CANADIAN COUNTY

Town of Union City, Oklahoma

2012 Multi-Hazard Mitigation Plan Update

Flanagan & Associates, LLC
Planning Consultants

Acknowledgements

The Town of Union City 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:

Union City Board of Trustees

Mayor ..... T. J. McCullough, Jr.
Vice-Mayor ..... Tracy Pappe
Trustee ..... Yvonne Meritt
Trustee ..... Larry Kesler
Trustee ..... Michael McCort

Town Administration

Clerk/Treasurer ..... Gina Dickerson
Police Chief ..... Eddie Dickerson
Fire Chief ..... David Jones
Assistant Fire Chief ..... Eric Stock
Public Works Director ..... Joseph Bosler

Hazard Mitigation Advisory Committee

Canadian County Emergency Manager ..... Jerry Smith
County Assessor ..... Ronnie Funck
Floodplain Director/Code Enforcement ..... Teresa Woolard
Emergency Management ..... Darrel Wilkerson, Jr.
First Baptist Church Pastor ..... Earl Stock

F.6 Union City

Union City is located in south-central Canadian County, eight miles south of El Reno and north of the Canadian River as shown in Locator Map Figure F.6-1. The Town is on the Union Pacific railroad line, which connects the Gulf Ports to the upper Midwest, and at the intersection of US Highway 81 and OK Highway 152.

Section 1 Introduction

1.1 Geography

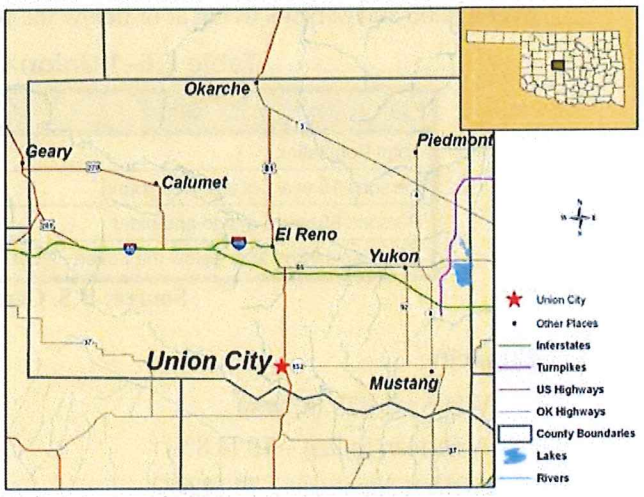
Latitude: 352330N

Longitude: 975629W

GNIS ID: 1099162

Union City is situated in central Oklahoma on the northern bank of the Canadian River. The Town has incorporated 59.2 square miles of land, while the urbanized core of the historic town is, itself, hardly more than one square mile in size. Figure F.6.2 is a Base Map of Union City. The Town's urbanized area is situated at about elevation 1,320. The Canadian River runs through this part of Canadian County from about elevation1,250 in the western part of Union City's incorporated area to elevation 1,230 in the east – about 80 feet above the River's floodplain.

Figure F.6–1 Town of Union City Locator Map



1.2 History

The post office of Union was established in 1889 in the area of what is now Union City. What later became the Chicago, Rock Island and Pacific railroad was built through the area in 1890.

Agriculture formed the basis of the Town's economy from the beginning – with perhaps the exception of a few wild years before statehood when 22 of the towns 35 businesses were saloons. By 1894 Union City had three grain elevators and a farm machinery dealership. In 1910 the brick Richardson Building (now on the National Register of Historic Places) was constructed in the downtown area, and commercial buildings anchored the four corners of US 81 and OK 152.

The Richardson Building, built in 1910, and on the Register of Historic Places.

Also known as the Meridian Highway, US 81 was completed across the United States in 1924 with the spanning of the Canadian River south of Union City. From 1909 until the 1970s, Union City's population held more or less steady at around 300, despite destructive tornado in 1973.

Union City's first school was built in 1894 for students through the 8th Grade. In 1920 four other school districts consolidated with Union City to form a four-year high school. The school gymnasium was completed in 1923.

Union City's most visible landmark is a grain elevator, which has a capacity of 500,000 bushels.

1.3 Demographics

After the 1973 tornado, by the time of the 1980 Census, the Town had grown to 558, and by 1990 to 1,000. The 2000 Census registered 1,375 citizens, and by 2010 the number had grown to 1,645. Table F.6-1 displays selected population information. Figures F.6-3 and F.6-4 present the persons over age 65 and persons living at or below the poverty level, respectively.

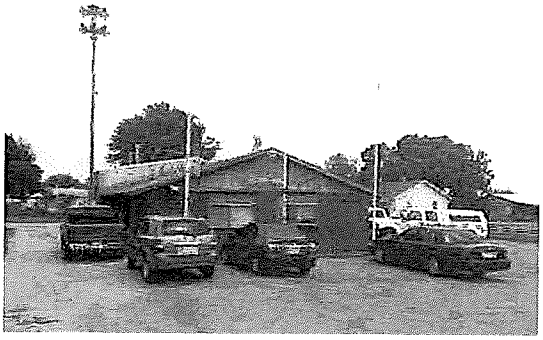
Table F.6–1 Union City Population

Group	2010	Percent
Total Population	1,645	
Persons 18 years of age and young	368	22.4
Persons 65 years of age and older	166	10.1
Individuals living at or below the poverty level (1999)	225	13.7

Source: U.S. Census Bureau

Ethnicity:

White – 1,379 (83.8%)
American Indian – 79 (4.8%)
African American – 74 (4.5%)
Hispanic – 76 (4.6%)
Asian – 8 0 (0.5%)
Other race – 21 (1.3%)



Union City Town Hall

1.4 Lifelines

See Chapter 1.2.6 for description of Lifelines.

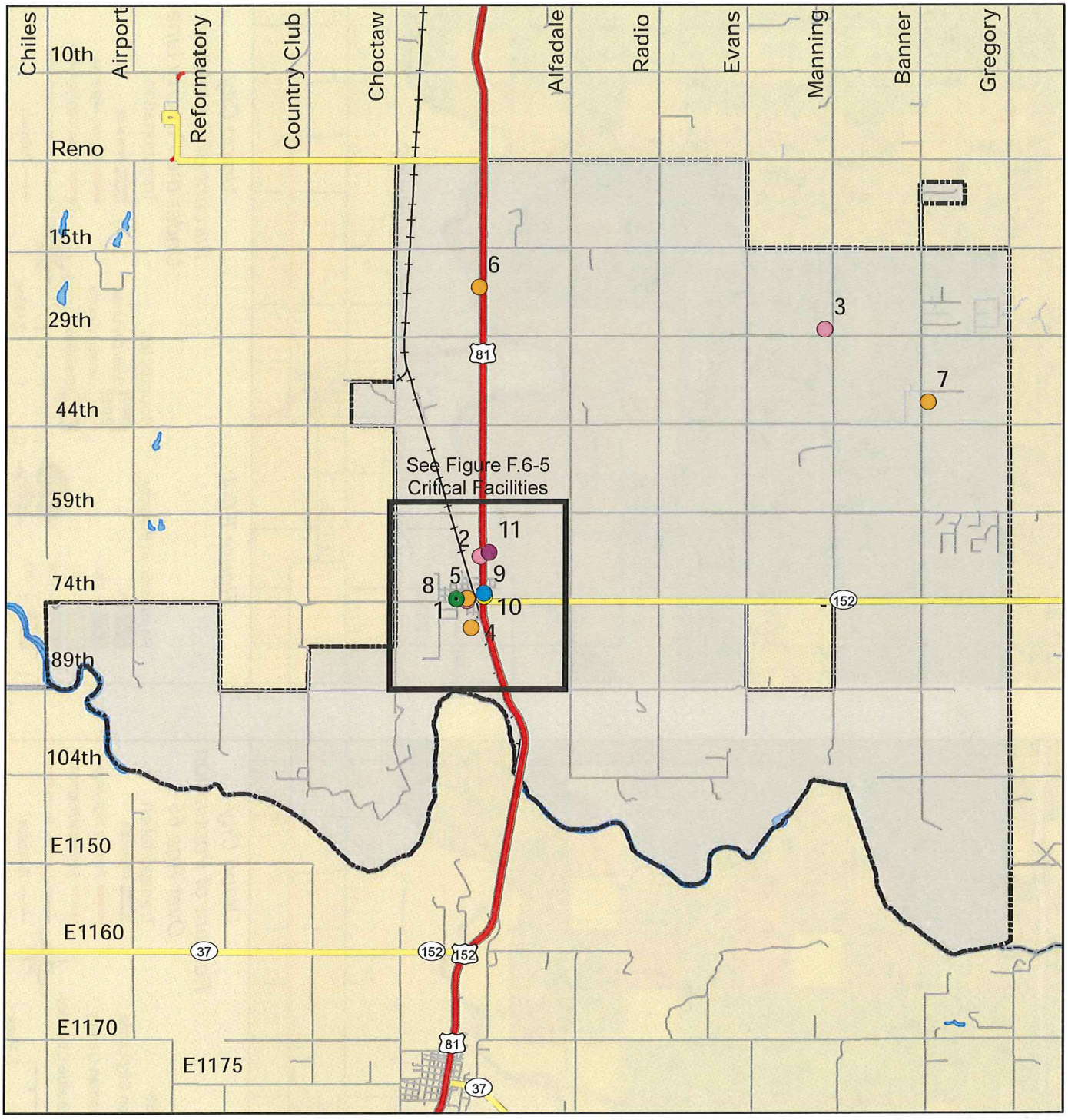
Union City Utility Systems

Electrical System

Oklahoma Gas & Electric Company and Caddo Rural Electric Cooperative.

Water Service

Water service is provided by the Union City Public Works Department, Canadian County Rural Water District #5, and Canadian County Rural Water Authority. Union City Public Works purchases water from the City of El Reno. The City has a 107,000 gallon standpipe along US 81 on the north side of town. Rural Water District #5, which serves the northwestern part of Union City is also supplied by El Reno. The Canadian County Water Authority, which serves eastern and northeastern Union City is supplied by Oklahoma City from Lake Hefner.



LEGEND

- Interstate
- US Highways
- State Highway
- Freeway ramp
- Local or Rural Road
- Railroads
- Water
- City Limits

Critical Facilities

- CITY
- UTILITY
- SCHOOLS
- BANK
- STATE
- FEDERAL

0 1 2 Miles

N W E S

Flanagan & Associates, LLC
Planning Consultants

Figure F.6-2

Town of Union City

Basemap

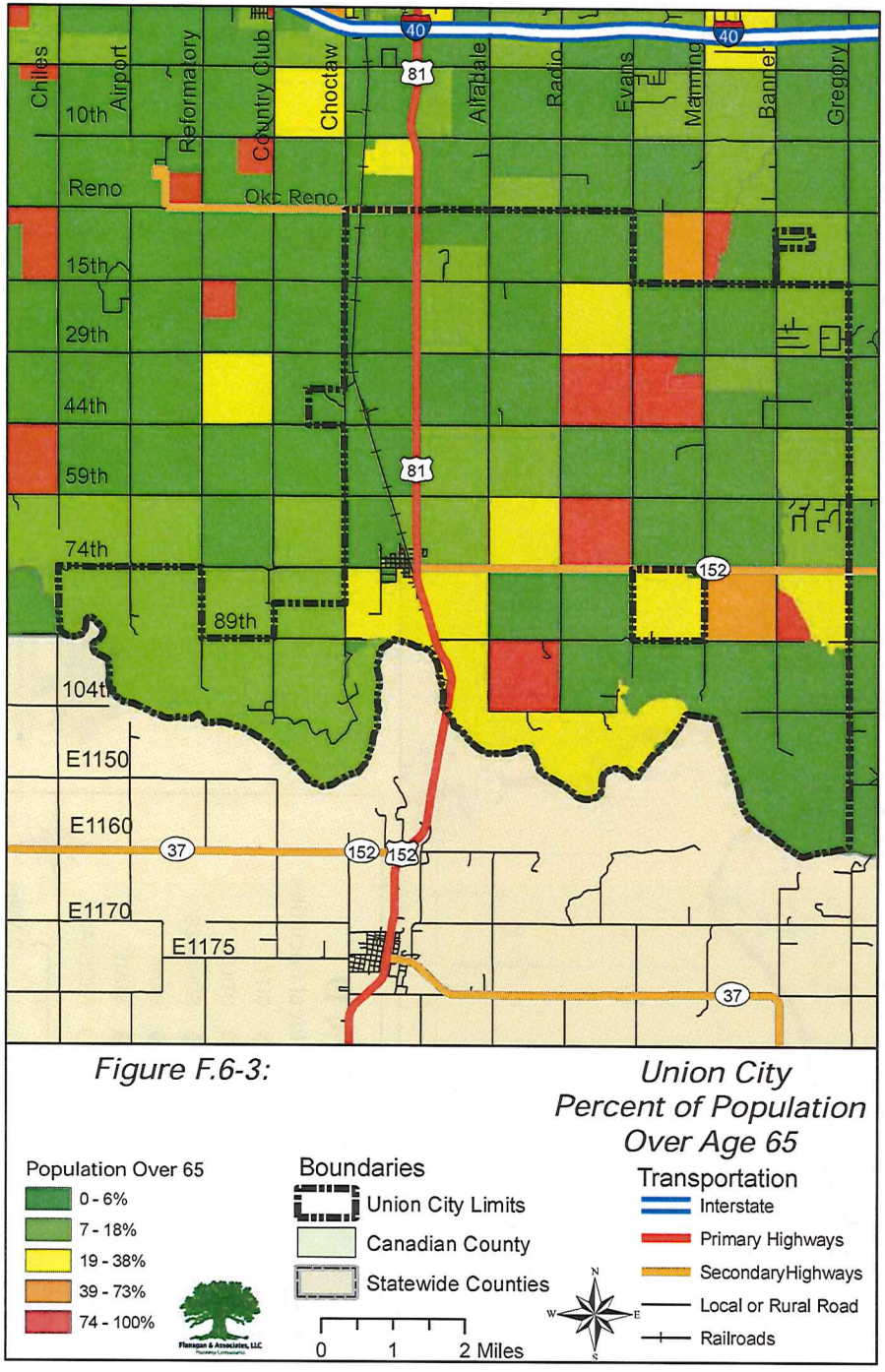


Figure F.6-3: *Union City Percent of Population Over Age 65*

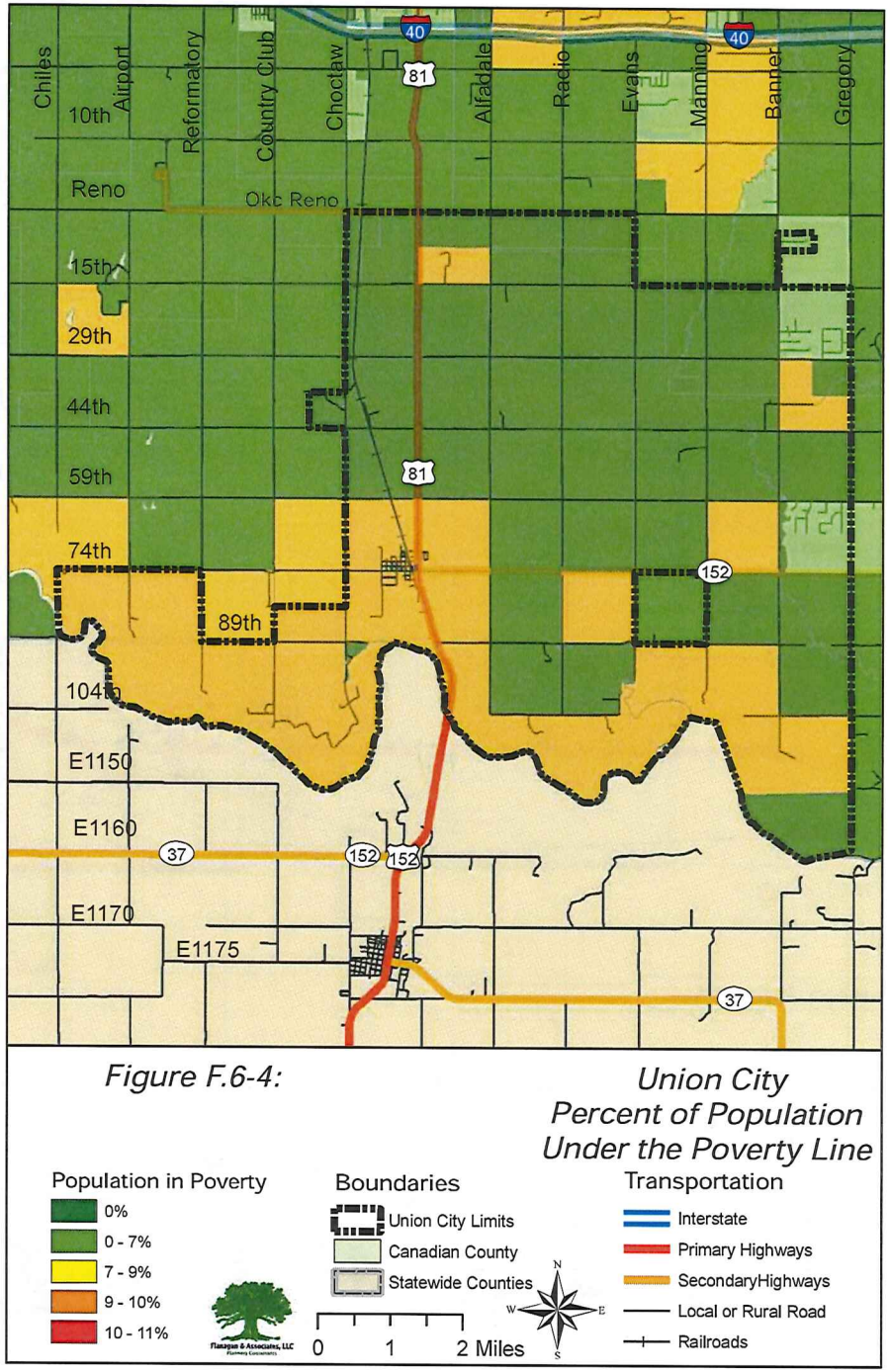


Figure F.6-4: *Union City Percent of Population Under the Poverty Line*

Wastewater Treatment

Sewer service for Union City is provided by Union City Public Works Department. The sewage lagoons are on the south side of Town, on the west side of US 81, on an unnamed south-flowing tributary of the Canadian River.

Natural Gas

Oklahoma Natural Gas Company.

Telephone & Cable

Oklahoma Communications System, Inc. (TDS Telecom)

Transportation Systems

Highways & Major Roads

- U.S. Highway 81 travels north-south through Union City.
- OK Hwy 152 runs east-west through Town and connects to Will Rogers World Airport in Oklahoma City.

Railroads

The Union Pacific railroad passes through Union City, running from the Gulf Ports of Texas to the upper Midwest.

Airports

- El Reno Regional Airport, is a publicly-owned, municipal field 8 miles north-northwest of Union City.
- Baker Airstrip, a private field, is located five miles north of Union City.
- Clarence E. Page Municipal Airport in Oklahoma City is nine miles north-northeast of Union City.
- Will Rogers World Airport is on the southwest side of Oklahoma City, about 18 miles east of Union City.

1.5 Economy

As of 2010, there were 1,277 people over the age of 18 in Union City. Of this number, approximately 55% were employed, 4.6% unemployed and 40.4% not in the labor force. Major employers are reflected in Table F.6-2.

Table F.6–2 Union City Major Employers

Employer	Product or Service	Employees
Union City Public Schools	Education	30
Union City Community Corrections Center.	Prison	30
Boral Bricks Inc.	Manufacturing	30

Development

Past Development

Union City has incorporated a large area surrounding its historical urban core. Although the City covers 59.2 square miles, its actual urbanized core is slightly more than one square mile in extent. When considering Union City's vulnerability to hazards and past and future development, this basic fact must be kept in mind. The great majority of Union City's inhabitants live in its urban core and the balance of the County more than 90% is undeveloped.

According to the 2010 Census housing units had risen to 568, of which 517 were occupied and 51 were vacant. Basic housing data is presented in Table F.6-3. More detailed 2010 Census data on the exact number of single-family, multi-family and mobile homes has not yet been released (as of November 2011).

Table F.6–3 Union City Housing Units, By Type

Housing Unit Type	2010
Single-family	430
Multi-family	1
Mobile homes	137
Boat, RV, van, etc.	0
Total housing units	568

Source: U.S. Census Bureau

According to the Canadian County Assessor's Office, there are 867 properties with improvements within Union City, with an independently estimated market value, of $61,480,201. The numbers of properties with improvements are shown in Table F.6-4.

Table F.6–4 Union City Property Types by Estimated Values

Improvement Type	Number	Estimated Market Value
Agriculture	314	$19,638,930
Residential	460	$29,561,904
Commercial	22	$5,847,486
Tax Exempt	71	$6,431,881
Total	867	$61,480,201

Source: Canadian County Assessor's Office

Development Plans

Union City has incorporated over 50 square miles. This act of incorporation was largely defensive, to keep Oklahoma City's rapid growth from eating up all the undeveloped land in the eastern half of Canadian County, and to preserve areas for Union City's future development. The areas most likely to grow are in the east and northeast sections of the incorporated area, between Gregory Rd. and Banner Rd. with growth pressure coming from Oklahoma City.

Closer in, new construction has occurred in the northeast quadrant and in the northwest. There are open areas of high ground (above elevation 1,320) southwest of Union City, north and west of Union Cemetery, north of Town generally, and east of Town to Alfadale Rd., on land that is presently devoted to agriculture and gas/oil production.

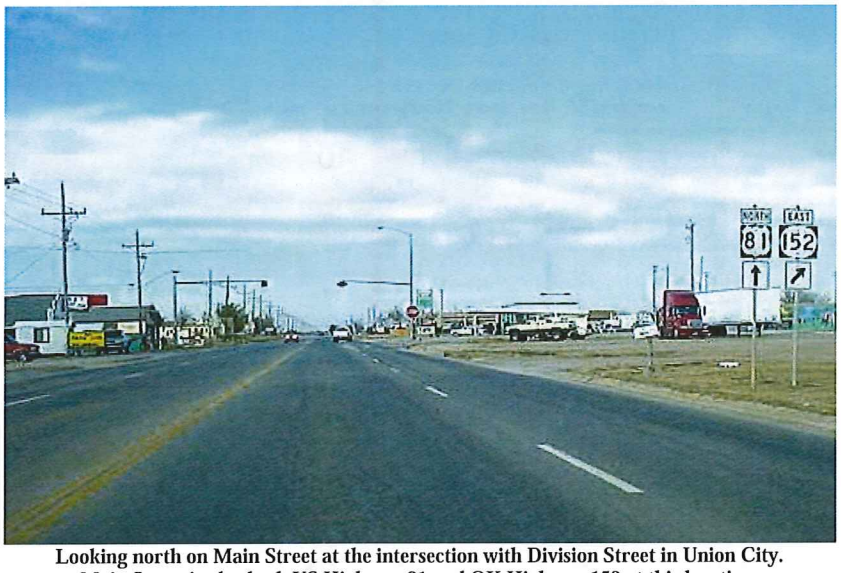
1.6 Critical Facilities

Union City's critical facilities are named in Table F.6-5 and illustrated in Figure F.6.-5.

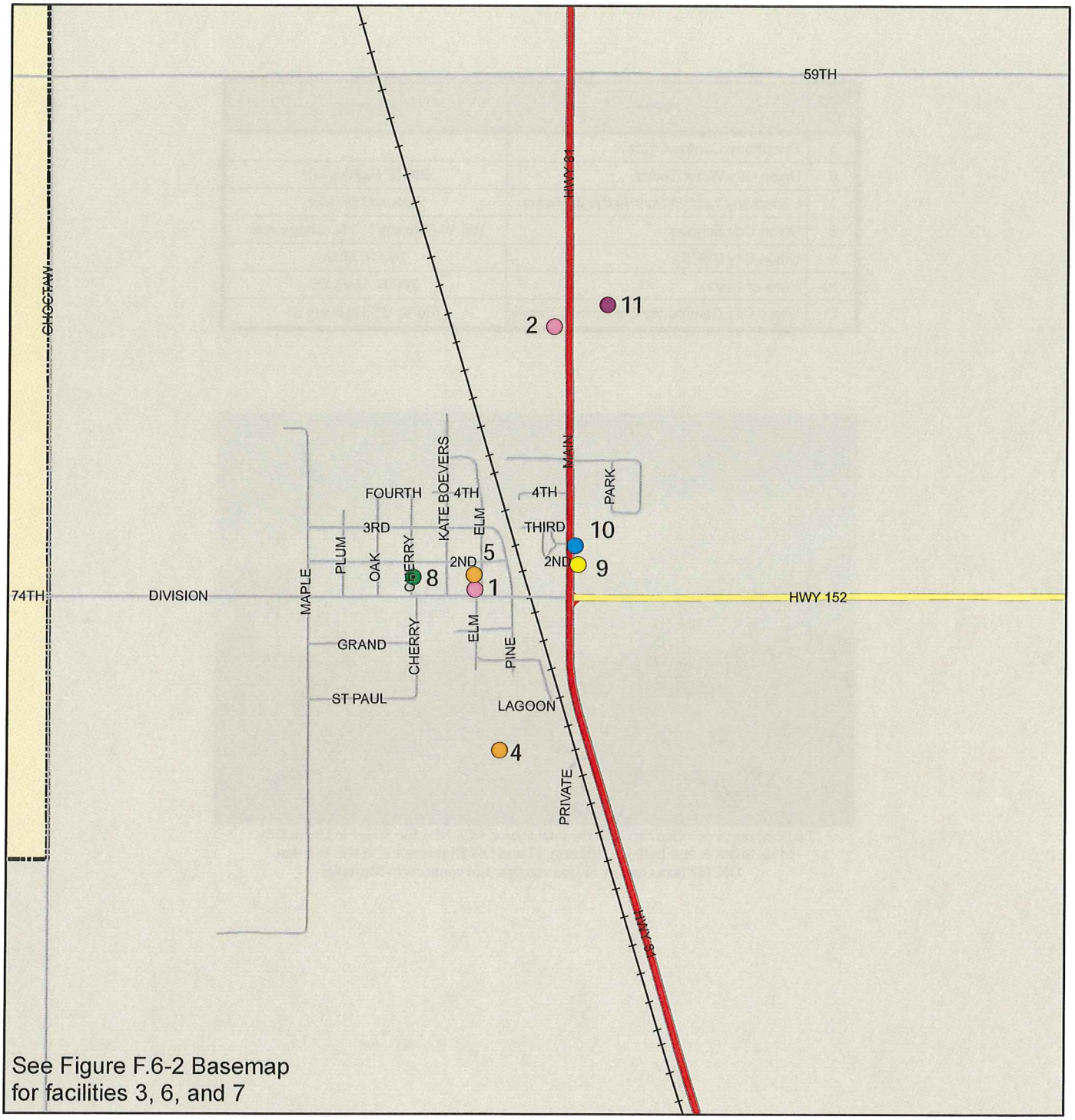
Table F.6–5 Union City Critical Facilities

Map ID	Name	Address
1	Town Hall, Police and Fire	101 N. Elm
2	Fire Station	675 N. US Highway 81
3	Fire Department Substation	SW 29th and Manning
4	Sewage Lagoons	300 S. Pine

Map ID	Name	Address
5	Telephone Central Office	
6	Union City Water Tower	660 N. Highway 81
7	Canadian County Water Authority Tower	36th and Banner
8	Union City Schools	105 W Division/110 N. Cherry Ave.
9	Union City USPS	202 N. Main
10	Bank of Union	206 N. Main St.
11	Union City Community Corrections Center	700 N. US Highway 81



Looking north on Main Street at the intersection with Division Street in Union City. Main Street is also both US Highway 81 and OK Highway 152 at this location. OK 152 turns east at the intersection and connects to Mustang.



LEGEND

- Interstate
- US Highways
- State Highway
- Freeway ramp
- Local or Rural Road
- Railroads
- Water
- City Limits

Critical Facilities

- CITY
- UTILITY
- SCHOOLS
- BANK
- STATE
- FEDERAL

0 1 2 Miles

N W E S

Flanagan & Associates, LLC
Planning Consultants

Figure F.6-5

Town of Union City

Critical Facilities

Section 2 Existing Mitigation Measures

National Flood Insurance Program. Union City has been a participant in FEMA's National Flood Insurance Program since 1989. Flood Insurance details are in Table F.6-6.

Table F.6–6 Union City Flood Insurance Information

Flood Insurance Information	
Policies in Force	16
Amount in Force	$2,259,900
Paid Premiums	12,129
Total Number of Losses Paid	0

Community Rating System. Union City is not in the NFIP Community Rating System.

StormReady Program. Union City is not a StormReady community.

FireWise Program. Union City does not participate in the FireWise Program.

Capital Improvements. Union City has received loans and grants from the OWRB which have been used to rehabilitate the storage standpipe and repair both the water and sewer systems.

Building Codes. Union City has adopted the *International Building Code*, 2009 edition.

Hospitals. Union City is served by Parkview Hospital El Reno and Integris Canadian Valley Hospital in Yukon.

Ambulance Service is provided by Parkview Hospital in El Reno and Integris Canadian Valley Hospital in Yukon.

Floodplain Management. Union City has adopted and strictly enforces FEMA's SFHA floodplain maps and standards. The Town's building ordinance requires elevation certificates on new homes, and that the first finished floors of all new homes in flood-prone areas are at least two feet above the BFE.

Emergency Services

Police Department. The Police Department has five full-time officers and is NIMS compliant.

Fire Department. Union City has a Volunteer Fire Department with one station 675 N. US Highway 81 and a substation at SW 29th and Manning. The VFD has 14 Volunteers, 11 of whom are trained First Responders and three of whom are trained EMTs. The VFD's ISO rating is 6 in Town and 9 rural. The VFD is NIMS compliant and has mutual aid agreements with all fire departments in the County. The Fire Station on US 81 is also the Town's EOC and has a backup generator.

Union City Fire Station and EOC

Emergency Shelters. The Methodist Church and Union City School have been designated as emergency shelters. The School has an underground locker room, which serves as a tornado shelter.

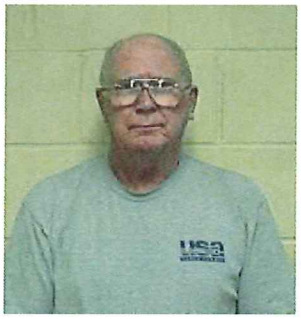
Storm Sirens. Union City has seven storm sirens located throughout the community.

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.6-7. Refer to Appendix C for meeting agendas.

Town of Union City Citizens' Advisory Committee

The **CAC** consists of the following members:



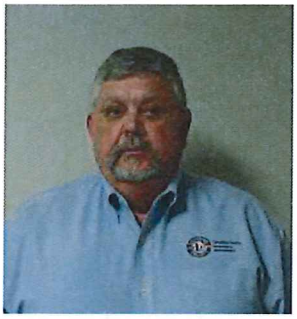
Larry Kesler
Town of Union City

Board of Trustees Member;
Bachelors degree from Black Hills University, Spearfish, South Dakota;
MBA from University of Central Oklahoma, Edmond;
USAF Supervisor, Safety and Environmental Health Field;
Oklahoma Employment Security Commission, Safety Officer

Y. Vonnie Meritt
Town of Union City, Town Board
Oklahoma State Department of Health, Director of Quality Initiatives;
BSN – Nursing from Southern Nazarene University;
MPH – Health Administration from Oklahoma University;
ICS 100, ICS 200, ICS 300, ICS 700, ICS 800

Supporting the CAC is the Union City 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 Union City Technical Advisory Committee



Jerry Smith
Canadian County Emergency Management Director

Joseph Bosler
Sewer and Water Superintendent
Town of Union City

ICS 100, ICS 200, ICS 300, ICS 700

Eddie Dickerson
Union City Chief of Police

Mayor, Town of Reydon, OK ;
ICS 100, ICS 200, ICS 300, ICS 700

Ronnie Funck
County Assessor, Canadian County

Bachelor's Degree from Southern Nazarene University;
Vice President of Oklahoma County Assessors Association.;
American Legion;
Kiwanis Secretary;
International Association of Assessing Officers;
State of Oklahoma IAAO;
PIO Training and Certificate;
FEMA Certifications.

Gina Dickerson
Town Clerk and Treasurer
Town of Union City

ICS 100, ICS 300, ICS 700

Teresa Woolard
Floodplain Director/Code Enforcement
Town of Union City

Certified Floodplain Administrator;
ICS 100, ICS 200

Kerri Griggs
Principal, Union City School

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

Other participants included:

Earl Stock, *Pastor, First Baptist Church*
Todd Carel, *Union City Schools*

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.6–7 Union City 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.

Date	Activity
March 25, 2009	Union City Multi-Hazard Mitigation Team Initial Meeting/Introductory PowerPoint Presentation.
April 29, 2009	Union City Hazard Mitigation Team Community Data Meeting: Reviewed maps and demographic data.
November 4, 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 2, 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 6, 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 3, 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.
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 Union City has identified certain facilities as critical to the health, safety and welfare of its citizens, business and economy. Table F.6-8 indicates, generally, the exposure of the critical facilities to the15 hazards covered by this Plan.

Table F.6–8 Union City 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	City Hall	X	X	X	X	X	X	X	X		X		X	X		X
2	Fire Dept		X	X	X	X	X	X	X		X	X	X			X
3	Union City Fire Dept Substation		X	X	X	X	X	X	X		X	X	X			
4	Sewage Lagoons		X	X	X	X	X	X	X	X	X	X	X			X
5	Telephone Central Office	X	X	X	X	X	X	X	X		X		X	X		X
6	Canadian County Rural Water District #3 Water Tower		X	X	X	X	X	X	X		X	X	X			X
7	Canadian County Rural Water District #3 Water Tower		X	X	X	X	X	X	X	X	X	X	X			
8	Union City Schools		X	X	X	X	X	X	X		X		X	X		X
9	Union City USPS		X	X	X	X	X	X	X	X	X		X	X		X
10	Bank of Union		X	X	X	X	X	X	X	X	X		X	X		X
11	Union City Community Corrections Center		X	X	X	X	X	X	X		X	X	X			X

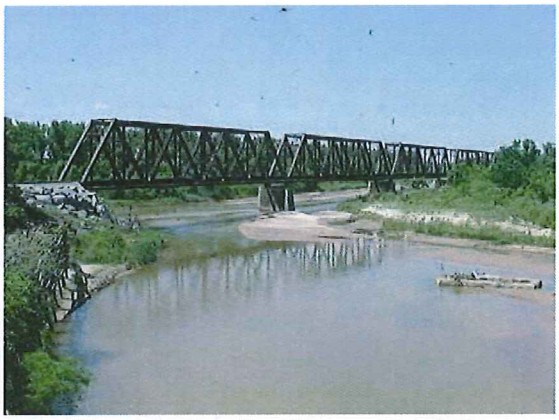
Table F.6-9 displays hazard information where there is community-specific data, as shown in the maps on the following pages.

Table F.6–9 Union City Hazard Impacts

Hazard	Area (Sq. Mi.)	Improved Parcels	Estimated Value	Area Impacted	Impacted Population
Floods	19.42	367	$26,254,793	34%	193
Highly Expansive Soils	16.82	496	$37,493,108	29%	537
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, ½ Mile	3.84	325	$22,850,088	7%	425
Tier II Hazardous Materials, ¼ Mile	0.92	201	$12,594,190	2%	245
Transportation	8.58	318	$22,814,306	15%	326

4.1 Flood

Union City is subject to two types of flooding: riverine flooding along the Canadian River, and flash flooding along tributary streams where development has taken place. The drainage basins and floodplains affecting Union City are listed in Table F.6-10 and shown in Figure F.6-6. The parcels impacted by these streams are listed in Table F.6-11. Figure F.6-7 focuses on floodplains in the urban core. Critical facilities located in the floodplains of Union City are identified in Table F.6-12. Union City has no Repetitive Loss Properties.



View of the Canadian River near Union City

Location

Within Union City's 59.6 square miles, several significant tributaries converge on the wide Canadian River floodplain. Arapaho, Beaver and Dry Creeks drain into the Canadian River. The headwaters of Sixmile, Purcell and Shell Creeks drain the northern part of the incorporated town and are tributaries of the North Canadian River, which is approximately 10 miles north of Union City. An unnamed intermittent tributary to the Canadian River runs through Union City's central business district and could possibly impact Town Hall/Police/Fire Stations, and the Public School.

Table F.6–10 Union City Creeks and Drainage Areas

Creek	Total Drainage Area at Union City (sq. mi.)	Structures in the 100-Year Floodplain
Canadian River Tributary 1	3.13	4
Canadian River Tributary 2	5.97	9
Canadian River Tributary 3	3.23	0
Beaver Creek	18.89	8
Arapaho Creek	8.04	10
Purcell Creek	10.87	8
Dry Creek	5.23	10
Sixmile Creek	3.05	1
Shell Creek	1.21	0
Lower Buggy Creek	.01	0
Total	**59.63**	**50**

Table F.6–11 Union City Parcels Touched by SFHA

Improvement Type	Number	Estimated Market Value
Agriculture	224	14,061,370
Residential	115	5,749,721
Commercial	12	5,483,130
Tax Exempt	16	$952,463
Total	**367**	**26,246,684**

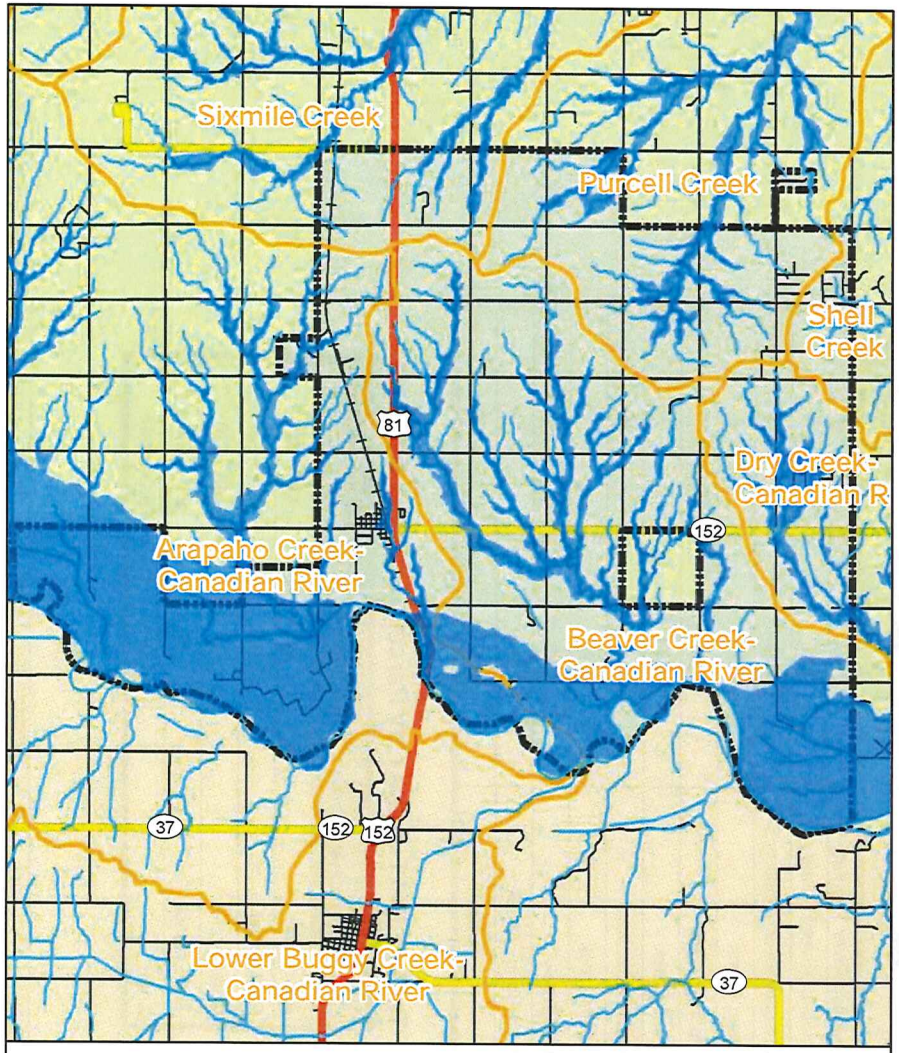


Figure F.6-6: *Union City 100yr Floodplains*

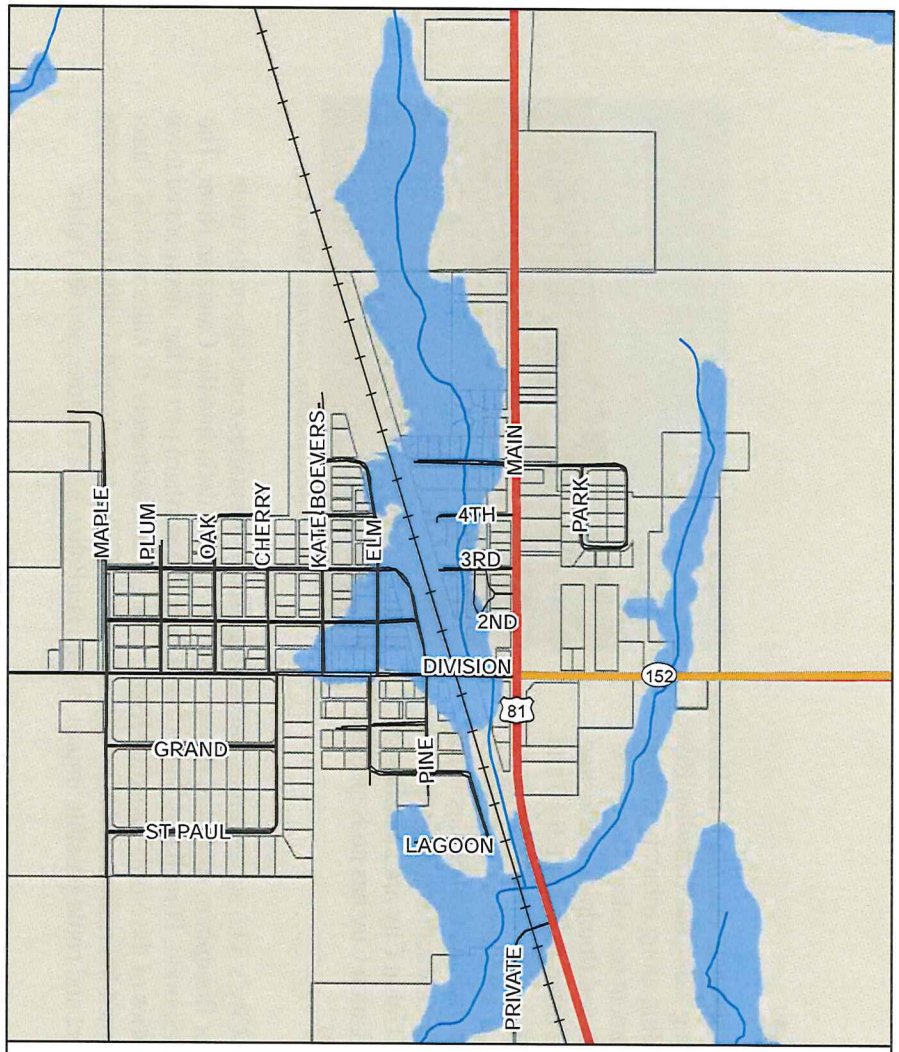


Figure F.6-7: *Union City - Urban Core Floodplains*

Table F.6–12 Union City Critical Facilities Located in the Floodplain

Map ID	Name
1	Union City Town Hall, Police and Fire
5	Telephone Central Office

The combined 100-year floodplains of the Canadian River and the other streams in Union City's incorporated area comprise 14.7 square miles, or 24.6% of the land within the corporate limits. Flooding problems within the urban areas of the Town are more likely to be associated with runoff from heavy rain, while the Canadian River floodplain is more vulnerable to riverine flooding.

The Canadian River floodplain within Union City's boundaries is used mostly for agriculture and ranching, but also contains several residences, structures and wells. Union City has no Hazardous Materials (Tier II) sites located in the floodplains.

The Canadian River flows past the historic urban core of Union City about one mile to the south, at elevation 1,240. The Town's urban core is at elevation 1,320, with a few scattered houses on the east side of town at elevation1,315. The Canadian River is responsible for most of the flooding in Union City's incorporated area, although the town center itself is well out of the reach of even the highest flows on the Canadian River.

Canadian River

The Canadian River flows generally southeast past Union City. The River is dammed in the Texas Panhandle, 37 miles northeast of Amarillo and eight miles west of Borger, at Sanford Dam to form Lake Meredith.

Although rainfall averages 34.5 inches per year in Union City, because of the geographical location, thunderstorms can, and have, dumped up to 15 inches of rain in nearby areas in a few hours.

Frequency

Union City has experienced three flood events from 1995 through 2010. Based on this data, the incorporated area can expect one flooding event every five years.

Extent/Severity

Union City 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

Union City has survived the Canadian River and its periodic floods. As a general rule, low-lying lands along the River are kept clear of development. Nevertheless, a number of residences and structures have been built along the north bank of the River, clearly in harm's way. According to the National Weather Service Forecast Office at Norman, OK, when the Canadian reaches 13 feet, there will be "Valley-wide flooding with depths up to 6 feet…along the river on the Canadian-Grady County border from near U.S. Highway 81 between Union City and Minco to near Tuttle….Agricultural lands and local roads are the areas most affected. Expect dangerous currents over many low-lying areas."

Canadian River Tributary 2 is an intermittent stream, passes through the urban core of Union City and has occasionally filled with runoff during very heavy rains. The Town Hall, Police and Fire Station, and Central Telephone Office are in this floodplain.

History

There have been five floods on the Canadian River between 1904 and 2007 which reached 13 feet at Union City:

- **October 3, 1904** holds the record for peak flow on the Canadian River at Union City. The river reached 14.7 feet. The Monthly Weather Review for November 1904 reported that the River became a vast flood that "rolled a wall of water 18 to 20 feet deep, in places spreading from hill to hill, with widths varying from one to two miles, sweeping everything in its path and covering the valley with sand from half a foot to four feet in depth, completely obliterating everything in the form of vegetation….The force of the water was so tremendous that nothing could stand in its course; crops, bridges…trees and houses were swept away like straws and swallowed up in the sands." At Union City the River, normally about 60 yards wide, was 4 miles across.
- **May 3, 1914** – Floods on the Canadian River were the result of rains in New Mexico. Flows went from nil to bank-full overnight. The Canadian River reached 13.10 feet at Union City. Floods killed 5 people, damaged railway and county bridges, washed away prospective crops in the bottom lands and covered agricultural lands with heavy deposits of sand. (Alfred J. Henry, "Rivers and Floods," *Monthly Weather Review*, May 1914, p. 292.)
- **May 31, 1937** - The Canadian River rose to 13.8 feet, the greatest height since 1904, and filled the floodplain to the third terrace level. In some areas more than a square mile of land was washed away. (Harold M. Hefley, "Ecological Studies on the Canadian River Floodplain in Cleveland County, Oklahoma")
- **June 23, 1948** - As much as 20 inches of rain in five hours in west central Oklahoma led to major flooding along the Canadian River. At Union City the River reached 13.0 feet.
- **October 4, 1986** - Sixth highest flood on the Canadian River (11.9 feet). Remnants of Hurricane Paine produced rains of as much as 20 inches in north central Oklahoma, causing major flooding on the Arkansas River and its tributaries. Flooding was reported in 52 counties. The Canadian River rose 2.5 feet in 2 hours on October 4. Many Union City residents evacuated as floodwaters extended a half-mile from the normal River channel.
- **August 20, 2007** – Third highest flood on the Canadian River at Union City. The River reached 13.5 feet. The heavy rainfall of August 18-19 brought flood crests that were among the top five highest of all time at three gauge stations along the Canadian River. Union City had not experienced a crest of this height since 1937.
- **August 19, 2008** – Heavy rains caused widespread flooding across eastern Canadian County. Many roads around Union City were covered by water.

Canadian River near Union City during August 2007

Future Flooding in Union City

The Town of Union City is experiencing development, primarily along the major transportation corridors. Development is also occurring along Canadian River Tributary 2 and Dry Creek. The rest of the Canadian River Basin has minor development. Given the massive thunderstorms and torrential rains that regularly pass through the area, the Town should require on-site stormwater detention to offset increased runoff from new development, or develop individual basin drainage plans that identify regional detention sites and other approaches to accommodate development.

Worst-Case Flooding Scenario for Union City

A worst-case flooding event for Union City would be similar to the great flood events of the past, usually the result of prolonged heavy rains from tropical storms that stall over western Oklahoma, Texas and New Mexico, filling streams and causing the Canadian River to rise as much as 14 feet. The result would be inundation of the entire floodplain and its agricultural land to depths of up to seven feet.

Conclusion

Union City has a High vulnerability to and High probability of the Flood hazard. Union City is subject to two different kinds of flooding: riverine flooding along the Canadian River, and flash flooding along tributary streams where development has taken place. Union City has been a member of the National Flood Insurance Program since 1989. The community has reported three flood events between 1995 and 2010, and major flooding along the Canadian River in 1904, 1914, 1937, 1948 and 1986. Given this frequency, Union City can expect flash flooding every five years, and catastrophic flooding along the Canadian River every 20 years. T

4.2 Tornado

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

Frequency

Union City can expect a tornado every 2.5 years.

Extent/Severity

Union City considers a minor severity tornado to be a tornado of EF1 or less on the Fujita Scale and a major severity tornado to be a tornado greater than EF1 on the Scale.

Impact

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

History

Union City reported six tornado events from 1995-2010, with two of these (1999 and August 2007) being multiple events in massive storms. Only one tornado (May 1973) has passed through the historic urban core of Union City. Union City tornado history is summarized below.

- **May 24, 1973** – An F4 tornado 300 yards wide and 13.3 miles long passed through Union City, killing two people, injuring four and causing $2.5 million in damage. The tornado destroyed 22 homes and 18 trailers, and damaged 49 buildings. This was the worst tornado to ever hit Union City and some long-time residents say that it very nearly destroyed the town.

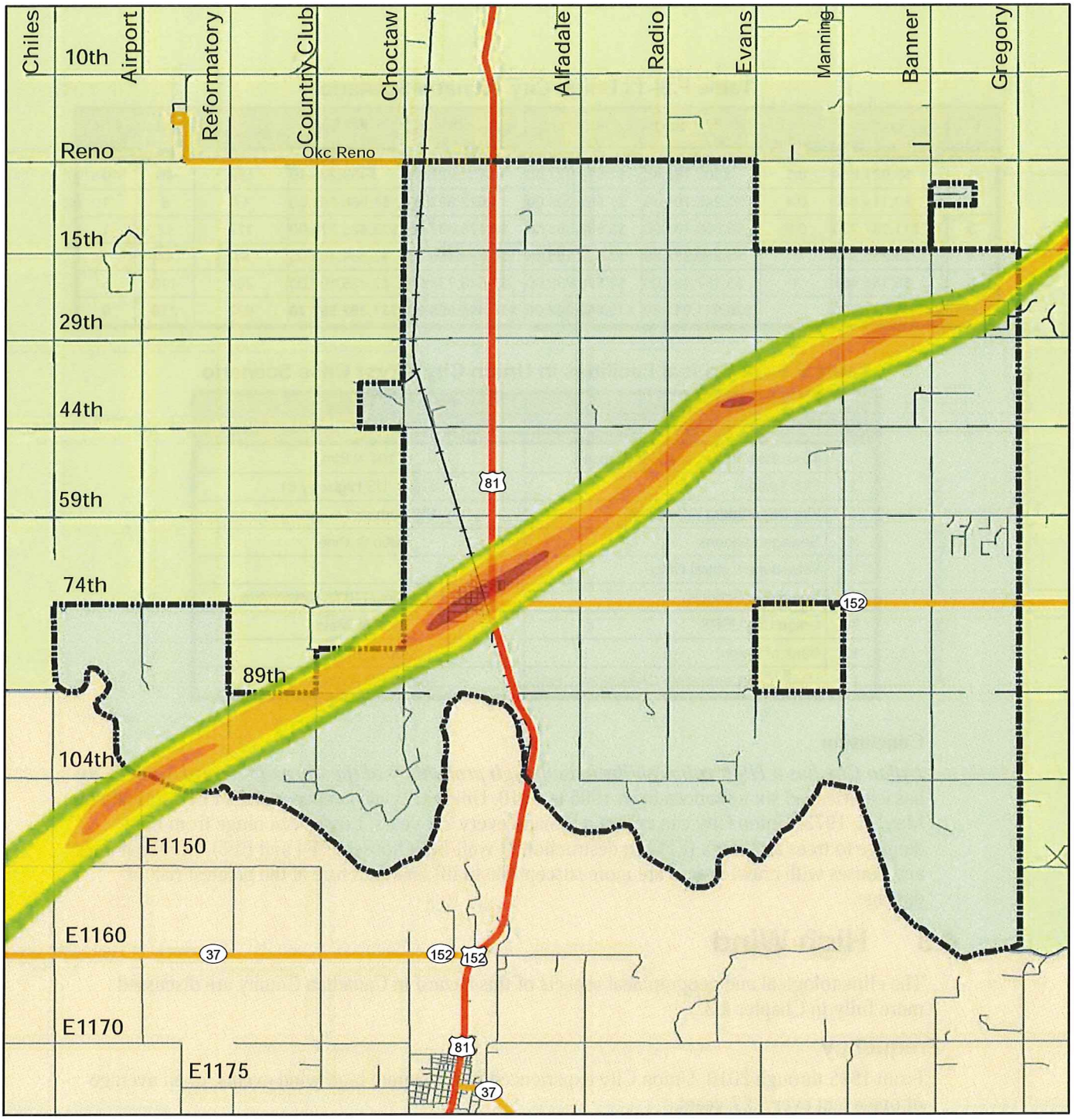
- **June 3, 1995** – An F1 tornado 200 yards wide and five miles long touched down three miles northeast of Union City and lifted one mile south of Banner. Damage was $500,000.
- **May 3, 1999** – In a massive tornado outbreak, three of the more than 58 identified tornadoes passed near Union City. The first formed about 2.5 miles northwest of Union City. No significant damage was observed (F0). The second formed about two miles north-northeast of Union City. No significant damage was reported (F0). The third formed about four miles northeast of Union City. No significant damage was reported (F0).
- **May 9, 2003** - This brief F1 tornado, 50 yards wide and 0.5 mile long, began 1.5 miles south-southwest of Town then moved east-northeast before dissipating 0.6 miles west of US Highway 81. A power pole was snapped, consistent with F1 damage, and two others blown over at the start of the path. Minor structural damage to a house was noted towards the end of the path. Damage was $2,500.
- **August 19, 2007** – Two tornadoes passed through the Union City incorporated area. An EF0 tornado 30 yards wide and one mile long, moved from Caddo County north into Canadian County about 0.3 miles west of the Canadian/Caddo/Grady County intersection damaging trees. Losses were $5,000. A second EF1 tornado, 75 yards wide and two miles long, did tree damage in Grady and Canadian Counties between Minco and Union City. The tornado passed just east of Union City's urban core and dissipated about one mile to the north. Damage was also $5,000.
- **May 10, 2010** – An EF0 tornado 40 yards wide and four miles long touched down four miles northeast of Union City and lifted six miles southeast of El Reno. No reported damage.

The F4 tornado of May 24, 1973 in Union City


Damage from the May 24, 1973 F4 Union City tornado

Worst-Case Tornado Scenario

For Union City, a worst-case EF5 tornado would be one that passed directly through the Town, damaging 622 residential structures and causing losses estimated to be $31,367,867.70, as summarized in Table F.6-13 and shown in Figure F.6-8. Nine critical facilities would be impacted, as shown in Table F.6-14.



LEGEND

- Interstate
- Primary Highways
- SecondaryHighways
- Local or Rural Road
- Railroads
- Union City Limits

Tornado Scenario

- F-Scale 1
- F-Scale 2
- F-Scale 3
- F-Scale 4
- F-Scale 5

0 1 2 Miles

Flanagan & Associates, LLC

Figure F.6-8

Town of Union City

Tornado Scenario

Table F.6–13 Union City Tornado Scenario

EF Scale	Estimated Market Value	Damage Factor	Est. Structure Damage	Est. Contents Value	Est. Contents Damage	Total Est. Damage	Population	Res. Struct.	Crit. Facs.
1	$3,021,854	0.1	$302,185.40	$1,510,927.00	$151,092.70	$453,278.10	132	46	0
2	$3,114,416	0.4	$1,245,766.40	$1,557,208.00	$622,883.20	$1,868,649.60	17	6	1
3	$11,187,730	0.8	$8,950,184.00	$5,593,865.00	$4,475,092.00	$13,425,276.00	112	12	1
4	$5,256,312	1	$5,256,312.00	$2,628,156.00	$2,628,156.00	$7,884,468.00	97	44	1
5	$5,157,464	1	$5,157,464.00	$2,578,732.00	$2,578,732.00	$7,736,196.00	264	110	5
Totals	**$27,737,776.00**	-	**$20,911,911.80**	**$13,868,888.00**	**$10,455,955.90**	**$31,367,867.70**	**622**	**218**	**8**

Table F.6–14 Critical Facilities in Union City Worst Case Scenario

Map ID	Name	Address
1	Town Hall, Police and Fire Station	101 N Elm
2	Fire Station	675 N. US Highway 81
3	Fire Department Substation	SW 29th and Manning
4	Sewage Lagoons	300 S. Pine
5	Telephone Central Office	
8	Union City Schools	105 W Division/110 N. Cherry Ave.
9	Union City USPS	202 N. Main
10	Bank of Union	206 N. Main St.
11	Union City Community Corrections Center	700 N. US Highway 81

Conclusion

Union City has a High vulnerability to and High probability of the Tornado hazard. Union City has experienced six tornadoes from 1995 to 2010. Union City also experienced an EF4 tornado on May 24, 1973. Union City can expect a tornado every 2.5 years. Losses can range from light damage to trees and roofs (EF0) to destruction of well-built houses (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

From 1995 through 2010, Union City experienced four separate high wind events, or an average of one event every 3.7 years.

Extent/Severity

Union City considers a minor severity wind force to be a wind force on the Beaufort Scale of 9 (55 mph) or below, and a majority severity wind force to be a wind force of greater than 9 on the Scale.

Impact

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

History

Canadian County reported 73 high wind events from 1995 through 2010, which injured two people and caused a total of $6,812,000 in damage. Although higher wind speeds have been measured at other Canadian County locations, by far the single greatest damage event from wind in the County was at Union City on June 3, 1995, which resulted in $5.5 million in losses.

- **June 3, 1995** – High winds caused $5 million damage one mile north of Union City. Unfortunately, no details were available for this event, including an estimated wind speed. However, this was also the date of an EF1 tornado at Union City, one mile south of Banner, which resulted in $500,000 in damage. It is often difficult to distinguish between the destruction done by straight-line winds and that from tornadoes, especially if a funnel has not actually been seen. "Straight line" winds or downbursts are often the cause.
- **August 26, 2006** – Power lines were blown down by 65-mph winds along OK Highway 152 and Gregory Rd.
- **August 19, 2007** – 80 mph winds were reported one mile south of Union City on US Highway 81.

Worst Case High Wind Event for Union City

The worst-case high wind event for the Town of Union City is presented in Table F.6-15. This scenario is based upon a high wind event that occurred in Tulsa, OK on June 6, 2006: a microburst with 85-mph winds that produced an estimated $2.5 million in damage to 1,420 homes.

A similar downburst in Union City would impact 325 properties and result in $55,682 damage.

Table F.6–15 Union City High Wind Worst Case Scenario Damages

EF Scale Wind Equivalent	Parcel Count	Damage Factor	Averaged Damage	Hospital Cost Factor	Hospital Costs	Debris Factor	Averaged Debris (yards)	Utility Loss Factor	Utility Loss
Residential Properties with Estimated Improvement Values									
0	37	$159.68	$5,908.16	$4.39	$162.43	4.77	176.49	$2.49	$92.13
1	210	$159.68	$33,532.80	$4.39	$921.90	4.77	1,001.70	$2.49	$522.90
Total	247	$159.68	$39,440.96	$4.39	$1,084.33	4.77	1,178.19	$2.49	$615.03
Commercial Properties with Estimated Improvement Values									
0	2	$159.68	$319.36	$4.39	$8.78	4.77	9.54	$2.49	$4.98
1	15	$159.68	$2,395.20	$4.39	$65.85	4.77	71.55	$2.49	$37.35
Total	17	$159.68	$2,714.56	$4.39	$74.63	4.77	81.09	$2.49	$42.33
Agricultural Properties with Estimated Improvement Values									
0	25	$159.68	$3,992.00	$4.39	$109.75	4.77	119.25	$2.49	$62.25
1	-	$159.68	$0.00	$4.39	$0.00	4.77	-	$2.49	$0.00
Total	25	$159.68	$3,992.00	$4.39	$109.75	4.77	119.25	$2.49	$62.25
Tax Exempt									
0	3	$159.68	$479.04	$4.39	$13.17	4.77	14.31	$2.49	$7.47
1	33	$159.68	$5,269.44	$4.39	$144.87	4.77	157.41	$2.49	$82.17
Total	36	$159.68	$5,748.48	$4.39	$158.04	4.77	171.72	$2.49	$89.64
Totals									
-	325	-	$51,896.00	-	$1,426.75	-	1,550.25	-	$809.25

Conclusion

Union City has a High vulnerability to and High probability of the High Wind hazard. Union City reported four high wind events from 1995 through 2010, or about one event every 3.7 years, that caused in excess of $5 million in damage. The factors that contribute most to wind-related deaths, injuries, and property damage are 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 by consumers 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

Union City reported no lightning events from 1995 through 2010. Union City can expect about nine severe thunderstorm events each year, any one of which could carry potentially damaging lightning.

Extent/Severity

Based on the information provided by the National Weather Service, Chapter 4, Union City 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.

Lightning strike near Union City, August 8, 2011

Impact

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

History

Union City reported no damaging lightning strikes from 1995 through 2010.

Worst-Case Lightning Scenario for Union City

A worst-case lightning event for Union City would be one that disrupted the electrical system and electronics at one or more of the Town's primary critical facilities, such as the communications system at the Town Hall/Police/Fire Station and/or resulted in injury or death.

Conclusion

Union City has a High vulnerability to and High probability of the Lightning hazard. Canadian County reported nine damaging lightning events from 1995 through 2010, none of which was in

Union City. Along with the rest of the County, however, Union City can expect to experience about nine severe thunderstorm events each year with potentially damaging lightning.

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 Union City reported 15 hail events with hail stones ranging in size from 0.75 to 2 inches. No damage was reports are available for these events. Given this frequency, Union City can expect about one hail event each year, and one potentially damaging event every 5.3 years.

Extent/Severity

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

Impact

Hail 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. As a general rule, hail damage increases sharply when stones reach 1.75 inches (H5) in diameter and higher, 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

Union City reported 15 hail events from 1995 through 2010, for an average of one event per year. Hail stones for these events ranged in size from 0.75 inches to 2.0 inches, with one storm having stones 1.75 inches in diameter, and one 2.0-inches in size. A later storm on October 22, 2011 produced hail at least 2.5 inches in diameter. No damage reports were recorded for these events.

2.5-inch hail that fell at Union City, October 22, 2011

Union City experienced three potentially damaging hail events in 16 years, and can expect such an event once every 5.3 years:

- **June 3, 1995** – Two-inch hail was reported three miles north of Union City.
- **June 10, 2003** – Hail 1.75 inches in diameter was reported near Union City.
- **October 22, 2011** – Two and a half and three-inch hail reported at Union City.

Worst-Case Hail Scenario for Union City

The largest hail stone reported in Canadian County was 4.5 inches in diameter and fell at Okarche on August 17, 1994. The County's most damaging hail 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 are possible everywhere in the County. This particular storm caused $500,000 damage to Okarche Public Schools and Police Department. A similar storm, containing hail stones 2.75 inches in diameter and higher, driven by high winds, could do similar damage in Union City.

Conclusion

Union City has a High vulnerability to and High probability of the Hail hazard. The Town has been hit by hail 15 times in the period 1995 through 2011, with hail ranging from 0.75 to 3 inches in diameter.

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

Based on the frequency of winter storms for the County, Union City can expect an average of 2.3 winter storms per year.

Extent/Severity

Union City 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 winter storm can affect a region for weeks and even months. People and livestock are all vulnerable to severe winter as are houses, water systems, electrical poles, and roads. 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. People and livestock are also susceptible to frostbite and death from exposure.

History

During the period 1995 through 2010, Canadian County reported 35 ice and snow events or an average of 2.3 winter storms each year. No NCDC Storm Data reports mention Union City, but due to the general and widespread nature of winter storms, it can be assumed that Union City also experienced 35 ice and snow events during these years.

Worst-Case Winter Storm Scenario

A worst-case winter storm for Union City would be as described in Chapter 4.6 for Canadian County

Conclusion

Union City has a High vulnerability to and High probability of the Winter Storm hazard. In part because Oklahoma is not a northern tier state and regularly subjected to prolonged winter storms, its communities are often unprepared for the sudden onslaught of 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. None of the NCDC narratives singles out Union City specifically, but it is assumed that the Town experienced the same number of events.

Extent/Severity

Union City considers minor severity extreme heat to be extreme heat of 95°F or less on the NOAA Heat Index, 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 impacts of extreme heat are the danger to people –heat exhaustion, heat stroke, and death frequently result from extended periods of exposure to extremely high temperatures – and increased risk of wildfire, drought, power outages and water shortages. The impacts and vulnerability of this hazard is addressed more fully in Chapter 4.

History

During the period 1996 through 2011, Canadian County – and consequently Union City – experienced four extreme heat events or an average of one every 3.7 years.

Worst-Case Extreme Heat Scenario

A worst-case scenario for Union City 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

Union City 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. This 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

Union City has experienced four droughts from 1996 through 2011.

Extent/Severity

Union City 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.

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 rises, 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 wildfires.

History

Canadian County has experienced four droughts from 1996 to 2011. There have been no reports regarding Union City associated with these events, but given the widespread nature of the hazard, it can be assumed that these events have impacted Union City as well.

Worst-Case Drought Scenario for Union City

Union City's water is provided by the City of El Reno and Canadian County Water Authority. The Canadian County Water Authority draws its water from Lake Hefner in the Oklahoma City system. El Reno's water is drawn from wells drilled into various alluvial and terrace aquifers of the North Canadian River. These groundwater resources have proven remarkably stable. However, in recent years there have been significant declines in water flows in the upper North Canadian River region, largely due to irrigation, stock ponds, and reservoirs. It is too early to speculate as to the long-term impact this decline in flows on the North Canadian River will mean for Canadian County communities. 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

Union City is considered to have a High vulnerability to and Moderate probability of the Drought hazard. Agriculture being a key component of the Union City economy, it is likely the Town will experience relatively greater impacts from drought than the more populous communities to the east whose economies are more urbanized. Many communities in central Oklahoma, including Union City and El Reno, were forced to resort to some form of rationing in 2011. The OWRB's *Oklahoma Comprehensive Water Plan* warns that the Canadian and North Canadian Rivers and alluvial aquifers, will face significant water supply limitations in coming years. Union City has joined the Central Oklahoma Water Resource Authority to focus on 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.

Location

The Town of Union City has identified areas of expansive soils that are classified as Very High and High. Following Table F.6-16 shows the breakdown of soil types in Union City. A map of Union City's expansive soils is presented in Figure F.6-9.

Altogether, about 70% of Union City's incorporated area is underlain by moderate to very high shrink/swell soils. Generally, low shrink/swell soils are in the far southern part of the Town in the Canadian River floodplain and in the floodplains of Arapaho, Beaver and Dry Creeks. Almost all

of Union City's urbanized area, and all its critical facilities, are built on soils of moderate, high and very high expansibility. See Table F.6-17 for the soils beneath Union City's critical facilities.

Table F.6–16 Union City Expansive Soils

Expansion Potential	Area (sq. mi.)	Area (%)
Very High	12.87	22.50%
High	3.95	6.91%
Moderate	23.63	41.31%
Low	15.21	26.59%
Water	1.54	2.69%

Table F.6–17 Union City Critical Facilities and Expansive Soils

Map ID	Facility Name	Shrink –Swell Potential
4	Sewage Lagoons	Very High
7	Canadian County Water Authority Tower	Very High
9	Post Office	Very High
10	Bank of Union	Very High
1	Union City Town Hall	Moderate
2	Fire Department	Moderate
3	Fire Dept. Substation	Moderate
5	Telephone Central Office	Moderate
6	Water Tower	Moderate
8	Union City Schools	Moderate
11	Union City Community Corrections Center	Moderate

Frequency

There is no data concerning the amount of damage that has been caused due to expansive soils.

Extent/Severity

Union City considers a minor severity shrink-swell level to be a shrink-swell level of Moderate and below on the USDA soil data base, and a severe shrink-swell level to be a shrink-swell level of High or Very High on the USDA soil data base.

Impact

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. 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. Particularly vulnerable to the impacts described in Chapter 4 are residential structures located on Moderate to Very High expansive soils in the community.

History

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

Worst-Case Expansive Soils Scenario

Given Union City's compact urban core and its vast incorporated area, a worst-case scenario for the Expansive Soils hazard is difficult to project. The Town extending water and sewer line into its 59-square mile area is unlikely, and will likely remain the responsibility of developers and the

rural water systems. Union City's greatest vulnerability to expansive soils is the aging infrastructure in its urban core – particularly its water and sewer lines – during times of extended drought. A worst-case scenario for the City would be an extreme drought, like that of 2011, lasting two or more years. The impact on the Town's infrastructure would require constant maintenance and would be financially draining on the community's resources.

Conclusion

Union City is considered to have a High vulnerability to and High probability of the Expansive Soils hazard. Union City has the choice of building on soils of low expansibility in floodplains or moderate to very high shrink/swell soils elsewhere in the incorporated area. Town planners and developers face a substantial challenge in selecting building sites. Although over 40% of the undeveloped area consists of moderately expansive soils, the northeastern section, the most attractive for near term development, has high and very high expansive soils.

4.10 Urban Fire

Union City's Fire Department has 14 fire fighters operating in an incorporated area of 59 square miles and a Fire District of 94 square miles. Its ISO rating is 6 in Town and 9 in the rural areas. According to the Census Bureau, 11.8% of Union City's residential structures were built prior to 1939, and 1.2% were being heated using wood.

Frequency

Annually, Union City can expect 1.8 single family home fires, one mobile home fire every 2.5 years, one industrial/warehouse fire every 1.6 years, and one critical facility fire every 10 years.

Extent/Severity

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

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, Union City had 18 residential fires, four mobile home fires, three office/commercial fires, and six industrial/warehouse fires. The Town had one fire in a critical facility during this period that did no damage. There were two civilian deaths and two fire fighter injuries. These events are summarized in Table F.6-18.

Table F.6–18 Union City 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	$85,000	0	$0	0	$0	0	$0	0	$0	0	$0	2	$85,000
2001	2	$4,500	0	$0	3	$4,400	1	$500	0	$0	1	$4,000	7	$13,400
2002	2	$72,000	0	$0	0	$0	0	$0	0	$0	0	$0	2	$72,000
2003	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
2004	0	$0	0	$0	1	$48,000	0	$0	0	$0	0	$0	1	$48,000
2005	2	$78,000	0	$0	0	$0	0	$0	0	$0	2	$36,000	4	$114,000
2006	2	$2,500	0	$0	0	$0	0	$0	2	$0	1	$250	5	$2,750

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
2007	5	$306,800	1	$2,500	0	$0	0	$0	1	$0	2	$2,100	9	$311,400
2008	1	$0	0	$0	0	$0	0	$0	0	$0	0	$0	1	$0
2009	2	$274,000	0	$0	0	$0	0	$0	0	$0	0	$0	2	$274,000
Total	**18**	**$822,800**	**1**	**$2,500**	**4**	**$52,400**	**1**	**$500**	**3**	**$0**	**6**	**$42,350**	**33**	**$920,550**

Source: Oklahoma State Fire Marshal

Conclusion

Union City has a Moderate vulnerability to and High probability of the Urban Fire hazard. The Town 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 due to the popularity of residential living in the wildland/urban interface. Union City has a relatively compact urban core surrounded by an extensive incorporated area that is, except in the far eastern portion, essentially rural and undeveloped.

Location

The many square miles of undeveloped land within the Town Limits, crossed by railroads and highways, can become a tinderbox from late summer into winter, especially in times of drought, as in 2005-2006 and 2010-2011. As a rule, farmland is less vulnerable than ranchland, because it is usually plowed and planted during the worst part of the wildfire season. Of particular concern to the urban core and the western Union City incorporated area is the Union Pacific railroad, which passes through the center of Town. A number of wildfires have occurred along the right of way. There are no critical facilities in the area of the railroad track; there is however residential properties located on either side. A wildfire event in this area could result in evacuation of residents and structural damage or complete loss of impacted properties. A grain elevator is also located in this area; a wildfire could consume the elevator and cause economic losses in the community. Indeed, most of Union City Fire Department's fire runs have been related to wildfire. Another area of concern is the spread of Eastern Red Cedar in the Canadian River floodplain

Figure F.6-10 displays the areas in Union City that are at risk from wildfire and Table F.6-19 lists critical facilities that are most vulnerable to this hazard.

Table F.6–19 Union City Critical Facilities Susceptible to Wildfire

Map ID	Name	Wildfire Level of Concern
3	Fire Department Substation	2
4	Sewage Lagoons	6
6	Union City Water Tower	3
7	Union City Water Tower	3
8	Union City Schools	4
9	Union City USPS	6
11	Union City Community Corrections Center	6

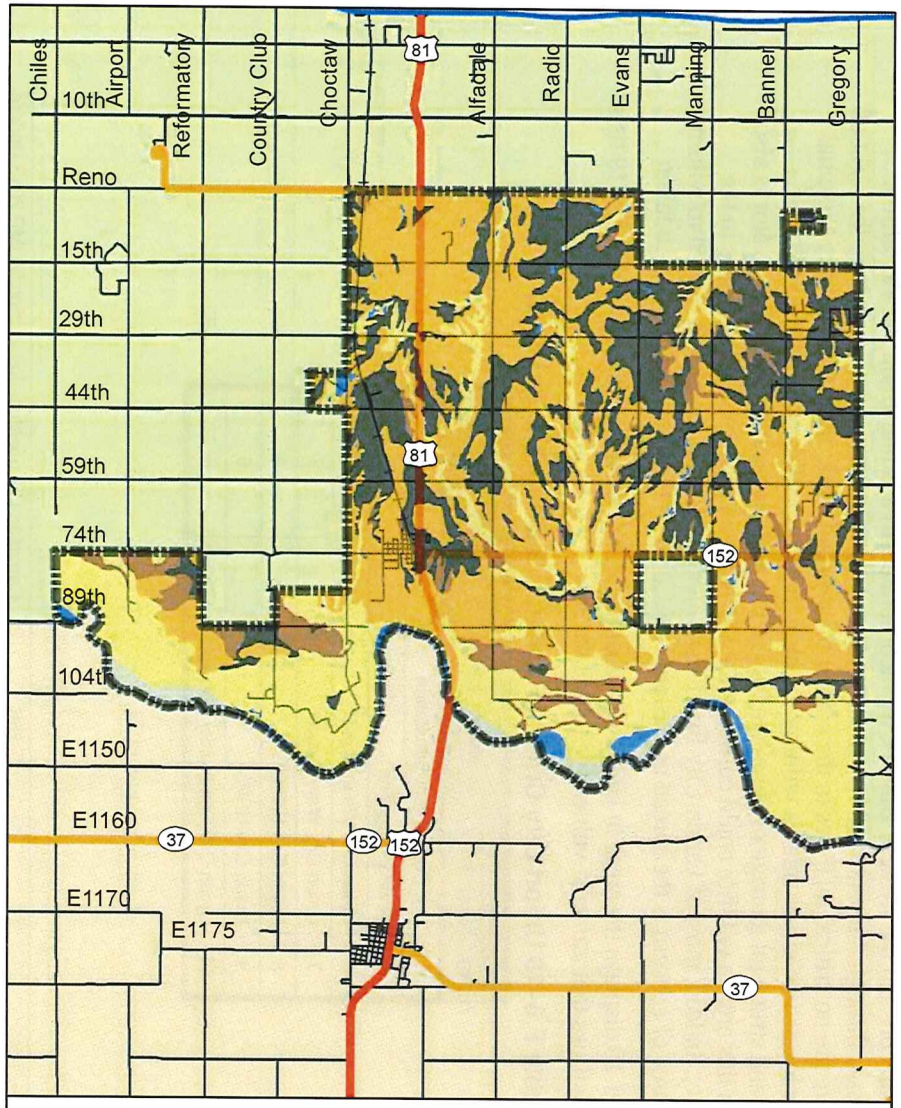


Figure F.6-9:

Union City Expansive Soils

Expansive Soils
- Low
- Moderate
- High
- Very High
- Water

Boundaries
- Union City Limits
- Canadian County
- Statewide Counties

0 1 2 Miles

Transportation
- Interstate
- Primary Highways
- SecondaryHighways
- Local or Rural Road
- Railroads

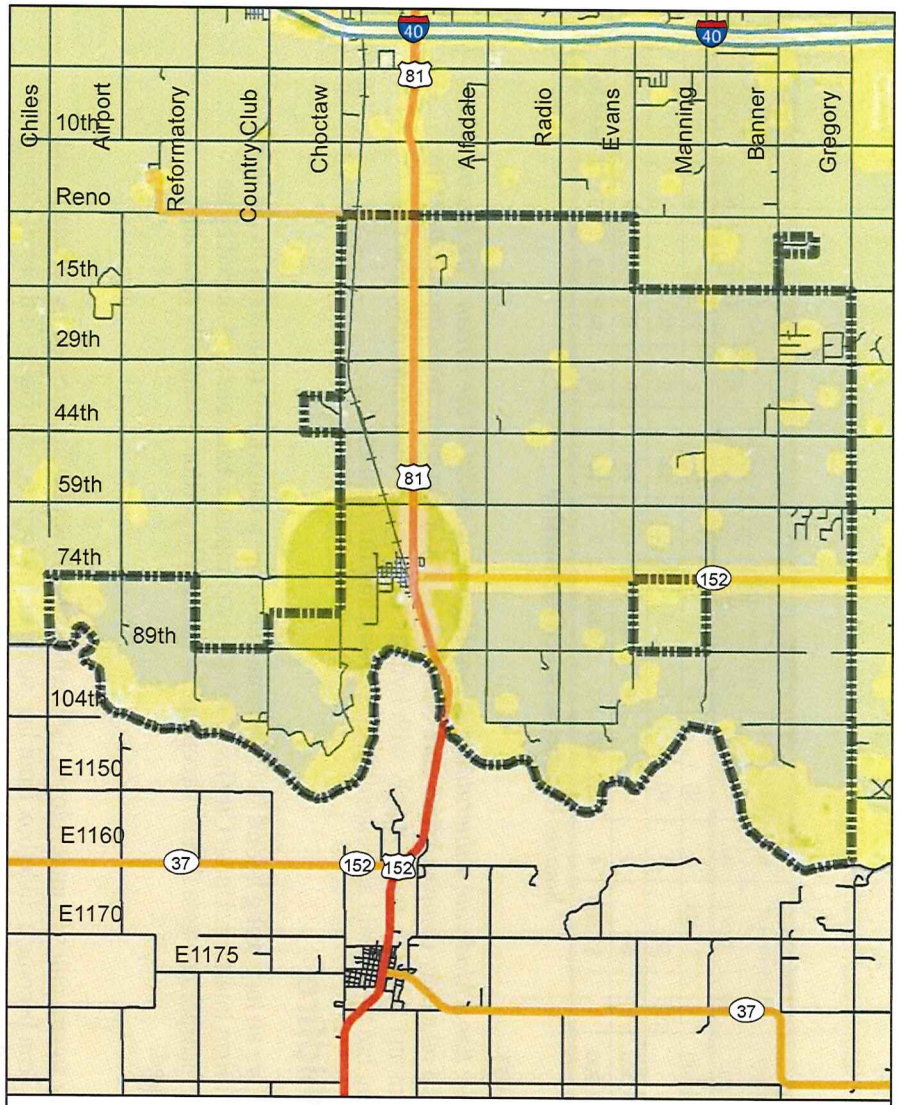


Figure F.6-10:

Union City Wildfire LOC

Level of Concern Index
- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Boundaries
- Union City Limits
- Canadian County
- Statewide Counties

0 1 2 Miles

Transportation
- Interstate
- Primary Highways
- SecondaryHighways
- Local or Rural Road
- Railroads

Frequency

Union City can expect 11.7 wildfires annually that burn 442 acres and cause $64,538 in damages.

Extent/Severity

Union City considers a minor severity danger of wildfire to be a wildfire danger reading of Moderate and below on the USDA Fire Danger Rating System, and a major severity danger of wildfire to be a wildfire danger reading of rating of above Moderate on the USDA Fire Danger Rating System. A severe wildfire in the Union City Fire District would be a wildfire that results in the injury or death of one person, either civilian or firefighter and/or destroys four structures.

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.

History

During the period 2000 through 2009, the Union City's Fire Department responded to 117 wildfires that burned 4,417 acres and resulted in $645,380 in damage. These events are summarized Table F. 6-20.

Table F.6–20 Union City Wildfires 2000-2009

Year	Runs	Acres Burned	Damages
2000	8	49	$575
2001	35	63	$9,150
2002	13	280	$12,685
2003	0	0	$0
2004	13	193	$3,950
2005	4	43	$1,600
2006	15	3,745	$593,350
2007	9	27	$6,700
2008	13	4	$11,620
2009	7	13	$5,750
Totals	**117**	**4,417**	**$645,380**

Source: Oklahoma State Fire Marshal

Worst-Case Wildfire Scenario for Union City

A worst-case event for the immediate Union City area would be a wildfire that resulted in injury or death and/or damage of destruction of homes, schools, businesses, farms or oil and gas industry facilities.

Conclusion

Union City has a Moderate vulnerability to and High probability of the Wildfire hazard. Union City's location on a rolling prairie that is subject to thunderstorms, lightning, high winds, drought and prolonged periods of extreme heat, make it an ideal environment for wildfires. The many square miles of undeveloped land within the Town Limits, crossed by railroads and highways, can become a tinderbox from late summer into winter, especially in times of drought, as in 2005-2006 and 2010-2011. An additional concern is the presence of Eastern Red Cedar in the Canadian River floodplain.

4.12 Earthquake

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.

Location

Union City is located in an area of considerable low-level seismicity. The Town is west of the recently active Wilzetta and Nemaha faults in Lincoln and Oklahoma Counties and north of the historically active Meers fault in southwestern Caddo County.

Frequency

Canadian County recorded 28 earthquakes between 1995 and 2009, followed by a cluster of 11 quakes on March 11-12, 2010. Three of these events were within Union City and two within its urban core. One of the latter was a "felt" event. Given this frequency, Union City will experience one tremor every five years.

Extent/Severity

Union City considers a minor severity earthquake to an earthquake that registers 4.8 magnitude and below on the Richter Scale, and a major severity earthquake to be an earthquake that registers above 4.8 magnitude on the Richter Scale.

Impact

The impact of this hazard depends on the intensity of the earthquake. A 5.7 magnitude earthquake centered on the Nemaha fault in the Union City area would cause minor damage to some structures and infrastructure.

History

Canadian County recorded 28 earthquakes between 1995 and 2009, followed by cluster of 11 earthquakes on March 11-12, 2010. Three of these events were within the corporate boundaries of Union City, and two were in the urban core of the Town, one of which was a "felt" event.

Conclusion

Union City's vulnerability to and probability of the Earthquake hazard is Low. Earthquakes in late 2011 and early 2012 in Lincoln County, along with the many hundreds of tremors that have been occurring in Oklahoma County in the past few years, suggest that seismic activity may be on the increase in the Nemaha/Wilzetta fault area. As a rule, however, these earthquakes cause little damage.

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. These chemicals are used in agriculture, industry, medicine, research, and consumer goods. Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. These substances are often released as a result of chemical

Union City grain elevators

accidents at plant sites or transportation accidents.

In this Plan, pipelines are considered a transportation network and are discussed as a Transportation hazard – including above-ground metering and booster facilities, which can sometimes be quite large.

Location

There are five Tier II facilities within Union City, one of which is considered extremely hazardous. Six critical facilities are within a quarter mile of these sites, along with 208 people and 64 homes. Union City's Tier II sites are listed in Table F.6-21 and shown in Figure F.6-11. The critical facilities within a quarter mile of these sites are listed in Table F.6-22.

Table F.6–21 Union City Tier II Sites

Facility	Address	EHS	Population w/in ¼ mile
Amerigas Propane	Highway 152 & Highway 81	N	87
Banner Coop Elevator Association	4175 N Banner Rd.	Y	117
Boral Brick	3895 S. Choctaw Ave.	N	0
DCP Midstream – Union City Booster	Alfadale Rd. between 74th and 89th	N	4
Menz Propane	1100 East Highway 152	N	0

Table F.6–22 Union City Critical Facilities' Vulnerable to Tier II Sites

Map ID	Name
1	Town Hall, Police and Fire
2	Fire Station
5	Telephone Central Office
8	Union City Schools
9	Union City USPS
10	Bank of Union

Frequency

From 1995 through 2010 there was one spill of hazardous materials from a fixed-site in Union City. Given this data, the community can expect a fixed-site Hazardous Materials incident every 15 years.

Extent/Severity

Union City considers a minor severity fixed-site Hazardous Materials incident to be fixed-site incident that does not 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 a fixed-site 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

The impact on the community of this hazard can include injury or loss of life, disrupted transportation systems, diminished emergency response, interrupted business operations, and short- or long-term ecological damage or degradation.

History

There was one fixed-site hazardous materials release in Union City between 1995 and 2010 which is detailed in Table F.6-23. A second release reported to the National Response Center web site attributed to Union City on April 12, 2010 was at a location well outside the corporate limits of Union City.

Table F.6–23 Fixed-Site Hazardous Materials Release

Date	Incident	Location	Type	Material
11/19/95	An oil well upstream from Union City leaked into stream.	Union City	Oil well	Crude oil

Source: National Response Center

Worst-Case Hazardous Materials Release

A worst-case fixed-site hazardous material release for Union City would be a fire, explosion or other incident involving anhydrous ammonia at Banner Co-Op Elevator Association. Anhydrous ammonia is one of the most potentially dangerous chemicals used in agriculture.

Conclusion

Union City has a Low vulnerability to and Moderate probability of the Fixed-site Hazardous Materials hazard. Union City has five fixed hazardous materials sites within its boundaries. There has been one reported fixed-site hazardous materials release within Union City, but not from one of these sites.

4.14 Dam Failure

There are three dams on the Canadian River. None are within Oklahoma and the nearest is Sanford Dam, almost 200 miles away in Borger, Texas. Union City is situated at elevation 1,320.on the north side of the Canadian River, which is the southern Canadian County border.There have been no dam failures on the Canadian River system.

Sanford Dam on the Canadian River near Borger, TX

Conclusion

Union City has a no vulnerability to and no probability of the Dam Failure hazard.

4.15 Transportation

There are three hazardous transportation corridors in Union City: Highways, Railroads and Pipelines.

Highways

The Union City consists of 13 miles of highways. US Highway 81 which runs north-south through the entirety of the Town and OK Highway 152 runs west-east for six miles from its junction with US 81 (Main Street) into Oklahoma County. US 81 carries about 5,100 vehicles a day through Town

Railroads

The Union Pacific Railroad running north-to south through Union City. There are eight miles of railroad track within the Town. Major cargos on the UP system are wheat and food grains, aggregate, paper, coal, petroleum and petroleum products, non metallic minerals and plastics.

Pipelines

Union City has three pipelines that pass within its boundaries, one carrying crude oil and two transporting natural gas. The gas pipelines run north-south, first along US Highway 81, through the booster station, then north along Choctaw Rd. into El Reno; the second runs northwest to southeast from about US Highway 81 and Reno Rd. to about 59th St. and Gregory Rd., then east into Oklahoma City. A crude oil pipeline runs east-west from Oklahoma City to Choctaw Ave., paralleling with SW 44th St. These pipelines do not appear to pose a major risk to urbanized Union City.

Critical Facilities in the Transportation Corridor

A quarter mile buffer was placed around the most significant of the Transportation corridors – highways and railroads. The highway corridor buffer encompasses 6.5 square miles of the incorporated area, and the railroad corridor buffer four square miles. Approximately 294 residents (or 21% of the population) live within these two corridors, and all but two of Union City's critical facilities. Union City's critical facilities the transportation corridors are listed in Table F.6-24 and mapped in Figure F.6-12.

Table F.6–24 Critical Facilities in the Transportation Corridors

Map ID	Name	Address
1	Town Hall, Police and Fire	101 N Elm
2	Fire Station	675 N. US Highway 81
4	Sewage Lagoons	300 S. Pine
5	Telephone Central Office	
6	Union City Water Tower	660 N.US Highway 81.
8	Union City Schools	105 W Division/110 N. Cherry Ave.
9	Union City USPS	202 N. Main
10	Bank of Union	206 N. Main St.
11	Union City Community Corrections Center	700 N. US Hwy 81

Frequency

Union City can expect one train accident every 7.5 years, a vehicle accident involving hazardous materials every 15 years, and a pipeline/storage tank incident every 15 years. Based on this data, Union City has a Moderate probability of the Transportation hazard.

Extent/Severity

Union City considers a minor severity Transportation incident to be a Transportation incident in which there are no injuries or deaths and/or in which detours are less than half a mile, traffic is disrupted for less than half an hour, hazardous materials are contained within a quarter mile. A major severity Transportation incident would involve injury or loss of life and/or detours exceeding half an hour, traffic disruption of more than half an hour and hazardous materials releases whose impact area exceeds a quarter mile, and/or loss of life and/or major injury.

Impact

The impact of Transportation incidents may result in injuries and sometimes even loss of life, highway disruptions, damage to nearby property and lost revenue. Transportation accidents are frequently a "cascade" disaster, occurring more frequently during storms. Storms cause streets to become slick, which increases the risk of transportation incidents. Wildfires can obscure roadways. Excessive speed, exhaustion and other causes increase the risk also.

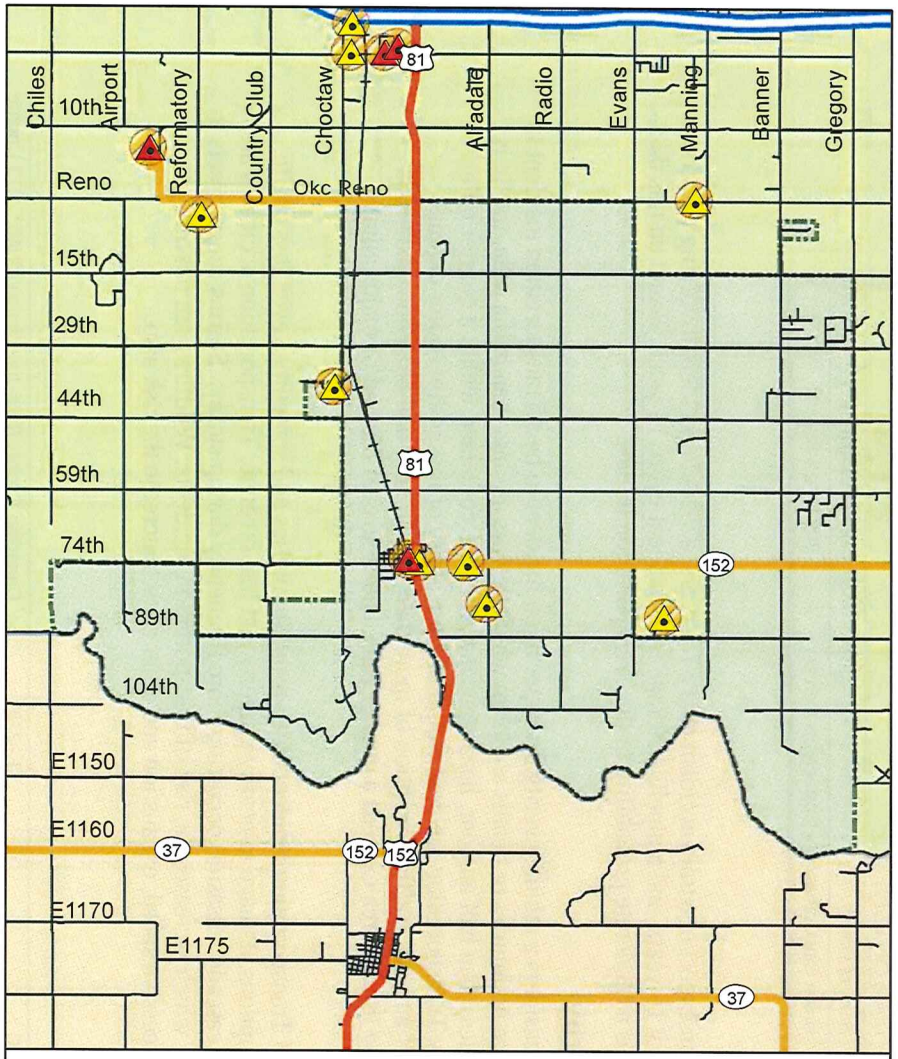


Figure F.6-11: *Union City Hazardous Material Sites*

Canadian County Tier II
- 2009 EHS Tier II
- 2009 non EHS Tier II
- Tier II 1/4mi Buffer

Boundaries
- Union City Limits
- Canadian County
- Statewide Counties

Transportation
- Interstate
- Primary Highways
- SecondaryHighways
- Local or Rural Road
- Railroads

0 1 2 Miles

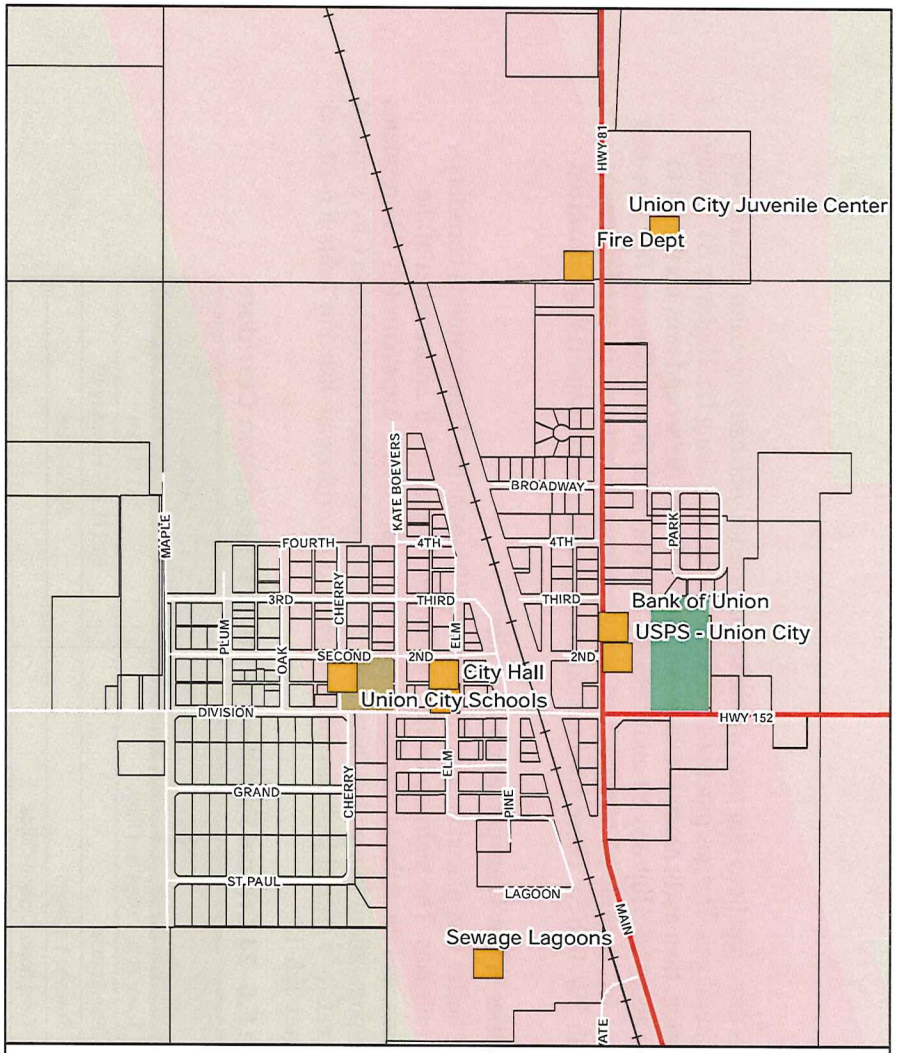


Figure F.6-12: *Union City - Urban Core Transportation Corridors*

Transportation Buffer
- Quarter Mile Buffer

Boundaries
- Union City Limits
- Canadian County
- Statewide Counties

Transportation
- Interstate
- Primary Highways
- SecondaryHighways
- Local or Rural Road
- Railroads
- airports

0 490 980 Feet

History

From 1995 through 2011, there were five accidents in Union City involving the three major transportation corridors. These are listed in Table F.6-25.

Table F.6–25 Transportation Corridor Accidents

Date	Incident	Location	Type	Material
10/19/00	Valve on ammonia tank released material into air	Union City	Storage tank	Anhydrous ammonia
02/25/02	Union Pacific freight train derailed	Milepost 414 Union City	Railroad	Sulfuric Acid
11/25/03	Tote containing 220 gallons of flammable liquid fell off truck and was struck by another truck, with liquid catching fire and spilling into Canadian River.	US Highway 81 bridge	Highway	Friction reducer B-145
12/02/05	10 cars and a locomotive from Union Pacific train derailed. No hazardous materials involved.	Milepost 409.5 Union City	Railroad	None
07/18/11	Tractor trailer hit by train at a grade crossing,	29th St. and Choctaw	Railroad	Oil:Diesel

Worst-Case Transportation Event in Union City

A worst-case transportation event for Union City is by its nature speculative. There have been two train derailments in the Union City area, one of them involving hazardous materials. The major grade crossings of Union Pacific tracks are at Division St., 59th, 44th, 29th, and Reno Ave. A worst-case event would be a train collision with a tanker truck carrying volatile liquids at the Division St. crossing, or a train derailment or collision within or near the urban core area resulting in an explosion, fire or toxic release.

Conclusion

Union City has a Moderate vulnerability to and Moderate probability of the Transportation hazard. Union City is a small, compact community with an extensive incorporated area that is largely undeveloped. It has several subdivisions in the eastern part of the incorporated area, neighboring Mustang and Oklahoma City. Encompassing all incorporated territory, the Town is crossed by two highways, a major railroad, and several pipelines carrying both crude oil and natural gas. The Town's greatest vulnerability is likely related to the railroads and highways, particularly where these intersect, as both are corridors for the transport of hazardous and volatile materials. The Union Pacific railroad and US Highway 81 and OK Highway 152 pass through the heart of Union City. The major grade crossings of Union Pacific tracks at Division St., 59th, 44th, 29th, and Reno Ave. are the spots where accidents involving hazardous materials are possible.

4.16 Hazards Summary

Hazards common to and impacting the entire county equally include Tornadoes, High Winds, Lightning, Hail, Extreme Heat, Drought and Earthquakes. These are addressed most fully in Chapter 4.

Site-specific hazards, unique to Union City, identified and mapped in this section, include Floods, Expansive Soils, Urban Fire, Wildfires, fixed Hazardous Materials sites, Dam Failure and Transportation Hazards.

The Hazards Composite Map, shown in Figure F.6-13, summarizes the areas of the community potentially impacted by the site-specific hazards.

There are many areas for future growth that are relatively free of site-specific hazards. The floodplain areas, shown in blue, should be avoided and remain in open-space. Highly Expansive

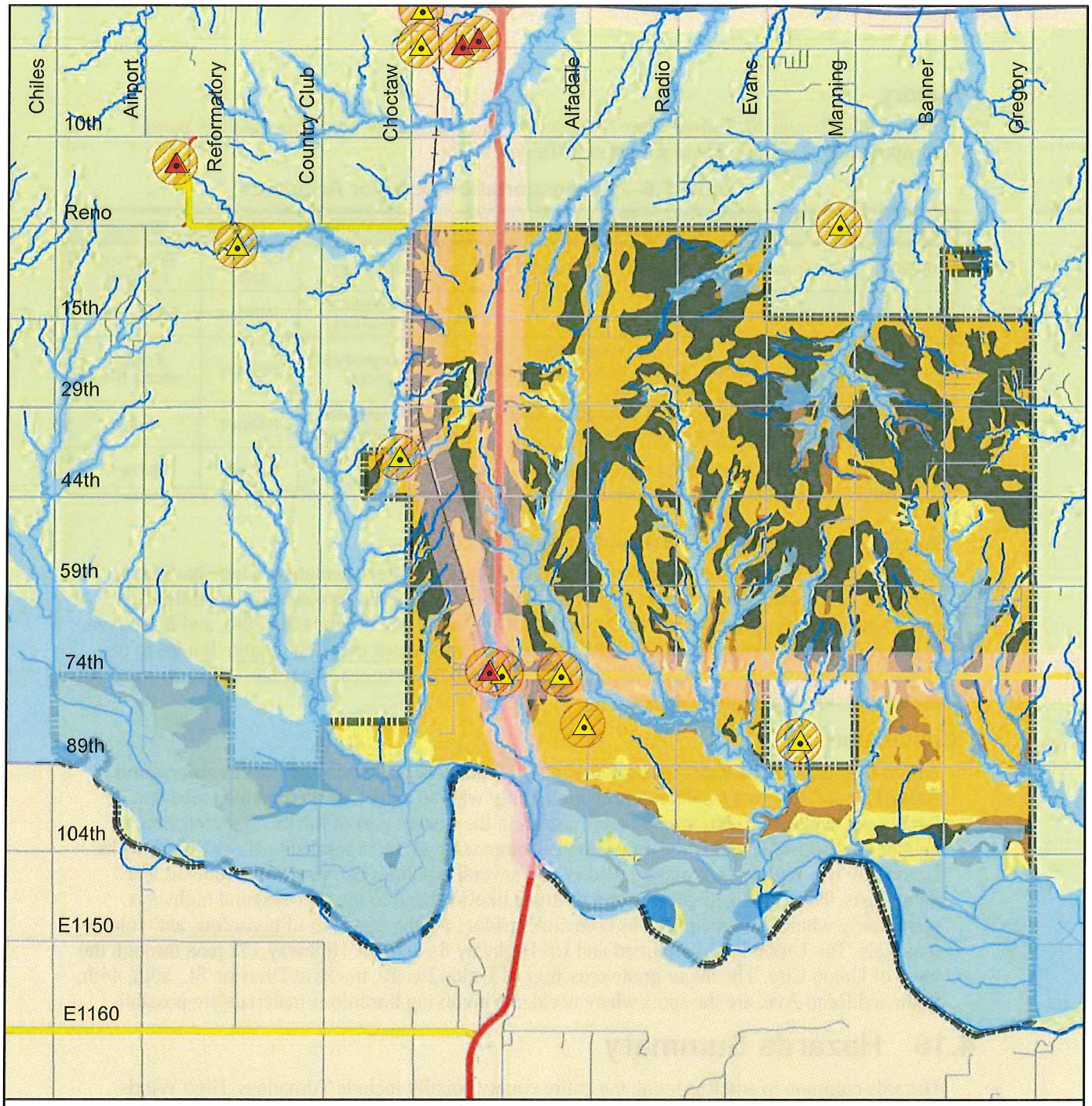


Figure F.6-13:

Union City Hazard Composite

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

Expansive Soils
- Low
- Moderate
- High
- Very High
- Water

Boundaries
- Union City Limits
- Canadian County

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

Flanagan & Associates, LLC
Planning Consultants

0 1 2 Miles

N W E S

Soils areas can require special treatment for the placement of utilities and critical facilities. The wildland/urban interface areas will likely remain vulnerable to wildfires – and perhaps increase in exposure as rural residential development pushes west from Oklahoma City, particularly in areas with concentrations of Eastern Red Cedar. A small percentage of Union City will remain vulnerable to Transportation Hazards from US Highway 81, OK Highway 152 and the Union Pacific railroad.

Section 5 Mitigation Strategy

This section provides a description of Union City'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 Union City 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 Union City 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 Union City, Oklahoma described the following process for implementing its hazard mitigation plan through existing planning mechanisms:

Upon formal adoption of the *Canadian County Multi- Hazard Mitigation Plan,* mitigation goals will be incorporated into future versions of the *Union City Emergency Operations Plan.* Meetings of the Town Board 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.

Union City has a Planning Commission in place that meets monthly. A Capital Improvements Program "CIP" was passed by the citizens of Union City to enhance the quality of life and focus on the bright future of Union City. The plan lists street, building, water, sewer, and stormwater capital improvement needs, their costs, priority, and 5-year funding schedule. *The Canadian County Multi-Hazard Hazard Mitigation Plan* will be reviewed in coming up with a set of CIP recommendations for the next budget cycle. Department heads have the ability to make recommendations to the Board of Trustees to implement mitigation measures identified in this plan. The Mayor is responsible for overseeing the implementation of the hazard mitigation plan upon approval.

Integration of Previous Mitigation Plan

The *Town of Union City Multi-Hazard Mitigation Plan* (2003) incorporated all pertinent existing plans during the update process. In addition, the *Multi-Hazard Mitigation Plan* has also been integrated with the following plans and codes:

- *Canadian County Emergency Operations Plan*
- *Union City 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 Union City *Capital Improvement Plan.*

5.2 Prioritization Process of Mitigation Measures

The City of Union City 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 City of Union City identified and prioritized mitigation measures in the previously adopted *Town of Union City Hazard Mitigation Plan (2003)*. Since the approval of the last plan update, priorities in Union City have changed due to post-disaster conditions. On May 24, 2011 an EF 5 tornado caused devastation through Canadian County. Though Union City was not directly impacted in the event, the community knows first hand the impact a tornado can have on the community; Union City was impacted by two tornado events since approval of the previous plan. In the 2003 plan tornado mitigation was low in priority. As a result of these events, the Union City HMPC placed tornado mitigation at higher priority as to hopefully prevent the level of damage, lost of life, and injury during future tornado events. A complete description of Union City tornado events can be found in Section 4, *Hazards*.