CANADIAN COUNTY

City of Piedmont, Oklahoma

2012 Multi-Hazard Mitigation Plan Update

Flanagan & Associates, LLC
Planning Consultants

Acknowledgements

The City of Piedmont 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:

Piedmont City Officials

Mayor ..... Mike Fina/Valerie Thomerson
Council Member/Mayor Pro-Tem ..... Larry Gage
Council Member ..... Vernon Woods
Council Member ..... Jeff Davis
Council Member ..... Hoss Cooley
Council Member ..... Wade Johnson
City Manager ..... Jim Crosby
City Clerk ..... Jennifer Smith
Police Chief ..... Alex Obleine
Fire Chief ..... Andy Logan

Piedmont Planning Commission and Hazard Mitigation Citizen Advisory Committee (HMCAC)

Chairman ..... John Bickerstaff

Piedmont Staff Technical Advisory Committee (STAC)

Community Development Director ..... Arti Patel
Former City Manager ..... Clark Williams
Former Police Chief ..... Jerry Koester
Civil Engineer ..... Ron Cardwell
City Engineer ..... Dr. Ellen Stevens
County Emergency Manager ..... Jerry Smith
County Assessor ..... Ronnie Funck
County Floodplain Administrator and GIS Manager ..... Amy Brandley
GIS Mapping Technician ..... Tammy Kualaau
Piedmont Schools ..... Jacky Parish
Oklahoma Health Department ..... Lyn Land
Emergency Management Director ..... Boyd Maser
Building Inspector ..... John Moore
Public Works ..... Bud Stuber
Piedmont Emergency Management ..... Michele Wagaman
Rent-a Crane ..... Randy Yount

F.5 Piedmont

The City of Piedmont is an incorporated community located in northeast Canadian County, as identified on Locator Map Figure F.5-1.

Section 1 Introduction

1.1 Geography

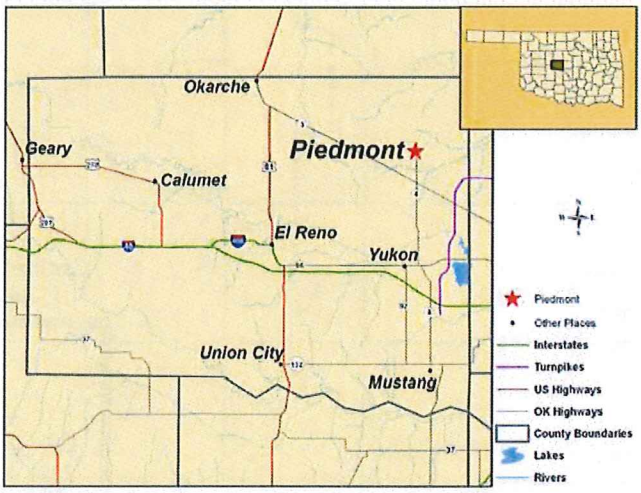
Latitude: 353831N

Longitude: 974447W

GNIS ID: 1096622

Piedmont is located northwest of Oklahoma City, in the northeast corner of Canadian County, at the terminus of OK Highway 4. The community is ten miles north of Yukon and, since the 1960s has abutted Oklahoma City's City Limits. Total land area within Piedmont is 43.8 square miles. The southern and eastern parts of Piedmont have experienced growth and development pressures from the Oklahoma City Metropolitan Area. The Base Map for the City of Piedmont is shown in Figure F.5-2.

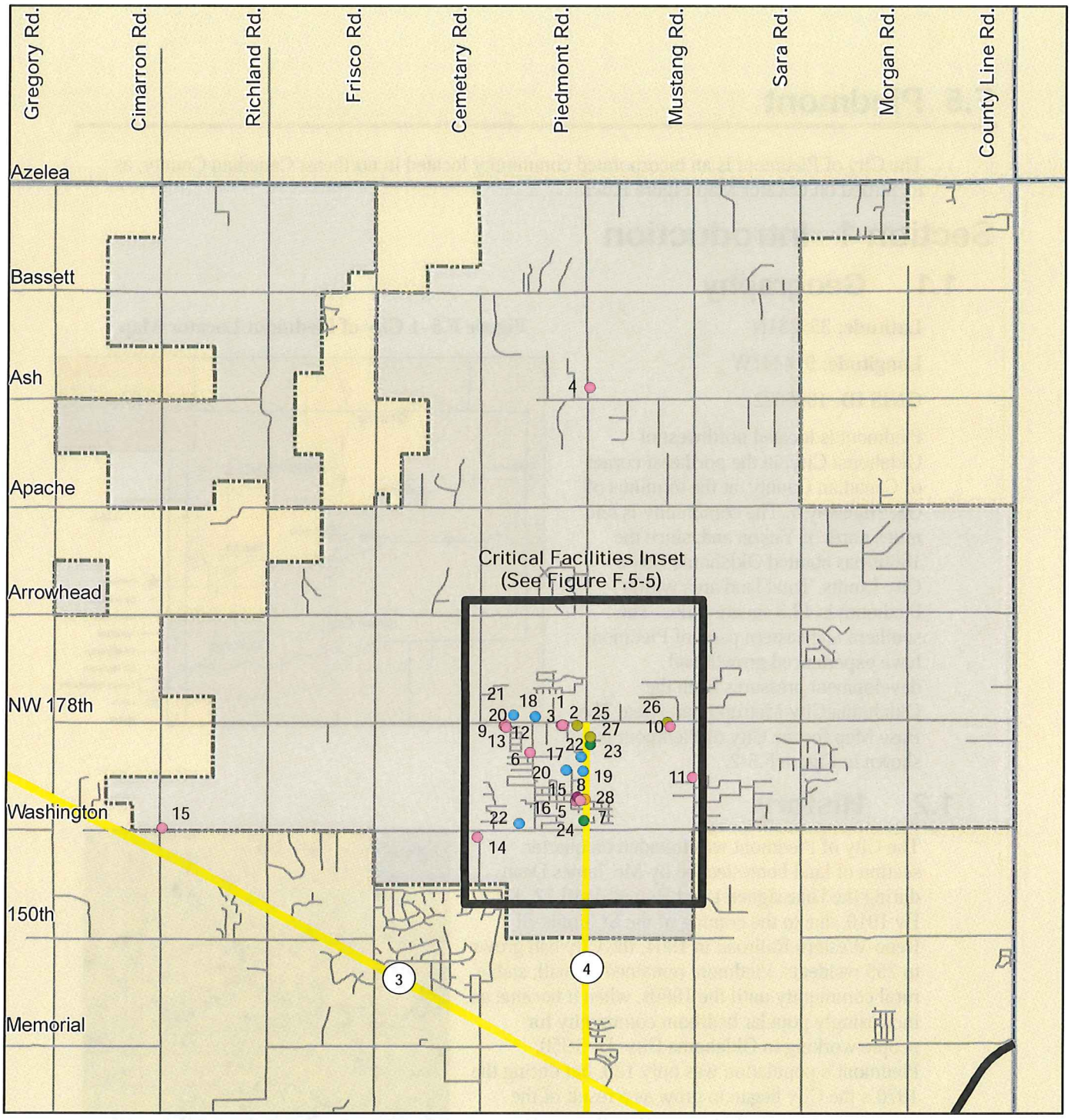
Figure F.5–1 City of Piedmont Locator Map



1.2 History

The City of Piedmont was founded on quarter section of land homesteaded by Mr. James Dean during the Unassigned Land Run of April 22, 1889. By 1910, due to the coming of the St. Louis-El Reno-Western Railroad in 1904, the City had grown to 255 residents. Piedmont remained a small, stable rural community until the 1960s, when it became an increasingly popular bedroom community for people working in Oklahoma City. By 1950, Piedmont's population was only 120, but during the 1970's the City began to grow as a result of the formation of the Piedmont Municipal Authority, which modernized water delivery to the community and due to Canadian County's reputation of a "low risk" oil and gas exploration area with oil rigs springing up all over the City.

Annexation increased the area of the City during the "annexation war" spurred by the aggressive annexation activities of Oklahoma City in the 1970's. And Piedmont has continued to see a steady increase in population and was one of the fastest growing communities in Oklahoma between the Census of 2000 and 2010, increasing by 56.7%.



LEGEND

- Interstate
- US Highway
- State Highway
- Turnpike
- Railroads
- City Limits
- City Government
- Federal
- Financial
- Public Schools
- Child Care/ Health Care
- Social Service

0 0.5 1 Miles

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Figure F.5-2

City of Piedmont

Basemap

1.3 Demographics

The City of Piedmont had a reported Census 2010 population 5,720 (a increase of 56.7% in 10 years), 1,948 households, with an average household size of 2.94 persons. Demographic information is presented in Table F.5-1 that may be important identifying persons vulnerable to winter storms and extreme heat..

The persons aged 65 and older is illustrated in Figure F.5-3. The persons living at or below the poverty level is presented in Figure F.5-4

Table F.5–1 City of Piedmont Population

Group	2010	Percent
Total Population	5,720	100.%
Persons 5 years of age and younger	455	8.0%
Persons 65 years of age and older	453	7.9
Individuals living at or below the poverty level	331	5.8

Source: US Census Bureau

Ethnicity:

White – 5,122 (89.7%)

American Indian – 193 (3.4%)

African American – 56 (1.0%)

Hispanic – 275 (4.8)

Asian – 39 (0.7%)

Other race – 91 (1.6%)

1.4 Lifelines

See Chapter 1.2.6 for description of Lifelines.

Piedmont Utility Systems

Electrical System

Oklahoma Gas and Electric Company and Cimarron Electric

Water Service

Piedmont draws its water from three active wells drilled into the Garber-Wellington aquifer, Deer Creek, and purchases from the Oklahoma City water system's Lake Hefner Water Treatment Plant. The distribution system includes four water storage facilities and over 130 miles of piping in a 100-square-mile-service area in northern Canadian and southern Kingfisher counties.

Wastewater Treatment

City of Piedmont lagoons, private septic systems, and Oklahoma City wastewater treatment facilities.

Natural Gas

Oklahoma Natural Gas Company and individual propane systems.

Telephone, Internet and Cable

AT&T Oklahoma, Pioneer Telephone Cooperative

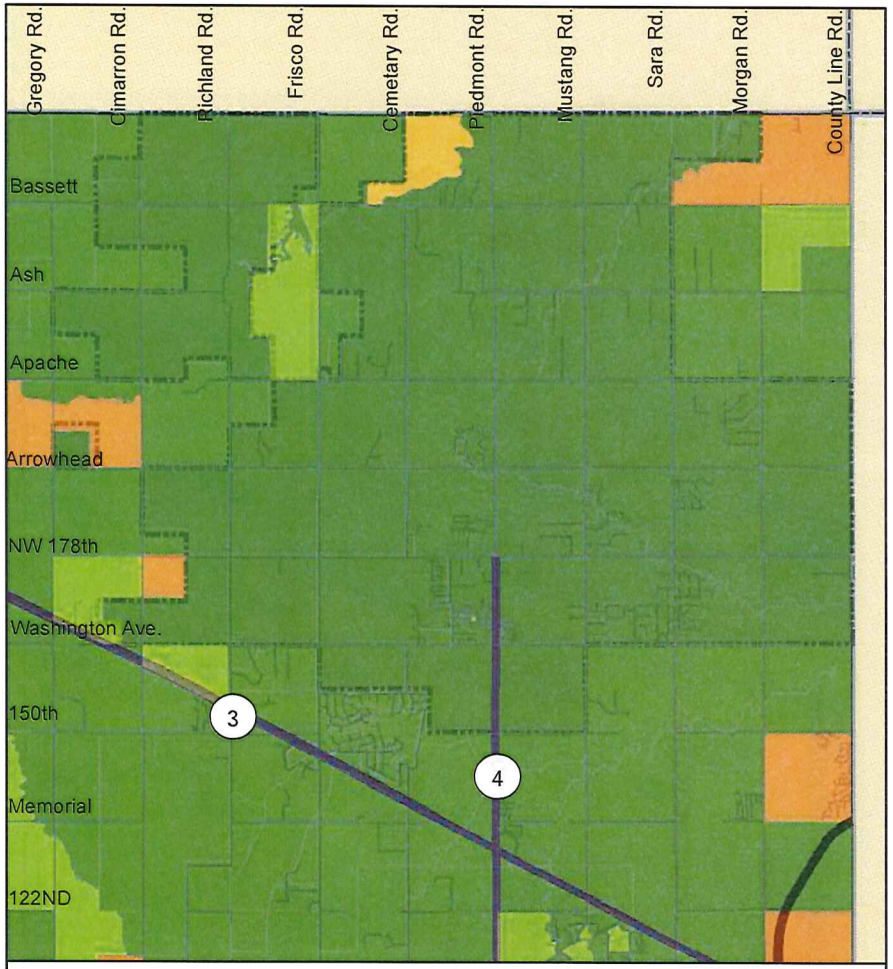

Figure F.5-3: *City of Piedmont Percent of Population Over Age 65*

Percent 65
- 0-25%
- 26-50%
- 51-75%
- 76-100%

Boundaries
- Piedmont_City_Limits
- Canadian County
- Statewide Counties

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

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0 1 2 Miles

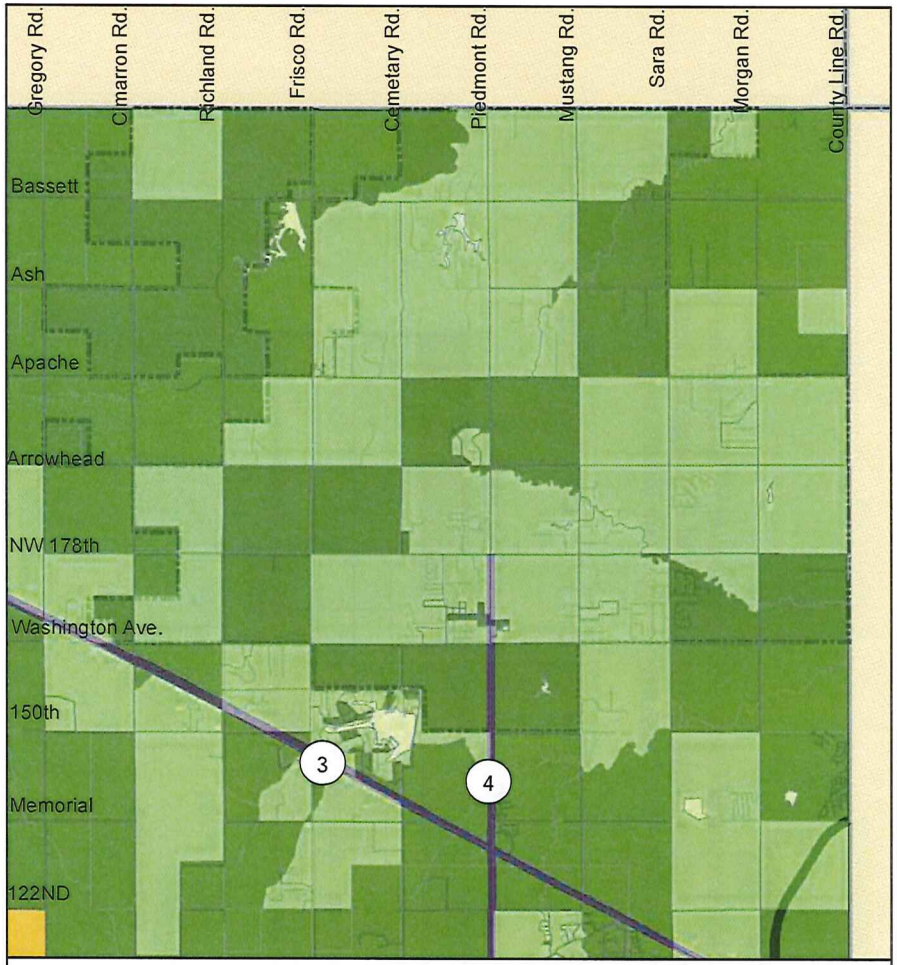

Figure F.5-4: *City of Piedmont Percent of Population Under the Poverty Line*

Percent in Poverty
- 0.0 - 3.8%
- 3.9 - 11.5%
- 11.6 - 20.4%
- 20.5 - 37.5%
- Local or Rural Roads

Boundaries
- Local or Rural Roads
- Piedmont_City_Limits
- Canadian County
- Statewide Counties

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

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0 1 2 Miles

Transportation Systems

- OK Highway 4 (aka Piedmont Rd.) passes north-south through Piedmont and ultimately connects with Interstate 44 west of Newcastle in Grady County. The traffic count at OK 4 and Edmond Rd., one of Piedmont's busiest intersections, is approximately 17,424 vehicles per day. Most of Piedmont's commerce and critical facilities are on OK 4.
- OK Highway 3 runs east-west through Piedmont.
- Washington Ave. (aka NW 164th St.) runs east-west, connecting Piedmont and Edmond.
- Edmond Rd. (aka NW 178th St.) runs east-west one mile north of Washington Ave., connecting Piedmont and Edmond.

Railroads

Piedmont does not have railroad service.

Airports

- Sundance Air Park is approximately two miles southeast of Piedmont.
- Will Rogers World Airport, Oklahoma City, is approximately 19 miles southeast.
- Wiley Post Airport is eight miles southeast of Piedmont at Bethany, in Oklahoma City.
- Clarence E. Page Municipal Airport is 11 miles south of Piedmont near Yukon.

1.5 Economy

As of 2010, 4,115 people (or 71.9%) were over the age of 16 in Piedmont. Of this number, 80% were in the labor force, 1.6% were unemployed and 38.1% were not in the labor force.

Piedmont is largely a bedroom community for the greater Oklahoma City Metropolitan Area. Its local economy is essentially one of providing education, government and retail services to its residents. The great majority of the revenue streams coming into the community are wages and incomes earned outside of the City, primarily in Oklahoma City. So long as the economy of Oklahoma City remains stable, Piedmont will continue to be a prosperous economy.

The major employers in Piedmont are listed in Table F.5-2.

Table F.5–2 Major Employers in Piedmont

Company	Product/Service	Employees
Piedmont Public Schools	Education	149
Express Personnel Services	Employment	40
Sonic Drive In	Restaurant	30
Nance Pre-Cast Concrete	Manufacturing	25
Union Mutual Insurance	Insurance	20
City of Piedmont	Government	19

1.6 Development

Past Development

According to the 2010 Census, the City of Piedmont has a total of 2,006 housing units. Housing data is shown in Table F.5-3. There is one Mobile Home Park in Piedmont.

Table F.5–3 City of Piedmont Housing Units, By Type

Housing Unit Type	2010
Single-family	1904
Multi-family	70
Mobile homes	32
Boat, RV, van, etc.	0
Total housing units	**2,006**

Source: US Census Bureau

According to the Canadian County Assessor's Office, there were 2,330 properties with improvements within the City of Piedmont in 2010, with an independently estimated market value, of $273,600,867. These are shown in the Table F.5-4.

As of 2005 there were a total of 48 neighborhood areas in Piedmont consisting of 77 platted subdivisions, with ten new subdivision in development, including Amber Fields Professional Medical Park, Circle V Ranch Estates, Coyote Springs, Eastwind Estates, Emerald Pointe, Golden Hills, Olde Towne Estates and Windmill Park.

Table F.5–4 Piedmont Property Types 1873 by Assessed Values

Improvement Type	Number	Value
Agricultural	307	$18,911,619
Residential	1,943	$245,944,063
Commercial	23	$3,470,828
Tax Exempt	57	$5,274,357
Total	**2,330**	**$273,600,867**

Source: Canadian County Assessor's Office

Development Plans

The City of Piedmont is currently is in the process of updating its 2005 Comprehensive Plan with the *2030 Comprehensive Plan.* The priority for Piedmont is to maintain orderly growth and development in a manner beneficial to the City and its residents. The City has incorporated 43.9 square miles, considerably larger than its urban core and well beyond the reach of its municipal services. As presently envisioned, commercial development will be concentrated along OK Highway 4 (Piedmont Rd.) from about a half mile south of Washington Ave. to about a half mile north of Edmond Rd., with small commercial clusters at the intersections of Edmond Rd. and Mustang Rd., and west of Mustang Rd. along Washington Ave. Near-term growth is expected primarily in the west (generally between NW 7th St. and Frisco Rd., and from Willow Ave. south to Washington Ave.), and infill on the east to Mustang Rd.

The City is committed to protecting its floodplains from development, and encouraging medium and low density residential housing. High density housing is not a community priority. High on the list of desirables for the community are quality schools, low crime rates, good shopping and dining possibilities, parks and recreation space, the preservation of open space, and improved access to the Oklahoma City area, while keeping these amenities within the Piedmont City Limits.

Mid-range population projections for Piedmont are about 9,700 people by the year 2020, and 16,000 by 2030, growth rates of 69.5% and 64.9%, respectively. Water and sewer services are generally adequate for the near term in the eight-square mile area around Piedmont's core, but this area represents only about 20% of incorporated area.

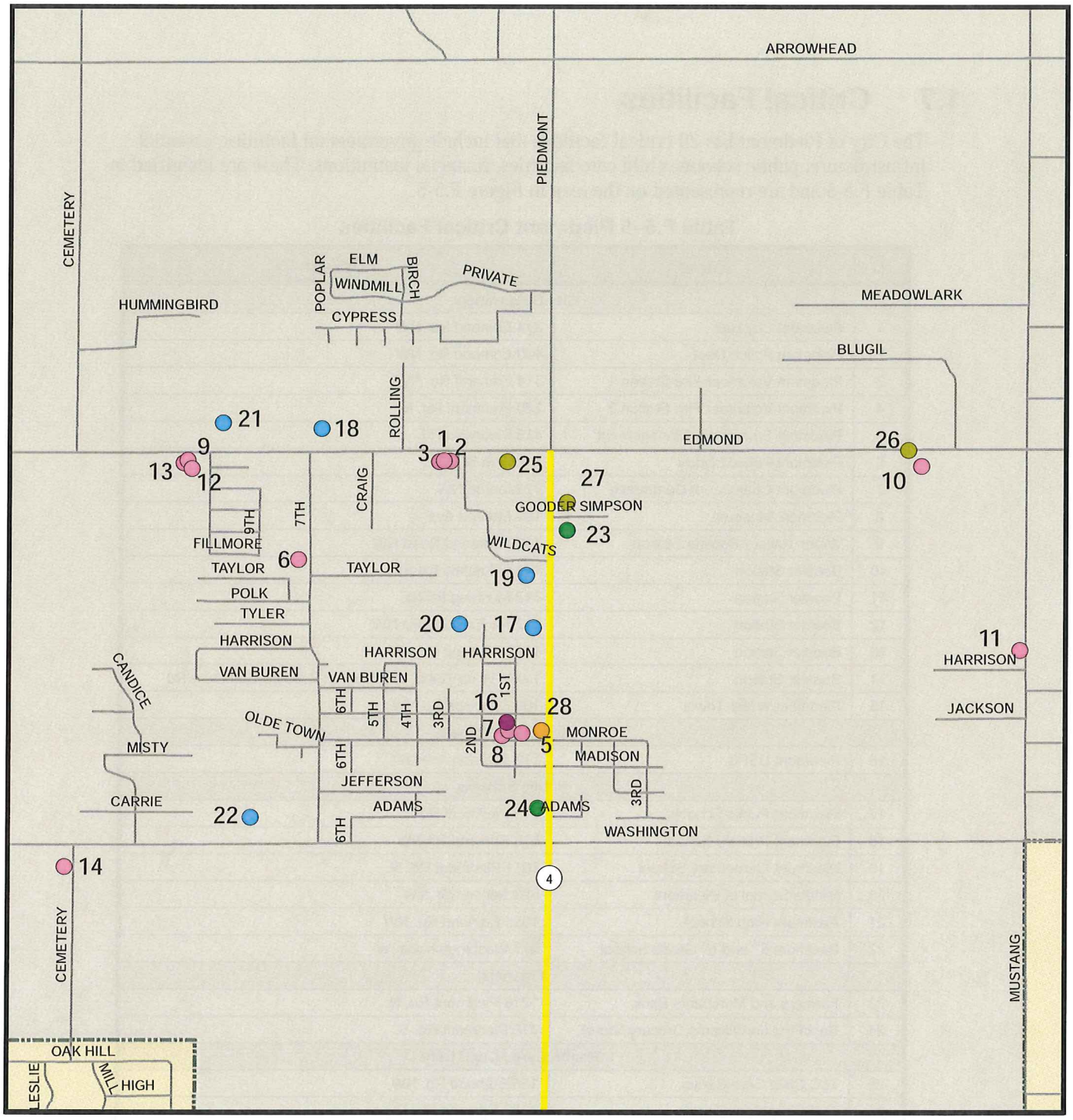
1.7 Critical Facilities

The City of Piedmont has 28 critical facilities that include governmental facilities, essential infrastructure, public schools, child care facilities, financial institutions. These are identified in Table F.5-5 and are represented on the map in Figure F.5-5.

Table F.5–5 Piedmont Critical Facilities

ID	Name	Address
City Government		
1	Piedmont City Hall	314 Edmond Rd. NW
2	Piedmont Police Dept	400 Edmond Rd. NW
3	Piedmont Volunteer Fire Station 1	314 Edmond Rd. NW
4	Piedmont Volunteer Fire Station 2	220 Piedmont Rd. N.
5	Piedmont Emergency Management	415 Piedmont Rd.
6	Piedmont Public Library	1129 7th St. NW
7	Piedmont Chamber of Commerce	12 Monroe NW
8	Piedmont Museum	101 Monroe Ave
9	Water Tower / Booster Station	1120 Edmond Road NW
10	Booster Station	1421 Mustang Rd SE
11	Booster Station	712 Mustang Rd NE
12	Booster Station	1120 ½ Edmond Rd NW
13	Booster Station	1122 Edmond Rd NW
14	Booster Station	1 mile W on 164th/ Washington ½ south Cemetery Rd
15	Piedmont Water Tower	100 Cimarron Rd NW
Federal Government		
16	Piedmont USPS	112 Jackson Ave NW
Public Schools		
17	Piedmont Public Schools	713 Piedmont Rd.
18	Piedmont Primary School	615 Edmond Rd NW
19	Piedmont Elementary School	1011 Piedmont Rd. N.
20	Middle School of Piedmont	823 Second St. NW
21	Piedmont High School	1055 Edmond Rd. NW
22	Piedmont 5th and 6th Grade School	977 Washington Ave W
Financial		
23	Farmers and Merchants Bank	1216 Piedmont Rd. N.
24	BancFirst (in Williams Grocery Store)	410 Piedmont Rd. S.
Health Care / Child Care		
25	TLC Child Care Center	156 Edmond Rd. NW
26	TLC Child Care Center	1207 Edmond Rd. NE
27	Piedmont Medical Clinic	63 Gooder Simpson Blvd.
Social Service		
28	Piedmont Service Center	415 Piedmont Rd. N.

Source: City of Piedmont



LEGEND

- Interstate
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- State Highway
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- Social Service

0 1 2 Miles

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Figure F.5-5

City of Piedmont

Critical Facilities-Inset

Section 2 Existing Mitigation Measures

The City of Piedmont has participated in the regular program of the NFIP since 1985. Its number of policies in force, premiums paid and the number and amount of losses paid are shown in Table F.5-6. There are 25 flood insurance policies in force in the City of Piedmont.

Table F.5–6 Piedmont Insurance Information

Flood Insurance Information	
Policies in Force	30
$ Flood Insurance in Force	$5,839,600
Paid Premiums	$15,715
Total Number of Losses Paid	2
Loss Payments	$35,613

Source: National Flood Insurance Program

There are no Repetitive Loss Properties in Piedmont.

Community Rating System. The City of Piedmont does not participate in the National Flood Insurance Program's Community Rating System.

StormReady Program. Piedmont is not a StormReady community.

FireWise Program. El Reno does not participate in the FireWise Program.

Building Codes

The City of Piedmont has adopted the following building codes:

Oklahoma City Construction Standards, current standards;

International Building Code, 2009 edition;

International Residential Code, 2009 edition;

International Property Maintenance Code, 2006 edition;

American National Standards Accessible and Usable Buildings Facilities Code, 2003 edition;

International Plumbing Code, 2006 edition;

International Private Sewage Disposal Code, 2003 edition;

National Electric Code, 2005 edition;

International Mechanical Code, 2006 edition;

International Fire Code, 2006 edition;

International Fuel Gas Code, 2006 edition;

Pamphlet No. 58, Storage and Handling of Liquefied Petroleum Gases, issued by the National Fire Protection Association, latest edition

Emergency Services

Police Department. The Police Department has 10 full-time officers and six reserve officers. The City of Piedmont is NIMS compliant.

Fire Department. Piedmont's Fire Department has four salaried fire fighters and 16 volunteers operating out of two fire stations. The Department has 13 fire fighters who are registered EMTs, one Paramedic, and six who have completed Structural FF 1 School. The Department's ISO rating is 5. The Piedmont Department is NIMS compliant. The Department has aggressive inspection, code enforcement and public education programs.

Hospitals. Piedmont has a Medical Clinic, Dental Clinic and Pharmacy, all located on Gooder Simpson Blvd. The nearest hospitals are Integris Canadian Valley Hospital in Yukon, and Parkview Hospital El Reno.

Floodplain Management. The City of Piedmont has adopted and strictly enforces FEMA's SFHA (2008) floodplain maps and standards. Chapter 6 of the Piedmont Municipal Code (Flood Damage Protection), Section 600 establishes the City's Floodplain Regulations. All construction in flood hazard areas must be permitted by the City's Floodplain Manager. The City also has strict drainage codes (City Code, Part 18), which requires that any development be equipped to handle runoff from a 24-hour, 100-year storm and not increase drainage problems either up or downstream.

Hazardous Materials. The City of Piedmont has adopted strict hazardous material regulations and reporting procedures (Division 5, Section 17A, *authority not cited*), as well as ordinances for oil and gas operations. (City Code, Part 12, Chapter 5)

Environmental Preservation. The City of Piedmont has strict regulations concerning the protection of the environment from deleterious substances resulting from oil and gas industry operations and encourages "green development" and environmental preservation generally.

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.5-7. Refer to Appendix C for meeting agendas.

City of Piedmont Technical and Citizens' Advisory Committees

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

Jerry Smith
Canadian County Emergency Management Director

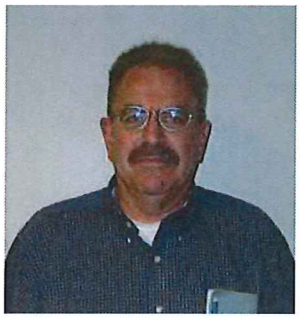
John Bickerstaff
Planning Commission Chairman

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.

Ron Cardwell
Civil Engineer

Bachelor of Science in Civil Engineering from Washington State University;
Bachelor of Arts in Physics from the University of Puget Sound;
APWA – Member.



Ronnie Funck
Canadian County
County Assessor

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

Jerry Koester
Piedmont Chief of Police

AA, Law Enforcement and Criminal Justice/Admin., Oklahoma Christian Univ.;
Graduate of the FBI National Academy in Quantico, VA;
Oklahoma ABLE Commission – Commissioner;
Retired Police Officers Assn – Past President;
OKC Metro Chiefs Assn – Past President;
Piedmont Kiwanis Club – Past President, Past Dist. Lt. Gov.

Tammy Kualaau
City of Piedmont
GIS Mapping Technician

Lyn Land
Oklahoma State Department of Health

Bachelor of Science in Biology from SNU;
Parks and Recreation Board – Chair;
ICS Training;
Int. Paramedic.

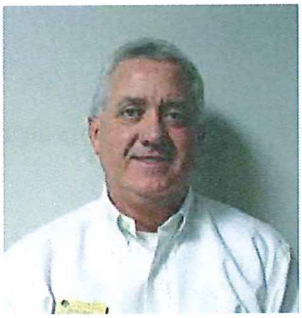
Boyd Maser
City of Piedmont
Emergency Management Director

Degree in Police Administration (Law Enforcement) from Arapahoe College/ Denver Metro College;
FEMA IS 700 & 800; ICS 100 & 200.

John Moore
City of Piedmont

Building Inspector.

Jacky Parish
Piedmont Schools



Assistant Superintendent, Piedmont Public Schools
Bachelors degree in Business Education from Oklahoma University;
MS in School Administration from UCO.

Arti Patel
City of Piedmont
Community Development Director

BBA in Finance from OU;
Masters in Regional and City Planning from OU;
American Planning Association – Member.

Dr. Ellen Stevens
Contract City Engineer for City of Piedmont

BS in Civil Engineering from WVIT;
MS in Civil Engineering from Mississippi State University;
PhD in Agricultural Engineering from Oklahoma State University;
OFMA Vice Chair; ASCE.

Bud Stuber
City of Piedmont

Public Works.

Michele Wagaman
Piedmont Emergency Management

Assoc. Allied Health in Nursing from Platt/OSU-OKC;
Emergency Management Piedmont – Medical.

Clark Williams
City of Piedmont
Director of Community Development

Bachelors degree in Political Science/Economics from Ok State University;
MRCP in Urban Planning from Oklahoma University;
Oklahoma Floodplain Managers Association, Chair
American Planning Association; CFM; NIMA Cert.

Vernon Woods
City of Piedmont

Piedmont City Council – Member.

Randy Yount
Rent-A-Crane

Safety Director.

Additional TAC/CAC members included:

Mike Hyatt Piedmont Schools
Bill Ward Piedmont Police Department, Deputy Chief

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 in 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.5–7 Piedmont 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.
March 25, 2009	Initial City of Piedmont Multi-Hazard Mitigation Plan Technical Advisory Committee (TAC) Meeting.
April 29, 2009	TAC/CAC Meeting – Community Database. Reviewed Community Information (maps, demographics, etc.).
May 27, 2009	Meeting of TAC and CAC; Presentation, review, discussion of Lightning and Hail; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
October 7, 2009	Meeting of TAC and CAC; Presentation, review, discussion of Extreme Heat, Drought, and Mass Communication; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
November 4, 2009	Meeting of TAC and CAC; Presentation, review, discussion of Fires; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
December 1, 2009	Meeting of TAC and CAC; Presentation, review, discussion of Severe Winter Storms and Back-Up Generators; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
January 5, 2010	Meeting of TAC and CAC; Presentation, review, discussion of Hazardous Materials and Transportation Hazards; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
February 2, 2010	Meeting of TAC and CAC; Presentation, review, discussion of Flooding and Dam Failures; Goals and Objectives; Existing Mitigation Measures, Potential additional Mitigation Measures, Hazard Priority Matrix.
March 2, 2010	Meeting of TAC and CAC at Piedmont City Hall. Presentation, review, discussion of High Winds, Tornados, Safe rooms and IBHS Fortified Home Standards. Review goals & objectives, existing and possible mitigation measures, develop hazard priority matrix.
April 6, 2010	Meeting of TAC and CAC @ City Hall. Presentation, review, and discussion of all Natural and Man-Made Hazards studied during the HMGP Planning Process. Confirm selected Mitigation Measures for all Hazards.
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 City of El Reno has identified certain facilities as critical to the health, safety and welfare of its citizens, business and economy. Table F.5-8 indicates, generally, the exposure of the critical facilities to the15 hazards covered by this Plan.

Table F.5–8 City of Piedmont 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	Piedmont City Hall		X	X	X	X	X	X	X		X	X	X			X
2	Piedmont Police Dept		X	X	X	X	X	X	X		X	X	X			X
3	Piedmont Volunteer Fire Station 1		X	X	X	X	X	X	X		X	X	X			X
4	Piedmont Volunteer Fire Station 2		X	X	X	X	X	X	X		X	X	X			
5	Piedmont Emergency Management		X	X	X	X	X	X	X	X	X		X			X
6	Piedmont Public Library		X	X	X	X	X	X	X		X	X	X			
7	Piedmont Chamber of Commerce		X	X	X	X	X	X	X	X	X		X			X
8	Piedmont Museum		X	X	X	X	X	X	X	X	X		X			X
9	Water Tower / Booster Station		X	X	X	X	X	X	X		X	X	X			
10	Booster Pump		X	X	X	X	X	X	X		X	X	X			
11	Booster Pump		X	X	X	X	X	X	X	X	X	X	X			
12	Booster Station		X	X	X	X	X	X	X		X	X	X			
13	Booster Station		X	X	X	X	X	X	X		X	X	X			
14	Booster Station		X	X	X	X	X	X	X		X	X	X			
15	Piedmont Water Tower		X	X	X	X	X	X	X		X	X	X			X
16	USPS - Piedmont		X	X	X	X	X	X	X	X	X		X			X
17	Piedmont Public Schools		X	X	X	X	X	X	X		X	X	X			X
18	Piedmont Primary Elementary School		X	X	X	X	X	X	X		X	X	X			
19	Piedmont Elementary School		X	X	X	X	X	X	X		X	X	X			X
20	Piedmont Middle School		X	X	X	X	X	X	X		X		X			X
21	Piedmont High School		X	X	X	X	X	X	X		X	X	X			
22	Piedmont Intermittent School		X	X	X	X	X	X	X		X	X	X			
23	Farmers and Merchants Bank		X	X	X	X	X	X	X		X	X	X			X
24	BancFirst(inside Williams Grocery Store)		X	X	X	X	X	X	X		X		X			X
25	TLC Child Care Center		X	X	X	X	X	X	X	X	X	X	X			X
26	TLC Child Care Center		X	X	X	X	X	X	X		X	X	X			
27	Piedmont Medical Center		X	X	X	X	X	X	X		X	X	X			X
28	Piedmont Service Center		X	X	X	X	X	X	X	X	X		X			X

Table F.5-9 displays hazard information where there is community-specific data, as shown in the maps on the following pages.

Table F.5–9 Piedmont Hazard Impacts

Hazard	Area (Sq. Mi.)	Improved Parcels	Value	Area Impacted	Impacted Population
Floods	2.96	411	$42,900,209	7%	152
Highly Expansive Soils	4.04	492	$48,342,539	10%	279
Wildfire	N/A	N/A	N/A	N/A	N/A
Dam Failure	0.52	54	$5,401,886	1%	-
Tier II Hazardous Materials ½ Mile	1.39	98	$10,348,182	3%	132
Tier II Hazardous Materials ¼ Mile	0.39	43	$5,621,176	1%	-
Transportation - Highway	3.72	535	$51,210,211	9%	298

4.1 Flood

All drainage within the incorporated area runs north and east to the Cimarron River in Kingfisher and Logan Counties. This has contributed to flooding in several Piedmont subdivisions.

Downstream view of Cottonwood Creek near Piedmont.

Location

The floodplains have significant impact on City of Piedmont. Within Piedmont's 43.8 square miles, several significant tributaries converge north of the City on the wide Cimarron River floodplain.

Cottonwood Creek has both the largest floodplain in Piedmont and is the main conduit of drainage to the Cimarron River. Cottonwood Creek Site 16 is a high hazard dam located in Piedmont on the Creek and is one of several upstream detention ponds located along the length of the tributary. Wolf Creek drains the northeastern locations of the City and is a tributary to Cottonwood Creek running approximately seven miles in length before joining the creek in Kingfisher County.

Deer Creek is the main drainage for areas located in the south and southeastern sections of the City including the central business district. Deer Creek, a right bank tributary to Cottonwood Creek runs 26 miles before joining with Cottonwood Creek in Logan County. Northwood Lake, on Deer Creek, contains a high hazard dam located directly south of Piedmont. Soldier Creek is a tributary to Deer Creek and runs approximately seven creek miles within the City Limits and another seven creek miles in Oklahoma County before its confluence with Deer Creek.

These creeks and their drainage areas are listed in Table F.5-10. More dramatic is the mapping of the floodplains and high hazard dams in Figure F.5-6. The combined 100-year floodplains of these tributaries comprise 2.5 square miles, or 5.5% of Piedmont's corporate limits. Flooding problems within the City are usually associated with runoff from sudden, heavy rains. Drainage system functions in the Piedmont area are positively supported by the clay and shale geology associated with the area. Figures F.5-7, F.5-8 and F.5-9 graphically present the flooding risks in three individual subdivisions.

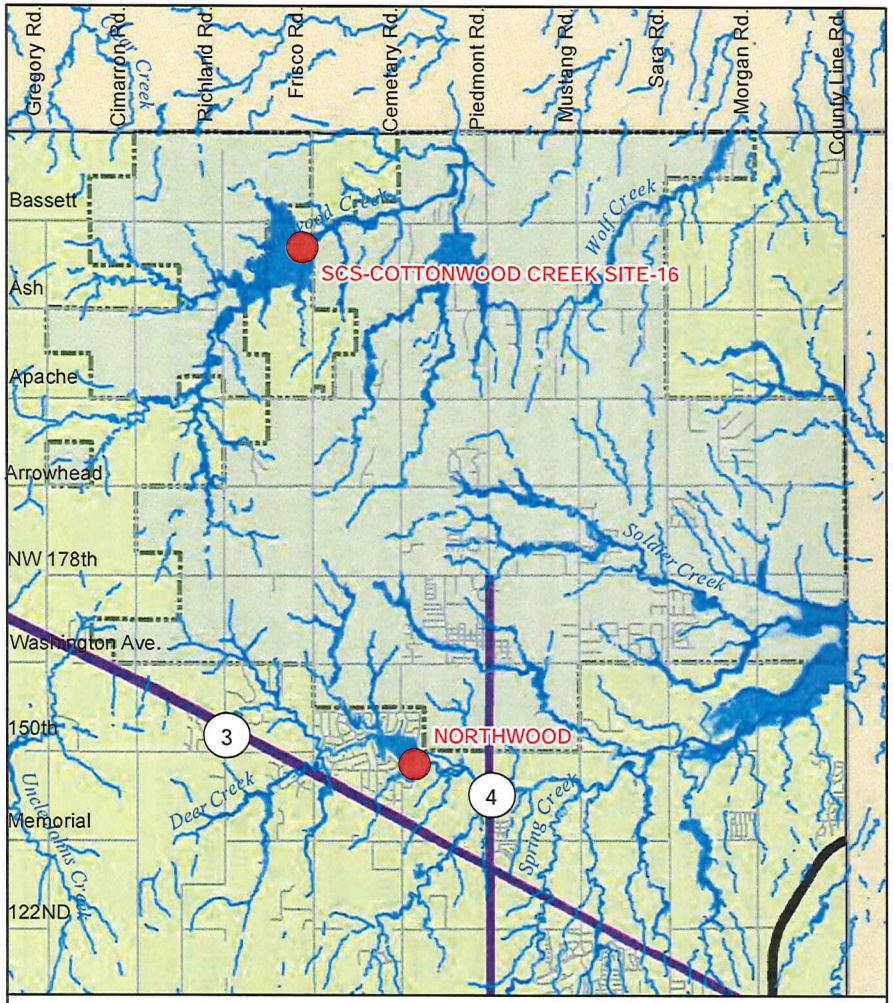


Figure F.5-6: *City of Piedmont 100yr Floodplains*

Floodplains
- 100yr Floodplain
- 500yr Floodplain

Boundaries
- Piedmont_City_Limits
- Canadian County
- Statewide Counties

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

0 1 2 Miles

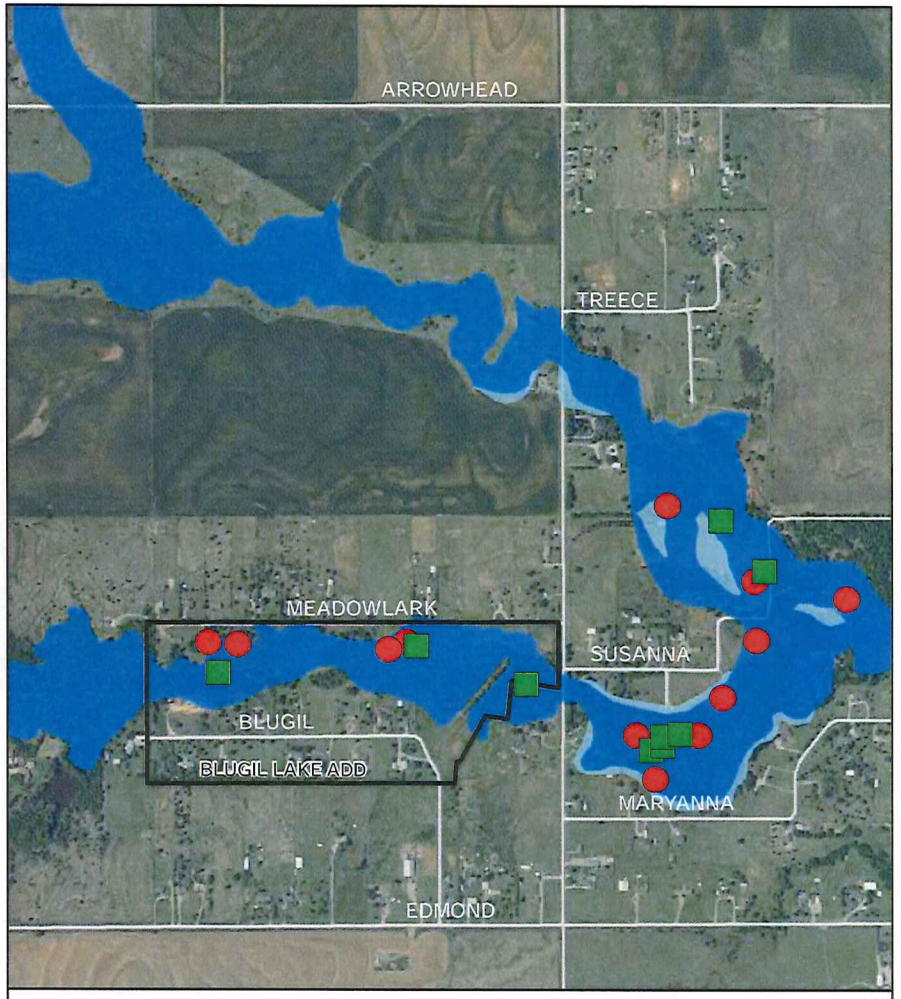


Figure F.5-7: *Bluegil Lake Addition Floodplains*

Floodplains
- Outbuilding
- Residence
- 100yr Floodplain
- 500yr Floodplain
- ROADSG

Boundaries
- Sub-Division
- Piedmont_City_Limits
- Canadian County
- Statewide Counties

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

0 485 970 Feet

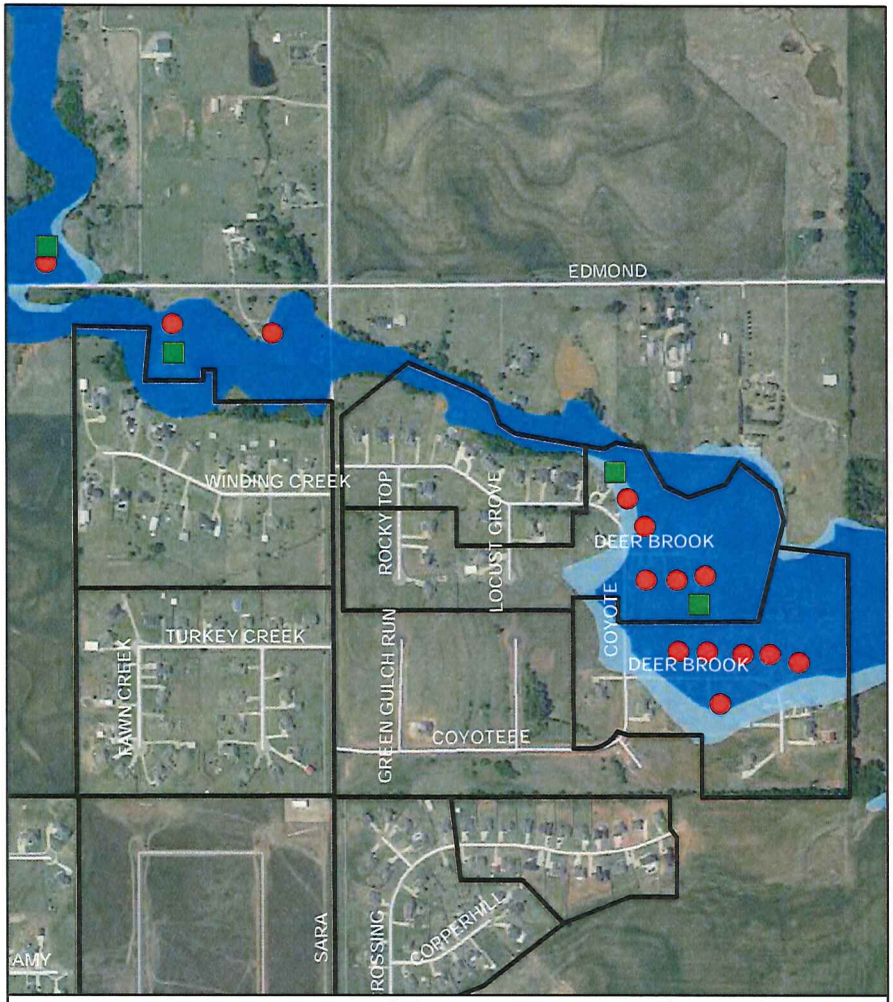


Figure F.5-8: *Coyote Springs Addition Floodplains*

Floodplains
- Outbuilding
- Residence
- 100yr Floodplain
- 500yr Floodplain

Boundaries
- Sub-Division
- Piedmont_City_Limits
- Canadian County
- Statewide Counties

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

Flanagan & Associates, LLC

0 500 1,000 Feet

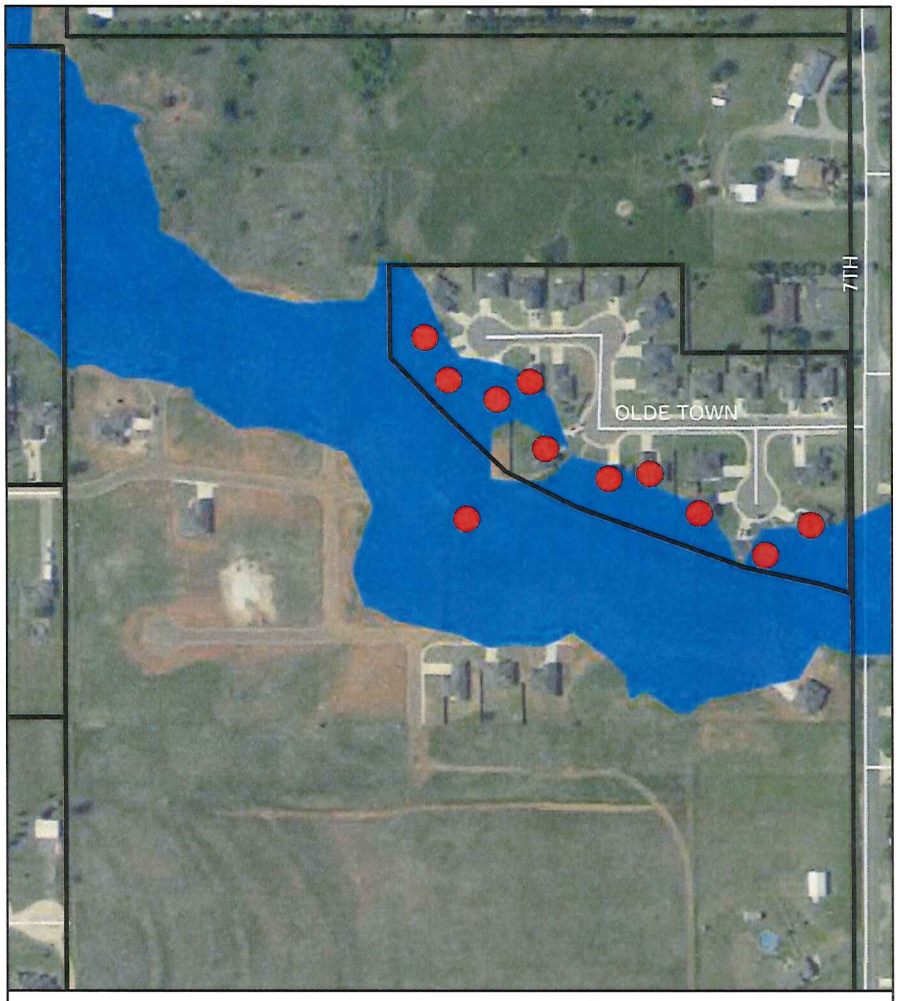


Figure F.5-9: *Old Towne Addition Floodplains*

Floodplains
- Outbuilding
- Residence
- 100yr Floodplain
- 500yr Floodplain

Boundaries
- Sub-Division
- Piedmont_City_Limits
- Canadian County
- Statewide Counties

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

Flanagan & Associates, LLC

0 125 250 Feet

Table F.5–10 City of Piedmont Creeks and Drainage Areas

Creek	Total Drainage Area at Piedmont (sq. mi.)	Structures in 100-year Floodplains
Cottonwood Creek	17.93	15
Wolf Creek	5.11	8
Deer Creek Tributary 1	3.58	0
Deer Creek Tributary 2	4.26	21
Soldier Creek Mainstem	11.57	26
Soldier Creek Tributary 1	0.94	0
Total	**43.39**	**70**

Frequency

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

Extent/Severity

Piedmont 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 approximately 397 parcels within Piedmont that are touched by the SFHA. The following table lists these parcels by type and their associated market values.

Table F.5–11 City of Piedmont Parcels Touched by SFHA

Improvement Type	Number	Estimated Market Value
Agricultural	96	$5,594,211
Residential	292	$37,092,400
Commercial	2	$112,339
Tax Exempt	7	$101,259
Total	**397**	**$42,900,209**

Although rainfall averages 32.74 inches per year, because of the geographical location, thunderstorms can, and have, dumped up to 15 inches of rain in nearby areas in a few hours. There are about 70 structures in Piedmont basins touched by the 100-year floodplain, 15 structures in the Cottonwood Creek basin, 26 on Soldier Creek and 21 on Deer Creek. None of the City's Public Schools are within an SFHA.

Table F.5–12 City of Piedmont Structures in SFHA

Type	Piedmont Data	Map Analysis
Residences	62	57
Outbuildings/Accessory Buildings	7	29
Commercial	0	1
Total	**69**	**87**

History

According to the NCDC Flood Events data base, Piedmont experienced three flood events from 1995 through 2010.

- **April 30, 2000** – Floodwaters partially covered OK Highway 4 at Piedmont.
- **June 25, 2000** - A heavy downpour inundated drainage basins both upstream and in Piedmont, resulting in flooding in several areas of the City. Most of the flooding occurred north of Piedmont in Kingfisher County, but several highways and streets in Piedmont were flooded, including Arrowhead Rd. north of Piedmont, Washington Ave. and Apache Rd. NE.
- **June 26, 2007** – Intense thunderstorms resulted in flooding along Washington Ave. between Morgan and County Line Rds., and closing the intersections at both Washington Ave. and Arrowhead Rd. and on County Line Rd.

Worst-Case Flooding Scenario

Piedmont's *Comprehensive Plan* is committed to maintaining the community's flood-prone lands as open space and communication corridors with trails and recreational facilities. The greatest potential for flood damages is in floodplains where development has already taken place: along the stream reaches of Soldier Creek and a Deer Creek tributary: specifically, west of NW 7th St. in the Old Towne Estates Addition (seven homes), and along Soldier Creek in the Blugil Lake Addition (12 homes) north of the intersection of Edmond Rd. and Mustang Rd., and in the Winding Creek and Coyote Springs developments (13 homes) south and east of the intersection of Edmond Rd. and Sara Rd. A worst-case flood event could impact an estimated 32 residences along these creeks.

Conclusion

Piedmont has a High vulnerability to and High probability of the Flood hazard. Over the past 30 years, progress has been made in protecting the lives and property of the citizens of Piedmont from flooding. Piedmont joined the National Flood Insurance Program in 1985, adopted floodplain ordinances, and required that all future development be built above the 100-year floodplain elevation. Much work remains to be done to make the Piedmont safe from flooding, but positive steps are being made to solve the flooding problems for existing properties, and to ensure that future development is safe from flooding and does not have an adverse impact on existing floodplain properties.

To protect citizens at risk from flooding, this study has identified several flood mitigation measures to be implemented by the City of Piedmont. These recommended projects are discussed in Chapter 6: Mitigation Strategies. These projects include acquisition and removal of flood-prone properties.

4.2 Tornado

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

Frequency

Piedmont has recorded six tornadoes from 1995 through 2011. Given these frequencies, the City can expect one tornado every 2.5 years

Extent/Severity

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

Impact

Storms that generate tornadoes also have the ability to cause lightning, hail, high winds, and flooding damage. Tornadoes can result injury and lost of lives, and the damage and 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.

Aftermath of EF5 Tornado in Piedmont, May 2011

History

Piedmont reported six tornadoes from 1995 through 2011, the combined damage of which was a total $227,000. Given these frequencies, Piedmont can expect one tornado every 2.5 years. These are summarized briefly below.

- **May 3, 1999** - In a tornado outbreak that spawned 58 tornadoes, three touched down near Piedmont. The first formed southwest of Piedmont and tracked northward for 6 miles before dissipating. Damage consisted of mangled and downed trees and power poles, two mobile homes sustained heavy damage (F1); a barn was destroyed, and one cow killed. The second developed about 1.5 miles west of Piedmont and tracked northward for eight miles ending in far south Kingfisher County. Damage consisted of downed trees and power poles, however F2 damage was observed about four miles northwest of Piedmont. The third about four miles north-northeast of Piedmont in northeast Canadian County and tracked northward for 10 miles before dissipating about near Cashion in Kingfisher County. F1 damage was observed in northeast Canadian County from this third tornado, where large trees were uprooted, and numerous power poles felled or bent over. Damage was about $52,000.
- **May 29, 2004** – Storm chasers observed a condensation funnel about five to six miles west of Piedmont that damaged a barn and toppled several electric poles before crossing OK Highway 3 near Banner Road. The tornado damaged several more barns before lifting five miles west of Piedmont. Damage was estimated at $150,000.
- **May 8, 2007** - A short-lived tornado touched down between Gregory Rd. and Cimarron Rd. south of OK 3. A few trees were uprooted, a tin shed destroyed, and two roofs damaged. Fifteen minutes later, a brief EF1 tornado caused minor damage three miles northwest of Piedmont, mainly along and near Duboise Road. Cars were dented and homes suffered shingle damage. One brick home was shifted on its foundation, and a car rotated 90 degrees.
- **May 24, 2011** – A severe storm that spawned seven tornadoes moved through central Oklahoma from the southwest to the northeast. The most notable was the second, which touched down in Caddo County, passed to the northeast south of Calumet, and then through the northwest part of El Reno and into Piedmont, before lifting near Guthrie. This 75-mile-long twister was on the ground for two hours and caused EF5 damage in Piedmont, leaving 10 people dead and 60 injured in three counties. The tornado path is shown in Figure F.5-10.

Worst-Case Tornado Event

For the City of Piedmont a worst-case EF5 tornado, as presented in Table F.5-13, would damage 329 residential structures and result in losses of $72,801,360. Sixteen critical facilities would be impacted is shown in Table F.5-14. Figure F.5-11 depicts the worst case scenario graphically.

Table F.5–13 Piedmont EF5 Tornado Scenario

EF-Scale	Estimated Market Value	Damage Factor	Structure Damage	Contents Value	Contents Damage	Total Damage	Pop.	Residential Structures	Critical Facilities
1	$29,604,328	0.1	$2,960,432.80	$14,802,164.00	$1,480,216.40	$4,440,649.20	130	44	3
2	$12,681,149	0.4	$5,072,459.60	$6,340,574.50	$2,536,229.80	$7,608,689.40	34	12	2
3	$21,598,641	0.8	$17,278,912.80	$10,799,320.50	$8,639,456.40	$25,918,369.20	330	120	5
4	$15,395,436	1	$15,395,436.00	$7,697,718.00	$7,697,718.00	$23,093,154.00	215	70	4
5	$7,826,999	1	$7,826,999.00	$3,913,499.50	$3,913,499.50	$11,740,498.50	254	83	2
Totals	**$87,106,553.00**		**$48,534,240.20**	**$43,553,276.50**	**$24,267,120.10**	**$72,801,360.30**	**963**	**329**	**16**

Table F.5–14 Critical Facilities Worst Case Scenario

ID	Name	Address
	City Government	
1	Piedmont City Hall	314 Edmond Rd. NW
2	Piedmont Police Dept	325 Piedmont Rd N
3	Piedmont Volunteer Fire Station 1	314 Edmond Rd. NW
6	Piedmont Public Library	1129 7th St. NW
7	Piedmont Chamber of Commerce	12 Monroe NW
10	Booster Station	1421 Mustang Rd SE
14	Booster Station	1 mile W on 164th/ Washington ½ south Cemetery Rd
	Federal	
16	Piedmont USPS	112 Jackson Ave NW
	Public Schools	
17	Piedmont Public Schools	713 Piedmont Rd.
19	Piedmont Elementary School	1011 Piedmont Rd. N.
20	Middle School of Piedmont	823 Second St. NW
22	Piedmont Intermittent School	977 Washington Ave W
	Financial	
23	Farmers and Merchants Bank	1216 Piedmont Rd. N.
	Health Care / Child Care	
25	TLC Child Care Center	156 Edmond Rd. NW
26	TLC Child Care Center	1207 Edmond Rd. NE
27	Piedmont Medical Center	63 Gooder Simpson Blvd

Conclusion

Piedmont has a High vulnerability to and High probability of the Tornado hazard. Piedmont has experienced six tornadoes from 1995 to 2011, including the EF5of May 24, 2011. Piedmont also experienced a previous EF4 tornado on April 30, 1978. Piedmont can expect a tornado every 2.5 years. Damage 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.

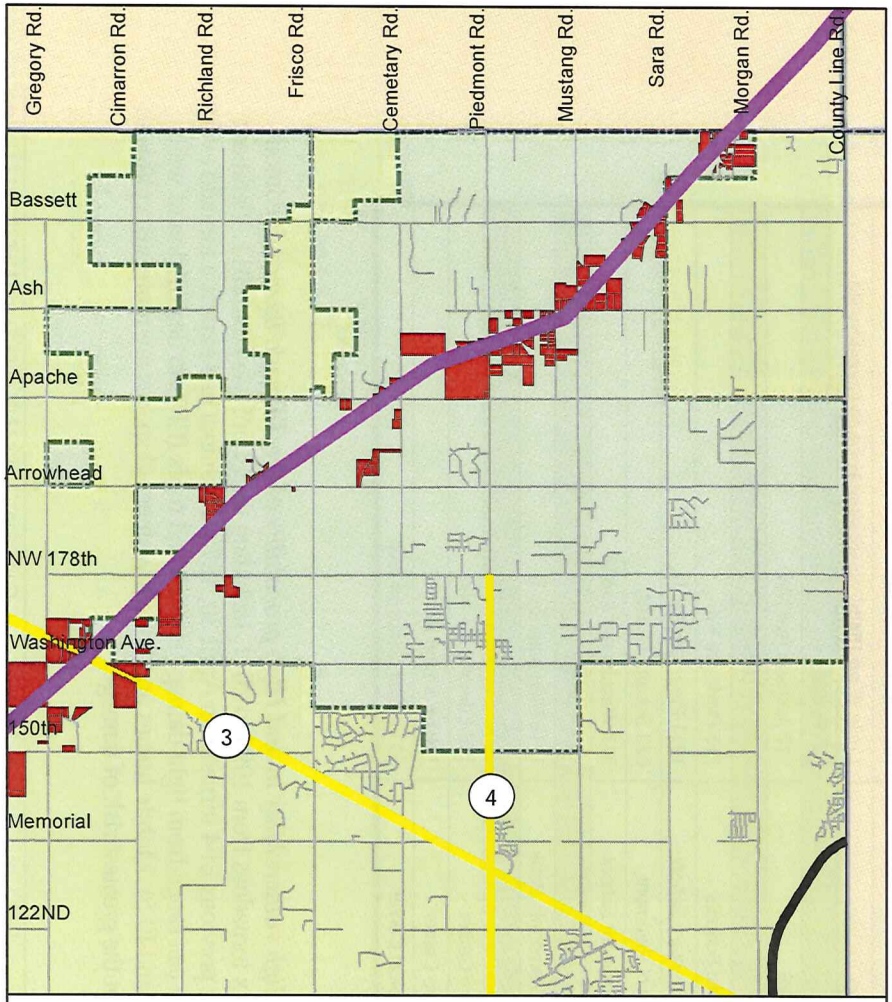


Figure F.5-10: *City of Piedmont 2011 Tornado Track*

Legend
- 2011 Tornado Track
- Parcel Damaged

Boundaries
- Piedmont_City_Limits
- Canadian County
- Statewide Counties

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

0 1 2 Miles

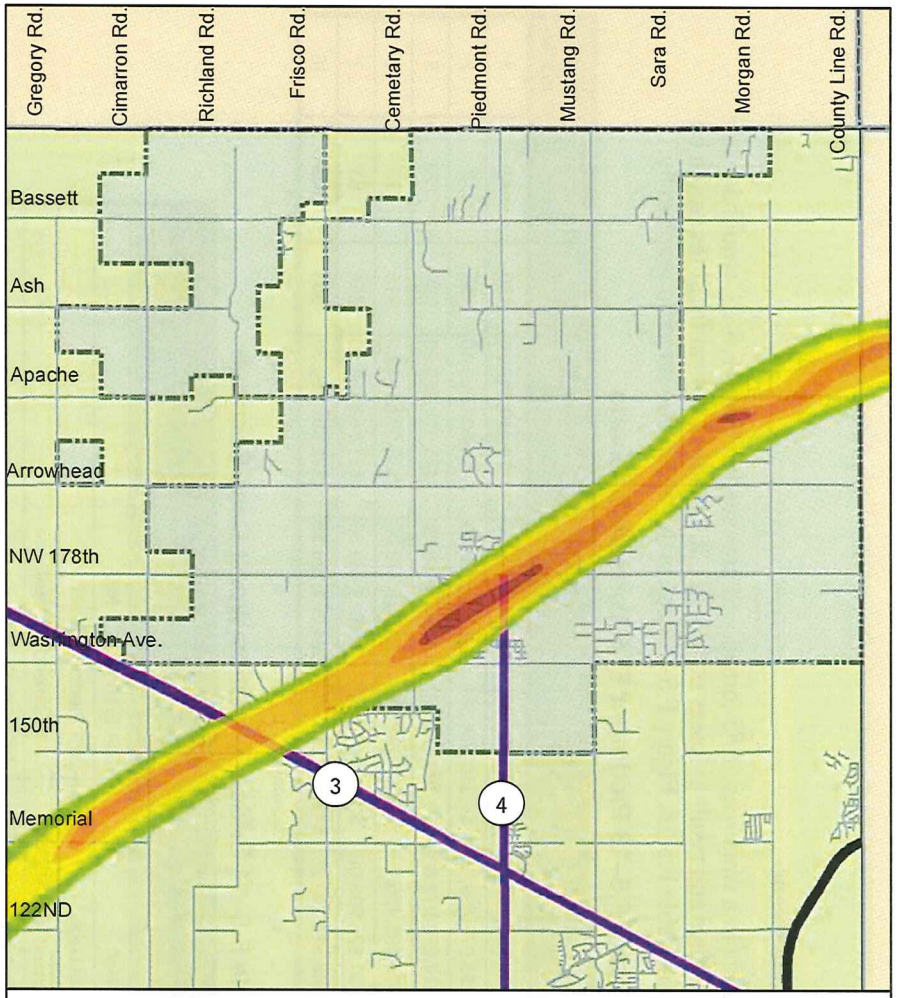


Figure F.5-11: *City of Piedmont Tornado Scenario*

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

Boundaries
- Piedmont_City_Limits
- Canadian County
- Statewide Counties

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

0 1 2 Miles

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, Piedmont experienced 16 separate high wind events, or an average of one event per year.

Extent/Severity

Piedmont 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 on the Scale to be major severity wind force.

Impact

The impact of this hazard can result in injury and death, damage to homes and businesses and cause 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. Until 2011, the highest wind speed – 92 mph – was reported at Mustang on July 23, 1995. By far the single greatest damage event in the County was at Union City on June 3, 1995, which resulted in $5.5 million in losses. During this same period, Piedmont experienced 16 separate high wind events, or an average of one event per year, which resulted in a total of $88,000 in damage. Based on this data, Piedmont can expect about $5,500 in damages per event, or annual damages of $5,866 from high winds.

- **April 3, 1999** - Minor roof damage occurred to several buildings on Monroe Ave. and Piedmont Rd. in Piedmont. Power poles, signs, and a barn were also damaged. Losses were $10,000.
- **May 27, 2001** - The roof of the Baptist Church was damaged by 80-mph winds. 160,000 electric customers lost power. Losses were $25,000.
- **March 2, 2008** – 70-mph winds blew off half of a roof and support beams from a sturdy barn. Damage was estimated at $30,000.
- **May 24, 2011** - The highest wind gust ever recorded at an Oklahoma Mesonet site was measured near El Reno and Piedmont, when an EF-5 tornado tore through Canadian County. The wind speed rose from 61 mph at 4:18 p.m. to 66 mph at 4:19, to 131 mph at 4:20, to 151 at 4:21, and then dropped to 91 mph at 4:22. The winds caused considerable damage.

Worst Case High Wind Event

For the City of Piedmont, a worst-case High Wind event would impact 806 residences, 18 businesses, and 15 agricultural properties, and result in total losses of $146,572. Twelve critical facilities would be impacted: FNB Bank, Piedmont Elementary School, Piedmont Middle School, Piedmont Public Schools, Piedmont Service Center, Piedmont City Hall, Piedmont Museum, Piedmont Chamber of Commerce, Piedmont Police Dept, Piedmont Volunteer Fire Station 1, USPS – Piedmont and Water Tower / Booster Station.

Table F.5–15 Piedmont High Wind Worst Case Scenario Damages

EF-Scale	Parcel Count	Damage Factor	Averaged Damage	Hospital Cost Factor	Hospital Costs	Debris Factor	Averaged Debris (yds.)	Utility Loss Factor	Utility Loss
Residential Properties w. Assessed Improvement Values									
0	489	$159.68	$78,083.52	$4.39	$2,146.71	4.77	2,332.53	$2.49	$1,217.61
1	317	$159.68	$50,618.56	$4.39	$1,391.63	4.77	1,512.09	$2.49	$789.33
Total	806	$159.68	$128,702.08	$4.39	$3,538.34	4.77	3,844.62	$2.49	$2,006.94
Commercial Properties w. Assessed Improvement Values									
0	18	$159.68	$2,874.24	$4.39	$79.02	4.77	85.86	$2.49	$44.82
1	-	$159.68	$0.00	$4.39	$0.00	4.77	-	$2.49	$0.00
Total	18	$159.68	$2,874.24	$4.39	$79.02	4.77	85.86	$2.49	$44.82
Agricultural Properties w. Assessed Improvement Values									
0	13	$159.68	$2,075.84	$4.39	$57.07	4.77	62.01	$2.49	$32.37
1	2	$159.68	$319.36	$4.39	$8.78	4.77	9.54	$2.49	$4.98
Total	15	$159.68	$2,395.20	$4.39	$65.85	4.77	71.55	$2.49	$37.35
Tax Exempt									
0	37	$159.68	$5,908.16	$4.39	$162.43	4.77	176.49	$2.49	$92.13
1	4	$159.68	$638.72	$4.39	$17.56	4.77	19.08	$2.49	$9.96
Total	41	$159.68	$6,546.88	$4.39	$179.99	4.77	195.57	$2.49	$102.09
Totals									
-	880	-	$140,518.40	-	$3,863.20	-	4,197.60	-	$2,191.20

Conclusion

Piedmont has a High vulnerability to and High probability of the High Wind hazard. Piedmont reported 16 high wind events from 1995 through 2010, or about one event per year, that caused a total of $88,000 damage. Almost the entire United States has some risk of high wind events, but the factors that contribute most to wind-related deaths, injuries, and property damage are the structure type, quality of construction, and the state of deterioration of the buildings where people reside. 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

Piedmont reported four lightning events from 1995 through 2010, or about one event every four years.

Extent/Severity

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

Impact

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

History

Canadian County reported nine damaging lightning events from 1995 through 2005. Four of these strikes were in Piedmont, and resulted in $47,000 in losses. Piedmont can expect to experience about nine severe thunderstorm events a year, any one of which can carry potentially damaging lightning.

- July 18, 1997 – Lightning hit an oil storage tank at Ben Booster pipeline station in northern Piedmont.
- May 25, 1998 - Lightning struck a house in Piedmont causing a fire. Damage was $40,000.
- May 29, 2001 – Lightning struck an oil tank battery causing it to catch fire. Damage was $5,000.
- July 24, 2002 – Lightning struck an oil tank battery, causing a fire. Damage was $2,000.

Worst-Case Lightning Scenario

A worst-case lightning event for Piedmont would be one that severely disrupted electrical service and damaged electronics at one or more of the City's primary critical facilities.

Conclusion

Piedmont has a High vulnerability to and High probability of the Lightning hazard. Piedmont can expect to experience about nine severe thunderstorm events a year, any one of which can carry potentially damaging lightning. Piedmont reported four damaging lightning events from 1995 through 2005 that caused a total of $47,000 damage. Electronic equipment, from personal computers to enterprise-level communications systems, can also be seriously damaged by power surges from lightning. Surge protection should be included in any electronic system to minimize the risk of damage from lightning.

4.5 Hail

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

Frequency

Piedmont reported 31 separate hail events from 1995 through 2010, for an average of two events per year.

Extent/Severity

Piedmont 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 hail storm greater than H2 on the Scale.

Impact

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

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

History

During the period 1995 through 2010, Canadian County reported 105 separate hail events (once duplicate reports of the same storm have been removed).

Piedmont reported 31 separate hail events from 1995 through 2010, for an average of two events per year. Hail stones for these events ranged in size from 0.75 inches to 3.0 inches, with three storms having stones 1.75 inches in diameter, two with 2.0-inch stones, two with 2.5-inch hail, one with 2.75-inch hail, and one with 3.0-inch stones. Only $1,000 damage was reported for these events – the one that dropped 3.0-inch hail. As a general rule, hail damage increases sharply when stones reach 1.75 inches in diameter and higher, when driven by high winds. Given this measure, Piedmont experienced nine potentially damaging hail events in the 15 years from 1995 through 2010, and can thus expect this level of the hazard once every 1.6 years.

- **June 20, 1998** – 2.5-inch hail fell five miles east of Piedmont.
- **April 30, 2004** – 3.0-inch hail broke the windows of two cars in Piedmont. Damage was $1,000.
- **June 4, 2005** – 1.75-inch hail reported eight miles northwest of Piedmont.
- **February 10, 2009** – 2.0-inch and 2.75-inch hail fell one mile east of OK 3 in Piedmont.

Worst-Case Hail Scenario

The County's most damaging storm occurred on May 29, 2004, and involved hail 2.75 inches in diameter at Okarche. Storms of this size are random events and are possible everywhere in the County. This particular storm caused $500,000 damage. A similar storm, containing hail stones 2.75 inches in diameter and higher, driven by high winds, could do similar damage in Piedmont.

Conclusion

Piedmont is considered to have a High vulnerability to and High probability of the Hail hazard. The peak season for hail is in the late spring and early summer. Piedmont was hit by hail 31 times from 1995 through 2010, for an average of two events per year. Hail ranged in size from 0.75 inches to 3.0 inches. As a general rule, hail damage increases sharply when stones reach 1.75 inches and higher, driven by high winds. Given this measure, Piedmont experienced nine potentially damaging hail events in 15 years, or one every 1.6 years.

4.6 Severe Winter Storm

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

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 Piedmont has experienced the same number of storms.

Extent/Severity

Piedmont 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, houses, roads, electrical poles and lines, 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. People and livestock are also susceptible to frostbite and death from exposure.

History

During the period 1995 through 2010, Canadian County experienced a reported 35 ice and snow events, or an average of 2.3 winter storms each year. None of the NCDC narratives for these events mentions Piedmont specifically. Because of the general and widespread nature of winter storms, it is assumed that Piedmont experienced the same number of ice and snow events.

Worst-Case Winter Storm Scenario

A worst-case winter storm for Piedmont would be the same as for the County detailed in Chapter 4.6.

Conclusion

Piedmont has a High vulnerability to and High probability of the Severe Winter Storm hazard. Because Oklahoma is not regularly subjected to prolonged winter storms, its communities are often unprepared for the impacts on transportation networks, property, infrastructure, and community services. Severe winter storms can result in widespread and lengthy power outages and other infrastructure damage.

4.7 Extreme Heat

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

Frequency

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

Extent/Severity

Piedmont 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 the increased risk of wildfire and drought, power outages and water shortages. Muscle cramps, nausea, heat exhaustion, heat stroke, and death frequently result from extended periods of extremely high temperatures.

History

During the period 1996 through 2011, Canadian County experienced four extreme heat events or an average of one every 3.7 years. Because of the general and widespread nature of heat waves, it can be reasonably assumed that Piedmont will experience the same number of extreme heat events.

Worst-Case Extreme Heat Scenario

A worst-case scenario for Piedmont 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

Piedmont has a High vulnerability to and High probability of the Extreme Heat hazard. Oklahoma summers are hot and humid. 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 economic losses, heat-related illness, water shortages and electric grid failures. The hazard can be mitigated by notifications and warnings to vulnerable populations, the establishment of cooling rooms, utility cost assistance 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

Piedmont has experienced four droughts from 1996 through 2011.

Extent/Severity

Piedmont considers a minor severity drought to be a drought greater than a -2 on the Palmer Drought Index, and a major severity drought to be a drought -2 or lower on the Scale. 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 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

Piedmont has experienced four droughts from 1996 to 2011. The agriculture industry was particularly hard hit county-wide. It is likely that the Piedmont will experience some impacts from drought, although not as severely as in the western parts of the County. Most communities in central Oklahoma, including Oklahoma City and Piedmont, were forced to resort to some form of rationing during the 2011 drought.

Worst-Case Drought Scenario

Piedmont's water is drawn from groundwater wells, drilled into the Garber-Wellington aquifer. This groundwater resource is productive, but to supply its community's needs Piedmont has also connected to the Oklahoma City water system. A worst-case scenario would be a drought as severe as that of 2011 extended over a two- or three-year period, combined with significantly reduced aquifer recharge and rising water costs.

Conclusion

Piedmont has a High vulnerability to and High probability of the Drought hazard. Piedmont's water is drawn from groundwater wells, drilled into Garber-Wellington aquifer, and from the Oklahoma City water system. Piedmont is a member of the Central Oklahoma Water Resource Authority whose task is to find long-term solutions to the area's water needs. Although Piedmont's water supply has been adequate, its population is growing and water costs are rising.

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. See Chapter 4 for a more detailed discussion of Expansive Soils.

Location

About 10% of Piedmont's incorporated community is underlain by very high expansive soils, predominantly in central Piedmont, between Mustang Rd. and Piedmont Rd., and from Arrowhead NW north to Bassett NE, and in western Piedmont, between Richland Rd. and Cimarron Rd., and from Azelea NW to Ash NW. Generally, low and medium shrink/swell soils underlie 90% of Piedmont.

Table F.5-16 shows the breakdown of soil types in Piedmont. A map of Piedmont's expansive soils is presented in Figure F.5-12.

Table F.5–16 City of Piedmont Expansive Soils

Expansion Potential	Area (mi^2)	Area (%)
Very High	4.00	9.5%
High	0.04	0.1%
Moderate	24.46	57.9%
Low	13.37	31.6%
Water	0.39	0.9%
Total	42.26	100%

Source: U.S. Department of Agriculture

Extent/Severity

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

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

Impact

According to GIS and County Assessor Data, 492 improved parcels with a value, estimated for fair market, of $48,342,439 are underlain by soils with Moderate to Very High shrink/well potential. Over time, residential and commercial structures not constructed to account for the soils in which they are laid upon, face damage to foundation and piping. In piedmont, Highway 4 runs through areas of Very High soil expansion potential. This route should be monitored, especially during periods of extreme heat or drought, for cracking of the roadway and need for repairs. Expansive soils can result in costly repairs and reduce the value of the buildings that are affected. As a rule, expansive soils do not cause injury or death, unless a structure weakened by cracks in foundation or walls and were to collapse during an earthquake or other event.

History

There have been no reports of damage from expansive soils in Piedmont. Table F.5-17 names the City's critical facilities that a built on High to Moderate Expansive Soils.

Worst-Case Expansive Soils Scenario

Given its extensive incorporated area, Piedmont's greatest vulnerability to expansive soils will be the extension of its water and sewer infrastructure in coming decades as the City develops. At present, this is a relatively compact area of 4 to 6 square miles – only 10% of its incorporated area. Extending and maintaining this infrastructure will be challenging. A worst-case scenario for the City would be an extreme drought, like that of 2011, lasting two or more years. The impact could be financially draining.

Table F.5–17 Critical Facilities on High to Moderate Shrink/Swell Soils

ID	Name	Address	LEP
City Government			
1	Piedmont City Hall	314 Edmond Rd. NW	Moderate/ High
2	Piedmont Police Dept	325 Piedmont Rd N	Moderate/ High
3	Piedmont Volunteer Fire Station 1	314 Edmond Rd. NW	Moderate/ High
4	Piedmont Volunteer Fire Dept 2	220 Piedmont Rd. N.	Moderate
5	Piedmont Emergency Management	415 Piedmont Rd.	High
6	Piedmont Public Library	1129 7th St. NW	Moderate
7	Piedmont Chamber of Commerce	12 Monroe NW	High
8	Piedmont Museum	101 Monroe Ave	High
10	Booster Station	1421 Mustang Rd SE	Moderate
11	Booster Station	712 Mustang Rd NE	High
15	Piedmont Water Tower	100 Cimarron Rd NW	Moderate
Federal			
16	Piedmont USPS	112 Jackson Ave NW	High
Public Schools			
17	Piedmont Public Schools	713 Piedmont Rd.	Moderate
18	Piedmont Primary School	615 Edmond Rd NW	Moderate
19	Piedmont Elementary School	1011 Piedmont Rd. N.	Moderate
20	Middle School of Piedmont	823 Second St. NW	Moderate
22	Piedmont Intermittent School	977 Washington Ave W	Moderate
Financial			
23	Farmers and Merchants Bank	1216 Piedmont Rd. N.	Moderate
24	BancFirst (in Williams Grocery Store)	410 Piedmont Rd. S.	Moderate
Health Care / Child Care			
25	TLC Child Care Center	156 Edmond Rd. NW	High
26	TLC Child Care Center	1207 Edmond Rd. NE	Moderate
27	Piedmont Medical Center	63 Gooder Simpson Blvd	Moderate
Social Service			
28	Piedmont Service Center	415 Piedmont Rd. N.	High

(All other Critical Facilities are on soil with a Low Coefficient.)

Conclusion

Piedmont has a Moderate vulnerability to and Moderate probability of the Expansive Soils hazard. Piedmont's *Comprehensive Plan* requires that all future infrastructure development be

environmentally responsible and economically sound. Although expansive soils are not specifically mentioned in this context, city planners, engineers and developers should use caution in developing the few areas that have very highly expansive soils.

4.10 Urban Fire

Piedmont's Fire Department has four salaried fire fighters and 16 volunteers operating out of two fire stations The Department's ISO rating is 5, placing it among the top US departments.

According to the US Census Bureau, the City of Piedmont had 3.3% of its homes built prior to 1939, and none of its homes were being heated using wood heat as a source. Most of the Piedmont's older housing stock in located in its urban core, North of Washington Ave. and south of Edmond Ave., between 7th St. on the west and 3rd St. on the east side of Piedmont Rd.

Frequency

Piedmont can expect about eight fires in single family home fires each year, 0.6 fires in other residential structures, 0.2 in office/commercial facilities, and 1.7 in industrial/warehouse structures, along with 0.6 fires in critical facilities.

Extent/Severity

Piedmont considers a minor severity structure fire to be a structure fire that results in no injury or loss of life and and/or that results in $5,000 or less in damages, and a major severity structure fire to be a structure fire that causes or loss of life or personal injury and/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, Piedmont had 84 single family residential fires, zero fires in mobile homes, six fires in other residential structures, twp office/commercial fires, and 17 industrial/warehouse fires. These events are summarized in Table F.5-18. During the same time frame, there were four civilian deaths 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.)

Table F.5–18 Piedmont 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	5	$78,600	0	$0	0	$0	0	$0	0	$0	6	$5,350	11	$83,950
2001	10	$176,000	0	$0	0	$0	0	$0	0	$0	4	$60,000	14	$327,100
2002	9	$45,000	0	$0	4	$46,100	0	$0	0	$0	0	$0	13	$91,100
2003	5	$236,750	0	$0	0	$0	0	$0	0	$0	4	$10,000	9	$246,750
2004	6	$7,900	0	$0	0	$0	0	$0	0	$0	3	$65,000	9	$72,900
2005	5	$7,500	0	$0	0	$0	1	$5,000	0	$0	0	$0	6	$12,500
2006	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
2007	15	$29,600	0	$0	0	$0	3	$21,000	0	$0	0	$0	18	$50,600
2008	15	$451,000	0	$0	1	$2,500	2	$1,500	2	$0	0	$0	20	$455,000
2009	14	$0	0	$0	0	$0	0	$0	0	$0	0	$0	14	$0

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
Totals	84	$1,032,350	0	$0	5	$48,600	6	$27,500	2	$0	17	$140,350	114	$1,339,900

Source: Oklahoma State Fire Marshal

Given this data, Piedmont can expect about eight single family home fires each year, 0.6 fires in other residential structures, 0.2 in office/commercial facilities, and 1.7 in industrial/warehouse structures, resulting in about $133,990 damage annually. Also from 2000 through 2009, Piedmont had six fires in critical facilities that caused$10,500 in damage – all of them nursing home fires, and all taking place during 2005. Given this limited data, Piedmont can expect 0.6 critical facility fires each year that result in about $1,000 damage annually.

Although there is no worst-case scenario for urban fire for Piedmont, given t the community

Conclusion

Piedmont is considered to have a Moderate vulnerability to and High probability of the Urban Fire hazard. Piedmont has a relatively compact urban core with some aging housing stock, but the more recent construction of its structures and the relatively dispersed nature of its development is an attribute. The City has a skilled fire department and adequate water supply with hydrants throughout the community and 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. Piedmont has encouraged development in areas contiguous to the existing urban core, in large part for reasons of greater economy and efficiency in the provision of services and infrastructure. Another advantage of this approach is the reduction of the Wildfire hazard. By limiting rural estate development, the City can reduce the chances of wildfires.

Large grassfire burns near County Line Rd. in Piedmont

Location

Piedmont has an urban core area of about 6 square miles, but its incorporated area is approximately 49 square miles in size, most of which is rolling plains with farms and grasslands and scattered residential developments.

Frequency

From 2000 to 2009, Piedmont's Fire Department responded to an average of 28.6 wildfires a year that burned and average 113 acres annually.

Extent/Severity

Piedmont considers minor severity wildfire condition to be a reading of Moderate and below on the USDA Fire Danger Rating System, and a major severity wildfire condition to be a rating of above Moderate on the USDA Fire Danger Rating System. A minor severity wildfire would be a wildfire that resulted in no injury or death and little or no damage to structures. A major severity

wildfire would be a wildfire results in injury or death of at least one person, either civilian or firefighter and/or destroys four structures.

Impact

A number of critical facilities in Piedmont are located in areas of Moderate to High wildfire concern. A list of critical facilities and their wildfire concern level is included in Table F.5-19. Of these facilities, the schools are most at risk. Their vulnerability to this hazard is discussed in Appendix G. 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.

Table F.5–19 Piedmont Critical Facilities Wildfire Susceptibility

ID	Name	Address	LoC
	City Government		
1	Piedmont City Hall	314 Edmond Rd. NW	4
2	Piedmont Police Dept	325 Piedmont Rd N	4
3	Piedmont Volunteer Fire Station 1	314 Edmond Rd. NW	4
4	Piedmont Volunteer Fire Dept 2	220 Piedmont Rd. N.	2
5	Piedmont Emergency Management	415 Piedmont Rd.	0
6	Piedmont Public Library	1129 7th St. NW	4
7	Piedmont Chamber of Commerce	12 Monroe NW	0
8	Piedmont Museum	101 Monroe Ave	0
9	Water Tower / Booster Station	1120 Edmond Road NW	4
10	Booster Station	1421 Mustang Rd SE	4
11	Booster Station	712 Mustang Rd NE	4
12	Booster Station	1120 ½ Edmond Rd NW	4
13	Booster Station	1122 Edmond Rd NW	4
14	Booster Station	1 mile W on 164th/ Washington ½ south Cemetery Rd	4
15	Piedmont Water Tower	100 Cimmaron Rd NW	3
	Federal		
16	USPS - Piedmont	112 Jackson Ave NW	0
	Public Schools		
17	Piedmont Public Schools	713 Piedmont Rd.	6
18	Piedmont Primary School	615 Edmond Rd NW	4
19	Piedmont Elementary School	1011 Piedmont Rd. N.	6
20	Middle School of Piedmont	823 Second St. NW	6
21	Piedmont High School	1055 Edmond Rd. NW	4
22	Piedmont Intermittent School	977 Washington Ave W	6
	Financial		
23	Farmers and Merchants Bank	1216 Piedmont Rd. N.	6
24	BancFirst (in Williams Grocery Store)	410 Piedmont Rd. S.	0
	Health Care / Child Care		
25	TLC Child Care Center	156 Edmond Rd. NW	4
26	TLC Child Care Center	1207 Edmond Rd. NE	4
27	Amberfield Medical Center	51 Gooder Simpson Blvd	6
	Social Service		
28	Piedmont Service Center	415 Piedmont Rd. N.	0

History

During the period 2000 through 2009, the Piedmont's Fire Department responded to 268 wildfires that burned 1,132 acres, although there was no reported damage. Given this limited data, Piedmont can expect 26.8 wildfires a year that burn 113 acres but there is insufficient data to place a monetary value on potential damage. These events are summarized Table F.5-20 and illustrated in Figure F.5-13.

Table F.5–20 Piedmont Wildfires 2000-2009

Year	Runs	Acres Burned	Damages
2000	52	0	$0
2001	42	247	$0
2002	18	77	$0
2003	23	69	$0
2004	19	122	$0
2005	31	32	$0
2006	0	0	$0
2007	19	100	$0
2008	28	410	$0
2009	36	75	$0
Totals	268	1,132	$0

Source: Oklahoma State Fire Marshal

Worst-Case Wildfire Scenario

A worst-case event for the community would be a wildfire that resulted injury or death to civilians or firefighters and/or damage or destruction of homes, schools, businesses, farms or oil and gas industry facilities.

Conclusion

Piedmont is considered to have a High vulnerability to and High probability of the Wildfire hazard. Wildfires are an increasing hazard in Oklahoma due to the popularity of residential living in the wildland/urban interface. Although Piedmont is attempting to encourage development within the areas reached by its utility infrastructure, the area has attracted upscale, large-lot rural residential development. Clusters of rural estates have been built in the east side of the incorporated area near the Oklahoma County line, along Washington Ave. and OK 3, and north along Piedmont Rd. to the Kingfisher County line. All of these developments are at risk to the wildfire hazard, particularly along the major traffic ways. The many square miles of undeveloped land 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, as it is usually plowed and planted during the worst part of the wildfire season. Piedmont's vulnerability to Wildfire is certain to increase as large-lot and rural estate development continues within its incorporated area. The City should continue to stress the importance of landscaping in preventing wildfires, as recommended by the FireWise program.

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.

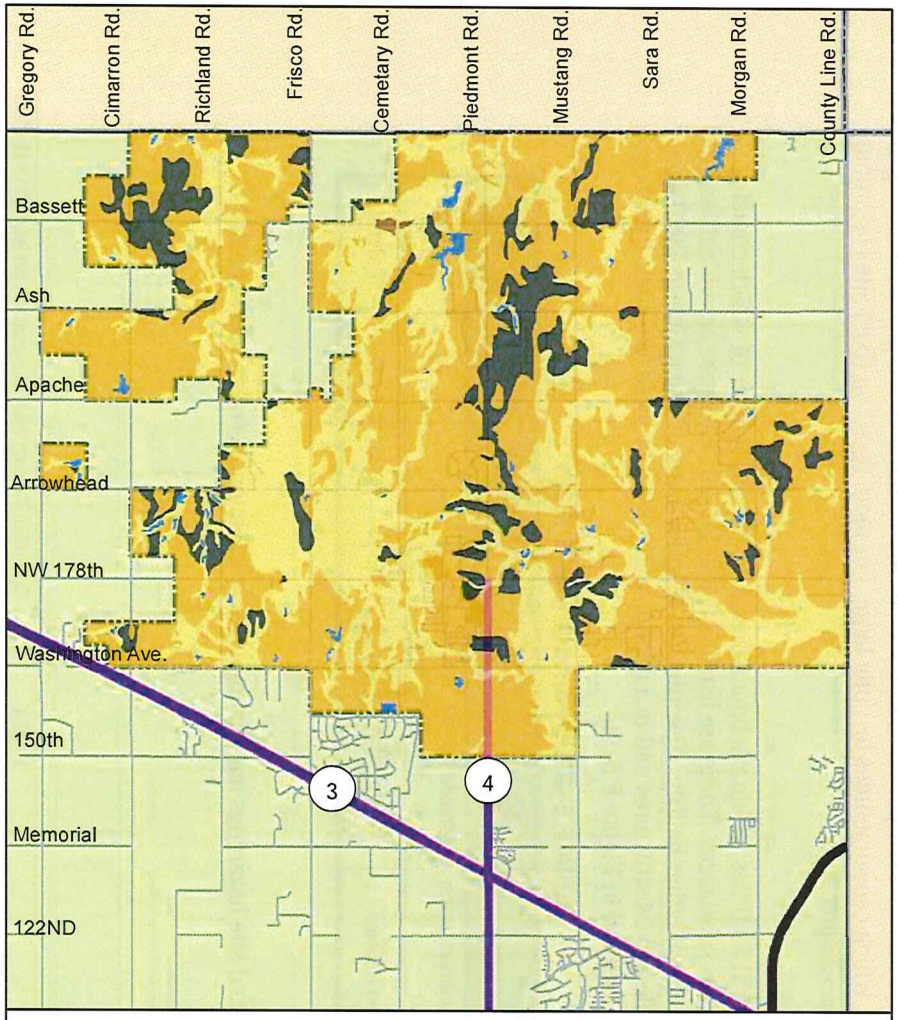


Figure F.5-12: *City of Piedmont Expansive Soils*

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

Boundaries
- Piedmont_City_Limits
- Canadian County
- Statewide Counties

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

0 1 2 Miles

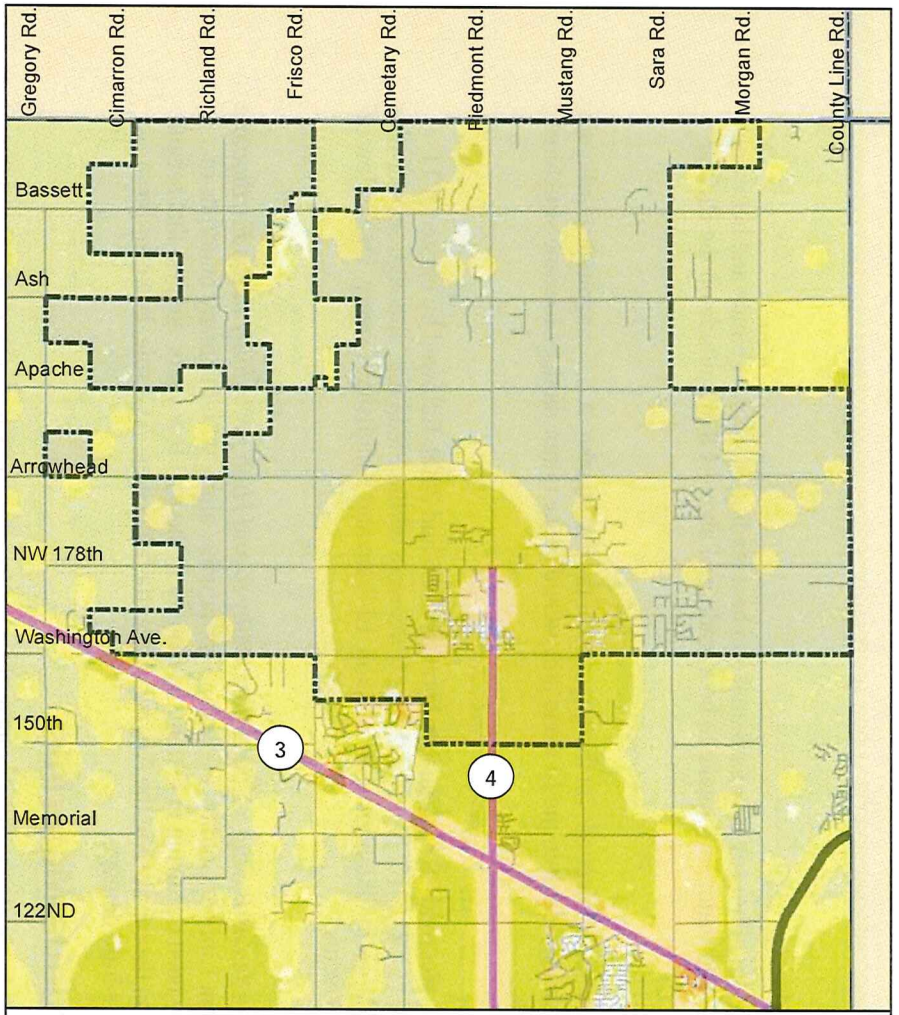


Figure F.5-13: *City of Piedmont Wildfire LOC*

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

Boundaries
- Piedmont_City_Limits
- Canadian County
- Statewide Counties

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

0 1 2 Miles

Extent/Severity

Piedmont considers a minor severity earthquake to be a reading of 4.8 magnitude and below on the Richter Scale, and major earthquake to be a reading of 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 El Reno 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 quakes on March 11-12, 2010. None of these events were within Piedmont, although several were close to its boundaries in Oklahoma City, Yukon, El Reno and Kingfisher County. Only a few of these were "felt" events.

Conclusion

Piedmont is regarded as having a Low vulnerability to and High probability of the Earthquake hazard. The recent Lincoln County, Oklahoma earthquake, 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 faults 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. In this Plan, pipelines are considered a transportation network and covered under Transportation hazards –including those above-ground metering and booster facilities, which can sometimes be quite large. For more detail on fixed-site Hazardous Materials risks see Chapter 4.13.

Location

There are two Tier II facilities within the boundaries of Piedmont, neither of which contains extremely hazardous substances. These are listed in Table F.5-20. There are no critical facilities within a quarter mile of either facility. According to Marplot analysis using Census 2000 data, there are 72 people and 24 structures within a quarter-mile radius of these two sites. Piedmont's Tier II sites are identified in Figure F.5-14.

Table F.5–21 Piedmont Tier II Sites

Name	Address	Contains EHS	Population at Risk	Isolation Distance
Dolese Brothers – Piedmont Batch Plant	Edmond Rd. NE, ¼ mile west of County Line Rd.	N	33	1,320 ft.
DCP Midstream – Ben Booster	NW corner of Piedmont Rd. N and Bassett Rd. NW	N	39	1,320 ft.

Frequency

There were no fixed-site hazardous material releases in Piedmont between 1995 and 2011.

Extent/Severity

Piedmont considers a minor severity fixed-site Hazardous Materials incident to be a chemical spill 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 or which meets the definition of a "large spill" for a particular chemical, according to the most current edition of the *Guidebook.*

Impact

In Piedmont, a limited number of people would be impacted by a fixed site hazardous materials event. 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 were no fixed-site hazardous material releases in Piedmont between 1995 and 2011.

Conclusion

Piedmont is considered to have a Low vulnerability to and Low probability of the fixed-site Hazardous Materials hazard. Piedmont has two hazardous materials sites within its boundaries, neither of which contains extremely hazardous substances (EHS). There have been no reported hazardous materials releases from these facilities.

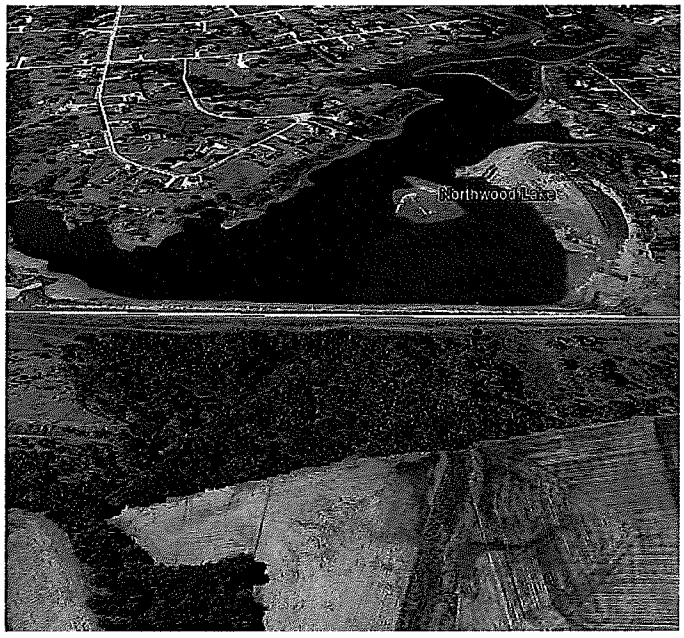
4.14 Dam Failure

The Oklahoma Water Resources Board has identified two high hazard dams whose failure could impact the City of Piedmont: Northwood Lake Dam and Cottonwood Creek Site #16 Dam.

Location

Although Piedmont has no high hazard dams within its corporate limits, two high-hazard dams adjacent to the City could impact properties or residents of Piedmont if they were to fail: Cottonwood Creek Site #16 Dam, southwest of Frisco Rd. NW and Bassett Rd. NW, and Northwood Lake Dam immediately south of Piedmont in Oklahoma City. These are identified in the map of Figure F.5-6 presented earlier which identified Piedmont floodplains.

Cottonwood Creek Site #16 would likely impact several structures along Bassett Rd. if a complete failure were to occur. A Northwood Lake failure would probably have greater impacts on structures and populations, as there are more people living downstream. However, almost all damage would be within the corporate limits of Oklahoma City.



Northwood Lake and Dam

Frequency

Although there have been no major dam failures in Canadian County (Mustang's Spittler Dam was a small residential development amenity), emergency releases and overtopping have taken place. While an actual failure of Northwood Dam or Cottonwood Creek Site #16 Dam are unlikely, heavy rains from storms originating in the Gulf of Mexico or Gulf of California do occur regularly at unpredictable intervals and could result in the overtopping of either facility.

Extent/Severity

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

Impact

A dam failure or emergency release can injure or kill people downstream, and damage or destroy homes, businesses, agriculture, and infrastructure. Failure can take place over a prolonged period, giving people time to prepare for the flood surge, or can be sudden with little to no warning time. Emergency releases can also cause catastrophic downstream flooding.

History

There have been no dam failures in or near Piedmont, other than Lake Overholser in Oklahoma City in October 1923 (and the small Spitler Lake in Mustang).

Worst-Case Dam Failure Scenario

A worst-case dam failure for Piedmont would be a sudden collapse of Cottonwood Creek Site #16 Dam during peak flooding conditions. Such an event would cause flooding of several residences and structures along the two-mile reach of the Cottonwood Creek within Piedmont, along Bassett Rd. (A Northwood Lake Dam failure would not likely impact residences in Piedmont directly.)

Conclusion

Piedmont is considered to have a Low vulnerability to and Low probability of the Dam Failure hazard. As neither Northwood Lake Dam nor Cottonwood Creek Site #16 Dam are in Piedmont, their impacts within the City's boundaries would be limited.

Cottonwood Creek Site 16 Reservoir and Dam

4.15 Transportation

There are two hazardous transportation corridors in Piedmont: Highways and Pipelines. These corridors are discussed in the following paragraphs and mapped in Figure F.5-15.

Location

Highways

The primary highway hazard to Piedmont consists of four miles of OK Highway 4, and a short stretch of OK Highway 3 (aka Northwest Expressway). OK 4 (aka Piedmont Rd.) enters Piedmont from the south and actually terminates four miles into the City. OK 3 is a northwest-southeast highway that becomes a major highway as it approaches Oklahoma City, in fact, OK 3 is a four-lane, divided highway beginning at Okarche, northwest of Piedmont.

The traffic count at the intersection of Piedmont Rd. (formerly OK 4) and Edmond Rd. in is approximately 17,424 vehicles per day. The east-west Washington Ave. carries 3,237 vehicles per through the City and the traffic count on Edmond Rd. north from Piedmont road is over 3,000 vehicles a day.

Pipelines

Piedmont's incorporated area is crossed by several pipelines – three carrying natural gas, one transporting natural gas liquids, and one moving carbon dioxide. None of these pipelines can be located with certainty.

Critical Facilities in the Transportation Corridor

Because pipeline locations are generally unknown, a quarter-mile buffer was placed around the most significant highways – OK 4 and OK 3. The OK 4 corridor buffer is approximately four square miles (or 9%) of the City, and contains 88 people (1.5% of the population). However, the corridor buffer contains 12 critical facilities, listed in Table F.5-21.

Table F.5–22 Critical Facilities in Transportation Corridors

Map ID	Name	Address
City Government		
1	Piedmont City Hall	314 Edmond Rd. NW
2	Piedmont Police Dept	325 Piedmont Rd N
3	Piedmont Volunteer Fire Station 1	314 Edmond Rd. NW
5	Piedmont Emergency Management	415 Piedmont Rd.
7	Piedmont Chamber of Commerce	12 Monroe NW
8	Piedmont Museum	101 Monroe Ave
15	Piedmont Water Tower	100 Cimarron Rd NW
Federal Government		
16	Piedmont USPS	112 Jackson Ave NW
Public Schools		
17	Piedmont Public Schools	713 Piedmont Rd.
19	Piedmont Elementary School	1011 Piedmont Rd. N.
20	Middle School of Piedmont	823 Second St. NW
Financial		
23	Farmers and Merchants Bank	1216 Piedmont Rd. N.
24	BancFirst (in Williams Grocery Store)	410 Piedmont Rd. S.

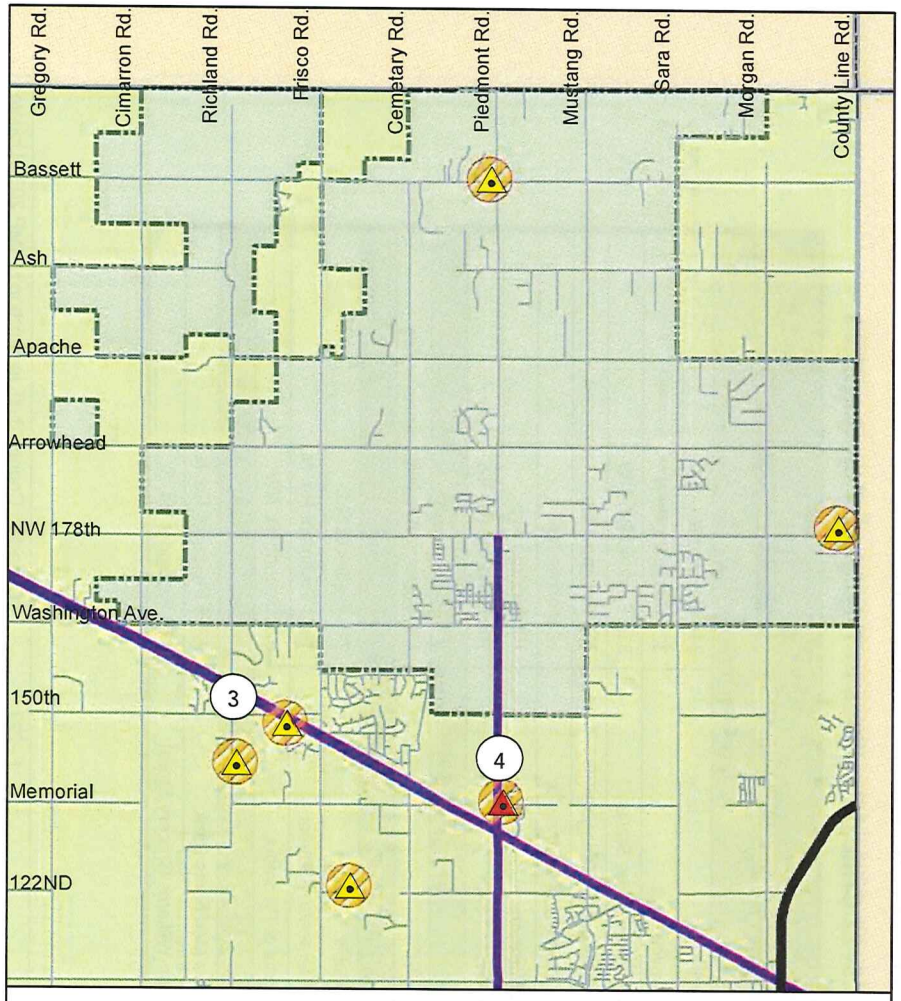


Figure F.5-14: *City of Piedmont Hazardous Material Sites*

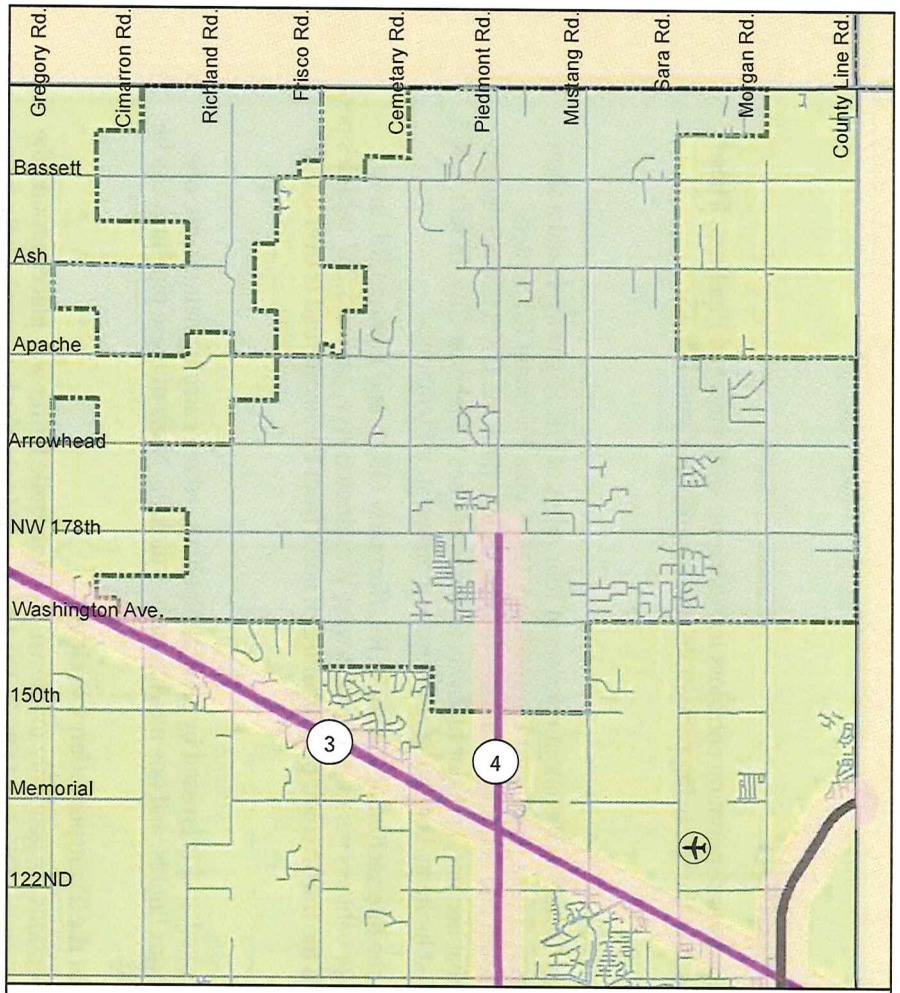


Figure F.5-15: *City of Piedmont Transportation Buffers*

Map ID	Name	Address
Health Care / Child Care		
25	TLC Child Care Center	156 Edmond Rd. NW
27	Piedmont Medical Center	63 Gooder Simpson Blvd
Social Service		
28	Piedmont Service Center	415 Piedmont Rd. N.

Frequency

From 1995 through 2010, there were three hazardous materials releases in Piedmont—all from pipelines. Given this frequency, Piedmont can expect a pipeline-related accident every 3.3 years.

Extent/Severity

Piedmont considers a minor severity transportation incident to be an incident resulting and no loss of life or major injuries, detours of less than half a mile, traffic disruption of less than half an hour, and/or hazardous materials contained within a quarter mile. A major severity transportation incident would involve loss of life and/or major injuries, detours exceeding half an hour, traffic disruption of more than half an hour, and/or hazardous materials impacts exceeding a quarter mile.

Impact

A transportation incident in Piedmont involving hazardous materials could result in the implementation of shelter in place or evacuation procedures of the homes, businesses, and critical facilities in the ¼ mile areas. Particularly at risk in such a situation would be those unaware of these procedures or those unable to take action on their own, such as the elderly, disabled, or young children. The impact of transportation events may include injuries and/or loss of life, highway disruptions and possible damage, 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 accidents. Excessive speed, exhaustion and other causes also increase transportation risks.

History

From 1995 through 2010, there were three hazardous materials releases involving Piedmont's transportation corridors – all of them having to do with the pipelines. These are listed in Table F.5-23.

Table F.5–23 Transportation Accidents

Date	Incident	Location	Type	Material
07/18/97	Slop oil storage tank struck by lightning at Ben Booster pipeline station	Piedmont	Pipeline	Natural gas condensate
05/14/99	4-inch below ground pipeline leak, due to corrosion	4 miles north of Piedmont on OK Hwy 4	Pipeline	Natural gas
01/10/01	Tornado carried off oil storage tank containing at least 45 barrels of crude, which spilled into dry ravine.	5 miles south southwest of Piedmont	Pipeline storage tank	Crude oil

Worst-Case Transportation Event

A worst-case transportation event for Piedmont is by its nature speculative, based upon past events. There have been no major highway transportation accidents within the City in the past 15 years. The most heavily trafficked highway in the area is the four-lane OK Highway 3, but this

expressway only touches the southwest corner of Piedmont. Major pipeline accidents are infrequent, although extremely hazardous when they do occur. The most likely transportation event for Piedmont would be a tanker truck accident and hazardous materials release or explosion on OK Highway 4 in downtown Piedmont.

Conclusion

Piedmont has a Moderate vulnerability to and High probability of the Transportation hazard. Although growing rapidly and located adjacent to Oklahoma City and on the north side of OK Highway 3 (Northwest Expressway), Piedmont is at present a rural, upscale commuter community. No major expressways or railroads pass through the community. However, tanker truck traffic carrying volatile liquids do pass through Piedmont's urban core on OK Highway 4, and along OK Highway 3, which touches the extreme southwest corner of the incorporated area. There have been three hazardous materials releases in the past 15 years, all from pipelines. In the near term, the most likely transportation-related hazardous materials event would be a tanker truck accident on OK Highway 4, in downtown Piedmont.

4.16 Hazards Summary

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

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

The Hazards Composite Map, shown in Figure F.5-16, 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—generally in the northern and western sectors of the incorporated area. The Floodplain areas, shown in blue, should be avoided and remain in open-space. Highly Expansive Soils areas should be carefully assessed before placing critical utility lines within them. 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 Metro Area. The urban core of Piedmont is vulnerable to Transportation hazards along OK Highway 4 and OK Highway 3, as well as to volatile material pipelines that pass through the jurisdiction.

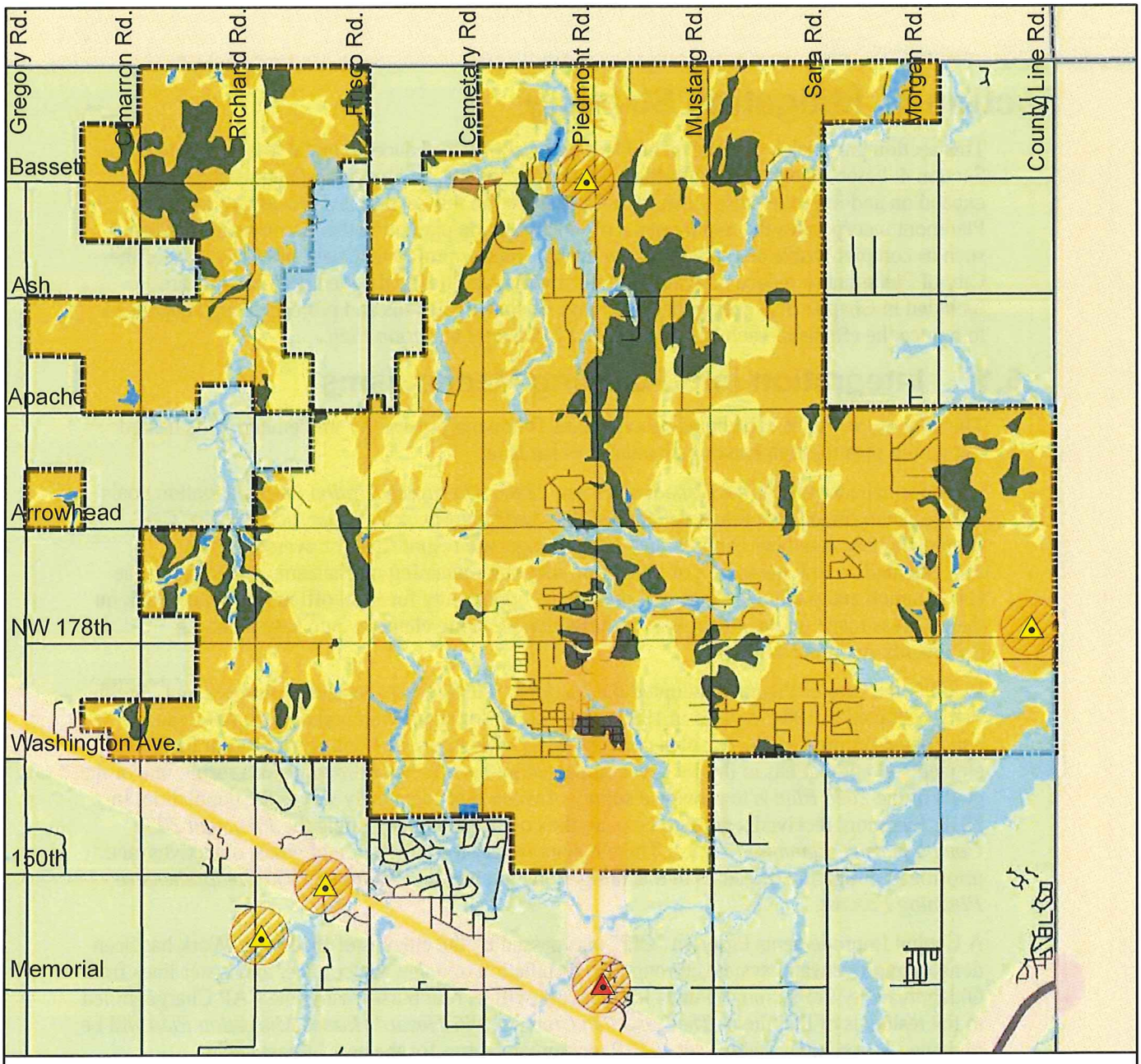


Figure F.5-16:

City of Piedmont Hazard Analysis

Hazard Composite
- 2009 EHS Tier 2
- 2009 non EHS Tier 2
- Tierll 1/4mi Buffer
- 100yr Floodplain

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

Boundaries
- Piedmont_City_Limits
- Canadian County
- Statewide Counties

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

Section 5 Mitigation Strategy

This section provides a description of Piedmont'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 Piedmont 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 Piedmont 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 City of Piedmont, 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 *Piedmont Emergency Operations Plan.* The Emergency Management Director and City Manager are responsible for overseeing the implementation and integration of mitigation into other planning mechanisms. Meetings of the City Council and public hearings will provide an opportunity for local officials to report back on the progress made on the integration of mitigation planning elements into City planning documents and procedures.

In 2005, the City of Piedmont adopted the *Piedmont 2020 Plan* to replace the subsequent "Smith Plan" (adopted in 1984, revised in 1993) and account for significant population growth and anticipated future growth. The plan contains goals, objectives, and policies for major plan elements. Piedmont has in the past been impacted by the effects of drought. As a result, one of the goals of the *2020 Plan* is to provide a supply of water that adequately serves the population. In 2010, Piedmont received a grant to help aid the community in beginning the *Piedmont 2030 Comprehensive Planning Process.* There is opportunity for integration of goals, objectives, and prioritized mitigation measures in this mitigation plan into the *Piedmont 2030 Comprehensive Planning Process.*

A Capital Improvements Program "CIP" was passed by the citizens of Piedmont. Work has been done to improve water systems through the installation of a new water tower and water lines from Oklahoma City to Piedmont. Funds for the work will be reimbursed using the CAP Charge, billed to the residents of Piedmont. *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.

The City Zoning Ordinance was created in 1987 the most appropriate uses of land; to maintain tans stabilize the value of property; to reduce the fire hazards and improve public safety and safeguard the public heath, to prevent undue concentration of population; and to create a comprehensive and stable pattern of land uses upon which to plan for transportation, water supply, sewerage, schools, parks, public utilities, and other facilities. The provisions of the ordinance are held to be necessary for the promotion of public health, safety, comfort, convenience, and general welfare. The Zoning Ordinance *may* be used in the future to prevent development in areas identified in this mitigation plan as being subject to natural or man-made hazards.

Integration of Previous Mitigation Plan

The *City of Piedmont Multi-Hazard Mitigation Plan* (2003) incorporated all pertinent existing plans during the update process. Action items from the *Hazard Mitigation Plan* have been

reviewed in updating the *City of Piedmont Capital Improvements Plan.* In addition, the *Multi-Hazard Mitigation Plan* has also been integrated with the following plans and codes:

- City of Piedmont Building Code
- *Piedmont Public Schools Emergency Operations Plan*

Integration Highlights:

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

Updating mitigation strategy goals and objectives to incorporate ideas from the *Piedmont Capital Improvement Plan* and *Piedmont 2020 Plan*

5.2 Prioritization Process of Mitigation Measures

The City of Piedmont identified 43 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 Piedmont identified and prioritized mitigation measures in the previously adopted *City of Piedmont Hazard Mitigation Plan (2003).* Since the approval of the last plan update, priorities in Piedmont have changed due to post-disaster conditions. On May 24, 2011 an EF 5 tornado caused devastation through Canadian County. The tornado caused over $20 million in property damages, injured many, and took the lives of two children in Piedmont. As a result of this event, the Piedmont HMPC placed tornado mitigation at highest priority as to hopefully prevent the level of damage, lost of life, and injury during future tornado events. A complete description of the May 24, 2011 event can be found in Section 4, *Hazards.*