

HAZARD MITIGATION PLAN

MEADE COUNTY, SOUTH DAKOTA



Hazard Mitigation Plan for Meade County, South Dakota

MULTI-JURISDICTIONAL PLAN

Meade County
City of Piedmont
City of Sturgis
City of Faith
City of Summerset

APPROVED:

INSERT DATE

PREPARED BY:

Meade County Department of Emergency Management

TECHNICAL ASSISTANCE PROVIDED BY:

Black Hills Council of Local Governments

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Figure 1: Meade County road closure following October 2013 flooding with view of Bear Butte

executive summary

The *Hazard Mitigation Plan for Meade County, South Dakota* is an update of the 2009 *Meade County Pre-Disaster Mitigation Plan*. The purpose of this Mitigation Plan update is to ensure that Meade County's strategies to reduce risks to people and property from hazard events are relevant and effective. This plan is a major revision of the 2009 plan and is in compliance with the Federal Emergency Management Agency's (FEMA) latest Local Mitigation Planning Guidance and the requirements of the Disaster Mitigation Act of 2000. Through the development and adoption of this plan, Meade County, Faith, Summerset, Piedmont, and Sturgis are eligible for FEMA Hazard Mitigation Grant Programs.

Section 1: Introduction outlines the purpose and scope of the planning process. The *Hazard Mitigation Plan for Meade County* is a multi-jurisdictional plan that includes all unincorporated areas of the county as well as the cities of Piedmont, Summerset, Faith, and Sturgis. The purpose of the plan is to help Meade County anticipate, withstand, and recover from hazards and in turn, reduce the risks to life and property associated with hazard events. The scope of the planning process was two-fold: to revise the 2009 plan in order to create a user-friendly document that addresses the current needs of the county, while at the same time meeting the requirements of the Disaster Mitigation Act of 2000.

Section 2: Planning Process discusses the process that was used to develop the plan. All signing jurisdictions participated in the development of the plan through representation on the Hazard Mitigation Planning Team. Throughout the planning process, all meetings were open to the public. In addition, a public event was held to allow residents and other stakeholders to provide input into the plan.

Section 3: Risk Assessment identifies and profiles the hazard events that threaten Meade County. This section provides a discussion of local assets, an analysis of hazard events that have occurred since the 2009 plan was adopted, describes the county's progress toward meeting the mitigation goals that were established in the in the 2009 plan, and assesses each individual community's vulnerabilities.

Section 4: Mitigation Strategies details the mitigations goals, objectives, and action items that were developed through the plan update process. Three overall goals were established during the planning process: *Protect People and Property*; *Improve Public Awareness*; and, *Strengthen Partnerships*.

Section 5: Action Plan & Implementation sets forth the Hazard Mitigation Plan implementation process and establishes roles and responsibilities related to the update and maintenance of the plan.

Section 6: Plan Adoption provides evidence of the formal adoption of the plan by Meade County and the signing jurisdictions.

The *Hazard Mitigation Plan for Meade County* was developed by the Meade County Emergency Management Department with the technical assistance of Black Hills Council of Local Governments.

section one: introduction

Meade County is vulnerable to natural and manmade disasters that have the potential to impact the county's infrastructure, the welfare of its residents, and the economy. Past disasters have inflicted costly damages upon Meade County. While these disasters cannot be eliminated, with mitigation planning, the response and recovery from these events can be improved and adverse impacts to individuals, businesses, and communities can be reduced. Hazard mitigation is the effort to make communities more resilient, and better able to anticipate, withstand, and recover from hazard events.

In order to be eligible for FEMA's Hazard Mitigation Assistance (HMA) grant programs, the Disaster Mitigation Act of 2000 (DMA 2000) requires that local governments have a FEMA-approved mitigation plan in place. In these mitigation plans, local jurisdictions must demonstrate that proposed mitigation projects have a basis in a solid planning process where the unique risks and capabilities of each community are assessed. Mitigation plans must be updated every five years to demonstrate that progress has been made toward meeting the community's mitigation goals and to ensure that the plan continues to be an effective mitigation tool that meets the needs of the community.

The *Hazard Mitigation Plan for Meade County* is a major update of the 2009 Pre-Disaster Mitigation Plan. This document details the planning process that was used to update the plan, considers changes in the built environment and population of the county since 2009, examines the community's progress toward meeting the mitigation goals set in the previous plan, re-evaluates hazard threats, and establishes new mitigation goals that will lead to a more resilient Meade County.

The *Hazard Mitigation Plan for Meade County* is a multi-jurisdictional plan that includes the unincorporated areas of Meade County and the cities of Piedmont, Faith, Summerset, and Sturgis. The plan provides goals, objectives, and mitigation activities developed by the Mitigation Planning Team that will guide the county's disaster mitigation efforts over the next five years.



Figure 2: October 2013 winter storm cattle fatalities



Figure 3: Sturgis EMS Week Event 2015

section two: planning process

A diverse group of emergency management professionals, local officials, and citizens participated in the hazard mitigation planning process. In June 2014, the Meade County Emergency Management Director invited community members and local and regional agency representatives to be part of the Mitigation Planning Team. In addition, a request was made to each participating jurisdiction to appoint a *specific* person to represent their jurisdiction on the planning team.

JURISDICTIONAL REPRESENTATIVES

MEADE COUNTY

Angella Sutton, Meade County Director of Emergency Management

STURGIS

Dave Smith, City of Sturgis Code Enforcement

SUMMERSET

Don Allen, City of Summerset Police Chief

PIEDMONT

William Paris, City of Piedmont Trustee

FAITH

Debbie Brown, Faith Finance Officer/Matthew Van Der Linden, Faith Police Chief

The initial Mitigation Planning Team meeting was held on July 10, 2014. At this meeting, the group discussed the purpose of the plan update, the planning process, elements of the plan, the timeline for completion, and the responsibilities of the Mitigation Planning Team.

The second planning team meeting was held on October 15, 2014. At this meeting group discussions focused on the history of hazard events in the county, changes in housing and population characteristics, and critical facilities. In addition, the group was asked to identify mitigation activities that have been accomplished since the previous plan was adopted, as well as opportunities to strengthen the mitigation capacity of the county.

The third planning team meeting was held on April 9, 2015. At this meeting, the group drafted mitigation activities for the county and participating municipalities.

On May 18, 2015, the Meade County Emergency Management Director participated in the Sturgis Ambulance and Fire District EMS Week Event to inform the public of the planning process and receive community input regarding hazard risks and mitigation strategies. The event provided the opportunities to gather preliminary feedback from the public on proposed mitigation activities.

On May 26, 2015, the Meade County Emergency Management Director held a meeting in Faith with local leadership and emergency management personnel in order to gather information and draft mitigation activities for their town.

A draft of the Meade County Hazard Mitigation Plan was sent out to the planning team for review in February 2016. In March 2016, the draft plan was sent to all that had participated in the planning meetings. The final planning team meeting to review the plan was held on April 21, 2016. On June 9, 2016 the plan was made available for public review and comment on the Meade County website and also publicized on the Meade County Facebook page and the County's Twitter feed. The plan was reviewed and approved to be submitted to FEMA by each signing jurisdiction in June and July 2016. The plan was also emailed to the Emergency Managers in each adjacent county in August 2016 for review.

HAZARD MITIGATION PLANNING TEAM REPRESENTATIVE ORGANIZATIONS	
Meade County Emergency Management	Faith Volunteer Fire Department
Meade County Highway	South Dakota Highway Patrol
Meade County Sherriff	Sturgis Ambulance
City of Sturgis	Sturgis Fire Department
City of Piedmont	Sturgis Regional Hospital
City of Faith	Sturgis Police Department
City of Summerset	South Dakota Wildland Fire Division
Faith Ambulance Service	South Dakota Office of Emergency Management
South Dakota Department of Transportation	American Red Cross

COORDINATION WITH OTHER PLANS

During the plan update process, existing planning documents were referenced to ensure that new plan goals align with other established plans and processes within the county. With the exception of the City of Faith, each participating jurisdiction has adopted its own comprehensive plan, which was reviewed and is discussed below. In addition, the current *State of South Dakota Hazard Mitigation Plan* provided a foundation to assess hazard vulnerability for Meade County.

The *Meade County Comprehensive Plan* was adopted in 2010. The plan outlines land use goals and policies. The plan does highlight a number of wildland fire mitigation goals related to requiring defensible space and requirements for water systems to accommodate firefighting requirements. In addition, the plan calls for preventing development in floodplain areas.

Sturgis 2030: A Comprehensive Plan was adopted in 2010. The plan sets goals and specific objectives around the city's physical development.

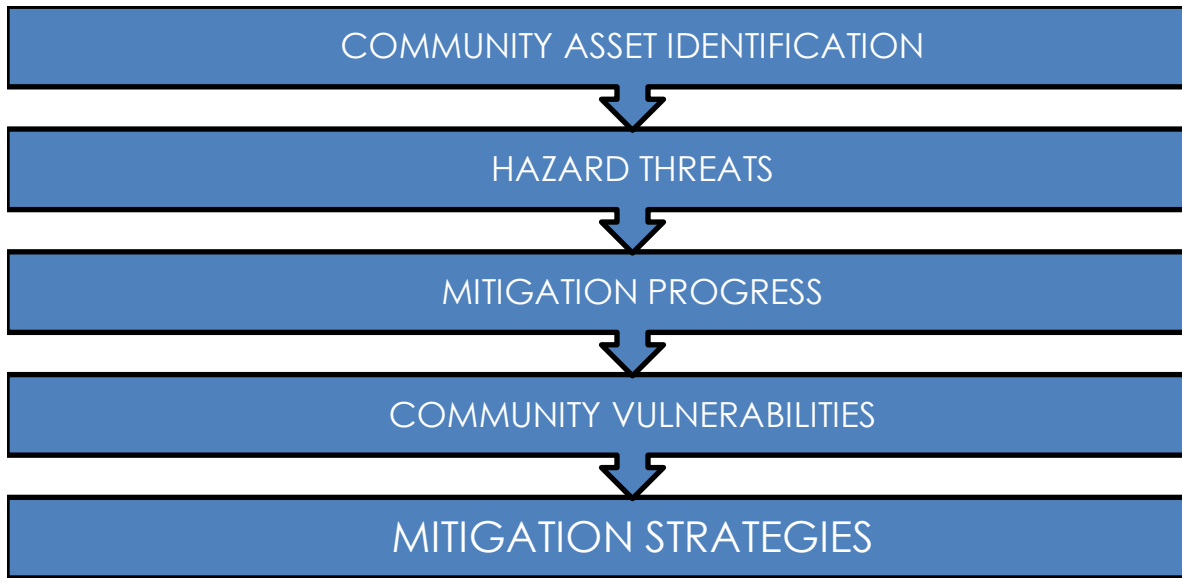
The *City of Summerset Comprehensive Plan, 2028* was adopted in 2008. Due to the rapid growth that the city has experienced, Summerset is currently in the process of updating the plan; a process that will take place through the summer of 2016. The existing plan focuses around the areas of community character, land use, public works, parks and recreation, and community facilities.

The *City of Piedmont Comprehensive Plan* was adopted in 2012. The City was incorporated in 2007 and developed the comprehensive plan in order to ensure orderly development as the city grows. The plan establishes goal statements under three headings: *People & the Economy; Land Use & Housing; and, Transportation & Infrastructure.*

The *Meade County Emergency Operations Plan* was last revised in 2010. The plan provides guidance to agencies responding to an emergency or disaster when it exceeds a municipality's capability. The plan establishes the policies, concept of operations, organizational structure, and the specific responsibilities of agencies in their response to events.

The *Meade County Hazardous Materials Plan* was last updated in 1997. The plan identifies facilities and transportation routes where hazardous materials are present and provides specific procedures and guidelines for response to actual incidents involving hazardous materials.

Community Wildfire Mitigation Plan for Meade County was completed in 2005. The plan discusses the fire history, previous mitigation projects, risk areas, assets, as well as guidelines for a hazardous fuels reduction program.



section three: risk assessment

A step-by-step approach was utilized to identify potential hazard risks for Meade County. Hazard risk is influenced by a community's assets—things like population and development characteristics, public facilities and infrastructure, the natural environment, and the local economy—and how those assets relate to hazard threats.¹ This section will describe Meade County's assets, profile hazards, detail progress that has been made on previous mitigation goals, and analyze specific vulnerabilities for each participating jurisdiction.

Numerous resources were used to complete this risk assessment for Meade County. The State of South Dakota Hazard Mitigation Plan was a major source of information on potential hazard risks. In addition, hazard histories were obtained from a number of sources, including the National Climatic Data Center, National Weather Service, Department of Agriculture-Division of Wildland Fire Suppression, and the United States Geological Survey. Finally, through the Sturgis EMS Week Event, the community was able to relate their perspectives on hazard impacts and their perception of the risks for Meade County.

The Mitigation Planning Team—along with other resources, like Meade County's Planning Department and the United States Census Bureau—helped identify and describe Meade County's assets.

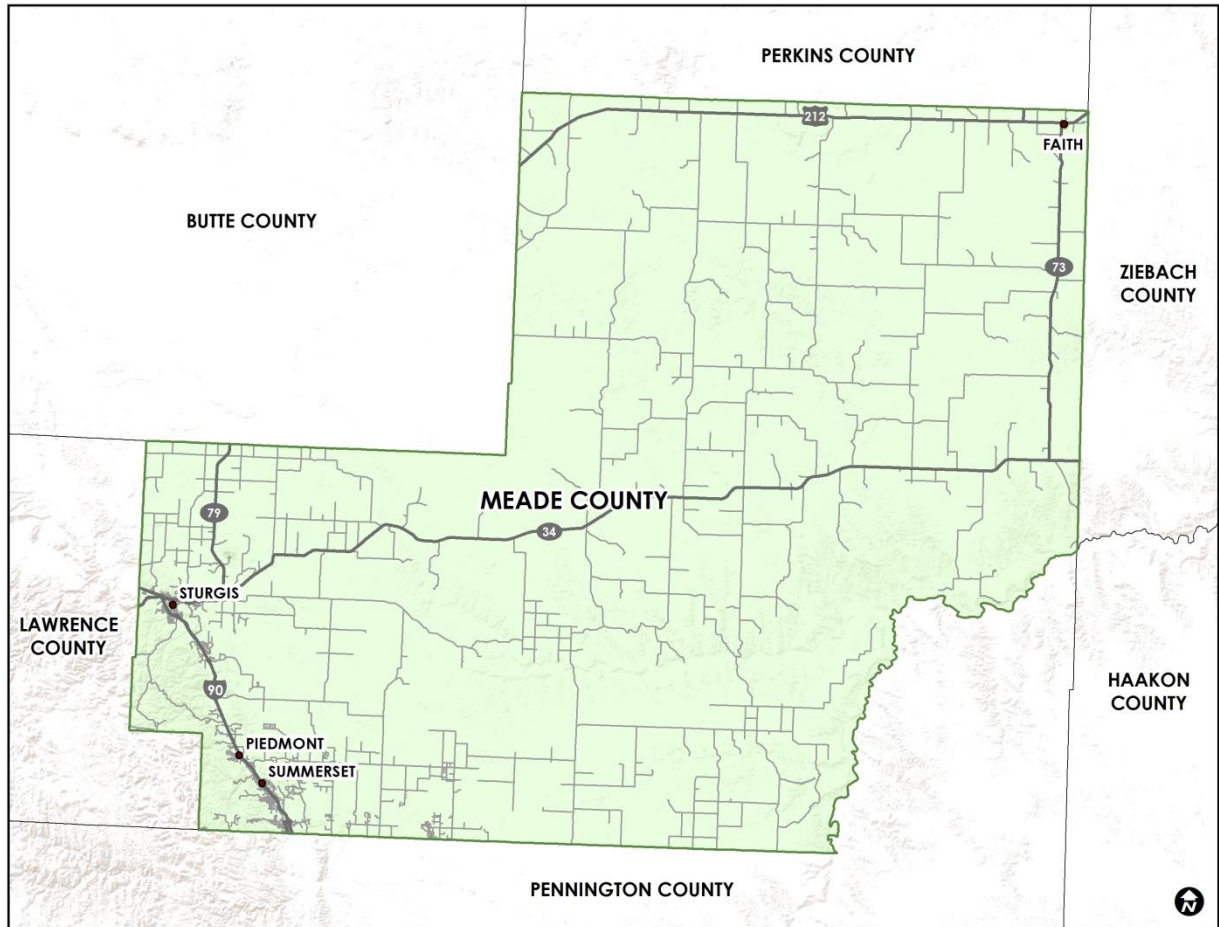


Figure 4: Meade County, SD

COMMUNITY ASSETS

Meade County is located in western South Dakota. It is the largest county in South Dakota in terms of land area. The county covers 3,470 square miles and has a population density of 7.3 people per square mile.² Meade County is bordered by Butte, Perkins, Ziebach, Haakon, Pennington, and Lawrence Counties.

The county has four incorporated cities—Sturgis, Summerset, Faith, and Piedmont. A portion of the city of Box Elder lies within Meade County’s boundaries; however, Box Elder participated in, and is covered under Pennington County’s Mitigation Plan.

PEOPLE

Recent population estimates reveal that Meade County is the eighth fastest-growing county in the nation.³ The county's population grew by 5.9 percent from 2010 to 2014, adding 1,517 residents, for a total estimated population of 26,951 people.⁴ The majority of the population growth in the county is occurring along the Interstate 90 corridor, focused in and around Piedmont, Summerset, and the unincorporated community of Black Hawk.⁵ *Figure 5* illustrates the population concentrations within Meade County.

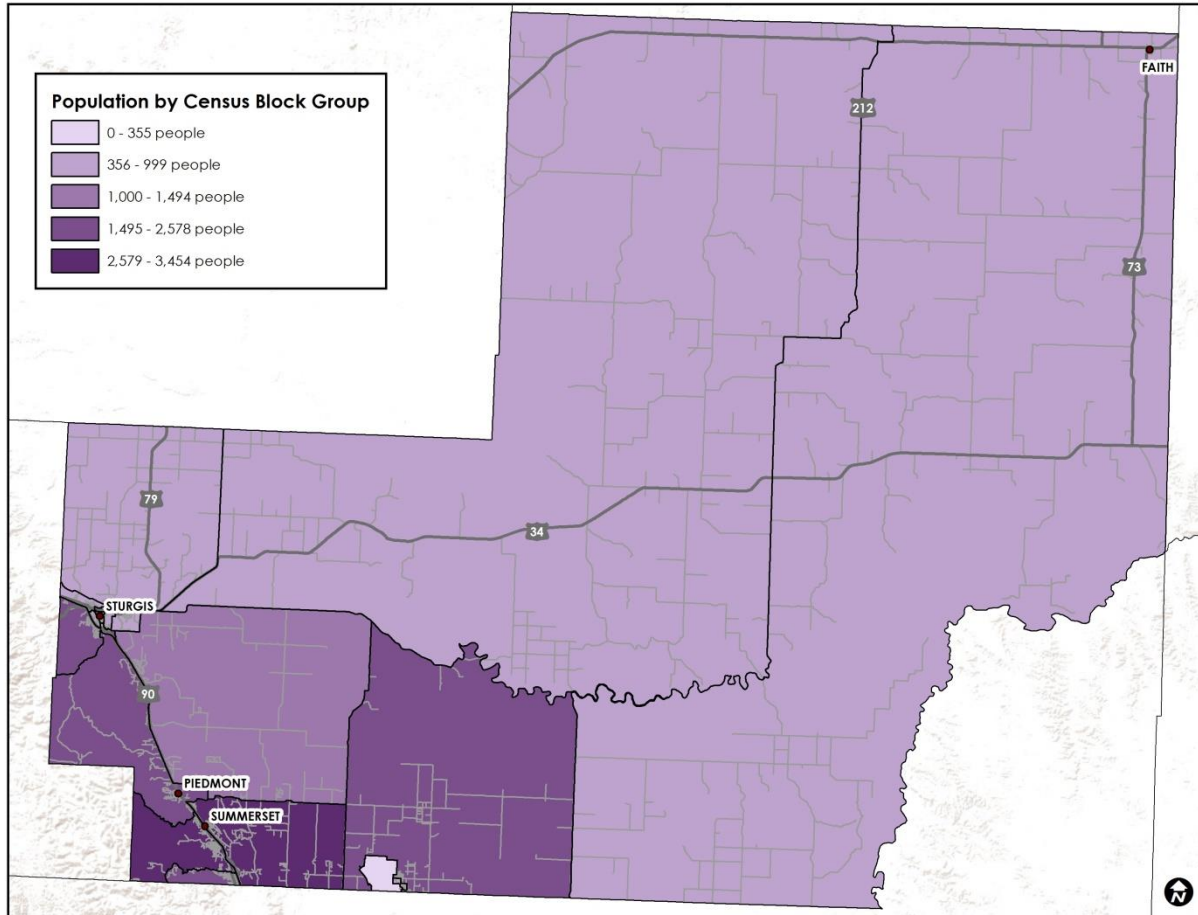


Figure 5: Meade County Population Density Map/ Source: 2010 US Census

Figure 6 provides insight into potential vulnerable populations within Meade County— young children and the elderly. In Meade County, almost 20 percent of the population fits into one of these two age groups.

There is a large elderly population in the eastern part of the county and in and around Sturgis. A major discussion point during the Mitigation Planning Team meetings was the elderly population in rural

areas, and more specifically, the issues with access to medical equipment, like oxygen, during disaster events. This was a significant problem during the October 2013 blizzard when oxygen supplies had to be delivered to remote areas of the county.

	PERCENT UNDER 5 YEARS OLD	PERCENT 65 YEARS OLD AND OVER
South Dakota	7.1%	14.5%
Meade County	7.4%	12.5%
Sturgis	7.1%	18.7%
Faith	6%	16.6%
Summerset	12.8%	6.9%
Piedmont	9.1%	6.7%

Figure 6: US Census Bureau, 2009-2013 American Community Survey 5-Year Estimates

Figure 7 identifies the locations of vulnerable population groups within Meade County: schools, daycares, nursing homes, assisted living facilities, and hospitals. The Piedmont and Summerset areas have a concentration of facilities that serve children. The Sturgis area has Sturgis Regional Hospital and the Veterans Affairs Black Hills Health Care System facilities. Faith has an assisted living facility and a medical clinic.

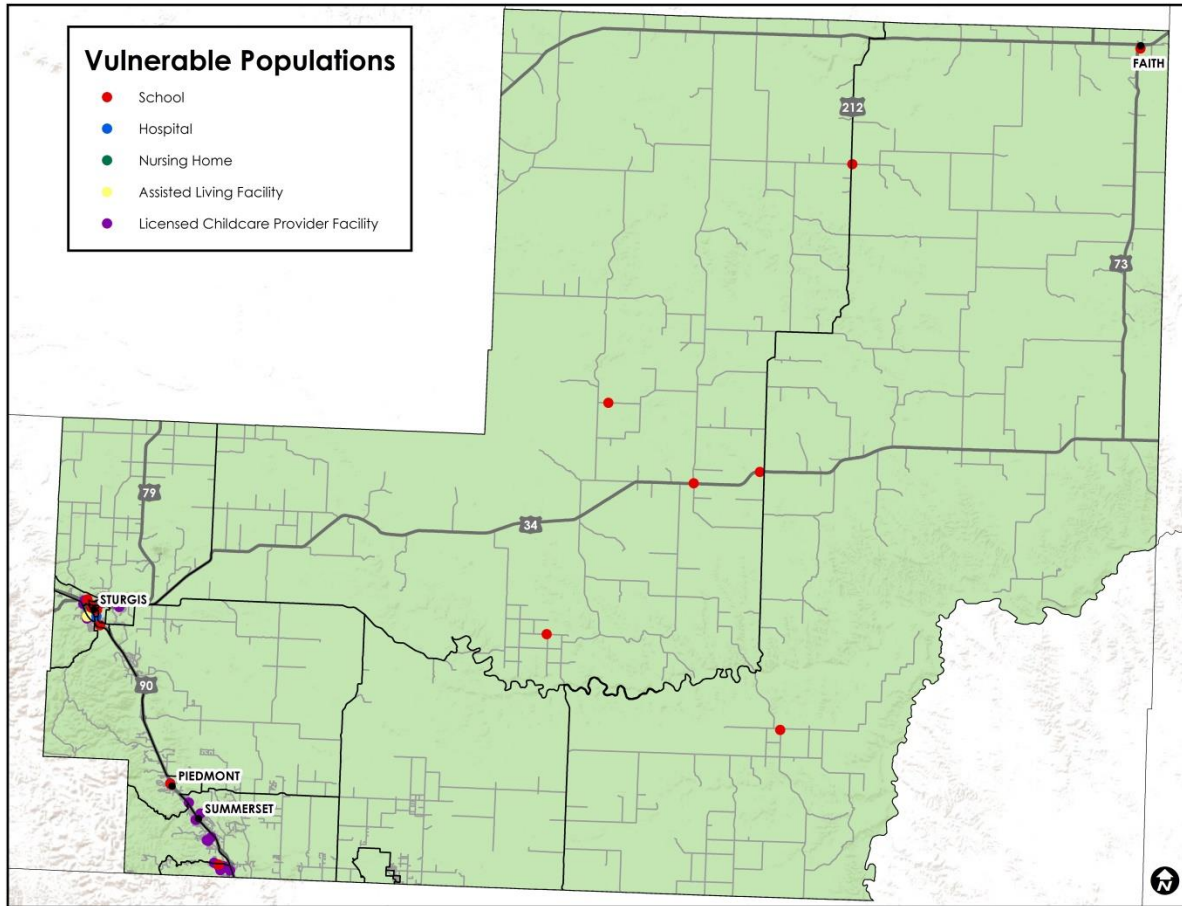


Figure 7: Meade County Vulnerable Populations/ Sources: SD OEM, SD DSS

Another unique consideration for Meade County is the impact that visiting populations have upon local emergency services. Every August, Sturgis hosts the *Sturgis Motorcycle Rally*. In 2015, an estimated 739,000 people attended this week-long event. There were 13 deaths related to the event and 542 emergency room visits at the Sturgis Hospital. Further, the Sturgis Police Department made five felony drug arrests, 44 misdemeanor drug arrests, 246 arrests for non-traffic violations, and 359 people were jailed by the Meade County Sheriff.⁶ Emergency management planning takes place for the *Sturgis Motorcycle Rally* all year long. The Planning Team understands the potential compounding impacts that a natural disaster occurring during this event could have upon local resources, and has developed strong partnerships to manage the event itself and plan for disaster events. One issue related to the *Sturgis Motorcycle Rally* is the large number of visitors that stay at campgrounds during the event, and therefore, their exposure to the elements. Figure 8 illustrates the concentration of campgrounds along the Interstate 90 corridor, Highway 79, and Highway 34.

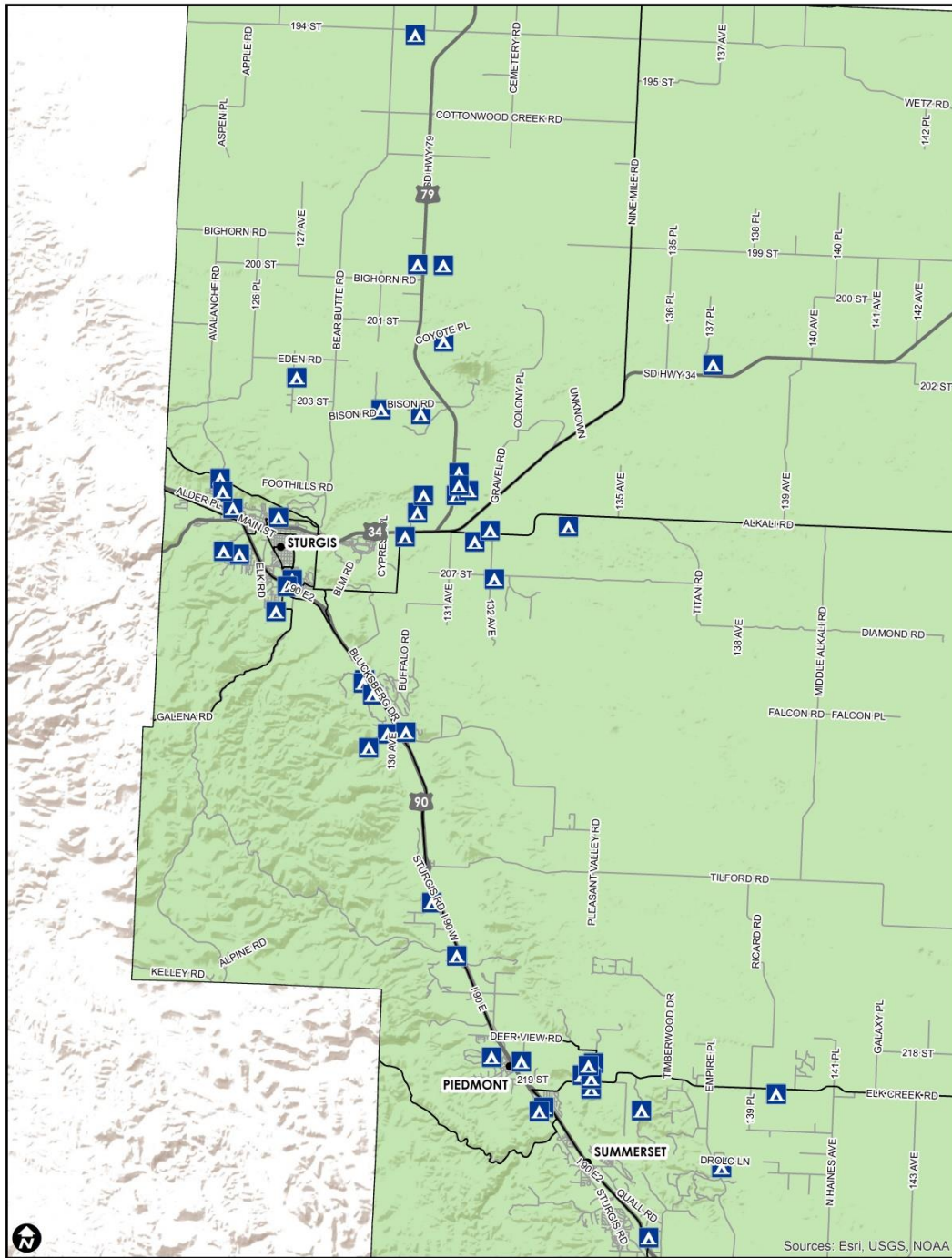


Figure 8: Meade County Campgrounds/ Source: Meade County Planning Department

ECONOMY

Meade County has a diverse economy. *Figure 9* provides information on the major businesses and industries in the county. According to this data, two of Meade County's major employment sectors are the retail trade and accommodation and food service industries, which points to the importance of tourism on the county. Transportation and warehousing⁷ and the manufacturing industry also make up a large part of the economy; disaster impacts, like power outages and transportation delays have the potential to have significant impacts on these types of businesses.

The agriculture sector is particularly important to Meade County's economy. In 2012, Meade County produced and sold \$116,443,000 in agricultural products; 22 percent of this was in crop sales and 78 percent was in livestock sales.⁸ The tourism and agricultural industries are also extremely vulnerable to the impacts of natural disasters, which was brought to light during the October 2013 blizzard.

2012 NAICS code	Meaning NAICS code	Number of establishments	Value of sales, shipments, receipts, revenue, or business done (\$1,000)	Annual payroll (\$1,000)	First-quarter payroll (\$1,000)	Number of employees	Number of nonemployer establishments	Nonemployer value of sales, shipments, receipts, revenue, or business done (\$1,000)
44-45	Retail trade	78	211,042	16,182	3,494	615	231	5,839
72	Accommodation and food services	74	43,592	10,920	2,175	671	44	2,146
48-49 (104)	Transportation and warehousing (104)	51	40,398	9,929	2,324	347	137	16,656
54	Professional, scientific, and technical services	50	-	-	-	-	182	4,570
81	Other services (except public administration)	50	20,772	4,123	997	151	317	7,916
62	Health care and social assistance	45	-	-	-	-	161	3,690
31-33	Manufacturing	35	-	8,334	-	225	49	1,607
56	Administrative and support and waste management and remediation services	34	-	-	-	-	131	2,854
52	Finance and insurance	23	-	7,292	1,969	188	46	2,677
53	Real estate and rental and leasing	23	11,646	1,850	451	75	214	12,995
42	Wholesale trade	21	-	-	-	-	-	-
71	Arts, entertainment, and recreation	18	-	-	-	-	106	1,849
51	Information	15	-	2,494	1,256	76	18	157
22	Utilities	6	-	-	-	-	-	-
61	Educational services	4	-	-	-	-	35	293

Figure 9: Meade County Economic Profile/ Source: 2012 Economic Census

PHYSICAL ENVIRONMENT

Land use

The majority of land within Meade County is used for agricultural purposes. Outside of the incorporated areas, residential land uses are scattered throughout the county, with concentrations along Interstate 90. The majority of the county is classified as agricultural, and there are large areas of public (exempt) land.

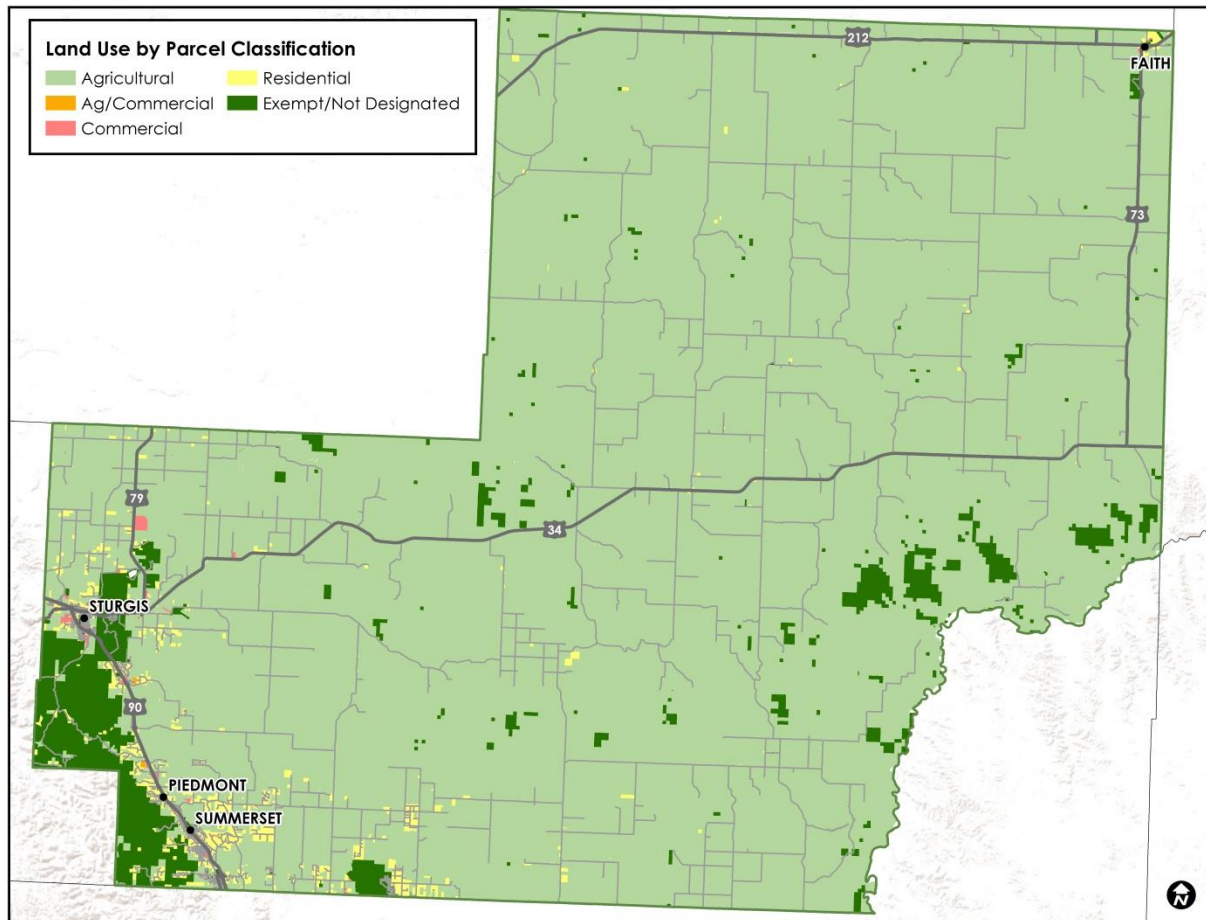


Figure 10: Meade County Land Use/ Source: Meade County Planning Department

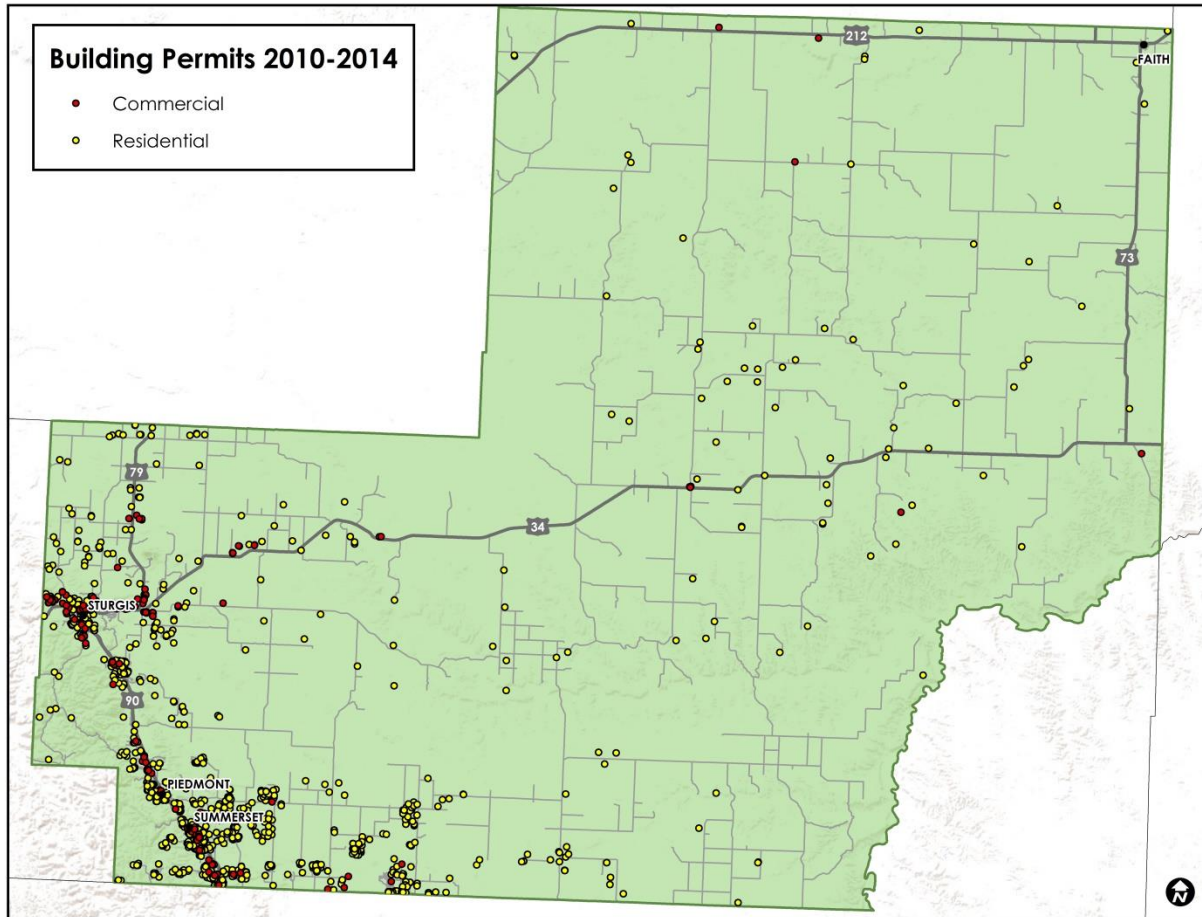


Figure 11: Meade County Building Permit History/ Source: Meade County Planning Department

Development

In the last five years, there has been a significant amount of development in Meade County. Figure 11 shows building permits issued within Meade County from 2010 through 2014.

According to Meade County records, from 2010-2014 there were 155 commercial building permits issued within the county. In the same time period, the county also witnessed a large number of new privately-owned residential building permits; from 2010-2014 there were a total of 483 new residential building permits issued in Meade County.⁷

In terms of future development, Meade County has a planning department that regulates development in the unincorporated areas of the county. The county does not have zoning, but employs other land development regulations, like subdivision and floodplain development ordinances to regulate development. As described previously, Meade County has adopted a comprehensive plan. Sturgis, Piedmont, and Summerset all have adopted comprehensive plans, zoning ordinances, subdivision ordinances, and floodplain development regulations.

Infrastructure

The continued operation of infrastructure systems during a natural disaster is extremely important to reducing the impacts that a hazard event may have upon a community. Meade County's transportation network is made up of State, Federal, and County highways, local roads, bridges, railways, and airports. There are also 42 road districts within Meade County that are responsible for the maintenance of the road systems within their district boundaries. There are approximately 30 miles of rail line in Meade County. There are small municipal airports outside of Faith and Sturgis, and Ellsworth Air Force Base is located along the Pennington/Meade County border.

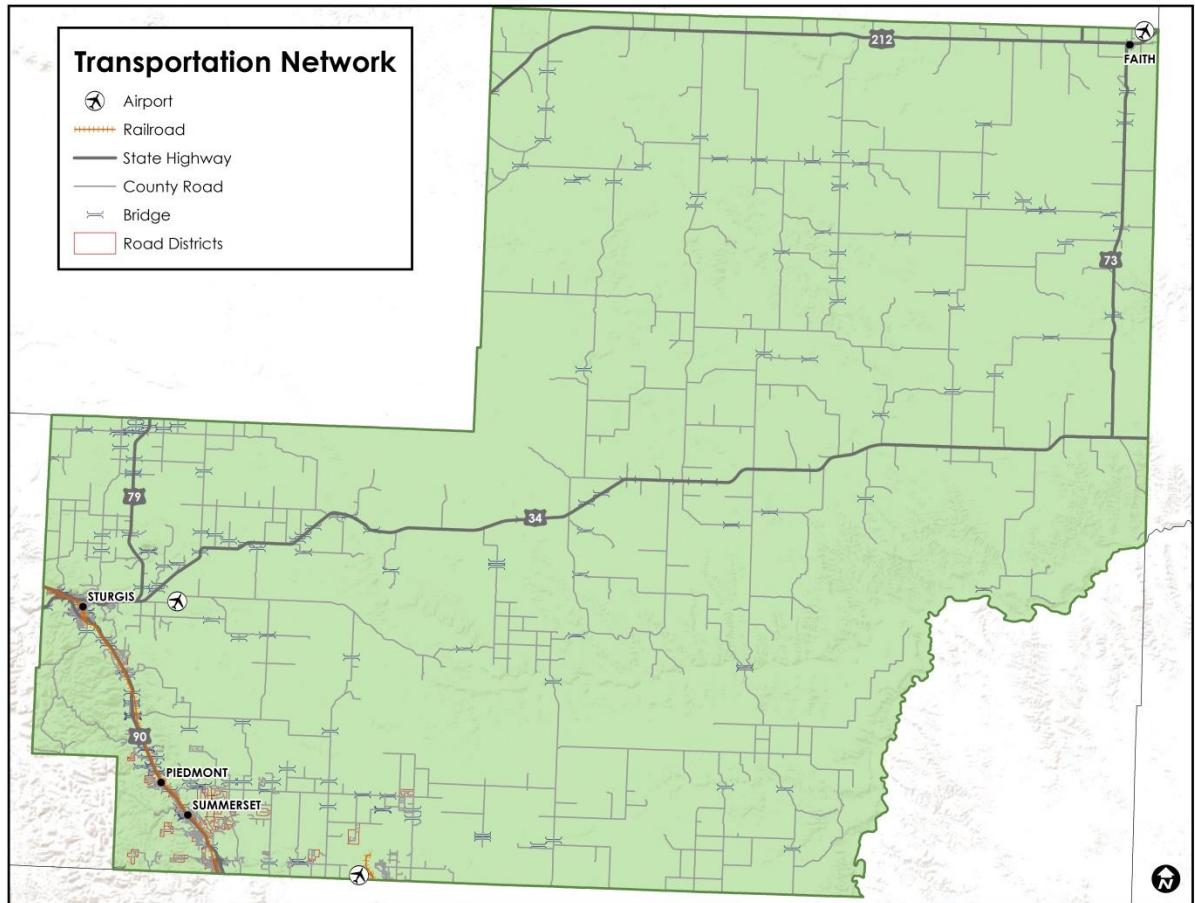


Figure 12: Meade County's Transportation Network/ Sources: SD DOT, Meade County Planning Department

Meade County's major utility systems are depicted in *Figure 13*. The county is serviced by a number of electric service territories: Black Hills Power; Grand Electric Cooperative; Butte Electric Cooperative; West River Electric Association; and, Faith Municipal Electric. The Williston Basin Pipeline follows Interstate 90 through Meade County.

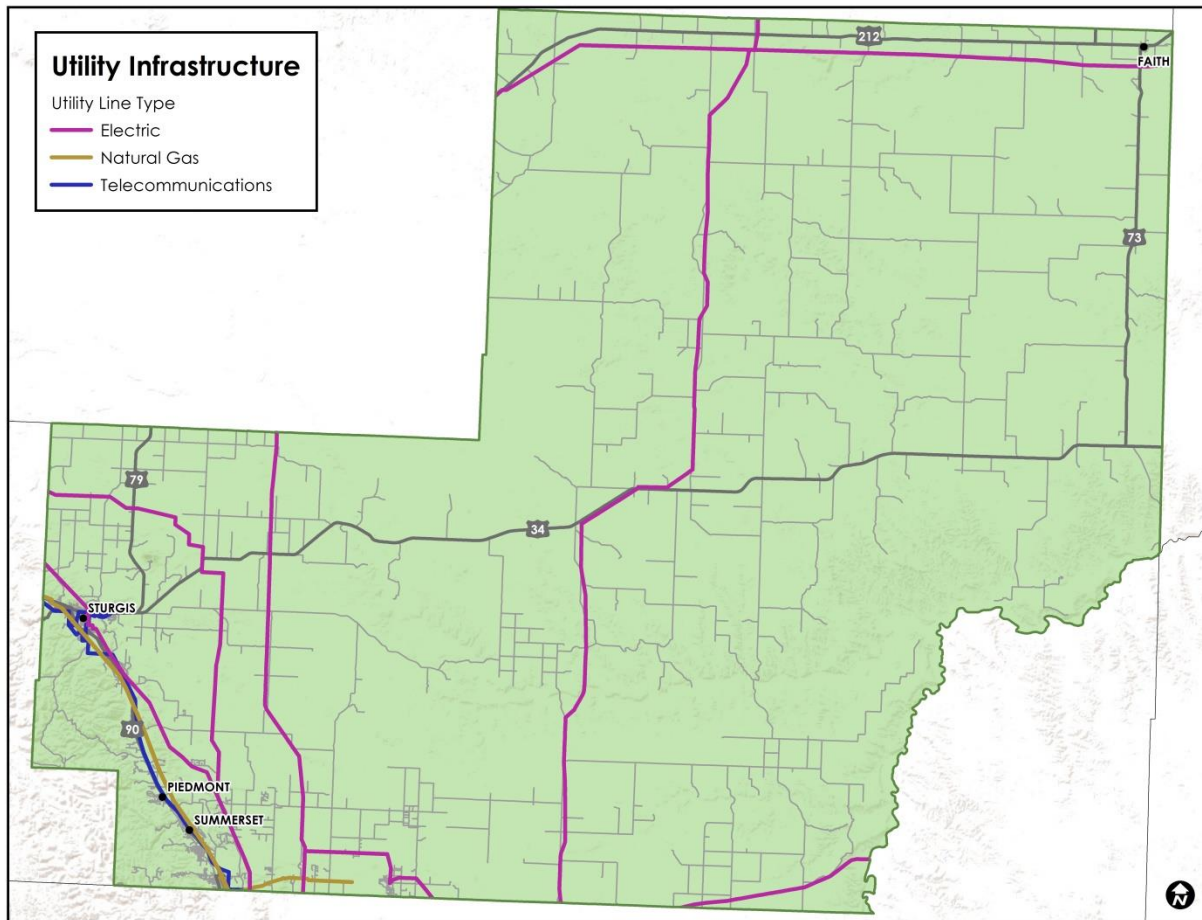


Figure 13: Meade County Utility Infrastructure

In terms of municipal water systems, Sturgis, Faith, and Piedmont all have municipal water systems. Residents of Summerset are served by either Black Hawk Water Users District or one of two private community systems. There are also ten individual sanitary districts within Meade County. Currently, Sturgis, Summerset, and Faith have municipal wastewater treatment systems.

Critical facilities

FEMA defines critical facilities as “structures and institutions necessary for a community’s response to and recovery from emergencies.”⁸ During the planning process, the Mitigation Planning Team was asked to help identify critical facilities within Meade County. The map below provides an overview of the critical facilities identified in Meade County. A more in-depth discussion of each jurisdiction’s critical facilities is included in the *Community Vulnerabilities* section.

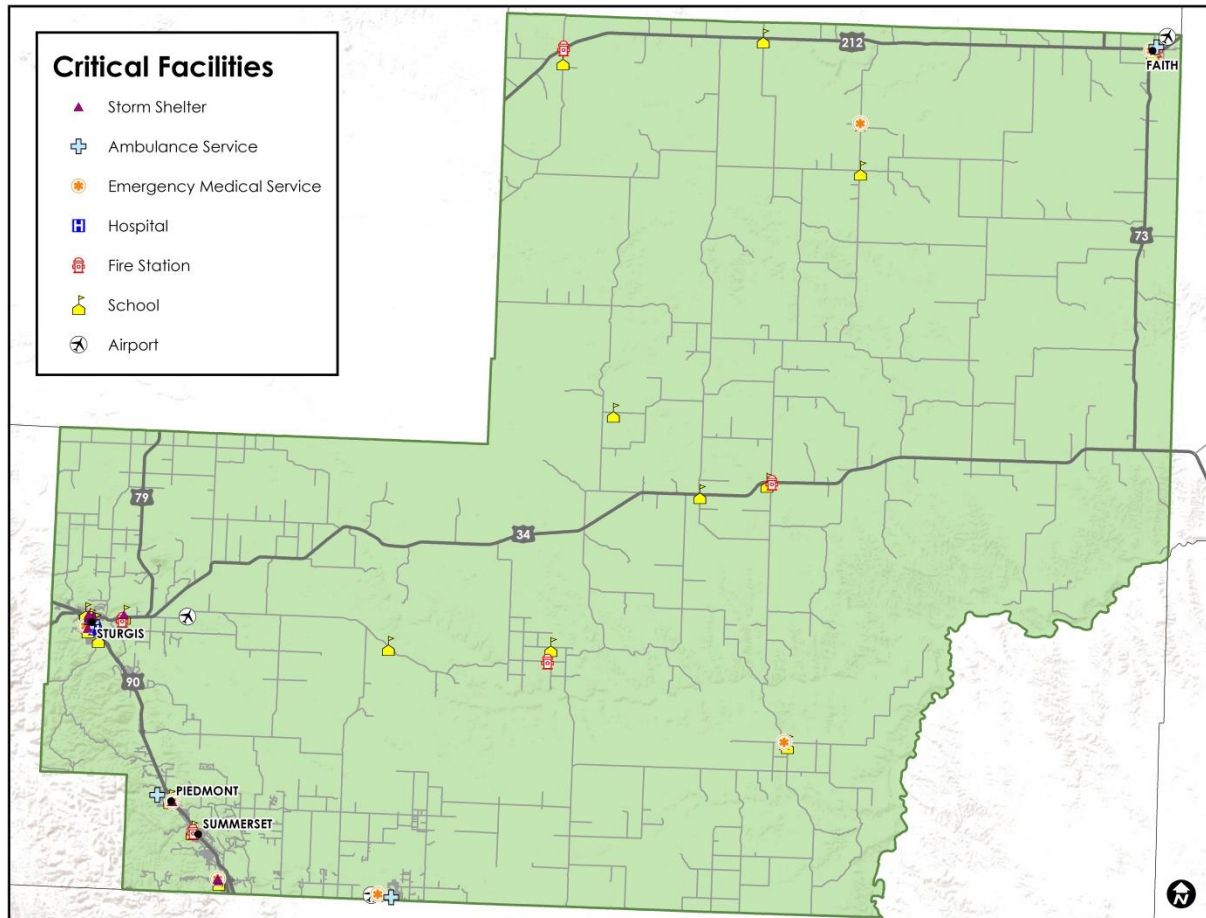


Figure 14: Meade County Critical Facilities/ Sources: SD OEM, Meade County Mitigation Planning Team

NATURAL ENVIRONMENT

Meade County has a varied landscape, with farm and ranchland making up the majority of the county and national forest in the southwest portion of the county. Because Meade County's economy is largely dependent upon its natural environment, it is particularly important to ensure its consideration in mitigation planning.

As shown in *Figure 15*, public lands are scattered throughout Meade County. The Black Hills National Forest makes up a large portion of land area west of Interstate 90 and abuts residential areas in the Piedmont Valley. Wildland-urban interface (WUI) considerations are very important in this area that is largely developed with single-family residential uses. In addition, the Black Hills National Forest is a significant recreational draw for the county. Bear Butte State Park is located north of Sturgis. Bear Butte is a sacred area for many Native American tribes and is a National Historic Landmark.

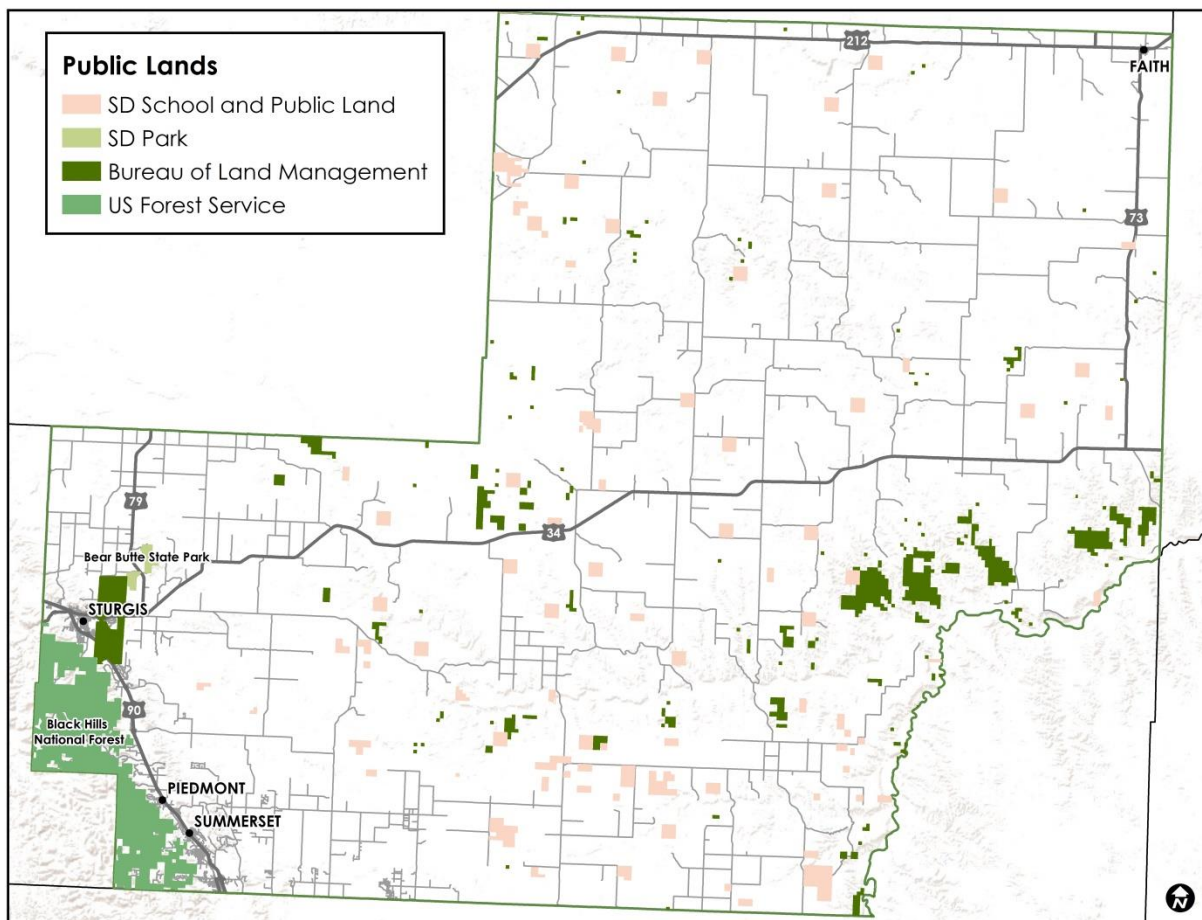


Figure 15: Meade County Public Lands/ Source: SD GIS

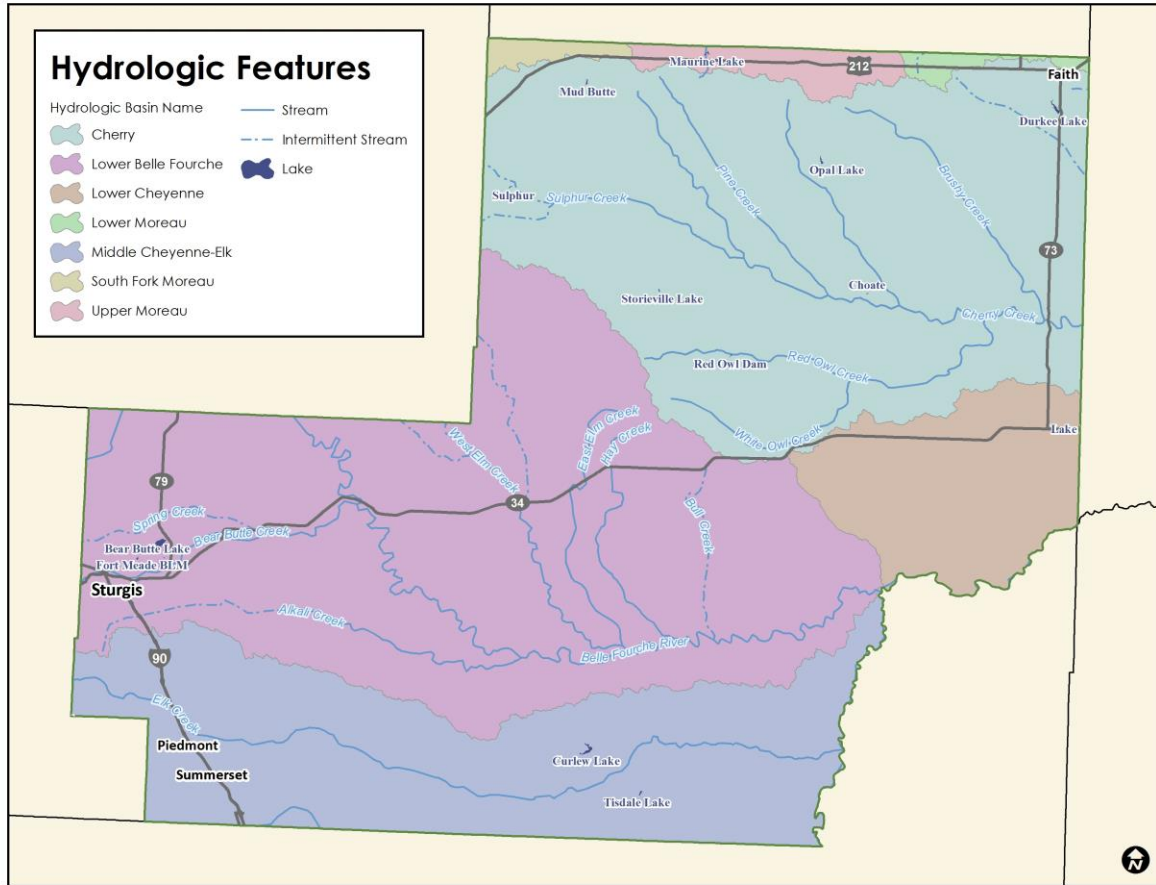


Figure 16: Meade County Hydrologic Features/ Source: USDA NRCS

There are a number of drainage basins located within Meade County; these drainage basins, along with Meade County's other water resources, are shown on Figure 16.

HAZARD PROFILES

The 2009 Meade County Pre-Disaster Mitigation Plan profiled a total of ten natural hazards and three human-caused disasters. Based on disaster history, population trends, and development trends in Meade County, eight hazard profiles are included in this plan update. Some of the hazards profiled in the previous plan have been re-categorized or consolidated under a new heading.

~~When profiling the hazards that have the potential to impact Meade County, it is important to consider climate change. Climate change has the potential to alter the strength and frequency of future hazard events. The South Dakota Hazard Mitigation Plan notes that due to climate change our region may witness increased temperatures, and, in turn, potentially increasing drought frequency. Infrequent, but intense rainfalls may also intensify flooding in the region.~~

MEADE COUNTY MITIGATION PLAN HAZARD PROFILES	
2009 Plan	Update
1. Drought	1. Flooding
2. Severe Thunderstorm	2. Winter Storms
3. Flash Flood	3. Wildfires
4. Tornado	4. Drought
5. High Winds	5. Thunderstorms
6. Winter Storm	6. Windstorms/Tornadoes
7. Wild Fires	7. Geologic Hazards
8. Earthquake	8. Hazardous Materials
9. Pine Beetle	
10. Landslides	
11. Special Events – Terrorism or Civil Disturbance	
12. Hazardous Materials	
13. Aviation Accidents	

FLOODING

Flooding, and more specifically flash flooding, is a major issue for Meade County. Flash floods are caused by stationary or slow-moving thunderstorms that produce heavy rain over a small geographical area.⁹ The National Climatic Data Center has recorded 18 flood events since 2009 for Meade County. Flash flooding specifically has caused extensive damages in Piedmont and Sturgis. Historically, May and June are the most common months that flooding occurs in the county. Rapid snowmelt caused by warming temperatures after a heavy snow storm or rain falling on snow can also cause flooding in Meade County.

Historically, there have been a number of major flood events that have taken lives, extensively damaged property and infrastructure, and impacted the region's economy. Most notably, the 1972 flood took 238 lives and injured over 3,000 people throughout the region. Another major flood event for Meade County occurred in 1907, when Elk Creek, west of Piedmont flooded, killing a woman and two children.

Figure 18 depicts the flood hazard areas in Meade County. Approximately 1.6 percent of Meade County is located within the 100-year floodplain; there are 709 buildings, and potential flood losses are estimated at over \$37 million within Meade County's 100-year floodplain.¹⁰ There are 151 flood insurance policies in Meade County, with total coverage of \$22,490,700. However, since 1978 there have only been 14 flood insurance claims, totaling \$25,523.¹¹ There are two repetitive loss properties in Meade County, both located in Piedmont.



Figure 17: October 2013 Flooding

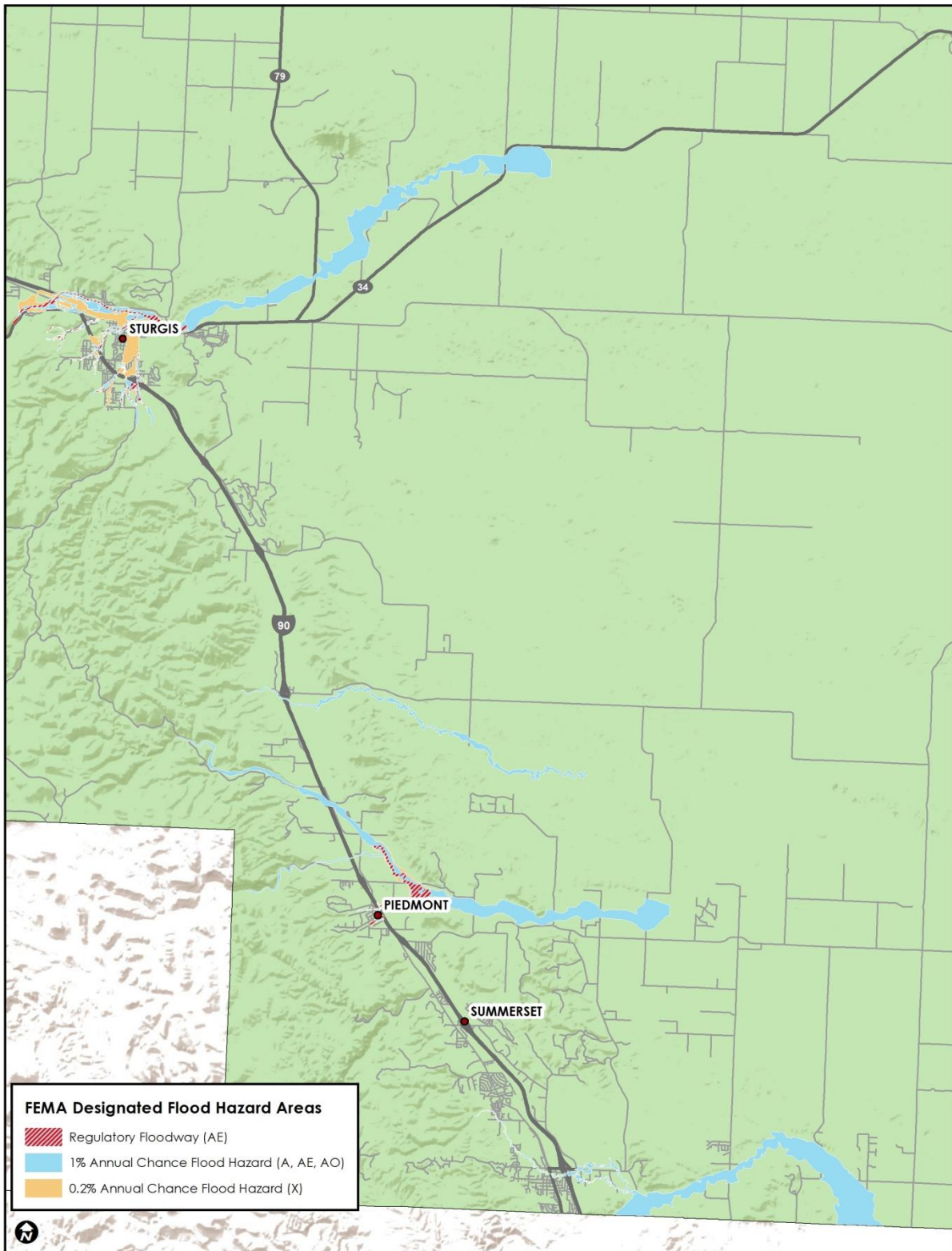


Figure 18: Meade County Flood Hazard Areas/ Source: FEMA

FLOOD HAZARD SUMMARY	
Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> • Meade County—Countywide • Piedmont • Sturgis 	<ul style="list-style-type: none"> • Road and bridge damages • Flooding of homes and businesses
Summary of Previous Occurrences within the County:	
<p>The NCDC identifies eighteen flood events in the county since 2009; this suggests that there are at least three flood events per year in Meade County. Flooding was responsible for \$430,000 in property damages in this time period. The vast majority of the flooding within Meade County occurs in the months of May and June. However, runoff from heavy snow has also caused considerable flood damages within the county.</p> <p>In May 2010, a flash flood caused damages estimated at \$150,000 in Meade County. Heavy rain caused flash flooding in southern Meade County from Black Hawk to Elm Springs. Flash flooding was reported along Elk Creek, Antelope Creek, and Box Elder Creek. A few homes reported water in their basements and several county roads were flooded.</p> <p>In October 2013, heavy rain falling on the snow remaining from the October 3-5 blizzard caused flooding. Water covered Elk Creek Road and Antelope Creek Road north of Box Elder and Curlew Road and Pioneer Road north of New Underwood. Some fields and pastures in southern Meade County also flooded. The river gauge on Elk Creek at Elk Vale Road reached a height of 12.6 feet, which is 3.6 feet over flood stage.</p> <p>In May 2014, a flash flood caused damages estimated at \$150,000 in the county. During this storm cluster of thunderstorms developed and regenerated over southwestern Meade County. Quarter to golf ball sized hail fell in the Bear Butte area. In less than four hours, two to five inches of rain fell over parts of the Sturgis and Bear Butte areas. Runoff overwhelmed drainage systems and small creeks, causing minor flooding. Streets and several basements in Sturgis were flooded. A drainage channel on the south side of Sturgis filled with water and flooded Harmon Street and Hillside Drive. Minor flooding was reported along Spring Creek at Highway 34 about 12 miles northeast of Sturgis.</p> <p>In June 2015, a flash flood caused extensive damages in the Piedmont Valley area. The flooding overwhelmed culverts, damaged streets, flooded basements, and even closed a portion of Interstate 90.</p>	
Community's Probability of a Future Hazard Event:	
<p>Based on historic occurrences, the probability that at least one flood will impact Meade County per year is 100 percent.</p>	
Community's Vulnerability to a Future Hazard Event:	
<p>Based on the State of South Dakota Multi-Hazard Mitigation Plan's vulnerability assessment using HAZUS-MH, flood impacts to Meade County have the potential to cause \$4.8 million in building damage losses, \$6.5 million in contents damage losses, and displace 469 people.</p>	

WINTER STORMS

Meade County is regularly impacted by winter storm events and is particularly vulnerable due to its population density, history of storm events, building exposure, and economy. As the update of this mitigation plan was taking place, the impacts of the October 2013 blizzard—detailed below—were still fresh: the devastating impacts of the storm on the local agricultural economy, costs of debris and snow removal, power outages, and damages to buildings.



Figure 19: Cattle fatalities resulting for October 2013 blizzard/ Source: Meade County OEM

WINTER STORMS HAZARD SUMMARY	
Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> Meade County – Countywide 	<ul style="list-style-type: none"> Heavy snow and ice can down power lines, leading to electrical outages Electrical outages can lead to interruptions in other utility services Snow, blowing snow, and ice on roadways create hazardous driving conditions Extreme cold can lead to both livestock and human deaths Snowmelt can lead to flooding
Summary of Previous Occurrences within the County:	
<p>The NCDC identifies 119 winter storm events since 2009, resulting in over \$7 million in property damages. Two major winter storm events are described below.</p> <p>In March 2009 a storm brought rain, snow, and very strong winds to western South Dakota. Precipitation started as rain, then changed to snow, and blizzard conditions developed. The heaviest snow fell over the northern Black Hills, where 18 to 48 inches of snow was measured. Sustained winds of 30 to 55 mph, with gusts over 80 mph, were reported. Interstate 90 and other highways were closed for more than 24 hours. Power outages were reported mainly across the northern Black Hills and northwestern South Dakota. Tens of thousands of livestock perished.</p> <p>In early October 2013 a historic blizzard pounded western South Dakota with record-setting snowfall and strong winds for almost 48 hours from the evening of October 3rd through the afternoon of October 5th. One to two feet of snow was reported over the plains of western South Dakota, with three to five feet of snow falling over the northern and central Black Hills. Wind gusts to 70 mph across the plains produced significant blowing and drifting snow, with visibilities near zero for much of the day on October 4th. The heavy wet snow and strong winds downed trees and power lines, causing prolonged outages and impassible highways. The roofs of several businesses, a middle school, and community center collapsed from the heavy snow. Thousands of livestock were killed from hypothermia, suffocation, or drowning. The South Dakota Animal Industry Board received reports of over 21,000 cattle; over 1,300 sheep; 400 horses; and 40 bison deaths from the storm. Tree and debris removal costs were several million dollars.</p>	
Community's Probability of a Future Hazard Event:	
<p>Based on historical occurrences, the probability that at least one winter storm will impact Meade County per year is 100 percent.</p>	
Community's Vulnerability to a Future Hazard Event:	
<p>According to the State of South Dakota Multi-Hazard Mitigation Plan's vulnerability assessment—which is based on prior events, building exposure, and population density—Meade County is highly vulnerable to winter storm events. Only five counties in South Dakota were assessed with high vulnerability, and one, Minnehaha, was assessed with very high vulnerability. Meade County had the highest number of prior events (99) out of all counties in South Dakota from the time period (1993 to 2014) used in the assessment. As Meade County continues to grow, its vulnerability to winter storms will increase.</p>	

WILDFIRES

As Meade County continues to grow there is an increased risk to people and property from wildfires. Increased housing development on the fringe of urban areas near the forest creates an environment where fire can easily move between structures and vegetation.¹² *Figure 20* identifies the Wildland Urban Interface (WUI) areas in Meade County, as well as the wildfire incidents from 2010-2015.¹³ Due to the housing density, population concentrations, and proximity to forested areas, there are many areas within the Piedmont Valley and around Sturgis that are designated as WUI. In the last five years there have also been a number of wildfire incidents in the Piedmont Valley area.

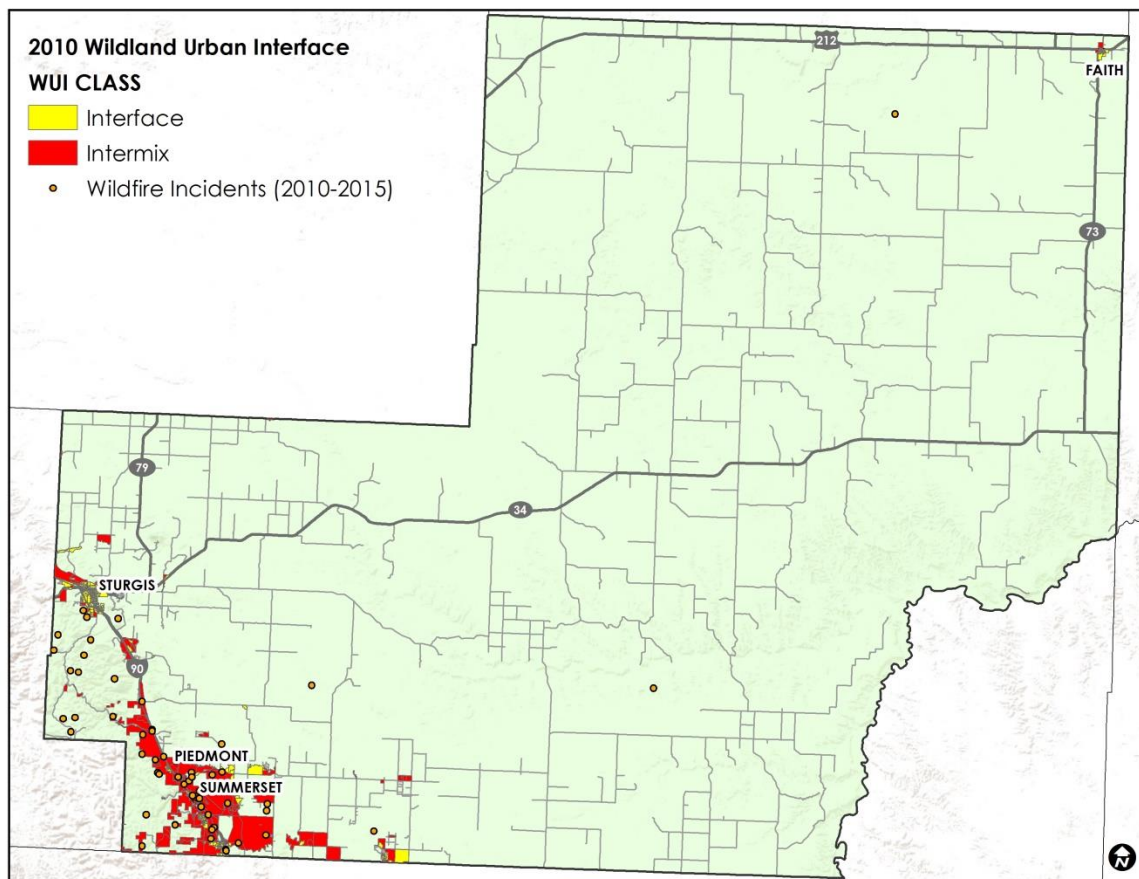


Figure 20: 2010 Meade County Wildland Urban Interface/ Sources: SILVIS Lab, State of South Dakota Division of Wildland Fire

Figure 21 depicts the wildfire history in Meade County, which was compiled by the United States Forest Service. The most recent fire, the Boxelder Fire burned 319 acres in southwestern Meade County in 2007. The East Ridge fire burned 3,200 acres in the area around Summerset in 2006, and the Ricco Fire burned almost 4,000 acres in the area west of Piedmont in 2005.

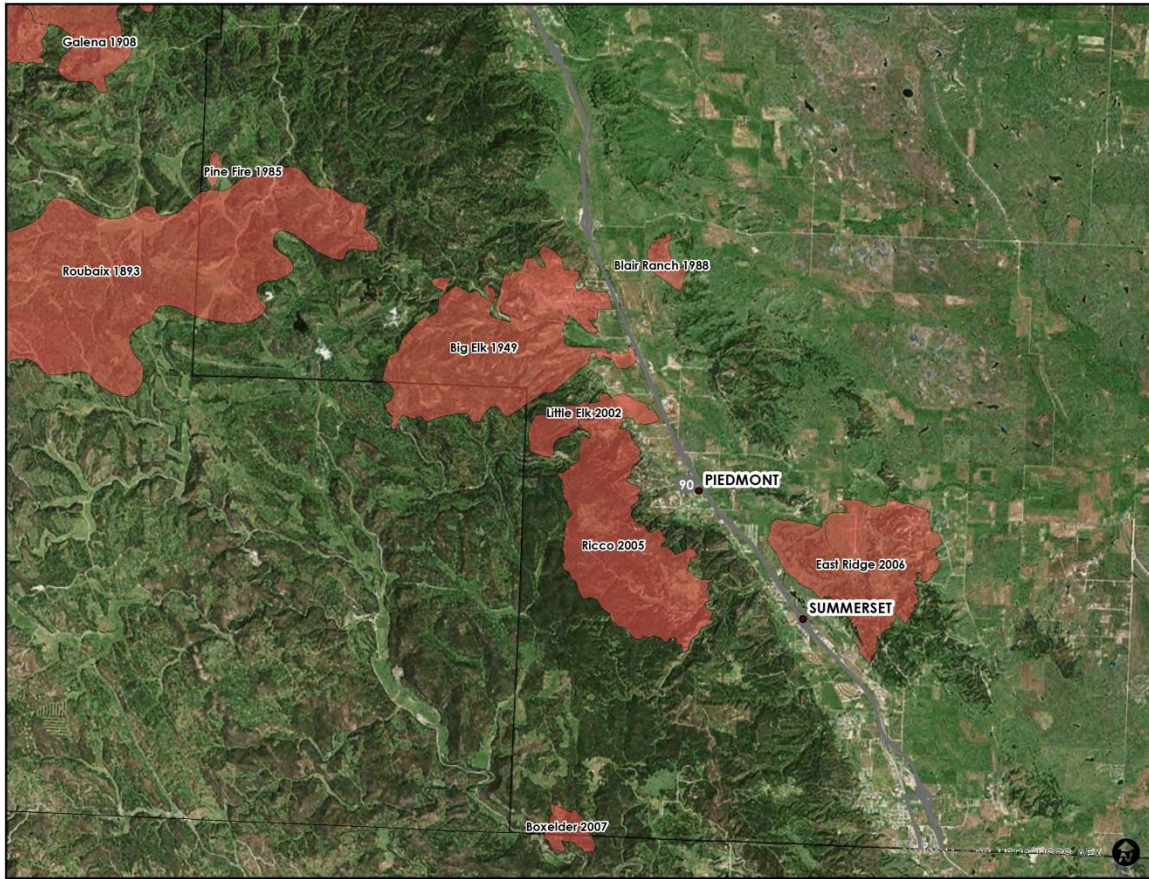


Figure 21: Meade County Wildfire History, 1880 – 2012/ Source: United States Forest Service

WILDFIRES HAZARD SUMMARY	
Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> Meade County – Countywide 	<ul style="list-style-type: none"> Damage to homes and property Injury and loss of life Damage to crops and livestock grazing areas
Summary of Previous Occurrences within the County:	
The State of South Dakota Division of Wildland Fire reports a total of 61 wildland fire incidents from 2010 through 2015. These fires burned a total of 2,565 acres of land in Meade County.	
Community's Probability of a Future Hazard Event:	
Based on historic occurrences, there is a 100% chance of at least one wildland fire per year in Meade County.	
Community's Vulnerability to a Future Hazard Event:	
Based on the State of South Dakota Hazard Mitigation Plan's Wildland-Urban Interface Exposure analysis, 20,512 people and 9,013 housing units are within high or moderate risk zones within Meade County. This represents almost \$2 billion in housing and contents replacement value. As population and development in the Wildland-Urban Interface areas increase in Meade County, so does its vulnerability.	

DROUGHT

Meade County is vulnerable to drought. The Drought Impact Reporter shows 259 reported impacts in Meade County from drought since 2009. The impacts of drought are especially severe on the county's agricultural industry and increase the threat of wildland fires. As of the writing of this plan, there are no drought conditions in Meade County; however, this stands in stark contrast to just three years ago, when Meade County had a total of \$4,512,961 in drought-related crop losses.¹⁴

DROUGHT SUMMARY	
Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> Meade County – Countywide 	<ul style="list-style-type: none"> Agricultural economy and associated businesses Water systems Increased wildland fire risk Increased risk of pests and agricultural disease
Summary of Previous Occurrences within the County:	
<p>Since 2009, the Palmer Drought Severity index identifies multiple occurrences of mid-range to extreme drought. The time period from June 2012 through March 2013 was marked by severe to extreme drought in Meade County. The U.S. Drought Monitor shows that there are currently no drought conditions in Meade County.</p>	
Community's Probability of a Future Hazard Event:	
<p>Based on historical data, it is highly likely that the county will be impacted by future drought cycles.</p>	
Community's Vulnerability to a Future Hazard Event:	
<p>Based on the State of South Dakota Hazard Mitigation Plan's vulnerability assessment indicates that all counties within South Dakota are vulnerable to drought.</p>	

THUNDERSTORMS

Thunderstorms are very common occurrences in Meade County. Severe thunderstorms involve numerous dangers like lightning, high winds and flooding. While high winds and flooding are discussed as standalone profiles, hail will be addressed in greater detail in this profile. Hail is a common byproduct of thunderstorms that is formed when strong updrafts in the storm carry droplets of water above freezing level, where they grow larger until they can no longer be supported by wind. Throughout Meade County, hail regularly causes significant damage to cars and structures, and can even injure or kill humans and animals caught in the open.

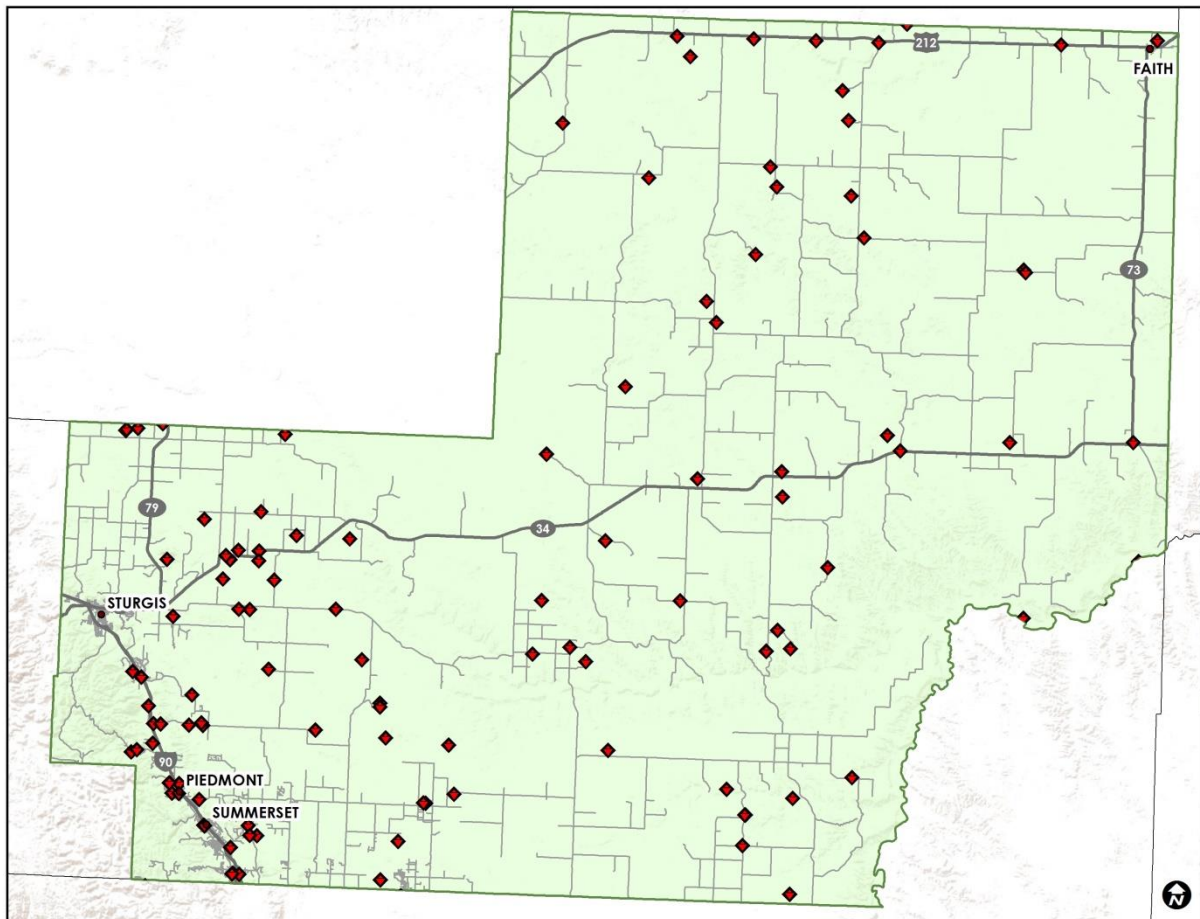


Figure 22: Meade County Hail Reports, 2010-2015/ Source: NOAA, NWS

THUNDERSTORMS SUMMARY	
Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> Meade County – Countywide 	<ul style="list-style-type: none"> Crop damage Property damage Utility outages Injury and loss of life
Summary of Previous Occurrences within the County:	
<p>The NCDC identifies 141 thunderstorm events and 159 hail events in Meade County since 2009. These thunderstorm events accounted for \$500,000 in property damages. The hail events were responsible for over \$1 million in property and crop damages.</p> <p>On June 14, 2009 two super cell thunderstorms developed over southeastern Meade County and moved slowly eastward across southern Meade County. The storms merged and moved into central and eastern Pennington County. Very large hail and heavy rain fell from Sturgis to New Underwood. Flooding occurred over south central Meade County, where two to three inches of rain fell in a short period of time.</p> <p>On July 19, 2010 a severe thunderstorm moved east-southeast from northeastern Wyoming across southern Butte County and southwestern Meade County. Large hail and strong wind gusts caused extensive damage before merging with a cluster of thunderstorms over Meade County.</p> <p>On July 20, 2013 a super cell thunderstorm developed over northern Butte County and tracked southeastward across Meade County. The storm produced golf ball sized hail along its path and estimated wind gusts were 52 knots.</p>	
Community's Probability of a Future Hazard Event:	
Based on historical occurrences, the probability that at least one severe thunderstorm will impact Meade County per year is 100 percent.	
Community's Vulnerability to a Future Hazard Event:	
Hailstorms and thunderstorms are not profiled in detail in the State of South Dakota Hazard Mitigation Plan; however, based on prior occurrences and lost estimates, the county is highly vulnerable to these events.	

WINDSTORMS & TORNADOES

Tornadoes are defined as a violently rotating column of air extending from a thunderstorm to the ground. They typically occur in May, June, and July. Since 2010 there have been five tornado events recorded in Meade County; two of these events were rated were F2, which have estimated wind speeds of 113-157 mph and cause considerable damage, such as tearing roofs off frame houses, demolishing mobile homes, uprooting large trees, and lifting cars off of the ground. Windstorms are generally associated with thunderstorms too, but have straight-line winds. Winds can exceed 100 mph and are responsible for the most extensive damage caused by thunderstorms.

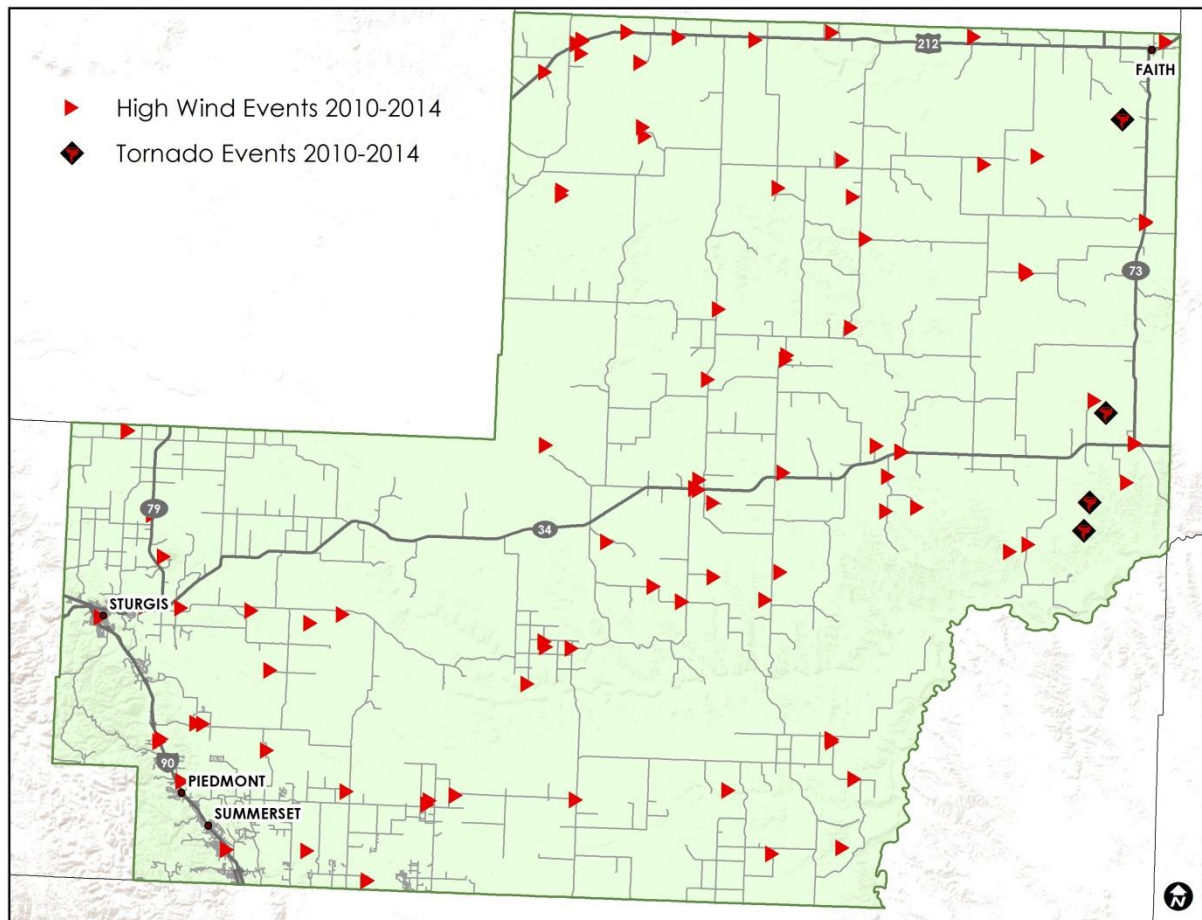


Figure 23: Meade County High Wind and Tornado Events/ Source: NOAA, NWS

WINDSTORMS & TORNADOES SUMMARY	
Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> Meade County – Countywide 	<ul style="list-style-type: none"> Crop damage Property damage Utility outages Injury and loss of life
Summary of Previous Occurrences within the County:	
<p>The NCDC identifies 87 high wind events and five tornadoes impacting Meade County since 2010.</p> <p>On May 24, 2010 an EF 2 tornado touched down south of Plainview and traveled more than 22 miles. It damaged a manufactured home, tearing off the roof and blowing over walls. It destroyed an abandoned house and pole barn, and tossed farm equipment and a van.</p> <p>On October 17, 2012 a strong cold front passed through the region. Gusty winds persisted through the afternoon of the 18th as a strong pressure gradient developed. Sustained winds of 30-50 mph and gusts up to 80 mph were recorded.</p> <p>On June 19, 2015 an EF 2 tornado touched down in rural southern Meade County, damaging buildings and tossing equipment at two ranches.</p>	
Community's Probability of a Future Hazard Event:	
<p>Based on historical occurrences, the probability that at least one windstorm or tornado event will impact Meade County per year is 100 percent.</p>	
Community's Vulnerability to a Future Hazard Event:	
<p>Based on the State of South Dakota Hazard Mitigation Plan's vulnerability assessment, Meade County is moderately vulnerable to tornadoes and those with a Fujita rank of F1. The plan estimates the annualized losses for Meade County at \$109,118. Meade County had the highest number of windstorm events (429 events) from 1955 to 2012 and highest number of events of at least 70 knots that caused property damage, fatalities, or injuries (71 events). Meade County has a high vulnerability to high wind events. Population growth and development increases the county's risk to losses from high wind events.</p>	

GEOLOGIC HAZARDS

Geologic hazards include earthquakes, landslides, and land subsidence. While these events are rare in Meade County, they have occurred in the past, and therefore, it is important to plan for these types of hazards. There have been two recorded earthquake events in Meade County, which are shown in *Figure 24*. The earthquake that occurred in between Piedmont and Sturgis in 1966 was recorded at a magnitude of 4.1, which causes noticeable shaking of indoor items and rattling, but an earthquake of this magnitude rarely causes significant damage.

Landslides are caused by the natural movement of earth down a slope. The South Dakota Hazard Mitigation Plan shows that there are many areas in Meade County that are moderately to highly susceptible to landslides. Further, there is a path along Interstate 90 with a high landslide incidence.¹⁷ The Meade County Office of Emergency Management reports two recent land subsidence events under roadways at Bear Butte Road and New Underwood Road.

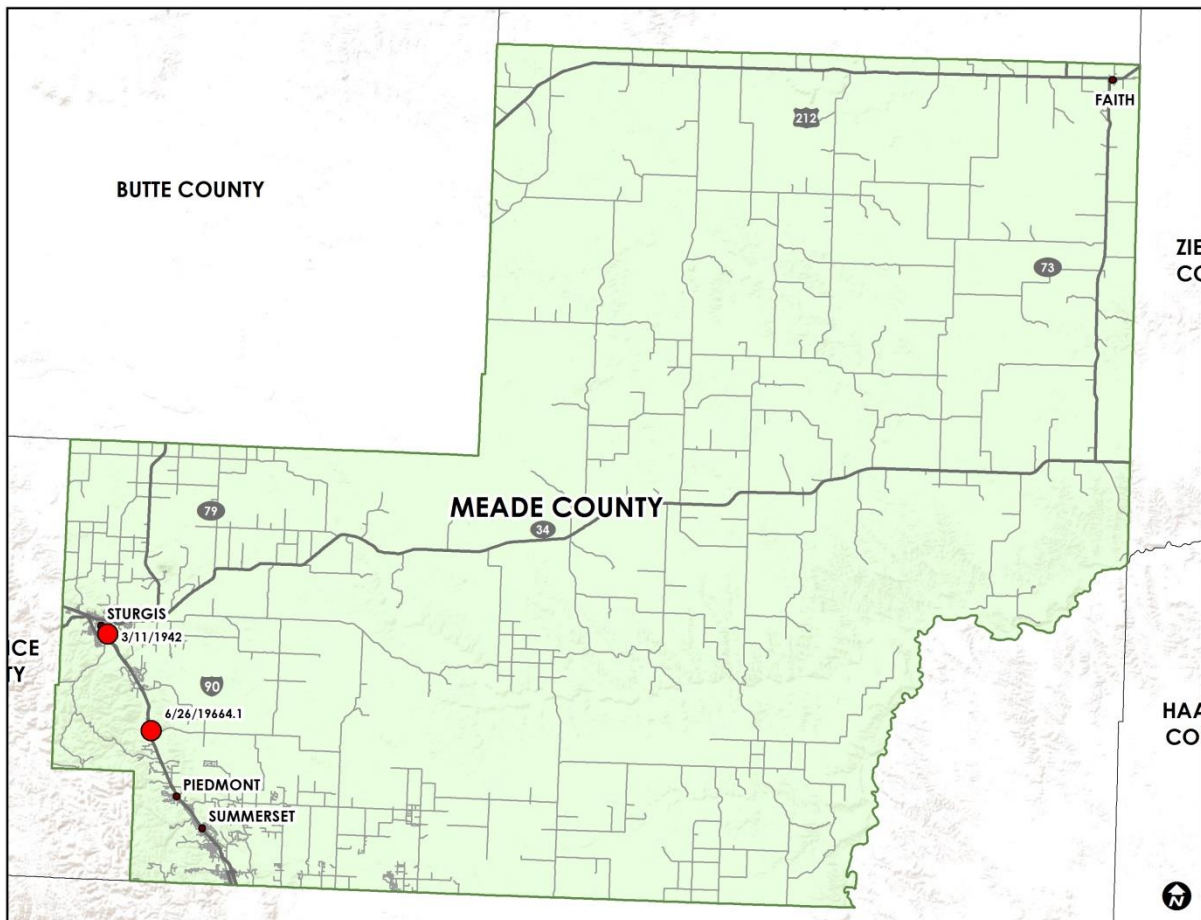


Figure 24: Meade County Earthquake Events/ Source: USGS

GEOLOGIC HAZARDS SUMMARY	
Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> Meade County – Countywide 	<ul style="list-style-type: none"> Road damage Utility damage
Summary of Previous Occurrences within the County:	
<p>There are two recorded earthquake events that occurred in Meade County. There are two recent land subsidence events under roadways at Bear Butte Road and New Underwood Road.</p>	
Community's Probability of a Future Hazard Event:	
<p>There is limited historical occurrence information on landslide and subsidence; however, it is probable that landslides and subsidence will occur in the future. Past events reveal that there is a potential for earthquakes and landslides/land subsidence in Meade County.</p>	
Community's Vulnerability to a Future Hazard Event:	
<p>Meade County's vulnerability to future geologic hazards is low.</p>	

HAZARDOUS MATERIALS

Hazardous materials are materials that are explosive, flammable, oxidizing, poisonous, corrosive, or radiological. Hazardous materials are typically released due to accidents during transport, or at production facilities. Meade County has 60 miles of gas transmission pipeline and 38 Tier II facilities. From 1971-2012 Meade County experienced 12 transportation-related hazardous materials events that accounted for \$84,915 in damages.

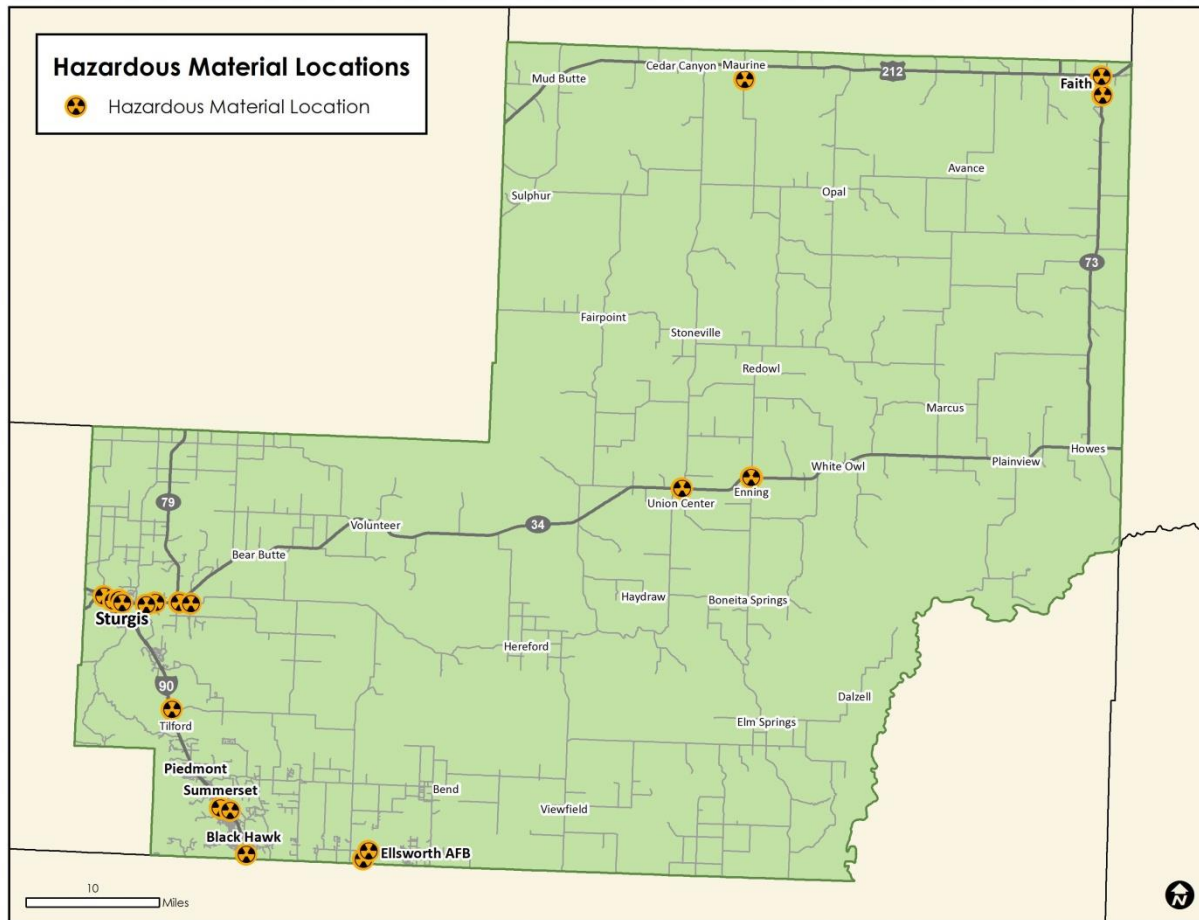


Figure 25: Meade County Hazardous Materials Facilities/ Source: Meade County OEM

HAZARDOUS MATERIALS SUMMARY	
Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> Meade County – Countywide 	<ul style="list-style-type: none"> Injuries to people and the environment
Summary of Previous Occurrences within the County:	
From 1971-2012, Meade County experienced 12 transportation-related hazardous materials events, that accounted for \$84,915 in damages.	
Community's Probability of a Future Hazard Event:	
Due to the random nature of hazardous materials incidents, it is hard to predict the probability of future events; however, due to the presence of Tier II facilities and pipeline in the county; as well as heavily traveled Interstate 90, it is probable that there will be a future incident in Meade County.	
Community's Vulnerability to a Future Hazard Event:	
Due to the number of Tier II facilities, the major travel corridors, and the presence of gas transmission pipeline, Meade County is vulnerable to future events.	

MITIGATION PROGRESS

The 2009 *Meade County Pre-Disaster Mitigation Plan* identified five broad goals: 1) Reduce injuries and loss of life from hazards; 2) Reduce damage to existing and future structures within hazard areas; 3) Reduce the losses to critical facilities, utilities, and infrastructure from hazards; 4) Reduce impacts to the economy, the environment, and cultural resources from hazards; and, 5) Support and assist local/tribal mitigation capabilities and efforts.

The 2009 plan also established related mitigation actions to help meet the identified goals. Three countywide actions—to *maintain compliance with State and Federal emergency management requirements, increase early warning capabilities, and install generators at critical facilities*—were identified in the previous plan. Since the plan was adopted, Meade County has made substantial progress completing these actions.

Since the 2009, early warning capabilities have been increased throughout the county. However, with the increase in sirens, there have been some complaints from residents during routine testing that the sirens are too loud. Therefore, the Planning Team would like to explore educational opportunities in relation to the sirens. In addition, the Planning Team also identified a number of areas that are not currently covered with existing sirens: Broken Spoke Campground, Shay Valley, Vanocker Canyon, areas of the city of Faith, and the Woodland Hills Subdivision.

There are also a number of generators at public and critical facilities within the county. During the planning process, the Planning Team determined that there is a need to take stock of the capacity of all of the generators at public facilities within the county, and to potentially purchase additional portable generators. Therefore, one of the activities identified in the *Mitigation Strategies* section is the inventory of all generators—portable and at public buildings—throughout the county to measure backup power capacity and to help assess needs. Further, a number of critical facilities lacking generators were identified to include in future grant requests: Sturgis Maintenance Facility; Faith Clinic; Faith City Hall; Faith Ambulance Building; and, Faith Pump Station

Compliance with relevant State and Federal emergency management requirements has been maintained. The table below demonstrates individual compliance with the National Flood Insurance Program.

CID	NAME	INITIAL FIRM	CURRENT MAP DATE
460054#	Meade County	08/01/1978	09/16/2011
461198#	City of Piedmont	09/16/2011	09/16/2011
460316#	City of Summerset	09/16/2011	NSFHA ¹⁵
460055#	City of Sturgis	06/01/1977	09/16/2011

COMMUNITY VULNERABILITIES

The following section details the specific assets, mitigation, progress, and ultimately, the vulnerabilities for each city covered under this Mitigation Plan.

PIEDMONT

In 2010 Piedmont had a population 222 people. Today, it's estimated that 835 people currently live in Piedmont. The bulk of this population growth can be attributed to the substantial amount of land that has been incorporated into city limits through voluntary annexations in the last five years.

In terms of local assets, the city of Piedmont has an elementary school, fire department, public library, city park, numerous established residential subdivisions, and a growing commercial area along Sturgis Road. The City has recently established a public water system and purchases water from Black Hawk Water System as a bulk user. Piedmont is in the process of exploring options to develop of public sewer system as the high number of individual septic systems, especially in the original town area of Piedmont, is not sustainable. Since the last plan was adopted the City has established a Planning and Zoning Board, adopted a comprehensive plan, and adopted land development regulations.

The 2009 plan established three goals for Piedmont: install comprehensive water and sewer system; improve city streets for evacuation routes; and, improve drainages and increase culvert size. Since 2009, Piedmont has constructed a public water system and is in the process of designing a public sewer system. The City recently received a grant to help reconstruct two major roadways within the original town area. Piedmont is also currently working with an engineer to develop a stormwater management plan. Last summer Piedmont experienced flash flooding that overwhelmed the existing culverts and drainages. Homes, roadways, and public buildings sustained damage. Improving the stormwater system and ensuring safety within the floodplain remain priorities for Piedmont.

The primary hazard concern for Piedmont is flooding. Figure 26 shows the location of the Flood Hazard Areas in Piedmont. Many homes, businesses, churches, City Hall, and the volunteer fire department are located within these flood hazard areas. Therefore, Piedmont's primary mitigation goal is to explore and secure funding to correct the drainage issues within original town. The only repetitive loss property within Meade County is located in Piedmont. There are also other residential properties that have repeatedly flooded, and the City would like to explore the potential for establishing a property acquisition program in order to remove these structures from the floodplain. The City would also like to explore possibilities for a storm shelter in the original town area where residents can gather in the event of severe flooding or tornadoes.

In addition, many of the newly annexed residential subdivisions in the southern section of Piedmont are directly adjacent to National Forest Service lands. There are opportunities to work with the homeowner's in these subdivisions to ensure that defensible space is maintained on individual properties and explore wildfire mitigation funding for combustible building material replacements and fuels reduction activities.

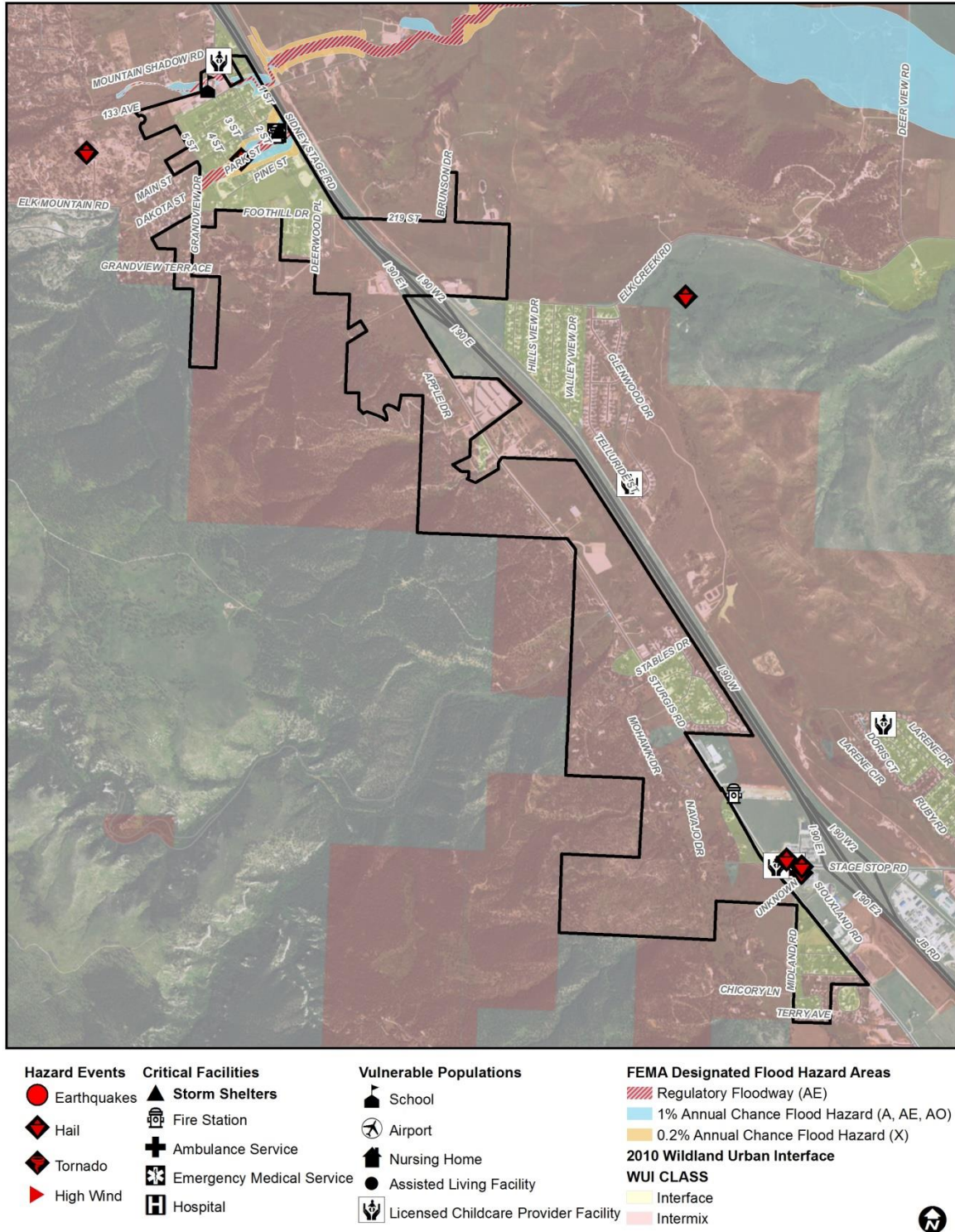


Figure 26: Piedmont, SD Vulnerability and Hazard History Map/ Sources: Source: NOAA, NWS, SD OEM, SD DSS, FEMA, SILVIS Lab

STURGIS

Today, Sturgis has a population of 6,741 people, which is a 1.6 percent increase from 2010. Sturgis is also unique due to the dramatic population increase that occurs every August for the *Sturgis Motorcycle Rally*, which can compound the impacts of hazard events.

The city has a number of assets: multiple schools, a hospital, Fort Meade Veterans Administration Medical Center, a fire and ambulance station, and growing residential and commercial areas.

One of the major natural hazard concerns for Sturgis is flooding. The 2009 plan identified four actions specific to Sturgis, three of which were related to flood improvements. Since the previous plan was adopted, the City has taken steps to reduce flash flooding on both Vanocker Creek and Bear Butte Creek. Plans are currently underway for additional retention and culverts within the Vanocker Creek watershed. In addition, the City has been working closely with the Bureau of Land Management to clean up the vegetation in the creek, as well as the related stormwater issues.

The last Sturgis-specific action in the 2009 plan was related to early warning systems. New sirens have been added since the previous plan was adopted, and the city now has coverage. In addition to the actions identified in the previous plan, the City has also increased its capabilities by updating its emergency snow removal plan, adding snow removal equipment, purchasing water buffalos, and installing a camera system throughout the city.

As shown in Figure 27, a large portion of Sturgis is located in the floodplain. There are several drainages that run through the city and discharge into Bear Butte Creek. There are numerous residences, businesses, and critical facilities in these flood hazard areas. Sturgis is subject to heavy runoff from snowmelt and spring rains causing flash flooding, which causes damage to streets, bridges, and utilities. The water table also rises during these events infiltrating utilities, businesses, and residences. The City has been continually working to improve drainage issues, and this remains a mitigation priority for Sturgis.

Sturgis is also vulnerable to wildland fires. There are many WUI intermix areas within city limits. The city would like to continue to focus on thinning projects on public lands to reduce fuel loads.

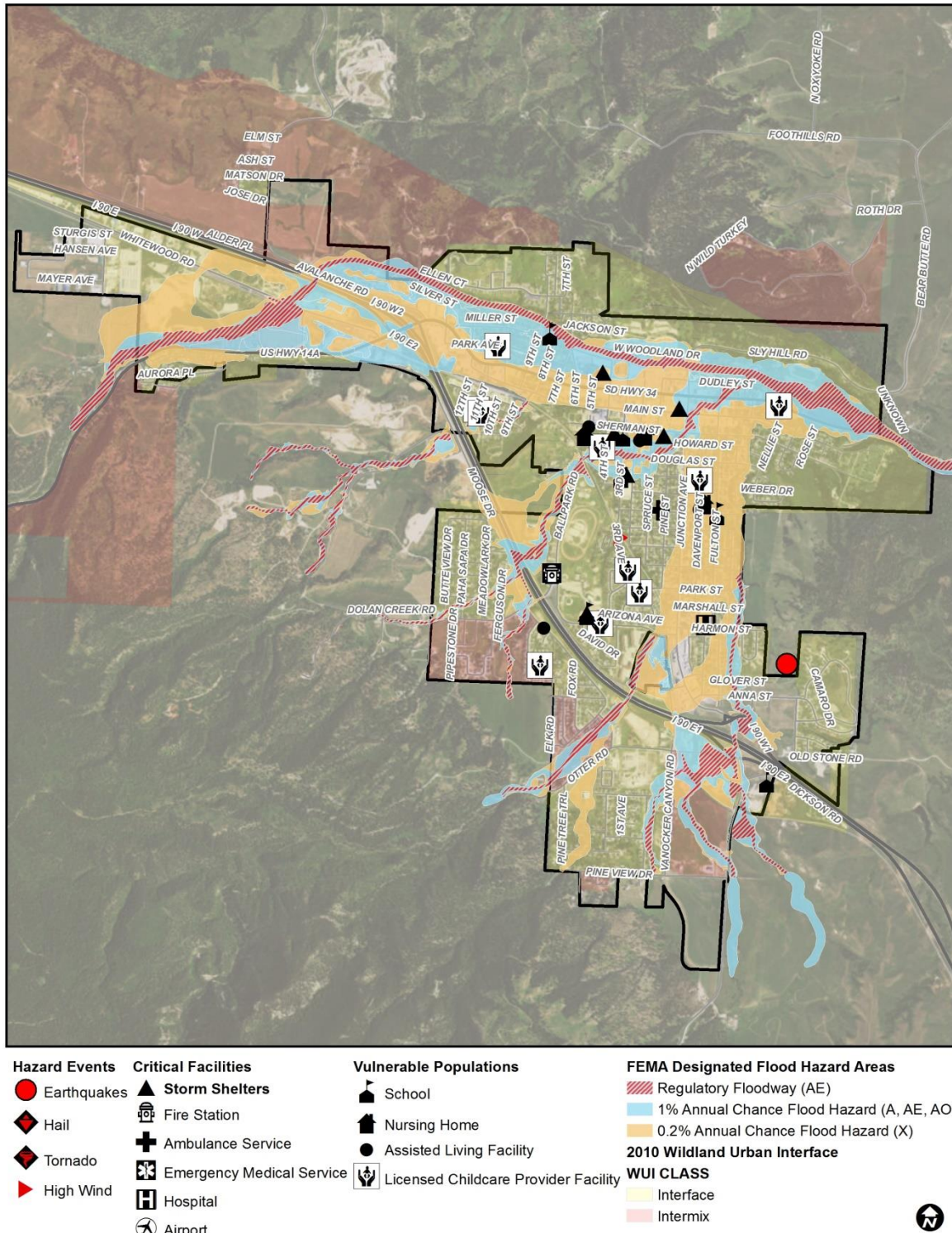


Figure 27: Sturgis, SD Vulnerability and Hazard History Map/ Sources: Source: NOAA, NWS, SD OEM, SD DSS, FEMA, SILVIS Lab

FAITH

Faith currently has a population of 421 people, down from 488 people in 2000. The town is unique in that it has its own municipal electric and telephone service, which means that the City of Faith has an even greater responsibility for mitigation planning to ensure that its municipal services remain operational during and after severe weather events.

Among Faith's assets are: a new school, medical clinic, fire and ambulance service, established residential neighborhoods, and a downtown commercial district. As previously mentioned, Faith provides a broad range of municipal services to its residents. The town continues to explore the potential to establish its own water supply due to concerns regarding future supply from its bulk provider Tri-County Water System.

Faith's major hazard concerns are high wind and tornado events. Historically, citizens took refuge from these storm events at the school; however, in 2004 the school that provided a safe room was condemned and demolished. Since that time, the town has been actively exploring options to construct a safe room for residents. The 2009 plan also addressed purchasing generators for the ambulance building, police station, and medical clinic—the police station does have access to a generator, but Faith would still like to purchase generators at the ambulance building and medical clinic. Another plan goal was to install a siren in the center of town with a wireless system; this is still a priority. Finally, the town currently purchases bulk water from Tri-County Water System, but as previously mentioned would like to explore its own water supply.

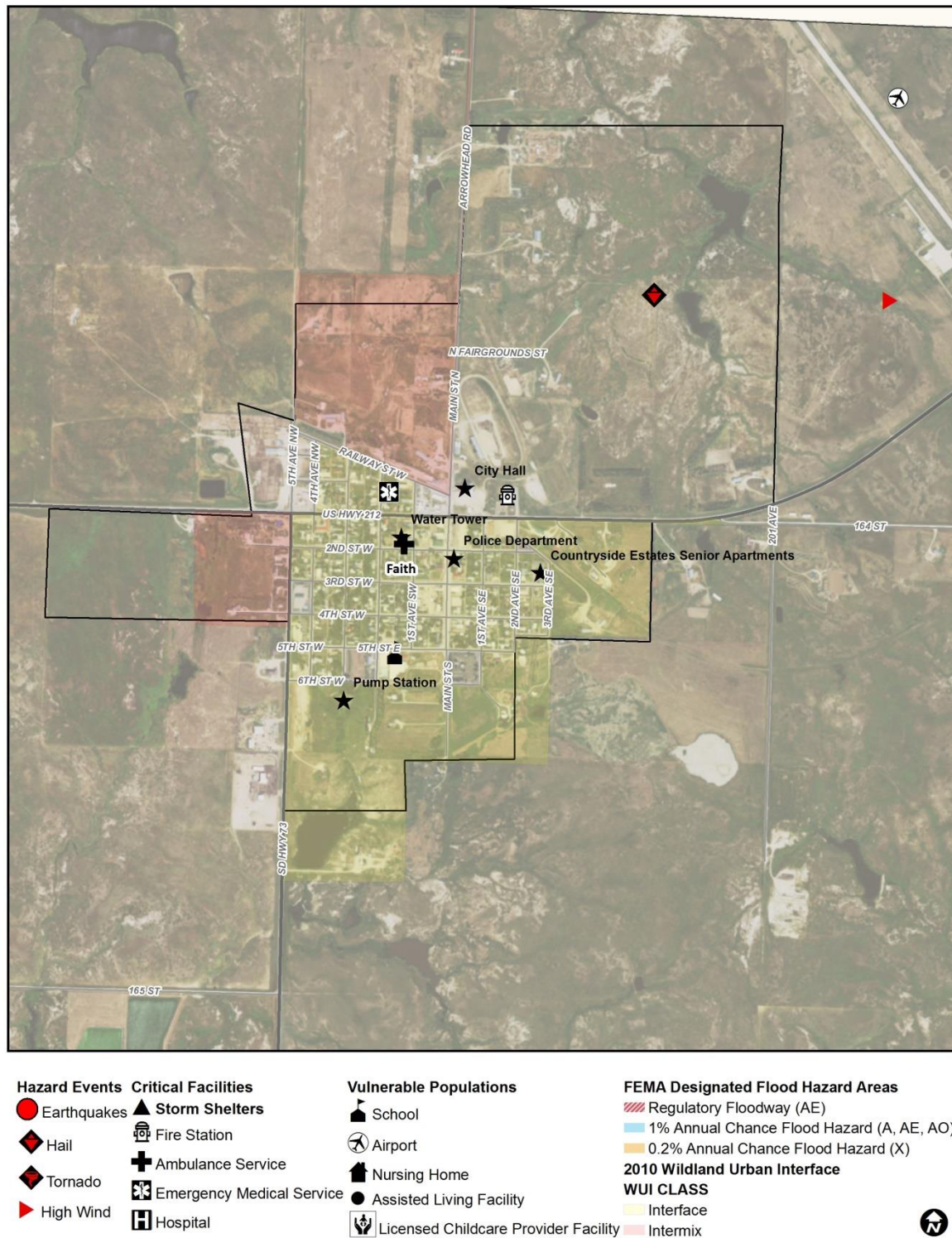


Figure 28: Faith , SD Vulnerability and Hazard History Map/ Sources: Source: NOAA, NWS, SD OEM, SD DSS, FEMA, SILVIS Lab

SUMMERSET

Current population estimates set Summerset's population at 2,118 people, a 17 percent increase from 1,814 people in 2010, and 77 percent increase from the 1,200 people estimated in the 2009 plan. Summerset was incorporated in 2005, and has seen tremendous building and development since that time.

Summerset has a number of assets: a police department, growing residential and commercial areas, newly annexed school land, and its own wastewater treatment plant. The city has a large population of young families and retirees. Many describe Summerset as a "bedroom community" and the majority of the city's residents commute to Rapid City or Sturgis for work.

Summerset has experienced some major drainage issues since the city was incorporated. Two drainage areas of particular concern were identified in the previous plan: the Castlewood Mulberry drainage and the Summerset USA drainage. Drainage improvements at the Castlewood Mulberry Drainage have been completed. In addition, while the Sun Valley Drainage was not addressed in the previous plan, the city is now on Phase 2 of 3 of a drainage improvements related to this development. The United State Geological Survey is also in the process of developing a project to look at potential flood hazards within the Sun Valley Estates Subdivision within Summerset.

Summerset's mitigation priorities are to continue to address drainage issues within city limits. In addition, a large amount of the city is located in WUI intermix areas, and so continued attention to wildfire mitigation is also an important consideration.

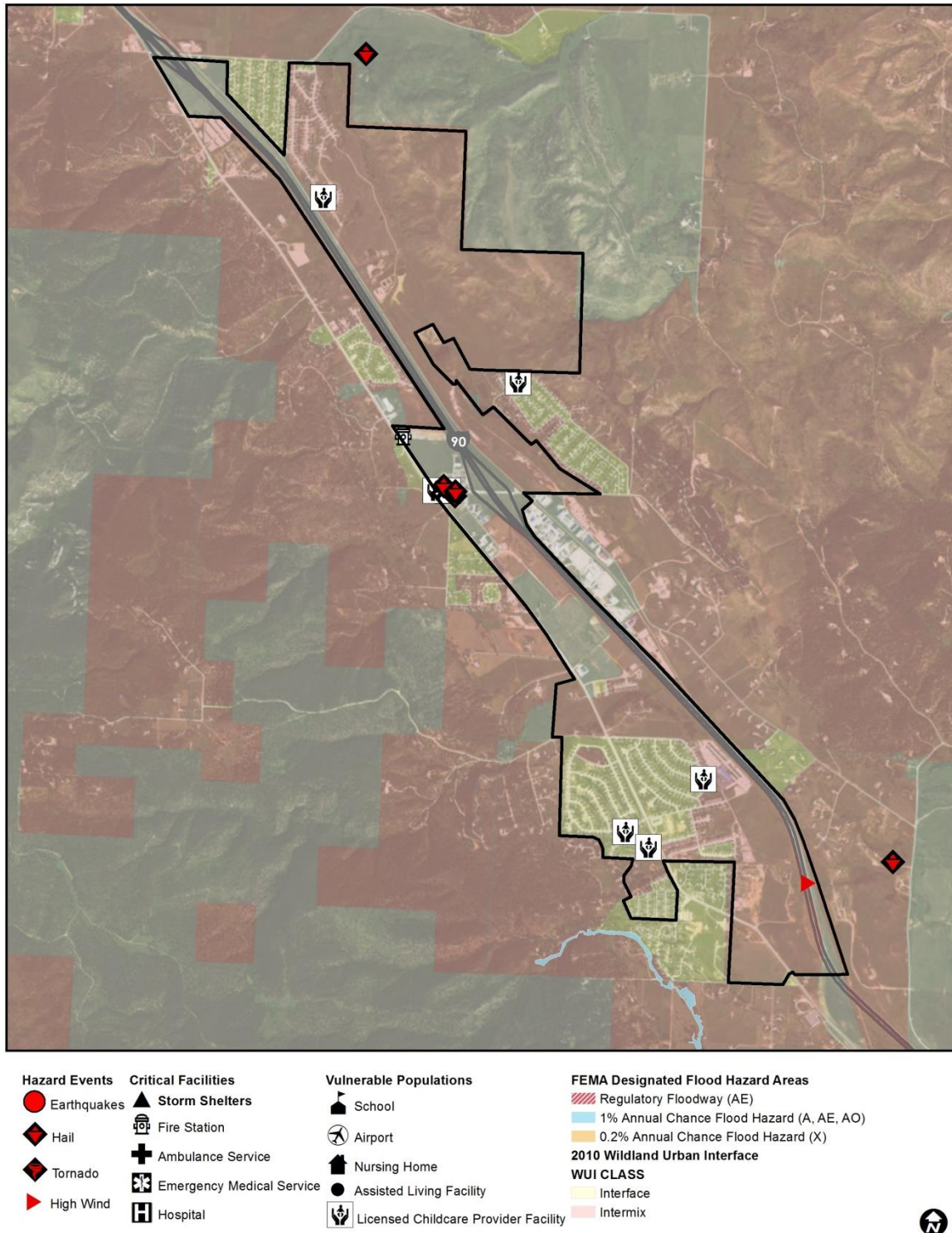


Figure 29: Summerset, SD Vulnerability and Hazard History Map/ Sources: Source: NOAA, NWS, SD OEM, SD DSS, FEMA, SILVIS Lab

section four: mitigation strategies

The following goals, objectives, and actions involve long-term planning, new projects, and other activities that will allow the Meade County to effectively address hazard mitigation. The mitigation actions identified were established to accomplish three main goals: *Protect People and Property*; *Improve Public Awareness*; and *Strengthen Partnerships*. These mitigation actions will guide Meade County's mitigation efforts over the next five years.

The mitigation actions under each objective are given a priority rating of *Low*, *Medium*, or *High*. The mitigation activities were prioritized by the using the STAPLEE method; those mitigation activities that are most urgent will be implemented within the short term. In addition, responsible entities, a timeframe, and potential funding sources are identified for each mitigation action.

<i>GOAL 1: PROTECT PEOPLE & PROPERTY</i>				
Objective				
<i>Implement activities that will protect people and property from wildfire hazards.</i>				
Mitigation Actions	Responsible Entity	Priority	Timeframe	Potential Funding
<i>Continue to participate in the Firewise Communities Program and encourage other communities within the county to participate.</i>	Meade County Emergency Management	High	Ongoing	N/A
<i>Continue to establish burn bans during periods of drought to reduce the risk of wildland fires.</i>	Meade County Emergency Management	High	Ongoing	N/A
<i>Evaluate and secure funding for areas that would benefit from wildland fire mitigation activities such as combustible building material replacements and fuel reduction activities.</i>	Meade County Emergency Management, Sturgis, VFDs	High	Short-term	FEMA HMGP, PDM
<i>Continue to support the needs of local fire departments.</i>	Meade County Emergency Management	High	Ongoing	FEMA Assistance to Fire Fighters
<i>Establish a regular schedule to monitor and report drought conditions.</i>	Meade County Emergency Management	High	Short-term	N/A

Objective				
<i>Implement activities that will protect people and property in the event of severe storms.</i>				
Mitigation Actions	Responsible Entity	Priority	Timeframe	Potential Funding
<i>Evaluate areas that are in need of safe rooms and secure funding to construct safe rooms in these locations.</i>	Meade County Emergency Management	Medium	Long-term	FEMA HMGP, PDM, CDBG
<i>Set policies to ensure that there are emergency food supplies and sleeping facilities available for employees at public facilities in the event of a disaster.</i>	Meade County Emergency Management	High	Short-term	N/A
<i>Explore sources and secure funding for a safe room in Faith.</i>	Meade County Emergency Management, Faith	High	Short-term	FEMA HMGP, PDM, CDBG
<i>Create and implement a storm preparedness checklist for all storm shelters.</i>	Meade County Emergency Management	High	Short-term	N/A
Objective				
<i>Implement activities that will protect people and property from flooding.</i>				
Mitigation Actions	Responsible Entity	Priority	Timeframe	Potential Funding
<i>Secure funding to correct drainage issues in Sturgis.</i>	Meade County Emergency Management, Sturgis	High	Short-term	FEMA HMGP, PDM, DENR
<i>Secure funding to correct drainage and flooding issues in Piedmont.</i>	Meade County Emergency Management, Piedmont	High	Short-term	FEMA HMGP, PDM, DENR
<i>Support efforts to study drainage issues within Summerset and secure funding to correct identified drainage issues.</i>	Meade County Emergency Management, Summerset	High	Short-term	FEMA HMGP, PDM, DENR
<i>Explore opportunities for flood mitigation and floodplain structure relocation and property acquisition throughout the county.</i>	Meade County Emergency Management	Medium	Long-term	FEMA HMGP, PDM

<i>Explore opportunities for floodplain structure relocation and property acquisition within Piedmont.</i>	Meade County Emergency Management, Piedmont	Medium	Long-term	FEMA HMGP, PDM
<i>Maintain detailed records of public infrastructure damage from flooding, including dates of occurrences, photos, and repair costs in order to prepare for future mitigation projects.</i>	Meade County Emergency Management, Piedmont, Faith, Summerset, Sturgis	High	Ongoing	N/A
Objective				
<i>Ensure that early warnings reach the entire community.</i>				
Mitigation Actions	Responsible Entity	Priority	Timeframe	Potential Funding
<i>Continue to identify locations where sirens are needed.</i>	Meade County Emergency Management, Piedmont, Faith, Summerset, Sturgis	High	Ongoing	N/A
<i>Secure funding for sirens at locations that lack access to early warning systems.</i>	Meade County Emergency Management, Piedmont, Faith, Summerset, Sturgis	High	Ongoing	FEMA HMGP, PDM
<i>Explore other community warning system products, such as web and mobile-phone delivery systems.</i>	Meade County Emergency Management, Piedmont, Faith, Summerset, Sturgis	High	Short-term	N/A

Objective				
<i>Ensure that critical facilities are equipped with backup power.</i>				
Mitigation Actions	Responsible Entity	Priority	Timeframe	Potential Funding
<i>Inventory all generators—portable and at public buildings—throughout the county to measure backup power capacity and to assess needs.</i>	Meade County Emergency Management, Piedmont, Faith, Summerset, Sturgis, VFDs, Ambulance Services	High	Short-term	N/A
<i>Create and maintain a priority listing for generators at critical facilities.</i>	Meade County Emergency Management	High	Short-term	N/A
<i>Secure funding for generators at critical facilities.</i>	Meade County Emergency Management, Piedmont, Faith, Summerset, Sturgis	High	Short-term	FEMA HMGP, PDM, Homeland Security
Objective				
<i>Stabilize erosion, subsidence, and landslide hazard areas.</i>				
Mitigation Actions	Responsible Entity	Priority	Timeframe	Potential Funding
<i>Study and map areas prone to erosion, subsidence, and landslide hazards.</i>	Meade County Emergency Management, Meade County Planning Department	Medium	Long-term	N/A
<i>Stabilize areas prone to erosion and landslides.</i>	Meade County Emergency Management	Medium	Long-term	FEMA HMGP, PDM

<i>GOAL 2: IMPROVE PUBLIC AWARENESS</i>				
Objective				
<i>Develop and implement education and outreach programs to increase public awareness of hazards.</i>				
Mitigation Actions	Responsible Entity	Priority	Timeframe	Potential Funding
<i>Continue to support and implement public education programs that address hazard mitigation and preparedness.</i>	Meade County Emergency Management	High	Ongoing	N/A
<i>Educate the public regarding the importance and value of early warning sirens.</i>	Meade County Emergency Management	High	Short-term	N/A
<i>Develop educational programs targeted in citizens in high hazard vulnerability areas, such as Wildland-Urban Interface areas and Flood Hazard Area about mitigation techniques.</i>	Meade County Emergency Management	High	Short-term	N/A
<i>Update the Meade County Hazardous Materials Plan.</i>	Meade County Emergency Management	High	Short-term	OEM
<i>GOAL 3: STRENGTHEN PARTNERSHIPS</i>				
Objective				
<i>Strengthen emergency operations by increasing collaboration among public agencies, non-profit organizations, business, and industry.</i>				
Mitigation Actions	Responsible Entity	Priority	Timeframe	Potential Funding
<i>Coordinate mass casualty training.</i>	Meade County Emergency Management	High	Short-term	N/A
<i>Disseminate information to all relevant partners regarding public assistance requirements for animal carcass removal and disposal.</i>	Meade County Emergency Management	High	Short-term	N/A
<i>Coordinate the implementation of the activities in the Hazard Mitigation Plan with other local planning efforts, such as the Local Emergency Management Plan, and City and County land use planning efforts.</i>	Meade County Emergency Management,	High	Ongoing	N/A

	Piedmont, Faith, Summerset, Sturgis, VFDs, Ambulance Services			
<i>Continue to participate in, and incorporate mitigation planning, into the planning activities related to the Sturgis Motorcycle Rally.</i>	Meade County Emergency Management, Piedmont, Faith, Summerset, Sturgis, VFDs, Ambulance Services	High	Ongoing	N/A

section five: plan update, evaluation, and implementation

After the plan is reviewed and accepted by the Mitigation Planning Team and the local governing bodies, the Meade County Director of Emergency Management is responsible for submitting the plan to the State Hazard Mitigation Management Officer at the South Dakota Department of Public Safety. The State Hazard Mitigation Officer will then submit the plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Meade County, Piedmont, Sturgis, Summerset, and Faith will formally adopt the plan and will be eligible for Hazard Mitigation Grant Programs and other federal mitigation grants.

The Meade County Director of Emergency Management will maintain the plan and will take on the following roles and responsibilities:

1. Coordinate an annual Mitigation Planning Team meeting, develop agendas, and notify members and the public via the media;
2. Document outcomes of the meetings;
3. Serve as the communication channel between the Planning Team, County and City Departments, and other stakeholders; and,
4. Identify and seek funding sources for mitigation activities.

The Mitigation Planning Team will serve as the coordinating body for the Mitigation Plan and will take on the following roles and responsibilities to ensure plan implementation and maintenance:

1. Meet on an annual basis to review the plan;
2. Serve as the local evaluation committee for funding programs;
3. Prioritize and recommend funding for hazard mitigation projects;
4. Evaluate the plan after hazard events;
5. Document mitigation activities and successes; and,
6. Evaluate and update the plan in accordance with the required maintenance schedule.

The *Hazard Mitigation Plan for Meade County* establishes numerous mitigation actions that will reduce the community's exposure to future losses from natural hazards. There is the potential for the mitigation activities to be implemented through existing policies. The *Hazard Mitigation Plan* will be updated every five years in accordance with the requirements of the Disaster Mitigation Act of 2000. A regular annual review of the plan by the Mitigation Planning Team will occur each year on the anniversary month of the adoption of the plan. In the fourth year after plan adoption, the planning update process will commence. The plan update will be submitted to the State Hazard Mitigation Management Officer at the South Dakota Department of Public Safety no later than four years and six months from the day of adoption to ensure that a lapse does not occur.

Meade County will continue to involve the public in the review and updating of the *Hazard Mitigation Plan for Meade County*. The Mitigation Planning Team meetings will be open to the public, and the community will have the opportunity to provide input about the plan.

section six: plan adoption

Meade County, South Dakota
Resolution #__

A resolution of the Meade County Commission Declaring Support and Adoption of the Hazard Mitigation Plan for Meade County, dated ____.

WHEREAS, the Meade County Board of Commissioners supports the contents of the Hazard Mitigation Plan for Meade County; and

WHEREAS, the Hazard Mitigation Plan for Meade County will be utilized as a guide for planning related to FEMA Hazard Mitigation and other purposes as deemed appropriate by the Meade County Board of Commissioners.

NOW THEREFORE IT BE RESOLVED, that the Meade County Board of Commissioners hereby adopts, supports, and will facilitate the Hazard Mitigation Plan for Meade County implementation.

Adopted this _____ day of _____, 2016.

Chairman

ATTEST:

City of Faith, South Dakota
Resolution #__

A resolution of the City of Faith Declaring Support and Adoption of the Hazard Mitigation Plan for Meade County, dated ____.

WHEREAS, the Faith City Council supports the contents of the Hazard Mitigation Plan for Meade County; and

WHEREAS, the Hazard Mitigation Plan for Meade County will be utilized as a guide for planning related to FEMA Hazard Mitigation and other purposes as deemed appropriate by the City of Faith.

NOW THEREFORE IT BE RESOLVED, that the Faith City Council hereby adopts, supports, and will facilitate the Hazard Mitigation Plan for Meade County implementation.

Adopted this _____ day of _____, 2016.

Mayor

ATTEST:

City of Sturgis, South Dakota
Resolution #__

A resolution of the City of Sturgis Declaring Support and Adoption of the Hazard Mitigation Plan for Meade County, dated ____.

WHEREAS, the Sturgis City Council supports the contents of the Hazard Mitigation Plan for Meade County; and

WHEREAS, the Hazard Mitigation Plan for Meade County will be utilized as a guide for planning related to FEMA Hazard Mitigation and other purposes as deemed appropriate by the City of Sturgis.

NOW THEREFORE IT BE RESOLVED, that the Sturgis City Council hereby adopts, supports, and will facilitate the Hazard Mitigation Plan for Meade County implementation.

Adopted this _____ day of _____, 2016.

Mayor

ATTEST:

City of Piedmont, South Dakota
Resolution #__

A resolution of the City of Piedmont Declaring Support and Adoption of the Hazard Mitigation Plan for Meade County, dated ____.

WHEREAS, the Piedmont Town Board supports the contents of the Hazard Mitigation Plan for Meade County; and

WHEREAS, the Hazard Mitigation Plan for Meade County will be utilized as a guide for planning related to FEMA Hazard Mitigation and other purposes as deemed appropriate by the City of Piedmont.

NOW THEREFORE IT BE RESOLVED, that the Piedmont Town Board hereby adopts, supports, and will facilitate the Hazard Mitigation Plan for Meade County implementation.

Adopted this _____ day of _____, 2016.

President

ATTEST:

City of Summerset, South Dakota
Resolution #__

A resolution of the City of Summerset Declaring Support and Adoption of the Hazard Mitigation Plan for Meade County, dated ____.

WHEREAS, the Summerset City Commission supports the contents of the Hazard Mitigation Plan for Meade County; and

WHEREAS, the Hazard Mitigation Plan for Meade County will be utilized as a guide for planning related to FEMA Hazard Mitigation and other purposes as deemed appropriate by the City of Summerset.

NOW THEREFORE IT BE RESOLVED, that the Summerset City Commission hereby adopts, supports, and will facilitate the Hazard Mitigation Plan for Meade County implementation.

Adopted this _____ day of _____, 2016.

Mayor

ATTEST:

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appendix a: hazard history

FEDERAL DISASTER DECLARATIONS, MEADE COUNTY Source: FEMA						
DISASTER NUMBER	DECLARATIO N DATE	DISASTER TYPE	INCIDENT TYPE	TITLE	INCIDENT BEGIN DATE	INCIDENT END DATE
4155	11/8/2013	DR	Severe Storm(s)	SEVERE WINTER STORM, SNOWSTORM, AND FLOODING	10/3/2013	10/16/2013
1887	3/10/2010	DR	Severe Storm(s)	SEVERE WINTER STORM	1/20/2010	1/26/2010
1811	12/12/2008	DR	Snow	SEVERE WINTER STORM AND RECORD AND NEAR RECORD SNOW	11/5/2008	11/7/2008
1774	7/9/2008	DR	Severe Storm(s)	SEVERE STORMS AND FLOODING	6/2/2008	6/12/2008
2658	7/27/2006	FM	Fire	EAST RIDGE FIRE	7/27/2006	8/7/2006
1647	6/5/2006	DR	Severe Storm(s)	SEVERE WINTER STORM	4/18/2006	4/20/2006
3234	9/10/2005	EM	Coastal Storm	HURRICANE KATRINA EVACUATION	9/6/2005	10/1/2005
2565	7/10/2005	FM	Fire	SD RICCO FIRE	7/9/2005	7/19/2005
1173	4/7/1997	DR	Flood	SEVERE FLOODING, SEVER WINTER STORMS,HEAVY RAINS HIGH WINDS	2/3/1997	5/24/1997
1161	2/28/1997	DR	Severe Storm(s)	SEVERE WINTER STORM	11/13/1996	11/26/1996
1156	1/10/1997	DR	Severe Storm(s)	SEVERE WINTER STORMS AND BLIZZARD CONDITIONS	1/3/1997	1/31/1997
1052	5/26/1995	DR	Flood	FLOODING	3/1/1995	6/20/1995
511	6/25/1976	DR	Flood	FLASH FLOODING & MUDSLIDES	6/25/1976	6/25/1976
3015	6/17/1976	EM	Drought	DROUGHT	6/17/1976	6/17/1976
336	6/10/1972	DR	Flood	HEAVY RAINS & FLOODING	6/10/1972	6/10/1972
197	5/26/1965	DR	Flood	FLOODING	5/26/1965	5/26/1965

HISTORY OF SIGNIFICANT HAZARD EVENTS IN MEADE COUNTY Source: National Climatic Data Center, Storm Events Database								
BEGIN DATE	EVENT TYPE	NARRATIVE	MAGNITUDE	TORN ADO F SCALE	DEATHS (DIRECT)	INJURIES (DIRECT)	PROPERTY DAMAGE (\$)	CROPS DAMAGE (\$)
7/14/1979	Tornado	Not available	0	F1	0	0	250000	0
6/30/1986	Hail	Not available	3		0	20	0	0
6/16/1989	Tornado	Not available	0	F1	0	4	250000	0
5/11/1991	Tornado	Not available	0	F2	0	5	250000	0
5/11/1991	Tornado	Not available	0	F3	0	20	2500000	0
6/14/1996	Flash Flood	Torrential downpours from a nearly stationary thunderstorm dumped more than 5 inches, and locally as much as 10 inches of rain between Sturgis and Hereford from 1600-1900 MST. Flooding mostly affected locations along Alkali Creek. Several spotter rain gauge reports were unavailable because the gages were washed away. The road from Sturgis to Hereford was washed out. Severe damage occurred to numerous fences, corrals, farm equipment, automobiles and homes. Several livestock were swept away, but most were later recovered. Hay fields received extensive damage. No injuries or fatalities are known to have occurred.			0	0	250000	10000
10/26/1996	Winter Storm	A winter storm with heavy snow and gusty northwest winds created blizzard-like conditions over western South Dakota. The heaviest snow fell in the central and northern Black Hills where one to two feet was common. Lead received 38.9 inches, setting an all-time state record for 24 hour snowfall. Winds frequently gusted over 45 mph, reducing visibility to zero and creating drifts several feet deep. Many roads in the Lead-Deadwood area were blocked for over 24 hours. The wet heavy snow downed numerous power lines and poles. Electric service to some rural areas was out for five days. Damage to power lines and poles in western South Dakota was estimated near \$600,000.			0	0	75000	0
6/26/1998	Hail	Not available	4.5		0	1	0	0
3/10/1999	Winter Storm	A surface low pressure system just south of the Black Hills combined with an upper level short wave over southwestern South Dakota created some locally heavy snowfall across the region. Generally, amounts ranged from 6 to 10 inches. The highest amounts were in the foothills near Sturgis, SD where up to 18 inches were reported.			0	3	0	0

HISTORY OF SIGNIFICANT HAZARD EVENTS IN MEADE COUNTY**Source: National Climatic Data Center, Storm Events Database**

BEGIN DATE	EVENT TYPE	NARRATIVE	MAGNITUDE	TORN ADO F SCALE	DEATHS (DIRECT)	INJURIES (DIRECT)	PROPERTY DAMAGE (\$)	CROPS DAMAGE (\$)
7/4/2000	Hail	A single thunderstorm that originated along the Wyoming and Montana state line moved across west-central South Dakota. Hail the size of golfballs and baseballs were reported throughout central Meade County. Also in Meade County, high winds with gusts estimated over 80 mph, caused extensive damage. Numerous sheds were blown down, homes had siding and roof damage, 2x4's were driven into walls, trees were blown over, large hay bales were rolled across fields, and six power poles were blown over. 40 lambs and ewes were killed by the large hail; with another 40 were crippled or blinded and had to be destroyed. In Ziebach County, a mobile home was damaged by high winds. Several outbuildings were also damaged.	2.5		0	0	100000	75000
8/26/2002	Hail	Softball sized hail fell south of Elm Springs. The hail fell on open pasture and no damage or injuries were reported.	4.5		0	0	0	0
6/21/2003	Hail	A supercell thunderstorm developed in northeastern Butte County and moved across northern Meade County and into central Ziebach County. Numerous reports of 1 inch hail were received along with some golf ball and tennis ball sized hail in Faith.	2.5		0	0	250000	0
5/21/2004	Hail	Severe thunderstorms developed across southern Meade County and then moved slowly eastward across northeast Pennington, northern Jackson, and Haakon Counties during the late afternoon and early evening. The storms produced very large hail with many reports of golf ball sized hail. When the storms first developed, hail to the size of baseballs fell near Black Hawk. Quarter to Baseball sized hail fell for several minutes causing automobile accidents and hail damage to automobiles.	2.75		0	0	100000	0

HISTORY OF SIGNIFICANT HAZARD EVENTS IN MEADE COUNTY**Source: National Climatic Data Center, Storm Events Database**

BEGIN DATE	EVENT TYPE	NARRATIVE	MAGNITUDE	TORN ADO F SCALE	DEATHS (DIRECT)	INJURIES (DIRECT)	PROPERTY DAMAGE (\$)	CROPS DAMAGE (\$)
5/11/2005	Winter Storm	A strong late spring storm developed across the Central Rockies and moved across the Northern Plains. The storm brought abundant amounts of precipitation to the area. Rain changed to sleet and then eventually to snow across far western South Dakota during the afternoon and early evening hours as colder air moved in. Snowfall amounts were highest across the higher elevations of northwest South Dakota, the Black Hills, and northern and eastern Foothills, where 6 to 12 inches accumulated. The heavy wet snow downed many tree limbs across the area and caused some power outages.			0	0	100000	0
6/7/2005	Hail	A supercell thunderstorm developed across northern Meade County and moved northeast into Ziebach County. This storm produced a swath of very large hail from northeast Meade County into southwest Ziebach County. Hail to the size of softballs fell south of Faith, with golf ball to baseball sized hail from north of Marcus to north of Red Scaffold.	4.25		0	0	5000	0
10/4/2005	Winter Storm	A strong low pressure system developed over the Central Rockies and moved through the Northern Plains, bringing heavy snow to much of the northern Black Hills and far northwest South Dakota. Precipitation started as rain during the day and changed over to snow during the late afternoon and early evening, mixed with freezing rain and sleet. Heavy snow fell during the night and ended in the morning. Snowfall amounts were generally in the 6 to 12 inch range, with locally heavier amounts across northern and western Harding County. The heavy, wet snow resulted in many downed trees, large branches, and power lines. This caused numerous power outages and some minor property damage.			0	0	250000	0

HISTORY OF SIGNIFICANT HAZARD EVENTS IN MEADE COUNTY								
Source: National Climatic Data Center, Storm Events Database								
BEGIN DATE	EVENT TYPE	NARRATIVE	MAGNITUDE	TORN ADO F SCALE	DEATHS (DIRECT)	INJURIES (DIRECT)	PROPERTY DAMAGE (\$)	CROPS DAMAGE (\$)
4/18/2006	Winter Storm	A major spring storm moved across the Central and Northern Plains, bringing significant amounts of rain and snow and gusty winds to much of western South Dakota. Snowfall was heaviest across the northern and central Black Hills, as well as far northwest South Dakota, where 1 to 2 feet fell. Favored upslope areas of the northern Black Hills received 2 to 5 feet of snow. Strong northwest winds gusting to 60 mph, created blizzard conditions across Harding, Butte, and Lawrence counties. Drifts to 15 feet high were reported across Harding and Butte counties. Power poles and trees were downed by the combination of heavy wet snow and wind, which resulted in widespread and prolonged power outages across northwest South Dakota and the Black Hills. Interstate 90 was closed from Rapid City to the Wyoming border for more than 24 hours.			0	0	2000000	0
8/17/2007	Flash Flood	Severe thunderstorms developed and remained stationary over the northeastern slopes of the Black Hills, producing very large hail and heavy rain. The most extensive damage was in the Piedmont area, where the hail broke windows and damaged roofs. Interstate 90 was lined with numerous vehicles that stopped after being damaged by the hail. An estimated four to six inches of rain and hail to the size of baseballs caused localized flooding between Piedmont and Tilford, especially near poor drainage areas and at a barricade along a frontage road. The water washed over several roads and was several inches deep over Interstate 90, forcing law enforcement officials to close it for a couple of hours.			0	0	250000	0
8/17/2007	Hail	Severe thunderstorms developed and remained stationary over the northeastern slopes of the Black Hills, producing very large hail and heavy rain. The most extensive damage was in the Piedmont area, where the hail broke windows and damaged roofs. Interstate 90 was lined with numerous vehicles that stopped after being damaged by the hail.	2.75		0	0	20000	0

HISTORY OF SIGNIFICANT HAZARD EVENTS IN MEADE COUNTY								
Source: National Climatic Data Center, Storm Events Database								
BEGIN DATE	EVENT TYPE	NARRATIVE	MAGNITUDE	TORN ADO F SCALE	DEATHS (DIRECT)	INJURIES (DIRECT)	PROPERTY DAMAGE (\$)	CROPS DAMAGE (\$)
1/4/2008	High Wind	Strong southwesterly winds developed along the northern and eastern slopes of the Black Hills during the evening and continued overnight. The strongest winds were just south and west of Spearfish, where gusts exceeded 80 mph in the evening. A peak gust of 91 mph was recorded five miles west of Spearfish.	52		0	0	25000	0
6/4/2008	Flash Flood	One to two inches of rain and four inches of hail fell in less than 30 minutes, causing flash flooding on the north side of Rapid City and Country Road along the Pennington/Meade County line. Homes, highways, and streets were damaged.			0	0	1000000	0
6/4/2008	Flood	Two to three inches of rain in 18 hours on saturated soils caused flooding in central and eastern Pennington County and southern Meade County on June 4. An additional one to two inches of rain on June 5 exacerbated the flooding. Houses, highways, and streets were damaged by the high water and several stock dams failed. Elk Creek, Alkali Creek, Antelope Creek, the Belle Fourche River and their tributaries flooded from east of Piedmont to Viewfield and Elm Springs.			0	0	500000	1000000
11/5/2008	Winter Storm	An intense fall storm produced blizzard conditions across the South Dakota plains for over 24 hours. Precipitation started as rain during the day and changed to heavy, wet snow during the evening of the 5th. Snow and blowing snow continued through much of the 6th with visibility near zero much of the time. Snowfall amounts were six to 18 inches with drifts 12 feet high. More than two thousand power poles were downed, causing widespread power outages that affected thousands of residents. Some locations did not have power for over a week, especially across the Pine Ridge Reservation. Most roads across the area, including Interstate 90, were closed for 24 hours or longer. Many livestock died from hypothermia. Officials estimated total damage around 5 million dollars.			0	0	11000000	0

HISTORY OF SIGNIFICANT HAZARD EVENTS IN MEADE COUNTY								
Source: National Climatic Data Center, Storm Events Database								
BEGIN DATE	EVENT TYPE	NARRATIVE	MAGNITUDE	TORN ADO F SCALE	DEATHS (DIRECT)	INJURIES (DIRECT)	PROPERTY DAMAGE (\$)	CROPS DAMAGE (\$)
3/23/2009	Winter Storm	A powerful spring storm brought rain, snow, and very strong winds to western South Dakota. Precipitation started as rain, then changed to snow, and blizzard conditions developed. The heaviest snow fell over the northern Black Hills, where 18 to 48 inches of snow was measured. Ten to 20 inches of snow fell across far northwestern South Dakota, with drifts as high as ten feet. Most other locations received at least six inches of snow. Sustained winds of 30 to 55 mph, with gusts over 80 mph, were reported. Interstate 90 and other highways were closed for more than 24 hours. Some power outages were reported, mainly across the northern Black Hills and northwestern South Dakota. Tens of thousands of livestock perished.			0	0	6625000	0
3/30/2009	Winter Storm	The second blizzard in a week brought heavy snow and strong winds to the western South Dakota plains. Northwest wind gusts to 50 mph produced significant blowing and drifting snow, reducing visibilities to near zero for many hours. Reports of six to 12 inches of snow were common, with higher amounts across northwestern South Dakota. Interstate 90 and many other highways were closed for a considerable period of time. More livestock losses occurred during the peak of calving and lambing season.			0	0	150000	0
6/14/2009	Hail	Two supercell thunderstorms developed over southwestern Meade County and moved slowly eastward across southern Meade County. The storms merged and moved into central and eastern Pennington County. Very large hail and heavy rain fell from Sturgis to New Underwood. Flooding occurred over south central Meade County, where two to three inches of rain fell in a short time. Hail to the size of baseballs fell.	2.75		0	0	100000	0
8/7/2009	Hail	A supercell thunderstorm developed across the northern Black Hills and moved eastward across the Sturgis area, southern Meade County, northeastern Pennington County, Haakon County, and northeastern Jackson County. The storm produced baseball sized near Sturgis, then strong winds and hail larger than baseball sized developed as the storm moved across the plains. The storm hit Sturgis during the annual motorcycle rally and	2.5		0	0	200000	0

HISTORY OF SIGNIFICANT HAZARD EVENTS IN MEADE COUNTY**Source: National Climatic Data Center, Storm Events Database**

BEGIN DATE	EVENT TYPE	NARRATIVE	MAGNITUDE	TORN ADO F SCALE	DEATHS (DIRECT)	INJURIES (DIRECT)	PROPERTY DAMAGE (\$)	CROPS DAMAGE (\$)
		caused extensive damage to motorcycles, vehicles, and property. Minor injuries from the hail were also reported. Baseball sized hail caused significant damage to automobiles, motorcycles, and property at a large bar and campground east of Sturgis.						
5/24/2010	Tornado	Severe thunderstorms spawned five tornadoes from southeastern Meade into northeastern Perkins County. A tornado touched down south of Plainview and traveled more than 22 miles to (). It damaged a manufactured home shortly after it formed, tearing off its roof and blowing over its walls. It also destroyed an old, abandoned house and pole barn and tossed a combine, hay swather, and van.		EF2	0	0	100000	0
5/24/2010	Flash Flood	Heavy rain caused flash flooding in southern Meade County from Black Hawk to Elm Springs. Flash flooding was reported along Elk Creek, Antelope Creek, and Box Elder Creek. A few homes reported water in their basements and several county roads were flooded.			0	0	150000	0
5/25/2013	Hail	A long-lived supercell thunderstorm developed over southeastern Butte County and western Meade County and tracked slowly east-southeast across Meade County. The storm produced very large hail over a five-hour period.	2.5		0	0	10000	0
7/20/2013	Hail	A supercell thunderstorm developed over northern Butte County and tracked southeastward across Meade County. The storm produced hail to golf ball size along its path.	2		0	0	20000	0
10/4/2013	Winter Storm	A historic blizzard pounded western South Dakota with record-setting snowfall and strong winds for almost 48 hours from the evening of October 3 through the afternoon of October 5. One to two feet of snow was reported over the plains of western South Dakota, with three to five feet of snow falling over the northern and central Black Hills. Wind gusts to 70 mph across the plains produced significant blowing and drifting snow, with visibilities near zero for much of the day on October 4. The heavy wet snow and strong winds downed trees and power lines, causing prolonged outages and impassible highways. The roofs of several businesses, a middle school, and community center collapsed from the heavy snow. Thousands of livestock were killed from hypothermia, suffocation, or drowning. The South Dakota Animal			0	0	0	0

HISTORY OF SIGNIFICANT HAZARD EVENTS IN MEADE COUNTY								
Source: National Climatic Data Center, Storm Events Database								
BEGIN DATE	EVENT TYPE	NARRATIVE	MAGNITUDE	TORN ADO F SCALE	DEATHS (DIRECT)	INJURIES (DIRECT)	PROPERTY DAMAGE (\$)	CROPS DAMAGE (\$)
		Industry Board received reports of over 21,000 cattle; over 1300 sheep; 400 horses; and 40 bison deaths from the storm. Tree and debris removal costs were several million dollars.						
5/29/2014	Flash Flood	A cluster of thunderstorms developed and regenerated over southwestern Meade County during the late afternoon and early evening. Quarter to golf ball size hail occasionally fell in the Bear Butte area. In less than four hours, two to five inches of rain fell over parts of the Sturgis and Bear Butte areas. Runoff overwhelmed drainage systems and small creeks, causing minor flooding. Runoff from heavy rain flooded streets and several basements in Sturgis. A drainage channel on the south side of Sturgis filled with water and flooded Harmon Street and Hillside Drive. Minor flooding was reported along Spring Creek at SD Highway 34 about 12 miles northeast of Sturgis.			0	0	150000	0
6/25/2014	Hail	A severe thunderstorm developed in the Tilford and Piedmont areas and slowly moved east-southeast across far southwestern Meade County. The storm produced large hail, with a few stones larger than golf balls.	2.25		0	0	50000	0

HISTORY OF SIGNIFICANT HAZARD EVENTS IN MEADE COUNTY								
Source: National Climatic Data Center, Storm Events Database								
BEGIN DATE	EVENT TYPE	NARRATIVE	MAGNITUDE	TORN ADO F SCALE	DEATHS (DIRECT)	INJURIES (DIRECT)	PROPERTY DAMAGE (\$)	CROPS DAMAGE (\$)
5/9/2015	Winter Storm	A strong late spring storm brought significant snowfall across much of western South Dakota. Rain changed to snow during the day on the 9th, with snow continuing into the next day, moderate to heavy at times. Northwest winds produced areas of blowing and drifting snow, with gusts around 45 mph over the west central South Dakota plains producing blizzard conditions on the 10th. Snowfall ranged from five to ten inches over northwestern South Dakota and eight to 16 inches fell over southwestern South Dakota. The northern Black Hills received 12 to 24 inches.			0	0	0	0
6/1/2015	Flood	A slow-moving supercell thunderstorm developed along the northeastern foothills of the Black Hills, producing large hail and heavy rain in the Piedmont and Black Hawk area. Very large hail was reported around Piedmont, where significant damage was reported. The storm also produced as much as seven inches of rain in less than three hours. Runoff damaged city and county streets and forced the closure of Interstate-90 for several hours. Flooding along Elk Creek inundated yards, houses, and roads in the Golden Valley Subdivision; covered Elk Creek Road between Elk Vale Road and Antelope Creek Road; and flooded agricultural land.			0	0	1000	0
6/1/2015	Hail	A slow-moving supercell thunderstorm developed along the northeastern foothills of the Black Hills, producing large hail and heavy rain in the Piedmont and Black Hawk area. Very large hail was reported around Piedmont, where significant damage was reported. The storm also produced as much as seven inches of rain in less than three hours. Runoff damaged city and county streets and forced the closure of Interstate-90 for several hours. Tennis ball to softball sized hail pummeled Piedmont.	4.5		0	0	500000	0

HISTORY OF SIGNIFICANT HAZARD EVENTS IN MEADE COUNTY**Source: National Climatic Data Center, Storm Events Database**

BEGIN DATE	EVENT TYPE	NARRATIVE	MAGNITUDE	TORN ADO F SCALE	DEATHS (DIRECT)	INJURIES (DIRECT)	PROPERTY DAMAGE (\$)	CROPS DAMAGE (\$)
6/19/2015	Tornado	A long-lived complex of severe thunderstorms tracked from southeastern Montana across northwestern South Dakota. The strongest storms produced hail to six inches in diameter, wind gusts over 80 mph, and a tornado in southern Meade County. Significant structure, property, and crop damage was reported in Butte and Meade Counties. Livestock were killed by the large hail in the Nisland area, with one rancher losing 35 sheep. The storms continued into south central South Dakota, but no reports were received due to a widespread power outage. A tornado touched down in rural southern Meade County, damaging buildings and tossing equipment at two ranches.		EF2	0	0	100000	0

endnotes

¹FEMA's Local Mitigation Planning Handbook. March 2013. Page 5-1

² United States Census Meade County Quick Facts, October 14, 2015

³ Among counties with a population greater than 10,000 people

⁴ United States Census Meade County Quick Facts, October 14, 2015

⁵ Holland, Deb. Rapid City Journal, March 28, 2014. *Meade is 8th-fastest growing county in nation, Census Bureau says.*

⁶ 2015 Sturgis Motorcycle Rally Statistics, *Sturgis Motorcycle Rally*.

⁷ United States Census, Building Permit Survey.

⁸ FEMA Local Mitigation Planning Handbook, March 2013, page S-11.

⁹ South Dakota State Hazard Mitigation Plan, 2014

¹⁰ South Dakota State Hazard Mitigation Plan, 2014. Table 3-46 Digital Flood Insurance Rate Maps Base Flood Loss Estimations.

¹¹ South Dakota State Hazard Mitigation Plan, 2014. Appendix 3C. South Dakota Flood Insurance Policies and Losses by County.

¹² The Wildland Urban Interface. SILVIS Lab. <http://silvis.forest.wisc.edu/maps/wui>.

¹³ WUI is comprised of interface and intermix communities. In intermix communities, housing and vegetation intermingle, wildland vegetation is continuous (more than 50 percent vegetation), and have more than 1 house per 40 acres. Interface communities have more than 1 house per 40 acres, less than 50 percent vegetation, and are within 1.5 miles of an area (made up of one or more contiguous Census blocks) over 1,325 acres that is more than 75 percent vegetated. SILVIS Lab.

¹⁴ South Dakota State Hazard Mitigation Plan, 2014. Table 3-59 South Dakota Crop Loss Due to Drought: 2002 and 2012.

¹⁵ No Special Flood Hazard Area – All Zone C