

## Special Topics

## Pottawatomie 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 14 key cities within the county: Shawnee, Tecumseh, Asher, Bethel Acres, Brooksville, Earlsboro, Johnson, Macomb, Maud, McLoud, Pink, St. Louis, Tribbey, and Wanette. Oklahoma City also has a part of the city in this county. There are also 7 unincorporated communities in the county: Aydelotte, Belmont, Dale, Harjo, Pearson, Romulus, and Sacred Heart.

**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 14 key cities, 4 have comprehensive plans that have been adopted: Earlsboro, McLoud, Shawnee, and Tecumseh. Of these plans the following plans contain language in the plan that addresses land use decisions that reduce placing housing and businesses within historical areas of risk (e.g. flooding) and other supporting actions to increase disaster resiliency.

Earlsboro: not publically available online

McLoud: <http://www.mcloudok.us/Comprehensive%20plan/McLoud%202030%20Comp%20Plan.pdf>

Page 8: "Residential development in floodplain areas should be prohibited. Non-residential development in such areas should be restricted and regulated."

Shawnee: <http://www.shawneeok.org/development/planning/ComprehensivePlan.asp>

Land Use document

Page 18: "Housing in the Uptown District is expected to range from medium to high density with limited commercial retail and office space integrated into development. Floodplains and waterways should be preserved and utilized as a recreational and aesthetic amenity..."

Page 31: Parks and Open Space: "Parks are a desirable use for floodplain areas."

<http://www.shawneeok.org/development/docs/2005ComprehensivePlan/Chapter%204%20Land%20Use%20for%20Web.pdf>

Housing document

Page 17: "More important, modular housing is required to meet local building codes and other related regulations. This is particularly important in Shawnee because of the ability to require increased reinforcement against wind events such as tornadoes and straight line winds."

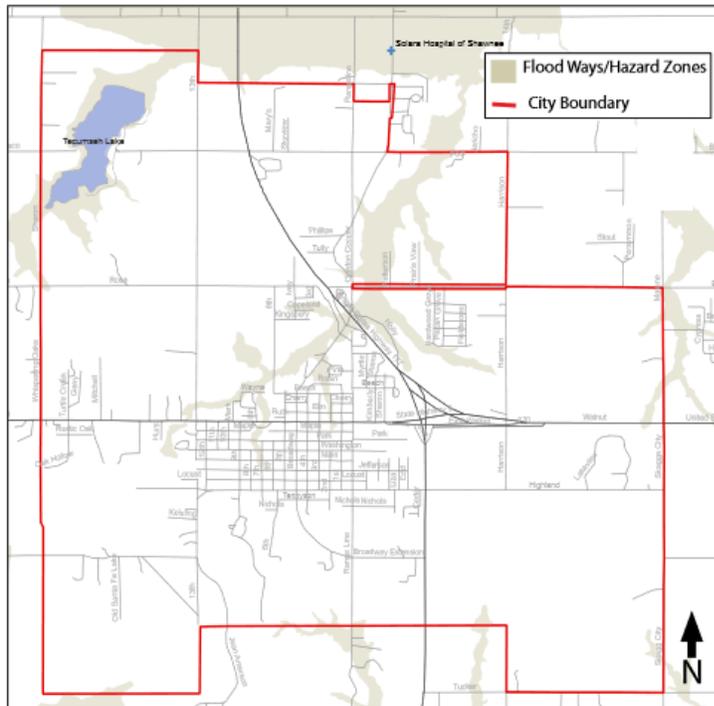
Page 28: "Primary conservation areas represent areas unsuitable for development such as floodways/floodplains, wetlands, steep slopes, or other areas of significance that are deemed inappropriate for development by the City of Shawnee..."

<http://www.shawneeok.org/development/docs/2005ComprehensivePlan/Chapter%205%20Housing%20for%20Web.pdf>

Tecumseh:

<http://static1.1.sqspcdn.com/static/f/391847/19947756/1345493672643/Tecumseh+Comp+Plan.pdf?toKen=%2Blhpn3mcuPiz5oz2L9kgrrMXtcY%3D>

Page 31: “Objective CR2.3: Restrict development in flood hazard areas and prohibit development in floodways.”



Appendix D Map

Based on the review of the existing and available comprehensive plans for the area, it is recommended that any future comprehensive planning work done include coordination and goals to address disaster resiliency.

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.

Pottawatomie County does have a Hazard Mitigation Plan. The plan was approved in 2014 and is currently in review by FEMA.

The following jurisdictions participate in Pottawatomie County’s Hazard Mitigation Plan: The Unincorporated areas of the County, Asher, Bethel Acres, Brooksville, Earlsboro, Johnson, Macomb, Maud, McLoud, Pink, Shawnee, and St. Louis, as well as the public school districts in the County.

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

The Pottawatomie County Hazard Mitigation Plan has five goals for all natural hazards:

1. Protection of lives and property
2. Improved identification and protection of Critical Facilities
3. Prevent repetitive flooding

4. Educate citizens on all potential hazards
5. Improve response capabilities to hazard events

The following table describes the chance a natural hazard may occur:

TABLE 3-2. PROBABILITY OF OCCURRENCE - DEFINITION	
4-HIGHLY LIKELY	Event is probable within the calendar year. Event has a 1 in 1 year chance of occurring.
3-LIKELY	Event is probable within the next three years. Event has up to 1 in 3 year's chance of occurring.
2-POSSIBLE	Event is probable within the next 5 years. Event has up to 1 in 5 year's chance of occurring.
1-UNLIKELY	Event is possible within the next 10 years. Event has up to 1 to 10 years chance of occurring.

**Dam Failure Risks – Risk level: 1**

Historical Context: “There are four major dams in Pottawatomie County and one in the neighboring Cleveland County that could affect Pottawatomie County in the event of a dam failure. All are rated by OWRB as High Hazard. There is no data or other information available that there has ever been a dam breach in Pottawatomie County; however, historical records are sparse and may not contain all events into the early 20<sup>th</sup> century.”

Table 3-5 POTTAWATOMIE COUNTY HAZARDOUS DAM DATA					
Name of Dam Site	Year Completed	Dam Height	Max Storage	Normal Storage	Surface Area
Shawnee Twin Lakes #1	1936	55	36500	22600	1275
Shawnee Twin Lakes #2	1960	50	18900	11400	1100
Wes Watkins Dam	1994	54	40735	14065	1142
Tecumseh Lake Dam	1934/1957	30	2370	1118	127
Thunderbird Lake Dam*	1965	144	106669	1039	5377

\*located in Cleveland County

**Mitigation Strategy / Recommendations for HMP:** “Identify, acquire and remove repetitive loss and repeated flood properties where...most cost effective... Implement structural and non-structural flood mitigation measures for flood prone area... Evaluate and Upgrade Community Warning System. Install outdoor warning devices... Conduct assessment to determine vulnerable special needs population... Develop and distribute public information and education materials... Purchase emergency power generators for critical facilities. Enhance facilities for the 911 center and the Emergency Operations Center. Revise Emergency Action Plans for dams... Installation of monitoring equipment on High Hazard dams. Purchase lighted electronic signs...to warn motorists of potential dangers...”

**Drought – Risk level: 3**

Historical Context: “According to the National Climatic Data Center (NCDC), fifteen drought events affected Pottawatomie County from 2006 to December 2011... Since 2004, Oklahoma and Pottawatomie County have been involved in a steady drought with a few periods of relief.



The most severe was during early 2011 and 2012 when dry conditions caused by the drought resulted in numerous water shortages and wildfires statewide.”

<b>Table 3-8 POTTAWATOMIE COUNTY DROUGHT EVENTS</b> <b>2006-2013</b> <small>Data from the National Climate Data Center (NCDC)</small>	
Date	Description
Oct 2012 -Mar 2013	<p>Drought conditions continued over the southern Plains following a hot and very dry summer. A few beneficial rain events did occur during September, resulting in improving drought conditions in some areas.</p> <p>With lack of any appreciable rainfall during the month of October, drought conditions persisted and/or worsened during the month.</p> <p>Precipitation totals for March 2013 were below normal across most of central and western Oklahoma, resulting in a continuation of the long-term drought.</p>
Jan 2011-Sept 2012	<p>The drought conditions that had affected Pottawatomie County earlier in the year returned in late June and early July as little precipitation fell and excessive days of temperatures over 100 degrees dried out vegetation and water levels from lakes and ponds dropped. Numerous grass fires were reported causing fire department resources to spread out across the county. At the end of August all of Pottawatomie County was in a D3 (Extreme) drought and had been for over a month.</p>
Oct 2006-Jan 2007	<p>Despite some rainfall the drought continued across much of western and central Oklahoma during October. The area was under severe to exceptional (D2-D4) drought conditions throughout the month. The worst conditions were in south central and southeast Oklahoma where drought conditions were in the extreme to exceptional (D3-D4) drought categories. Participation in January improved areas of the state and the moisture that saturated the ground ended the drought effects.</p>

**Mitigation Strategy / Recommendations for HMP:** “Shawnee and Pottawatomie County shall develop...new technologies to assess the probable impact of droughts; development of education programs; and the development of indices and response actions that signal the onset of various stages of drought. The City of Shawnee shall seek additional water reservoir capacity. Develop and distribute public information and education materials... Enhance facilities for the 911 center and the Emergency Operations Center.”

**Earthquake – Risk level:** felt earthquakes: 3; damaging earthquakes: 2

Historical Context: “On average there are about 50 measurable earthquakes each year in Oklahoma with only a few of these with shaking strong enough to be felt. The USGS database shows that there is a 2.087% chance of a major earthquake within 50 miles of Shawnee, Oklahoma within the next 50 years.”

Date	Location	General Description
10/26/2002	17km SE of Shawnee	M5.4 – no damage reported
7/1/2009	1mi SE of McLoud	M3.4 – no injuries or damage reported
10/13/2010	Norman	M4.4 – felt by many in Pottawatomie County but no damage or injuries reported
11/6/2011	21mi NNE of Shawnee	M5.6 – significant damage in the County. Damage to spires on top of Benedictine Hall at St. Gregory’s University; commercial structure in downtown Shawnee; 15 residential structures with minor damage and one residence destroyed; St. Benedicts Church, Romulus Baptist Church, and Eaton Hydraulics; and the Shawnee water treatment facilities and public works building.

<b>Table 3-10 POTTAWATOMIE COUNTY EARTHQUAKE EVENTS</b>					
January 1, 2012-August 31, 2012					
Information provided by the Oklahoma Climatological Survey					
Date	Time	Depth	Magnitude	Latitude	Longitude
August 13 <sup>th</sup>	08:46:40	5.0	1.3	35.4656	-96.8140
August 10 <sup>th</sup>	02:39:23	5.0	1.4	35.4275	-97.0084
August 9 <sup>th</sup>	23:23:25	5.0	1.8	35.4476	-97.0220
July 31 <sup>st</sup>	14:24:11	5.0	1.8	35.4580	-96.7962
June 13 <sup>th</sup>	22:44:32	3.0	3.1	35.4597	-96.7003
June 2 <sup>nd</sup>	22:11:48	5.0	2.3	35.4681	-96.7089
May 30 <sup>th</sup>	22:15:43	5.0	2.5	35.4573	-96.6993
May 16 <sup>th</sup>	13:22:11	5.0	0.9	35.4657	-96.6230
April 29 <sup>th</sup>	11:50:23	5.0	2.0	35.4432	-97.0269
April 16 <sup>th</sup>	10:59:39	5.0	2.1	35.4041	-96.6663
Feb 19 <sup>th</sup>	08:12:39	.2	.6	35.4598	-96.8567
Jan 24 <sup>th</sup>	18:10:05	7.8	2.0	35.3942	-97.0950

*NOTE: Unfortunately the usual source in Oklahoma for accurate Oklahoma earthquake data, the Geological Survey Laboratory at Leonard, Oklahoma, suffered a computer failure and has been out of service for several months. The above information was received from other sources but may not be entirely accurate.*

**Mitigation Strategy / Recommendations for HMP:** “Conduct assessment to determine vulnerable special needs population... Revise building codes to reflect latest guidance for wind resistance and tie downs for mobile homes. Develop and distribute public information and education materials... ...locate utility lines underground and increase trimming of trees affecting utility lines... Purchase emergency power generators for critical facilities. Enhance facilities for the 911 center and the Emergency Operations Center.”

#### **Extreme Heat – Risk level: 3**

**Historical Context:** “Pottawatomie County’s highest temperature on record occurred on August 10, 1936 when the temperature reach 116 degrees Fahrenheit in Shawnee. Pottawatomie County has experienced extreme heat events over the last five years with excessively high temperatures causing significant problems for citizens... The Oklahoma Climatological Survey indicates the Pottawatomie County area averages 10-20 days over 100 degrees during the summer.”

<b>Table 3-12 SIGNIFICANT POTTAWATOMIE COUNTY EXTREME HEAT HISTORY 2009-2012</b>				
Data provided by the Oklahoma Climatological Survey				
Year	Days above 90 degrees	Days above 100 degrees	Pottawatomie County	
			Fatalities	Injuries
2012	93	34	None known	Unknown
2011	109	63	None known	Unknown
NOTE: NCDC website was checked for data but information available was inadequate. NWS Norman was also checked for temperature data but usable data was not found.				
Average High for July: 93.1 degrees Average Number of Days above 90 degrees: 76				

**Mitigation Strategy / Recommendations for HMP:** “Develop and publicize locations of cooling/warming stations for refuge... Conduct assessment to determine vulnerable special needs population... Develop and distribute public information and education materials... Purchase emergency power generators for critical facilities. Enhance facilities for the 911 center and the Emergency Operations Center.”

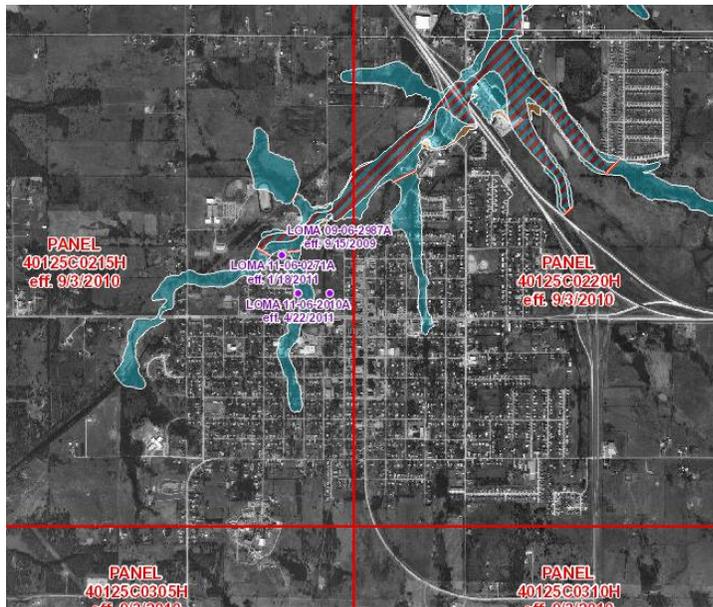
**Flood – Risk level: 3**

Historical Context: “All of the communities in Pottawatomie County are susceptible to occasional minor street flooding primarily due to flash flooding; however the communities of Bethel Acres, Earlsboro, Shawnee and Tecumseh have been affected by flooding in the past... Tecumseh Middle School and Dale Public Schools have facilities that are located within the FEMA recognized Special Flood Hazard Area...”

Date	Location	General Description
4/30/2000	Earlsboro	Flash flood – isolated areas of wind damage, large hail, lightning damage, and flooding from thunderstorms.
3/3/2004	Entire County	Flood – rainfall amounts of 1.5in to 3.5in. Little River near Tecumseh crested at 15ft, flooding agricultural lands in Pottawatomie and western Seminole Counties.
7/7/2004	Entire County	Flood – An early morning thunderstorm dropped 2in+ of rain, flooding the Little River, which crested 1.8ft above the flood stage.
11/17/2004	Entire County	Flood – Strong thunderstorms dropped 1-2in of rain in west-central parts of the county. The ground was already saturated from previous storms in the year and the Little River flooded. Minor rural flooding occurred.
5/8/2007	Shawnee	Flood – Hardesty Rd and Donna Lane were closed due to a culvert collapsing. Roads were closed between Hwy 102 and Stevens Rd.
6/18/2007	Maud	Flash flood – flooding called for a few evacuations from houses in Maud due to rapidly rising water. Many county roads were closed and monetary damages were estimated.
6/26/2007	Tecumseh, Shawnee, Earlsboro	Flood – Monetary damages were estimated. Tecumseh – 6in of water reported in Kwik Stop. A woman had to be evacuated from her home and water got into the high school, damaging the flooring. Shawnee – 45 <sup>th</sup> St was closed between West Bryant and East Harrison due to high water. 46 single family homes and 7 commercial buildings sustained major

		flood damage. About 60 homes had minor flood damage. Earlsboro – State Hwy 9 was flooded and impassable.
7/10/2007	Shawnee	Flash flood – hail, high winds, and flash flooding reported. Squirrel Creek overflowed its banks, forcing evacuation of campers.
7/30/2007	Shawnee	Flash flood – many roads closed and rising water also entered a few businesses with minor damage reported.
8/19/2007	Tecumseh	Tropical Storm Erin – rainfall amounts exceeded 5in over a large area with some places receiving between 8in and 10in. Many people were rescued by boat and helicopter from homes and cars. Pumps, outlets and fans were damaged at the wastewater treatment plant. Tecumseh High School classrooms had 1in of water in most classrooms. Numerous streets were flooded and closed. No injuries reported at any location
6/14/2010	Bethel Acres	Flash flood – many roads between Bethel Acres and Shawnee had to be closed. One car became stranded in rapidly rising water. Many locations on Hwy 177 and 18 were impassable in Shawnee and Tecumseh. A few swift water rescues were carried out north of Tecumseh when two cars were swept off the road. Several homes were damaged.
4/17/2013	Shawnee	Flash flood – heavy rainfall from several rounds of thunderstorms led to flooding in downtown Shawnee. Numerous streets flooded but no damage reported and no injuries or fatalities occurred.

Tecumseh



FEMA's National Flood Hazard Layer <http://fema.maps.arcgis.com/>

Bethel Acres



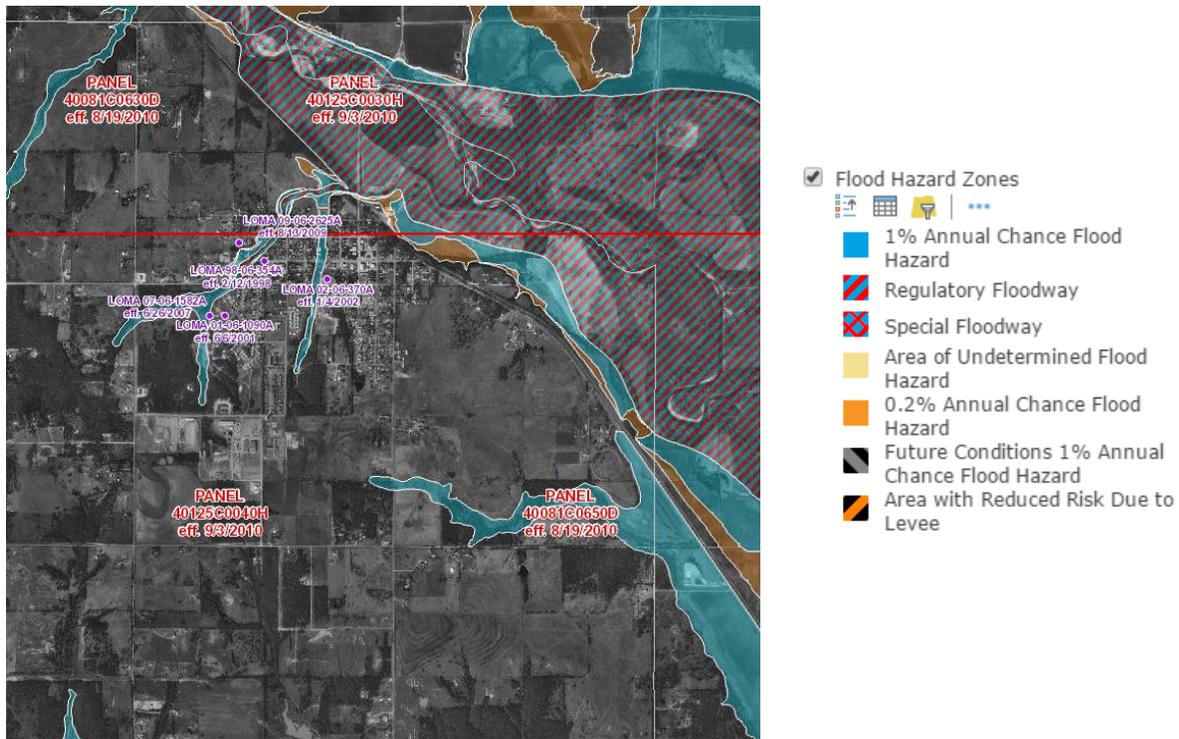
FEMA's National Flood Hazard Layer <http://fema.maps.arcgis.com/>

Shawnee



FEMA's National Flood Hazard Layer <http://fema.maps.arcgis.com/>

McCloud



FEMA's National Flood Hazard Layer <http://fema.maps.arcgis.com/>

**Mitigation Strategy / Recommendations for HMP:** “Identify, acquire and remove repetitive loss and repeated flood properties where...most cost effective... Implement structural and non-structural flood mitigation measures for flood prone area... Conduct assessment to determine vulnerable special needs population... Develop and distribute public information and education materials... Purchase emergency power generators for critical facilities. Enhance facilities for the 911 center and the Emergency Operations Center. Purchase lighted electronic signs...to warn motorist of potential dangers...”

**Hail – Risk level: 4**

**Historical Context:** “All of Pottawatomie County, including all of the jurisdictions within the county...are subject to hailstorms. Between 2000 and 2013, the NCDL has recorded 119 hail events that have impacted communities in Pottawatomie County.”

Date	Location	General Description
3/24/2004	Shawnee	2.75in
4/21/2004	Shawnee	1.25in – 3in to 2ft deep in some areas. Damaged numerous structures and vehicles. Damage estimates across the OKC metro area were \$100million.
1/8/2008	McLoud	1in
3/31/2008	Tecumseh	1in – some damage
4/3/2008	Macomb	1.75in
11/5/2008	Shawnee, Pink	1.75in – several windows broken at Shawnee Lake. Damage estimated at \$10,000
3/30/2009	Wanette	1in – no damage reported
6/12/2009	Entire County	1.75in

7/8/2009	Wanette	1in
5/16/2010	Shawnee	1in – widespread, significant damage in and around metro area. Many vehicles damaged or totaled and many buildings with roof, window or structural damage. Trees and other vegetation were shredded.
5/19/2010	St. Louis, Macomb	1.75in
4/14/2011	Johnson, Tecumseh, Shawnee	1in
4/22/2011	Tecumseh, Pink	1.25-2.75in
5/12/2011	Earlsboro	1in
8/12/2011	Shawnee, Pink, Earlsboro	1.75in
10/22/2011	Asher, Wanette	1.5-1.75in

**Mitigation Strategy / Recommendations for HMP:** “Evaluate and Upgrade Community Warning System. Install outdoor warning devices... Develop and distribute public information and education materials... ...locate utility lines underground and increase trimming of trees affecting utility lines... Purchase emergency power generators for critical facilities. Enhance facilities for the 911 center and the Emergency Operations Center.”

#### High Winds – Risk level: 4

Historical Context: “Pottawatomie County and its participating jurisdictions...experiences high winds and occasional downbursts during some thunderstorms exposing virtually all structures, infrastructure, and individuals in the county to the effects.”

Date	Location	General Description
7/4/2005	Shawnee	56 knots – estimated damage: \$13,000. Trees and power lines downed and the ceiling at the Shawnee Care Center fell in.
7/21/2006	Maud, Tribbey	56 knots – estimated damage: \$20,000. Power lines downed. Roof of a car wash was blown off.
8/3/2006	Shawnee	56 knots – estimated damage: \$25,000. Many trees and a chain link fence was downed. An outbuilding was blown over and a movie theater sign was splintered.
8/15/2006	Shawnee	61 knots – estimated damage \$50,000. Many trees uprooted and several semi-trucks were rolled.
5/30/2007	Shawnee, North part of County	70 knots – estimated damage: \$207,000. Several power lines and tree limbs downed. The roof of a building at Gordon Cooper Vo-Tech was blown off, and 6 tribal buildings and 7 homes sustained minor damage.
11/5/2008	Shawnee	56 knots – estimated damage: \$10,000. Minor roof damage to three structures in the Shawnee area.
2/10/2009	Tecumseh	56 knots – estimated damage: unavailable. Power lines downed and in Tecumseh part of Hwy 9 had to be closed due to power lines lying on the road. Some fencing and roof damage also reported.
6/7/2009	Shawnee, Tecumseh	61 knots – estimated damage: unavailable. Tree damage and some shingles were blown off several rooftops.
7/8/2009	Tecumseh	61 knots – estimated damage: unavailable. Power lines, utility poles, and trees downed and a sign from a local convenience store was blown over. Most of the town was without power for a short time.

5/10/2010	Wanette	60 knots – estimated damage: unavailable. Roof damage reported to a business just north of Wanette.
5/13/2010	Entire County	56 knots – estimated damage: \$4,000. Several power lines and a tree were downed.
7/13/2011	Tribbey	61 knots – estimated damage: \$9,000. Roof blown off of a barn and several trees blown over.
8/8/2012	Macomb	61 knots – estimated damage: \$2,000. Roof shingles were blown off a house.

**Mitigation Strategy / Recommendations for HMP:** “Construct safe rooms...to protect first responders and the public. Constructs safe rooms on school campuses...to protect students, staff and visitors... Evaluate and Upgrade Community Warning System. Install outdoor warning devices... Conduct assessment to determine vulnerable special needs population... Revise building codes to reflect latest guidance for wind resistance and tie downs for mobile homes. Develop and distribute public information and education materials... ..locate utility lines underground and increase trimming of trees affecting utility lines... Purchase emergency power generators for critical facilities. Enhance facilities for the 911 center and the Emergency Operations Center.”

**Lightning** – Risk level: 4

Historical Context: “All of Pottawatomie County...is vulnerable to lightning.”

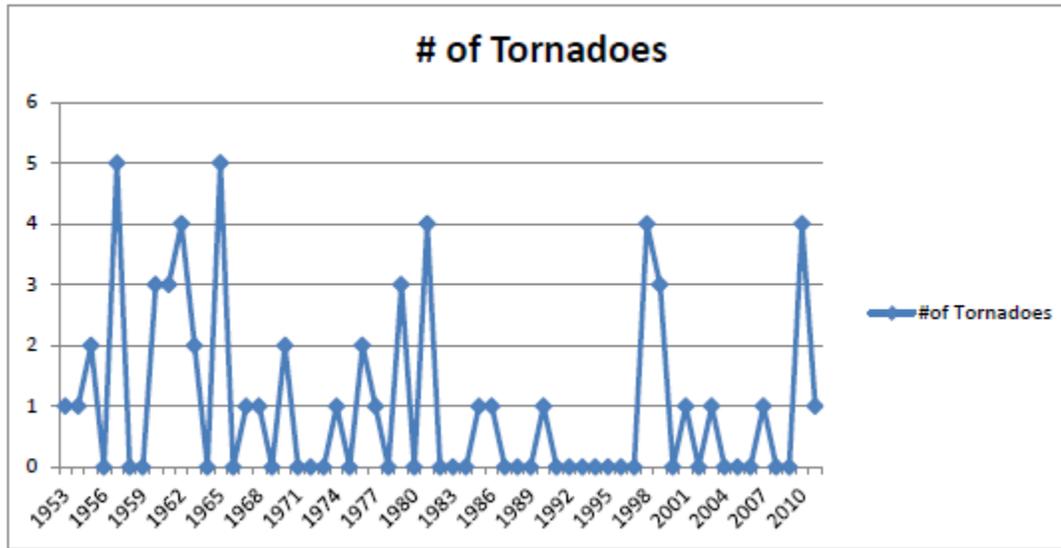
<b>Table 3-19 POTTAWATOMIE COUNTY LIGHTNING EVENTS 2000-2012</b> <small>Data provided by the National Climatic Data Center (NCDC)</small>		
Date	Location	Description
06 Nov 2003	Bethel Acres	Lightning caused a house fire near Bethel Acres on Lake Road. Damage estimate: \$15,000.00
19 May 2003	Shawnee	A house was set on fire due to a lightning strike. Damage estimate: \$10,000.00
09 Jul 2001	Shawnee	Lightning struck a house on 11st Street, causing a small fire in the attic. . Damage estimate: \$1,000.00
09 Mar 2000	Asher	Lightning struck an oil tank battery, igniting a fire. Damage estimate: \$2,000.00

**Mitigation Strategy / Recommendations for HMP:** “Conduct assessment to determine vulnerable special needs population... Develop and distribute public information and education materials... ..locate utility lines underground and increase trimming of trees affecting utility lines... Purchase emergency power generators for critical facilities. Enhance facilities for the 911 center and the Emergency Operations Center.”

**Tornado** – risk level: 3

Historical Context: “The entire State of Oklahoma is at great risk for tornados including all of Pottawatomie County. In one day on May 10, 2010, four tornados ranging from EF2 to EF4 touched down in the county resulting in hundreds of residential structures seriously damaged or destroyed. Since 1875, Pottawatomie County has been affected by seventy-eight tornados...”

Historic data on tornados between 1953-2013 there are 62 tornados documented. There were 315 injuries that occurred connected to these tornados, with 84 of those injuries happening in the October 5<sup>th</sup>, 1970 tornado. There were 15 fatalities connected to tornados during this time period, 5 of which occurred in the May 5<sup>th</sup>, 1960 tornado. Property losses between 1953-1996 ranged from \$7,183,500 to \$71,835,100. Accounting for losses estimated changed in 1996. The losses estimated between 1996-2014 was \$2.5million.



Date	Location	General Description
5/3/1999	Shawnee, Pink	EF1 to 2 – estimated damage: \$1billion. Many structures sustained moderate damage, such as the roof being blown off.
4/11/2001	4mi NW of Maud	EF1
5/7/2007	Entire County	EF0
5/10/2010	NNE of Earlsboro, Pink, Tecumseh	EF3 - estimated damage: unavailable. 3 tornados from this system caused damage in the County.
5/24/2011	McLoud	EF2 – estimated damage: unavailable.

**Mitigation Strategy / Recommendations for HMP:** “Construct safe rooms...to protect first responders and the public. Constructs safe rooms on school campuses...to protect students, staff and visitors... Evaluate and Upgrade Community Warning System. Install outdoor warning devices... Conduct assessment to determine vulnerable special needs population... Revise building codes to reflect latest guidance for wind resistance and tie downs for mobile homes. Develop and distribute public information and education materials... ..locate utility lines underground and increase trimming of trees affecting utility lines... Purchase emergency power generators for critical facilities. Enhance facilities for the 911 center and the Emergency Operations Center. Purchase lighted electronic signs...to warn motorist of potential dangers...”

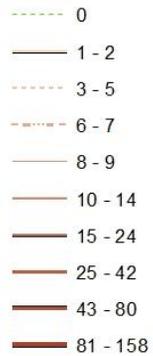
For all the county profiles for this study we are providing maps of the historic tornados mapped over the developed social vulnerability index. This is in addition to the data prepared and summarized from the HMP in this section.

# Social Vulnerability - Impacts on Housing & Disaster Resiliency

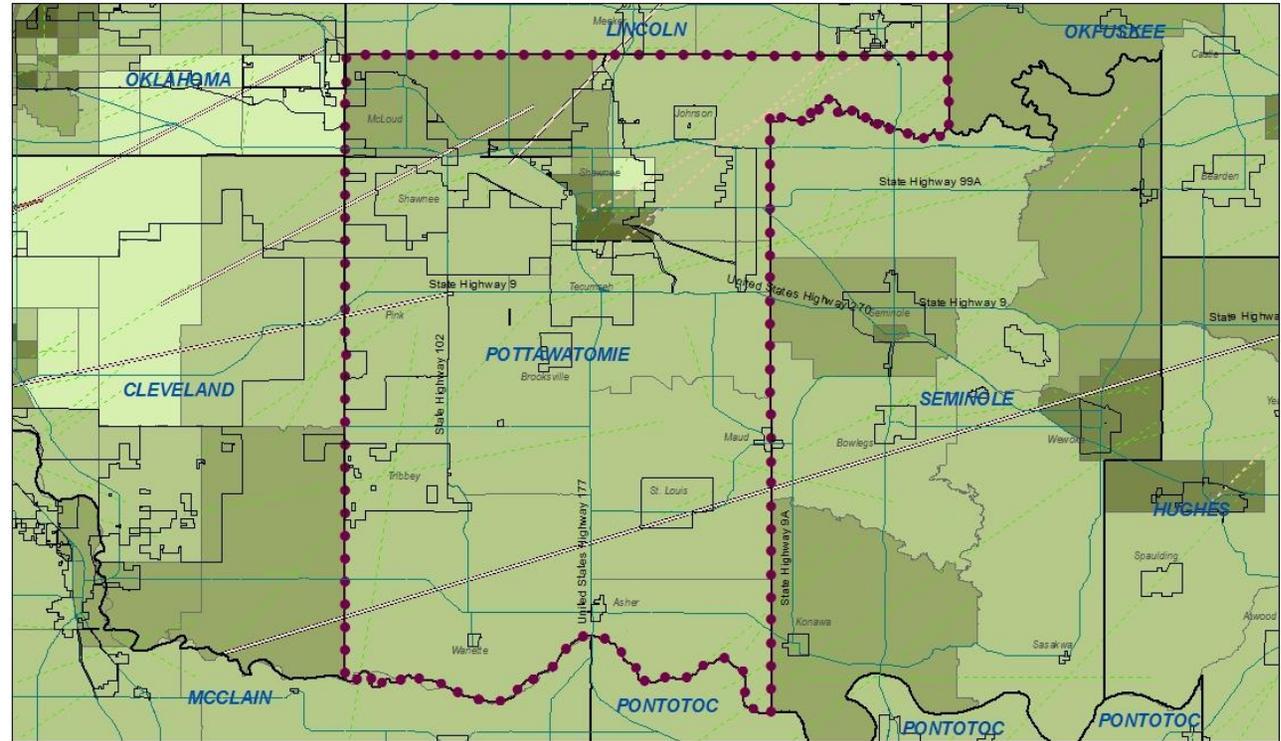
## Tornado Events 1950 - 2014

### Pottawatomie County

**# of fatalities associated with event**



**Social Vulnerability Index**



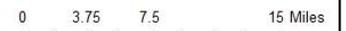
Sources: Shannon Van Zandt, Texas A&M, Hazard Planning materials, and 2009-2013 American Community Survey, Tables B11003, B01001, B17001, B08301, B25044, B25001, B25042, B02001, B03002, B26001, B25036, B17001, B25043, S1501, B23025 & B06007

19XX or 20XX Year of Event

Oklahoma Municipal Boundaries

Selected County Boundary

COUNTY NAME

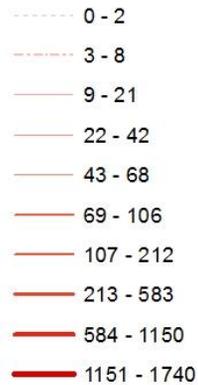


# Social Vulnerability - Impacts on Housing & Disaster Resiliency

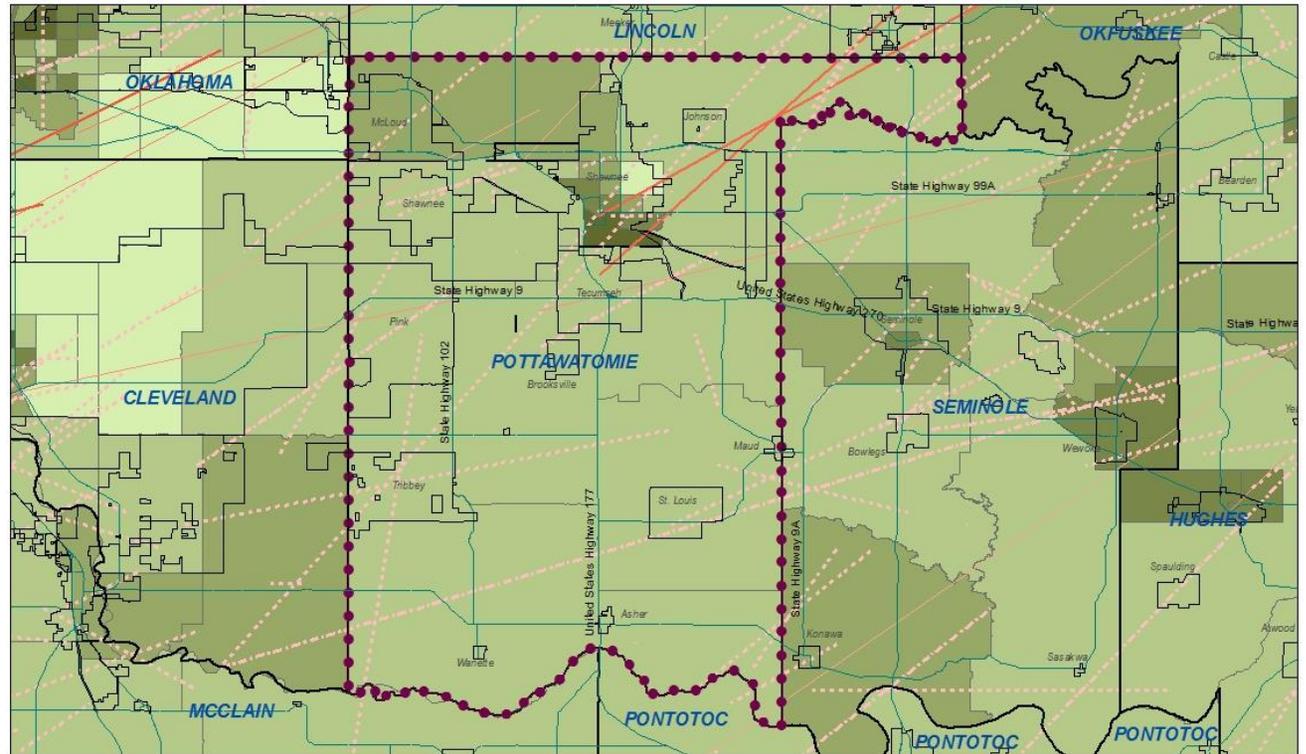
## Tornado Events 1950 - 2014

### Pottawatomie County

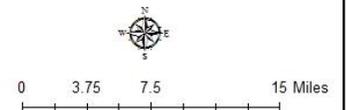
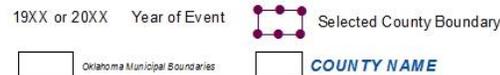
#### # of injuries associated with event



#### Social Vulnerability Index



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

### Pottawatomie 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
- \$50,000,000

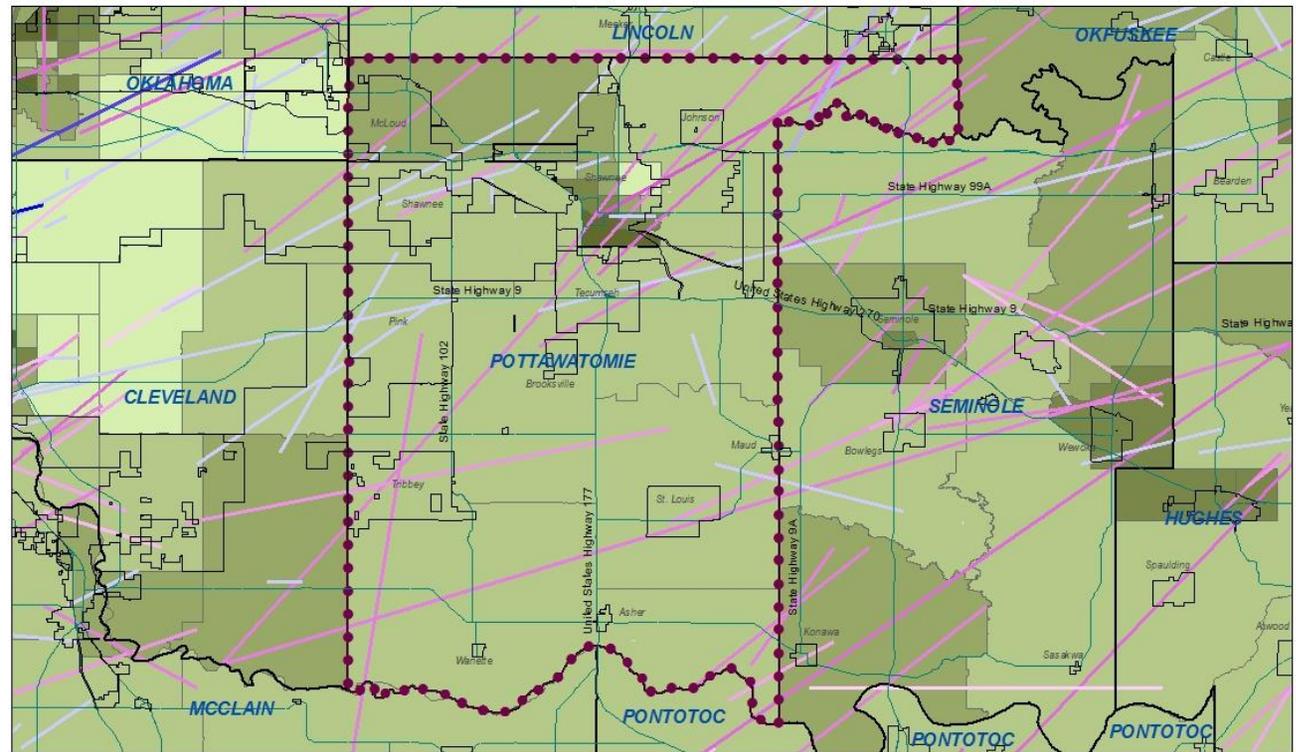
**Tornadoes after 1996**

**\$ 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 3.75 7.5 15 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

**Wildfires** – Risk level: 4

Historical Context: “While most of Pottawatomie County is susceptible to grass and wildfire, the southwestern part of the county is the most prone to severe wildfire. In 2009, there were three major wildfires that scorched close to 3000 acres. A fire in July 2011 that began northeast of Asher, OK charred over three square miles over a two-day period and resulted in the response of every fire department in Pottawatomie County.”

**Table 3-24 FIRE MANAGEMENT & FM ASSISTANCE DECLARATIONS**

Federal Declaration #	Declaration Date	Incident dates	Location
FM-2953	August 31, 2011	August 31, 2011	Twin Lakes Fire Complex
FM-2872	March 12, 2011	March 12, 2011 to March 15, 2011	Shawnee Fire
FM-2602	January 2, 2006	January 1, 2006	Bethel Acres Fire
FM-2140	March 12, 1996	March 12, 1996	Little Axe Fire
EM-3118	February 27, 1996	February 27, 1996 to May 31, 1996	Oklahoma Fire Emergency

**Mitigation Strategy / Recommendations for HMP:** “Evaluate and Upgrade Community Warning System. Install outdoor warning devices... Conduct assessment to determine vulnerable special needs population... The City of Shawnee shall seek additional water reservoir capacity. Develop and distribute public information and education materials... ..locate utility lines underground and increase trimming of trees affecting utility lines... Purchase emergency power generators for critical facilities. Enhance facilities for the 911 center and the Emergency Operations Center. Purchase lighted electronic signs...to warn motorist of potential dangers...”

**Winter storm** – Risk level: 3

Historical Context: “All of Pottawatomie County and central Oklahoma have the potential for winter snow and ice storms. The winters of 2000-2001, 2006-2007, and 2010-2011 each featured a major ice storm that deposited more than three inches of ice in 24 hours across much of Oklahoma including communities in Pottawatomie County.”

Date	Location	General Description
11/29-30/2006	Entire County	Winter storm – freezing rain, sleet, and snow caused hazardous travel conditions.
1/12-14/2007	Entire County	Winter storm – snow, freezing rain, and sleet closed airports, schools, malls and other businesses.
12/9-11/2007	Entire County	Ice storm – 1in of ice caused worst power outage in OK history. At least 27 people died statewide, mostly due to traffic collisions, though some were due to prolonged cold air exposure or carbon monoxide poisoning. More than 641,000 were without power across the state and it took weeks for power to be restored to everyone.
1/26-	Entire	Winter storm – 1/4in of ice and 3in of sleet caused many minor wrecks.

27/2009	County	
12/24-25/2009	Entire County	Winter storm – estimated damage: \$43,114.25. Snowfall >14in.
1/28-30/2010	Entire County	Ice Storm – estimated damage: \$31,446.76. Roads impassable, search and rescue missions conducted, shelters set up.
1/31/2011 – 2/3/2011	Entire County	Winter Weather – estimated damage: \$119,752.52. Thunder sleet, freezing rain, and snow. Wind gusts over 30mph.
2/8-9/2011	Entire County	Winter Storm – 2-4in of snow. Wind gusts over 25pmh
2/25-26/2013	Entire County	Winter Weather – little to no snow but Shawnee saw about an inch

**Mitigation Strategy / Recommendations for HMP:** “Develop and publicize locations of cooling/warming stations for refuge... Conduct assessment to determine vulnerable special needs population... Develop and distribute public information and education materials... ..locate utility lines underground and increase trimming of trees affecting utility lines... Purchase emergency power generators for critical facilities. Enhance facilities for the 911 center and the Emergency Operations Center. Purchase lighted electronic signs...to warn motorist of potential dangers...”

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

“Many residents of Pottawatomie County have built safe rooms or underground tornado shelters. All of the schools in Pottawatomie County have locations to provide students and staff some protection from tornados but most are not reinforced or specially designed safe rooms meeting FEMA standards.” Action Project 3 calls to “Construct safe rooms as needed to protect first responders and the public. Construct safe rooms on school campuses as needed to protect students, staff and visitors from tornados and high winds.”

McCloud has no public shelters. <http://newsok.com/article/2657072>

Shawnee closed their public storm shelters, the City Hall and Fire Station #3, in 2014. <http://kfor.com/2014/08/23/city-officials-close-shawnee-public-storm-shelters/>

Citizen Potawatomi Nation has secured funding to construct a 2,500 safe room to address tornado hazard to the area (planned to be rated to handle F5 event). Additionally CPN has 3 community shelters (all welcome).

#### **C.2.1.3 Public Policy and Governance to Build Disaster Resiliency**

The County’s Hazard Mitigation Plan calls for 78 individual Action Plans, dealing with everything from installing storm shelters in schools and critical facilities, to designing and installing better storm sewage systems on individual roads in Shawnee.

#### **C.2.1.4 Local Emergency Response Agency Structure**

There is mention of an Emergency Operations Plan that “...coordinates responsibilities to designated departments, agencies, and volunteers in the event of a disaster. This plan provides information on the location of warning sirens and community shelters.” However, this document does not appear to be publically available, as a Google search had no relevant results.

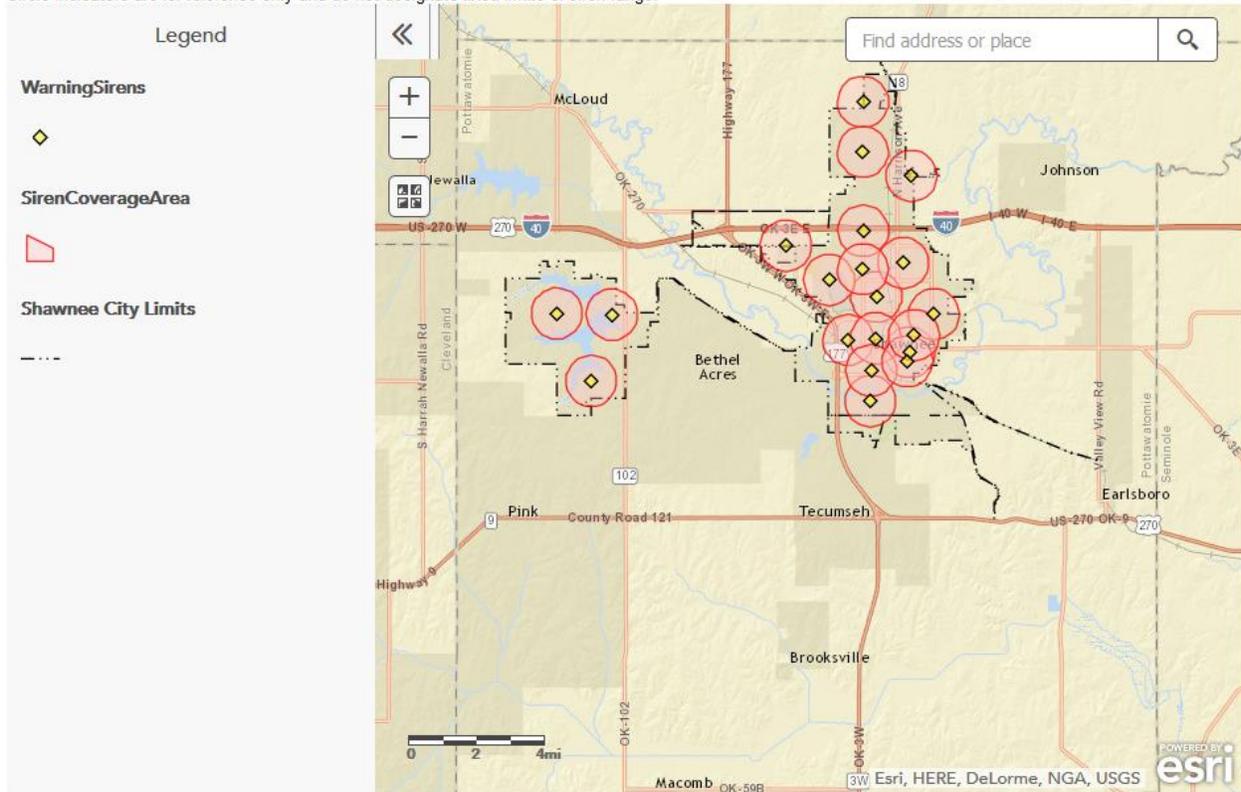
### C.2.1.5 Threat & Hazard Warning Systems

The identified Threat & Hazard Warning Systems for Pottawatomie County include:

- Sirens
- Desire to purchase and distribute NOAA radios to the public, schools and critical facilities (Action Project 21)

#### EMERGENCY SIREN LOCATIONS

Circle indicators are for reference only and do not designate fixed limits of siren range.



<http://www.shawneeok.org/development/Engineering/Default.asp?MUID=27>

## 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 - Pottawatomie County

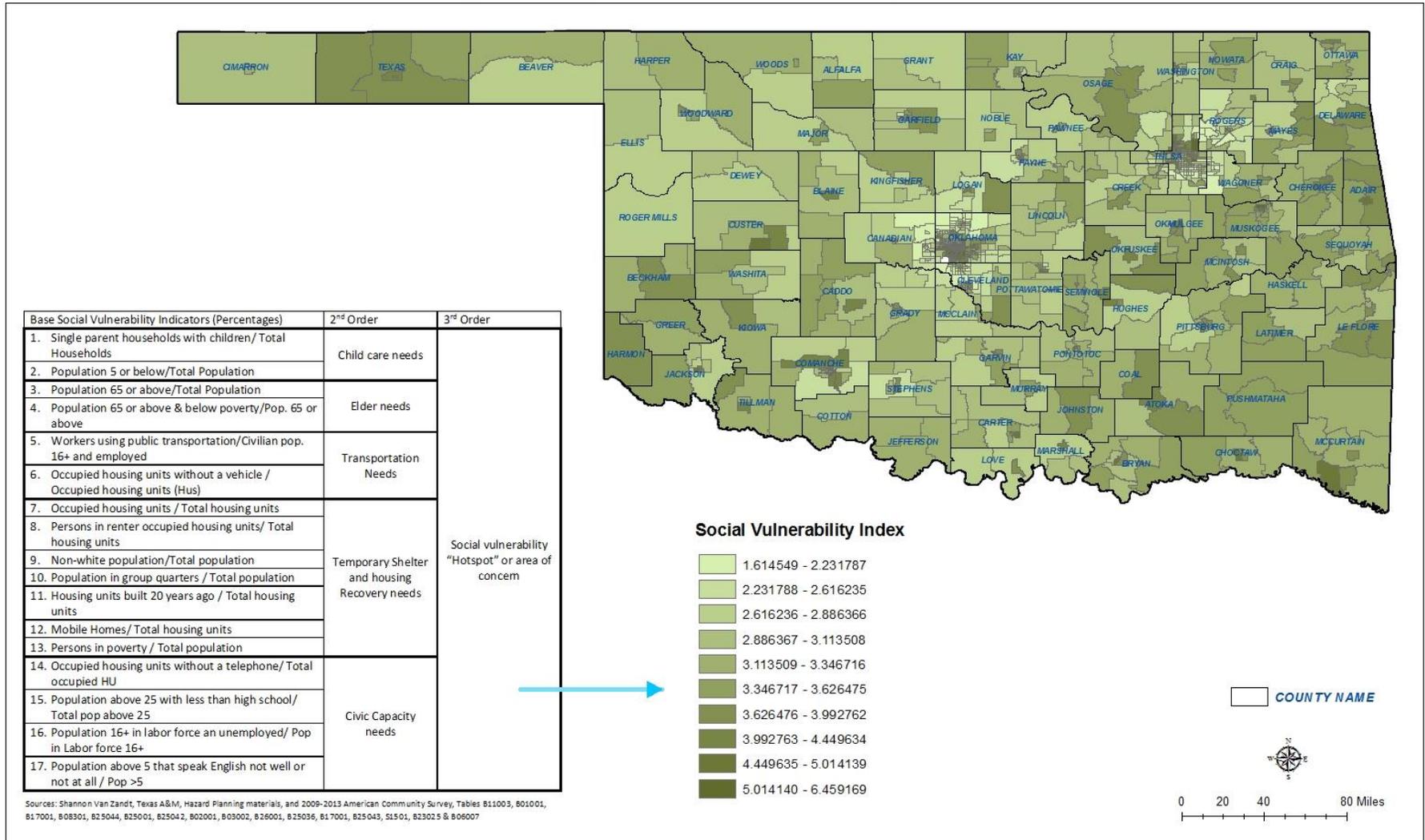
Base Social Vulnerability Indicators (%)	2nd Order	3rd Order
1.) Single Parent Households	14.78%	0.216
2.) Population Under 5	6.85%	(Child Care Needs)
3.) Population 65 or Above	14.62%	0.252
4.) Population 65 or Above & Below Poverty Rate	10.59%	(Elder Needs)
5.) Workers Using Public Transportation	0.18%	0.06
6.) Occupied Housing Units w/o Vehicle	5.87%	(Transportation Needs)
7.) Housing Unit Occupancy Rate	87.82%	2.517 (Temporary Shelter and Housing Recovery Needs)
8.) Rental Occupancy Rate	28.11%	
9.) Non-White Population	25.82%	
10.) Population in Group Quarters	4.89%	
11.) Housing Units Built Prior to 1990	73.23%	
12.) Mobile Homes, RVs, Vans, etc.	13.19%	
13.) Poverty Rate	18.63%	
14.) Housing Units Lacking Telephones	2.69%	0.248 (Civic Capacity Needs)
15.) Age 25+ With Less Than High School Diploma	13.90%	
16.) Unemployment Rate	7.05%	
17.) Age 5+ Which Cannot Speak English Well or Not At All	1.17%	

**3.294**  
**Social Vulnerability**  
**'Hotspot' or Area of**  
**Concern**

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



# Social Vulnerability - Impacts on Housing & Disaster Resiliency

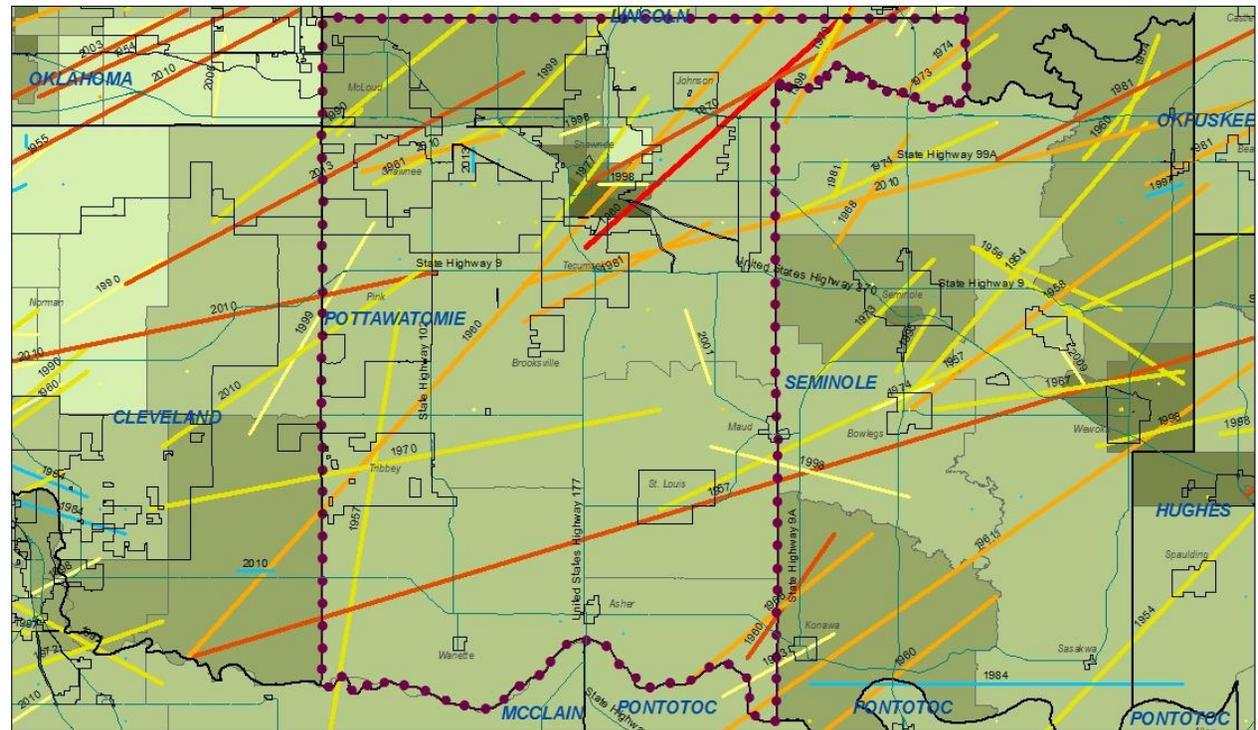
## Tornado Events 1950 - 2014

### Pottawatomie County

**Tornado Magnitude**



**Social Vulnerability Index**



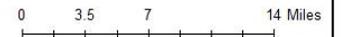
19XX or 20XX Year of Event

Selected County Boundary

Oklahoma Municipal Boundaries

COUNTY NAME

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 greater gap or disadvantage prior to the event (Shannon Van Zandt, Texas A&M, Hazard Planning).

This county falls below the state score per this index for social vulnerability when comparing as a county to other counties in the state. The census tracts near Shawnee and Tecumseh have elevated scores for social vulnerability.

**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.