts. Okarche is a member

of the Central Oklahoma Water Resource Authority whose task is to find long-term solutions to the area's water needs.

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. Expansive Soils are discussed in more detail in Chapter 4.9.

Location

The Town of Okarche has soils that are classified as Moderate and Low. Table F.4-9 shows the breakdown of soil types and a map of Okarche's expansive soils is presented in Figure F.4-8. Almost all of Okarche is built upon soils with a Low shrink/swell potential. However, the incorporated area to the south of town, beginning generally at the point where Stroh Ave. meets US Highway 81, is almost entirely comprised of Moderately expansive soils.

Table F.4-9 Town of Okarche Expansive Soils

Expansion Potential	Area (sq. mi.)	Percent of Land Area
Very High	0	0
High	0	0
Moderate	1.106	60.474%
Low	0.718	39.253%
Water	0.005	0.273%
Total	1.829	100%

Source: U.S. Department of Agriculture

Extent/Severity

Okarche considers a shrink-swell level of Moderate and below based upon the NRCS soil data base 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.

There is no data concerning damage that has been due to expansive soils.

Impact

The impact of this hazard occurs over time and affects structures and infrastructure. 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.

History

There have been no reports of damage from expansive soils in the community.

Worst-Case Expansive Soils Scenario

Okarche's greatest vulnerability to expansive soils is its aging infrastructure – particularly its water and sewer lines – during times of extended drought. A worst-case scenario would be the extension of an extreme drought, like that of 2011, into two or more years. The impact would not be catastrophic, but constant and financially draining.

Conclusion

Okarche has a Low vulnerability to and Low probability of the Expansive Soils hazard. Almost all of Okarche's urbanized area, and all its critical facilities, are built upon Low expansive soils,

with the exception of the homes built along Stroh Ave. that are categorized as Moderate expansive soils.

4.10 Urban Fire

Okarche's Volunteer Fire Department has 20 fire fighters operating in a Town of less than two square miles in size and has an ISO rating of 5. The members of the VFD also respond to fires in a fire district of 187 square miles, including 97 square miles in Canadian County and 90 square miles in Kingfisher County. The Town of Okarche is equipped with 76 hydrants and the VFD has a floating pump capable of drafting water from other available sources.

Location

According to the Census Bureau, 19.8% of Okarche's residential structures were built before 1939; 46% before 1969. Wood was being used to heat 0.3% of homes. Most of the Town's older housing stock is located in its urban core, south of Missouri Ave. and north of Texas Ave.

Frequency

The Okarche Fire District can expect about 1.6 single family home fires each year, 0.4 mobile home fires, 0.6 fires in office/commercial facilities, and 2.1 in industrial/warehouse structures, causing about \$367,840 damage annually. The community can expect fire in one critical facility every 10 years.

Extent/Severity

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

Impact

The impact of urban fire can be death and injury to civilians or emergency personnel, the loss of homes and businesses, and the loss of employment and local revenue streams. The loss of homes, businesses, jobs can be devastating to families and communities.

History

From 2000 through 2009 Okarche had 16 single family residential fires, four fires in mobile homes, six office/commercial fires, and 21 industrial/warehouse fires, all outside of the Okarche Town Limits. According to the retired Fire Chief, the last structure fire in the Town of Okarche was in 2005. These events are summarized in Table F.4-10.

Table F.4-10 Okarche Urban Fire Damages 2000-2009

Year	Single Family		Apartment		Mobile Homes		Other Residential		Office/ Commercial		Warehouse/ Industrial		Total	
	#	Dmg	#	Dmg	#	Dmg	#	Dmg	#	Dmg	#	Dmg	#	Dmg
2000	1	\$80,000	0	\$0	0	\$0	0	\$0	0	\$0	10	\$2,149,200	11	\$2,229,200
2001	1	\$15,000	0	\$0	0	\$0	0	\$0	1	\$500	0	\$0	2	\$15,500
2002	4	\$89,500	0	\$0	1	\$600	0	\$0	1	\$2,000	0	\$0	6	\$92,100
2003	1	\$20,000	0	\$0	1	\$10,000	0	\$0	1	\$5,000	3	\$1,200	6	\$36,200
2004	2	\$120,000	0	\$0	0	\$0	0	\$0	0	\$0	2	\$40,400	4	\$160,400
2005	4	\$820,000	0	\$0	1	\$80,000	0	\$0	1	\$15,000	0	\$0	6	\$925,000
2006	0	\$0	1	\$100	0	\$0	1	\$3,000	0	\$0	2	\$45,500	3	\$48,500
2007	1	\$22,500	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	1	\$22,500
2008	0	\$0	0	\$0	1	\$6,000	0	\$0	2	\$1,000	0	\$0	2	\$1,000

Year	Single Family		Apartment		Mobile Homes		Other Residential		Office/ Commercial		Warehouse/ Industrial		Total	
	#	Dmg	#	Dmg	#	Dmg	#	Dmg	#	Dmg	#	Dmg	#	Dmg
2009	2	\$144,000	0	\$0	0	\$0	0	\$0	0	\$0	4	\$4,000	6	\$148,000
Totals	16	\$1,311,000	1	\$100	4	\$96,600	1	\$3,000	6	\$23,500	21	\$2,240,300	47	\$3,678,400

Source: Oklahoma State Fire Marshal

During the 2000-2009 time frames, there were two civilian injuries, one civilian death, and one fire fighter injury. (The Fire Marshall data does not specify the cause of fire injuries or deaths in its data base, so it is unknown whether these were from structure fires, wildfires, or traffic accidents.)

Conclusion

Okarche has a Low vulnerability to and Moderate probability of the Urban Fire hazard.

Okarche has a relatively compact urban core with an aging housing stock, but with a skilled fire department and adequate water supply with hydrants throughout the community. The fire department has mutual aid agreements with surrounding fire districts.

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. Okarche has a compact urban core. As an agricultural area, Okarche'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 winter and late fall. Agricultural land is usually plowed by the time the wildfire season arrives.

Wildfires are discussed more fully in Chapter 4.11.

Location

Okarche has a relatively compact urban core surrounded by an incorporated area that is essentially rural and slowly developing in large lot residential and rural estates. Running through the community are the Union Pacific railroad and US Highway 81/OK Highway 3. The undeveloped land within the City Limits and in the fire district, crossed by railroads and highways, can become a tinderbox from late summer into winter, especially in times of drought. See Wildfire vulnerability in Figure F.4-9.



Grass fire burns 30 acres in Canadian County near the town of Okarche

Frequency

From 2000 through 2009, the Okarche's Fire Department responded to 177 wildfires, or 17.7 wildfires a year that burned 225 acres (per year) and caused \$13,243 in annual damage.

Extent/Severity

Okarche considers a reading of Moderate and below on the USDA Fire Danger Rating System to be a minor severity condition, and a rating of above Moderate on the USDA Fire Danger Rating System to be a condition of major severity.

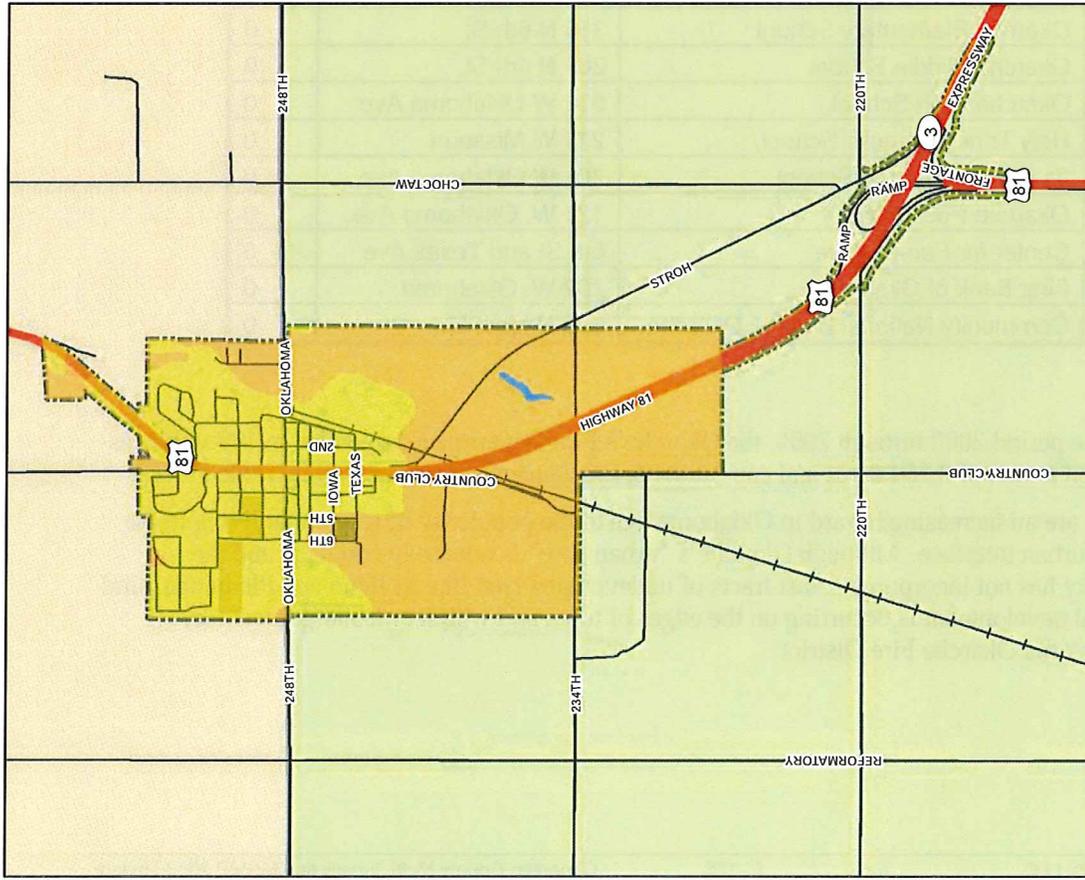


Figure F.4-8:

Town of Okarche
Expansive Soils

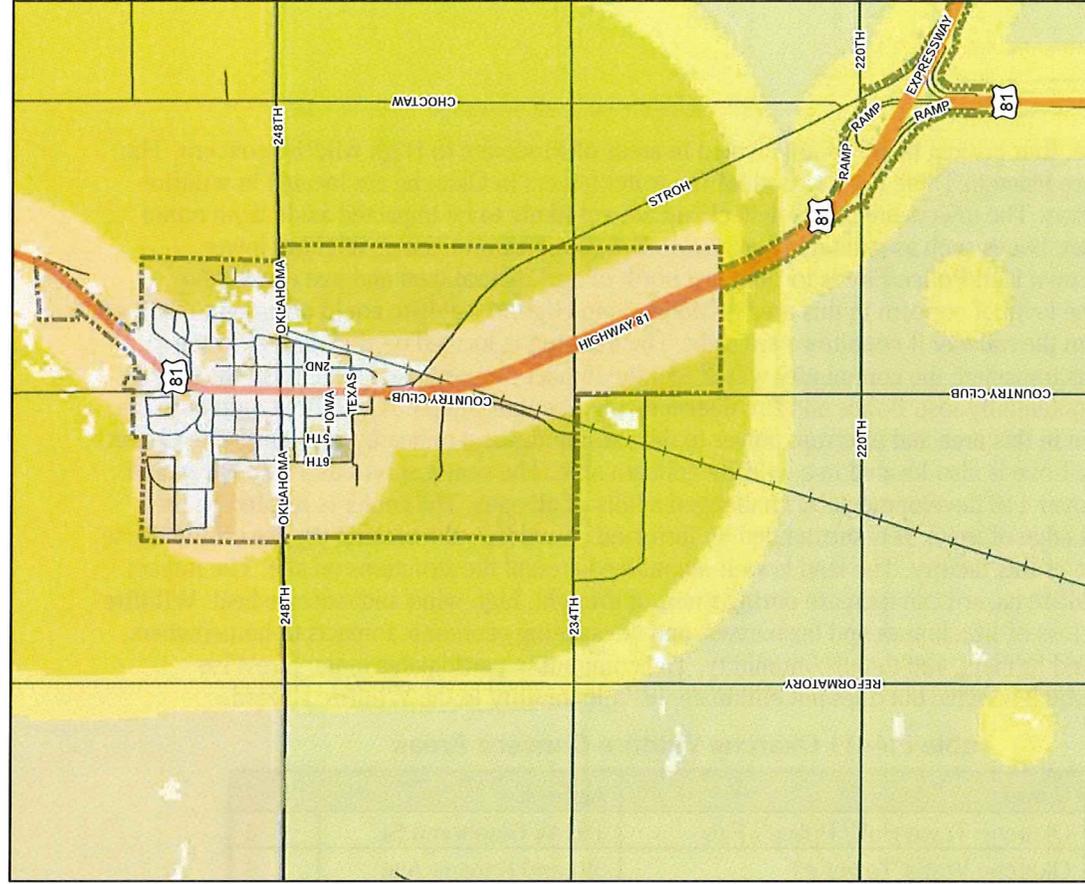
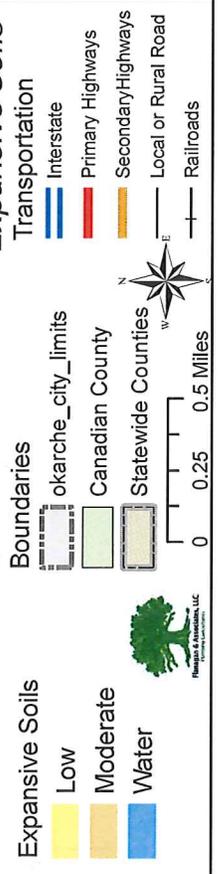
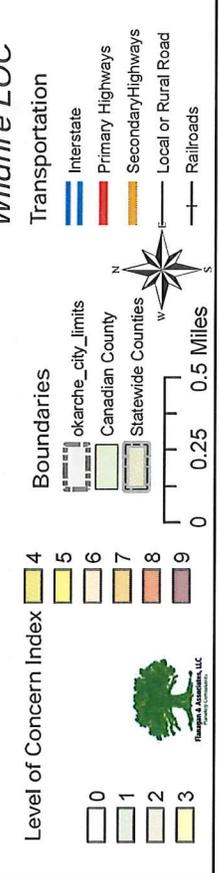


Figure F.4-9:

Town of Okarche
Wildfire LOC



Impact

In Okarche, four critical facilities are located in areas of Moderate to High wildfire concern. The facilities are listed in Table F.4-11. Both of the water towers in Okarche are located in wildfire concern areas. The towers are made of steel and are not likely to be impacted aside from minor maintenance issues such as paint damage. A wildfire could prevent access to either tower. Okarche Town Hall/Police/Fire is located just north of agricultural land and just east of the railway; the level of concern in this area is Moderate to High. A wildfire could occur as a result of sparks from the railway if conditions are right. The building is located on rock gravel. If the facility was impacted, the community would feel the impact. Important documents in the facility would be potentially lost. Police and fire dispatch could be interrupted. A wildfire could burn the poles down in this area and interrupt power in the community and to nearby residents. The Center for Family Love is also located in a wildfire concern area. The center serves as a safe haven and home for over 110 developmentally challenged adults of all ages. The center is located on the Southwest edge of town. It is surrounded by farmland. A wildfire threatening the area could cause evacuation of this facility. The land is well maintained around the structures on site. 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. The community participates in the FireWise program which lessens, but does not eliminate, its vulnerability to the Wildfire Hazard.

Table F.4-11 Okarche Wildfire Concern Areas

ID	Name	Address	LoC
1	Okarche Town Hall / Police / Fire	103 W Oklahoma St	6
2	Okarche Water Tower #1	5th and Kansas Ave	6
3	Okarche Water Tower #2	5th and Okarche Ave	6
4	Okarche Public Schools		0
5	Okarche Elementary School	315 N 6th St	0
6	Okarche Middle School	205 N 4th St	0
7	Okarche High School	632 W Oklahoma Ave	0
8	Holy Trinity Catholic School	211 W Missouri	0
9	St John's Lutheran School	201 W Oklahoma Ave	0
10	Okarche Post Office	121 W. Oklahoma Ave.	0
11	Center for Family Love	6th St and Texas Ave	6
12	First Bank of Okarche	202 W. Oklahoma	0
13	Community National Bank of Okarche	653 N Main St	0

History

During the period 2000 through 2009, the Okarche's Fire Department responded to 177 wildfires that burned a total of 2,254 acres and caused \$132,430 damage as summarized in Table F.4-12.

Wildfires are an increasing hazard in Oklahoma due to the popularity of residential living in the wildland/urban interface. Although Okarche's "urban core" is relatively compact, and the community has not incorporated vast tracts of undeveloped land like El Reno and Piedmont, rural residential development is occurring on the edges of town and within much larger territory comprising the Okarche Fire District.

Table F.4–12 Okarche Wildfires 2000-2009

Year	Runs	Acres Burned	Damages
2000	18	0	\$5,395
2001	20	100	\$70,000
2002	22	300	\$3,500
2003	14	306	\$14,000
2004	8	69	\$17,835
2005	17	281	\$2,750
2006	22	465	\$9,200
2007	20	256	\$5,850
2008	25	312	\$2,900
2009	11	165	\$1,000
Totals	177	2,254	\$132,430

Source: Oklahoma State Fire Marshal

Given that the land surrounding Okarche is predominantly cultivated, the community’s most vulnerable time for wildfire is in late April to early June when the wheat crop matures.

Worst-Case Wildfire Scenario

A worst-case event for the community would be a wildfire that resulted in injury or death, damage or destruction to homes, schools, businesses, farms or oil and gas industry facilities and the associated economic consequences.

Conclusion

Okarche is considered to have a Low vulnerability to and Moderate probability of the Wildfire hazard. Okarche is a participant in the FireWise Program, and has conducted an assessment of its vulnerability to wildfire (the findings were “Low” vulnerability) and developed a prioritized list of mitigation measures and an Action Plan. The Plan calls for (1) increasing public awareness of the danger of wildfire, (2) making brochures available at the Fire Station, (3) inviting speakers to talk with school groups, (4) conducting a Spring Clean-up Day, and (5) chemically treating or removing vegetation along the highway.

4.12 Earthquake

Earthquakes are considered a general hazard that occurs more or less randomly and unpredictably throughout Canadian County. Okarche’s vulnerability to earthquakes is the same as the rest of the County. See Chapter 4-12 for more detail on the Earthquake hazard.

Frequency

In the 15 years between 1995 and 2009, Canadian County recorded 28 earthquakes, followed by cluster of 11 more tremors on March 11-12, 2010. Given this frequency, Okarche can expect a nearby tremor every 3.7 years.

Extent/Severity

Okarche considers an earthquake of 4.8 magnitude and less on the Richter Scale a minor severity earthquake and an earthquake of a 4.8 magnitude or more on the Scale to be an event of major severity.

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 earthquake in Prague, in Lincoln County, in November 2011 caused damage to several homes, resulted in some highway buckling and toppled two brick towers on St. Gregory University's campus in Shawnee, Oklahoma, 20 miles away.

History

Canadian County experienced 28 earthquakes between 1995 and 2009, followed by cluster of 11 quakes in on March 11-12, 2010. Four of these events were within five miles of Okarche.

Conclusion

Okarche 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 the environment. 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, and can be released from fixed-sites or as a result of transportation accidents. In this Plan, pipelines are considered a transportation network and are covered under Transportation hazards, including those above-ground metering and booster facilities, which can sometimes be quite large.

Location

There are four fixed-site Tier II Hazardous Materials facilities within the boundaries of Okarche, two of which contain extremely hazardous materials as shown in Table F.4-13. There are 1064 people, 304 homes and 12 critical facilities within a quarter mile of these fixed-site Tier II sites, according to the Marplot analysis using 2000 Census data. Impacted critical facilities are listed in Table F.4-14, and are depicted in Figure F.4-10.

Table F.4-13 Okarche Tier II Sites

Facility	Address	Contains EHS	Population Within ¼ mile
Municipal Swimming Pool	6th and Iowa Ave.	Y	131
CHS Inc dba Plains Partners Okarche Main	Industrial Ave. and Oak St.	Y	265
Agrilliance Service Center	115 E. Oklahoma Ave.	Y	323
Ranger S Store	114 N Main	N	345

Table F.4-14 Critical Facilities within 1/4 Mile of Okarche's Tier II Sites

Map ID	Facility	Address	Type	EHS
1	Okarche City Hall/Police	103 W. Oklahoma St.	Government	Y
10	Okarche USPS	121 W. Oklahoma Ave.	Government	Y
12	First Bank of Okarche	202 W. Oklahoma Ave.	Financial	Y
13	Community National Bank of Okarche	653 US Highway 81	Financial	Y
6	Okarche Middle School	205 N. 4th St.	Education	Y
8	Holy Trinity School	211 W. Missouri	Education	Y
9	St. John Lutheran School	201 S. 5th St.	Education	Y
11	Center of Family Love	6th St. and Texas Ave.	Social Service	Y

Extent/Severity

Okarche considers a minor severity fixed-site Hazardous Materials incident to be a release of a toxic chemical that is unlikely to cause severe casualties and/or which meets the *Emergency Response Guidebook* definition of a “small spill,” and a major severity fixed-site Hazardous Materials incident to be the release of a toxic chemical which has the likelihood of producing serious injury or death and/or which meets the definition of a “large spill” for a particular chemical, according to the most current edition of the *Guidebook*.

Impact

In Okarche, populations most at risk of impact as a result of this hazard are those living or working in the ¼ mile buffer area of the Tier II sites. An incident at the facilities could cause shelter in place or evacuation procedures to be implemented. This brings a challenge to facilities that house special populations, such as the schools and the Center of Family Love. All facilities at these facilities should be well versed and aware of emergency procedures. It is not likely the facilities themselves would be impacted. The impact of a hazardous materials release on the community can include injury and loss of life, disrupted transportation systems, diminished emergency response, interrupted business operations, short- or long-term ecological damage or degradation.

History

There have been no fixed-site hazardous materials releases in Okarche.

Worst-Case Hazardous Materials Release Scenario

A worst-case hazardous material release for Okarche would involve a chlorine spill at the Municipal swimming pool.

Conclusion

Okarche is considered to have a High vulnerability to and Low probability of the Fixed-Site Hazardous Materials hazard.

4.14 Dam Failure

Okarche has no vulnerability to the Dam Failure hazard. Okarche is situated on high ground, with nearby streams flowing away from the town in all directions into Middle Uncle John’s Creek and Dead Indian Creek, both tributaries of Kingfisher Creek and the Cimarron River. Okarche would not be impacted by a dam failure anywhere in Canadian or Kingfisher counties.

Dam Failure is discussed in detail in Chapter 4.14

Conclusion

Okarche has no vulnerability to and no probability of the Dam Failure hazard.

4.15 Transportation

Location

There are four hazardous transportation corridors in Okarche: Highways, Railroads, Pipelines and Airports. These corridors are discussed in the following paragraphs and mapped in Figure F.4-11.

Highways

The Highway corridors consist of four miles of highways and one mile of County roadway. These are: US Highway 81 and OK Highway 3 which join at Okarche and traverse together generally north through the Town center as Main St. US Highway 81 is a four-lane thoroughfare to the

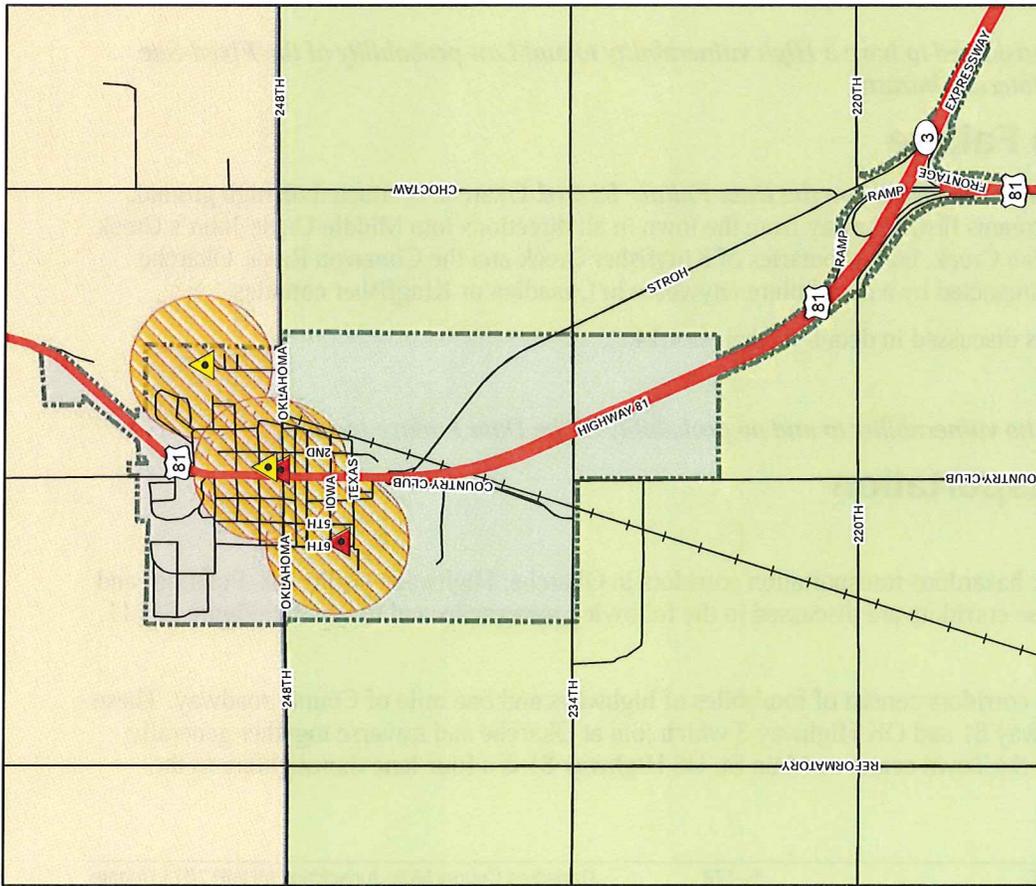


Figure F.4-10:

Town of Okarche
Hazardous Material Sites

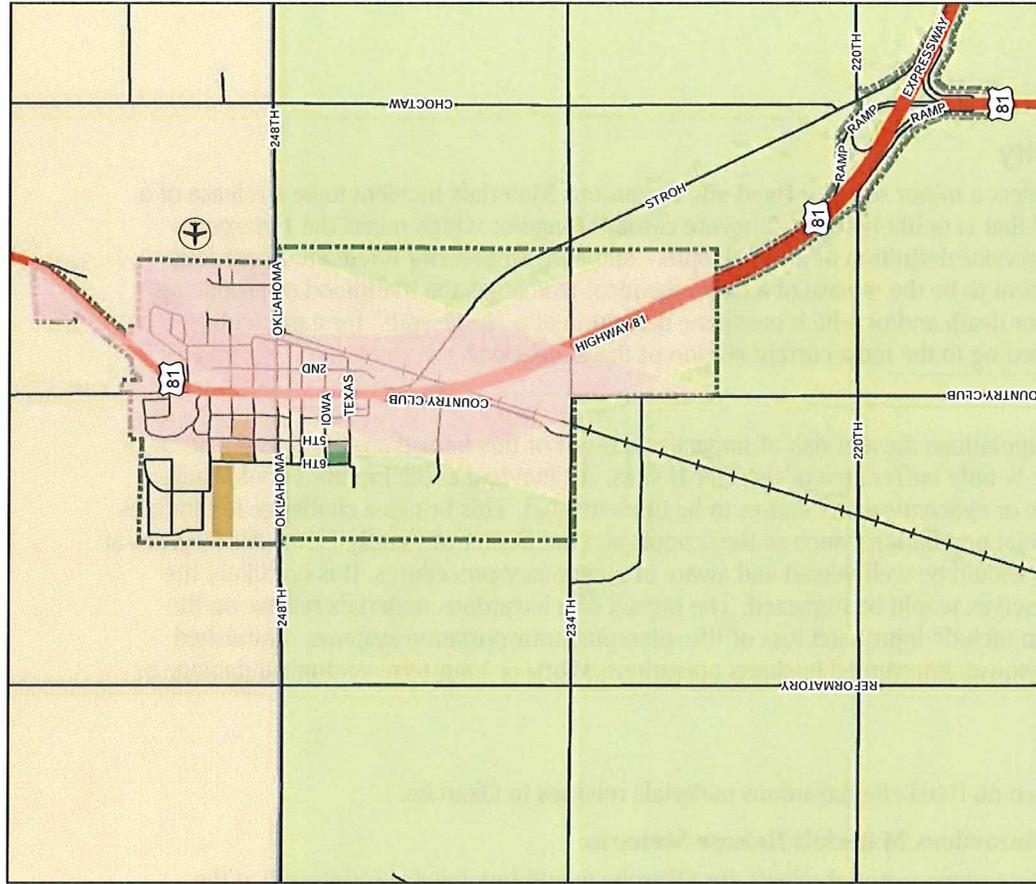
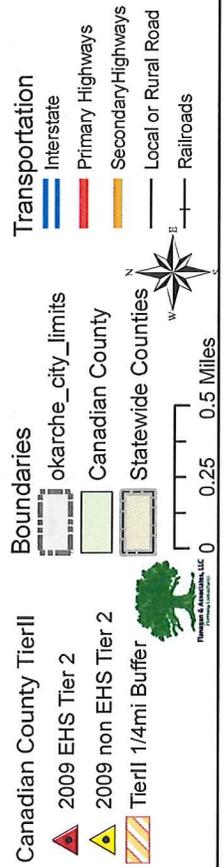
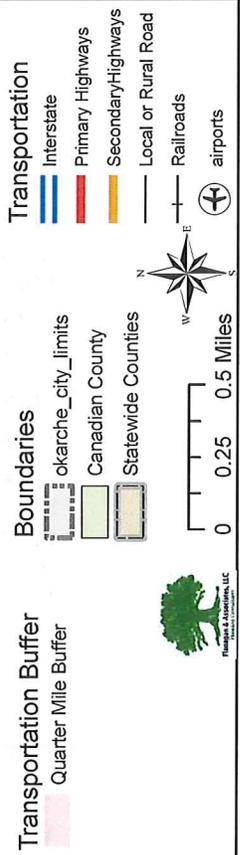


Figure F.4-11:

Town of Okarche
Transportation Corridors



north and south of Okarche. OK Highway 3 travels southeast from the south Town limits and is a major highway connecting directly to the urban core of Oklahoma City.

Railroad

The Railway corridor consists of the Union Pacific line that runs north-south through Okarche. The only unprotected crossing is at Oklahoma Ave. South of Okarche the railway underpasses US 81/OK 3 and overpasses Stroh Ave. The train, which often hauls petroleum and petroleum products along with other toxic and flammable loads, does not, as a rule, stop in Okarche. Occasionally it passes through the community at speeds higher than 40 mph. Other major cargos are wheat and food grains, aggregate, paper, coal, non metallic minerals and plastics.

Airports

There is one airport in Okarche on the east side of town. It is a private field. Two single-engine "crop duster" airplanes are located at the field. It has a 100-ft.-wide turf runway 2,440 ft. in length. There are no services at the field.

Pipelines

Two hazardous materials pipelines pass beneath Okarche. One carries crude oil northeast to southwest on the south side of Okarche, and passes beneath Stroh Ave. and Choctaw Ave. midway between NW 220th and 234th St. The second pipeline carries natural gas along the OK 3 right-of-way from southeast before turning west along 234th St.

Critical Facilities in the Transportation Corridor

A quarter-mile buffer was placed around the most significant of these corridors – highways and railroads. The Highway buffer encompasses 0.97205 of a square mile and affects 802 people. The Railroad buffer contains 0.80689 of a square mile and affects 518 people. Within these two corridors are nine critical facilities, which are listed in Table F.4-14 and mapped in Figure F.4-11.

Table F.4-15 Critical Facilities in Okarche's Transportation Corridors

Map ID	Name	Address
Town Government		
1	Okarche Town Hall, Police and Fire	101 N Choctaw Ave.
Education		
4	Okarche Public Schools	205 N. 4th Street
5	Okarche Elementary School	315 N. 6th Street
6	Okarche Middle School	205 N. 4th Street
7	Okarche High School	632 W. Oklahoma Ave.
8	Holy Trinity Catholic School	211 W. Missouri
9	St. John's Lutheran Day Care School	201 S. 5th St.
Federal Government		
10	Okarche USPS	121 W. Oklahoma Ave.
Financial		
12	First Bank of Okarche	202 Oklahoma Ave.
13	Community National Bank of Okarche	653 US Highway 81
Health Care		
11	Center for Family Love Campus	6th St. and Texas Ave.

Frequency

From 1995 through 2010, there were two transportation accidents in Okarche, both involving pipelines. These are listed in Table F.4-15. Given this data, Okarche can expect one pipeline accident every 7.5 years.

Table F.4-16 Transportation Accidents

Date	Incident	Location	Type	Material
05/23/06	Condensate spilled from a 10-inch pipeline into an unnamed dry creek. Cause was corrosion.	Okarche	Pipeline	Natural gas condensates
05/23/06	Condensate spilled from a 10-inch pipeline into an unnamed dry creek bed. Cause was corrosion.	Okarche	Pipeline	Natural gas condensates

Extent/Severity

Okarche considers minor severity transportation incidents to be those transportation incidents which cause no loss of life or injury, hazardous materials spills are contained within a quarter mile, detours are less than half a mile, and traffic disruption lasts less than half an hour, and major severity transportation incident to be a transportation incident that results in injury or loss of life, hazardous material spills that impact an area greater than a quarter mile, includes detours exceeding half a mile, and disruption of traffic of more than half an hour.

Impact

The impact of transportation events may include lost revenue, highway disruptions, explosions, fires, injuries and sometimes 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

Freight trains, tanker trucks and pipelines all carry hazardous materials through Okarche. From 1995 through 2010 there were two accidents involving these transportation corridors. While reassuring, such low numbers can be misleading. US 81/OK 3 carries a steady flow of hazardous materials through the heart of Okarche. This transport hazard is somewhat mitigated by the traffic signal at Oklahoma Ave. and by the 35-miles-per-hour speed limit through Town. The UP railroad has only one at-grade crossing at Oklahoma Ave. But trains have come through Okarche traveling at speeds as high as 60 miles per hour, according to witnesses. A UP train was derailed at Okarche in 1990. Thus, an accident involving both high speeds and hazardous materials is not inconceivable.

Worst-Case Transportation Accident

It is difficult to generalize on Okarche’s sparse transportation data. The most potentially hazardous corridors are US Highway 81/OK Highway 3 (although less so through the narrowed and speed-limited stretch known as Main Street) and the Union Pacific railroad. There have been no highway accidents or spills in the community over the past 15 years. Nevertheless, they remain potentially dangerous. As Okarche grows, especially should it expand south and southeast towards El Reno and Oklahoma City, its exposure to highway transportation incidents will likely increase. Of particular concern would be the tanker truck transport of flammable materials or toxic substances involved in a high-speed accident on US 81/OK 3 before entering the 35 mph speed zone in Okarche.

Also of concern is the Union Pacific railroad corridor which passes through the east side of Okarche. The long-term future will likely see increased use of this corridor. A worst-case event would be a train derailment and spill of hazardous or toxic materials within Okarche, or a train collision with a tanker truck carrying flammable or toxic substances at the Oklahoma Ave. crossing. Such event could cause evacuation or shelter in place procedures to be implemented in nearby homes and businesses.

Conclusion

Okarche is considered to have a High vulnerability to and High probability of the Transportation hazard. Okarche is a rural community of compact size, but with a considerable transportation presence: US Highway 81/OK Highway 3, the Union Pacific railroad, and two hazardous materials pipelines, both of which have a history of hazardous materials releases.

4.16 Hazards Summary

Hazards that impact the entire county randomly and more or less equally include Tornadoes, High Winds, Urban Fires, Extreme Heat, Drought, Lightning, Hail, and Earthquakes are addressed in more fully in Chapter 4.

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

The Hazards Composite Map, shown in Figure F.4-12, summarizes the areas of the community potentially impacted by site-specific hazards.

There are many areas for future growth that are relatively free of site-specific hazards – generally to the west, south and east of Okarche. The Floodplain areas should be avoided and remain in open-space. Okarche has no highly Expansive Soils within its Town Limits. The wildland/urban interface areas will likely remain vulnerable to Wildfires, and perhaps increase in exposure as rural residential development pushes west from the Oklahoma City Metropolitan Area. Okarche has assessed its Wildfire vulnerability and judged it to be low, but recognizes that vigilance, public information and careful landscaping is necessary to keep its vulnerability Low.

Much of Okarche is vulnerable to Transportation hazards from US 81/OK 3, and from traffic along County Line Rd. to the east. The Union Pacific railroad is likely to remain something of a wild card. While its safety record is good, freak accidents can and do happen, as witnessed by a 2008 BNSF derailment and explosion near Luther, Oklahoma in adjacent Oklahoma County. There was also a head-on collision of two Frisco trains in the County at Mustang in 1974.

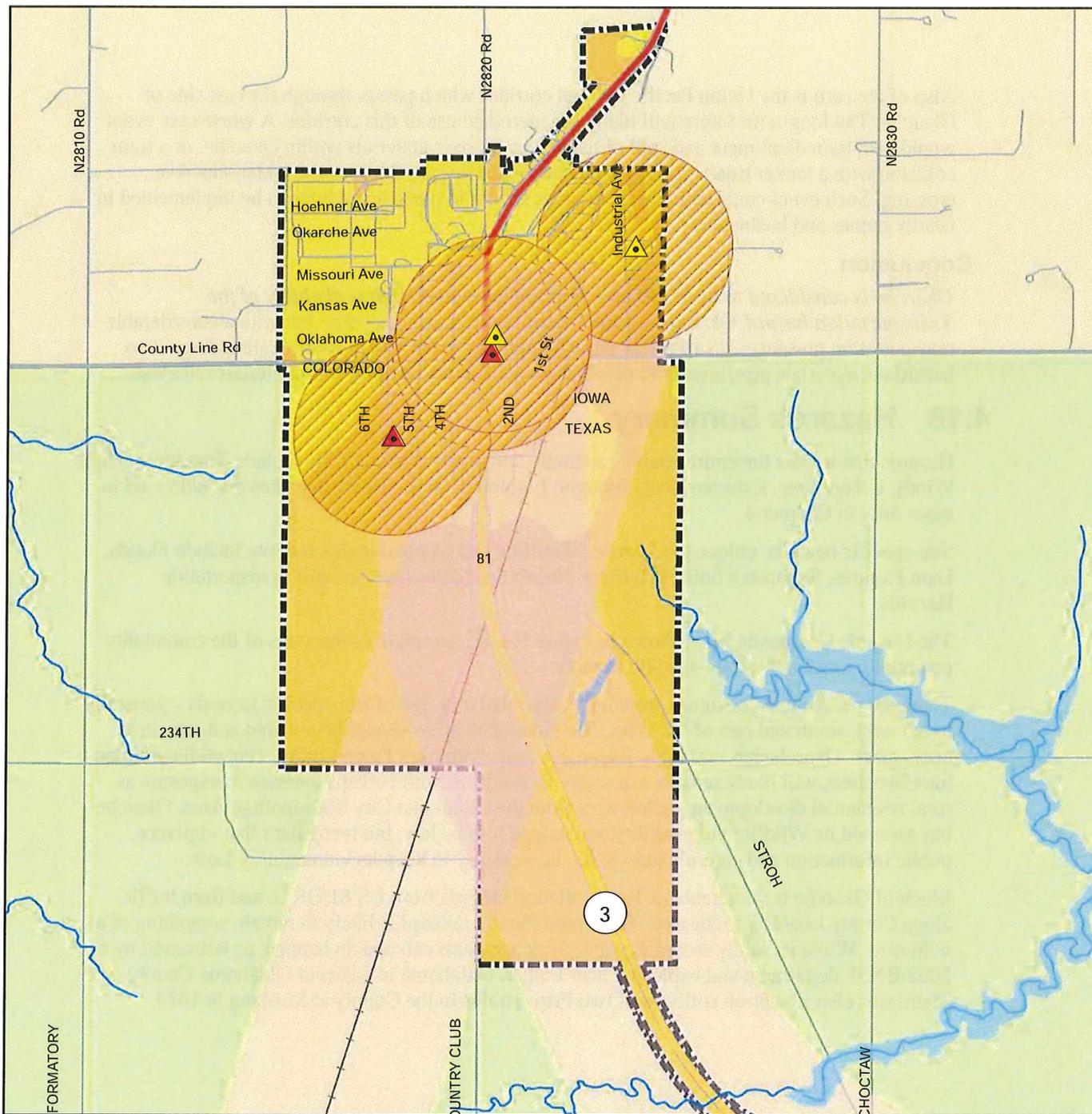


Figure F.4-12:

*Town of Okarche
Hazard Analysis*

Hazard Overlays

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

Expansive Soils

- Low
- Moderate
- Water

Boundaries

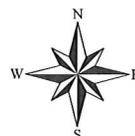
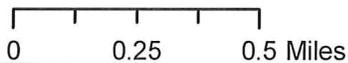
- okarche_city_limits
- Canadian County

Transportation

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



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Section 5 Mitigation Strategy

This section provides a description of Okarche'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 Okarche incorporates the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvements, when appropriate. Goals and objectives of the City of Okarche 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 Okarche, Oklahoma described the following process for implementing its hazard mitigation plan through existing planning mechanisms:

Okarche does not have an Emergency Operations Plan; they take advantage of the Canadian County EOP and rely on it for guidance during emergency situations. Upon formal adoption of the *Canadian County Multi-Hazard Mitigation Plan*, mitigation goals will be incorporated into future versions of the *Canadian Emergency Operations Plan*.

Okarche has developed a *Comprehensive Plan* that provides a broad framework for future development and community resource use. The Mayor is responsible for reviewing the hazard mitigation plan and recommending appropriate measures be integrated into the next update of the *Comprehensive Plan*. Meetings of the Town Board of Trustees 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 town planning documents and procedures.

A Capital Improvements Program "CIP" was passed by the citizens of Okarche to enhance the quality of life and focus on the bright future of Okarche. *The Canadian County Multi-Hazard Mitigation Plan* will be reviewed in coming up with a set of CIP recommendations for the next budget cycle. The Mayor is the responsible party for reviewing the hazard mitigation plan and suggesting which mitigation measures should be integrated into the *Capitol Improvements Plan*.

The Mayor of Okarche is responsible for overseeing the implementation and integration of the hazard mitigation plan into other planning mechanisms upon approval. According to Okarche's mayor, serving at the time of the plan update, opportunity exists for the hazard mitigation plan to be reviewed and integrated into plans for expanding water supply and accomplishing infrastructure development.

5.2 Prioritization Process of Mitigation Measures

Okarche has identified 33 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.

