

Special Topics

Osage 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 as recovery can be improved with good planning.

C.0 Comprehensive Plans & Hazard Mitigation Plans

There are 9 cities and towns within the county including the cities of Barnsdall, Hominy, Pawhuska and Shidler. The City of Pawhuska is the county seat. Towns include Avant, Burbank, Fairfax, Prue, and Winona.

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.

Osage County has a Comprehensive Land Use Plan. The following is language in the plans 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.

City of Pawhuska Comprehensive Plan Elements addressing housing and community resiliency:

Land use Objectives

- Protect County residents from the hazards of flooding.

Parks, Recreation, Trails and Open Space Objectives

- Protect natural open space areas identified as Development Sensitive Conservation Areas to preserve the natural vegetation, wildlife and enjoyment while reducing potential hazards to human life from improperly building on steep slopes with erodible soils or where the hazards of flooding are present.
- Protect the floodplain of area creeks and streams and incorporate the natural amenities of such areas into development where possible in accordance with the County's Floodplain Management Program.

Development of Sensitive and Conservation Areas Objectives

- Compliance with federal, state and local safety regulations such as floodplain programs – Continuing administration of the County's Floodplain Management Program in cooperation with FEMA and the OWRB by the County's Emergency Management Program.

Public Safety: Law Enforcement, Fire and Emergency Medical Services and Multi-Hazard Mitigation Objectives

- Support the area public and quasi-public agencies that function to protect the public health, safety, and welfare of the County to ensure continued high quality services and states of readiness by providing effective, highly trained and motivated law enforcement personnel, fire fighting and fire prevention and emergency medical services personnel and equipment.
- Incorporate the adopted Multi-Hazard Mitigation Plan into the 2030 Plan and Land Use Planning Program – Implementation by the County Commissioners in coordination with the

County Sheriff's Department, the Osage County Emergency Management Program, Municipal and Rural Fire Departments and the Planning Commission initiated and completed as necessary during the short term of the Planning Period.

Floodplain Stormwater Management and Drainage Objectives

- Protect the public health, safety and welfare by the property administration of the County's floodplain regulations as required by the OWRB and EPA.
- Reduce flooding along area creeks caused by heavy rains by clearing of trees and other obstructions where public access and funding is available.
- Support cities and towns, where possible, in their programs of floodplain management and cleaning of creeks to reduce flooding.
- Adopt the Multi-Hazard Mitigation Plan as an element of the 2030 Plan as a policy guide for land use and development decisions.

Quality of Life Objectives

- Support a high level and quality of law enforcement, fire protection and emergency medical services, and social-health care programs to protect the public health, safety and welfare.

Emergency Operation Plan

Osage County has adopted an emergency Operations Plan (EOP), revisits and readopts it annually, the last readoption in 2011. The EOP was used as a reference in preparing the Hazard Mitigation Plan (HMP). As part of the EOP, critical facilities were identified. These facilities include shelters, police and fire stations, schools, childcare centers, senior citizen centers, hospitals, disability centers, vehicle and equipment storage facilities, emergency operations centers, and city halls.

- **Emergency Operations Center** – Osage County Emergency Management (OCEM) has established emergency operations and procedures. OCEM is responsible for the Emergency Operations Center (EOC) and the coordination of disaster emergency response activities within the community.
- **9-1-1** – Osage County has also implemented a 9-1-1 Emergency Telephone System (E-911).
- **Warning Siren** – Osage County has warning sirens within the cities and towns but not in the outlying areas of the county.

The other key plan for a city to manage, mitigate and plan for recovery related to disasters are county or city **Hazard Mitigation Plans and/or Emergency Management Plans**.

Osage County has a Hazard Mitigation Plan (HMP) that provides guidance related to major risks that impact the area and methods to address and mitigate those risks. The existing HMP was completed with coordination from all communities and school districts within the county.

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

The Osage County Multi Hazard Mitigation Plan Update has the following goals and objections:

Hazard Mitigation Goals	
Goal 1	General: To protect vulnerable populations and critical facilities from hazards.
Objectives	
1.	Minimize the loss of life and damage to property and infrastructure from natural and man-made disasters.
2.	Increase public awareness of risks from hazards and implement measures that can be taken to protect families and property from disasters.
3.	Reduce the risk and effects of hazards and minimize disruption in the county.
4.	Identify and protect vulnerable populations from natural man-made hazards.
5.	Identify and protect critical county and community facilities from hazards so that they can continue their missions in the event of a disaster.
Goal 2	Flood Hazard: To reduce the risk of flood hazard in Osage County
1.	Identify buildings at risk from the 100-years regulatory flood.
2.	Ensure that development does not increase flooding downstream or have off-site adverse impacts.
3.	Identify and maximize the natural and beneficial uses of the floodplain.
4.	Implement the best flood control measures to reduce vulnerability of flood-prone properties
Goal 3	Tornado Hazard: To reduce the risk from tornadoes in Osage County
1.	Encourage building of individual safe rooms and storm shelters.
2.	Educate and encourage the building trades industry about construction standards that are adequate to withstand frequent high winds.
Goal 4	Hailstorm Hazard: To reduce the risk from hailstorms in Osage County
1.	Promote construction of hail resistant roofs.
Goal 5	Lightning Hazard: To reduce the risk from lightning in Osage County
1.	Reduce loss of life and property, and injury due to lightning by increased public awareness of measures to prevent and reduce damage, including warnings.
Goal 6	Winter Storm Hazard: To reduce the hazards from winter storms in Osage County
1.	Reduce property loss and community disruption due to severe winter cold and ice storms.
Goal 7	High Winds Hazard: To reduce the risk from high winds in Osage County
1.	Educate and encourage the building trades industry about construction standards that are adequate to withstand frequent high winds.
Goal 8	Drought Hazard: Reduce the economic impact of drought hazards to Osage County
1.	Reduce damage to property and building foundations due to drought by improving building codes.
Goal 9	Wildfire Hazard: To reduce the threat of wildfire hazards and their financial impact in Osage County.
1.	Develop a County-wide fire response and support group to facilitate the provisioning of water to fires during large fires.
Goal 10	Expansive Soil Hazard: Reduce structure's susceptibility to soil movement.
1.	Reduce damage to property and building foundations due to expansive soils by improving

	building codes.
Goal 11	Earthquake Hazard: To reduce the risk from earthquakes in Osage County
1.	Educate and encourage the building trades industry about earthquake resistant construction.
Goal 12	Hazardous Materials Hazard: To reduce the risk from hazardous material storage facilities around Osage County.
1.	Protect the public from exposure from hazardous materials events from sites within the community.
Goal 13	Dam Break Hazard; To reduce the risk of a dam break in Osage County.
1.	Identify dams that could impact the county.
2.	Identify at risk areas.
Goal 14	Extreme Heat: To reduce the risk from extreme heat in Osage County
1.	Lessen injury and potential loss of life to citizens during periods of extreme heat through education.

The following are high priority mitigation measures defined by the Osage County, by each of the cities and towns, and by the school districts:

Osage County Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	County Emergency Management	Provide surge protection and uninterruptible power sources for electronic-reliant county facilities, such as the Sheriff Department, County Offices, and Emergency Operations Center
2	County Emergency Management	Develop a plan for Sheriff Department and Fire Department personnel to expand their knowledge and capabilities relative to hazardous materials and events, including meth labs. Also include public education on meth labs.
3	County Emergency Management	Obtain funding for the distribution of educational materials on the hazards of extreme heat to vulnerable populations.
4	County Emergency management	Upgrade the emergency communications network for fire, police, sheriff, 911, ambulance and other emergency operations.
5	County Emergency Management	Develop a public information campaign to promote the advantages of individual fire suppression equipment in residences, including fire extinguishers.
6	County Maintenance Department	Update County equipment and vehicles for combating ice storm damage/adverse conditions to public infrastructure.
7	County Emergency Management	Educate the public about adequate building systems for resistance to tornados and high winds.
8	County Emergency Management	Install window air conditions for elderly shut-ins for whom extreme heat can be a life threatening hazard.
9	County Emergency Management	Identify and plan for hazardous materials and incidents on major transportation routes throughout the county.

10	County Emergency Management	Hazard occurrence data collection.
11	County Emergency Management	Public information on mitigation.
12	County Administration	Window laminates.
13	County Emergency Management	Establish fire breaks in the wildfire urban interface.
14	County Emergency Management	Osage County website – provide information to county residents, particularly on hazards.

Town of Avant Mitigation Measures

Rank	Lead/Responsible Department	Mitigation Strategy
1	Town	Provide surge protection and backup power for the Water Treatment Facility, Wastewater Treatment Facility, and Town Hall.
2	Town	Install emergency warning sirens in town.
3	Town	Replace undersized water lines and add fire hydrants.
4	Town	Develop a contingency plan for responding to a massive power outage due to severe winter storms, ice and snow.
5	Town	Acquire snow removal equipment.

City of Barnsdall Mitigation Measures

Rank	Lead/Responsible Department	Mitigation Strategy
1	City Administration	Hazard occurrence data collection.
2	Public Works Department	Replace inadequately sized water lines with lines of sufficient size to provide proper fire protection, and develop a fire department response plan to all developed property within the city.
3	Fire Department	Supply NOAA Weather Radios to all local government buildings, schools, and critical facilities.
4	Police Department and Fire Department	Develop a plan for Barnsdall Police and Fire Department personnel to expand their knowledge and capabilities relative to hazardous materials and events, including meth labs.
5	Electric Department	Develop a contingency plan for responding to a massive power outage due to severe winter storms, ice and snow.
6	Fire Department	Identify and plan for hazardous materials and incidents on major transportation routes, including railroads, and insure Barnsdall Police and Fire personnel are up to date on their hazardous materials training.

Town of Burbank Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	Town Administration, Town Emergency Management	Construct a storm shelter in a central location for the community's residents.
2	Town Emergency Management, Town Fire Department	Replace the antique storm siren with an up to date siren or sirens.
3	Town Administration, Public Works Department	Supply NOAA Weather Radios to all local government buildings and critical facilities.
4	Town Fire Department, Town Emergency Management	Communication Equipment – Acquire radio communication equipment including hand held radios.

Town of Fairfax Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	Street Department	Purchase snow removal equipment including sand spreader and a snow blade (plow).
2	City Administration	Initiate a water conservation plan.
3	Police and Fire Departments	Provide safe rooms in the Police Department and the Fire Department Stations to protect the community's first responders.
4	Police Department and Public Works Authority	Provide surge protection and backup power for the Police Department and the Water Treatment Facility.

City of Hominy Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	City Emergency Management	Expand outdoor warning siren network.
2	Hominy Fire Department	Purchase Communication Equipment including pagers, hand-held radios and radio system upgrade.
3	Hominy Emergency Management	Install reverse 911 telephone system.
4	Hominy Emergency Management	Acquire mobile command center.

City of Pawhuska Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	Public Works Department	Repair dam at Lake Pawhuska.
2	Public Works Department	Acquire floodplain properties where acquisition is the most cost effective mitigation measure.
3	Electric Department	Develop a contingency plan for responding to a massive power outage due to severe winter storms, ice and snow.
4	Electric Department	Tree trimming needs around power lines to lessen the probability of tree branches causing power outages due to severe winter storms, ice and snow.
5	Fire Department	Teach City employees the symptoms of common, life-threatening emergencies, for instance, the symptoms of heat disorders, and how to give CPR and first aid.
6	Electric Department	Evaluate and update warning systems.
7	Fire Department	Supply NOAA Weather Radios to all local government buildings, schools and critical facilities.
8	Public Works Department	Update City equipment and vehicles for combating ice storm damage/adverse conditions to public infrastructure.
9	Fire Department	Make sure that fire extinguishers are strategically placed and serviced in all City facilities and vehicles.
10	Public Works Department	Replace inadequately sized water lines with lines of sufficient size to provide proper fire protection.
11	Police Department and Fire Department	Provide backup facilities, including a safe room, at the fire station for the emergency response personnel located at Pawhuska police station.
12	Police Department and Fire Department	Develop a plan for Pawhuska Police and Fire Department personnel to expand their knowledge and capabilities relative to hazardous materials and events, including meth labs.

Town of Prue Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	Town and School District	Provide Safe Rooms at the school
2	Public Service Company of Oklahoma and Verdigris Valley Electric	Bury overhead power lines and purchase back-up generators.
3	Town Public Works Authority and Town Fire Department	Replace undersized water lines.
4	Town	Information campaign on the hazards of Extreme Heat and Drought.

City of Shidler Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	City	Install window air conditioners for elderly shut-ins for whom extreme heat can be a life threatening hazard.
2	Police Department	Upgrade the emergency communications network for fire, police, 911, ambulance and other emergency operations.
3	Police Department and Fire Department	Develop a plan for Shidler Police and Fire Department personnel to expand their knowledge and capabilities relative to hazardous materials and events, including meth labs.
4	Fire Department	Supply NOAA Weather Radios to all local government buildings, schools and critical facilities.

Town of Wynona Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	Public Works Department, Fire Department	Update Town equipment and vehicles for combating ice storm damage/adverse conditions to public infrastructure.
2	Public Works, Town Administration, Fire and Police Departments	Emergency generators to restore power to Town's infrastructure and water wells.
3	Emergency Management Department	Replace antique storm siren with up to date sirens that can be heard throughout the Town.
4	Emergency Management Department	Place a storm shelter for First Responders, Utility Workers, Police and Fire Personnel
5	Town Administration, Emergency Management	Place a Storm Shelter in a centrally located place for the Town's citizens.

Anderson School District Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	Anderson School	Install a backup electrical power system, consisting of a natural gas generator and connection to current electrical system, at school to allow it to be used when total loss of power occurs in the district.
2	Anderson School	Equipment to clean-up, treat, or prevent winter storms from damaging facilities, roadways, parking lots and sidewalks.
3	Anderson School	Install 2-way radios on school buses.

Barnsdall Independent School District Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	Barnsdall Public School	Install outdoor Warning System for playgrounds, bus loading areas, athletic fields and other areas of campus.
2	Barnsdall Public School	Install school safe room.
3	Barnsdall Public School	Install Retro-Fit Metal Roof on Jr./Sr. High School Buildings.

Hominy Independent School District Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	Hominy Schools	Install 2-way radios on school buses.
2	Hominy Schools	Install a new Safe Room in the elementary school that can be used by the community and also serve as the cafeteria.
3	Hominy Schools	Acquire new communication equipment including pagers, hand-held radios and radio system upgrade.
4	Hominy Schools	Train school personnel in the proper procedures for dealing with emergency situations.

McCord School District Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	McCord Public Schools	Secure School Project – install safety doors, metal walls, cameras, and door scanners.
2	McCord Public Schools	Snow/Ice Removal Equipment – Install electric snow/ice melt carpets; snow/ice box blades; and obtain snow blower.
3	McCord Public Schools	Bio Hazard Prevention – Acquire two chemical suits and cleaners/decontaminations, neutral, disinfectant, stabilizing agents.

4	McCord Public Schools	Install surge protection equipment and uninterruptable power sources for electronic reliant school facilities. 5
5	McCord Public Schools	Install 2 large capacity safe rooms/storm shelters for the residential neighborhood and the school campus.
6	McCord Public Schools	Install sidewalks around the school that are above the flood area.
7	McCord Public Schools	Install a retro fit metal roof on the office and cafeteria buildings.
8	McCord Public Schools	Educate students, parents, and staff with written information, handouts, and pamphlets on hazardous materials.

Osage Hills Elementary School District Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	Osage Hills School	Install retro fit metal roof.
2	Osage Hills School	Install a large capacity safe room/storm shelter on the school grounds.
3	Osage Hills School	Acquire equipment to clean-up, treat, or prevent severe winter storms from damaging facilities, roadway, parking lots, and sidewalks.
4	Osage Hills School	Install outdoor sirens and intercom/early warning system.
5	Osage Hills School/Osage County/Local Fire Department	Secure a reliable water supply (hydrant, storage tank) for volunteer fire departments.

Pawhuska Independent School District Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	Pawhuska Schools Administration	Install a large capacity safe room within each school building.
2	Pawhuska Schools Administration	Upgrade surge protection and uninterruptable power sources for electronic reliant school facilities.
3	Pawhuska Schools	Install emergency warning system for playgrounds, bus loading areas, athletic fields and other areas of campus.
4	Pawhuska Schools	Acquire equipment to clean-up, treat, or prevent severe winter storms from damaging facilities, roadways, parking lots, and sidewalks.

Prue Independent School District Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	Prue Schools Administration	Upgrade the surge protection and uninterruptable power sources for the electronic reliant school facilities.
2	Prue Schools Administration	Install Safe Rooms in schools.

Woodland School District Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	Woodland Schools	Upgrade intercom system at the district's school buildings.
2	Woodland Schools	Install breakage resistant windows.
3	Woodland Schools	Install lightning rods and surge protectors at school buildings.
4	Woodland Schools	Install 2-way radios on school buses.
5	Woodland Schools	Install storm shelters at all school buildings
6	Woodland Schools	Purchase snow removal equipment

Wynona Independent School District Mitigation Measures		
Rank	Lead/Responsible Department	Mitigation Strategy
1	School Administration	Provide equipment and vehicles for combating ice storm damage/adverse conditions to public infrastructure.
2	School Administration	Place a storm shelter at the school for faculty and student use.
3	School Administration	Emergency generators to restore power to school and water wells.

Dam Failure Risks

Historical Context: There are 11 dams in Osage County that have a hazard category rating of "high" or "significant". Osage County has not experienced flooding due to a dam failure from 1950 to 2010.

Mitigation Strategy / Recommendations from HMP:

No mitigation measures provided for dam failure risks.

Drought

Historical Context: Six major drought events have occurred in Oklahoma over the past 50 years. Osage County has experienced **9 drought** events times from 1950 through 2010. Information regarding losses of property or crop damage is not available.

Mitigation Strategy / Recommendations from HMP: Need to ensure adequate long-term water resources for Osage County. Lack of water is damaging to livestock and crops.

Earthquake

Historical Context: According to the National Climatic Data Center (NCDC), there have been no earthquake events in Osage County from 1950 to 2010.

Mitigation Strategy / Recommendations from HMP: Osage County does not consider earthquakes to be a significant threat.

Expansive Soils

Historical Context: Specific data is not available for Osage County regarding damage due to expansive soils damage to structures due to expansive soils.

Mitigation Strategy / Recommendations from HMP: No Mitigation measures were provided for expansive soils.

Extreme Heat

Historical Context: According to the National Climatic Data Center, from 1950 to 2010, Osage County experienced **9 Extreme Heat** events. No structural damage was recorded for the heat hazard for the county, **but 5 deaths resulted.**

Mitigation Strategy / Recommendations from HMP: Install window air conditions for elderly shut-ins for whom extreme heat can be a life threatening hazard.

Flood

Historical Context: Flooding can be connected to development being permitted too close to stream, rivers and floodplains. Flooding can also have devastating impacts to property owners without flood insurance. Osage County has experienced **71 Flood** events from 1950 through 2010 resulting in \$992,000 in damage.

Mitigation Strategy / Recommendations from HMP: Implement the best flood control measures to reduce vulnerability of flood-prone properties.

Hail

Historical Context: Osage County has reported **524 Hail Events** from 1950 through 2010, with \$423,000 in reported damage.

Mitigation Strategy / Recommendations from HMP:
Install Retro-Fit Metal Roof on public buildings to limit hail damage.

Hazardous Materials

Historical Context: The City of Pawhuska Fire Department responded to 17 hazardous material incidents from 2008 to 2010. Several Osage County Fire Departments have developed Hazardous Materials Standard Operating Guides to provide personnel with guidance and assistance in determining incident levels for response to hazardous materials incidents.

High winds

Historical Context: Osage County has experienced **441 High Wind** events from 1950 through 2010 resulting in \$996,000 in property damage.

Mitigation Strategy / Recommendations from HMP:

Educate and encourage the building trades industry about construction standards that are adequate to withstand frequent high winds.

Lightning

Historical Context According to the NCDC, Osage County has not reported any lightning strikes during the 61-year period from 1950 through 2010. With frequent wind and thunderstorm activity, it is certain that lightning strikes occurred but were just not reported.

Mitigation Strategy / Recommendations from HMP:

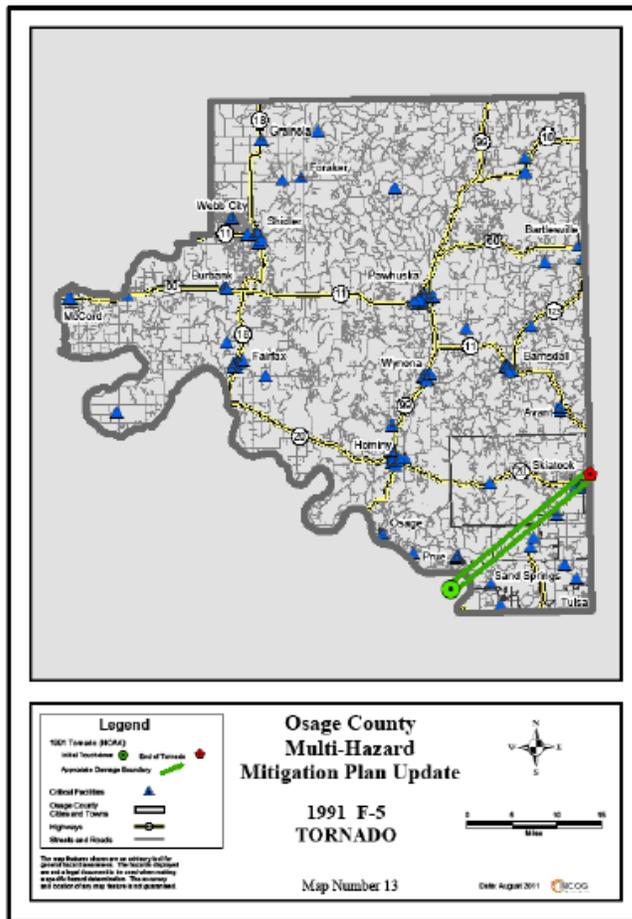
Reduce loss of life and property, and injury due to lightning by increased public awareness of measures to prevent and reduce damage, including warnings.

Tornado

Historical Context: Osage County was hit by an F-5 tornado in 1991 in the southeastern corner of the county. The length of the tornado was approximately 21 miles, its width of impact was reported at 2,550 feet. Overall, Osage County has experienced **73 Tornado** events from 1950 through 2010 resulting in \$32,800,000 in property damage.

Mitigation Strategy / Recommendations from HMP:

Educate the public about adequate building systems for resistance to tornados and high winds.



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

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

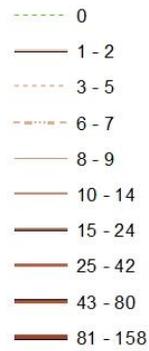
Historic data on tornadoes between 1950-2014 there are 96 tornadoes documented. There were 334 injuries that occurred connected to these tornadoes, with 24 of those injuries happening in the 1991 tornado and 150 injuries occurring in the 1974 tornado. There were 16 fatalities connected to tornadoes during this time period, 14 of which occurred in 1974. Property losses between 1950-1996 ranged from \$11,916,553.00 to \$119,165,650.00. (The accounting methods used for losses changed in 1996.) The losses estimated between 1996-2014 was \$2,680,000.00.

Social Vulnerability - Impacts on Housing & Disaster Resiliency

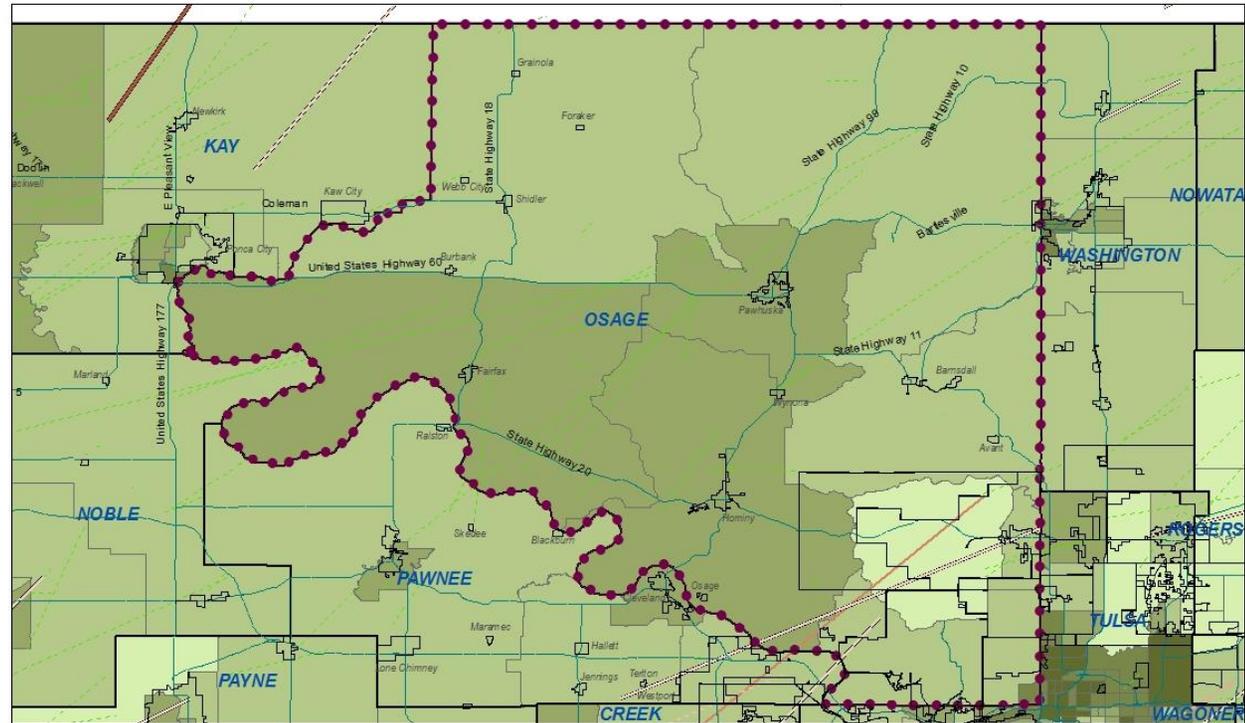
Tornado Events 1950 - 2014

Osage County

of fatalities associated with event



Social Vulnerability Index



19XX or 20XX Year of Event

Oklahoma Municipal Boundaries

Selected County Boundary

COUNTY NAME

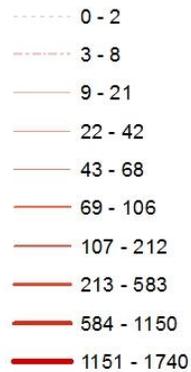
Sources: Shannon Van Zandt, Texas A&M, Hazard Planning materials, and 2009-2013 American Community Survey, Tables B11003, B01001, B17001, B08301, B25044, B25001, B25042, B02001, B03002, B26001, B25036, B17001, B25043, S1501, B23025 & B06007

Social Vulnerability - Impacts on Housing & Disaster Resiliency

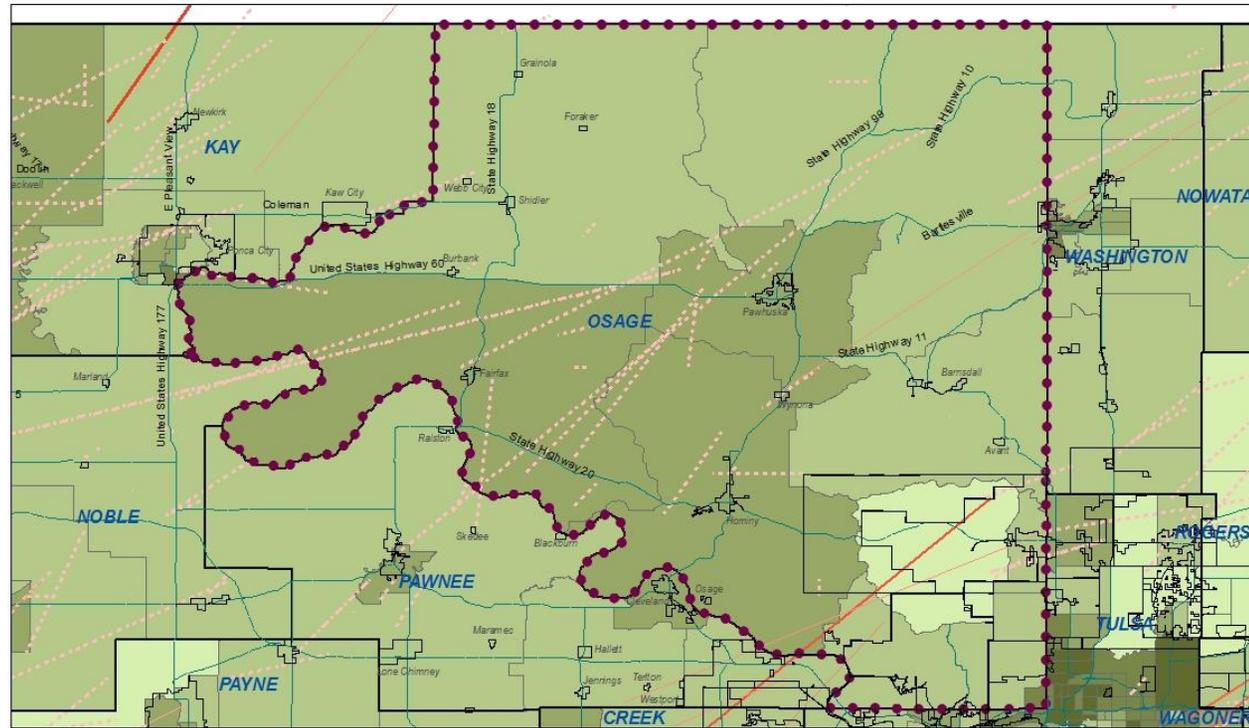
Tornado Events 1950 - 2014

Osage County

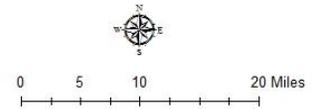
of injuries associated with event



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 - Impacts on Housing & Disaster Resiliency

Tornado Events 1950 - 2014
Osage County

Tornado prior to 1996
\$ losses associated with event

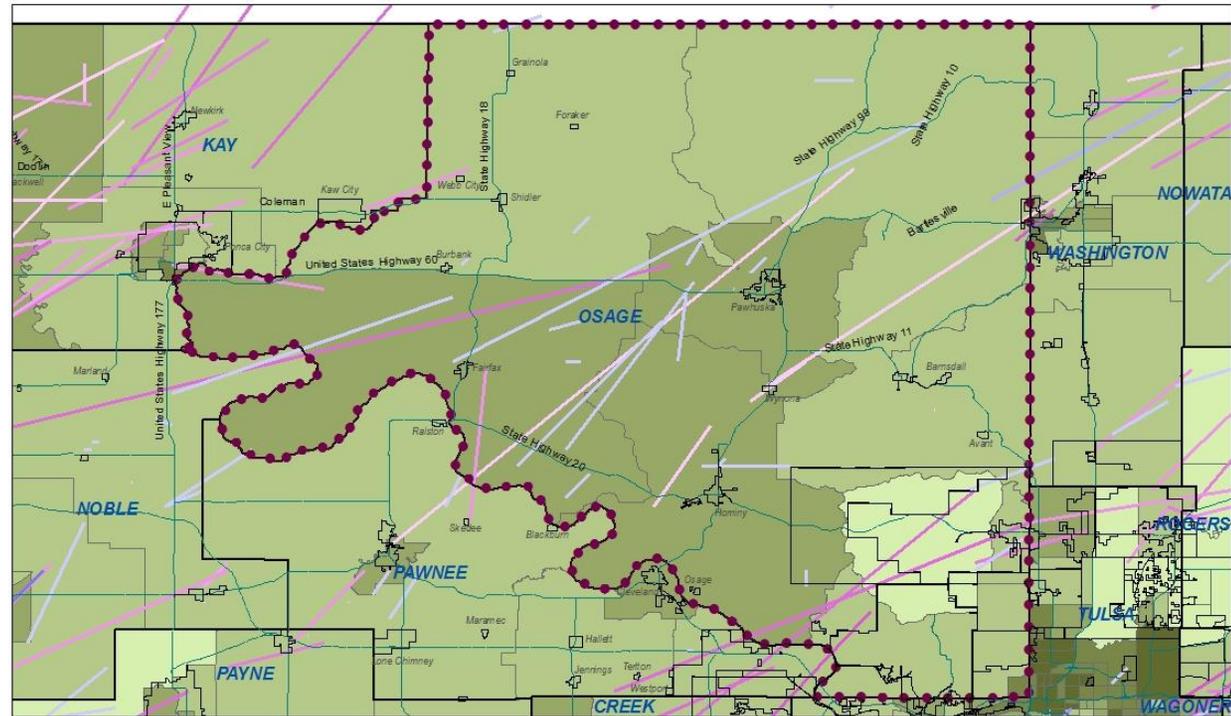
- >\$50
- \$50-\$500
- \$500-\$5,000
- \$5,000-\$50,000
- \$50,000-\$500,000
- \$500,000-\$5,000,000
- \$5,000,000-\$50,000,000
- \$50,000,000

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

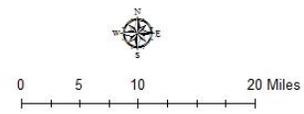
- 0.00 - 0.91
- 0.92 - 3.20
- 3.21 - 8.50
- 8.51 - 13.11
- 13.12 - 125.34
- 125.35 - 370.00
- 370.01 - 1000.00
- 1000.01 - 2800.10

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
 Oklahoma Municipal Boundaries
 Selected County Boundary
 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, B20201, B03002, B26001, B25036, B17001, B25043, S1501, B23025 & B06007

Wildfires

Historical Context: The City of Pawhuska, alone, responded to 53 grass fire events from 2008 to 2010. Between 2004 and 2008, the Bartlesville Fire Department made a total of **435 runs** related to grass and crop fires that caused **\$15,351 in damage**. In 2008, Osage County fire agencies made 199 wildland fire runs with a reported 10,727 acres affected.

Mitigation Strategy / Recommendations from HMP:

Establish fire breaks in the wildfire urban interface.

Winter Storms

Historical Context: According to the NCDC, Osage County has experienced **35 Winter Storm** events from 1950 through 2010 resulting in \$51,500,000 in property damage.

Mitigation Strategy / Recommendations from HMP:

Develop a contingency plan for responding to a massive power outage due to severe winter storms, ice and snow.

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

Most jurisdictions have elected to not have public shelters in order to discourage people from leaving safe places and ultimately be caught on the road trying to reach a public shelter. Mitigation measures included in the HMP include installing safe rooms/storm shelters in schools and other public facilities.

Osage County has a storm shelter registration program. Residents can e-mail the following address to register their shelters:

osagecountystormshelters@gmail.com

C.2.1.3 Public Policy and Governance to Build Disaster Resiliency

Osage County has adopted and uses the 2000 International Building Codes published by BOCA. The county has numerous fire departments with various ISO fire ratings. Fire Department ISO ratings are set within the Hazard Mitigation Plan.

Osage County Hazard Mitigation Planning Team includes representation by all cities, towns and school districts within the county.

C.2.1.4 Local Emergency Response Agency Structure

The Osage County Emergency Operation Plan was used as a reference in preparing the HMP.

Warning systems may be activated from any level of government by agencies having responsibility to notify the public of imminent danger. At the local level, these warnings are channeled through the Emergency Management Director in order to assign responsibility and ensure control of the warning process.

C.2.1.5 Threat & Hazard Warning Systems

Town of Avant – needs outdoor siren and was included as goal item within the HMP.

Town of Burbank – plans to upgrade their sirens per the HMP.

City of Hominy – plans to extend their outdoor sirens to cover the City Lake area better.

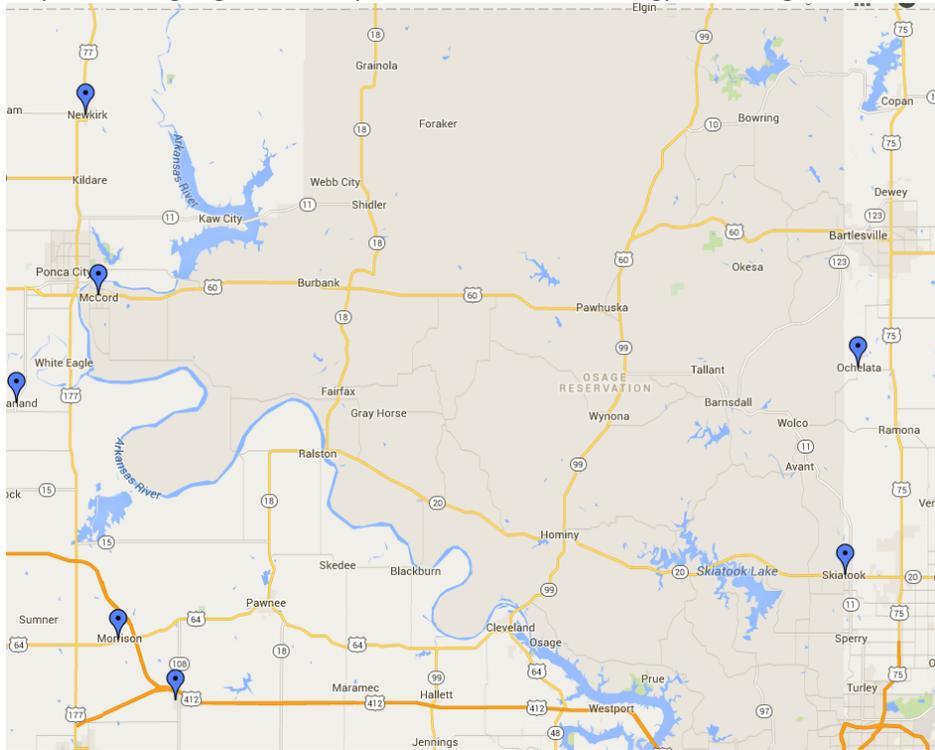
Pawhuska has determined a need for five additional sirens per the HMP.

Wynona – plans to upgrade their sirens per the HMP

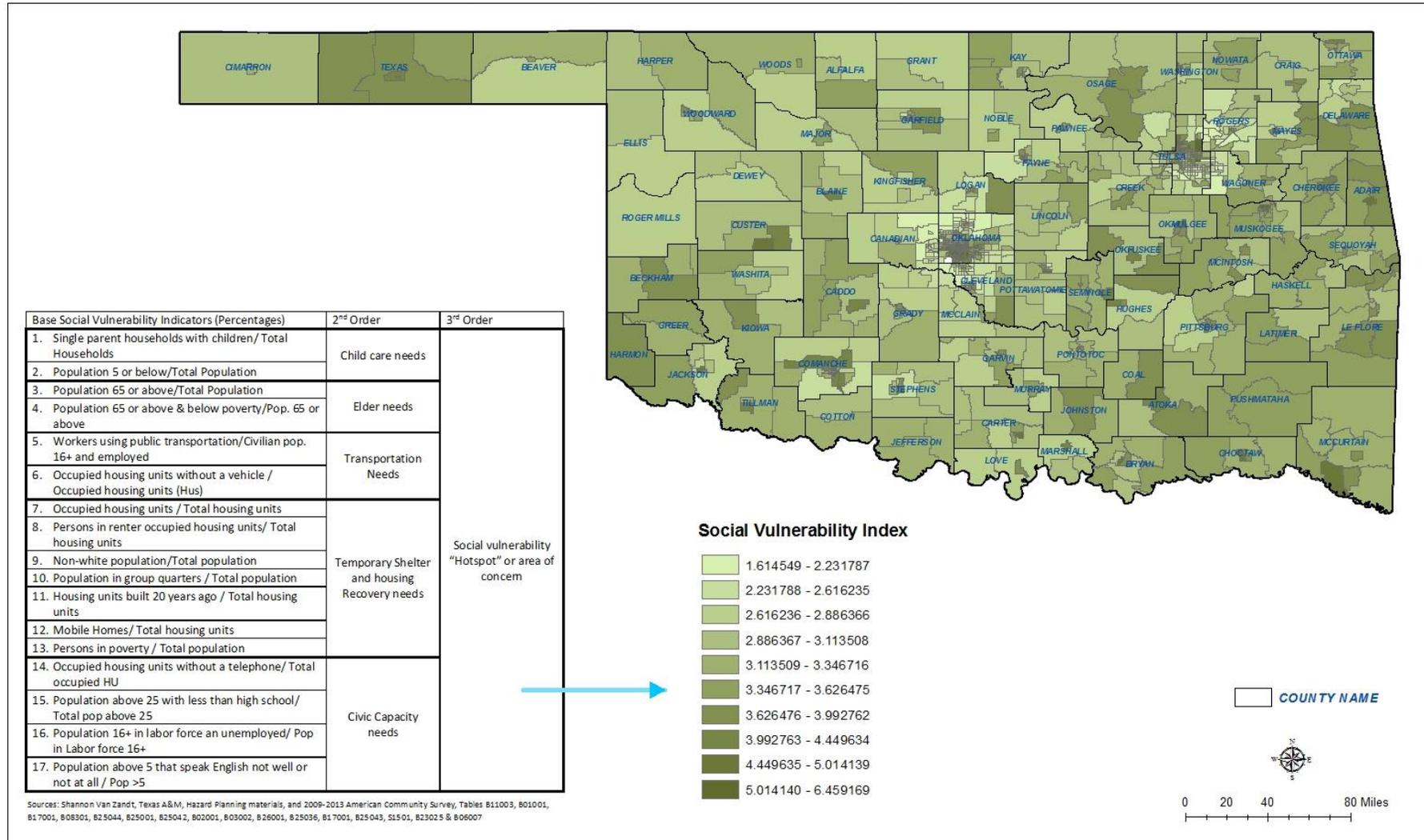
Osage Hills Elementary School District – plans to upgrade their Outdoor Sirens and Intercom System.

Google Mapped sirens in Oklahoma:

<https://www.google.com/maps/d/u/0/viewer?mid=zkgp3PmLxLzg.kXQeGF45FpQg&hl=en>



Social Vulnerability - Impacts on Housing & Disaster Resiliency



Social Vulnerability - Impacts on Housing & Disaster Resiliency

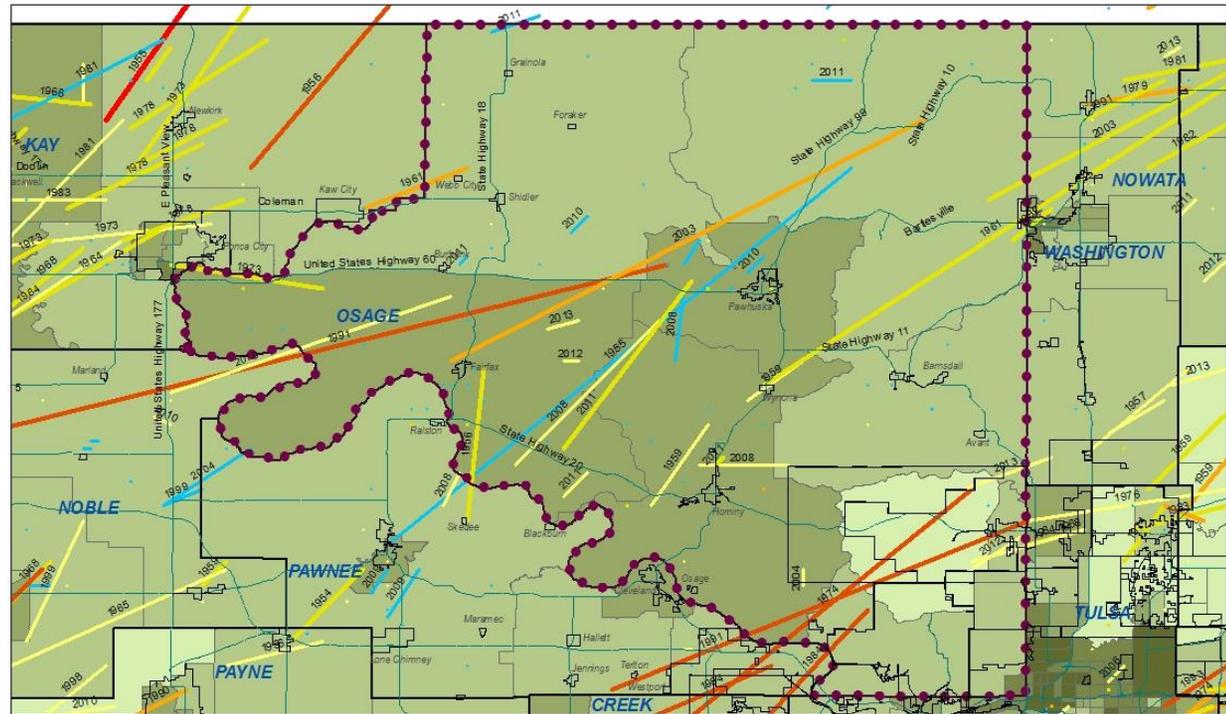
Tornado Events 1950 - 2014

Osage County

Tornado Magnitude



Social Vulnerability Index



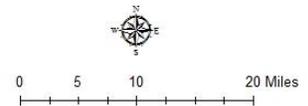
19XX or 20XX Year of Event

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. Looking at the census tract level, the western portion of the county, including Pawhuska, has elevated social vulnerability and thus additional efforts to provide assistance for preparation prior to an event, during an event and for recovery may be needed.

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.

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 - Osage County

Base Social Vulnerability Indicators (%)		2nd Order	3rd Order
1.) Single Parent Households	12.58%	0.184	3.252 Social Vulnerability 'Hotspot' or Area of Concern
2.) Population Under 5	5.79%	(Child Care Needs)	
3.) Population 65 or Above	16.47%	0.276	
4.) Population 65 or Above & Below Poverty Rate	11.11%	(Elder Needs)	
5.) Workers Using Public Transportation	0.41%	0.056	
6.) Occupied Housing Units w/o Vehicle	5.19%	(Transportation Needs)	
7.) Housing Unit Occupancy Rate	87.53%	2.514 (Temporary Shelter and Housing Recovery Needs)	
8.) Rental Occupancy Rate	21.04%		
9.) Non-White Population	35.52%		
10.) Population in Group Quarters	3.22%		
11.) Housing Units Built Prior to 1990	73.21%		
12.) Mobile Homes, RVs, Vans, etc.	16.36%		
13.) Poverty Rate	14.49%	0.223 (Civic Capacity Needs)	
14.) Housing Units Lacking Telephones	2.11%		
15.) Age 25+ With Less Than High School Diploma	12.40%		
16.) Unemployment Rate	6.81%		
17.) Age 5+ Which Cannot Speak English Well or Not At All	0.94%		

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