Special Topics

Pontotoc County Disaster Resiliency Assessment

The purpose of this section is to assess at the county level key components of disaster resiliency. Housing location and quality as well as planning activities can help reduce impacts from disaster events and allow for faster recovery. Disasters can include tornadoes, extreme weather, high winds, as well as man-made events. These events may largely be inevitable, but the ability to reduce damage and casualties as well recovery can be improved with good planning.

C.0 Comprehensive Plans & Hazard Mitigation Plans

There are 2 key cities within the county: Ada and Byng.

Comprehensive plans are the guiding documents for cities of various sizes to address key aspects of their community from land use, transportation, environment, housing, and economic development. Of the 2 key cities no adopted comprehensive plans were found.

The other key plan for a city to manage, mitigate and plan for recovery related to disasters is a **Hazard Mitigation Plan** (or Emergency Management Plan). Often low density counties, the Hazard Mitigation Plan is done at the county level, though some cities may augment the county plan with a city plan.

The City of Ada does have a "Multi-Jurisdictional" Hazard Mitigation Plan in place. The plan was adopted by the city in 2008 though it is unclear when it was accepted by FEMA. In 2014 an update was completed to the HMP by the original contracting firm.

C.2.1.1. Historical Data on Natural Disasters and Other Hazards

Data on historical damages and casualties is typically collected as part of a **Hazard Mitigation Plan** preparation to determine the appropriate planning measures and actions to take before and after an event.

The Hazard Mitigation Plan for the City of Ada included a Hazard Summary of 15 natural and man-made hazards. This includes floods, tornadoes, high winds, lightning, hail, severe winter storms, extreme heat, drought, expansive soils, urban fires, wildfires, earthquakes, fixed site hazardous material events, dam failures, and transportation events.

Hazard	Events	Events/ Year	Total Property Damage	Property Damage/ Event	Property Damage/ Year	Injuries	Injuries/ Event	Injuries/ Year	Deaths	Deaths/ Event	Deaths/ Year
Floods	2	.2	$6,000	$3,000	$600	0	0	0	0	0	0
Tornadoes	1	.1	$0	$0	$0	0	0	0	0	0	0
High Winds	35	3.5	$1,332,700	$3,807	$133,270	2	.05	.2	0	0	0
Lightning	7	.7	$138,000	$19,714	$13,800	5	.7	.5	0	0	0
Hail	18	1.8	$0	$0	$0	0	0	0	0	0	0
Winter Storms	*Insufficient Data*										
Extreme Heat	*Insufficient Data*										
Drought	*Insufficient Data*										
Expansive Soils	*Insufficient Data*										
Urban Fires*	400	80	$25,174,000	$62,935	$5,034,800	31	.07	6.2	1	.002	.20
Wildfires*	229	45.8	$38,800	$169	$7,760	0	0	0	0	0	0
Earthquakes	4	.4	$0	$0	$0	0	0	0	0	0	0
HazMat Events	6	.6	$0	$0	$0	1	.16	.1	0	0	0
Dam Failures	0	0	$0	$0	$0	0	0	0	0	0	0
Transportation	5	.2	$0	$0	$0	0	0	0	0	0	0

* Indicates data from 1999-2003

The 2008 Hazard Mitigation Plan identifies the 15 hazards facing the City of Ada and the greater Pontotoc County. The HMP provides in depth explanations of how the hazards occur and their frequency in the context of Ada, Pontotoc County, Oklahoma, and the US. The HMP also highlights what populations are most vulnerable to these events, identifies some mitigation measures, and provides goals and objectives for how the city seeks to manage these disasters.

Flood

Historical Context: "The city of Ada has 11 creeks within its city limits. Ada is situated on high ground, generally between the elevations of 950 and 1100 feet, with streams draining off its plateau in all directions—the Little Sandy to the north, the Muddy Boggy to the east, the Clear Boggy to the south, and to the west, a number of streams flowing rather abruptly into the Canadian Sandy."

"Because of its elevated situation, Ada has not typically been subjected to the kind of flash flood events that have devastated river towns like Tulsa and Bartlesville. The National Climatic Data Center lists only four specific flood events in or near Ada since 1990, with these being primarily street flooding, or flooding outside the city:" (City of Ada – 2008 Hazard Mitigation Plan). The HMP identified 4 recent flood events in The City of Ada and another in Pontotoc County.

Recent Flood Events

- April 13, 1993. Flash flooding was reported near Ada.
- January 4, 1998. Rains caused flooding of a county bridge 3 miles north of Ada.
- June 30, 1999. Thunderstorms in central Oklahoma caused widespread street flooding in Ada. On N. Broadway, automobiles stalled in 1-foot-deep water.
- August 15, 2005. Heavy rains caused flooding along Bois d'Arc Creek, 9 miles southeast of Ada.

- April 24-26, 1999, seven inches of rain fell over portions of central Oklahoma, with Allen, 15 miles northeast of Ada, receiving over 10 inches.

Some areas of county are susceptible to flooding. Near Ada, Ada City Lake currently has housing that is built relatively close to the floodplain.

Hazard-Specific Goal and Objectives:

GOAL: To reduce the incidence of injuries, loss of life, and damage to property, equipment and infrastructure due to Floods and Flash Floods.

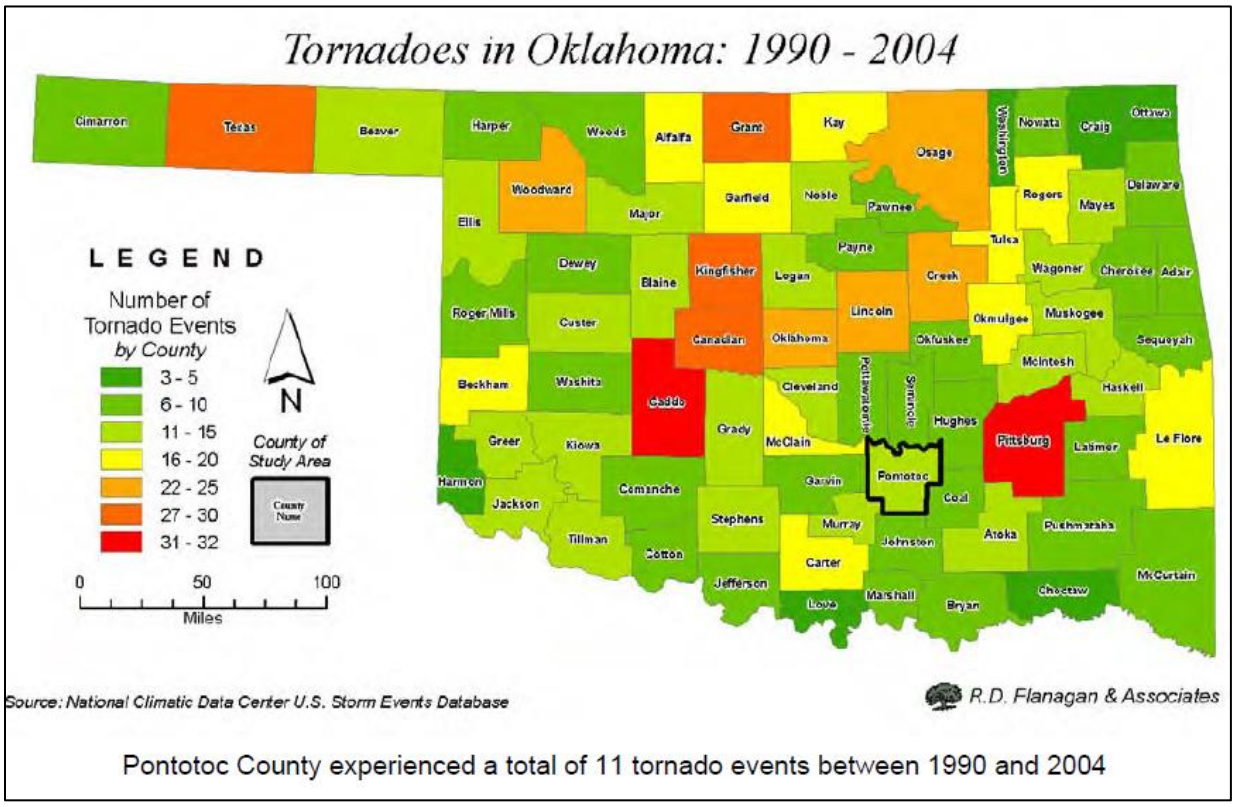
- Objective 1. Improve public awareness of Flood and Flash Flood hazards and measures by which people can protect themselves, their property and their community.
- Objective 2. Identify and protect populations, structures, and critical infrastructure that are vulnerable to Flood and Flash Flood hazards.
- Objective 3. Ensure that Flood and Flash Flood prevention and mitigation policies have no negative impacts and, whenever possible, provide positive protection and enhancements to natural resources

Table 2.2 FEMA's National Flood Hazard Layer (http://fema.maps.arcgis.com/)

Tornado

Historical Context: "The City of Ada has been hit by five tornadoes in the last 55 years, which equates to a 9% yearly chance, or "medium" score in the hazard analysis ranking. Between 1990 and 2004, Pontotoc County experienced 11 tornadoes, ranking tied for 38th among Oklahoma counties in total number of tornadoes within that period. The number of tornadoes by county between 1990 and 2004 is depicted in the figure on the following page. In that same period, Ada was hit by two tornadoes." (City of Ada – 2008 Hazard Mitigation Plan)

Table 2.3



Pontotoc County experienced a total of 11 tornado events between 1990 and 2004

Table 2.4 Tornadoes in Oklahoma and in Ada from 1950 to 2004

Oklahoma	Events	Deaths	Injuries	Damage
1950-2004	3,207	263	4,068	$3,165,483,000
1995-2004	723	46	919	$1,649,076,000
Ada	**Events**	**Deaths**	**Injuries**	**Damage**
1950-2004	5	1	59	$7,775,000
1995-2004	2	0	2	$2,750,000

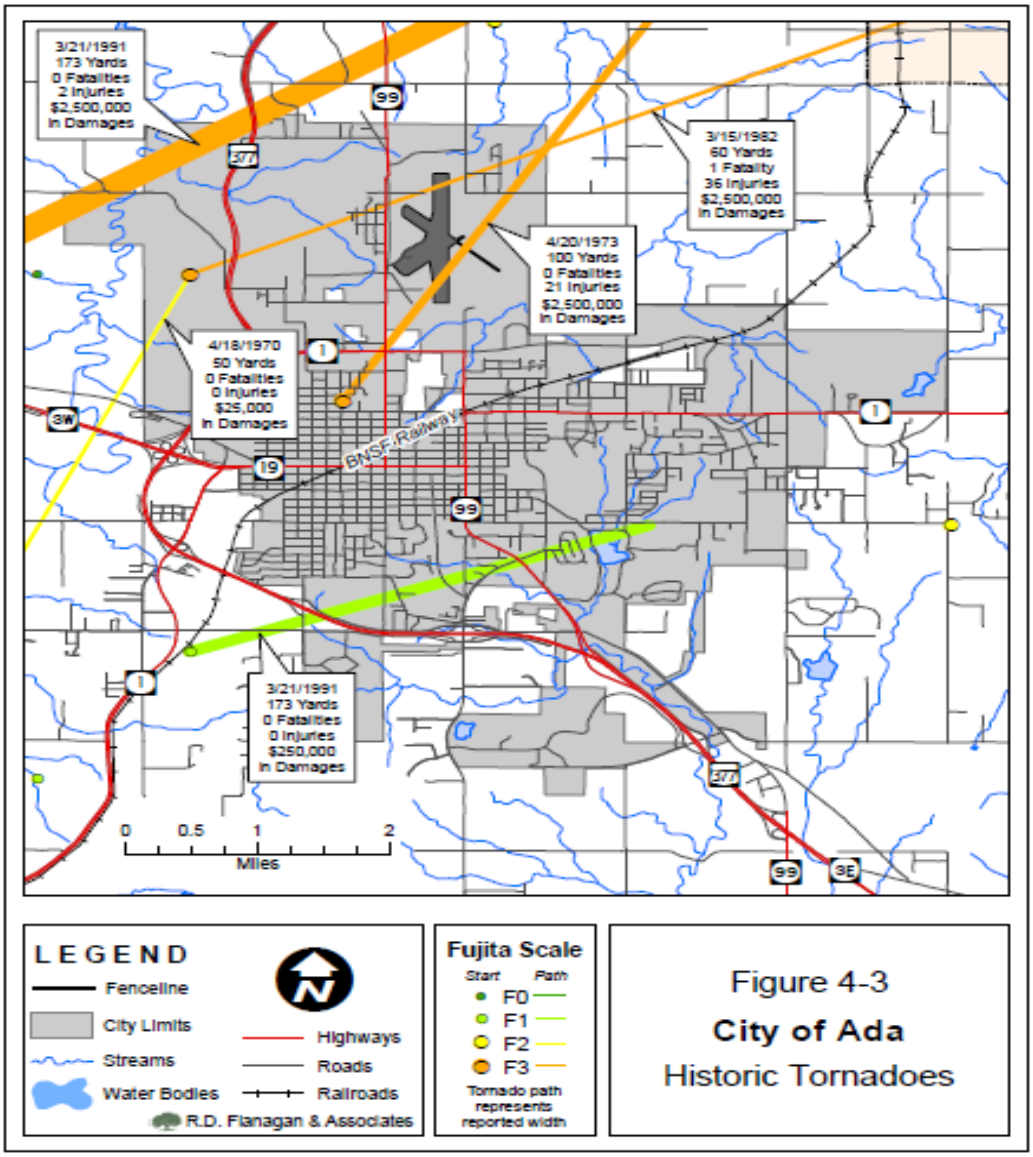
Ada Historic Tornado Events – *Taken from the City of Ada 2008 Hazard Mitigation Plan*

- April 18, 1970- A 50-yard-wide F0 twister did $25,000 in damage in the western part of Ada.

- April 20, 1973- An F3 tornado moved NE through Ada, destroying a trailer park and many homes. About 500 buildings were damaged or destroyed by both tornado and downburst winds, and 21 people injured. There was heavy damage at the airport, where a hangar and several planes were destroyed.

- March 15, 1982- A tornado moved through the NW edge of Ada destroying 51 mobile homes and damaging 17 others. One person in a trailer was killed and 36 people injured. One business suffered major damage and several more had minor damage. Total damage was estimated at $2.5 million.

- March 21, 1991- Two tornadoes spawned by a severe storm as it passed through Ada destroyed six homes along the northwest edge of the City and damaged 130 others. Two people were injured. Total damages were estimated at $2.75 million.



NOAA data shows the following historic data on disaster events for the county:

Historic data on tornados between 1950-2014 there are 45 tornados documented. There were 96 injuries that occurred connected to these tornados, with 36 of those injuries happening in the 1982 tornado. There were 8 fatalities connected to tornadoes during this time period, 7 of those occurred in 1959. Property losses between 1960-1996 ranged from $602,102.00 and $6,021,100.00. (The accounting methods used for losses changed in 1996.) The losses estimated between 1996-2014 were $560,000.00.

Hazard-Specific Goal and Objectives:

GOAL: To reduce the incidence of injuries, loss of life, and damage to property, equipment and infrastructure due to Tornadoes.

- Objective 1. Improve public awareness of Tornado hazards and measures by which people can protect themselves, their property and their community.

- Objective 2. Identify and protect populations, structures, and critical infrastructure that are vulnerable to Tornado hazards.

High Winds

Historical Context: "Since 1957, Pontotoc County has experienced 141 high wind events, almost all connected to thunderstorm activity. Damage from these events was estimated at $1.8 million. Since 1993, Ada has reported 35 thunderstorm/high wind events, with damages of around $1.3 million. Wind speeds for these events generally ranged from 60-75 mph." (City of Ada – 2008 Hazard Mitigation Plan)

Table 2.5 High Wind Events in Ada from 1995 to 2004– (City of Ada 2008 Hazard Mitigation Plan)

Location	Events	Fatalities	Injuries	Damages
Ada	35	0	2	$1,332,700
Pontotoc County	75	0	2	$1,483,370
Oklahoma	6,302	6	107	$185,253,000
United States	124,854	524	5,063	$9.75 Billion

"The people most vulnerable to high wind-related deaths, injuries, and property damage are those residing in mobile homes and deteriorating or poorly constructed homes. However, the entirety of the City of Ada and the Ada Public Schools jurisdictions are at risk from a high wind event due to possible structural and economic damages caused by downed trees and power lines. All future development areas are also at risk." (City of Ada – 2008 Hazard Mitigation Plan)

Uniform building codes for wind-resistant construction and demand for quality construction practices would result in buildings being less susceptible to high winds.

Hazard-Specific Goal and Objectives:

GOAL: To reduce the incidence of injuries, loss of life, and damage to property, equipment and infrastructure due to High Winds.

- Objective 1. Improve public awareness of High Wind hazards and measures by which people can protect themselves, their property and their community.

- Objective 2. Identify and protect populations, structures, and critical infrastructure that are vulnerable to High Wind hazards.

Lightning

Historical Context: "Pontotoc County has experienced 14 damaging lightning events since 1993, which resulted in $191,000 damage. Seven of these events occurred in the City of Ada, causing $126,000 in damage. Based on this limited data, Ada can expect a damaging lightning event every 2 years, resulting in a house or building fire that does about $18,000 damage. Although the entire Ada community is at risk from lightning, the probable extent of a damaging strike would largely depend upon the age, condition and density of structures in the strike area, the community's fire response capability, and the presence or absence of lightning warning and protection systems." (City of Ada – 2008 Hazard Mitigation Plan)

Ada Historic Lighting Events – *Taken from the City of Ada 2008 Hazard Mitigation Plan*

- May 7, 1995- A lightning strike did $5,000 damage in Ada.

- October 25, 1995- Two miles southeast of Ada, a woman was struck by lightning while driving on OK Hwy 3. The lightning melted the antenna rod and put a large dent in the roof. The woman reported feeling only a sore throat and slight headache after the incident.

- April 22, 1996- Lightning struck and set fire to a house in Ada. The house and contents, valued at $70,000, were destroyed.

- February 25, 1997- Lightning struck the wireless cable antenna on the roof of a house 4 miles northwest of Ada. All electrical appliances, lights, and the water pipes under the foundation behind the house were blown up, but no fire was set. Damage was estimated at $12,000.

- June 24, 1999- Severe thunderstorms produced lightning that struck a law enforcement communications tower in Ada, damaging the radio system.

- October 26, 2000- Lightning struck Polo's Embassy Restaurant on West Main Street, causing a fire. Two people were treated for smoke inhalation at a nearby hospital and released. Damage from the fire was estimated at $30,000.

- July 2, 2004- Lightning injured three people near the intersection of Mississippi and Arlington behind the Chickasaw Nation Headquarters. The workers were standing in the back of a dump truck loading rocks. The strike caused a hole 2 inches wide and 1 inch deep in the concrete near the right rear tire of the truck.

Table 2.6 Casualties and Damages Caused by Lightning from 1995 to 2004

Location	Events	Fatalities	Injuries	Damages
City of Ada	7	0	5	$138,000
Pontotoc County	12	0	5	$198,000
Oklahoma	331	11	65	$17,475,000
United States	8,705	484	3,130	$370,978,000

"Anyone out-of-doors during a thunderstorm is exposed and at risk to lightning. More people are killed by lightning strikes while participating in some form of recreation than any other incident, source, or location. The next largest group of fatalities involves people located under trees, then those in proximity to bodies of water. Other common incidents involve golfers, agricultural activity, telephone users, and people in proximity to radios and antennas. The City of Ada is at risk to lightning-caused fires, damages and casualties. All future development areas are also vulnerable to lightning strikes. People outside can have a false sense of security, thinking that they are safe because a storm front has yet to reach their location. The general rule of safety is that anyone outside during a thunderstorm should take cover." (City of Ada – 2008 Hazard Mitigation Plan)

Hazard-Specific Goal and Objectives:

GOAL: To reduce the incidence of injuries, loss of life, and damage to property, equipment, and infrastructure due to lighting strikes.

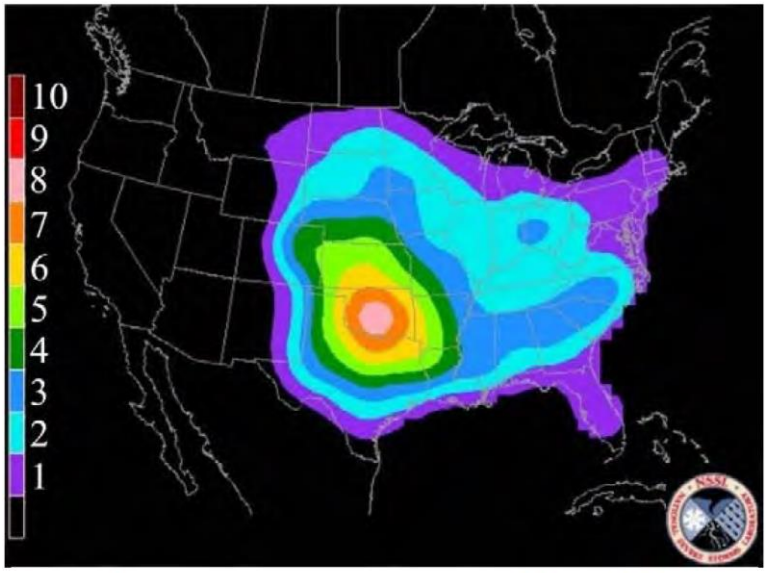
- Objective 1. Improve public awareness of lighting hazards and measures by which people can protect themselves, their property and their community.

- Objective 2. Identify and protect populations, structures, and critical infrastructure that are vulnerable to lighting strikes.

Hail

Historical Context: "The National Climatic Data Center lists 214 hail events for Pontotoc County between 1955 and 2006, with a total damage of $6.5 million. Of these, 14 events dropped hail larger than 2 inches in diameter. Ada has reported 36 hail storms since 1993, when the Center began keeping locality specific data. Of these storms, 86 storms produced hail over 1 inch in diameter, with some having baseball and softball-size hail. The most destructive storm, by far, was that of April 2, 1994, when 2.75-inch hail did $5 million in damage in and around Ada." (City of Ada – 2008 Hazard Mitigation Plan)

Table 2.7 Hailstorm days per year from 1980 to 1999



Hailstorm days per year from 1980 to 1999

According to the City of Ada's 2008 Hazard Mitigation Plan, the City of Ada and Ada Public Schools are at moderate risk to damaging hailstorms because of the frequency of convective thunderstorms in the region. There is a high probability a disaster level incident will occur within the next decade.

"Measures that can reduce vulnerability to hail damage are the installation of hail-resistant roofing, siding and windows on public buildings and critical facilities, and the provision of roofed shelters for public vehicles."

Hazard-Specific Goal and Objectives:

GOAL: To reduce the high costs of property and infrastructure damage caused by hailstorms.

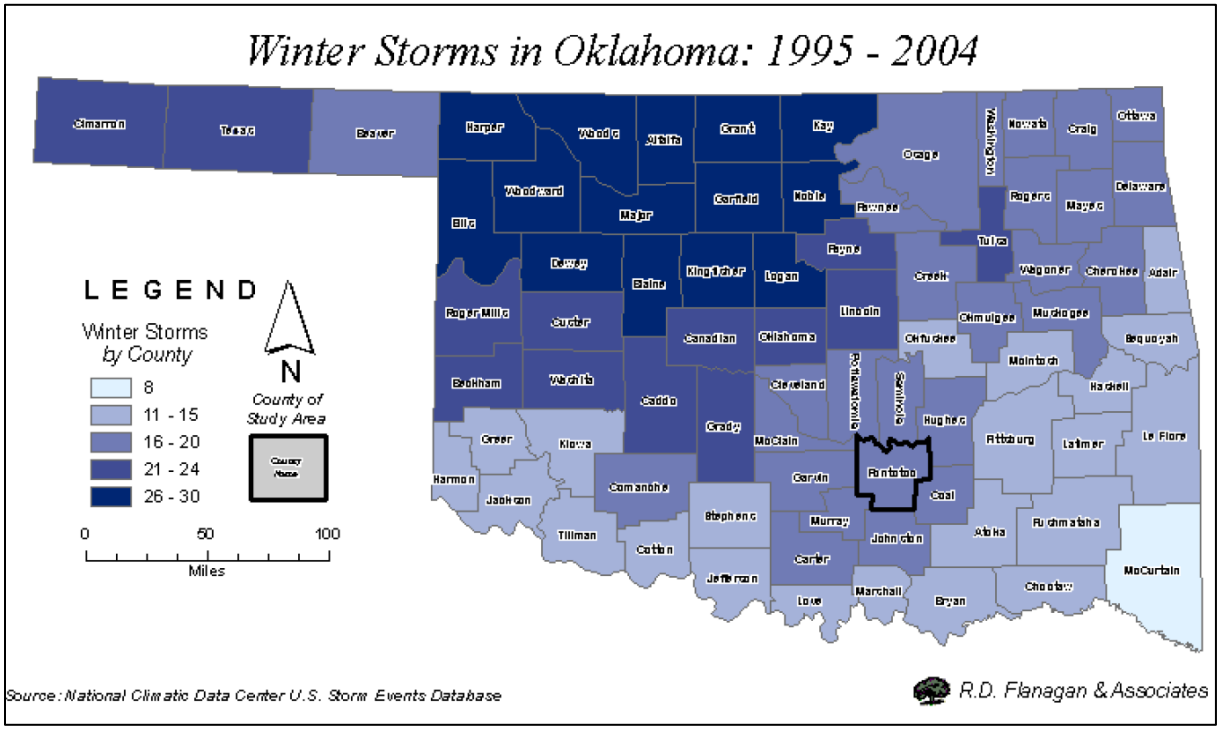
- Objective 1. Improve public awareness of hailstorm hazards and measures by which people can protect themselves, their property and their community.

- Objective 2. Identify and protect populations, structures, and critical infrastructure that are vulnerable to hail damage.

Severe Winter Storms

Historical Context: "Oklahoma averages 14 winter storm events each year. Occurrences of daily low temperatures below freezing range from an average of 140 days per year in the western panhandle to 60 days in the Red River plain in extreme southeastern Oklahoma. Occurrences of daily high temperatures below freezing range from an average of 15 days per year in portions of north central and northwest Oklahoma to 3 days per year in the southeast. Pontotoc County and Ada have experienced 21 severe winter weather events between1993 and 2007." (City of Ada – 2008 Hazard Mitigation Plan)

Table 2.8



The impacts of severe winter storms affect all populations within a community. However elderly populations are especially vulnerable to these events as they are often less capable of adapting to extended loss of electricity, heat, and mobility options.

Advanced warning, preparation, and alternative communication aids are extremely important tools prior to, during, and after these events.

Hazard-Specific Goal and Objectives:

GOAL: To reduce the incidence of injuries, loss of life, loss of critical utilities, and damage to property, equipment and infrastructure due to Winter Storms.

- Objective 1. Improve public awareness of Winter Storms and ice hazards and measures by which people can protect themselves, their property and their community.

- Objective 2. Identify and protect people and critical infrastructure that are vulnerable to Winter Storms and ice storms.

- Objective 3. Ensure that Winter Storm mitigation policies have no negative impacts on the environment.

Extreme Heat

Historical Context: Pontotoc County has reported three extreme heat events since 1993, which included Ada. These were:

- July 4-31, 2001- An extended period of excessive heat affected all of western and central Oklahoma, with most areas experiencing temperatures at or above 100 degrees, particularly western and north central Oklahoma. Eight fatalities resulted from the heat.

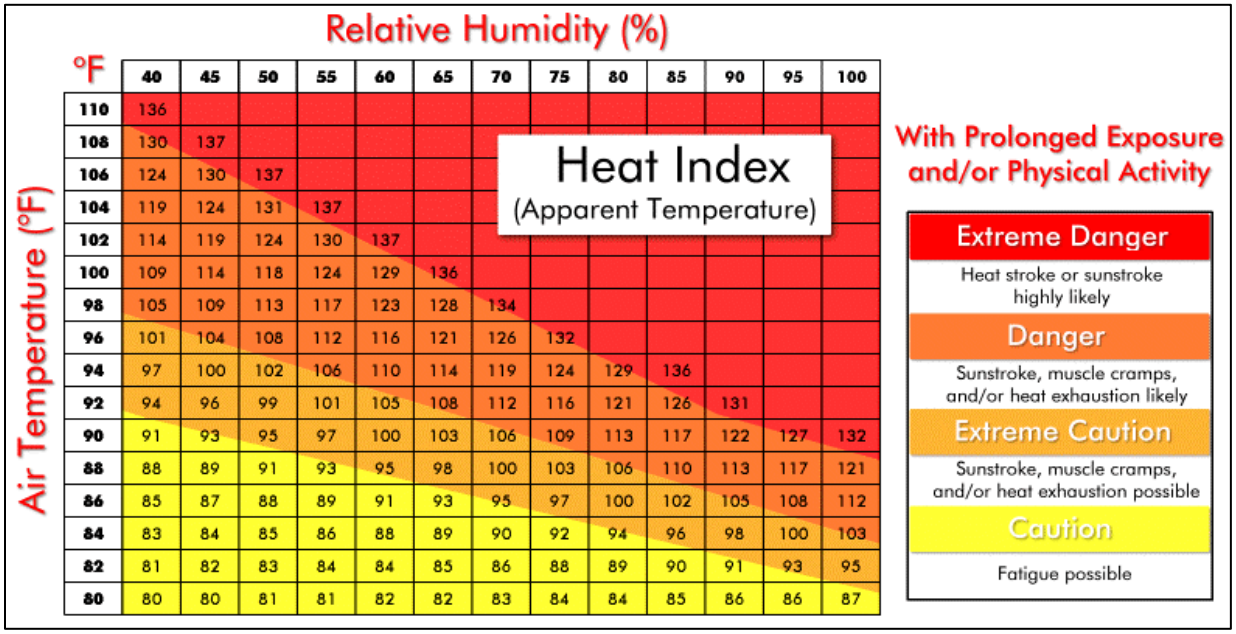
- July 16-31, 2006- Temperatures reached triple digits across the state starting in mid-July and continued through the end of the month. Many locations reached 105 degrees. The heat caused 10 fatalities during this time period. Most fatalities occurred outside or in homes that did not have fans or working air conditioners.

- August 1-13, 2006- Temperatures above 100 continued from July, resulting in 8 deaths statewide.

"In general, the poor and elderly populations of a community are less able to afford high utility bills and air conditioning units, leaving them with an increased vulnerability to extreme heat events. Another segment of the population at risk are those whose jobs consist of strenuous labor outside exposed to high temperatures and humidity."

"The City of Ada and Ada Public Schools are vulnerable to extreme heat every summer, including all areas of future development. This is especially true of the 16.9% of the population aged 65 and above and the 21.4% of the population living in poverty within the City of Ada. The average high temperature in Ada for July is 92.9° Fahrenheit, with an average afternoon humidity of 55%. This calculates to a heat index of 104° Fahrenheit, putting the area in the "Extreme Caution" category on the National Weather Service (NWS) Heat Index scale. This indicates that with prolonged exposure and/or physical exertion, heat related maladies are possible." (City of Ada – 2008 Hazard Mitigation Plan)

Table 2.9 Heat Index Guide (provided by City of Ada 2008 Hazard Mitigation Plan)



°F	40	45	50	55	60	65	70	75	80	85	90	95	100
110	136												
108	130	137											
106	124	130	137										
104	119	124	131	137									
102	114	119	124	130	137								
100	109	114	118	124	129	136							
98	105	109	113	117	123	128	134						
96	101	104	108	112	116	121	126	132					
94	97	100	102	106	110	114	119	124	129	136			
92	94	96	99	101	105	108	112	116	121	126	131		
90	91	93	95	97	100	103	106	109	113	117	122	127	132
88	88	89	91	93	95	98	100	103	106	110	113	117	121
86	85	87	88	89	91	93	95	97	100	102	105	108	112
84	83	84	85	86	88	89	90	92	94	96	98	100	103
82	81	82	83	84	84	85	86	88	89	90	91	93	95
80	80	80	81	81	82	82	83	84	84	85	86	86	87

According to the City of Ada's 2008 HMP, the most vulnerable groups are: elderly, poor, obese, those with health-related issues (particularly heart problems), and those who work outside.

"The most effective proven way to mitigate casualties from extreme heat is through public information and education. Other community programs, such as cooling stations and air conditioner loan programs can also produce an impact."

Hazard-Specific Goal and Objectives:

GOAL: To reduce the incidence of injuries, loss of life, loss of critical utilities, and damage to property, equipment and infrastructure due to extreme heat.

- Objective 1. Improve public awareness of heat hazards and measures by which people can protect themselves, their property and their community.

- Objective 2. Identify and protect people and critical infrastructure that are vulnerable to extreme heat conditions.

- Objective 3. Ensure that heat mitigation policies have no negative impacts and, whenever possible, provide positive enhancements to the environment.

Drought

Historical Context: "According to the City of Ada 2008 Hazard Mitigation Plan, approximately 20% of the contiguous United States is currently suffering from the effects of prolonged severe to extreme drought. Parts of the east coast have been particularly hard hit, and the drought in those areas is so

severe that months of above normal rainfall would be necessary to end it, according to the National Weather Service. In Oklahoma, five major drought events were reported over the past 50 years resulting in damage to crops estimated at $900 million."

"Ada and Pontotoc County have experienced drought two times in the past 10 years, characterized primarily by water rationing, crop damage and wildfire. Ada's water is supplied by the Arbuckle-Simpson Aquifer and Byrd's Mill Spring, supplemented with local well water. The Arbuckle-Simpson Aquifer is an abundant source of pure water, but it also supplies the cities of Sulphur, Tishomingo and Durant, and in recent years there have been attempts by water merchants to take water from the aquifer for communities in the Oklahoma City metropolitan area. As a result of this the City of Ada is in the process of planning and constructing Scissortail Reservoir on the Canadian Sandy, just west of the city limits. Although its present and future water supplies are adequate, the City's aging and deteriorating water supply infrastructure is cutting into its water budget, and has on several occasions forced the imposition of water rationing." (City of Ada – 2008 Hazard Mitigation Plan)

Hazard-Specific Goal and Objectives:

GOAL: To reduce the impact of Drought on property, infrastructure, natural resources and local government response functions.

- Objective 1. Improve public awareness of Drought and measures by which people can protect themselves, their property, and their community.

- Objective 2. Identify and protect resources and critical infrastructure that are vulnerable to Drought.

- Objective 3. Ensure that Drought mitigation policies have no negative impacts and, whenever possible, provide positive enhancements to the environment.

Expansive Soils

Historical Context: "Expansive soils appear to be having a serious impact on Ada's aging water infrastructure, particularly during the drought and high temperature conditions of 2006. The City has been plagued with water main and pipe breaks and leaks. In July, 2006, for example, the City lost about 2.5 MGD in its distribution system due to breaks, leaks and unmonitored (but authorized) use. Partly because of these losses, Ada was forced to institute water restrictions.

TABLE 2.10 Susceptibility of City of Ada Expansive Soils

Expansion Potential	Area (mi^2)	Area (%)
Very High	1.17	7
High	4.20	25.22
Moderate	2.57	15.38
Low	8.67	52
Water	0.07	.40

According to the City of Ada 2008 Hazard Mitigation Plan, 67% of the soils within the city limits are categorized as having "low" to "moderate" shrink/swell potential. As a result the City of Ada and Ada Public Schools have moderate vulnerability to the damaging effects of expansive soils. Periods of prolonged drought result in the greatest concern for soil expansion structural damages.

Hazard-Specific Goal and Objectives:

GOAL: To reduce the damage caused by Expansive Soils on property and local infrastructure.

- Objective 1. Improve public awareness of Expansive Soil hazards and measures by which people can protect their property and their community.

- Objective 2. Identify and protect resources and critical infrastructure that are vulnerable to Expansive Soils.

- Objective 3. Ensure that Expansive Soil mitigation policies have no negative impacts and, whenever possible, provide positive enhancements to the environment.

Urban Fires

Historical Context: "Structure fire is the fifth leading unintentional cause of injury and death in the United States, behind motor vehicle crashes, falls, poisoning by solids or liquids, and drowning. Fire kills more Americans than all natural disasters combined. In 2003 (the most recent year the National Center for Health Statistics compiled data), Oklahoma ranked 8th in number of per capita fire deaths with 20.5 deaths per million residents."

"From 1999 to 2003, the City of Ada experienced a total of 382 structural fires, 32 casualties, and $25,006,000 in fire damage (excluding critical facilities). During the same period, there were 18 critical facility fires resulting in $168,000 in damage." (City of Ada – 2008 Hazard Mitigation Plan)

Table 4–26: City of Ada Urban Fire Damages, Injuries & Deaths 1999-2003
Source: Oklahoma State Fire Marshal
All Damages listed in 1000's of Dollars

Type of Structure	1999		2000		2001		2002		2003		Total	
	#	Damage	#	Damage	#	Damage	#	Damage	#	Damage	#	Damage
Single Family	133	$714	45	$397	40	$1,084	31	$721	35	$359	**284**	**$3,275**
Apartments	0	$0	7	$21	6	$0	2	$3.3	7	$195	**22**	**$219**
Mobile Homes	0	$0	4	$49	1	$0	4	$20	4	$23.5	**13**	**$92.5**
Other Residential	0	$0	2	$2	1	$0	2	$0	5	$17.8	**10**	**$19.8**
Commercial	18	$47.9	0	$0	4	$10	2	$1	1	$80	**25**	**$139**
Warehouse	0	$0	1	$3	5	$27.8	3	$8	7	$55	**16**	**$93.8**
Industrial	4	$1,050	1	$20,000	3	$22	0	$0	3	$76	**11**	**$21,148**
Office	0	$0	0	$0	1	$19	0	$0	0	$0	**1**	**$19**
Total	**155**	**$1,812**	**60**	**$20,472**	**31**	**$1,163**	**44**	**$753**	**62**	**$806**	**382**	**$25,006**

Fire-Related Casualties

Casualty	1999	2000	2001	2002	2003	Total
Civilian Injuries	0	2	4	4	1	**11**
Civilian Deaths	0	1	0	0	0	**1**
Firefighter Injuries	3	7	5	1	4	**20**
Firefighter Deaths	0	0	0	0	0	**0**
Total Injuries	**3**	**9**	**9**	**5**	**5**	**31**
Total Deaths	**0**	**1**	**0**	**0**	**0**	**1**

According to the City of Ada 2008 Hazard Mitigation Plan, the City of Ada has a "moderate to high" risk to urban fires. A number of factors in Ada influence the degree of risk from urban fires:

- The percentage of older structures (built before 1970) is somewhat higher than the state average (60.0% vs. 45.9%).

- The history of casualties due to urban fires listed above is higher than the state numbers (1 casualty per 11.9 fires vs. state figures of 1 casualty per 16.8 structure fires).

- The City of Ada and Ada Public Schools have strong public information and education programs in place that include fire safety.

- Ada has an ISO Fire Protection Rating of 4 (see Section 2.1.3 for more information).

Since urban fires are the most common type of disaster, public information and education efforts should remain strong in this area and other mitigation measures should be reviewed.

Hazard-Specific Goal and Objectives:

GOAL: To reduce the incidence of injuries, loss of life, and damage to property, equipment and infrastructure due to Urban Fires.

- Objective 1. Improve public awareness of Urban Fire hazards and measures by which people can protect themselves, their property and their community.

- Objective 2. Identify and protect populations, structures, and critical infrastructure that are vulnerable to Urban Fires.

Wild Fires

Historical Context: "The State of Oklahoma had an average of 14,740 wildfires per year between 1999 and 2003, burning over one million acres and doing over $43.5 million in damage. Pontotoc County experienced an average of 200.7 fires a year over the same period, with 2,927 acres burned and $121,047 in damages. See Tables 4-29 and 4-30 detail wildfire activity and damages for the State of Oklahoma and Pontotoc County.

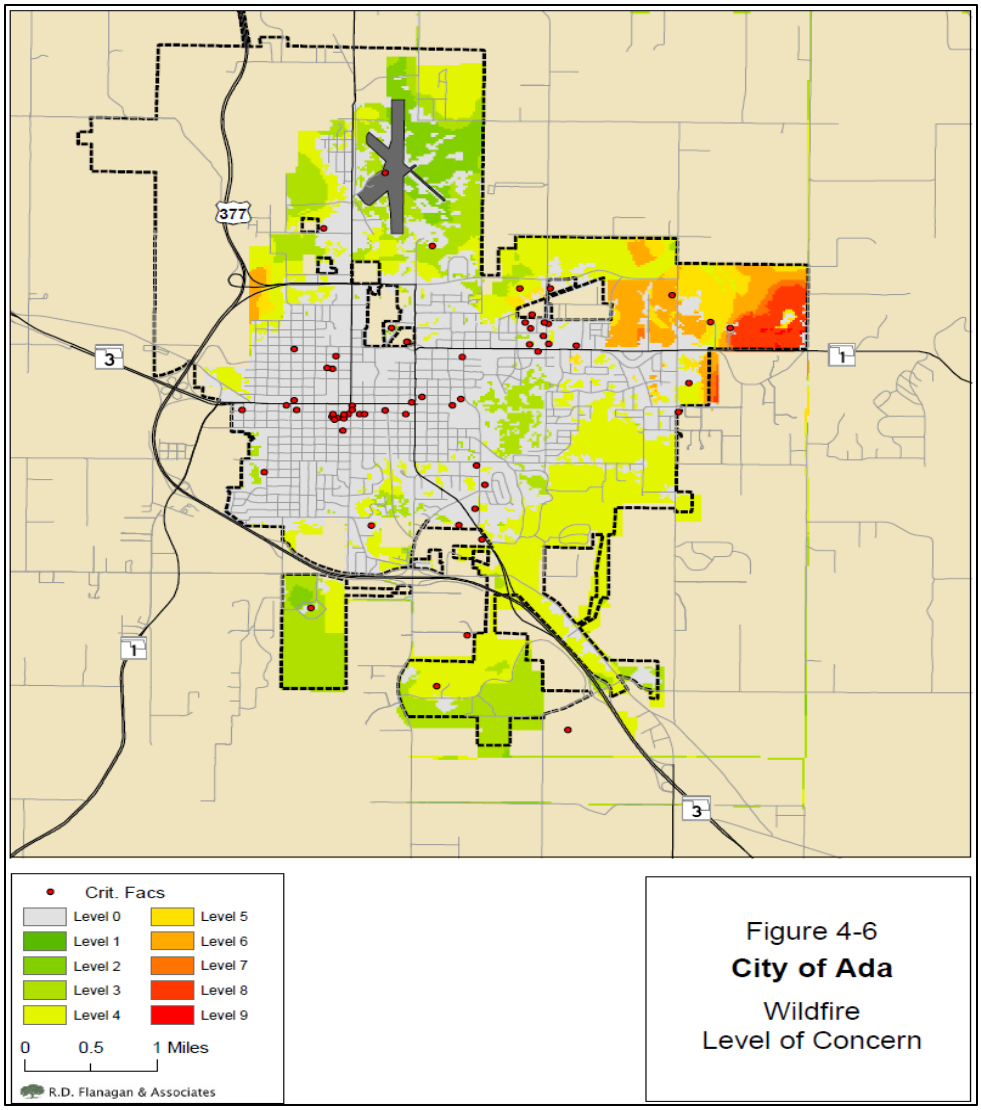
The Ada area has three wildland fire seasons. The worst is February through April, when grass fuels are dead, the humidity low, temperatures elevated, and winds as high as 50-70 mph. A moderate wildfire season occurs in July or August, when some grasses are dormant or dead from the mid-summer heat. The third wildfire season, also moderate, is in the fall, after frost has killed the annual grasses. It was in this fall wildfire season of 2005 when Oklahoma and Ada were hit by one of the worst outbreaks of wildfire in recent history." (According to the City of Ada 2008 Hazard Mitigation Plan)

Table 2.11 Pontotoc County Grass and Crop Fires, 1999-2003 (Source: Oklahoma State Fire Marshal)

Year	Runs	Acres Burned	Damages
1999	210	3,163	$93,160
2000	283	7,153	$315,590
2001	140	666	$24,020
2002	170	728	$51,418
2003	No data		
Total	**803**	**11,710**	**$484,188**
Average	**200.7**	**2,927**	**$121,047**

Table 2.12 Ada Grass and Crop Fires, 1999-2003 (Source: Oklahoma State Fire Marshal)

Year	Runs	Acres Burned	Damages
1999	60	0	$975
2000	82	444	$17,800
2001	36	140	$0
2002	47	118	$10,000
2003	74	2,339	$11,000
Total	**229**	**3,041**	**$38,800**
Average	*45.8*	*608.2*	*$7,760*



According to the City of Ada 2008 Hazard Mitigation Plan, "The City of Ada expects to see an increase in rural residential development, and with growth taking place in the northwest, north, south and east, these areas in particular need to be looked at. Proper mitigation activities, particularly the implementation of the Firewise program, should be undertaken to protect these growth areas."

"There have been fire suppression measures taken in the past that caused an even greater fire hazard because ground cover that had been burning at natural intervals was able to build up. Western ecosystems have adapted to and have become dependent on wildfires, which play an essential role by thinning forests and creating stands of different plant species. Land management agencies are now changing their policies concerning the control of naturally occurring wildfires." (City of Ada 2008 Hazard Mitigation Plan)

Careful consideration should be used as to where development occurs in the rural portions of Pontotoc County and how these areas utilize wildfire mitigation techniques.

Hazard-Specific Goal and Objectives:

GOAL: To reduce the incidence of injuries, loss of life, and damage to property, equipment and infrastructure due to Wildfires.

- Objective 1. Improve public awareness of Wildfire hazards and measures by which people can protect themselves, their property and their community.

- Objective 2. Identify and protect populations, structures, and critical infrastructure that are vulnerable to Wildfires.

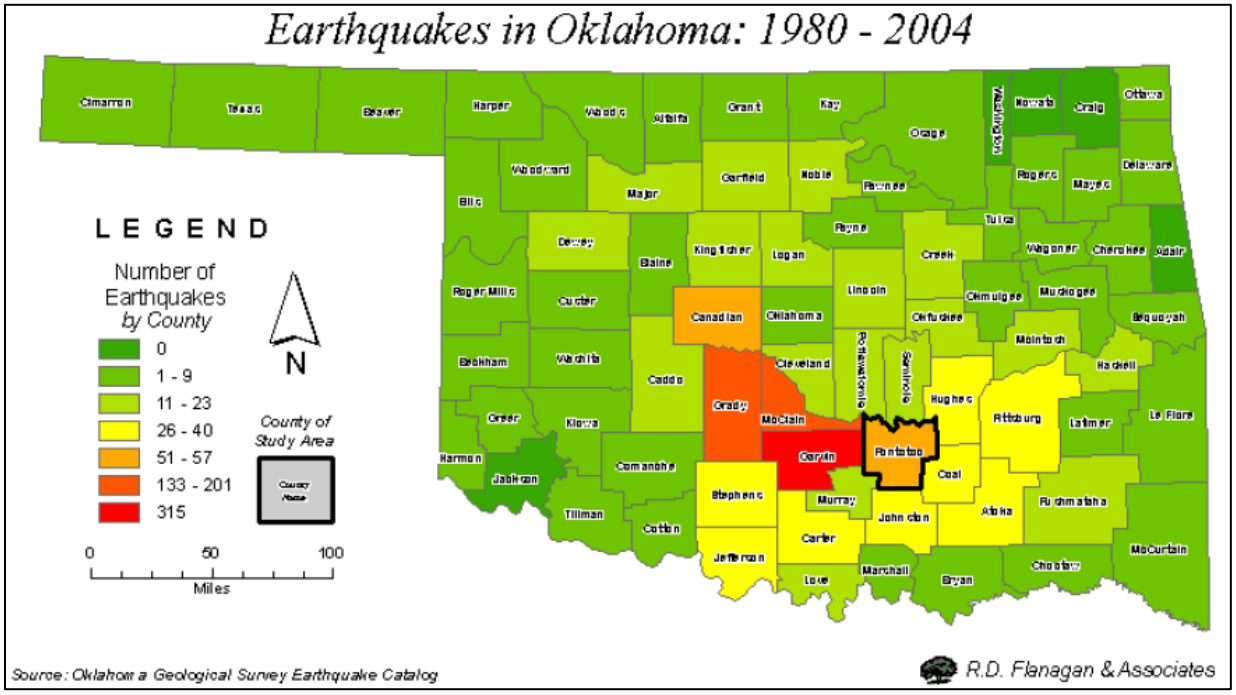
- Objective 3. Ensure that Wildfire mitigation policies have no negative impacts and, whenever possible, provide positive enhancements to the environment.

Earthquakes

Historical Context: "Oklahoma has experienced an average of 50 earthquakes each year since the Oklahoma Geological Survey began keeping records. Most of the earthquakes have been so small that they were not felt by people. Only about two or three per year have been large enough to be felt and the vast majority caused no damage. As shown in the figure below, the majority of Oklahoma earthquakes are concentrated in Garvin, Grady, and McClain counties in south central Oklahoma where the Ouachita, Arbuckle and Wichita mountains converge."

"Pontotoc County experienced 57 earthquakes between 1980 and 2004, the largest of which was a 2.9 on the Richter scale. The County ranks fourth among Oklahoma counties in number of quakes for that period. Only one earthquake was centered in the City of Ada. Therefore, a "low" probability score was awarded in the hazard analysis." (According to the City of Ada 2008 Hazard Mitigation Plan)

TABLE 2.13



According to the Oklahoma Geological Survey, Pontotoc County reported 65 earthquake events in the 52 years from 1953 to 2005. Two of these were felt events. About half of Pontotoc County earthquakes occur in a relatively narrow, 15-mile wide belt between Roff in the west and Stonewall in the east. The Ada area has experienced 23 earthquakes within a 6-mile radius of the city. Given this historical frequency, the Ada area can expect to experience an unfelt earthquake event every 2 years that does no damage, and a felt event every 25 years that does little or no damage.

According to the City of Ada 2008 Hazard Mitigation Plan- Ada and its Public Schools are classified as low risk from earthquakes. The HMP also states that, “almost all Oklahoma earthquakes are too small to be felt and cause no visible damage.”

Hazard-Specific Goal and Objectives:

GOAL: To reduce the likelihood of injury, loss of life, and damage to property, equipment and infrastructure due to Earthquakes.

- Objective 1. Improve public awareness of Earthquake hazards and measures by which people can protect themselves, their property and their community.

- Objective 2. Identify and protect populations, structures, and critical infrastructure that are vulnerable to Earthquakes.

Fixed Site Hazardous Material Events

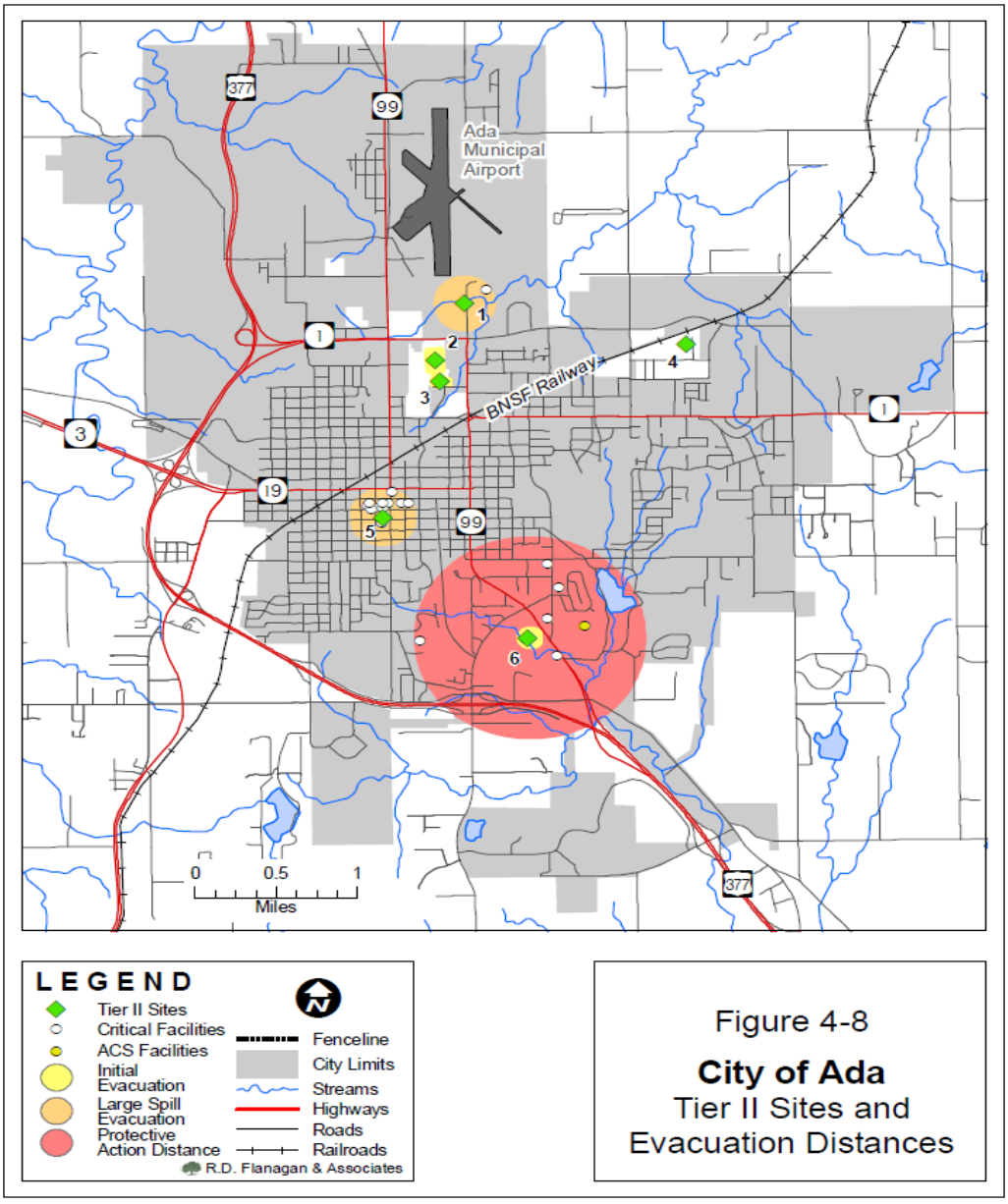
Historical Context: "Fixed sites include buildings or property where hazardous materials are manufactured or stored, and are regulated nationally under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) by the U.S. Environmental Protection Agency (EPA), and in Oklahoma by the Department of Environmental Quality."

"The Emergency Planning and Community Right to Know Act of 1986 defines a Tier II site as any location that has, for any 24 hour period, either 1) specified threshold amounts of defined Extremely Hazardous Substances, or 2) any other substance requiring a Material Safety Data Sheet (MSDS) for amounts greater than 10,000 pounds. In Oklahoma in 2001, there were 28,000 Tier II sites reported to the Oklahoma Department of Environmental Quality. Ada accounted for six of these sites."

"Approximately 2,000 people, or 13% of Ada's population, live within the large spill evacuation distance associated with at least one of its six Tier II sites, including 18 critical facilities and one Ada Public School facility. In the 10-year period 1995-2004, there were six hazardous materials incidents in Ada, which seriously injured one person." (According to the City of Ada 2008 Hazard Mitigation Plan)

TABLE 2.14 Ada Fixed Site Hazardous Materials Incidents 1995 – 2005 (Source: National Response Center)

Incident Date	*Location*	*Suspected Responsible Company*	*Injuries/ Deaths*	*Type Of Incident*	*Medium Affected*	*Material Name*
05/15/97	301 N. Broadway	Clark Oil Co	0 / 0	Fixed	Land	Firefighting Water
09/30/99	2321 N. Oak Ave	HCI Advance Chemical	0 / 0	Fixed	Land	Sodium Hypochlorite
08/18/01	Cement Plant 1220 Ladder Rd.	Holman	0 / 0	Fixed	Water	Unknown Material
06/05/02	Computer Memory Products, 327 East 14th	Peripheral Enhancements	1 / 0	Fixed	Water	Lead
11/15/02	Flex-N-Gate, 1 General Street	Flex-N-Gate Ok	0 / 0	Fixed	Land	Methyl Ethyl Ketone
01/22/03	Holcim, 1100 W. 18th Street	Holcim	0 / 0	Continuous	Air	Ammonia, Anhydrous, Benzene



Based on Ada's hazardous materials information, including percentage of the population at risk and other factors, the City of Ada and Ada Public Schools are at moderate risk from hazardous materials incidents; however the number of critical facilities at risk should be a factor included in mitigation plans.

Hazard-Specific Goal and Objectives:

GOAL: To reduce the incidence of injuries and loss of life and the negative impact on the community and the environment due to Fixed Site Hazardous Material incidents.

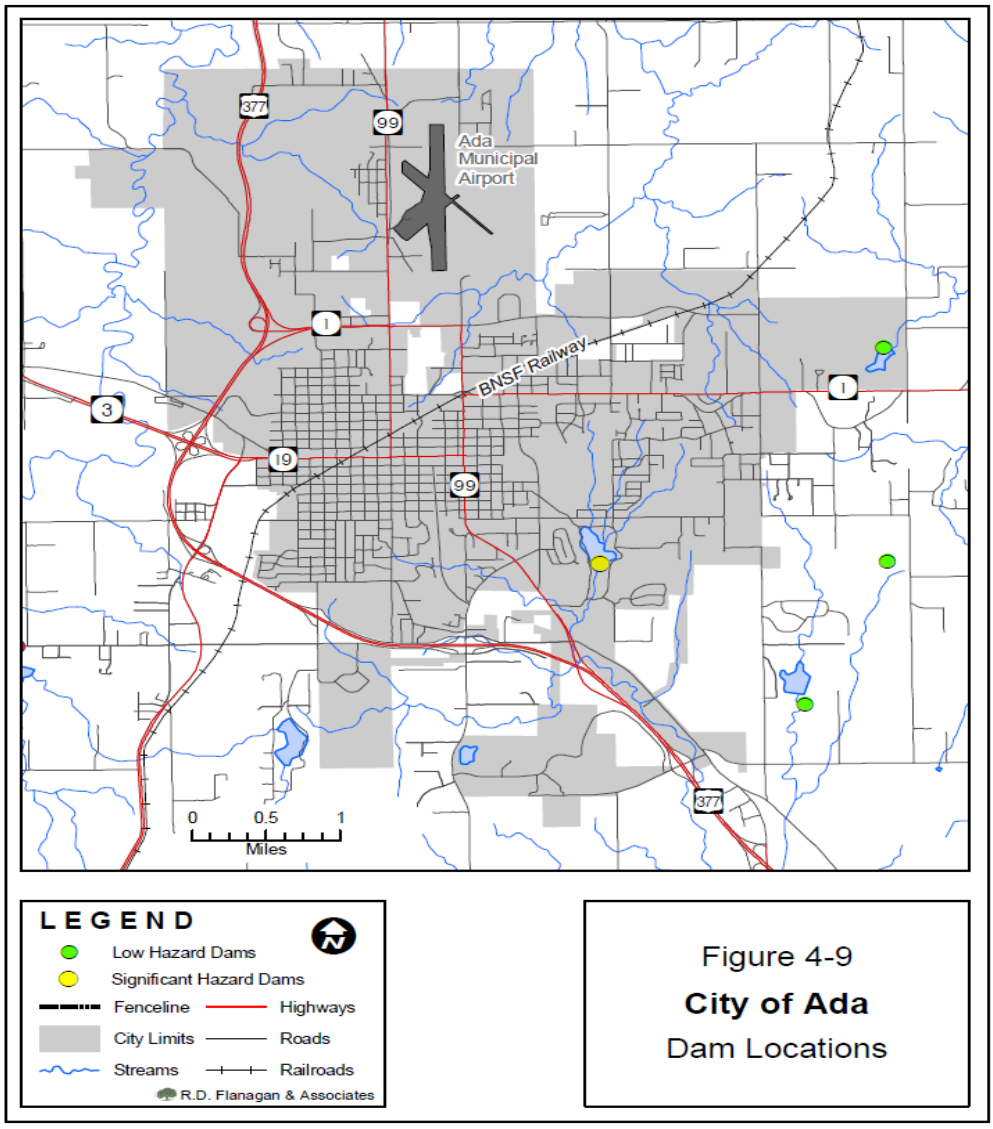
- Objective 1. Improve public awareness of Fixed Site Hazardous Material incidents and measures by which people can protect themselves and their community.

- Objective 2. Identify and protect populations and critical infrastructure that are vulnerable to Fixed Site Hazardous Material incidents.

- Objective 3. Identify and limit the damage that Fixed Site Hazardous Material incidents have on the environment.

Dam Failures

Historical Context: "There are no high hazard dams within the City of Ada, or outside it, whose failure would pose a hazard to the community. There is one significant hazard dam in the southeast quadrant: City Lake Dam. This 16-acre lake contains 339 acre-feet of water, and has very little development in the floodplain downstream of the dam. The City of Ada is currently investigating the construction of Scissortail Lake Dam two miles west of the city on Canadian Sandy Creek. As currently proposed, this dam would not pose a hazard to the City of Ada, the community of Latta, or to the CLEET facilities downstream." (According to the City of Ada 2008 Hazard Mitigation Plan)



"A new chapter for Ada will begin with the creation of Scissortail Lake. With a reservoir at the 937-foot level, the lake should pose no hazard for Ada itself (or Latta, too, for that matter), since the city is built largely above the 950 foot contour on the west side. If the community is careful about preventing development downstream of Scissortail dam that would be at risk from a breach or emergency release, the lake should not pose a hazard for the city. The CLEET facility, whose property reaches across the Canadian Sandy floodplain, is built on high ground. With prudent planning of future development, it should not be at risk." (City of Ada 2008 Hazard Mitigation Plan)

According to the City of Ada 2008 Hazard Mitigation Plan, "It is required that the City have an Emergency Action Plan for the dam, including the identification of vulnerable populations downstream, and a plan as to how this population will be notified in case of a dam failure. It is not within the scope of this study to identify the potential inundation areas associated with a failure of the proposed Scissortail Dam, or the properties likely to be affected by such an event."

Based the classification of the dams in the City of Ada and the populations at risk for damages as a result of dam failure, the city has a low vulnerability to dam failure.

Hazard-Specific Goal and Objectives:

GOAL: To reduce the incidence of injuries, loss of life, and damage to property, equipment and infrastructure due to partial or total Dam failures.

- Objective 1. Improve public awareness of Dam Break hazards and measures by which people can protect themselves, their property and their community.

- Objective 2. Identify and protect populations, structures, and critical infrastructure that are vulnerable to Dam Break hazards.

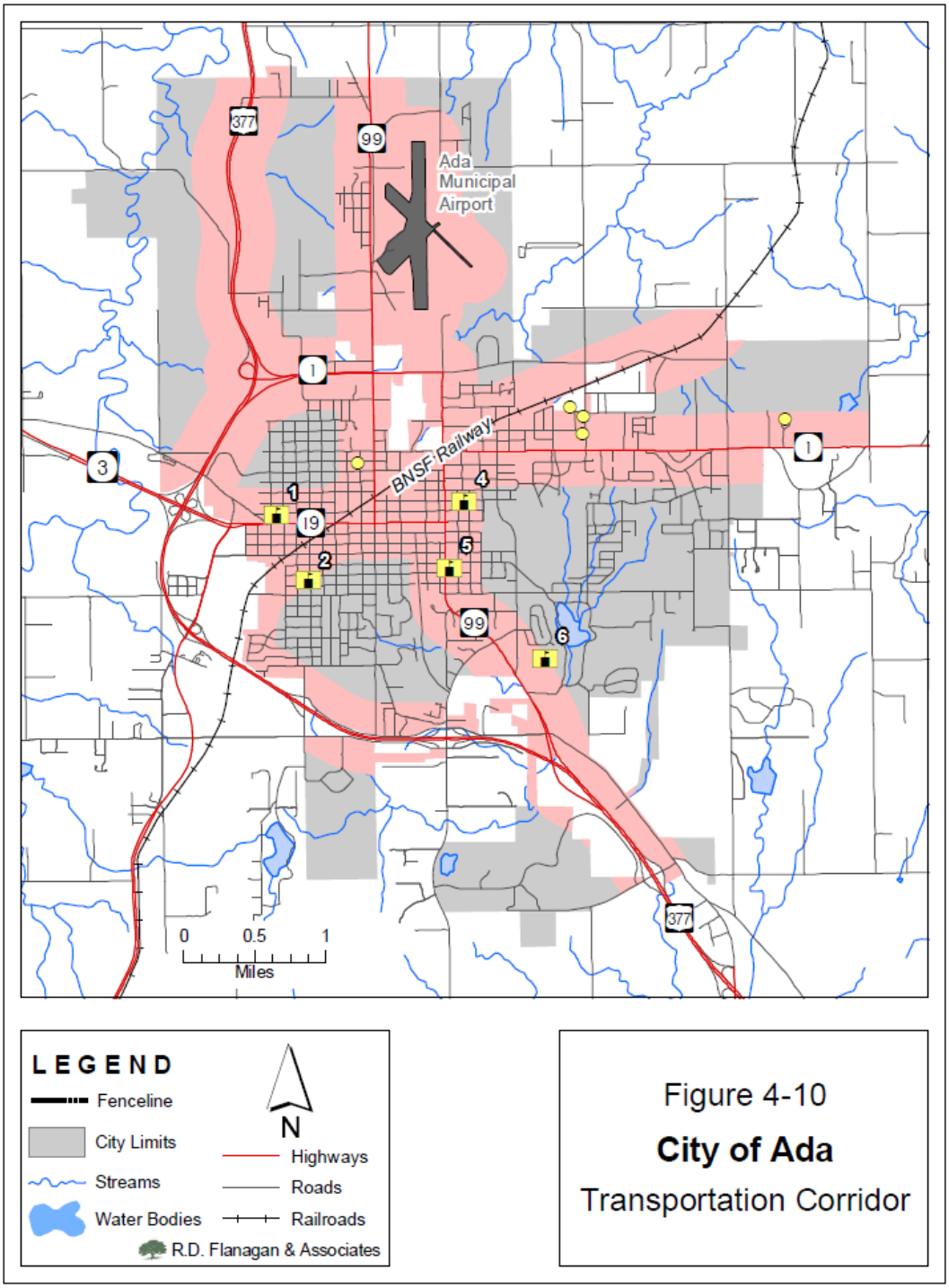
- Objective 3. Ensure that Dam Break prevention and mitigation policies have no negative impacts and, whenever possible, provide positive protection and enhancements to natural resources.

Transportation Events

Historical Context: According to the City of Ada 2008 Hazard Mitigation Plan, "Ada had three railway transportation events in the 10-year period 1996 2005, and three aviation accidents. During the same time period, there were five reported hazardous materials events, one involving a Burlington Northern rail car derailing, and four pipeline or storage tank incidents. Based on this limited data, Ada can expect one railway accident every 3 years, one aviation incident every 3 years, and a hazardous materials event every 2 years."

Table 2.15 Ada Mobile Hazardous Materials Incidents 1995 – 2005 (National Response Center)

Date	Location	Suspected Responsible Party	Event	Medium Affected	Material Name
03/21/96	Unspecified	BNSF	Railroad		Denatured & Ethyl Alcohol
11/28/03	100 East 13th St	Pontotoc Production	Storage Tank	Water	Saltwater
11/30/03	Mt. Gilcrease Facility, 100 East 13th St	Pontotoc Production	Storage Tank	Water	Saltwater
11/30/03	Steadman Pump, 100 East 13th St	Pontotoc Production	Storage Tank	Water	Saltwater
12/02/03	Jonas, 100 East 13th St	Pontotoc Production	Storage Tank	Water	Saltwater



"Due to the high percentage of critical facilities and population within its transportation corridor, the City of Ada and Ada Public Schools have a high vulnerability to the impacts of transportation hazards. The damage from a volatile chemical truck incident in the center of the town could be extensive. The extent of a transportation event can be lessened by, among other measures, well-trained and

equipped Hazmat Teams, Reverse 9-1-1 notifications of people in the impact area, planned and practiced notification and evacuation procedures, and by relocating hazardous material transportation routes away from populated areas and critical facilities." (City of Ada 2008 Hazard Mitigation Plan)

Hazard-Specific Goal and Objectives:

GOAL: To reduce the incidence of injuries and loss of life and the negative impact on public infrastructure and the environment due to Transportation-related hazardous material incidents and other Transportation incidents with the potential for causing mass casualties.

- Objective 1. Improve public awareness of Transportation incidents and measures by which people can protect themselves and their community.

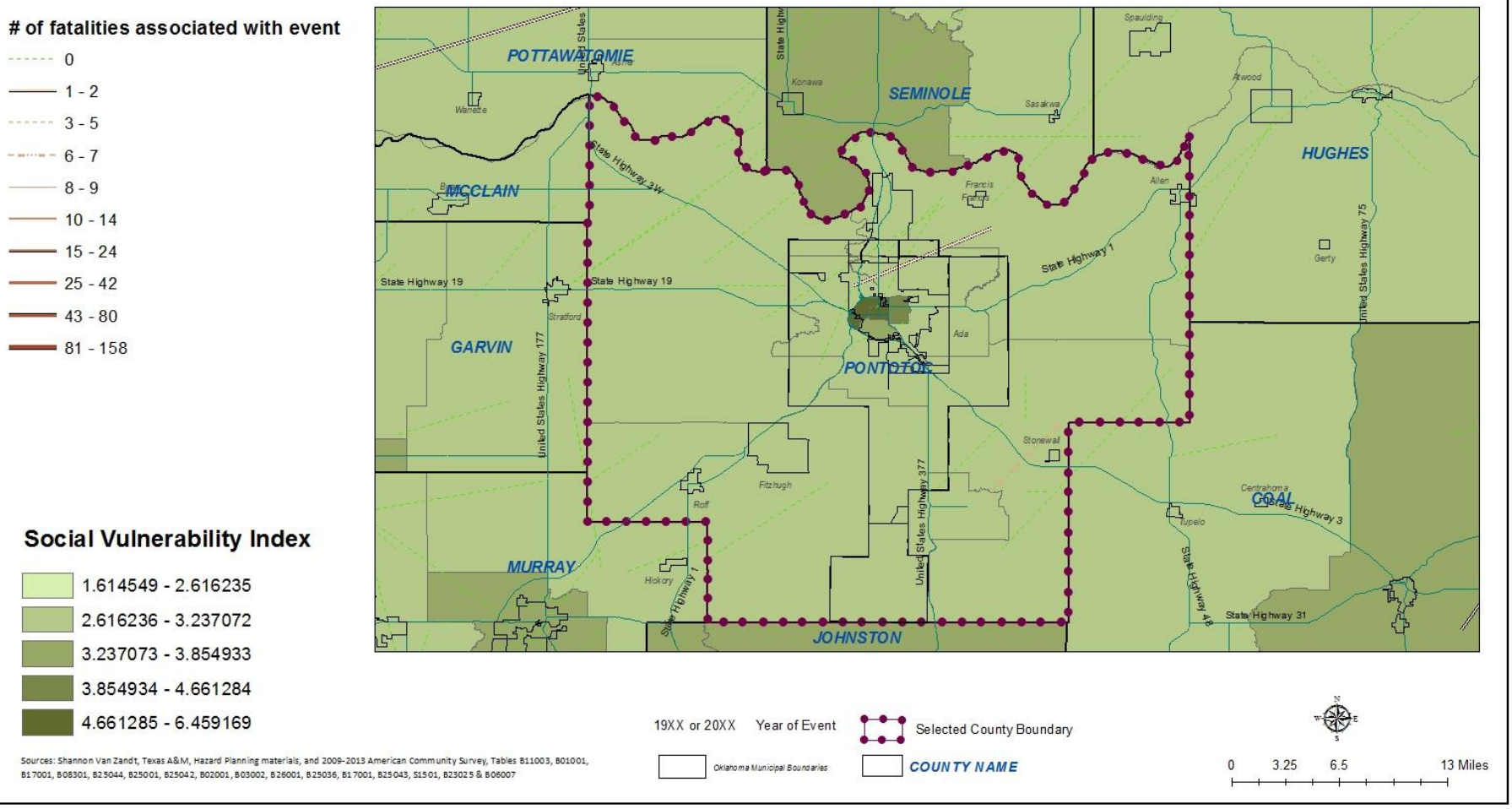
- Objective 2. Identify and protect populations and critical infrastructure that are vulnerable to Transportation incidents.

- Objective 3. Identify and limit the damage that Transportation incidents have on the environment

Social Vulnerability - Impacts on Housing & Disaster Resiliency

Tornado Events 1950 - 2014

Pontotoc County

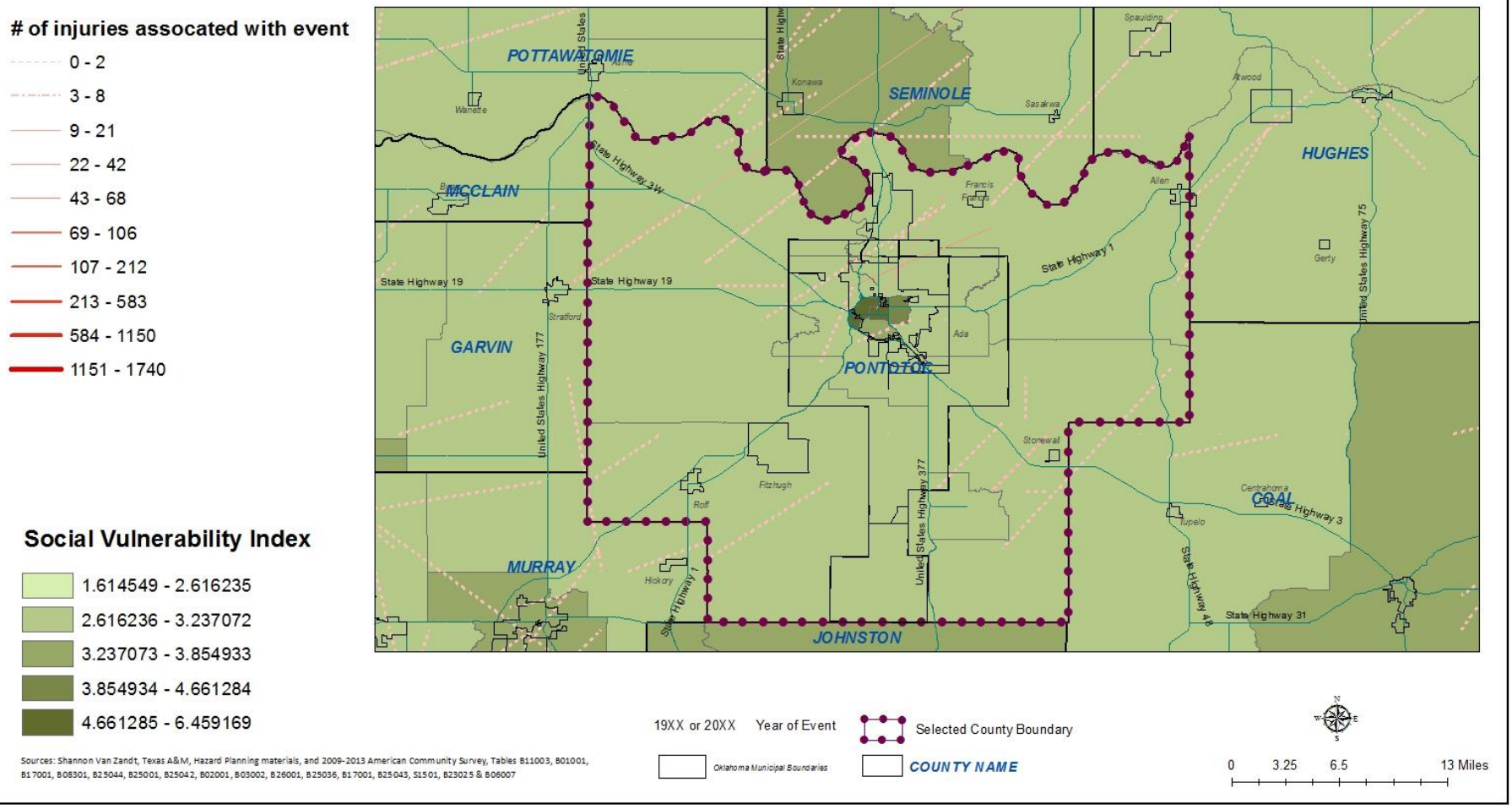


Sources: Shannon Van Zandt, Texas A&M, Hazard Planning materials, and 2009-2013 American Community Survey, Tables B11003, B01001, B17001, B08301, B25044, B25001, B25042, B02001, B03002, B26001, B25036, B17001, B25043, S1501, B23025 & B06007

Social Vulnerability - Impacts on Housing & Disaster Resiliency

Tornado Events 1950 - 2014

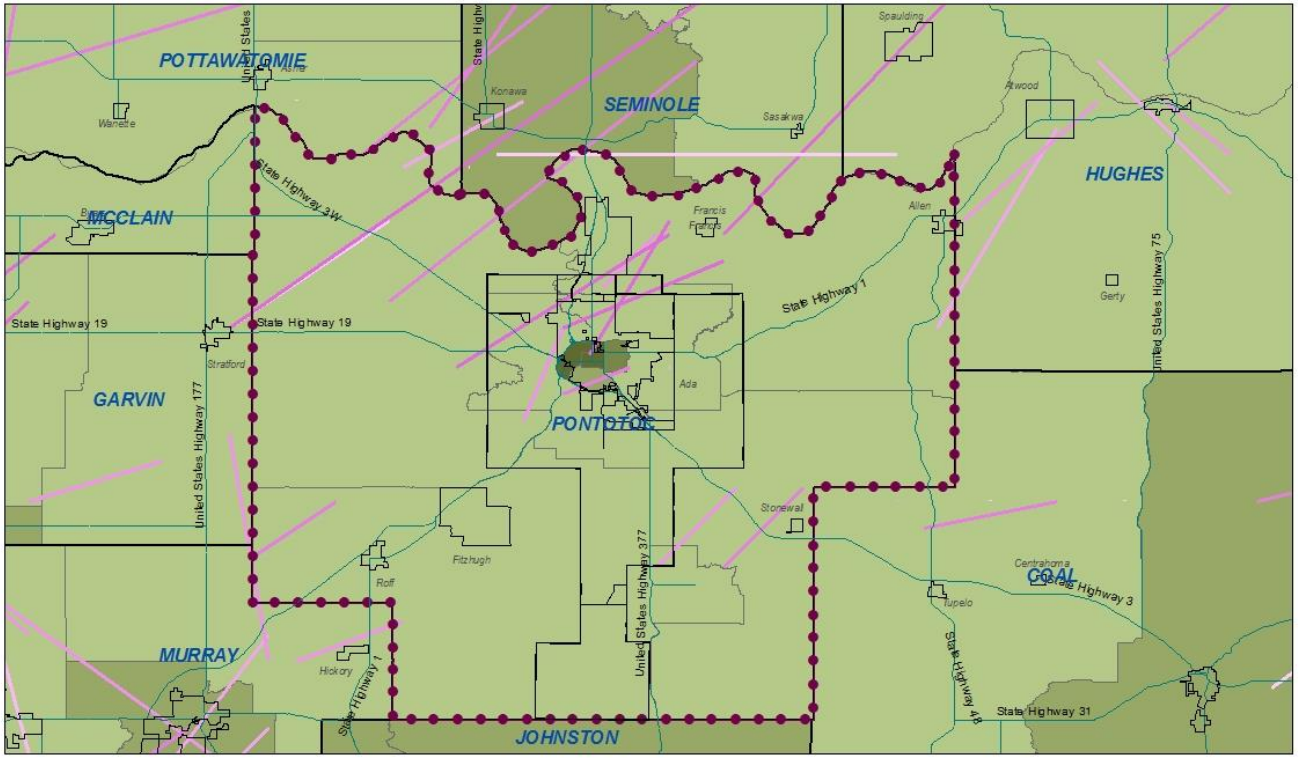
Pontotoc County



Social Vulnerability - Impacts on Housing & Disaster Resiliency

Tornado Events 1950 - 2014

Pontotoc County



Tornado prior to 1996

$ losses associated with event

- >$50
- $50-$500
- $500-$5,000
- $5,000-$50,000
- $50,000-$500,000
- $500,000-$5,000,000
- $5,000,000-$50,000,000
- $5000,000,000

Tornados after 1996

$ in millions in losses associated with event (accounting categories changed in 1996)

- 0.00 - 0.91
- 0.92 - 3.20
- 3.21 - 8.50
- 8.51 - 13.11
- 13.12 - 125.34
- 125.35 - 370.00
- 370.01 - 1000.00
- 1000.01 - 2800.10

Social Vulnerability Index

- 1.614549 - 2.616235
- 2.616236 - 3.237072
- 3.237073 - 3.854933
- 3.854934 - 4.661284
- 4.661285 - 6.459169

19XX or 20XX Year of Event

Selected County Boundary

Oklahoma Municipal Boundaries

COUNTY NAME

0 3.25 6.5 13 Miles

Sources: Shannon Van Zandt, Texas A&M, Hazard Planning materials, and 2009-2013 American Community Survey, Tables B11003, B01001, B17001, B08301, B25044, B25001, B25042, B02001, B03002, B26001, B25036, B17001, B25043, S1501, B23025 & B06007

C.2.1.2; C.2.1.6; C.2.1.7; C.2.1.8 Shelters from Disaster Event

According to the HMP, the City of Ada does not have an official public shelter with its city limits designed to serve as a shelter during a disaster event. Residents are encouraged to shelter in place. However numerous public facilities are available after a disaster including: Red Cross, public school gymnasiums, and numerous churches.

The HMP does state that the city of Ada has inspected and gained reimbursement funding for more than 30 safe-room shelters in Pontotoc County. However it is unclear whether these were public or private shelters.

Based on the information gained from the HMP more public shelters are needed for the cities in Pontotoc County, however no estimates were provided.

C.2.1.3 Public Policy and Governance to Build Disaster Resiliency

The City of Ada adopted the 2009 International Building Code published by the ICC. This is also enforced by the building code inspector for the City of Ada.

Ada's City Code outlines ordinances in place to minimize public and private losses due to flood conditions in specific areas.

2008 City of Ada Hazard Mitigation Plan recommends FEMA Retrofitting Guide for homes to build disaster resiliency.

C.2.1.4 Local Emergency Response Agency Structure

"The HMP contains procedures and responsibilities for the three operational groups in each stage of an emergency, and includes report forms, contact lists and telephone numbers, damage assessment procedures, equipment sources, critical facilities, hazardous materials sites, shelter locations, volunteer groups and other community resources, and references.

The HMP has general response procedures applicable to a wide range of natural and man-made disasters, as well as instructions for specific emergencies, such as HAZMAT events, bomb threats and terrorism, airplane crashes, and power failures. Also included are instructions for setting up incident command posts, shelters, and staging areas, and handling animal care and mass evacuations."

– The previous language was taken directly from the Ada Hazard mitigation Plan. The structure for response and to address any perceived vulnerabilities in the county is included in the Hazard Mitigation Plan. [Relevant section in the plan include: 1.1.7 –Point of Contact and B-5.5 Emergency Services and Response]

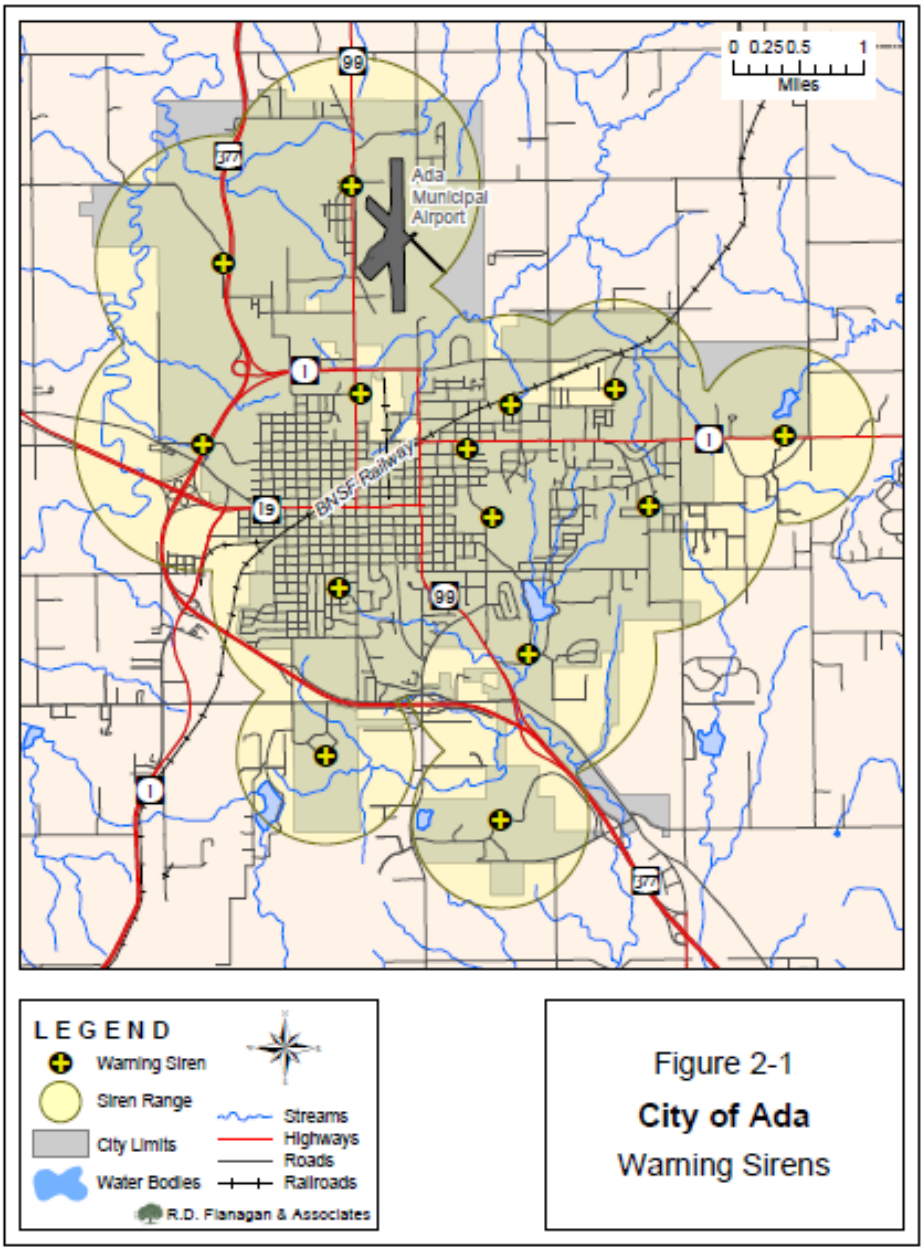
C.2.1.5 Threat & Hazard Warning Systems

The identified Threat & Hazard Warning Systems for the City of Ada include:

Sirens – The City of Ada has 16 warning sirens throughout the community. Based on the map below, the coverage area covers the majority (if not all of the urban portions of the City of Ada)

Phone notification (HMP mentions paging systems but does not explain whether text or call.)

Emergency Broadcast System (via FM/AM radio and TV broadcasts)



Social Vulnerability

Based on the research work done by the Texas A&M University Hazard Reduction and Recovery Center, an added component is being included in this section. Social vulnerability can place households at a further disadvantage during and after a disaster. This analysis is assessing for the county the levels of social vulnerability based on demographic indicators to highlight 'hotspots' or

counties that have higher social vulnerability. That combined with Hazard Mitigation Plans – or lack thereof – can highlight places where additional work is needed to reduce impacts on households.

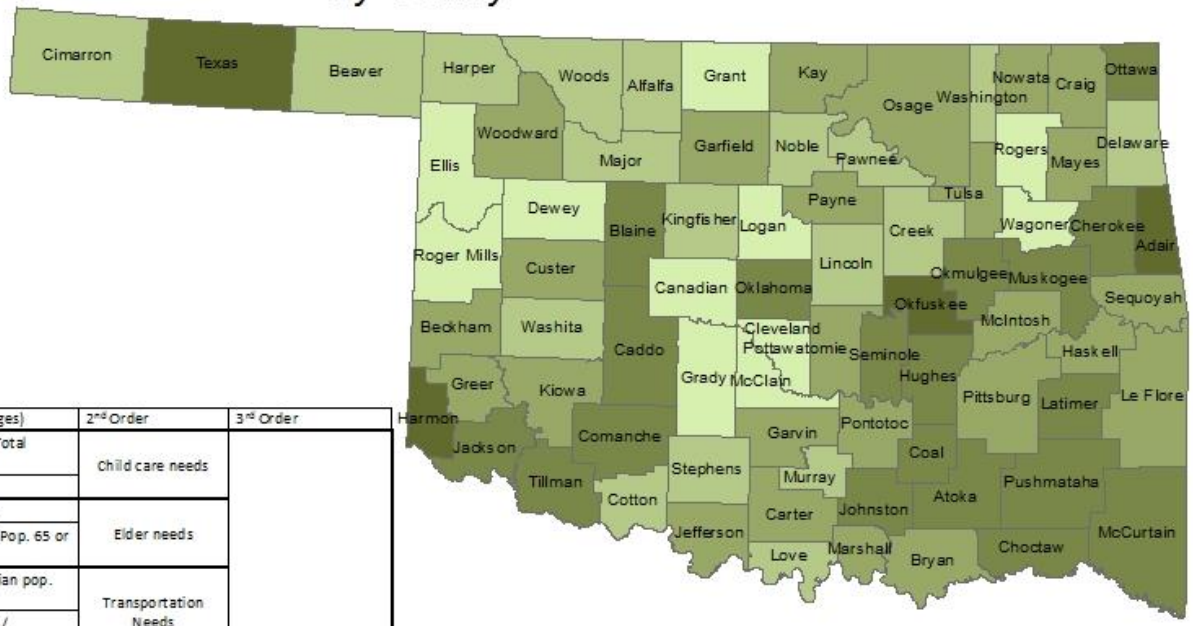
Social Vulnerability Analysis - Pontotoc County

Base Social Vulnerability Indicators (%)		2nd Order	3rd Order
1.) Single Parent Households	18.16%	0.252	
2.) Population Under 5	7.02%	(Child Care Needs)	
3.) Population 65 or Above	15.03%	0.235	
4.) Population 65 or Above Poverty Rate	8.46%	(Elder Needs)	
5.) Workers Using Public Transportation	0.36%	0.069	
6.) Occupied Housing Units w/o Vehicle	6.50%	(Transportation Needs)	
7.) Housing Unit Occupancy Rate	89.04%		
8.) Rental Occupancy Rate	33.37%		
9.) Non-White Population	31.23%	2.625	**3.415**
10.) Population in Group Quarters	3.12%	(Temporary Shelter and Housing	**Social Vulnerability 'Hotspot' or Area of Concern**
11.) Housing Units Built Prior to 1990	77.79%	Recovery Needs)	
12.) Mobile Homes, RVs, Vans, etc.	9.14%		
13.) Poverty Rate	18.83%		
14.) Housing Units Lacking Telephones	2.52%		
15.) Age 25+ With Less Than High School Diploma	13.30%	0.235 (Civic Capacity Needs)	
16.) Unemployment Rate	6.35%		
17.) Age 5+ Which Cannot Speak English Well or Not At All	1.30%		

Sources: Shannon Van Zandt, Texas A&M, Hazard Planning materials, and 2009-2013 American Community Survey, Tables B11003, B01001, B17001, B08301, B25044, B25001, B25042, B02001, B03002, B26001, B25036, B17001, B25043, S1501, B23025 & B06007

Social Vulnerability Index

By County



Levels of Social Vulnerability Analysis

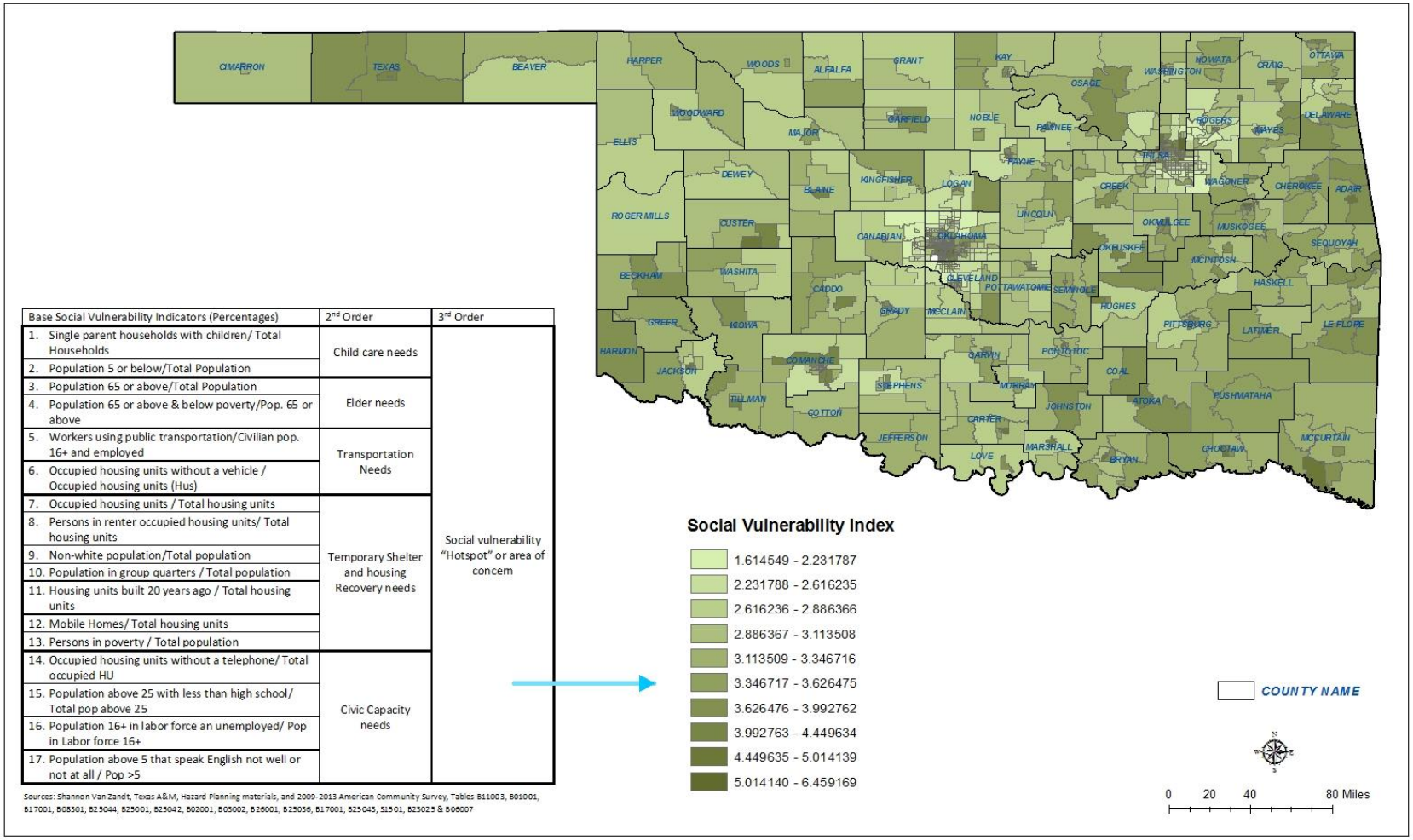
Base Social Vulnerability Indicators (Percentages)	2nd Order	3rd Order
1. Single parent households with children/ Total Households	Child care needs	Social vulnerability "Hotspot" or area of concern
2. Population 5 or below/Total Population		
3. Population 65 or above/Total Population	Elder needs	
4. Population 65 or above & below poverty/Pop. 65 or above		
5. Workers using public transportation/Civilian pop. 16+ and employed	Transportation Needs	
6. Occupied housing units without a vehicle / Occupied housing units (Hus)		
7. Occupied housing units / Total housing units	Temporary Shelter and housing Recovery needs	
8. Persons in renter occupied housing units/ Total housing units		
9. Non-white population/Total population		
10. Population in group quarters / Total population		
11. Housing units built 20 years ago / Total housing units		
12. Mobile Homes/ Total housing units		
13. Persons in poverty / Total population		
14. Occupied housing units without a telephone/ Total occupied HU	Civic Capacity needs	
15. Population above 25 with less than high school/ Total pop above 25		
16. Population 16+ in labor force an unemployed/ Pop in Labor force 16+		
17. Population above 5 that speak English not well or not at all / Pop >5		

Source: Shannon VanZandt, Texas A&M, Hazard Planning materials; 2009-2013 American Community Survey, Tables B11003, B01001, B17001,

Social Vulnerability - Impacts on Housing & Disaster Resiliency

Base Social Vulnerability Indicators (Percentages)	2nd Order	3rd Order
1. Single parent households with children/ Total Households	Child care needs	Social vulnerability "Hotspot" or area of concern
2. Population 5 or below/Total Population		
3. Population 65 or above/Total Population	Elder needs	
4. Population 65 or above & below poverty/Pop. 65 or above		
5. Workers using public transportation/Civilian pop. 16+ and employed	Transportation Needs	
6. Occupied housing units without a vehicle / Occupied housing units (Hus)		
7. Occupied housing units / Total housing units	Temporary Shelter and housing Recovery needs	
8. Persons in renter occupied housing units/ Total housing units		
9. Non-white population/Total population		
10. Population in group quarters / Total population		
11. Housing units built 20 years ago / Total housing units		
12. Mobile Homes/ Total housing units		
13. Persons in poverty / Total population		
14. Occupied housing units without a telephone/ Total occupied HU	Civic Capacity needs	
15. Population above 25 with less than high school/ Total pop above 25		
16. Population 16+ in labor force an unemployed/ Pop in Labor force 16+		
17. Population above 5 that speak English not well or not at all / Pop >5		

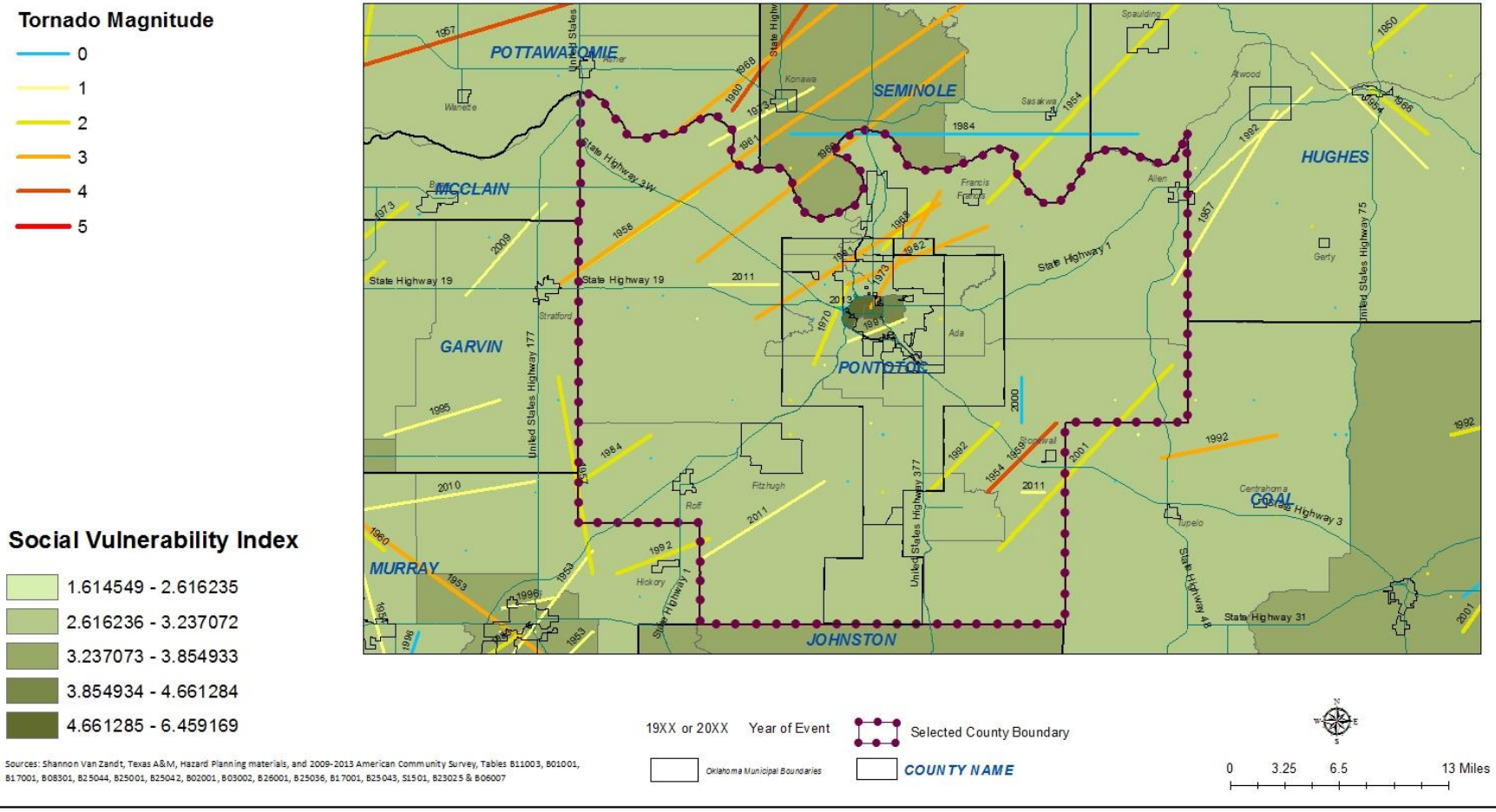
Sources: Shannon Van Zandt, Texas A&M, Hazard Planning materials, and 2009-2013 American Community Survey, Tables B11003, B01001, B17001, B08301, B25044, B25001, B25042, B02001, B03002, B26001, B25036, B17001, B25043, S1501, B23025 & B06007



Social Vulnerability - Impacts on Housing & Disaster Resiliency

Tornado Events 1950 - 2014

Pontotoc County



Sources: Shannon Van Zandt, Texas A&M, Hazard Planning materials, and 2009-2013 American Community Survey, Tables B11003, B01001, B17001, B08301, B25044, B25001, B25042, B02001, B03002, B26001, B25036, B17001, B25043, S1501, B23025 & B06007

Social vulnerability combined with the devastating impacts of a natural or man-made disaster can compound a household's ability to recover and in fact can place those individuals at an even great gap or disadvantage prior to the event (Shannon Van Zandt, Texas A&M, Hazard Planning).

This county falls above average per this index for social vulnerability when comparing as a county to other counties in the state. At the census tract level, the Ada area is the most socially vulnerable and therefore residents may experience further negative impacts from a disaster event and subsequent recovery.

Recommendations for this county:

- Continue to update and maintain the county HMP and include attention to areas within the county that in addition to physical vulnerability may have compounding social vulnerability factors.

- Efforts to strengthen building codes related to tornadoes and natural disasters should be considered.

- Planning for shelters from disaster events for multifamily, HUD and LIHTC units, in addition to all housing in the community should be incorporated with any effort to increase housing.

- Continue to apply for grants and pursue funding for more public emergency shelters.