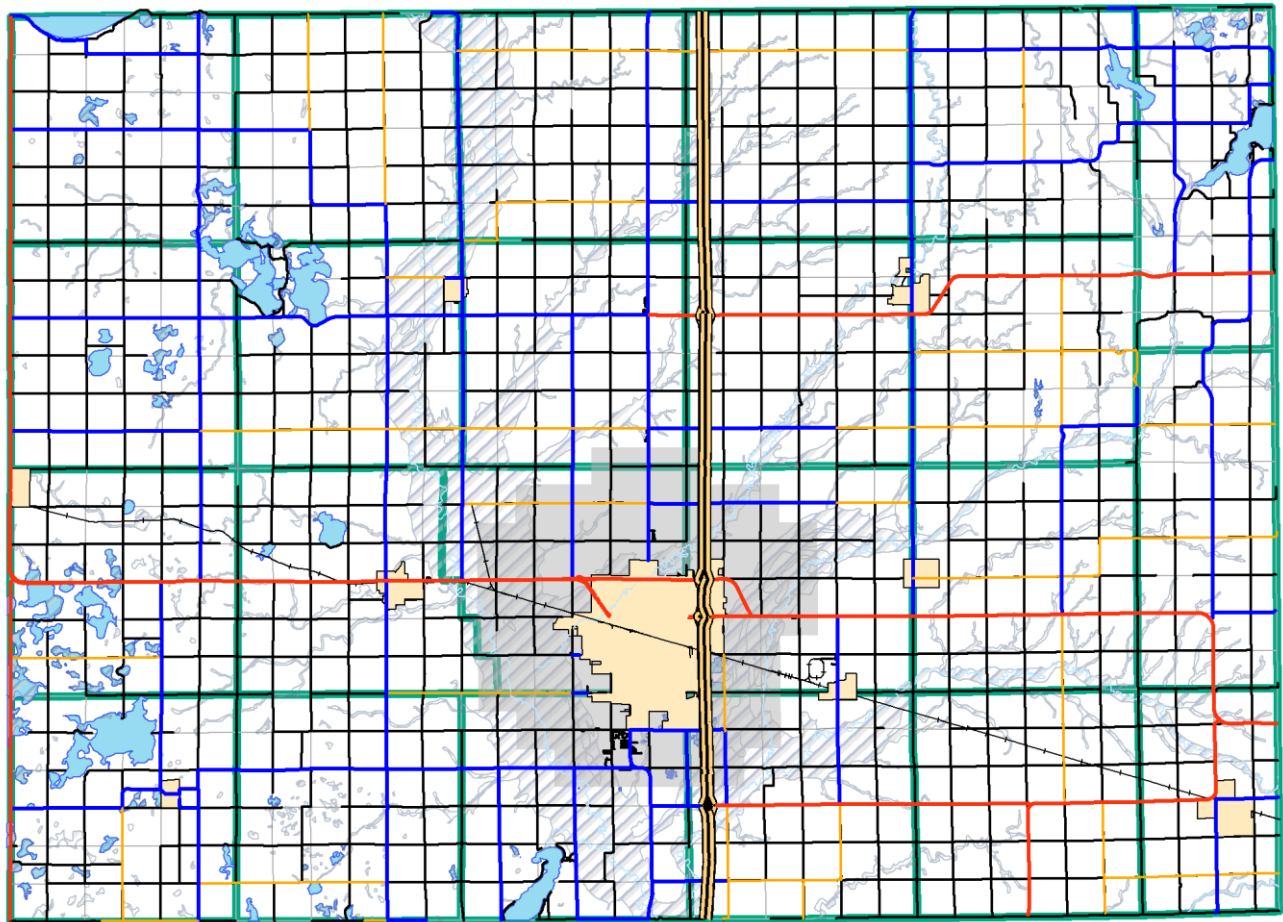




Brookings County Pre-Disaster Mitigation Plan 2019 - 2024



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CHAPTER 1 INTRODUCTION

INTRODUCTION

Brookings County (County) is vulnerable to natural hazards that have the possibility of causing serious threat to the health, welfare, and security of our citizens. The cost of response and recovery, in terms of potential loss of life or loss of property, from potential disasters can be lessened when attention is turned to mitigating their impacts and effects before they occur or re-occur.

This plan is an update of the Pre-Disaster Mitigation Plan (PDM) that was updated by the County in 2014. The document will serve as a strategic planning tool for use by the county and its communities in its efforts to mitigate against future disaster events. The plan identifies and analyzes the natural disasters that may occur in the County in order to understand the county's vulnerabilities and propose mitigation strategies that minimize future damage caused by those hazards. This knowledge will help identify solutions that can significantly reduce threat to life and property. The plan is based on the premise that hazard mitigation works. With increased attention to mitigating natural hazards, communities can do much to reduce threats to existing citizens and avoid creating new problems in the future. In addition, many mitigation actions can be implemented at minimal cost.

In the past 10 years there have been 20 Major Disaster Declarations which have occurred fully or partially within the state of South Dakota, including 6 which occurred in 2010. With three of those declarations including the county, Brookings County is not a stranger to natural and man-made disasters. In order to prevent and reduce the cost that is incurred by businesses, citizens, and property owners from these disasters, the Brookings County Pre-Disaster Mitigation Plan developed. This plan identifies hazards that occur throughout Brookings County and mitigation projects that will aid in preventing and reducing the effects of those disasters on the property and lives within. Special consideration has been given to critical infrastructure throughout the county.

This is not an emergency response or emergency management plan. Certainly, the plan can be used to identify weaknesses and refocus emergency response planning. Enhanced emergency response planning is an important mitigation strategy. However, the focus of this plan is to support better decision making directed toward avoidance of future risks and the implementation of activities or projects that will eliminate or reduce the risk for those that may already have exposure to a natural hazard threat.

AUTHORITY FOR PRE-DISASTER MITIGATION PLAN

In October of 2000, the Disaster Mitigation Act (DMA2K) was signed to amend the 1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 (a-d) requires that local governments, as a condition of receiving federal disaster mitigation funds, have a pre-disaster mitigation (PDM) plan in place that:

1. Identifies hazards and their associated risks and vulnerabilities;
2. Develops and prioritizes mitigation projects; and
3. Encourages cooperation and communication between all levels of government and the public.

The objective of this plan is to meet the hazard mitigation planning needs for the County and participating entities. Consistent with the Federal Emergency Management Agency's guidelines, this plan will review all possible activities related to disasters to reach efficient solutions, link hazard management policies to specific activities, educate and facilitate communication with the public, build public and political support for mitigation activities, and develop implementation and planning requirements for future hazard mitigation projects.

PURPOSE

The County PDM is a planning tool to be used by the County, as well as other local, state and federal units of government, in their efforts to fulfill federal, state, and local hazard mitigation planning responsibilities; to promote pre and post disaster mitigation measures, short/long range strategies that minimize suffering, loss of life, and damage to property resulting from hazardous or potentially hazardous conditions to which citizens and institutions within the county are exposed; and to eliminate or minimize conditions which would have an undesirable impact on our citizens, economy, environment, or the well-being of the County. This plan will aid city, township, and county agencies and officials in enhancing public awareness to the threat hazards have on property and life, and what can be done to help prevent or reduce the vulnerability and risk of each County jurisdiction.

USE OF PLAN

The plan will be used to help the county and communities and their elected and appointed officials:

- Plan, design and implement programs and projects that will help reduce their community's vulnerability to natural hazards
- Facilitate inter-jurisdictional coordination and collaboration related to natural hazard mitigation planning and implementation.
- Develop or provide guidance for local emergency response planning.
- Be compliant with the Disaster Mitigation Act of 2000.

SCOPE OF PLAN

- Provide opportunities for public input and encourage participation and involvement regarding the mitigation plan.
- Identify hazards and vulnerabilities within the county and local jurisdictions.
- Combine risk assessments with public and emergency management ideas.
- Develop goals based on the identified hazards and risks.
- Review existing mitigation measures for gaps and establish projects to sufficiently fulfill the goals.
- Prioritize and evaluate each strategy/objective.
- Review other plans for cohesion and incorporation with the PDM.
- Establish guidelines for updating and monitoring the plan.
- Present the plan to the Brookings County Commissioners and the participating communities within the county for adoption.

WHAT IS HAZARD MITIGATION?

Hazard mitigation is defined as any cost-effective action(s) that has the effect of reducing, limiting, or preventing vulnerability of people, property, and the environment to potentially damaging, harmful, or costly hazards. Hazard mitigation measures, which can be used to eliminate or minimize the risk to life and property, fall into three categories. First are those that keep the hazard away from people, property, and structures. Second are those that keep people, property, and structures away from the hazard. Third are those that do not address the hazard at all but rather reduce the impact of the hazard on the victims such as insurance. This mitigation plan has strategies that fall into all three categories.

Hazard mitigation measures must be practical, cost effective, and environmentally and politically acceptable. Actions taken to limit the vulnerability of society to hazards must not in themselves be more costly than the value of anticipated damages.

The primary focus of hazard mitigation actions must be at the point at which capital investment decisions are made and based on vulnerability. Capital investments, whether for homes, roads, public utilities, pipelines, power plants, or public works, determine to a large extent the nature and degree of hazard vulnerability of a community. Once a capital facility is in place, very few opportunities will present themselves over the useful life of the facility to correct any errors in location or construction with respect to hazard vulnerability. It is for these reasons that zoning and other ordinances, which manage development in high vulnerability areas, and building codes, which ensure that new buildings are built to withstand the damaging forces of hazards, are often the most useful mitigation approaches a jurisdiction can implement.

Previously, mitigation measures have been the most neglected programs within emergency management. Since the priority to implement mitigation activities is generally low in comparison to the perceived threat, some important mitigation measures take time to implement. Mitigation success can be achieved, however, if accurate information is portrayed through complete hazard identification and impact studies, followed by effective mitigation management. Hazard mitigation is the key to eliminating long-term risk to people and property in South Dakota from hazards and their effects. Preparedness for all hazards includes: response and recovery plans, training, development, management of resources, and mitigation of each jurisdictional hazard.

This plan evaluates the impacts, risks and vulnerabilities of natural hazards within the jurisdictional area of the entire county. The plan supports, provides assistance, identifies and describes mitigation projects for each of the local jurisdictions who participated in the plan update. The suggested actions and plan implementation for local governments could reduce the impact of future natural hazard occurrences. Lessening the impact of natural hazards can prevent such occurrences from becoming disastrous but will only be accomplished through coordinated partnership with emergency managers, political entities, public works officials, community planners and other dedicated individuals working to implement this program.

BROOKINGS COUNTY PROFILE

Population

Brookings County is in eastern South Dakota. It borders Hamlin and Deuel Counties to the north, Lincoln County, MN to the east, Moody and Lake Counties to the south, and Kingsbury County to the west. The county has a geographic area of 792 square miles and its Census 2010 population was 31,965, which averages to 40.6 persons per square mile. Just about ten percent of the population is older than age 65. Education levels of persons age twenty-five and older include ninety-two percent high school graduates and thirty-eight percent college level.

The county seat is Brookings, which is situated at the intersection of Interstate 29 and US Highway 14. Table 1.1 shows the population and number of housing units of the county's municipalities. It should be noted that a small portion of the City of Arlington is located within Brookings County, but only two housing units (8 individuals) and no municipally provided infrastructure is located in Brookings County. Most of the City of Arlington is located in Kingsbury County, and is therefore not included in this plan. Table 1.2 lists the twenty-three County Townships by population. The County has continued to experience population growth since 1960. This is due primarily to the growth of the City of Brookings, which serves as the governmental, employment and trade center for the county and region. South Dakota State University in Brookings has also seen an increase in enrollment.

Table 1.1: Brookings County Municipalities

Name	Population	Location	Elevation	Housing Units
Aurora	532	44 17'03" N 96 41'08" W	1,624 feet	256
Brookings	22,056	44 18'41" N 96 47'54" W	1,621 feet	8,715
Bruce	204	44 26'17" N 96 53'23" W	1,627 feet	111
Bushnell	65	44 19'43" N 96 38'33" W	1,690 feet	32
Elkton	736	44 14'04" N 96 28'48" W	1,752 feet	324
Sinai	120	44 14'40" N 97 02'27" W	1,781 feet	61
Volga	1,768	44 19'24" N 96 55'22" W	1,634 feet	783
White	485	44 26'00" N 96 38'45" W	1,798 feet	212
Unincorporated Areas	5,991			2,641
Brookings County	31,965	44 18'30" N 96 49'01" W	1,611 feet	13,137

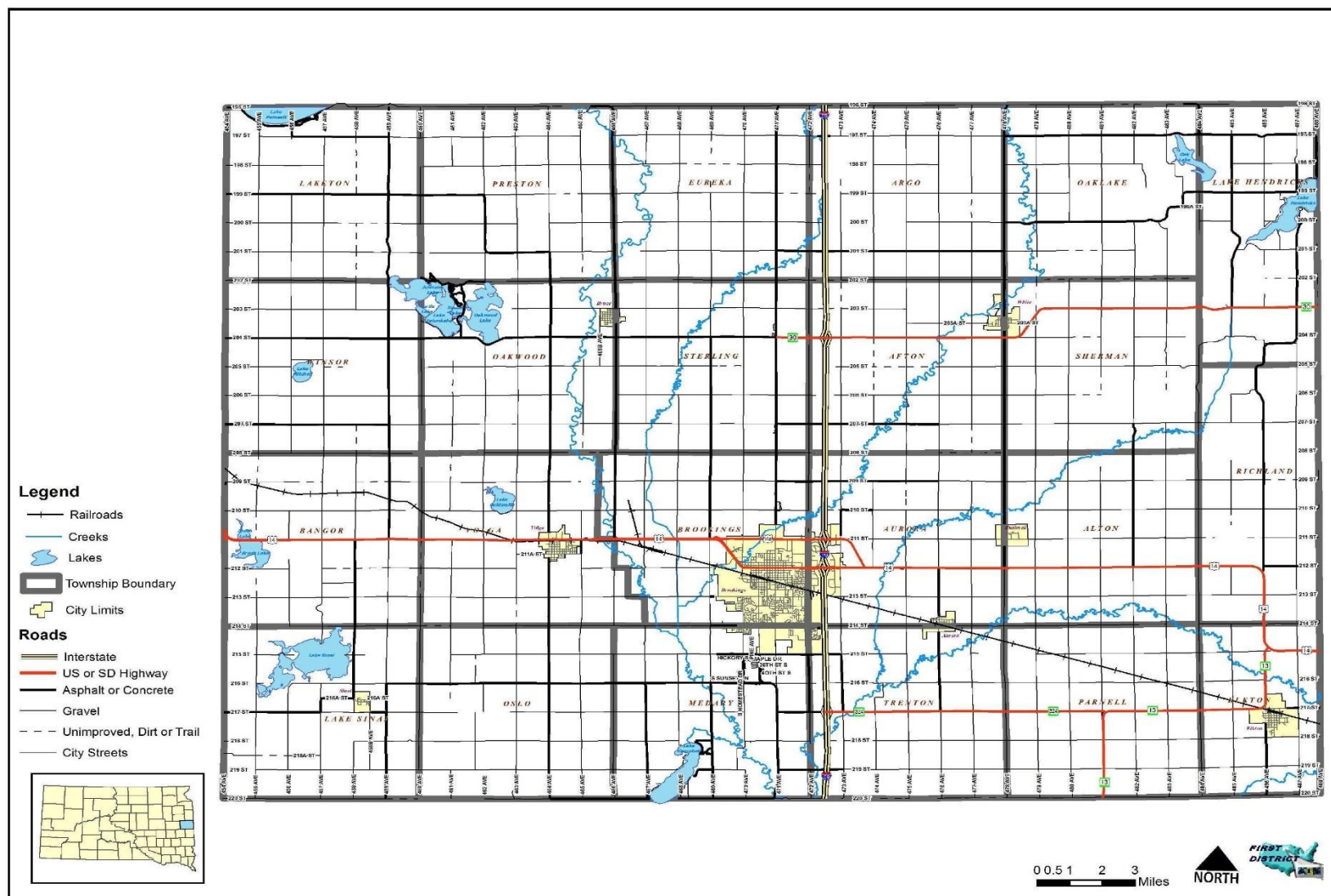
Source: 2010 Census, www.Lat-Long.com, www.usbeacon.com

Table 1.2: Brookings County Townships

Source: 2010 Census

Township	Population	Township	Population
Afton	212	Oak Lake	100
Alton	228	Oakwood	189
Argo	131	Oslo	202
Aurora	294	Parnell	144
Bangor	145	Preston	183
Brookings	431	Richland	199
Elkton	94	Sherman	227
Eureka	158	Sterling	378
Lake Hendricks	189	Trenton	174
Lake Sinai	175	Volga	383
Laketon	169	Winsor	159
Medary	1,427		

Figure 1.1 Political Map



Social and Economic Description

Brookings County according to the Robert Wood Johnson Foundation and the University of Wisconsin Population Health Institute ranks among the healthiest counties in South Dakota. The County's economy is dependent upon its agricultural and manufacturing sectors. Most non-agricultural employment is in manufacturing, education, health care, or service industries. Some notable employers in the City of Brookings are South Dakota State University, Larson's Manufacturing, Daktronics, 3M Manufacturing, and Bel Brands. Brookings is the governmental, employment and retail hub for the county and region. The remaining rural communities in the County serve as bedroom communities to Brookings and provide "small town" atmosphere to those residents. A large majority of the residents within these community's commute to Brookings or other employment centers. Most of the communities have limited retail and service sectors which provide basic needs to its residents.

Physical Description and Climate

The climate of Brookings County is a typical example of the humid-continental climate having four easily distinguishable seasons. Brookings County generally experiences frequent cold, dry polar or arctic air masses in winter, while warm, moist maritime air moves northward during the summer months. Circulation around low-pressure areas moving toward the east or northeast is one of the causes of the northward flow of warm gulf air into the County. The principal source of moisture is the northward flow of air from the Gulf of Mexico. The wind around the western side of the Bermuda high-pressure area, which intensifies in summer, contributes to the northward flow of air. In winter, a reverse monsoon effect caused by the outflow of cold air from the interior contributes to the generally easterly movement of cold air masses across the country. Squall lines in advance of cold fronts, and individual thunderstorms and tornadoes bring very strong, sometimes destructive winds, particularly in summer.

The climate of Brookings County strongly reflects continental conditions, where there are no large bodies of water to affect the climate. Temperatures reflect a large annual and diurnal (day to day) range. During the summer, temperatures may rise to 100 degrees (f), and drop to 20 degrees (f) or more below zero in winter. Thermometer readings in the county reach 100 degrees or higher on an average of about once a year in July, once in three years in August and once in five years in June. A reading of 20 degrees below zero or lower may be expected about two times a year in January and once a year in December. A 30- degree below reading may occur about once in three years in January and February. The temperature may fail to climb above zero during the day two times per year in January and about once a year in February and December. The average date of the last spring frost in the county is May 17 and the first frost in fall about September 21, giving rise to a growing season averaging 127 days. Relative humidity averages from about 70 percent in the afternoon to 80 percent in the early morning during winter and from 55 percent in the afternoon to 85 percent in early morning during summer.

Brookings County is located entirely on the Coteau des Prairies, a flat iron shaped plateau region extending along the Minnesota – South Dakota border. Most of the county is flat to gently rolling, with elevations varying between 1,600 and 1,750 feet. The landscape in the northeastern corner, however, is a bit more rugged with steeply sloping hills rising almost 2,000 feet above sea level. The area's most prominent natural features are its deep, dark soil, lakes and wetlands, and the Big Sioux River and its tributaries. Seasonal flooding, snowmelt, and high ground water levels cause most of the drainage problems in the County. Presence of the Big Sioux River with its extensive floodplain and network of drainages poses a major flood hazard to the County.

The National Weather Service identifies the weather station used for this report as Brookings 2NE, located approximately in the geographic center of the County. It has been in continuous service since 1931. The elevation of the station is 1,639.7 feet above sea level. Reported average annual precipitation from 1931 - 2000 is 21.71 inches. The smallest amount recorded in one year was 12.4 inches in 1933 and the largest amount 35.87 inches in 1963. Hail may be expected about twice a year, whereas, in some years none will fall. It occurs most frequently in the months of June and July. Hail often causes damage to real property and crops and must be addressed in hazard mitigation planning.

Snowfall is a major contributor to hazard risk in Brookings County. Snowfall may occur in nine out of twelve months. Average snowfall is 26.6 inches. The largest amount of snow recorded in Brookings County is 71.3 inches in 1951, with 34 inches falling in March 1951. The largest amount attributed to the winter season is 64.5 inches in the winter of 1968 - 69. Spring 1951 had 37.0 total inches and fall 1983 had 18 inches total.

Transportation and Utility Infrastructure

Major infrastructure in the county includes roads and railroads. Interstate 29 passes north-south, through the middle of the county. Highway 14 and the Canadian Pacific Railroad run east and west. An extensive network of county and township roads completes the infrastructure.

Transportation systems in Brookings County have expanded and evolved, increasing in complexity in order to meet the needs of the growing region. The County's 394-mile road system includes 133 gravel road miles, 261 hard surface rural road miles, and 220 bridges. In Brookings County, the transportation choices are limited to mostly private automobiles traveling over state highways and county roads. The rural road system performs two basic functions: (1) providing general mobility for the residents in rural areas, and (2) accommodating the movements of agricultural products to market. The rural transportation system was not designed to accommodate large volumes of traffic on a daily basis.

Brookings County meets its current transportation needs through a mixture of township and municipal road systems, county roads, state and federal highways. Brookings County is currently conducting a transportation study to further improve the efficacy of the road system throughout the county. The Brookings Area Transit Authority (BATA) provides bus service to the county and there is one taxicab company in Brookings County.

The county is well served by I-29 and US14, which provide local firms the ability to ship their products nationwide. The Rapid City, Pierre & Eastern Railroad provides the ability to ship bulk loads of agricultural commodities to national and international destinations.

The cities of Brookings and Volga have their own water systems, while Brookings-Deuel and Kingbrook Rural Water Systems serve rural households in the county, including the residents of Bushnell, White, Elkton, Bruce, and Sinai. The City of Aurora uses water from the Brookings Municipal System. Regarding wastewater disposal, all of the municipalities, with the exception of Bushnell, within the County have municipal wastewater collection and treatment systems. Rural residences and those in Bushnell rely on individual septic tanks and drain-fields. The density of septic systems and their potential to cause water contamination is an environmental concern. Although residential growth is not expected to be significant in the county, new developments need to be controlled through planning and development guidelines. Electric power is provided to rural county residents and people in the communities by the Sioux Valley Energy, H-D Electric, and Otter Tail Power. Brookings, Volga, White and Aurora operate their own municipal power system. The primary telephone companies serving the County's rural population are Interstate Telephone Company (ITC) and Century Link. Cellular phone service is available in most parts of the county, but there are still places in the county where signals are weak.

Medical and Emergency Services

Brookings Health System operates four modern Type III ambulances and one Type II Special Operations Vehicle in Brookings County. They provide emergency 911 Advanced Life Support (ALS) services for the City of Brookings, much of the county of Brookings and the communities of Aurora, Bruce, Bushnell, Sinai, and Volga. Brookings Ambulance also assists area ambulance services from Arlington, Clear Lake, Elkton, Estelline, White and Lake Preston when requested.

Avera Medical Group and Brookings Health System serve the needs of Brookings and surrounding communities, including Arlington, Badger, Hetland, Lake Preston, Sinai, Nunda, Rutland, Estelline, Dempster, Bruce, Toronto, Astoria, White, Bushnell, Aurora, Elkton, Ward, and Volga. The health system houses a 49-bed hospital with three operating rooms; a 79-bed nursing home, Neighborhoods at Brookview; congregate living apartments for seniors, Brookhaven Estates; Arlington Medical Center; and Yorkshire Eye Clinic.

The City of Brookings is also home to the Sanford Health Clinic which has been providing medical care for the Brookings community since 2005.

The Brookings Emergency 9-1-1 Center continues to serve the Brookings Police Department and other area agencies as well. Those agencies include:

- Brookings Ambulance Service
- Brookings County Emergency Management
- Brookings County Sheriff's Office
- Brookings Fire Department
- Four county ambulance services
- Nine county fire departments
- South Dakota Highway Patrol (Brookings Squad)

CHAPTER 2 PREREQUISITES

ADOPTION BY LOCAL GOVERNING BODY

The local governing body, that oversees the update of the Brookings County Pre-Disaster Mitigation Plan, is the Brookings County Board of Commissioners. The Commission has tasked the Brookings County Emergency Management Office with the responsibility of ensuring that the PDM is compliant with Federal Emergency Management Agency (FEMA) Guidelines and corresponding regulations.

MULTI-JURISDICTIONAL PLAN PARTICIPATION

Requirement 201.6(c)(5). Local Mitigation Plan Review Tool – E2.

Requirement 201.6(c)(5). Local Mitigation Plan Review Tool – E1.

This plan is a multi-jurisdictional plan which serves the entire geographical area located within the boundaries of Brookings County, South Dakota. The County has portions of nine incorporated municipalities. All of the incorporated municipalities located entirely within the County elected to participate in the planning process and the update of the 2014 PDM. As previously noted; the City of Arlington is not included in this plan and participates in the Kingsbury County multi-jurisdictional plan. In addition, Sioux Valley Energy is eligible, and chose to participate throughout the entire planning process. The participating local jurisdictions include the following municipalities:

Table 2.1: Plan Participants

Participating Jurisdictions	Do Not Participate*
Aurora	All 23 Townships
Brookings	
Bruce	
Bushnell	
Elkton	
Sinai	
Sioux Valley Energy	
Volga	
White	
Brookings County	

*All townships reviewed hazard history and identified vulnerable infrastructure. Therefore they are eligible to benefit from future mitigation projects identified by the County.

The townships are not direct participating entities in the plan because these entities are too small, both in population and in resources, to be capable of handling disaster needs on their own. The townships were invited to participate in the PDM update by the PDM Planning Team. The township supervisors were asked to review and identify hazard risks, vulnerability and critical infrastructure and return them to the team for incorporation into the plan. Ten of twenty-three townships responded to the request.

The Brookings County Commission and each of the listed participating municipalities will pass resolutions to adopt the updated PDM. In addition to these municipalities, Sioux Valley Energy, a local rural electric cooperative also participated in the plan update. Sioux Valley Energy will pass a resolution to adopt the PDM. The dates of adoption by resolution for each of the jurisdictions are summarized in Table 2.2.

Table 2.2: Dates of Plan Adoption by Jurisdiction

Jurisdiction	Date of Adoption
Brookings County Commission	
Aurora	
Brookings	
Bruce	
Bushnell	
Elkton	
Sinai	
Sioux Valley Energy	
Volga	
White	

All of the participating jurisdictions were involved in the plan update. Representatives from each municipality, the County, and electric providers were invited to planning meetings. Those in attendance provided valuable perspective on the changes required for the plan. All representatives took part in the risk assessment exercise at the September 26, 2018 meeting.

Representatives in attendance took information from the PDM planning meetings back to their respective councils/organizations and presented the progress of the plan update. First District staff travelled to each community and met with their local governing board to present community specific information regarding critical infrastructure, hazard vulnerability and identification information and potential mitigation projects for the updated plan. Representatives of the PDM Team met with First District staff to provide feedback and oversight into the draft plan. Those participants identified in Table 2.1 that did not attend a PDM Planning Team meetings participating in the planning process by reviewing information relevant to their communities and feedback by email or telephone conversations. A final meeting was held to make final comments and corrections and provide a motion to submit the plan to the State Office of Emergency Management. The local jurisdictions/organizations have also presented the Resolution of Adoption to their councils/boards and will pass the resolutions upon FEMA approval of the PDM update. The Resolutions are included in the Appendix.

Table 2.3 was derived to help define “participation” for the local jurisdictions who intend on adopting the plan. To be considered “participating”, each jurisdiction must have at least seven of the ten participation requirements fulfilled.

Table 2.3: Record of Participation

Nature of Participation	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	SVE	Volga	White	Brookings County
Attended Meetings or work sessions (a minimum of 1 meetings will be considered satisfactory).	X	X	X	X	X	X	X	X	X	X
Submitted inventory and summary of reports and plans relevant to hazard mitigation.	X	X	X	X	X	X	X	X	X	X
Submitted the Risk Assessment Worksheet.	X	X	X	X	X	X	X	X	X	X
Submitted description of what is at risk (including local critical facilities and infrastructure at risk from specific Hazards worksheet)	X	X	X	X	X	X	X	X	X	X
Submitted a description or map of local land-use patterns (current and proposed/ expected).	X	X	X	X	X	X	NA	X	X	X
Developed goals for the community.	X	X	X	X	X	X	X	X	X	X
Developed mitigation actions with an analysis/ explanation of why those actions were selected.	X	X	X	X	X	X	X	X	X	X
Prioritized actions emphasizing relative cost-effectiveness.	X	X	X	X	X	X	X	X	X	X
Reviewed and commented on draft Plan.	X	X	X	X	X	X	X	X	X	X
Hosted opportunities for public involvement (allowed time for public comment at a minimum of 1 city council meeting after giving a status report on the progress of the PDM update)	X	X	X	X	X	X	NA	X	X	X

SVE: Sioux Valley Energy

CHAPTER 3 PLANNING PROCESS

BACKGROUND

The effort that led to the development of this plan is part of the larger, integrated approach to hazard mitigation planning in South Dakota that is led by the South Dakota Office of Emergency Management. Production of the plan was the ultimate responsibility of the Brookings County Emergency Management Director, who served as the county's point of contact for all activities associated with this plan. Input was received from the PDM Planning Team that was put together by the Emergency Management Director and whose members are listed below in Table 3.1.

The plan itself was written by an outside contractor, First District Association of Local Governments (First District) of Watertown, South Dakota, one of the state's six regional planning entities. The office has an extensive amount of experience in producing various kinds of planning documents, including municipal ordinances, land use plans, and zoning ordinances, and it is an acknowledged leader in geographic information systems (GIS) technology in South Dakota. The following staff members of the First District Association of Local Governments were involved in the production of the plan. Thomas Nealon, Planner, was the project manager of the plan. Nealon attended the PDM Planning Team meetings as the plan was being developed. Assisting Mr. Nealon was Amy Arnold, Geographic Information Systems Planner, who produced all the maps for the plan, Luke Muller, Senior Planner, directed the floodplain risk analysis, and completed the county land cover analysis discussed in the previous chapter. Meeting coordination performed by Project Intern Mark McLaughlin. Several other individuals at the state level provided additional support and information that was quite useful. They include:

- Marc Macy, South Dakota National Flood Insurance Program Coordinator – provided classification and information regarding value and number of flood insurance policies and claims, as well as guidance and direction as the plan was being developed.
- SD State Fire Marshall Office – provided information on fire calls in the county.
- Tim Schaal, South Dakota State Dam Inspector – provided information on dams located in the county.
- Greg Pollreis, SD Department of Transportation – provided bridges and road mileage information for county.

DOCUMENTATION OF THE PLANNING PROCESS

Methodology

Mitigation planning is a process that communities use to identify policies, activities, and tools to implement mitigation actions. The process that was used to develop this plan consisted of the following steps:

- Planning Framework
- Risk Identification and Assessment
- Mitigation Strategy
- Review of Plan
- Plan Adoption and Maintenance

Planning Framework

The planning framework component identified five objectives:

- Develop Plan to Plan;
- Establish PDM Planning Team;
- Define Scope of the Plan;
- Identify Governmental Entities/Stakeholders; and
- Establish PDM Planning Team

Prior to receiving funding public meetings were held at the Brookings County Courthouse to inform the public about the required PDM update. Funding from FEMA and the South Dakota Office of Emergency Management to prepare the mitigation plan was awarded by the county in July 2018. Once funding was secured, the Brookings County Emergency Management Director and the First District acted as the PDM Planning Team began to discuss the strategy to be used to develop the plan. The first task was to identify those entities/stakeholders that would have direct and indirect interests in the update of the PDM.

Prior to the first public informational meeting, the Chairperson of the Brookings County Commissioners and Brookings County Emergency Management Director wrote letters to all the stakeholders, community organizations, municipalities, townships, utility providers and emergency responders and concerned residents who might wish to volunteer their time and serve on a committee, and to those who would act as a resource for the PDM Planning Team. The letters included a brief description of the PDM. Public input was solicited via notices regarding the PDM planning process in local media outlets and via the Internet.

Each individual who was contacted for the PDM Planning Team had at least one of the following attributes to contribute to the planning process:

- Significant understanding of how hazards affect the county and participating jurisdictions.
- Substantial knowledge of the county's infrastructure system.
- Resources at their disposal to assist in the planning effort, such as maps or data on past hazard events.

Table 3.1 lists the PDM Planning Team members, and it includes their attendance at the planning meetings, all of which were open to the public, that were held as the plan was being developed. An agenda was sent out to the PDM Planning Team prior to each meeting, and the meeting minutes were sent to them afterward to keep everybody informed of what was discussed and any decisions that were made.

Table 3.1: Participation in Plan Development

Last Name	First Name	Entity Represented	Job Title	Meeting Attendance		
				Meeting 1	Meeting 2	Meeting 3
Hill	Robert	Brookings County Emergency Management	Emergency Manager	x	x	x
Bartley	Mike	Brookings County Commission	Board Member	x	x	x
Briseno	Paul	Brookings City Manager's Office	City Manager		x	x
Lanning	Jackie	Brookings City Engineer's Office	City Engineer	x		
Haugen	Richard	Brookings County Zoning Office	Zoning Officer		x	
Hartmann	Darrell	Brookings City Fire Department	Fire Chief	x	x	
Stanwick	Marty	Brookings County Sheriff's Office	Sheriff			
Erickson	Dave	Brookings City Police Department	Police Chief	x	x	x
Berreth	Jameson	City of Volga City Manager's Office	City Manger	x	x	
Santema	Randy	City of Volga Mayor's Office	Mayor	x		
Steen	Kevin	City of Volga Public Works	City Engineer			
Johnson	Doyle	Town of Sinai Mayor's Office	Mayor			
Anderson	Jeff	City of Bruce Mayor's Office	Mayor			
Stokes	Richard	City of Bruce Maintenance Department/Fire Department	Fire Chief			
Wright	Terry	Town of White Mayor's Office	Mayor			
DeYoung	Daniel	Town of White Maintenance Department	Engineer			

Huebner	Dave	Town of Bushnell Mayor's Office	Mayor			
Weeks	Fred	Town of Aurora Mayor's Office	Mayor			
Muller	John	Town of Aurora Public Works	Engineer			
Landsman	Dave	Town of Elkton Mayor's Office	Mayor			
Jensen	Steve	Town of Elkton Public Works	Engineer			
Anderson	Matt	City of Volga Fire Department	Fire Chief			
Wosje	Jeremy	Town of Sinai Fire Department	Fire Chief			
Schwartz	Tervor	Town of White Fire Department	Fire Chief			
Ahartz	Mike	Town of Aurora Fire Department	Fire Chief		x	
Alberts	Chris	Town of Elkton Fire Department	Fire Chief			
Meyer	Steve	Brookings Municipal Utilities	General Manger			
Nelson	Jeff	East River Electric	General Manger			
MacFarlane	Charles	Otter Tail Electric	General Manager			
Nielson	Michele	Sioux Valley Energy	Manager of Engineering		x	x
Witts	Gene	Brookings-Deuel Rural Water Systems	General Manager			
Jencks	Randy	Kingsbrook Rural Water Systems	General Manger			
Trygstad	Jayme	South Dakota State University	Emergency Management Specialist	x		
Willert	Klint	Brookings School District	Superintendent			
Kludt	Kimberly	Deubrook School District	Superintendent			
Jandahl	Brian	Elkton School District	Superintendent			
Schuster	Laura	Sioux Valley School District	Superintendent			
Heuton	Al	Brookings Economic Development Corporation	Executive Director			
Gilbertson	Jay	East Dakota Water Development District	Manager	x		x
Dekkanga	Gordon	Brookings Health System	Ambulance Director	x	x	x
Birk	Dick	Brookings County Highway Department	Superintendent	x		
Jarrett	Martin	Big Sioux Community Water System	General Manger			

Leadership and guidance in the planning effort and at the planning meetings was provided by the First District staff and the Brookings County Emergency Management Director. An agenda was distributed to each PDM Planning Team member prior to each meeting, but free-flowing discussion was always encouraged. When PDM Planning Team members had questions about a topic of discussion, either First District staff or the Emergency Management Director would step in.

Generally speaking, the planning process associated with the plan's development was relaxed and informal. No subcommittees were formed, and all decisions were made by mutual consensus of the PDM Planning Team members - no votes were taken or motions made. Everyone's opinion was respected, nobody was discouraged from voicing their opinion, and no one was made to feel any less important than anyone else.

As the PDM Planning Team was being assembled, arrangements were made for the first PDM Planning Team meeting, which took place at the Brookings City County Government Center in Brookings on September 26, 2018. An agenda was distributed to prospective PDM Planning Team members. The Appendix includes a copy of each meeting agenda, the signup sheet from each meeting, and the minutes from each meeting.

Those who attended the September meeting for the PDM update were asked to volunteer to serve on the PDM Planning Team. The PDM Planning Team was tasked with fostering coordination between the various entities involved; reviewing the drafts and providing comments after First District Association of Local Governments staff initiated changes to the existing plan. Each of the local jurisdictions had a member of their respective councils represent the municipalities in the plan. In addition, South Dakota State University's representative attended all team meetings, and reported back to staff.

The representatives from the municipalities were asked to share the progress of the plan at their council meetings and to ensure that those attending the council meetings were aware that they are invited to make comments on and participate in the process of updating the new plan. Comments provided by local residents at the city council and PDM Planning Team meetings were collected and incorporated into the plan.

The public was provided several opportunities to comment on the plan during the drafting stages at the PDM Planning Team Meetings and City Council Meetings. There were several work sessions and public hearings held to keep the public updated and involved in the plan. Primarily, public input included the involvement in hazard assessment and mitigation projects. Those who were most involved were the representatives PDM Planning Team and representatives from the municipalities. The municipalities put the PDM update on the agenda at their council meetings and allowed people to comment at the meetings. Table 3.2 identifies the location and date of each opportunity that was provided for the public to comment and how it was advertised. Again, South Dakota State University staff reviewed and participated in the hazard assessment and mitigation project planning to provide input regarding the needs of the university.

The first meeting of the PDM Planning Team served to introduce the participants to the concept of mitigation planning; why the plan was being updated and how the process would proceed in the months to come (scheduling, assigning responsibilities, etc.). The meeting also included a review of the existing plan, which led to two important decisions. First, it was the consensus opinion of the PDM Planning Team that a comprehensive rewrite of the plan would be needed.

The PDM Planning Team decided that:

- The 2014 PDM did not include all of the necessary requirements found in the Local Hazard Plan Review Tool (2011). Thus, to ensure that the updated plan included everything required by the plan review tool, the PDM Planning Team and community meetings used the plan review tool to guide the discussions. The 2014 PDM was then compared to the new plan

review tool and any portion of the Plan that was not needed to fulfill the new crosswalk requirements was eliminated and deficiencies were noted as areas of focus.

- More information and data regarding the risk assessment was needed, more informative tables and maps would be helpful, and the mitigation strategy needed to be rethought.
- The risk identification and assessment as well as the identification of critical infrastructure and local municipal goals and objectives should be completed by the First District prior to the next meeting of the PDM Planning Team.

Table 3.2: Opportunities for Public Comment

Location of Opportunity	Date	Type of Participation			How Was Meeting Advertised	
		City Council or County Commission Meeting	PDM Meeting	City Staff/Township Annual Mtg/Survey	Public Notice	Website
Aurora	12/10/2018	X			X	
	Adoption Date					
Brookings	11/01/18		X			X
	Adoption Date					
Bruce	01/08/19	X			X	
	Adoption Date					
Bushnell	11/05/2018	X			X	
	Adoption Date					
Elkton	12/03/18	X			X	
	Adoption Date					
Sinai	12/03/18	X			X	
	Adoption Date					
Volga	12/17/18	X			X	
	Adoption Date					
White	02/04/19	X			X	
	Adoption Date					
Brookings County	PDM Grant Application 06/26/18					
	09/26/18		X		X	
	02/27/19		X		X	
	03/19/19		X		X	

Risk Identification & Assessment/Mitigation Strategy/Review of Plan

Requirement 201.6(b)(1). Local Mitigation Plan Review Tool – A3.

Requirement 201.6(c)(1). Local Mitigation Plan Review Tool – A1.

Requirement 201.6(b)(3). Local Mitigation Plan Review Tool – A4.

The Risk Identification and Assessment component identified three objectives: Collect and Organize Data, Develop GIS Data, and Analyze Data. The Mitigation Strategy component identified five objectives: Review Existing PDM and other plans, Formation of goals/objectives, Compile existing resources to accomplish goals/objectives, Identification of community capabilities, Public review of goals/objectives, and PDM Planning Team Review of goals/objectives. The Review of PDM component identified three objectives: Writing of PDM, Public Review of PDM, PDM Planning Team Review of PDM.

Prior to the second PDM Planning Team meeting, First District Staff met with the participating municipalities at public noticed meetings to identify hazards and critical facilities, assess vulnerability, discuss development trends, and develop mitigation goals. Meeting dates are referenced in Table 3.2. Staff members from each municipality, Brookings County, Brookings County Townships, and rural electric and water providers were asked to identify hazards and critical facilities, assess vulnerability, discuss development trends, and develop mitigation goals and review these items with each respective governing body (if applicable). First District staff also conducted research regarding the history of disaster events in the county, including events that had occurred since the original plan was developed.

First District also conducted a technical review of existing documents. This review incorporated existing plans, studies, reports, technical information, zoning and flood damage prevention ordinances into the PDM Update. It should be noted that most of the planning documents of each of the communities had been previously developed by the First District. However, some of the smaller communities did not have such planning documents. Additionally, the 2014 PDM was used as a resource for the new plan because most of the natural hazard profile research had already been completed when it was drafted. In addition to the 2014 PDM, the First District reviewed several other existing documents including but not limited to the State of South Dakota Hazard Mitigation Plan, Brookings County Hazardous Materials Plan, and Flood Insurance Rate Maps for the local jurisdictions. A summary of the technical review and incorporation of existing plans is included in Table 3.3.

Risk Identification/Assessment was discussed at the PDM Planning Team meeting on September 26, 2018. First District staff reviewed the hazards identified in the State of South Dakota Hazard Mitigation Plan and that risk assessment portion of the existing PDM. First District staff also provided an overview of the information regarding Critical Facilities, Risk Identification, Hazard Vulnerability and mitigation goals identified by the County's municipalities. Also at that meeting, the PDM Planning Team identified goals for the PDM Update and compared those goals to those identified in the 2014 PDM.

The list of hazards that the PDM Planning Team decided to focus on is presented in Chapter 4. A profile of each of the hazards was begun at this meeting. The profile included information from each of the participating jurisdictions about how the hazard affected their community. Discussion

also occurred regarding the existing strategies being used to mitigate each hazard, with a particular emphasis on the critical and essential facilities in each community.

The PDM Planning Team also dealt with the Mitigation Strategy at the September 2018 meeting. Formation of the strategy began with a review of the results of the risk assessment, which led to discussion about the goals to be achieved with the mitigation plan. The list of goals is included in Chapter 5.

At the second meeting, on February 27th, the PDM Planning Team reviewed the updates prepared by the First District and discussed specific mitigation actions. The PDM Planning Team began by reviewing the proposed actions included in the previous mitigation plan and discussion followed about the progress that had been made on implementing the actions. Specific mitigation actions recently identified by the participating jurisdictions were also discussed.

The rest of the meeting was spent discussing the mitigation actions and discussing how the plan would be implemented. It was emphasized that cooperation between the county and the participating jurisdictions was especially important, and discussion occurred about how this could best be achieved. Representatives from the jurisdictions were made aware of the critical role they needed to play to ensure the success of the mitigation strategy, such as implementing specific mitigation actions. The Emergency Management Director emphasized the importance of ensuring that no local decisions be made or actions taken contrary to the goals of this plan. Also, responsible parties were identified for reporting on progress being made to implement the proposed mitigation actions, for evaluating the plan's overall effectiveness, and for getting the public more involved in the planning process. The PDM Planning Team decided to rely on the prioritization of projects by jurisdiction rather than on a county-wide basis since each jurisdiction is responsible for the implementation of respective mitigation actions.

At the end of the meeting the First District was instructed to conduct an internal review of the document and forward the document to the South Dakota Office of Emergency Management for their review and comment. The draft plan was also to be posted on the First District Association of Local Governments and Brookings County websites and emailed to all of the participants and to the emergency managers in the neighboring counties of: Hamlin, Deuel, Moody, Lake, and Kingsbury in South Dakota. Everyone who received an email copy of the plan draft was allowed forty-five days to comment on the draft.

A third and final meeting of the PDM Planning Team was subsequently held on March 19th to review and discuss final draft as amended based upon comments from participating jurisdictions, PDM Planning Team members and the public. At the meeting the PDM Planning Team recommended that the plan be submitted to FEMA. The final draft of the plan was again posted on the First District Association of Local Governments and Brookings County websites a link for which was emailed to all of the participants.

Table 3.3: Record of Review (Summary)

Existing Program/Policy/Technical Documents	Local Jurisdiction									Referenced in Plan
	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County	
Comprehensive Plan	✓	✓	NA	NA	✓	NA	✓	✓	✓	Appendix F
Flood Damage Prevention Ordinance	✓	✓	✓	NA	✓	NA	✓	NA	✓	Pg. 53
Economic Development Plan	NA	O	NA	NA	O	NA	O	NA	NA	Pg. 103
Local Emergency Operations Plan	✓	✓	✓	C	✓	✓	✓	✓	✓	Pg. 22
Transportation Plan	C	✓	NA	NA	NA	NA	NA	NA	✓	Pg. 11
Flood Insurance Studies or Engineering studies for streams	✓	✓	✓	NA	✓	✓	NA	✓	✓	Pg. 51-52
Hazard Vulnerability Analysis (by the local Emergency Management Agency)	C	C	C	C	C	C	C	C	✓	Pg. 25
Emergency Operations Plan	NA	✓	NA	NA	NA	NA	NA	NA	✓	Pg. 53
Zoning Ordinance	✓	✓	✓	NA	✓	NA	✓	✓	✓	Pg. 62-63
Building Code	NA	✓	NA	NA	NA	NA	O	NA	✓	Pg. 72
Site Plan Review	✓	✓	✓	NA	✓	✓	✓	✓	✓	Pg. 100
Subdivision Ordinance	✓	✓	NA	NA	NA	NA	O	✓	✓	Pg. 64, Appendix H
Floodplain Ordinance	✓	✓	✓	NA	✓	✓	NA	✓	✓	Pg. 51-52
Existing Land Use maps	✓	✓	NA	NA	✓	NA	✓	✓	✓	Appendix F
Aquifer Protection Ordinance	✓	✓	NA	NA	NA	NA	NA	NA	✓	Pg. 51-52
State Hazard Mitigation Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	All Chapters

NA The jurisdiction does not have this program/policy/technical document

O The jurisdiction has the program/policy/technical document, but did not review/incorporate it in the mitigation plan

C The jurisdiction is regulated under the County's policy/program/technical document\

✓ The jurisdiction reviewed the program/policy/technical document

CHAPTER 4 RISK ASSESSMENT

IDENTIFICATION OF HAZARDS

Requirement 201.6(c)(2)(i). Local Mitigation Plan Review Tool – B1.

In this chapter, the hazards that were identified by the PDM Planning Team as having the most significance for the County are analyzed. As part of the analysis, various maps and tables were produced and are included within this chapter. The planning participants began the risk assessment process by reviewing the State of South Dakota Hazard Mitigation Plan. The PDM Planning Team also reviewed records of hazard events that have occurred in the county since 2007, relying primarily on the Spatial Hazard Events and Losses Database for the United States (SHELDUS), compiled by the University of South Carolina's Hazards and Vulnerability Research Institute and data from the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center's (NCDC) Storm Events Database. A summary of the findings for significant hazard occurrences from the past ten years is provided below in Table 4.1: The PDM Planning Team also identified potential hazards by observing development patterns, interviews from towns and townships, public meetings, PDM work sessions, previous disaster declarations and research of the history of hazard occurrences located within the County.

Table 4.1: Significant Hazard Occurrences 2007-2018

Type of Hazard	# of Occurrences Since 2007 - 2018	Source
Drought	7	NOAA
Wildfire/Forest Fire	347	NOAA & State Fire Marshall's Office
Flood	37	NOAA
Hail	53	NOAA & SHELDUS
Lightning	1	NOAA
Tornado	2	NOAA & SHELDUS
Temperature Extremes	15	NOAA
Winter storms	44	NOAA
Thunderstorm and High Wind	51	NOAA & SHELDUS

Hazards were analyzed in terms of the hazard's probability of occurrence in the county. Representatives from each participating jurisdiction and the PDM Planning Team were asked to complete worksheets that categorized hazards by the likelihood of occurrence for either their specific geographical location, or for county-wide risks.

Every possible hazard or disaster was evaluated and placed into one of three separate columns depending on the likelihood of the disaster occurring in the PDM jurisdiction. Hazards that occur at least once a year or more were placed in the High Probability column; hazards that may have occurred in the past or could occur in the future but do not occur on a yearly basis were placed in

the low probability column; and hazards or disasters that have never occurred in the area before and are unlikely to occur in the PDM jurisdiction any time in the future were placed in the Unlikely to Occur column. While man-made hazards were discussed briefly during the completion of the worksheet, the PDM Planning Team decided to eliminate man-made hazards from the PDM because those types of hazards are difficult to predict and assess due to wide variations in the types, frequencies, and locations. Types and scopes of manmade hazards are unlimited.

Due to the topographical features of the County and the nature of the natural hazards that affect the geographical area covered by this PDM, most areas of the county have similar likelihood of being affected by the natural hazards identified. Only the natural hazards from the High Probability and Low Probability Columns will be further evaluated throughout this plan, with an emphasis on the High Probability hazards. All hazards in the Unlikely to Occur column, except Dam Failures, will not be further evaluated in the plan. Table 4.2 is an adjusted list of hazards produced from the FEMA worksheets completed by each participating jurisdiction and the PDM Planning Team.

Table 4.2: Hazards Categorized by Likelihood of Occurrence

High Probability	Low Probability	Unlikely to Occur
Extreme Cold	Drought	Earthquake*
Extreme Heat	Flood	Ice Jam
Hail	Tornado	Subsidence
Lightning	Urban Fire	Dam Failures
Strong Winds	Wild Fire	
Thunderstorm		
*Earthquakes are marked with an asterisk because they occur but are so small that the effects are minimal. Thus, mitigation measures specifically for earthquakes are not a priority.		

TYPES OF NATURAL HAZARDS IN THE PDM JURISDICTION AREA

Requirement 201.6(c)(2)(i). Local Mitigation Plan Review Tool – B1.

Some descriptions of the natural hazards likely to occur in the County were taken directly from the 2014 Brookings County PDM. Most of the descriptions were revised for better clarity. For the purpose of consistency throughout the plan, additional definitions were included to reflect all of the hazards that have a chance of occurring in the area and all of the hazards are alphabetized. For all of the hazards identified the probability of future occurrence is expected to be the same for all of the jurisdictions covered in the PDM.

Blizzards are a snow storm that lasts at least three hours with sustained wind speeds of thirty-five miles per hour (mph) or greater, visibility of less than one-quarter mile, temperatures lower than 20°F and white out conditions. Snow accumulations vary, but another contributing factor is loose snow existing on the ground which can get whipped up and aggravate the white out conditions. When such conditions arise, blizzard warnings or severe blizzard warnings are issued. Severe blizzard conditions exist when winds obtain speeds of at least forty-five mph plus a great

density of falling or blowing snow and a temperature of 10°F or lower. At least one blizzard should occur each year in Brookings County.

Drought is an extended period of months or years when a region notes a deficiency in its water supply. Generally, this occurs when a region receives consistently below average precipitation. It can have a substantial impact on the ecosystem and agriculture of the affected region. Although droughts can persist for several years, even a short, intense drought can cause significant damage and harm the local economy. This global phenomenon has a widespread impact on agriculture. The Keetch-Byron Drought Index measures drought impact. There is an 8% chance of drought occurring annually.

Dam Failure Dams function to serve the needs of flood control, recreation, and water management. During a flood, a dam's ability to serve as a control agent may be challenged. An excessive amount of water may result in a dam breach, simply an overflowing. Dams that are old or unstable, dams that receive extreme amounts of water, or dams that get debris pile-up behind their face may result in dam failure, a cracking and/or breaking. Brookings County has eight (8) dams. All dams are considered by the South Dakota Dam Inspector as "low risk" for failure. Dam Failure was considered unlikely to occur by the PDM Planning Team and Communities, however is detailed here because it was determined to be the most likely of the "Unlikely to Occur" hazards.

Earthquakes are a sudden rapid shaking of the earth caused by the shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, avalanches, and tsunamis. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks, and are followed by vibrations of gradually diminishing force called aftershocks. The underground point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter. The Richter Scale measures earthquake intensity. The potential for an earthquake to occur in the County is .68% annually.

Extreme Cold What constitutes extreme cold and its effects can vary across different areas of the country. In regions relatively unaccustomed to winter weather, near freezing temperatures are considered "extreme cold," however, Eastern South Dakota is prone to much more extreme temperatures than other areas in the country. Temperatures typically range between zero degrees Fahrenheit and 100 degrees Fahrenheit, so extreme cold could be defined in the Brookings County PDM jurisdiction area as temperatures below zero. The Wind Chill Chart is used to measure extreme cold. At least one extreme cold event should occur each year.

Extreme Heat, also known as a Heat Wave, is a prolonged period of excessively hot weather, which may be accompanied by high humidity. There is no universal definition of a heat wave; the term is relative to the usual weather in the area. Temperatures in the County have a very wide range typically between 0 to 100 degrees Fahrenheit, therefore anything outside those ranges could be considered extreme. The term is applied both to routine weather variations and to extraordinary spells of heat which may occur only once a century. The Heat Index measures the impact of extreme heat on people and livestock.

Flooding is an overflow of water that submerges land, producing measurable property damage or forcing evacuation of people and vital resources. Floods can develop slowly as rivers swell during an extended period of rain, or during a warming trend following a heavy snow. Even a very small stream or dry creek bed can overflow and create flooding. Two different types of flooding hazards are present within the County.

1. Inundation flooding occurs most often in the spring. The greatest risks are realized typically during a rapid snowmelt, before ice is completely off all of the rivers.
2. Flash flooding is more typically realized during the summer months. This flooding is primarily localized, though enough rain can be produced to cause inundation flooding in areas along the Big Sioux River and its tributaries. Heavy, slow moving thunderstorms often produce large amounts of rain. The threat of flooding would be increased during times of high soil moisture.

National Flood Insurance Rate maps designate 100 year and 500 year floodplain zones. Areas subject to inundation by the 1-percent-annual-chance flood event are designated 100 year floodplain. Moderate risk areas within the 0.2-percent-annual-chance floodplain are designated 500 year floodplain. Brookings County should anticipate having one flood event each year.

Freezing Rain/Ice occurs when temperatures drop below thirty degrees Fahrenheit and rain starts to fall. Freezing rain coats objects with ice, creating dangerous conditions due to slippery surfaces, platforms, sidewalks, roads, and highways. Sometimes ice is unnoticeable, and is then referred to as black ice. Black ice creates dangerous conditions, especially for traffic. Additionally, a quarter inch of frozen rain can significantly damage trees, electrical wires, weak structures, and other objects due to the additional weight bearing down on them.

Hail is formed through rising currents of air in a storm. These currents carry water droplets to a height at which they freeze and subsequently fall to earth as round ice particles. Hailstones usually consist mostly of water ice and measure between 5 and 150 millimeters in diameter, with the larger stones coming from severe and dangerous thunderstorms. The County has a 100% potential for hail occurring each year

Heavy Rain is defined as precipitation falling with intensity in excess of 0.30 inches (0.762 cm) per hour. Short periods of intense rainfall can cause flash flooding while longer periods of widespread heavy rain can cause rivers to overflow. At least one heavy rain event will occur in the County annually.

Ice Jams occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of the river. The ice layer often breaks into large chunks, which float downstream and often pile up near narrow passages and other obstructions, such as bridges and dams.

Landslide is a geological phenomenon which includes a wide range of ground movement, such as rock falls, deep failure of slopes and shallow debris flows, which can occur in offshore, coastal and onshore environments. Although the action of gravity is the primary driving force for a landslide to occur, there are other contributing factors build up specific sub-surface conditions that make the area/slope prone to failure, whereas the actual landslide often requires a trigger before being released.

Lightning results from a buildup of electrical charges that happens during the formation of a thunderstorm. The rapidly rising air within the cloud, combined with precipitation movement within the cloud, results in these charges. Giant sparks of electricity occur between the positive and negative charges both within the atmosphere and between the cloud and the ground. When the potential between the positive and negative charges becomes too great, there is a discharge of electricity, known as lightning. Lightning bolts reach temperatures near 50,000° F in a split second.

The rapid heating and expansion, and cooling of air near the lightning bolt causes thunder. There is a 100% chance of lightning occurring in Kingsbury County each year.

Severe Winter Storms deposit four or more inches of snow in a twelve-hour period or six inches of snow during a twenty-four hour period. Such storms are generally classified into four categories with some taking the characteristics of several categories during distinct phases of the storm. These categories include: freezing rain, sleet, snow, and blizzard. Generally winter storms can range from moderate snow to blizzard conditions and can occur between October and April. The months of May, June, July, August, and September could possibly see snow, though the chances of a storm is very minimal. Like summer storms, winter storms are considered a weather event not a natural hazard, and thus will not be evaluated as a natural hazard throughout this PDM.

Sleet does not generally cling to objects like freezing rain, but it does make the ground very slippery. This also increases the number of traffic accidents and personal injuries due to falls. Sleet can severely slow down operations within a community. Not only is there a danger of slipping, but with wind, sleet pellets become powerful projectiles that may damage structures, vehicles, or other objects.

Snow is a common occurrence throughout the County during the months from October to April. Average annual snowfall for the county is about twenty-two inches. Accumulations in dry years can be as little as five to ten inches, while wet years can see yearly totals up to eighty inches. Snow is a major contributing factor to flooding, primarily during the spring months of melting.

Strong winds are usually defined as winds over forty miles per hour, are not uncommon in the area. Winds over fifty miles per hour can be expected twice each summer. Strong winds can cause destruction of property and create safety hazards resulting from flying debris. Strong winds also include severe localized wind blasting down from thunderstorms. These downward blasts of air are categorized as either microbursts or macrobursts depending on the amount geographical area they cover. Microbursts cover an area less than 2.5 miles in diameter and macrobursts cover an area greater than 2.5 miles in diameter. Multiple strong wind events will occur in the County annually.

Subsidence is defined as the motion of a surface as it shifts downward relative to a datum. The opposite of subsidence is uplift, which results in an increase in elevation. There are several types of subsidence such as dissolution of limestone, mining-induced, faulting induced, isostatic rebound, extraction of natural gas, ground-water related, and seasonal effects.

Summer Storms are generally defined as atmospheric hazards resulting from changes in temperature and air pressure which cause thunderstorms that may cause hail, lightning, strong winds, and tornados. Summer storms are considered a weather event rather than a natural hazard; therefore summer storms are not evaluated as a natural hazard throughout this PDM.

Thunderstorms are formed when moisture, rapidly rising warm air, and a lifting mechanism such as clashing warm and cold air masses combine. The three most dangerous items associated with thunderstorms are hail, lightning, and strong winds.

Tornados are violent windstorms that may occur singularly or in multiples as a result of severe thunderstorms. They develop when cool air overrides warm air, causing the warm air to rapidly rise. Many of these resulting vortices stay in the atmosphere, though touchdown can occur. The Fujita Tornado Damage Scale categorizes tornadoes based on their wind speed:

F0=winds less than 73 m/h=winds 261-318 m/h
F1=winds 73-112 m/h=winds greater than 318 m/h
F2=winds 113-157 m/h
F3=winds 158-206 m/h
F4=winds 207-260 m/h
F5=winds 261-318 m/h

Wildfires are uncontrolled conflagrations that spread freely through the environment. Other names such as brush fire, bushfire, forest fire, grass fire, hill fire, peat fire, vegetation fire, and wild fire may be used to describe the same phenomenon. A wildfire differs from the other fires by its extensive size; the speed at which it can spread out from its original source; its ability to change direction unexpectedly; and to jump gaps, such as roads, rivers and fire breaks.

Fires start when an ignition source is brought into contact with a combustible material that is subjected to sufficient heat and has an adequate supply of oxygen from the ambient air. Ignition may be triggered by natural sources such as a lightning strike, or may be attributed to a human source such as “discarded cigarettes, sparks from equipment, and arched power lines”. The Keetch-Byram Drought Index assesses the risk of fire due to drought. Multiple wildfires will occur in the County annually.

Climate Change is a long term change in the earth’s climate, especially a change due to an increase in the average atmospheric temperature. In particular, a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels. Rising temperatures will lead to more climate and weather hazards of greater intensity such as flooding, droughts, severe storms and winter storms. Many scientists consider climate change a global phenomenon.

HAZARD PROFILE

Requirement 201.6(c)(2)(i). Local Mitigation Plan Review Tool – B1.

Requirement 201.6(c)(2)(i). Local Mitigation Plan Review Tool – B2.

Requirement 201.6(c)(2)(ii). Local Mitigation Plan Review Tool – B3.

It should be stated that most of the hazards identified in the previous section have the potential of occurring anywhere in the County. A brief section about the history of each hazard’s occurrence in the county is provided. Table 4.3 below shows all of the Presidential Disaster Declarations that have involved the county. Information on previous occurrences – the location, the extent (i.e., magnitude or severity) of each hazard, and probability of future events (i.e., chance or occurrence) are listed individually by the type of hazard in the following tables. Occurrences are listed from 2007 – 2017. Partial data for 2018 became available during the drafting of this plan and is referenced where applicable.

**Table 4.3: Presidential Disaster Declarations in South Dakota
Including Brookings County**

Date	Disaster Dec #	Type	Total Damage	Public Assistance Cost
4/18/1969	257	Flooding	\$4,599,306	
5/3/1986	764	Severe Storms and Flooding	\$5,158,130	
7/2/1992	948	Flooding, Severe Storms, and Tornadoes		
7/19/1993	999	Severe Storms, Tornadoes and Flooding	\$53,068,748	
6/21/1994	1031	Severe Storms and Flooding	\$8,187,938	
5/26/1995	1052	Flooding	\$35,649,349	
1/5/1996	1075	Severe Winter Storm	\$13,085,649	
1/10/1997	1156	Severe Winter Storm and Blizzard	\$19,455,263	
4/7/1997	1173	Severe Winter Storm and Severe Flooding	\$87,069,429	
5/17/2001	1375	Severe Winter Storm and Flooding	\$10,441,684	\$5,097,818.74
12/20/2005	1620	Severe Winter Storm	\$28,071,441	\$24,647,039.99
11/2/2010	1947	Severe Storms and Flooding		\$1,079,972.79
05/13/2011	1984	Flooding		\$52,090,678.47

Source: <https://www.fema.gov/disasters>

While the PDM Planning Team reviewed all hazard occurrences that have been reported in the last 100 years, the list for some of the hazards was extremely long. The information provided in the tables is not a complete history report, but rather an overview of the hazard events which have occurred over the last ten years. The PDM Planning Team felt the hazard trend for the last ten years could be summarized in this section and decided to include any new occurrence that have taken place since the previous 2014 PDM was drafted.

DAM FAILURE

Dam breach or failure is of lesser concern for the citizens of the County than flooding. Brookings County has a number of structures which control or regulate flow from one water body to another. Such as the earthen dam which is not considered a risk to residents. South Dakota Department of Environment and Natural Resources identifies eight dams in the County (listed below). None of the dams are listed as vulnerable to failure.

4.4 Dam Locations in Brookings County

Ownership Type	Location	Water Body
Local Government	SW1/4 SW1/4 31-T112N-R47W	Upper Deer Creek
Federal	NE1/4 SW1/4 3-T110N-R52W	Big Sioux River - tributary
Federal	NE1/4 NW1/4 15-T109N-R52W	Big Sioux River - tributary
Private	NE1/4 SW1/4 27-T111N-R48W	Deer Creek - tributary
Federal	NW1/4 NW1/4 11-110N-52W	Big Sioux River - tributary
Private	NW1/4 SE1/4 27-111N-52W	Big Sioux River - tributary

Ownership Type	Location	Water Body
Private	NW1/4 SW1/4 27-111N-48W	Deer Creek - tributary
Private	SE1/4 SW1/4 22-111N-48W	Deer Creek - tributary

DROUGHT

South Dakota's climate is characterized by cold winters and warm to hot summers. There is usually light moisture in the winter and marginal to adequate moisture for the growing season for crops in the eastern portion of the state. Semi-arid conditions prevail in the western portion. This combination of hot summers and limited precipitation in a semi-arid climatic region places South Dakota present a potential position of suffering a drought in any given year. The climatic conditions are such that a small departure in the normal precipitation during the hot peak growing period of July and August could produce a partial or total crop failure.

The fact South Dakota's economy is closely tied to agriculture only magnifies the potential loss which could be suffered by the state's economy during drought conditions. Roughly every fifty years a significant drought is experienced within the county, while many less severe droughts can occur at times every three years. Table 4.5 identifies the ten-year drought history for the County.

Table 4.5: Brookings County Ten Year Drought History

Location	Date Start	Date End	Type
Brookings County	07/24/2007	08/21/2007	Moderate to Severe Drought
Brookings County	09/02/2008	09/30/2008	Moderate Drought
Brookings County	09/13/2011	05/01/2011	Moderate to Severe Drought
Brookings County	07/10/2012	06/11/2013	Moderate to Severe Drought
Brookings County	08/27/2013	10/22/2013	Moderate Drought
Brookings County	03/31/2015	06/23/2015	Moderate Drought
Brookings County	04/18/2017	07/25/2017	Moderate Drought

Source: <https://droughtmonitor.unl.edu/Data/DataTables.aspx>

Major Drought Occurrences:

- 1987-1990: An abnormally low amount of precipitation in the summer of 1987 combined with a hot and dry summer during 1988, left South Dakota in dire straits. Agricultural income was down 0.8% and wheat price per bushel decreased significantly.
- 1930s: During the infamous dust bowl years, Brookings County was not spared a fair share of problems. Particularly dry summers were in 1934 and 1936.
- 1880s-1890s: The years 1887, 1894-1896, 1898-1901 were very dry years. The National Weather Service has several fire danger informational items located on their website.

WILDFIRE

A strong possibility exists for simultaneous emergencies during droughts. Wildfires are the most common. While researching the hazard occurrences that have taken place in the County, it became evident that the information found on the NOAA and SHEL DUS websites was incomplete. Therefore, other sources were contacted whenever possible. Specifically, NOAA had zero occurrences listed for wildfires in the County, but the State Fire Marshal's Office (SFMO) was contacted to verify that information. That SMFO information provided is derived from the reports submitted by the local fire departments who respond to the fires. It was explained that since many of the fire departments in the County are Volunteer Fire Departments many times wildfires are extinguished and reports are never filed with the State. Thus, the information provided by the State Fire Marshall's office is not entirely complete either. For the purpose of this PDM we have used the numbers provided by the State Fire Marshal's Office as a point of reference in determining the likelihood of a wildfire hazard occurrence within the jurisdiction. The information provided identifies 205 structure fire responses, 102 vehicle fire responses, and 263 outside fire responses reported since 2000. The cause of the outside fires is not listed, so it is not known for certain whether all or some of these fires resulted due to a natural hazard occurrence or as a result of human behavior. The Fire Marshal's Office also provided information about the number of injuries and fatalities reported as a result of these fires. According to the records, nine civilian injuries and two civilian fatalities were reported between 2001 and 2010. Additionally, five firefighter injuries and one firefighter death was reported in the same period.

Table 4.6 identifies the number of fire department responses to structural, vehicle and outside fires that have been experienced within the county. It should be noted that the number of responses does not necessarily mean that there were 263 outside (wildfire) fires as some fires required multiple departments to respond. The 2014 PDM did not list or identify the history of wildfire occurrences. The data compiled by the SMFO is not discriminate enough to determine whether a fire can be classified as an urban or wild-fire. The picture displayed on the following page is Brookings County as described in the South Dakota Wildland Urban Interface from the South Dakota State Hazard Mitigation Plan. This shows very little chance of a wildfire occurrence broadly over the entire county jurisdiction.



Table 4.6:
Brookings County Structural, Vehicle and Outside (Wildfire) Department Responses

Year	Structural Fires	Vehicle Fires	Outside Fires
2008	26	8	25
2009	29	12	23
2010	21	13	33
2011	19	12	42
2012	12	10	61
2013	22	10	25
2014	17	15	38
2015	15	7	28
2016	24	17	35
2017	19	12	37
Total	204	116	347

SOURCE: South Dakota State Fire Marshall Office

FLOOD

Flooding is a temporary overflow of water onto lands not normally covered by water producing measurable property damage or forcing evacuation of people and resources. Floods can result in injuries and even loss of life when quickly moving water is involved. Six inches of moving water is enough to sweep a vehicle off a road. Disruption of communication, transportation, electric service, and community services, along with contamination of water supplies and transportation accidents are very possible. Table 4.7 is a ten-year flood history in the County from 2007 to 2017.

Table 4.7: Brookings County 10-year Flood History

Location or County	Type	Date	Time	Property Damage
Brookings	Flood	03/13/2007	7:00 p.m.	0
Brookings	Flood	04/03/2007	6:00 a.m.	0
Bruce	Flood	04/25/2007	1:00 a.m.	0
Brookings	Flood	06/08/2008	6:00 a.m.	0
Bruce	Flood	03/17/2009	7:00 a.m.	0
Bruce	Flood	03/14/2010	6:00 a.m.	0
Bruce	Flood	04/01/2010	12:00 a.m.	0
White	Flash Flood	06/11/2010	2:50 a.m.	20k
Bruce	Flood	06/13/2010	6:00 a.m.	0
Brookings	Flash Flood	06/26/2010	6:07 p.m.	50k
Brookings	Flash Flood	07/17/2010	7:10 p.m.	0
Brookings	Flash Flood	07/23/2010	9:15 p.m.	25K
White	Flash Flood	09/02/2010	3:00 a.m.	0
White	Flash Flood	09/02/2010	2:45 a.m.	0
Medary	Flash Flood	09/22/2010	6:37 p.m.	500K

Location or County	Type	Date	Time	Property Damage
Bruce	Flood	09/22/2010	6:00 p.m.	0
Brookings Municipal Airport	Flood	09/23/2010	12:30 a.m.	0
Bruce	Flood	10/01/2010	12:00 a.m.	0
Bruce	Flood	03/17/2011	6:00 a.m.	0
Bruce	Flood	04/01/2011	12:00 a.m.	500K
Bruce	Flood	05/01/2011	12:00 a.m.	0
Bruce	Flood	06/01/2011	12:00 a.m.	0
Storla	Flash Flood	07/01/2011	2:40 p.m.	0
Bruce	Flood	07/12/2011	6:00 a.m.	0
Bruce	Flood	06/23/2013	06:00 a.m.	0
White	Flash Flood	06/01/2014	06:25 p.m.	0
White	Flash Flood	06/05/2014	09:16 a.m.	0
Brookings	Flash Flood	06/17/2016	06:00 a.m.	0
Bruce	Flood	03/22/2018	05:00 a.m.	0
Medary	Flood	03/24/2018	08:00 a.m.	0
Bruce	Flood	04/13/2018	06:00 a.m.	0
Bruce	Flood	04/20/2018	07:00 a.m.	0
Bruce	Flood	04/20/2018	10:00 p.m.	0
White	Flood	04/21/2018	04:00 a.m.	0
Bruce	Flood	04/23/2018	02:00 a.m.	0
Medary	Flood	04/23/2018	10:00 a.m.	0
Bruce	Flood	05/01/2018	00:00 a.m.	0

SOURCE: <https://www.ncdc.noaa.gov/stormevents/>

Major Flood Occurrences:

- April 2011-** Major flooding of the Big Sioux River, other streams, lakes, and general flooding, which began with a rapid March snowmelt, continued through April. Many roads remained flooded with heavy road damage being reported in some areas. High water and groundwater levels resulting from record precipitation in the previous year was the main reason that improvement was so slow. Flooding around the south end of Lake Pointsett in the northwest part of the county continued in particular to be damaging. The Big Sioux River crested at 3 feet above flood stage near Brookings on April 6th. Some roads remained closed by the flooding for part of the month. Water was running over other roads, from flooded lowlands, lakes, and the Big Sioux River. Some roads were heavily damaged. Some homes and businesses were still flooded and damages were estimated at \$500,000.

September 2010- Persistent thunderstorms developed in the late morning over southeast South Dakota and continued through the afternoon and evening. All of the storms through early afternoon produced large hail, with one report of damaging wind gusts. Large hail, heavy rain and flash flooding were noted during the evening. The Flooding started in Medary and ended in Bruce. Heavy rainfall of several inches caused flash flooding of numerous streets, basements, fields, and other low areas in and near Brookings. People in at least 50 houses, mobile homes, and apartments were forced to evacuate, and there

was widespread water damage to structures, contents, and vehicles in this area. Damages were estimated at \$500,000.

- **April 2001** - Beadle, Brookings, Brown, Buffalo, Clark, Codington, Day, Deuel, Edmunds, Grant, Gregory, Hamlin, Hanson, Jerauld, Kingsbury, Marshall, Mellette, Moody, Roberts, Sanborn, Spink, Todd, Turner, and Tripp counties were included in the disaster declaration. The major impact was to public infrastructure. Due to ice and wind damage to utility poles and lines, electrical services to some areas were interrupted. Numerous bridges and roads were impacted as well. There was damage to county and township roads in the eastern and northeastern portion of the state that had previously not been affected by floodwater. Some of the damaged roads included school bus, mail, and farm-to-market routes. Travel on these roadways involved significant risk. Several roads were temporarily impassable, requiring residents to travel greater distances because of detours. Many farmers were unable to access their fields to begin spring planting. In Mellette County, ice fluctuations substantially damaged a bridge, which caused the county to close the bridge to through traffic, resulting in a 40-mile detour for residents needing to cross the White River. This disaster also heavily impacted South Dakota's agricultural and livestock community.
- **June 1992** - On the afternoon and evening of the June 16, several violent thunderstorms (super cells) produced large amounts of rain and several large, damaging tornadoes. Heavy rain was experienced in the Davison, Miner, Kingsbury, Lyman, Buffalo, Moody, Brookings, Deuel, Minnehaha, and Hamlin counties. The heavy rains occurred in an area already saturated by previous rains. Over a two to three day period, 15 to 20 inches of rain fell in the Clear Lake/Watertown area resulting in widespread flooding of the Big Sioux River. The rains subsided late in the week. Some flooding was experienced by South Dakotans as far south as Sioux Falls.
- **March 1960** - Big Sioux River—Flooding occurred from the Brookings area south to the junction with the Missouri. Deer Creek and Medary Creek caused flooding in Aurora. Bruce and Sioux Falls also experienced flooding. Damage was heavy and estimated at \$2.3 million. Approximately half of this was incurred in the lower basin. About 86,000 acres of land were flooded, and 41,000 of these were between Sioux Falls and Sioux City.
- **Spring 1951** - Big Sioux River—Heavy flooding originated in the Brookings area. An accumulation of snow throughout February and an additional six to fourteen inches during March served as the flood source. High temperatures in late March brought about rapid melting and the flood condition. The Big Sioux was ½ mile wide in Moody County, 1 ½ miles wide around Baltic and Sioux Falls, and 2 miles wide below the Rock River. The area from Brookings to below the falls of Sioux Falls had about 73,400 acres of land flooded and damage of nearly \$2.25 million. The area from Sioux Falls to Sioux City, Iowa, had an estimated 29,000 acres flooded and \$600,000 in damage.

HAIL

Table 4.8 indicates hail occurrences by location throughout the county. However, the information provided by the NOAA and SHELDUS websites was incomplete due to inconsistent reporting after such hazards occur. Obviously, with such a high number of occurrences it is reasonable to expect that at least some property or crop damage was sustained in the communities during some

of the occurrences, even though the damage may not have been reported or recorded. It is possible that such damage was not reported because it was believed to be insignificant at the time, or because those responsible for reporting such information did not report to the proper agencies. In 2012, seven additional incidents of hail were logged. The largest being three inches in diameter, collected in Volga on June 18, 2012.

Table 4.8: Brookings County 10-year Hail History

Location or County	Date	Time	Type	Magnitude
Bruce	04/21/2007	9:53 p.m.	Hail	1.00 In.
Brookings	07/16/2007	2:59 p.m.	Hail	0.88 In.
White	07/16/2007	2:45 p.m.	Hail	1.00 In.
White	07/16/2007	2:40 p.m.	Hail	1.25 In.
Bruce	09/20/2007	5:30 a.m.	Hail	1.00 In.
Bruce	09/29/2007	11:42 p.m.	Hail	0.75 In.
Elkton	09/30/2007	2:53 p.m.	Hail	0.88 In.
Volga	06/20/2008	4:35 p.m.	Hail	0.75 In.
Bruce	08/13/2008	8:10 a.m.	Hail	1.00 In.
Elkton	06/18/2009	8:54 p.m.	Hail	1.00 In.
Medary	06/18/2009	8:42 p.m.	Hail	1.00 In.
Sinai	06/18/2009	8:28 p.m.	Hail	1.00 In.
Bruce	07/14/2009	2:45 p.m.	Hail	1.00 In.
Elkton	07/14/2009	3:40 p.m.	Hail	1.00 In.
Brookings Municipal Airport	07/14/2009	3:17 p.m.	Hail	1.00 In.
Brookings	07/14/2009	2:50 p.m.	Hail	1.00 In.
Bruce	06/26/2010	1:59 p.m.	Hail	1.00 In.
Brookings	07/17/2010	7:20 p.m.	Hail	1.00 In.
Volga	07/17/2010	6:51 p.m.	Hail	2.00 In.
Brookings	07/17/2010	6:51 p.m.	Hail	1.00 In.
Volga	07/17/2010	6:51 p.m.	Hail	1.00 In.
Brookings	07/17/2010	6:43 p.m.	Hail	0.88 In.
Brookings	08/19/2010	9:35 p.m.	Hail	1.00 In.
Sinai	05/08/2011	7:58 a.m.	Hail	0.88 In.
Sinai	05/08/2011	7:35 a.m.	Hail	0.88 In.
White	05/30/2011	2:45 a.m.	Hail	1.25 In.
Elkton	07/02/2011	2:42 p.m.	Hail	0.75 In.
Brookings Municipal Airport	04/15/2012	2:30 p.m.	Hail	1.00 In.
Ahnberg	05/05/2012	11:20 a.m.	Hail	1:00 In.
Bruce	05/05/2012	7:43 p.m.	Hail	1.25 In.
Volga	06/18/2012	11:45 p.m.	Hail	1.00 In.
Volga	06/18/2012	11:45 p.m.	Hail	3.00 In.
Bruce	06/18/2012	11:50 p.m.	Hail	1.25 In.
White	06/19/2012	00:07 a.m.	Hail	1.25 In.
Medary	06/21/2013	7:26 p.m.	Hail	0.88 In.
Medary	06/21/2013	7:40 p.n.	Hail	1:00 In.
Elkton	06/21/2013	8:00 p.m.	Hail	1:25 In.
White	03/31/2014	2:33 p.m.	Hail	0.75 In.

Location or County	Date	Time	Type	Magnitude
Bruce	03/31/2014	2:40 p.m.	Hail	0.88 In.
Sinai	05/08/2014	11:32 a.m.	Hail	1.75 In.
Ahnberg	05/08/2014	11:40 a.m.	Hail	1.50 In.
Volga	08/06/2015	5:55 p.m.	Hail	1.75 In.
Ahnberg	06/03/2016	3:55 p.m.	Hail	0.88 In.
Brookings	06/17/2016	5:49 p.m.	Hail	1.50 In.
Medary	06/19/2016	8:45 p.m.	Hail	0.75 In.
Ahnberg	07/05/2016	3:53 p.n.	Hail	0.75 In.
Brookings	07/05/2016	4:31 p.m.	Hail	1.75 In.
Bruce	07/16/2016	9:50 p.m.	Hail	1.00 In.
White	07/11/2017	8:30 p.m.	Hail	1.50 In.
Bruce	07/11/2017	8:55 p.m.	Hail	1.00 In.
White	07/11/2017	9:08 p.m.	Hail	1.00 In.
White	07/25/2017	3:28 p.m.	Hail	1.50 In.
White	04/13/2018	11:33 p.m.	Hail	0.75 In.

SOURCE: <https://www.ncdc.noaa.gov/stormevents/>

Major Hail Occurrences:

- **April 2004-** Large hail accompanied by winds gusting to 50 mph, dented vehicles, cracked and broke windshields and windows, dented siding, and damaged roofs. Property damages were estimated at \$500,000.
- **June 2001** - Large hail falling over an area 20 miles long and almost 5 miles wide caused property and crop damage. The hail damaged siding and windows of homes as well as vehicles. An estimated 60,000 acres of crops were destroyed or damaged. Hail was discovered piled up 6 inches deep in some fields 6 hours after the storm. The affected area included the city of Brookings, where some of the largest hail was reported. Damages were estimated at \$2,000,000 in property damage and \$4,000,000 in crop damages.
- **July 18, 1963** - Winds were clocked at 100 miles per hour and hail the size of baseballs was reported along an area eight to ten miles wide reaching from northwest to southeast of White, with the city receiving damage by having bricks torn off of a building. Differing reports gave credit to a small twister, lightning, or high winds “sucking” the bricks off of the wall. Cows caught in the storm received two to three inch bruises from falling hailstones.
- **July 31, 1909** - Crops were completely destroyed by hail for a distance of four to five miles north of the City of Brookings, but none fell in the city itself. This storm did not “leave a straw standing after it passed”. Farms were hit north and west of Bruce, east of Brookings, east of Elkton, and it hailed for thirty minutes in the town of Aurora.

LIGHTNING

The extent or severity of lightning can range from significant to insignificant depending on where it strikes and what structures are hit. Water towers, cell phone towers, power lines, trees, and common buildings and structures all have the possibility of being struck by lightning. People who

leave shelter during thunderstorms to watch or follow lightning also have the possibility of being struck by lightning. The lightning history for the past ten years denotes only five occurrences where damage was reported; however, possibility exists that the information reported is incomplete. It is also important to note that while no damage was reported, lightning strikes are very common in all South Dakota counties.

4.9 Brookings County Lightning History

Location	Date	Time	Type	Property Damage
Brookings	05/04/2009	9:38 p.m.	Lightning	5K

SOURCE: <https://www.ncdc.noaa.gov/stormevents/>

Major Lightning Occurrences:

- **May 2009-** Lightning struck the roof of a house in Brookings, starting a fire which damaged the attic and roof. Damages were estimated at \$5,000.
- **May 2002** - Lightning struck the roof of a house in Brookings, knocking a hole in the roof. The lightning shorted out attic wiring, television sets, and a stove. The lightning also damaged a gas line or meter, causing the house to fill with natural gas. Damages were estimated at \$5,000
- **April 2001-** Lightning struck a house in Elkton, causing a fire which destroyed the house. Damages were estimated at \$80,000.
- **July 2000-** Lightning struck and damaged a tree in Bruce, and debris from the tree damaged the wall of a home. The force of the lightning strike also broke 6 windows in the home. Damages were estimated at \$5,000

TORNADO

The annual risk for intense summer storms is very high. The entire County is susceptible to summer storms. Warning time for summer storms is normally several hours, sufficient for relocation and evacuation if necessary. However, tornadoes may occur with little or no warning. Between the years of 1950 and 2018, the County confirmed twenty-six tornadoes. Table 4.10 includes the tornado history in the County over the course of the past ten years.

Table 4.10: Brookings County 10-year Tornado History

Location	Date	Time	Type	Magnitude	Injuries	Property Damage
Volga	08/06/2015	5:33 p.m.	Tornado	0	0	80K
Brookings County	08/06/2015	6:00 p.m.	Tornado	0	0	80K

SOURCE: <https://www.ncdc.noaa.gov/stormevents/>

Major Tornado Occurrences:

- **August 1996**- A tornado in Aurora heavily damaged a farm. The house and adjacent garage and some contents were damaged, hay barn and dog kennels were destroyed, and damage occurred to other farm buildings and to trees. Overall, the damages were estimated at \$200,000.
- **June 1992** - This marked the date of one of the largest tornado outbreaks on record, affecting portions of Central United States. From June 14 – June 18 170 tornados were confirmed to have touched down with three F4 and one F5 tornados. The damages in 1992 from this outbreak were estimated at 242 million dollars with one life lost.
- **August 3, 1944** -The center of this storm struck south of the City of Brookings. A funnel was sighted and it left a swath of destruction for five miles. Twenty-two barns were destroyed, 14 between the towns of Sinai and Volga. All telephone poles south of the City of Brookings were destroyed and one third of the hangar roof was torn off at the airport.
- **July 9, 1938** - The town of White vicinity was struck by a tornado which destroyed all crops in its ½ mile wide, 6 ½ mile long path. It completely bent over the flagpole at the District 62 schoolhouse and caved the schools well in. It totally destroyed one farmer's house and barns, leaving nothing but the basement standing. Damage was estimated at \$30,000 to \$50,000 dollars

Each year, many storms and a few tornadoes affect the county. Summer storms in the County usually produce a wide range of damage making damage estimates very difficult. A complete listing of all summer storms having occurred within the county is not possible due to inaccurate reporting. The National Weather Service reports online were the primary source for this information.

EXTREME TEMPERATURES

Extreme temperatures in the County are common occurrences. It is expected that at least two times each year there will be extreme heat or extreme cold in the area. The following information was found on the SHELDUS and NOAA websites. It is possible that people in the area have adapted to this type of extreme temperatures and thus such weather events are not reported as often as they occur. It is also possible that the information has only in recent years been tracked or reported. Table 4.11 identifies dates and times of the temperature extremes.

The location in table 4.11 is not specifically identified in the table by jurisdiction due to the vast area across the State of South Dakota affected by extreme temperatures. On January 13, 2009, after a clipper system dropped from one to four inches of snow, Arctic air and blustery north winds pushed into the area. The coldest air and the lowest wind chills of the season spread across much of central and northeast South Dakota. Wind chills fell to thirty-five to fifty degrees below zero late in the evening of the thirteenth and remained through the fourteenth. By the morning of January 15, 2009 the Arctic high pressure area settled in across northeast South Dakota, bringing wind chills as low as sixty degrees below zero. Many vehicles did not start because of the extreme cold and several schools had delayed starts. Daytime highs remained well below zero across the area. This was one of the coldest days that most areas experienced since the early 1970s. The

records were broken by 1 to as much as 7 degrees. Some of the record lows included, -31 degrees at Sisseton; -32 degrees at Milbank; -35 degrees near Summit; and -39 degrees at Castlewood. Some near record low temperatures included -29 degrees at Redfield and Victor; and -34 degrees at Watertown. With these types of temperature extremes the biggest concern for people is exposure because prolonged exposure means almost certain death.

The counterpart to extreme cold is extreme heat which also has dangerous implications to humans, livestock, and critical structures and facilities if certain conditions are present. A temperature extreme occurrence took place between July 28 and July 30, 2006 when record heat and high humidity affected central, north central, and northeast South Dakota. Heat indices rose to 105 to 115 degrees across the area. Also in 2011 extreme heat and high humidity caused the deaths of many head of livestock in the County. Additionally, two excessive heat events were recorded in 2012. Both events were in July, with high dew points and daily high temperatures above 100 degrees.

Table 4.11: Brookings County 10-year History of Extreme Temperatures

Location	Date	Time	Type
Brookings County	02/19/2008	9:00 p.m.	Extreme Cold/Wind Chill
Brookings County	01/14/2009	6:00 a.m.	Extreme Cold/Wind Chill
Brookings County	02/01/2011	12:00 a.m.	Extreme Cold/Wind Chill
Brookings County	07/15/2011	12:00 p.m.	Excessive Heat
Brookings County	07/02/2012	11:00 a.m.	Excessive Heat
Brookings County	07/16/2012	11:00 a.m.	Excessive Heat
Brookings County	12/23/2013	1:00 a.m.	Extreme Cold/Wind Chill
Brookings County	01/23/2014	5:00 a.m.	Extreme Cold/Wind Chill
Brookings County	03/02/2014	2:00 a.m.	Extreme Cold/Wind Chill
Brookings County	01/16/2016	9:00 p.m.	Extreme Cold/Wind Chill
Brookings County	06/10/2016	11:00 a.m.	Excessive Heat
Brookings County	07/20/2016	12:00 p.m.	Excessive Heat
Brookings County	12/30/2017	8:00 a.m.	Extreme Cold/Wind Chill
Brookings County	01/01/2018	00:00 a.m.	Extreme Cold/Wind Chill
Brookings County	01/15/2018	00:00 a.m.	Extreme Cold/Wind Chill

SOURCE: <https://www.ncdc.noaa.gov/stormevents>

THUNDERSTORMS/HIGH WIND

Thunderstorms and high wind occurrences in the County are also very common. According to the National Climatic Data Center Storm Events database, the County experienced one hundred wind events from 1955-2017. Table 4.12 denotes the extent and severity of such hazards occurring in the last ten years. In addition, one occurrence of thunderstorm wind peak at 70.2 mph was recorded near Elkton on June 18, 2012. The County continues to educate residents of the dangers of such storms through public service announcements and other printed media.

Table 4.12: Brookings County 10-year History for Thunderstorms

Location	Date	Time	Type	Mag (kts)
Elkton	07/16/2007	1:55 p.m.	Thunderstorm Wind	59.8
Bruce	09/29/2007	11:18 p.m.	Thunderstorm Wind	59.8
Brookings	06/05/2008	7:34 p.m.	High Wind	70.2
Brookings	06/12/2008	7:05 p.m.	Thunderstorm Wind	59.8
Brookings	06/12/2008	7:03 p.m.	Thunderstorm Wind	59.8
Bruce	06/12/2008	7:02 p.m.	Thunderstorm Wind	70.2
Brookings	06/12/2008	6:58 p.m.	Thunderstorm Wind	65.6
Elkton	07/14/2009	3:40 p.m.	Thunderstorm Wind	59.8
Brookings	06/10/2010	9:15 a.m.	High Wind	57.5
Brookings	06/10/2010	9:16 a.m.	High Wind	64.4
Ahnberg	07/06/2010	11:45 p.m.	Thunderstorm Wind	59.8
Aurora	07/17/2010	7:05 p.m.	Thunderstorm Wind	70.2
Bruce	07/17/2010	5:50 p.m.	Thunderstorm Wind	70.2
Brookings	07/17/2010	6:55 p.m.	Thunderstorm Wind	59.8
White	07/17/2010	6:12 p.m.	Thunderstorm Wind	70.2
Bruce	07/17/2010	5:55 p.m.	Thunderstorm Wind	70.2
Bruce	07/17/2010	5:48 p.m.	Thunderstorm Wind	64.4
Brookings Municipal Airport	07/23/2010	8:55 p.m.	Thunderstorm Wind	61.0
Brookings	07/23/2010	8:55 p.m.	Thunderstorm Wind	59.8
Brookings Municipal Airport	08/19/2010	9:31 p.m.	Thunderstorm Wind	58.7
Brookings	08/19/2010	9:31 p.m.	Thunderstorm Wind	70.2
Brookings	10/26/2010	7:00 a.m.	High Wind	59.8
Brookings Municipal Airport	05/30/2011	8:10 p.m.	Thunderstorm Wind	59.8
Elkton	07/01/2011	2:42 p.m.	Thunderstorm Wind	70.2
Elkton	07/01/2011	2:47 p.m.	Thunderstorm Wind	64.4
Brookings	06/18/2013	11:55 p.m.	Thunderstorm Wind	61
Brookings	06/21/2013	3:02 p.m.	Thunderstorm Wind	61

Location	Date	Time	Type	Mag (kts)
Brookings County	06/22/2015	4:35 a.m.	High Wind	56
Brookings County	06/22/2015	4:55 a.m.	High Wind	51
Volga	07/28/2015	1:58 a.m.	Thunderstorm Wind	52
Volga	08/06/2015	5:55 p.m.	Thunderstorm Wind	55
Brookings Municipal Airport	08/06/2015	6:02 p.m.	Thunderstorm Wind	60
Medary	08/06/2015	6:04 p.m.	Thunderstorm Wind	61
Medary	08/06/2015	6:12 p.m.	Thunderstorm Wind	74
Brookings Municipal Airports	08/06/2015	6:13 p.m.	Thunderstorm Wind	60
Brookings Municipal Airports	08/06/2015	6:13 p.m.	Thunderstorm Wind	65
Volga	06/03/2016	3:57 p.m.	Thunderstorm Wind	56
Medary	06/19/2016	8:45 p.m.	Thunderstorm Wind	52
Volga	07/16/2016	9:55 p.m.	Thunderstorm Wind	52
Volga	08/01/2016	3:40 a.m.	Thunderstorm Wind	52
Aurora	08/11/2016	11:27 p.m.	Thunderstorm Wind	52
Sinai	05/28/2017	5:26 p.m.	Thunderstorm Wind	56
Ahnberg	05/28/2017	5:26 p.m.	Thunderstorm Wind	52
Sinai	05/28/2017	5:26 p.m.	Thunderstorm Wind	61
Bruce	07/11/2017	9:10 p.m.	Thunderstorm Wind	52
White	07/11/2017	9:40 p.m.	Thunderstorm Wind	56
Bruce	07/11/2017	9:40 p.m.	Thunderstorm Wind	56
Bushnell	07/11/2017	9:57 p.m.	Thunderstorm Wind	56
Brookings	07/19/2017	12:05 p.m.	Thunderstorm Wind	64
Bushnell	07/19/2017	12:30 p.m.	Thunderstorm Wind	70
White	07/25/2017	3:45 p.m.	Thunderstorm Wind	52

SOURCE: <https://www.ncdc.noaa.gov/stormevents/>

Major Thunderstorm/ High Wind Occurrences:

- July 2011-**Thunderstorms produced large hail and damaging winds across part of southeast South Dakota near and north of Interstate 90 during the afternoon of July 1st. Most of the damage from the severe weather and flash flooding was in Lake, Brookings, and Moody Counties. Thunderstorm winds caused widespread tree damage, including numerous trees blown down. Several houses and garages were damaged by tree debris, and the winds blew shingles off roofs. The winds damaged siding and roofs. Power lines and poles were blown down, resulting in a power outage. Several streets in Elkton were blocked by trees. Damages were estimated at \$100,000.
- March 2005-** A wind storm which included Brookings County, Sustained winds of 40 to 45 mph with gusts above 60 mph persisted from mid morning until late afternoon. The winds caused widespread tree damage with branches and smaller tree debris broken off.

Several power lines were knocked down by the wind or by windblown debris. This resulted in several power outages, especially between the Missouri and James Rivers. Damages to buildings were mostly to shingles and gutters. However, a metal storage building was blown over at Mitchell. Also at Mitchell, construction barriers were blown over, and windows were broken in two vehicles by blowing rocks. An aluminum recycling cage was blown away at Woonsocket. A window was blown out at a school in Freeman. In Sioux Falls, there was damage to the airport tower. Damages were estimated at \$530,000.

- **July 28, 2002-** Beginning at the town of Sinai and ending 5 miles east south east of the town of Sinai a thunderstorm winds caused widespread structural, tree, and power line damage in and near Sinai. The roof was ripped off a mobile home, a well drilling business was destroyed, the siding from another business was ripped off, part of a grain elevator was smashed, several garages were destroyed or heavily damaged, several trees were blown down and widespread tree debris littered the area, and power lines and poles were blown down. Power outages lasted until the next day. At a farm just east of Sinai, five grain bins, a machine shed, and several small shacks were destroyed, and the farmhouse was damaged, with about 300 thousand dollars in damage estimated at this farm alone. Other small farm structures in the area were reported to be destroyed or damaged. Crops in the area were heavily damaged by the wind and accompanying hail, with one witness watching as a bean field "just disappeared." The crop damage was widespread, but the amount of crop damage could not be determined. Starting three miles west of Sinai and ending two miles west North West of Sinai, length 1 mile width 50 yards tornado caused no reported damage. The City of Elkton had thunderstorm winds that caused tree damage, and damage to buildings such as shingles blown off and broken windows from tree debris. The winds caused severe crop damage in the area, especially to corn crops. South of Brookings thunderstorm winds damaged a barn, a silo, and tore the roof off a mobile home. The winds also caused tree damage, including fifty to sixty trees blown down on a golf course. The City of Brookings reported large hail, driven by severe winds, damaged vehicles and crops. Total estimated damage was \$3,250,000.00 with one life lost during cleanup operations.
- **May 7, 1993-** Very strong winds, likely the result of a downburst in a severe thunderstorm, destroyed an apartment building, five mobile homes, 15 garages, and 16 vehicles, and damaged many other homes and vehicles. 12 people were treated for minor injuries from the storm. The storm also caused considerable damage to some area farms and the roof of a motel. Estimated damage was \$5,000,000.00 dollars.
- **July 1, 1928 -** Traveling from southwest of Sinai to northeast of White the winds tore down large trees, wrecked telephone poles and broke many large windows in downtown businesses. The roof of a hangar at the Brookings airport was carried nearly 300 feet from its original location, and two planes were damaged. The schoolhouse three and one half miles northwest of Volga was completely destroyed

WINTER STORMS

Table 4.13 shows just how common snow and ice storms are in the County. While such storms would be considered extreme in many parts of the State, the consistent nature of such weather hazards are expected in this area. Thus, planning and response mechanisms for snow and ice storms are vital to the County and are routine procedures in the County due to the common nature of such storms. Winter storms in South Dakota are known to cover large geographical areas, often an entire county or multiple counties can be affected by a single storm. All of the storms identified in Table 4.13 were considered to have occurred countywide. Due to the multiple occurrences of winter storms each year, an exhaustive compilation is not possible.

Table 4.13 Brookings County 10-year History of Snow and Ice Storms

Location	Date	Time	Type
Brookings County	02/24/2007	12:00 p.m.	Winter Storm
Brookings County	02/28/2007	08:00 a.m.	Heavy Snow
Brookings County	04/10/2007	14:00 p.m.	Heavy Snow
Brookings County	12/01/2007	04:30 a.m.	Heavy Snow
Brookings County	03/26/2008	22:00 p.m.	Heavy Snow
Brookings County	03/31/2008	04:00 a.m.	Heavy Snow
Brookings County	04/10/2008	13:00 p.m.	Blizzard
Brookings County	04/25/2008	05:00 a.m.	Heavy Snow
Brookings County	11/06/2008	23:00 p.m.	Blizzard
Brookings County	12/14/2008	05:00 a.m.	Blizzard
Brookings County	12/20/2008	12:00 p.m.	Blizzard
Brookings County	01/12/2009	12:00 p.m.	Blizzard
Brookings County	12/23/2009	03:00 p.m.	Blizzard
Brookings County	12/11/2010	12:00 a.m.	Blizzard
Brookings County	12/20/2010	06:00 a.m.	Heavy Snow
Brookings County	12/31/2010	06:00 a.m.	Blizzard
Brookings County	12/31/2010	06:00 a.m.	Winter Storm
Brookings County	01/01/2011	12:00 a.m.	Blizzard
Brookings County	01/01/2011	12:00 a.m.	Winter Storm
Brookings County	01/31/2011	10:00 a.m.	Winter Storm
Brookings County	02/20/2011	03:00 a.m.	Heavy Snow
Brookings County	02/20/2011	03:00 a.m.	Ice Storm
Brookings County	02/20/2011	03:00 a.m.	Winter Storm
Brookings County	11/19/2011	06:00 a.m.	Heavy Snow
Brookings County	12/09/2012	10:00 a.m.	Blizzard
Brookings County	02/10/2013	03:00 p.m.	Blizzard
Brookings County	01/16/2014	10:00 a.m.	Blizzard
Brookings County	03/04/2014	04:00 p.m.	Heavy Snow

Location	Date	Time	Type
Brookings County	03/18/2014	09:00 a.m.	Heavy Snow
Brookings County	12/15/2014	08:00 a.m.	Winter Storm
Brookings County	01/05/2015	11:00 a.m.	Winter Storm
Brookings County	01/08/2015	01:20 p.m.	Blizzard
Brookings County	11/30/2018	02:00 a.m.	Winter Storm
Brookings County	12/01/2015	00:00 a.m.	Winter Storm
Brookings County	12/15/2015	04:00 p.m.	Heavy snow
Brookings County	12/25/2015	08:00 p.m.	Winter Storm
Brookings County	11/18/2016	04:00 a.m.	Blizzard
Brookings County	12/10/2016	10:00 a.m.	Heavy Snow
Brookings County	12/16/2016	11:00 a.m.	Winter Storm
Brookings County	03/12/2017	05:00 p.m.	Heavy Snow
Brookings County	02/22/2018	01:00 p.m.	Winter Storm
Brookings County	03/23/2018	08:00 p.m.	Winter Storm
Brookings County	04/08/2018	07:00 a.m.	Winter Storm
Brookings County	04/13/2018	12:00 p.m.	Blizzard

SOURCE: <https://www.ncdc.noaa.gov/stormevents/>

Major Winter Storm Occurrences:

- April 2008** - A strong low pressure area brought widespread heavy snow of 6 to 20 inches to most of northeast South Dakota. Many stranded motorists had to abandon their vehicles in the hardest hit areas. Travel was not advised across the entire area. A school bus slid into a ditch east of Castlewood with no injuries occurring. Interstate-29 was closed from 3 pm the 25th until 3 pm on the 26th from Brookings north to the North Dakota border. In addition, South Dakota State Highway 12 was closed from Webster to the Minnesota line from the afternoon of the 25th until the late morning of the 26th. Most counties affected by the storm opened emergency shelters when Interstate 29 was closed to house stranded motorists. Also, many schools were closed across the area. The very heavy snow set several records across the area. The 19 inches at Watertown broke its all time 24 hour snowfall record of 16 inches. Both Victor and Clear Lake had their second highest snowfall ever recorded in a 24 hour period. Watertown, along with several other locations in northeast South Dakota, received near record or record snowfall for the month of April. In fact, Watertown's 29.5 inches of snow for the month of April was almost their seasonal normal snowfall. This event was also declared a disaster by the President.
- November 2005** - Snowfall varying from 4 to 15 inches combined with winds gusting over 50 mph to produce blizzard conditions. The heaviest snowfalls were mostly near and west of the James River, in the area where a severe ice storm immediately preceded the blizzard. Several reports of 6 to 8 foot drifts were received from this area. Visibilities were lowered frequently to zero and travel was made impossible in many areas. Roads, including Interstate Highways 90 and 29 were closed for extended periods of time. Most schools and businesses that were not already closed because of the ice storm were forced to close. The winds during the blizzard continued to bring down power lines and poles, most of which had been coated and weighted down by ice in the area hit

by the ice storm. In addition, minor damage was caused to homes and vehicles by the strong winds and by windblown debris, mainly from trees. A 79 year old man died from exposure three and a half miles north of Harrison in Douglas County when he became stuck in a barbed wire fence after the tractor he was driving on his farm became entangled in the fence late on the afternoon of the 28th. Damages were estimated at \$1,900,000.

- **March 2002-** Widespread heavy snow was preceded by freezing rain. Precipitation from the Chamberlain to Huron areas and east to Brookings was mainly snow, with accumulations ranging from 8 inches in several areas to 19 inches at Huron. The heavy snow on top of the ice made travel difficult, and in places impossible, as some roads were blocked. Cattle losses were suspected from the heavy wet snow occurring during calving season, but in most cases specific numbers were not available. Over the Southeast part of the affected area, including near and just south of Sioux Falls, damage to power lines due to icing was reported, with several power outages in Sioux Falls. Three to six inches of snow fell on top of the ice in this area. Damages were estimated at \$210,000.
- **October 1995 -** a severe autumn snow and ice storm caused widespread damage in South Dakota. Winds associated with the storm caused lines to slap together and poles to fail, producing widespread power outages to large portions of rural South Dakota. Tree damage also led to significant damage to electrical utilities. Thirteen rural electric cooperatives reported damage from this storm. The cooperatives lost nearly 9,500 poles and 170 transmission lines. Damage was estimated at \$10 to \$10.3 million to rural electric infrastructure only. Approximately 30,290 households were affected by the power outages. Crews from electric cooperatives in South and North Dakota, Minnesota, Iowa, and Nebraska assisted local cooperatives with line repairs. The power outages also caused several rural water system pumping stations to go off line, causing a loss of water utilities to members of rural water systems. The National Guard provided generators to power these pumping stations to restore water service. This storm also forced major transportation delays as portions of Interstates 90 and 29 had to be closed because of the snow accumulation on the roadway and poor visibility. One of these interstate closings led Davison and Codington counties to initiate their sheltering plans for travelers who could not find rooms at local motels. The storm also caused numerous cancellations and delays in school openings because of travel conditions or the lack of power. Interstate traffic was restored by early October 24. Twenty-eight counties were included in the disaster declaration: Aurora, Beadle, Bon Homme, Brookings, Brule, Buffalo, Charles Mix, Clark, Codington, Davison, Day, Deuel, Douglas, Grant, Gregory, Hamlin, Hanson, Hutchinson, Jerauld, Kingsbury, Lake, McCook, Marshall, Miner, Roberts, Sanborn, Spink, and Tripp Counties.

Climate Change

Climate change is a global phenomenon. Human related activities are releasing increasing quantities of carbon dioxide and other heat trapping gases into the Earth's atmosphere causing increases in temperatures worldwide. Dennis Todey, Extension State Climatologist, predicts increased precipitation in the northern Great Plains with more heavy precipitation events and flooding. Warmer temperatures will lengthen the growing season and increase the number of frost-free days. Total snow fall accumulations will decrease. Overall, climate change will increase the number and intensity of weather hazards in the region.

ASSESSING VULNERABILITY: OVERVIEW

Requirement 201.6(c)(2)(i). Local Mitigation Plan Review Tool – B1.

Requirement 201.6(c)(2)(i). Local Mitigation Plan Review Tool – B2.

Requirement 201.6(c)(2)(ii). Local Mitigation Plan Review Tool – B3.

Hazards were also analyzed in terms of the level of the community or county's vulnerability to the hazard. Vulnerability to the hazard is the susceptibility of life, property, and the environment to injury or damage if a hazard occurs. Representatives from each participating jurisdiction and the PDM Planning Team were asked to complete worksheets that rated their perception to vulnerability of hazards for either their specific geographical location, or for county-wide risks. A low vulnerability hazard is one that has very low damage potential to either life or property (minor damage to less than 5% of the jurisdiction). A "medium" vulnerability hazard is unlikely to threaten human life, although some people may be at risk, but may pose moderate damage potential (causing partial damage to 5% to 10% of the jurisdiction, on an irregular occurrence). A "high" vulnerability hazard may threaten human life, and more than ten percent of the jurisdiction may be at risk on a regular occurrence. Table 4.14 below is an overall summary of vulnerability by jurisdiction produced from the FEMA worksheets completed by each participating jurisdiction and PDM Planning Team. Also See Tables 5.1-5.12 for additional strategies and solutions that jurisdictions are taking to mitigate high-priority hazards.

Table 4.14: Overall Summary of Vulnerability by Jurisdiction

Type of Disaster	Brookings County	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	SVE	Volga	White
Dam Failure	M	N	M	N	N	N	N	N	N	N
Drought	L	M	L	L	M	N	L	N	L	M
Earthquake	M	N	M	N	N	H	N	N	N	N
Extreme Cold	M	M	L	L	M	H	L	L	M	M
Extreme Heat	M	M	L	L	L	H	L	L	M	L
Flood	M	L	M	H	N	N	L	L	L	N
Freezing Rain/Sleet/Ice	M	L	M	L	H	H	H	H	M	H
Hail	M	M	M	M	M	M	M	L	M	M
Heavy Rain	M	L	H	L	L	M	L	L	M	L
Heavy Snow	M	L	L	L	H	M	L	L	M	H
Ice Jam	L	N	N	L	N	N	N	L	N	N
Landslide	M	N	M	N	N	N	N	N	N	N
Lightning	M	M	L	L	L	L	L	L	L	L
Rapid Snow Melt	M	L	H	L	N	L	L	L	L	N
Strong Winds	M	H	M	M	H	H	H	M	M	H
Subsidence	N	N	N	N	N	N	N	N	N	N
Thunderstorm	M	M	M	L	N	M	L	M	L	L
Tornado	M	H	L	H	H	H	H	M	H	H
Urban Fire	M	M	M	L	H	L	H	L	L	H
Wild Fire	M	M	L	M	H	L	N	M	L	H

- N** : Not applicable; not a hazard to the jurisdiction
- L** : Low risk/vulnerability; little damage potential (minor damage to less than 5% of the jurisdiction)
- M** : Medium risk/vulnerability; moderate damage potential (causing partial damage to 5-10% of the jurisdiction, and irregular occurrence)
- H** : High risk/vulnerability; significant risk/major damage potential (for example, destructive, damage to more than 10% of the jurisdiction and/or regular occurrence)

The following paragraphs summarize the description of the jurisdiction's vulnerability to each hazard and the impact of each hazard on the jurisdiction.

Blizzards are characterized by high winds, blowing snow, cold temperatures, and low visibility. Blizzards create conditions such as icy roads, closed roads, downed power lines and trees. The County's population is especially vulnerable to these conditions because people tend to leave their homes to get to places such as work, school, and stores rather than staying inside. Traffic is one of the biggest hazards in the County during a blizzard because people often get stuck, stranded, and lost when driving their vehicles which usually prompts others such as family and or emergency responders to go out in the conditions to rescue them.

Drought can be defined as a period of prolonged lack of moisture. High temperatures, high winds, and low relative humidity all result from droughts and are caused by droughts. A decrease in the amount of precipitation can adversely affect stream flows and reservoirs, lakes, and groundwater levels. Crops and other vegetation are harmed when moisture is not present within the soil.

South Dakota's climate is characterized by cold winters and warm to hot summers. There is usually light moisture in the winter and marginal to adequate moisture for the growing season for crops in the eastern portion of the state. Semi-arid conditions prevail in the western portion. This combination of hot summers and limited precipitation in a semi-arid climatic region present a potential position of suffering a drought in any given year. The climatic conditions are such that a small departure in the normal precipitation during the hot peak growing period of July and August could produce a partial or total crop failure. South Dakota's economy is closely tied to agriculture only magnifies the potential loss which could be suffered by the state's economy during drought conditions. Roughly every fifty years a significant drought is experienced within the county, while less severe droughts have occurred as often as every three years.

Earthquakes occur in the area, but have not had a great enough magnitude or intensity in the past ten years to be reported. The magnitude and intensity of an earthquake is measured by the Richter scale and the Mercalli scale. An earthquake of noteworthy magnitude has not occurred in the county for decades, but it would be reasonable to expect that a large earthquake would have comparative impact on the County as it would anywhere else. The County does not have skyscrapers or very many tall buildings, but it also does not have codes in place that require homes or buildings to be retrofitted.

Extreme Cold temperatures often accompany a winter storm, so you may have to cope with power failures and icy roads. Whenever temperatures drop decidedly below normal and as wind speed increases, heat can leave your body more rapidly. These weather-related conditions may lead to serious health problems. Extreme cold is a dangerous situation that can bring on health emergencies in susceptible people, such as those without shelter or who are stranded, or who live in a home that is poorly insulated or without heat. Exposure is the biggest threat/vulnerability to human life; however, incidences of exposure are isolated and thus unlikely to happen in masses.

Extreme Heat Severe heat waves have caused catastrophic crop damage, thousands of deaths from hyperthermia, and widespread power failures due to increased use of air conditioning. Loss of power and crop damage are the largest vulnerability to the county during extreme heat. Both have an effect on quality of life, however, neither are detrimental to the existence of the population of the County.

Flooding can result in injuries and even loss of life when quickly moving water is involved. Six inches of moving water is enough to sweep a vehicle off a road. Disruption of communication, transportation, electric service, and community services, along with contamination of water supplies and transportation accidents are very possible.

The County is networked with a series of creeks and tributaries, which are part of the Big Sioux River watershed. This area receives several large thunderstorms per year that can cause intense rainfall for short periods of time, resulting in water feeding the Big Sioux River through its respective tributaries. In addition to flooding caused by rainfall, the area surrounding the Big Sioux River is subject to flood damage because of the possibility of extensive snowpack and subsequent spring snowmelt flooding.

There have also been past issues dealing with the maintenance and clearing of drainage channels in the area that have resulted in obstructions restricting the flow of water during a storm. Some residents live in the 100-year flood plain located in the Big Sioux River watershed. Conditions, at times, make response and evacuation operations, very difficult, adversely affecting the safety of residents.

The flooding of township roads is a concern for the entire county. Township officials have identified areas that are either vulnerable or have experienced recurring damages. These areas are identified in maps contained in the Appendix.

Freezing Rain causes adverse conditions such as slippery surfaces and extra weight buildup on power lines, poles, trees, and structures. The additional weight can often cause weak structures to cave in and cause tree branches and power lines to break and fall. The County and the local jurisdictions within are susceptible to these conditions due to the types of structures and surfaces that exist in the county that cannot be protected from freezing rain. Traffic on the roads and highways tend to be the biggest hazard during freezing rain conditions because vehicles often slide off the road which prompts emergency responders and others to have to go out on rescue missions in the adverse conditions.

Hail causes damage to property such as crops, vehicles, windows, roofs, and structures. The County and its local jurisdictions are vulnerable to hail, like most other areas in the State due to the nature of the hazard. Mitigating for hail is difficult and is usually found in the form of insurance policies for structures, vehicles, and crops.

Heavy Rain causes damage to property such as homes and roads. Often when heavy rains occur in the County it may cause sewers to backup in homes due to excess water entering the wastewater collection lines. The excess water sometimes has no place to go and thus basements fill up with water which results in damage to water heaters, furnaces, and damage to living quarters for people who live in basement apartments. Roads and bridges can be washed out, thus causing traffic hazards for travelers and commuters. Many times the roads have to be closed causing rural traffic to have to take alternate routes which can sometimes be an additional five to ten miles out of the way. All areas of the County are vulnerable when heavy rains occur. Storm sewers are built for the typical storm and therefore do not accommodate for excessive or heavy rains.

Ice Jams cause damage to bridges, roads, and culverts due to water currents pushing large chunks of ice under or through small openings. There are 181 bridges and many more culverts throughout Brookings County which are at risk for ice jams.

Landslides have a low chance of occurring in the County due to the relatively flat topography.

Lightning often strikes the tallest objects within the area. In towns trees and poles often receive the most strikes. In rural areas, shorter objects are more vulnerable to being struck. Electrical lines and poles are also vulnerable because of their height and charge. In addition, many streetlights function with sensors. Since thunderstorms occur primarily during hours of darkness, lightning strikes close to censored lights cause the lights to go out, causing a potential hazard for drivers. Flickering lights and short blackouts are not at all uncommon in the county.

One of lightning's dangerous attributes includes the ability to cause fires. Since the entire county is vulnerable to lightning strikes and subsequent fires, these fires will be treated under the fire section of this PDM.

Most injuries from lightning occur near the end of thunderstorms. Individuals who sought shelter leave those areas prior to the entire completion of the thunderstorm. Believing it is safe to freely move around, concluding lightning strikes catch them off guard.

Severe Winter Storms have a high risk of occurrence. Approximately five snowstorms each resulting in five to ten inches of snow occur in the County area annually. Heavy snow can immobilize transportation, down power lines and trees and cause the collapsing of weaker structures. Livestock and wildlife are also very vulnerable during periods of heavy snow. Most storms can be considered to have occurred countywide. Due to the multiple occurrences of winter storms each year, an exhaustive compilation is not possible.

Additionally, winter storms often result in some forms of utility interruptions. High voltage electric transmission/distribution lines run the length of the County. These lines are susceptible to breaking under freezing rain and icy conditions and severing during high blizzard winds. Within the county, particularly within Brookings, there are fiber optics associated with phone transmissions that are the lifeline to communications. Any electrical complications bring associated risk of food spoilage, appliance burnout, loss of water, and potential harm for in-house life support users. Limited loss of power is not uncommon on an annual basis. A typical power interruption lasts from one to three hours. Most residents are prepared to deal with this type of inconvenience.

The greatest danger during winter weather is traveling. Many individuals venture out in inclement weather. Reasons include the necessity of getting to work, going to school, going out just to see how the weather is, and to rescue stranded persons.

Snow Drifts are caused by wind blowing snow and cold temperatures. These drifts can be small finger drifts on roadways causing cautionary driving, or twenty to forty foot high drifts that block entire highways, roads, and farmyards for several days.

Populations at highest vulnerability for this type of hazard are rural homeowners, which account for approximately seventeen percent of the county, and the elderly. As with any weather event, those dependent upon healthcare supplies and other essentials will also bear the brunt of highway closures and slowed transportation due to snow and ice. Emergency services will also be delayed during winter storms.

Snow removal policies and emergency response is at excellent performance and no projects will be considered in this area. Generators provide back-up power to many critical facilities within the municipalities and in rural areas. However, some of the critical facilities that could be utilized in

disaster situations do not have backup generators. Also, some facilities have generators that only power a portion of operations.

Strong Winds can be detrimental to the area. Trees, poles, power lines, and weak structures are all susceptible and vulnerable to strong winds. When strong winds knock down trees, poles, power lines, and structures it creates additional traffic hazards for travelers and commuters. Strong winds are a common occurrence in all parts of the County. The farming community tends to be vulnerable because many old farm sites have weak, dilapidated, or crumbling structures or structures such as grain bins which can easily be blown over. Another area of particular vulnerability would be those areas with dense tree growth where dead or decaying trees lose their stability and can be blown over or knocked down easily.

Thunderstorms cause lightening and sometimes large amounts of rain in a small timeframe. The entire county experiences thunderstorms on a regular basis and is only vulnerable when weather events outside the norm occur. Specific vulnerabilities are further identified in the paragraphs for “Lightening” and “Heavy Rains”.

Tornadoes present significant danger and occur most often in South Dakota during the months of May, June, and July. The greatest period of tornado activity (about 82 percent of occurrence) is from eleven a.m. to midnight. Within this time frame, most tornadoes occur between four p.m. and six p.m. The annual risk for intense summer storms is very high. Often associated with summer storms are utility problems. High voltage electrical transmission lines run the length of the County. These lines are susceptible to breaking during high winds and hail. Tall trees located near electrical lines can be broken in wind or by lightning strikes and land on electrical lines, severing connections. Any electrical complications bring associated risk of food spoilage, appliance burnout, loss of water, and potential harm to in-house life support dependents. Limited loss of power is common on an annual basis. Typical power interruptions last around one to three hours. Most residents are prepared to deal with this.

Wildfires occur primarily during drought conditions. Wildfires can cause extensive damage, both to property and human life, and can occur anywhere in the county. Even though wildfires can have various beneficial effects on wilderness areas for plant species that are dependent on the effects of fire for growth and reproduction, large wildfires often have detrimental atmospheric consequences, and too frequent wildfires may cause other negative ecological effects. Current techniques may permit and even encourage fires in some regions as a means of minimizing or removing sources of fuel from any wildfire that might develop.

Since there are no remote forested regions in the County, wildfires can be easily spotted and are capable of being maintained. The County does not have any areas that are considered wildland-urban interface because property outside city limits is primarily agricultural land, thus, there are no urban interface areas of risk in the County. In addition, fire interference with traffic on highways is not a major concern. The most important factor in mitigating against wildfires continues to be common sense and adherence to burning regulations and suggestions disseminated by the County.

Moisture amounts have the biggest impact on fire situations. During wet years, fire danger is low. More controlled burns are conducted and fewer mishaps occur. During dry years, severe restrictions are placed on any types of burns. For information on dealing with open/controlled burning within the county, see SDCL 34-29B and SDCL 34-35.

Climate Change is a global issue. Climate change exacerbates many of the identified weather hazards such as drought, extreme temperatures, severe storms, flooding, tornadoes and wildfires. Current climate conditions in the northern Great Plains already put a strain on communities and cause millions of dollars in damages. Climate change will only add to these problems.

ASSESSING VULNERABILITY: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE

Requirement 201.6(c)(3)(ii). Local Mitigation Plan Review Tool – C2.

Brookings County participates in the National Flood Insurance Program (NFIP). All communities in Brookings County with the exception of Bushnell, participate in the NFIP. Most floodplain regulations restrict only properties in the floodway or a Zone A flood hazard area. Bushnell has not adopted floodplain standards because the entire community is located within Zone X according to the FIRM published January 1, 2008. The county will continue to participate and ensure compliance of the participating local jurisdictions located within the floodplain.

Table 4.15:
Communities Participating in the National Flood Program, Brookings County, SD

Community Name	Community ID	Current Map Effective Date
Brookings County	460253	07/16/08(M)
Aurora	460051	07/16/08
Brookings	460004	07/16/08
Bruce	460005	07/16/08(M)
Bushnell	Not Participating	
Elkton	460172	07/16/08
Sinai	460098	07/16/08
Volga	460223	07/16/08
White	460148	07/16/08

The Brookings County Zoning Office maintains the flood zone maps and utilizes DFIRMS for all planning mechanisms occurring in the unincorporated areas of the county; specifically development of new structures. Each individual participating community has a designated floodplain administrator that requires elevation certificates and issues floodplain development permits for structures constructed within Zone A of the identified flood hazard areas. The DFIRMS are used to determine where the natural drainage occurs and ensures that new development will not interrupt the natural drainage. The Brookings County Zoning Office and City of Brookings Community Development Department have the DFIRMS in electronic format and thus will utilize and maintain the maps in the electronic format.

ADDRESSING VULNERABILITY: REPETITIVE LOSS PROPERTIES

Requirement 201.6(c)(2)(ii). Local Mitigation Plan Review Tool – B4.

Due to various geomorphologic and topographical conditions, periodic flooding affects numerous areas in both incorporated and unincorporated areas of the County. Residential development occurred adjacent to numerous lakes in Brookings County prior to the initial flood hazard boundaries being identified on December 20, 1977. As a result, numerous structures already existed at the time of adoption of the first map and continue to be lived in today. Numerous structures, primarily residentially used are located within Flood Hazard Areas currently identified as Zone A. Many structures located within the County have experienced flooding or are required to be insured against flood due to their proximity to special flood hazard areas. The County has a total of nine hundred five (905) flood insurance policy holders. The vast majority of those policies insure residents adjacent to the numerous lakes in Brookings County.

Table 4.16: Brookings County National Flood Insurance Program Statistics

Community Name	Current NFIP Policies	Number of Claims Paid Since 1978	Total Value of Claims Paid	Policies for Structures in A-Zones	Repetitive Loss Properties
City of Aurora	1	0	\$0.00	0	0
City of Brookings	69	17	\$182,329.00	47	0
City of Bruce	13	11	\$33,852.00	12	0
Unincorporated areas of Brookings County	119	52	\$587,014.00	87	0
Totals	202	80	\$803,195.00	146	0

SOURCE: South Dakota State NFIP Coordinator

The PDM Planning Team focused attention particularly on flood related issues. An issue of primary concern the number of times specific properties and structures on those properties flood. Fortunately for Brookings County there have been zero incidence of repetitive loss claims throughout the county. Repetitive loss properties are those for which two or more losses of at least \$1,000 each have been paid under the National Flood Insurance Program (NFIP) within any ten-year period. A goal of the County is to protect specific areas in the county from flooding. This goal aims to protect properties prone to flood losses, but does not discount the possibility that in some cases structures located in the floodplain may need to be removed.

ADDRESSING VULNERABILITY: SEVERE REPETITIVE LOSS PROPERTIES

Requirement 201.6(c)(2)(ii). Local Mitigation Plan Review Tool – B4.

The Flood Insurance Reform Act of 2004 identified another category of repetitive loss, severe repetitive loss, and defined it as “a single family property (consisting of one-to-four residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which four or more separate claims payments have been paid under flood insurance coverage

with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least two separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property. Again, since Brookings County does not have any properties classified as “repetitive loss” there are none classified as “severe repetitive loss” either.

ASSESSING VULNERABILITY: IDENTIFYING STRUCTURES

Requirement 201.6(c)(2)(ii). Local Mitigation Plan Review Tool – B3.

One of the primary purposes of this PDM is identifying critical facilities, emergency shelters, and summer storm shelters and equipping those facilities with the means to provide the necessary energy for access to sanitation and maintain important functions during a natural hazard occurrence. In the event of a disaster as a result of severe summer or winter storms, a terrorist attack, or a hazardous materials incident, the County and participating entities will have the ability to prevent further loss of life by generator powered critical facility shelters. The City of Brookings has many structures that are vital to emergency operations. Each jurisdiction was responsible for listing critical infrastructure within their communities. Table 4.17 is a list of critical facilities that would cause the greatest distress in the county if destruction occurred. It should be noted that electrical transmission lines, transformers, and substations are generally not listed in Table 4.17 despite information being provided for them. They are displayed in Figure 4.1 and Table 4.30. The information provided in Table 4.17 was compiled via survey of the participating communities.

Table 4.17: Critical Structures in Brookings County

Jurisdiction/ Entity	Location	Address	Sector	Sub sector	Name	Owner Type
Aurora	City of Aurora		Government Facility	Building	City Hall	Public
Aurora	City of Aurora		Government Facility	Building	Post Office	Public
Aurora	City of Aurora	319 26 th Street South	Emergency Services	Building	Fire Department	Public
Aurora	City of Aurora		Population to Protect	Manufactured Homes	Trailer Court	Public
Aurora	City of Aurora		Government Facility	Building	City Shop - Generator	Public
Aurora	City of Aurora	206 Lilac Avenue	Population to Protect	Day Care	Jessica Waldner Day Care	Private
Aurora	City of Aurora		Telecommunications	Telephone	Cell Tower	Private
Aurora	City of Aurora		Telecommunications	Switch/Router	Interstate Telecom (ITC)	Private
Aurora	City of Aurora		Non Emergency Response Facility	Sanitary Sewer	Lift Station	Public

Jurisdiction/ Entity	Location	Address	Sector	Sub sector	Name	Owner Type
Aurora	City of Aurora		Non Emergency Response Facility	Sanitary Sewer	Lagoons	Public
Aurora	City of Aurora		Population to Protect	Building	Apartments	Private
Aurora	City of Aurora		Non Emergency Response Facility	Water Supply – Tower	City Water Tower	Public
Brookings	City of Brookings		Non Emergency Response	Bridge on Evacuation Route	US 14B Bridge (Big Sioux River)	Public
Brookings	City of Brookings		Non Emergency Response	Bridge on Evacuation Route	US 14 Bridge (Big Sioux River)	Public
Brookings	City of Brookings	422 Western Ave.	Government Facility	Emergency Fuel Facility	Brookings County Highway Department	Public
Brookings	City of Brookings	520 3 rd Street	Government Facility	Building	City Hall	Public
Brookings	City of Brookings	311 3 rd Avenue	Emergency Services	Building	Police Station	Public
Brookings	City of Brookings	311 3 rd Avenue	Emergency Services	Building	Fire Station #1	Public
Brookings	City of Brookings	607 20 th Avenue	Emergency Services	Building	Fire Station #2	Public
Brookings	City of Brookings	530 22 nd Avenue	Emergency Services	Building	Fire Station #3	Public
Brookings	City of Brookings	32 nd Street	Emergency Services	Building	Fire Station #4	Public
Brookings	City of Brookings	Western Avenue	Emergency Services	Building	Fire Station - Airport	Public
Brookings	City of Brookings	824 32 nd Avenue	Government Facility	Emergency Shelter	Swiftel Center Shelter	Public
Brookings	City of Brookings		Non Emergency Response Facility	Water Supply – Tower	Water Tower	Public
Brookings	City of Brookings	22nd Avenue S. and Olwein St	Non Emergency Response Facility	Water Supply	Water Tower	Public
Brookings	City of Brookings	3000 8 th Street South & 2304 Medary Ave	Non Emergency Response Facility	Water Supply – Wells	Treatment Plant	Public
Brookings	City of Brookings	21660 470 th Ave	Non Emergency Response Facility	Sanitary Sewer	Wastewater Treatment	Public

Jurisdiction/ Entity	Location	Address	Sector	Sub sector	Name	Owner Type
Brookings	City of Brookings	405 1 st Avenue	Non Emergency Response Facility	Emergency Shelter	URC Shelter-Non Profit	Public
Brookings	City of Brookings	415 4 th Street	Communications	Telephone, Internet, Cable Services	Swiftel Telephone	Public
Brookings	City of Brookings	22 nd & 6 th Street	Telecommunications	Switch/Router	Interstate Telecom (ITC)	Private
Brookings	City of Brookings	22 nd Avenue S.	Non Emergency Response Facility	Natural Gas Supply	Utilities	Private
Brookings	City of Brookings	300 22 nd Avenue	Emergency Response Facility	Building	Brookings Hospital	Public
Brookings	City of Brookings	2300 Yorkshire Drive	Emergency Response Facility	Building	Ambulance Facility	Public
Brookings	City of Brookings		Non Emergency Response Facility	Electrical Supply	Sub Station	Public
Brookings	City of Brookings	127 7 th Avenue	Government Facility	Transportation	Street Department	Public
Brookings	City of Brookings	47352 307 th Street	Non Emergency Response Facility	Waste Facility	Landfill	Public
Brookings	City of Brookings		Public Institution	Education	South Dakota State University	Public
Brookings	City of Brookings	520 Elm Avenue	Public Institution	Education	Brookings High School	Public
Brookings	City of Brookings	1801 12 th Street	Public Institution	Education	Mickelson Middle School	Public
Brookings	City of Brookings	1401 15 th Street	Public Institution	Education	Camelot Intermediate School	Public
Brookings	City of Brookings	304 15 th Avenue	Public Institution	Education	Hillcrest Elementary School	Public
Brookings	City of Brookings	718 5 th Street	Public Institution	Education	Medary Elementary School	Public
Brookings	City of Brookings	111 26 th Street South	Public Institution	Education	Dakota Prairie Elementary School	Public
Brookings	City of Brookings		Non Emergency Response Facility	Electrical Supply	Sub Station	Public
Brookings	City of Brookings		Non Emergency Response Facility	Electrical Supply	Sub Station	Public
Brookings	City of Brookings	10th Street and HWY 14	Population to Protect	Manufactured Home Court	Manufactured Home Court	Private
Brookings	City of Brookings	Medary Ave and 15th St	Population to Protect	Manufactured Home Court	Manufactured Home Court	Private

Jurisdiction/ Entity	Location	Address	Sector	Sub sector	Name	Owner Type
Brookings	City of Brookings	13th Street and 7th Ave	Population to Protect	Manufactured Home Court	Manufactured Home Court	Private
Brookings	City of Brookings	2nd St South and 8th Ave South	Population to Protect	Manufactured Home Court	Manufactured Home Court	Private
Brookings	City of Brookings	472nd Ave and Western Estate Rd	Population to Protect	Manufactured Home Court	Western Estates	Private
Brookings	City of Brookings	20th Street and 472nd Ave	Population to Protect	Manufactured Home Court	Manufactured Home Court	Private
Brookings	City of Brookings	3rd Avenue and 2nd Street	Population to Protect	Manufactured Home Court	Manufactured Home Court	Private
Brookings	City of Brookings	8th Avenue and 6th Street	Population to Protect	Manufactured Home Court	Manufactured Home Court	Private
Brookings	City of Brookings	Medary Avenue and Vine Street	Population to Protect	Manufactured Home Court	Manufactured Home Court	Private
Brookings	City of Brookings	5th Avenue S and 7th Street	Population to Protect	Manufactured Home Court	Manufactured Home Court	Private
Brookings	City of Brookings	3rd Avenue and 5th Street	Population to Protect	Manufactured Home Court	Manufactured Home Court	Private
Brookings County	Brookings County	315 7 th Avenue	Government Facility	Building	Sheriff's Office and Detention Center	Public
Brookings County	Brookings County	314 6 th Avenue	Government Facility	Building	Courthouse	Public
Brookings County	Brookings County	40th St S and County 77	Population to Protect	Manufactured Home Court	Manufactured Home Court	Private
Brookings County	Brookings County	215th St and 470th Ave	Population to Protect	Manufactured Home Court	Manufactured Home Court	Private
Brookings County	City of Bruce	Co. Road 6	Transportation	Evacuation Route	Co. Road 6	Public
Brookings County	City of White	Co. Road 25	Transportation	Evacuation Route	Co. Road 25	Public
Brookings County	Town of Sinai	Co. Road 11	Transportation	Evacuation Route	Co. Road 11	Public
Brookings County	City of Elkton	Co. Road 30 & 33	Transportation	Evacuation Route	Co. Road 30 & 33	Public
Bruce	City of Bruce	507 Jay Street	Government Facility	Building	City Hall	Public
Bruce	City of Bruce	525 Jay Street	Government Facility	Building	Fire Hall	Public

Jurisdiction/ Entity	Location	Address	Sector	Sub sector	Name	Owner Type
Bruce	City of Bruce	NW ¼ of STR 7-111-50	Non Emergency Response	Sanitary Sewer – Lagoon	City Lagoon	Public
Bruce	City of Bruce	611 Washington Street	Non Emergency Response	Sanitary Sewer – Lift Station	Lift Station	Public
Bruce	City of Bruce	409 & 508 Jefferson Street	Population to Protect	Building	Community Club	Private
Bruce	City of Bruce	47821 Main Street	Non Emergency Response	Building	City Shop	Public
Bruce	City of Bruce	5 th Street and Jay Street	Non Emergency Response	Electrical Supply	Sub Station	Public
Bushnell	Town of Bushnell	47821 Main Street	Government Facility	Building	City Hall	Public
Bushnell	Town of Bushnell	47821 Main Street	Non Emergency Response Facility	Water Supply - Well	City Well	Public
Bushnell	Town of Bushnell	47821 Main Street	Communications	Emergency Services	Storm Siren	Public
Bushnell	Town of Bushnell	Main St/2 nd Avenue	Population to Protect	Park	City Park	Public
Bushnell	Town of Bushnell	21078 478 th Avenue	Non Emergency Response Facility	Electrical Supply	Ottertail Transformer	Private
Elkton	City of Elkton	109 Elk Street	Emergency Services	Building	Ambulance/Fire Department	Public
Elkton	City of Elkton	800 Buffalo Street	Public Institution	Education	Elkton School	Public
Elkton	City of Elkton	1 Block N of E 2 nd Street & Badger Street	Non Emergency Response Facility	Water Services – Water Storage	Elkton Water tower	Public
Elkton	City of Elkton	485 th Ave/218 th St	Non Emergency Response Facility	Sanitary Sewer	Lagoons	Public
Elkton	City of Elkton	Beaver Street	Non Emergency Response Facility	Electrical Supply	Ottertail Power	Private
Elkton	City of Elkton	206 th Buffalo Street	Government Facility	Building	City Shop	Public
Elkton	City of Elkton	Marshal Street & 1 st Street	Telecommunications	Switch/Router	Interstate Telecom (ITC)	Private
Elkton	City of Elkton	302 nd Beaver Street	Non Emergency Response Facility	Sanitary Sewer	Lift Station	Public
Elkton	City of Elkton	215 3 rd Street	Non Emergency Response Facility	Sanitary Sewer	Lift Station	Public
Elkton	City of Elkton	470 5 th Street	Non Emergency Response Facility	Sanitary Sewer	Lift Station	Public

Jurisdiction/ Entity	Location	Address	Sector	Sub sector	Name	Owner Type
Elkton	City of Elkton	Marshal Street & 1 st Street	Communications	Cell Tower	Cell Tower	Private
Elkton	City of Elkton	Cornel Avenue	Non Emergency Response Facility	Water Services	Rural Water	Private
Elkton	City of Elkton		Transportation	Railroad	Elkton Railroad	Private
Elkton	City of Elkton	3 rd Street	Population to Protect	Park	Campground	Private
Sinai	Town of Sinai	103 Main Street	Government Facility	Building	Sinai City Hall	Public
Sinai	Town of Sinai	103 Main Street	Government Facility	Building	Sinai Fire Department	Public
Sinai	Town of Sinai	103 Main street	Communication	Emergency Services	Storm Siren	Public
Sinai	Town of Sinai	458 th Ave & 217 th Street	Non Emergency Response	Sanitary Sewer – Lagoon	City Lagoon	Public
Sinai	Town of Sinai	2 nd St W & Main Ave	Non Emergency Response	Sanitary Sewer – Lift Station	Lift Station	Public
Volga	City of Volga	NW of 109 Samara Avenue	Non Emergency Response	Electrical Supply	West Substation	Public
Volga	City of Volga	SW Corner of 100 Caspian Avenue	Non Emergency Response	Electrical Supply	East Substation	Public
Volga	City of Volga	125 W 2 nd Street	Population to Protect	Assisted Living	Dakota Sun	Private
Volga	City of Volga	226 Kasan Avenue	Government Facility	Building	City Hall	Public
Volga	City of Volga	226 Kasan Avenue	Government Facility	Building	Fire Hall	Public
Volga	City of Volga	220 E Hwy 14	Population to Protect	Manufactured Home Court	DC Court	Private
Volga	City of Volga	222 E Hwy 14	Population to Protect	Manufactured Home Court	Valley Village	Private
Volga	City of Volga	315 Samara Avenue	Population to Protect	Manufactured Home Court	Sand Creek	Private
Volga	City of Volga	200 Hansina Avenue	Population to Protect	Education	Sioux Valley School	Public
Volga	City of Volga	226 E 6 th street	Population to Protect	Education	Volga Christian School	Private

Jurisdiction/ Entity	Location	Address	Sector	Sub sector	Name	Owner Type
Volga	City of Volga	(West of City)	Non Emergency Response	Water Supply – Wells	City Well	Public
Volga	City of Volga	120 E 1 st Street	Non Emergency Response	Water Supply – Tower	City Water Tower	Public
Volga	City of Volga	Throughout the City	Non Emergency Response	Water Supply – Transmission Lines	City Water Lines	Public
Volga	City of Volga	304 Caspain Avenue	Non Emergency Response	Sanitary Sewer – Lagoon	City Lagoon	Public
Volga	City of Volga	E of 217 E 7 th Street	Non Emergency Response	Sanitary Sewer – Lift Station	Lift Station	Public
Volga	City of Volga	222 E HWY 14	Non Emergency Response	Sanitary Sewer – Lift Station	Lift Station	Public
Volga	City of Volga	W of 101 Edman Avenue	Non Emergency Response	Sanitary Sewer – Lift Station	Lift Station	Public
Volga	City of Volga	212 Kasan Avenue	Government Facility	Emergency Shelter	Auditorium	Public
Volga	City of Volga	109 Samara Avenue	Government Facility	Emergency Shelter	Community Center	Public
Volga	City of Volga	515 Samara Avenue	Population to Protect	Apartment(s)	Country View	Private
Volga	City of Volga	W of 99 Caspian Avenue	Communications	Cell Tower	Cell Tower	Private
Volga	City of Volga	120 E 1 st Street	Communications	Cell Tower	Cell Tower	Private
Volga	City of Volga	South of HWY 14	Transportation	Railroad	Rapid City, Pierre & Eastern	Private
Volga/Brookings County	Brookings County	East of Volga	Non Emergency Response	Bridge on Evacuation Route	US 14 Bridge (E of Volga)	Public
White	City of White	499 S Hooker Ave	Utility	Substation	Substation	Private
White	City of White	NE Corner of 477 th Ave & 204 th St	Non Emergency Response Facility	Sanitary Sewer	City Lagoons	Public
White	City of White	100 S School Ave	Public Institution	School	Deubrook School	Public
White	City of White	300 W Main St	Government Facility	City Hall	White City Hall	Public
White	City of White	104 N Lincoln Ave	Telecommunications	Private	ITC Telecommunications	Private
White	City of White	105 N Lincoln Ave	Government Facility	Building	White Fire Department	Public

Jurisdiction/ Entity	Location	Address	Sector	Sub sector	Name	Owner Type
White	City of White	107 N Lincoln Ave	Non Emergency Response Facilities	Water Services	White Water tower	Public
White	City of White	102 W 5 th Street	Emergency Response Facility	Building	Storm Shelter	Private
White	City of White	269 E 2nd St	Population to Protect	Park	Park/ Campground	Public
Kingbrook Rural Water	Winsor Township	45502 208 th St	Non Emergency Response	Water Supply	Arlington Reservoir	Private
Kingbrook Rural Water	Laketon Township	45446 200 th St	Non Emergency Response	Water Supply	Badger Reservoir	Private
Kingbrook Rural Water	Oakwood Township	20595 463 rd Ave	Non Emergency Response	Water Supply	Oakwood Booster	Private
Kingbrook Rural Water	Oslo Township	46126 216 th St	Non Emergency Response	Water Supply	Sinai Booster	Private
Brookings-Deuel Rural Water	Preston Township	20009 466 th Ave	Non Emergency Response	Water Supply	Water Treatment Plant	Private
Brookings-Deuel Rural Water	Argo Township	47602 200 th St	Non Emergency Response	Water Supply	Water Treatment Plant & Pumping	Private
Brookings-Deuel Rural Water	Richland Township	20511 486 th Ave	Non Emergency Response	Water Supply	Water Storage and Pumping	Private
Brookings-Deuel Rural Water	Alton Township	21395 483 rd Ave	Non Emergency Response	Water Supply	Water Storage and Pumping	Private
Brookings-Deuel Rural Water	Oaklake Township	20058 481 st Ave	Non Emergency Response	Water Supply	Elevated Tower	Private

Table 4.18: Administrative and Technical Capabilities

Administrative/ Staff Composition	Local Jurisdiction								
	<i>Aurora</i>	<i>Brookings</i>	<i>Bruce</i>	<i>Bushnell</i>	<i>Elkton</i>	<i>Sinai</i>	<i>Volga</i>	<i>White</i>	<i>Brookings County</i>
Board of Adjustment	Planning Commission	Appointed	Elected Officials	NA	Elected Officials	NA	Elected Officials	Elected Officials	Planning Commission
Building Official	NA	Appointed	NA	NA	NA	NA	NA	NA	Appointed
Community Planner	NA	Appointed	NA	NA	NA	NA	NA	NA	Appointed
Elected Officials	Aldermanic	Commission	Aldermanic	Trustee	Aldermanic	Trustee	Aldermanic	Aldermanic	Commission
Emergency Manager	NA	NA	NA	NA	NA	NA	NA	NA	Appointed/ Zoning Officer
Engineer/Highway Superintendent	NA	Appointed	NA	NA	NA	NA	NA	NA	Appointed
Floodplain Administrator	Finance Officer/ Maintenance Supervisor	Zoning Officer	Finance Officer	NA	Finance Officer	Finance Officer	NA	Finance Officer	Zoning Officer
GIS Coordinator	NA	NA	NA	NA	NA	NA	NA	NA	Appointed
Planning Commission	Appointed	Appointed	NA	NA	Elected Officials	NA	Elected Officials	Elected Officials	Appointed
Zoning Officer	Finance Officer/ Maintenance Supervisor	Appointed	Finance Officer	NA	Finance Officer	NA	Finance Officer	Finance Officer & Mayor	Appointed
Grant Writing Capability (Yes/No)	Yes*	Yes*	Yes*	Yes*	Yes*	Yes*	Yes*	Yes*	Yes*
Non-profit organizations focused on environmental protection.	Yes**	Yes**	Yes**	Yes**	Yes**	Yes**	Yes**	Yes**	Yes**
Public-Private partnership initiatives addressing disaster-related issues	No	No	No	No	No	No	No	No	No

NA: This jurisdiction has nobody serving in this role.

Table 4.19: Capabilities of Growth Guidance Instruments

Capabilities of Community Planning Mechanisms	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County
Does the Future Land-Use Map identify natural hazard areas?	Y	Y	NA	NA	Y	NA	Y	Y	Y
Do the land-use policies discourage development or redevelopment within natural hazard areas?	Y	Y	Y	NA	Y	NA	Y	Y	Y
Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas?	Y	Y	NA	NA	Y	NA	Y	Y	Y
Does the transportation plan limit access to hazard areas?	N	N	NA	NA	N	NA	N	N	N
Is transportation policy used to guide growth in safe locations?	Y	Y	NA	NA	Y	NA	N	Y	Y
Are movement systems designed to function under disaster conditions (e.g. evacuation)?	Y	Y	NA	NA	Y	NA	Y	Y	Y
Are environmental systems that protect development from hazards identified and mapped?	N	N	NA	NA	N	NA	N	N	N
Do environmental policies provide incentives to development that is located outside protective ecosystems?	N	N	NA	NA	N	NA	N	N	N
Do environmental policies maintain and restore protective ecosystems?	N	N	NA	NA	N	NA	N	N	Y
Are the goals and policies of the comprehensive plan related to those of the FEMA Local Hazard Mitigation Plan?	N	N	NA	NA	N	NA	N	N	N

Capabilities of Community Planning Mechanisms	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County
Is safety explicitly included in the plan's growth and development policies?	Y	Y	NA	NA	Y	NA	Y	Y	Y
Does the monitoring and implementation section of the plan cover safe growth objectives?	N	N	NA	NA	N	NA	N	N	N
Does the Zoning Ordinance conform to the comprehensive plan in terms of discouraging development or redevelopment within natural hazard areas?	Y	Y	NA	NA	Y	NA	Y	Y	Y
Does the zoning ordinance contain natural hazard overlay zones that set conditions for land use within such zones?	Y	Y	NA	NA	Y	NA	Y	Y	Y
Do rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use?	N	Y	NA	NA	N	NA	Y	N	Y
Does the zoning ordinance restrict development within, or filling of, wetlands, floodways, and floodplains?	Y	Y	Y	NA	Y	NA	Y	Y	Y
Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas?	Y	Y	NA	NA	NA	NA	NA	Y	Y
Do the subdivision regulations provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources?	N	N	NA	NA	NA	NA	NA	N	Y
Do the subdivision regulations allow density transfers where Hazard areas exist?	N	N	NA	NA	NA	NA	NA	N	N

NA: This jurisdiction does not have the specified document.

ASSESSING VULNERABILITY: COMMUNITY CAPABILITIES

Requirement 201.6(c)(2)(i). Local Mitigation Plan Review Tool – B1.

Requirement 201.6(c)(3). Local Mitigation Plan Review Tool – C1.

Each community has a unique set of capabilities, including authorities, policies, programs, staff, funding, and other resources for accomplishing mitigation. One important step in assessing the vulnerability of a given community is to objectively review the capabilities to implement mitigation strategies and to identify limiting factors. Each community reviewed existing administrative documents, procedures, and policies. This helped the communities and planning team to evaluate how existing capabilities contribute to the vulnerability by reducing or exacerbating disaster impacts. Table 4.18 (above) identifies whether each community has the specified administrative and technical capabilities, and who serves in such capacity. It should be noted that First District Association of Local Governments provides grant writing services without cost for all communities listed. In addition, East Dakota Watershed Development District is a non-profit organization focused on environmental, particularly watershed, protection. Table 4.19 (above) encapsulates the efficacy of the specified planning mechanisms with regard to disaster mitigation and to identify potential deficiencies in the specified plans.

ASSESSING VULNERABILITY: ESTIMATING POTENTIAL LOSSES

Requirement 201.6(b)(3). Local Mitigation Plan Review Tool – A4.

Requirement 201.6(c)(2)(ii). Local Mitigation Plan Review Tool – B3.

Requirement 201.6(d)(3). Local Mitigation Plan Review Tool – D1.

As part of this Plan the Planning Team decided to include estimates for number of structures, value of structures, and the percentage of which are located within identified hazard areas. These estimates shall be used in multiple ways, including the establishment of baseline statistics for future development and disaster mitigation plans as well as to compare with information generated in the 2014 Plan. The information provided in the following tables was collected from the Brookings County Director of Equalization and Brookings County Zoning Office. Michelle Nielson of Sioux Valley Energy provided the information for Sioux Valley Energy. Inconsistencies and missing information result from lack of existing mechanisms, plans, and technical documents available.

The assessor's office provided the assessed valuation of total structures on each property within the incorporated and rural areas of the county. The data provides a total value for structures of a certain use on each property. It was not possible to discern the value of each structure on a lot so the actual number of structures is based on the number of parcels with the specified use type and the values thereupon. For the purposes of this plan only Residential, Commercial/Industrial, Agricultural, and Manufactured Homes were included. More specifically, all agricultural structures were included; only primary residential structures (houses, apartments, etc.) and not including sheds, lean-to's, and garages were included. All commercial or industrial structures were included, whether considered primary or accessory structures. Public or quasi-publicly owned structures and other structures for which the Department of Equalization did not have an assessed value were not included in the calculation. Two differences between the 2013 "structural" data should be noted. First, in 2013 some uses (agricultural and manufactured homes) included

counts of total numbers of actual structures rather than parcels with structures of a given type. Second, manufactured homes in manufactured home parks were included in the “commercial/industrial” category. Population of manufactured homes which may have been located within manufactured home courts located in the floodplain was not estimated.

Structures throughout the incorporated and unincorporated portions of the county were reviewed based upon updated flood hazard area (Zone “A”) boundaries and other discovery documents updated in 2018. If it was determined any structures on the applicable lot were located within the flood hazard area, the total assessed value for structures on said lot was included in the value of structures in the hazard area. The information does not account for letters of map amendment or letters of map revision which may have been approved.

All properties with structures, whether owner occupied or not were included in the valuations provided in Tables 4.20 through 4.30. The reports provided by the assessor’s office did not include the number of people in each structure; thus, many of the tables are missing this information. The following tables also do not address information regarding religious, governmental, or utility structures. Although not included in Tables 4.20 through 4.30, the State of South Dakota Hazard Mitigation Plan incorporated HAZUS analysis accounting for potential losses to those structures within Brookings County.

**Table 4.20: Brookings County (Rural Area)
Estimated Potential Dollar Losses to Vulnerable Structures**

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in County	# in HA	% in HA	\$ in County	\$ in HA	% in HA	# in Rural Areas	# in HA	% in HA
Residential	1,578	87	5.51	\$240,774,100	\$9,981,800	4.15	5,999	205	3.42
Commercial/Industrial	81	4	4.94	\$44,746,000	\$172,200	0.38			
Agricultural	1,203	46	3.82	\$164,986,300	\$1,366,100	0.83			
Mobile Homes	28	3	10.71	\$2,029,700	\$207,400	10.22		7	0.17
Total	2,890	140	4.84	\$452,536,100	\$11,727,500	2.59	5,999	212	3.59

Table 4.21: Aurora Estimated Potential Dollar Losses to Vulnerable Structures

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in HA	% in HA	\$ in City	\$ in HA	% in HA	# in City	# in HA	% in HA
Residential	357	0	0	\$36,350,700	0	0	532	0	0
Commercial/Industrial	22	0	0	\$3,827,200	0	0			
Agricultural	0	0	0	\$0	0	0			
Manufactured Home	1	0	0	\$81,400	0	0			
Total	380	1	0.35	\$40,259,300	\$158,500	0.69	532	0	0

Table 4.22: Brookings (City) Estimated Potential Dollar Losses to Vulnerable Structures

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in HA	% in HA	\$ in City	\$ in HA	% in HA	# in City	# in HA	% in HA
Residential	4,955	11	0.22	\$779,877,900	\$2,252,800	0.29	22,056	25	0.11
Commercial/Industrial	677	2	0.30	\$426,711,100	\$627,900	0.15			
Agricultural	6	0	0	\$46,800	0	0			
Manufactured Home	12	0	0	\$1,036,200	0	0			
Total	5,650	13	0.23	\$1,207,672,000	\$2,880,700	0.24	22,056	25	0.11

Table 4.23: Bruce Estimated Potential Dollar Losses to Vulnerable Structures

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in HA	% in HA	\$ in City	\$ in HA	% in HA	# in City	# in HA	% in HA
Residential	78	32	41.03	\$4,974,200	\$1,711,100	34.40	204	59	28.92
Commercial/Industrial	27	2	4.65	\$1,028,100	\$28,700	4.32			
Agricultural	2	0	0	\$289,300	0	0			
Manufactured Home	3	1	33.33	\$164,400	\$54,200	32.97		2	0.98
Total	110	35	20.00	\$6,456,000	\$1,231,500	21.08	204	61	29.90

Table 4.24: Bushnell Estimated Potential Dollar Losses to Vulnerable Structures

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in HA	% in HA	\$ in City	\$ in HA	% in HA	# in City	# in HA	% in HA
Residential	34	0	0	\$1,926,000	0	0	65	0	
Commercial/Industrial	3	0	0	\$64,800	0	0			
Agricultural	4	0	0	\$249,200	0	0			
Manufactured Home	0	0	0	\$0	0	0			
Total	41	0	0	\$2,240,000	0	0	65	0	0

Table 4.25: Elkton Estimated Potential Dollar Losses to Vulnerable Structures

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in HA	% in HA	\$ in City	\$ in HA	% in HA	# in City	# in HA	% in HA
Residential	289	0	0	\$21,509,900	0	0	736	0	
Commercial/Industrial	52	0	0	\$4,801,200	0	0			
Agricultural	0	0	0	\$0	0	0			
Manufactured Home	1	0	0	\$67,000	0	0			
Total	342	0	0	\$26,378,100	0	0	736	0	0

Table 4.26: Sinai Estimated Potential Dollar Losses to Vulnerable Structures

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in HA	% in HA	\$ in City	\$ in HA	% in HA	# in City	# in HA	% in HA
Residential	61	0	0	\$2,384,500	0	0	120	0	
Commercial/Industrial	10	0	0	\$615,600	0	0			
Agricultural	0	0	0	\$0	0	0			
Manufactured Home	1	0	0	\$500	0	0			
Total	72	0	0	\$3,000,600	0	0	120	0	0

Table 4.27: Volga Estimated Potential Dollar Losses to Vulnerable Structures

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in HA	% in HA	\$ in City	\$ in HA	% in HA	# in City	# in HA	% in HA
Residential	618	15	2.43	\$86,338,000	\$1,458,600	1.69	1,768	36	2.04
Commercial/Industrial	89	15	16.85	\$16,322,100	\$2,742,300	16.80			
Agricultural	4	0	0	\$136,700	0	0			
Manufactured Home	5	1	20.00	\$214,500	\$30,100	14.03		3	0.17
Total	716	31	4.33	\$103,011,300	\$4,231,100	4.11	1,768	39	2.21

Table 4.28: White Estimated Potential Dollar Losses to Vulnerable Structures

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in HA	% in HA	\$ in City	\$ in HA	% in HA	# in City	# in HA	% in HA
Residential	215	0	0	\$17,517,600	0	0	485	0	
Commercial/Industrial	30	0	0	\$1,683,000	0	0			
Agricultural	5	0	0	\$144,700	0	0			
Manufactured Home	6	0	0	\$325,300	0	0			
Total	256	0	0	\$19,670,600	0	0	485	0	0

Table 4.29: Brookings County (Total) Estimated Potential Dollar Losses to Vulnerable Structures

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in County	# in HA	% in HA	\$ in County	\$ in HA	% in HA	# in County	# in HA	% in HA
Residential	8,185	145	1.77	\$1,191,652,900	\$15,404,300	1.29	31,965	325	1.02
Commercial/Industrial	991	23	2.32	\$499,799,100	\$3,571,100	0.72			
Agricultural	1,224	46	2.96	\$165,853,000	\$1,366,100	0.82			
Manufactured Home	57	5	8.77	\$3,919,000	\$501,000	7.44		12	0.03
Total	10,457	219	2.09	\$1,861,224,000	\$20,842,500	1.12	31,965	337	1.05

Notes

in HA: Number of structures in hazard area utilized county assessment data to identify the number of properties of a given use type, with structures located within the floodplain. Aerial photography, Comprehensive Land Use Plans, and Discovery Map data (updated Zone A boundaries) provided by FEMA were used for identification. Some structures included may have received LOMA's, removing them from the flood plain, since the effective date of the current DFIRM.

\$ in HA: Value of structures in hazard area was estimated by extrapolating assessed valuations of structures on parcels which had a primary structure within the hazard area. This data was provided by the Brookings County Department of Equalization and is classified by land use.

in [Jurisdiction]: The number of people was based on the 2010 Census.

in Hazard Area: The number of people in a hazard area was determined by multiplying the average household size of a given community as identified by the number of structures in the identified hazard area, and multiplying that number by the rate of occupancy for the community (All statistics from the US Census 2010).

**Table 4.30: Sioux Valley Energy.
Vulnerable Structures**

Type of Structure	Total Number of Structures	Total Value of Structures*	HAZARDS			
			Flood	Strong Winds	Tornado	Winter Storms
Poles	12,864	\$22,512,000	Yes	Yes	Yes	Yes
Overhead Transformers	755	\$755,000	Yes	Yes	Yes	Yes
Underground Transformers	2179	\$6,537,000	Yes	No	Yes	No
Underground Cabinets	1189	\$20,807,500	Yes	No	Yes	No
Underground Pedestals	1156	\$1,156,000	Yes	No	Yes	No
Miles of Underground Line	501	\$37,074,000	Yes	No	No	No
Miles of Overhead Line	564	\$41,736,000	Yes	Yes	Yes	Yes
Substations	8 (Owned by East River)	N/A	Yes	No	Yes	Yes

*Projected Replacement Value

SOURCE: Sioux Valley Energy

As part of the State of South Dakota Hazard Mitigation Plan, data were prepared for specific hazard types. Although the data is not current, the modeling used in the plan would be difficult to replicate or improve upon. The following sections describing vulnerability to flooding and tornadoes is based largely on the corresponding sections in the State of South Dakota Hazard Mitigation Plan.

Flooding

Portions of the Big Sioux Watershed were identified in the State of South Dakota Hazard Mitigation Plan as priority regions and jurisdiction. Based on its history of flood problems, Brookings County was deemed a high priority jurisdiction by the 2004 Map Modernization plan and in South Dakota's most recent multi-hazard mitigation plan. For that reason HAZUS-MH analysis was performed in conjunction with the completion of the State's Plan. The results were based on flooding with a one percent chance of occurrence or commonly referred to as a "100-year flood" and display the potential base flood losses to the County. Most startlingly, the results indicate a flood of the projected magnitude would displace nine hundred forty-three (943) people. The full results of HAZUS-MH analysis for the County are displayed in Table 4.31

Table 4.31: HAZUS-MH Base Flood (1 Percent Chance) Loss Estimation Results (2014)

Building Damage	Loss Ratio*	Contents Damage and Inventory Loss	Total Economic Building Loss	Number of Displaced People	People Needing Shelter
\$4,563,000	0.3%	4,563,000	15,476,000	943	383

SOURCE: *State of South Dakota Hazard Mitigation Plan. Appendix 3B. South Dakota Office of Emergency Management. 2014.*

*Loss ratio is the percent of the total building inventory value that could be damaged from flooding in any given year.

Tornado

As part of the State of South Dakota Hazard Mitigation Plan HAZUS-MH analysis was performed calculating potential building exposure to tornadoes in the state. Total value of structures lost due to tornadoes from 1950 – 2012 was calculated, inflated to current (2012) dollars. A loss ratio was then calculated by dividing the total damage by the total building exposure. Table 4.32 identifies data specific to the annualized losses from tornadoes for the County as identified in the State of South Dakota Hazard Mitigation Plan.

To provide additional insight into potential losses caused by tornadoes, historic loss data were also analyzed on a statewide scale. According to the National Climatic Data Center Storm Events database, there were 1,639 tornadoes in South Dakota between January 1950 and October 2012. Of those, 61 were rated as an F3 event, 6 as an F4, and 1 as an F5. Total property damage for these events is estimated at \$694 million. This suggests that South Dakota experiences 26 tornadoes and \$11.2 million in losses each year. There were 18 deaths and 452 injuries in this time period, which averages out to approximately eight injuries each year. Of these storms, five resulted in major disaster declarations, with a total relief cost estimated at \$158,555,869 in 2012 dollars. This averages out to \$31.711 million (also in 2012 dollars) per major disaster. Based on the frequency of events, South Dakota averages one major disaster level tornado every 318 events or approximately every 12 years. The total historic losses and annualized losses by county are presented.

Table 4.32: Brookings County Annualized Losses from Tornadoes

Total Events 1950-2012	Total Property Damage (inflated) 1950- 2012	Annualized Losses	Total Building Exposure	Loss Ratio
24	4,941,762	79,706	2,935,763,000	0.00003

SOURCE: State of South Dakota Hazard Mitigation Plan. Table 3-218. South Dakota Office of Emergency Management. 2014.

ASSESSING VULNERABILITY: ANALYZING DEVELOPMENT TRENDS

Requirement 201.6(b)(3). Local Mitigation Plan Review Tool – A4.

Requirement 201.6(c)(3). Local Mitigation Plan Review Tool – C1.

Requirement 201.6(d)(3). Local Mitigation Plan Review Tool – D1.

Requirement 201.6(d)(3). Local Mitigation Plan Review Tool – D2.

The land use and development trends for each jurisdiction were identified by the representatives from each of the jurisdictions. Multiple communities within Brookings County are experiencing growth and have comprehensive land use plans which identify future areas for development. According to the Land Use Plans however, future development shall comply with the National Flood Insurance Program and associated regulatory agencies. Construction of new non-agricultural structures and non-single-family homes is required by either state law or building

codes adopted by each respective community to comply with the International Building Code. In addition to Brookings County, the cities of Aurora, Brookings, and Volga have adopted Building Codes to address residential and agricultural and single-family residential development. Building Codes assist in mitigating the affects of high winds and fire among other natural hazards in the area.

Three of the eight participating communities showed no growth. They have not issued any building permits for new homes or commercial structures. Brookings has issued 402 building permits for homes and 30 for commercial businesses over the past five years. Volga has also issued 60 building permits for homes and ten for commercial properties. Aurora has issued 50 building permits for homes and eight for commercial properties. The other two (Elkton and Bruce) communities issued building permits for 20 new homes including mobile homes and ten commercial structures over the last five years. The County issued 107 building permits for new homes and mobile homes plus 17 building permits for commercial properties over the last five years. Major development will continue to occur within the Cities of Brookings, Volga, and Aurora in areas appropriately identified in the future land use plans. No major plan revisions were made from 2014.

The towns of Bruce and Bushnell have not adopted comprehensive land use plans or zoning regulations. It should be noted that the City of Bruce, does however regulate property within the identified floodplain. The Comprehensive Land Use Plans for each community were reviewed by each community utilizing one. Specifically available undeveloped areas projected for residential, commercial, and industrial uses were reviewed. Based upon their own projected density of development for each land use, the communities then identified the potential number of lots which could be created within flood hazard areas given current land use regulations and controls. Communities in Brookings County adopted the most recently prepared National Flood Insurance Program Flood Hazard Maps since the 2014 Plan was adopted; and approved recommended ordinances for the proper regulation of property within the floodplain. In addition to adopting the updated map, and land use regulation, Brookings County continues to enforce a Natural Resources Zoning District which restricts land use within a specified distance of most water bodies throughout the county. Tables 4.33 – 4.38 identify the projected vulnerability for communities which have adopted land use plans. Future Land Use Maps for each jurisdiction which have adopted Comprehensive Land Use Plans are included in Appendix G.

**Table 4.33: Brookings County (Unincorporated Area)
Potential Floodplain Development – By Land Use Type**

Land Use Category	Community Totals		Flood Hazard Area			
	Projected Development Density (Acres/Unit)	Acres of projected future development	Acres of future development in Hazard Area	% Area for future development	Potential # of Lots for future development	# of Undeveloped Lots Already Appropriately Zoned
Ag - Residential	35	N/A	N/A	N/A	229*	157
Lake - Residential	2	N/A	N/A	N/A	30*	13
Commercial	2	N/A	N/A	N/A	0	0
Industrial	2	N/A	N/A	N/A	0	0

**Potential developable lots require platting. Use of hazard areas is restricted at that time under current policies.*

N/A: Most of the rural area is planned to remain agricultural in use with varying degree of land use restrictions.

**Table 4.34: City of Aurora
Potential Floodplain Development – By Land Use Type**

	Community Totals		Flood Hazard Area			
Land Use Category	Projected Development Density (Units/Acre)	Acres of projected future development	Acres of future development in Hazard Area	% Area for future development	Potential # of Lots for future development	# of Undeveloped Lots Already Appropriately Zoned
<i>Residential</i>	2.5	54	4.0	7.4	10	2
<i>Commercial</i>	1	54	12.2	22.6	12	0
<i>Industrial</i>	0.25	268	22.3	8.3	5	0

**Table 4.35: City of Brookings
Potential Floodplain Development – By Land Use Type**

	Community Totals		Flood Hazard Area			
Land Use Category	Projected Development Density (Units/Acre)	Acres of projected future development	Acres of future development in Hazard Area	% Area for future development	Potential # of Lots for future development	# of Undeveloped Lots Already Appropriately Zoned
<i>Residential</i>	2.5	600	0.0	0	0	0
<i>Commercial</i>	1	55	0.0	0	0	0
<i>Industrial</i>	0.25	92	20.0	21.7	5	0

**Table 4.36: City of Elkton
Potential Floodplain Development – By Land Use Type**

	Community Totals		Flood Hazard Area			
Land Use Category	Projected Development Density (Units/Acre)	Acres of projected future development	Acres of future development in Hazard Area	% Area for future development	Potential # of Lots for future development	# of Undeveloped Lots Already Appropriately Zoned
<i>Residential</i>	2.5	49	0.0	0	0	0
<i>Commercial</i>	1	2	0.0	0	0	0
<i>Industrial</i>	0.25	49	0.0	0	0	0

**Table 4.37: City of Volga
Potential Floodplain Development – By Land Use Type**

Land Use Category	Community Totals		Flood Hazard Area			
	Projected Development Density (Units/Acre)	Acres of projected future development	Acres of future development in Hazard Area	% Area for future development	Potential # of Lots for future development	# of Undeveloped Lots Already Appropriately Zoned
<i>Residential</i>	3	749	9	1.2	27	3
<i>Commercial</i>	1	66	3	4.5	3	1
<i>Industrial</i>	0.25	97	1.5	1.6	0	2

**Table 4.38: City of White
Potential Floodplain Development – By Land Use Type**

Land Use Category	Community Totals		Flood Hazard Area			
	Projected Development Density (Units/Acre)	Acres of projected future development	Acres of future development in Hazard Area	% Area for future development	Potential # of Lots for future development	# of Undeveloped Lots Already Appropriately Zoned
<i>Residential</i>	2.5	87	1.3	1.4	3	0
<i>Commercial</i>	1	6	0.0	0	0	0
<i>Industrial</i>	0.25	24	0.0	0	0	0

UNIQUE OR VARIED RISK ASSESSMENT

Requirement 201.6(c)(2)(i). Local Mitigation Plan Review Tool – B1.

Requirement 201.6(c)(2)(ii). Local Mitigation Plan Review Tool – B3.

Requirement 201.6(d)(3). Local Mitigation Plan Review Tool – D1.

After conducting the risk assessment for each jurisdiction, the PDM Planning Team decided that all areas of the county have an equal chance of a natural hazard occurrence in their area. While the extent to which each jurisdiction is affected by such hazards varies slightly between the local jurisdictions, the implications are the same. Thus the PDM Planning Team decided that all jurisdictions in the County, with the exception of Brookings because of its size, are equally affected by the types of hazards/risks that affect the PDM jurisdiction. Thus, the unique or varied risk requirement is not applicable to the Brookings County PDM.

On the following pages, a hazard vulnerability map is shown for each of the jurisdictions participating in this PDM. (See Figures 4.1 – 4.10.) The maps identify critical infrastructure and one-hundred-year flood plain. Since the other major hazards facing the county are not geographically based. Winter storms and severe summer storms are about as likely to occur in one part of the county as another. Similarly, wildfires can occur almost anywhere in the county, although they are more likely to occur in areas with extensive grassland cover or shrubs. Certain facilities provide for utility services within Brookings County in addition to transmitting energy and

resources through the jurisdiction, into other portions of the state and nation. Since the 2004 Plan was written and subsequent 2014 update, numerous wind towers, and one power plant have been constructed. Brookings County has also implemented an ordinance and policies regarding land use near pipelines in order to minimize potential conflicts in the event of a natural or man-made hazard. While specific locations for above ground electrical distribution lines are not identified on the map(s) Figure 4.1 identifies electrical energy generators (power plants, wind turbines), enforced consultation zones for pipelines in Brookings County, bridges, culverts and evacuation routes.

Figure 4.1: Brookings County (Rural Areas) Hazard Vulnerability Map

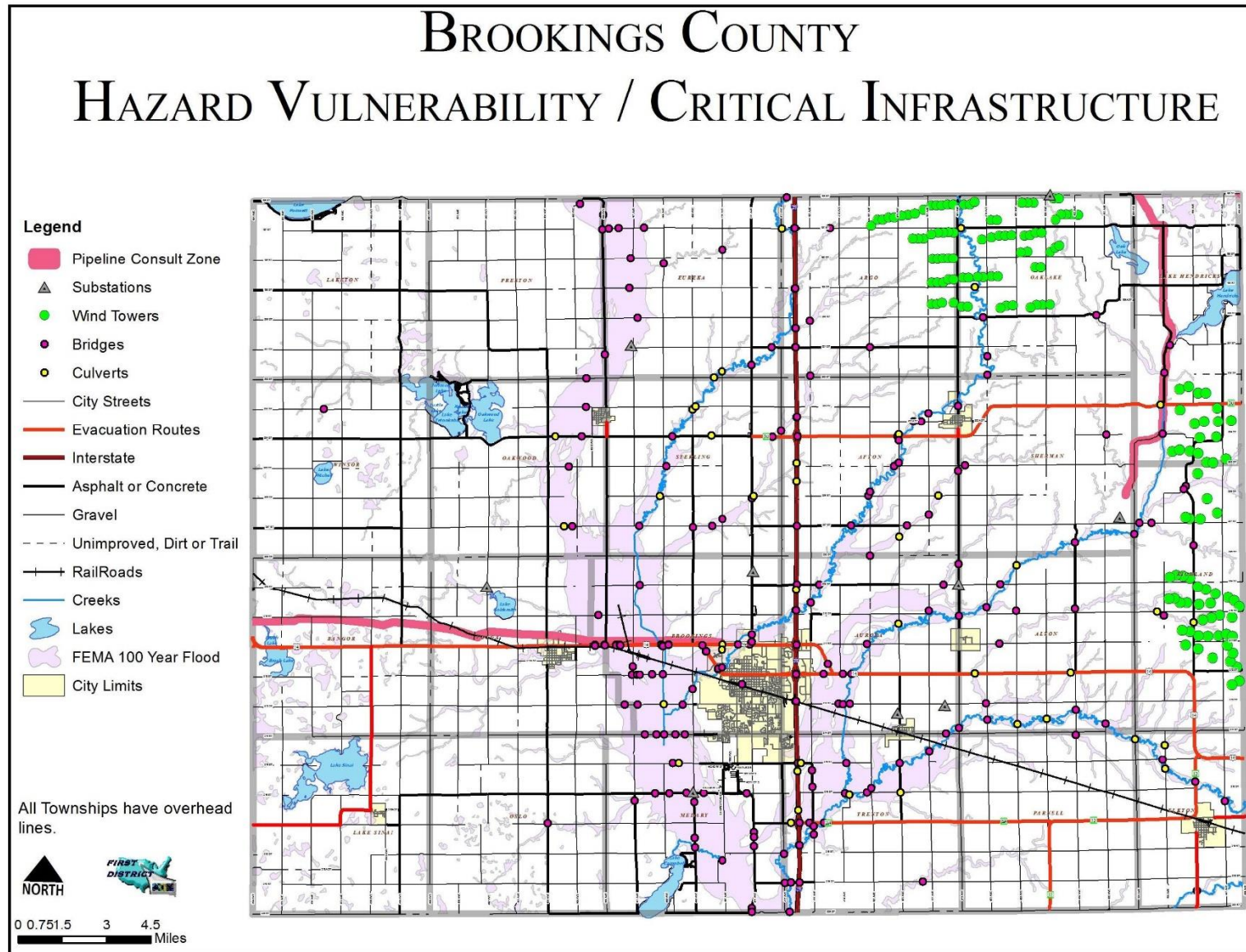


Figure 4.2: Brookings County Hazard Vulnerability Map

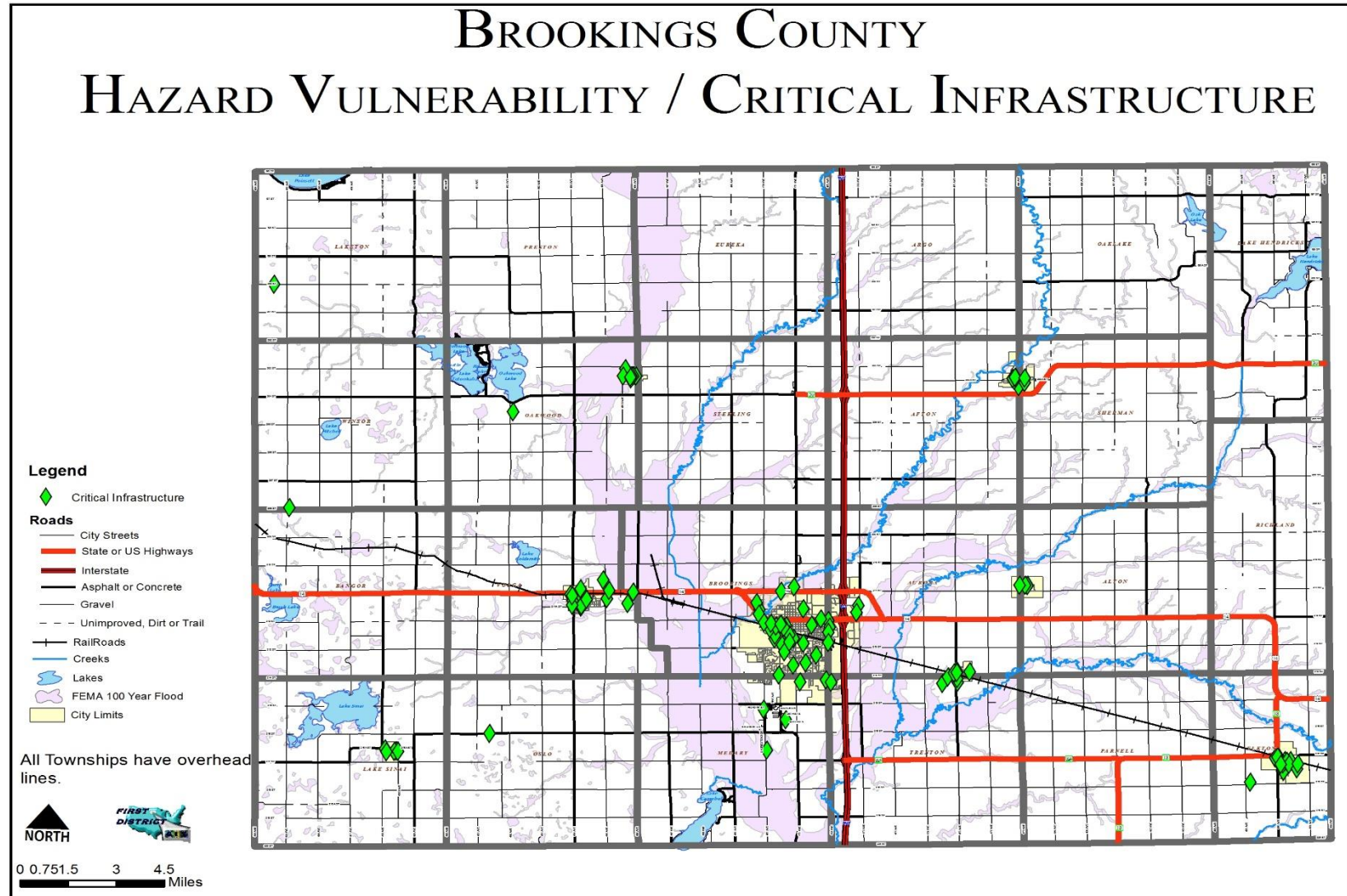


Figure 4.3: City of Aurora Hazard Vulnerability Map

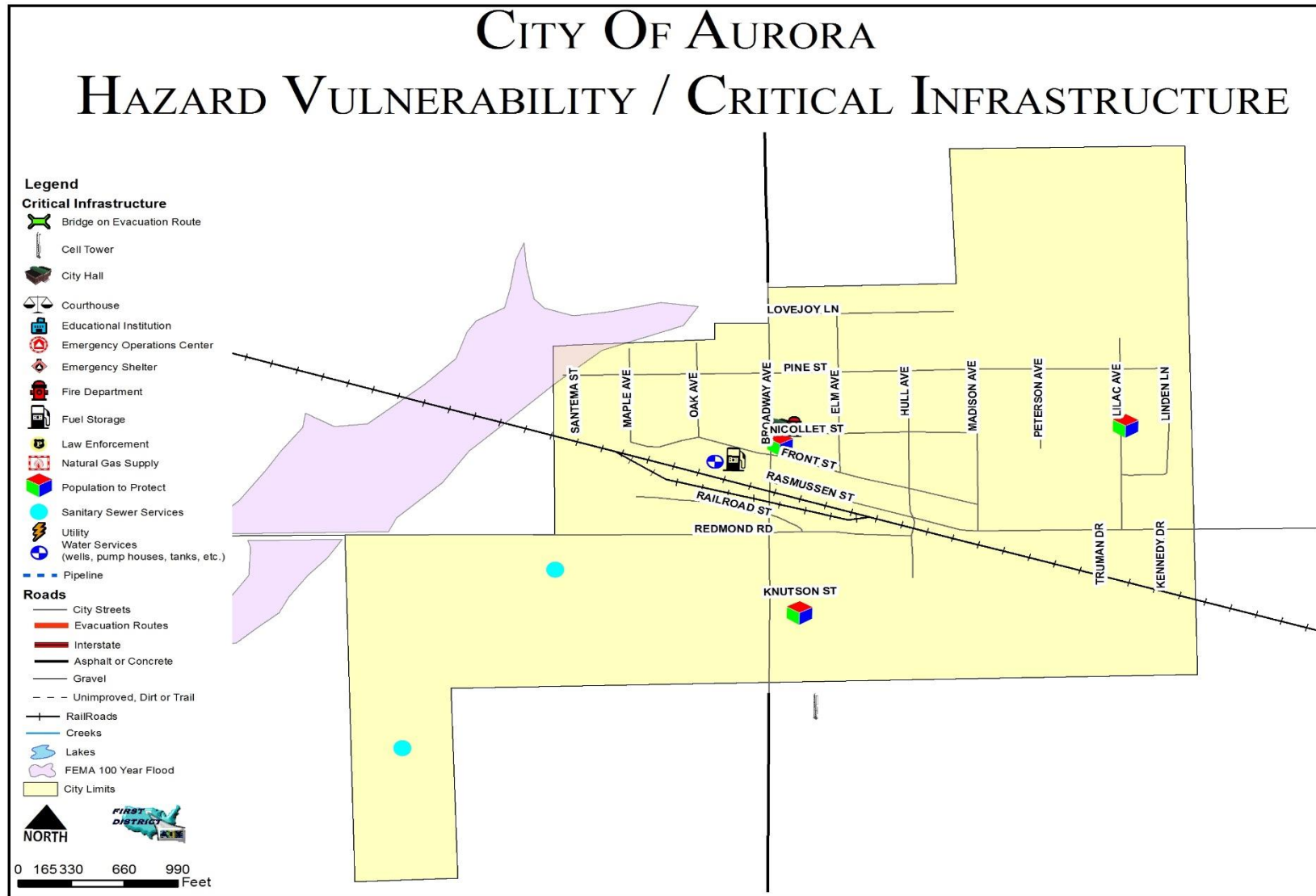


Figure 4.4: City of Brookings Hazard Vulnerability Map

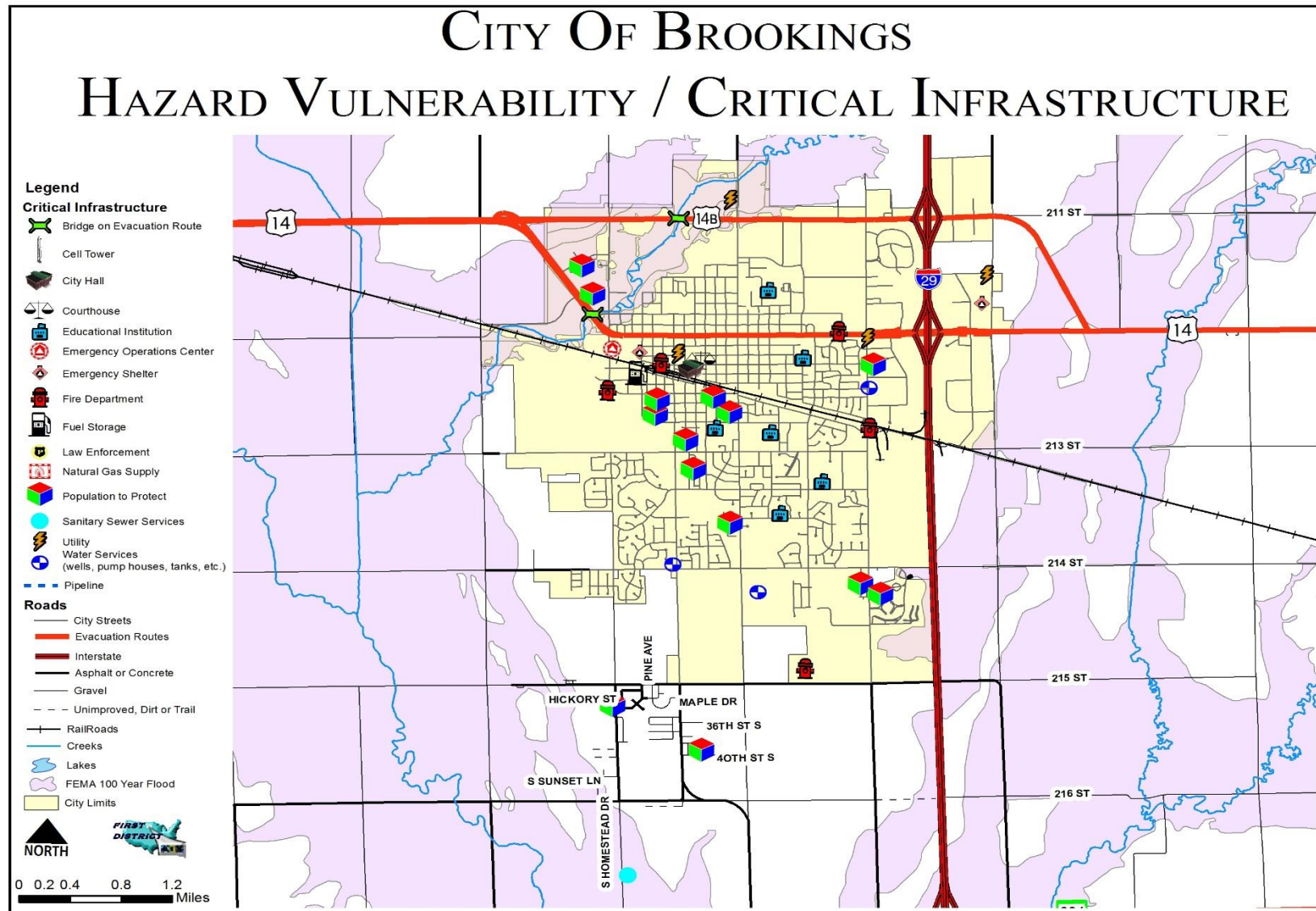


Figure 4.5: City of Bruce Hazard Vulnerability Map

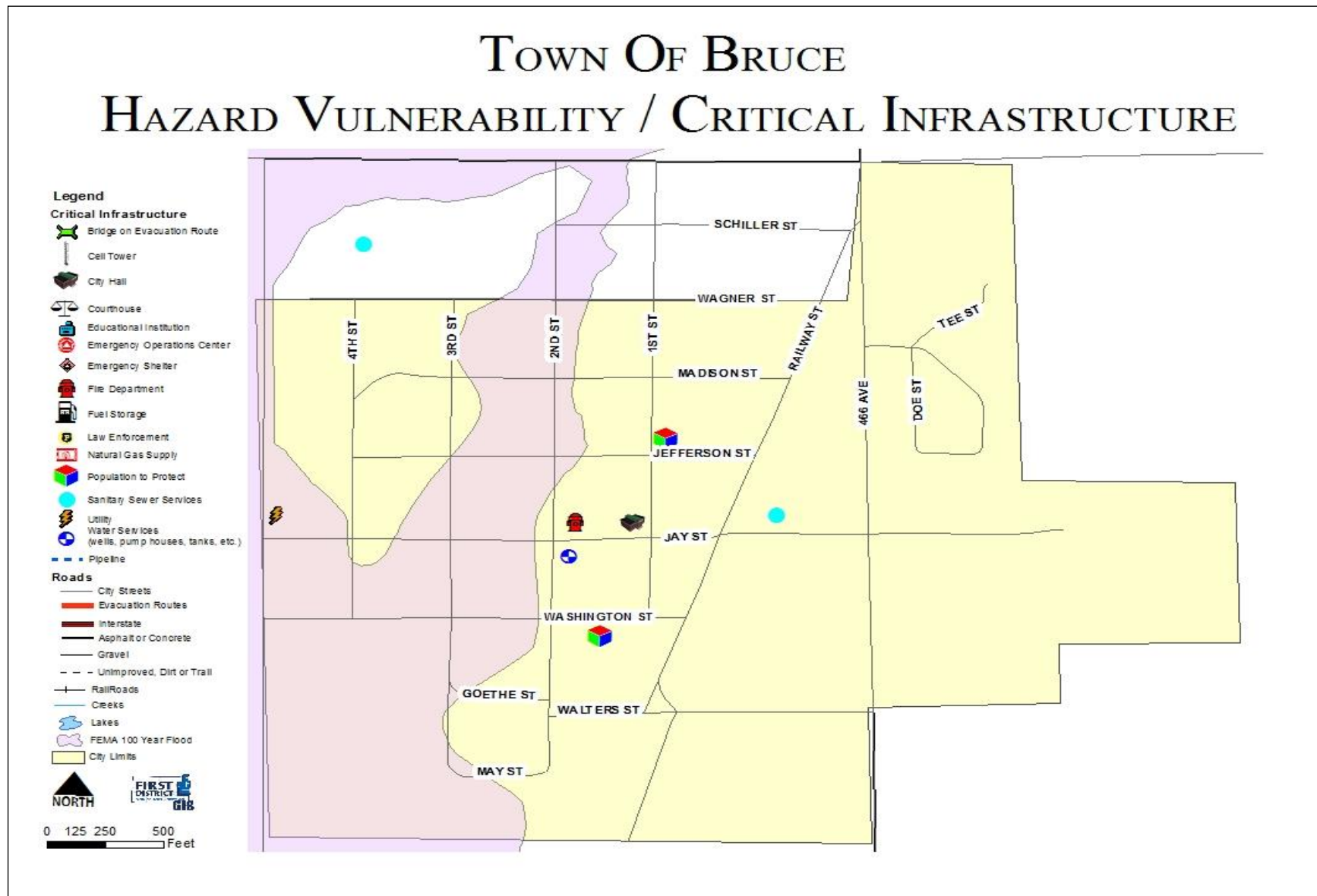


Figure 4.6: Town of Bushnell Hazard Vulnerability Map

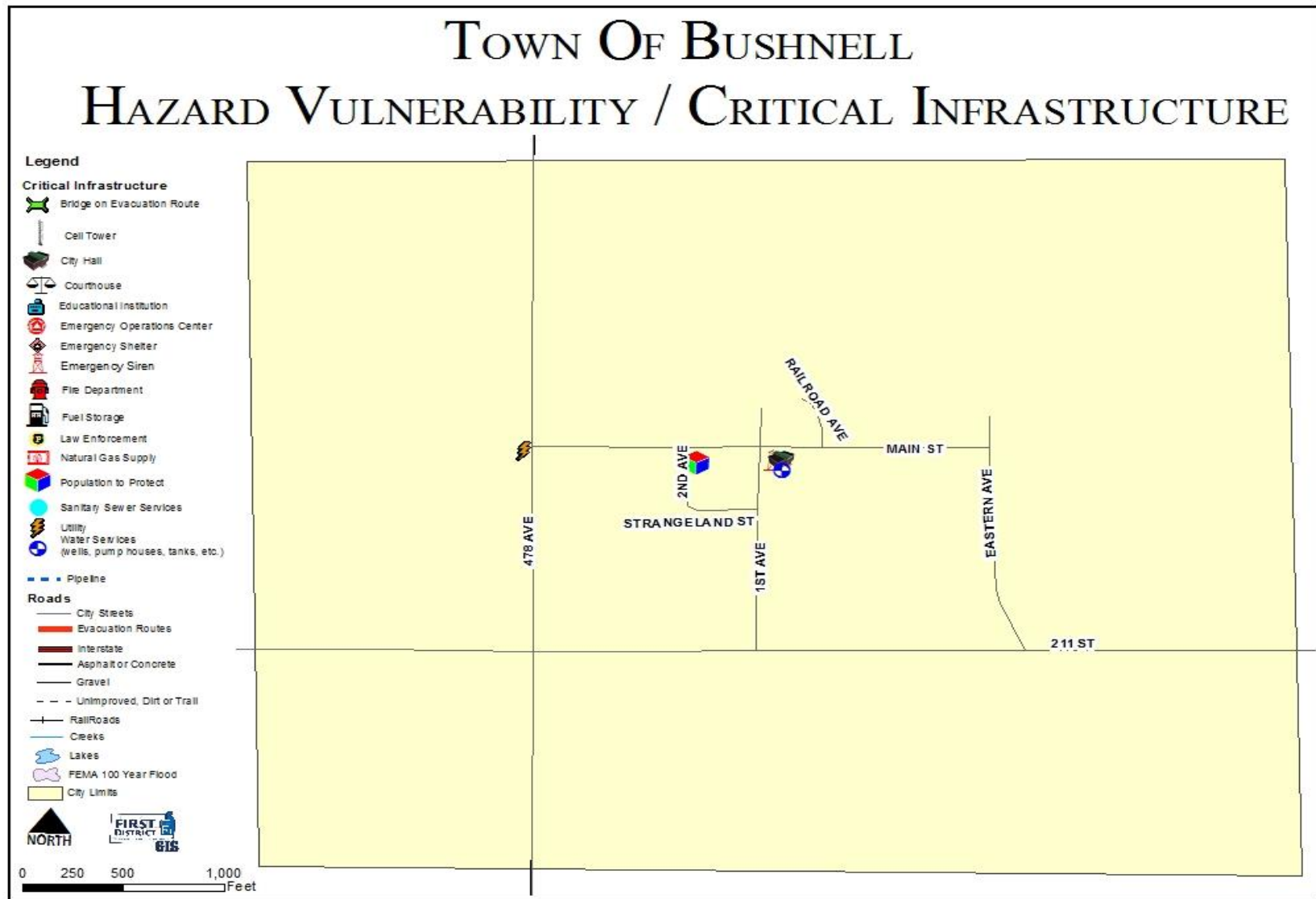


Figure 4.7: City of Elkton Hazard Vulnerability Map

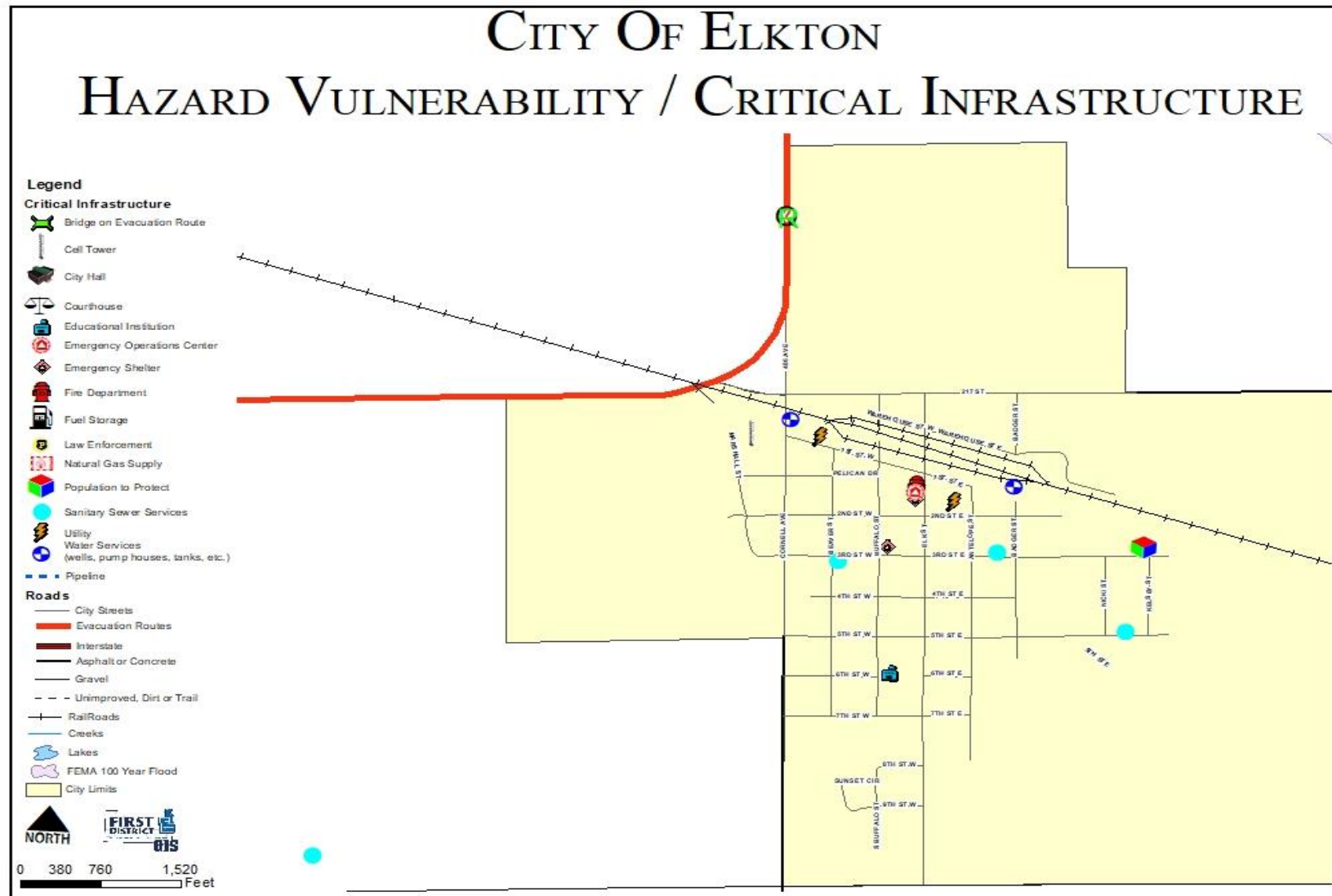


Figure 4.8: Town of Sinai Hazard Vulnerability Map

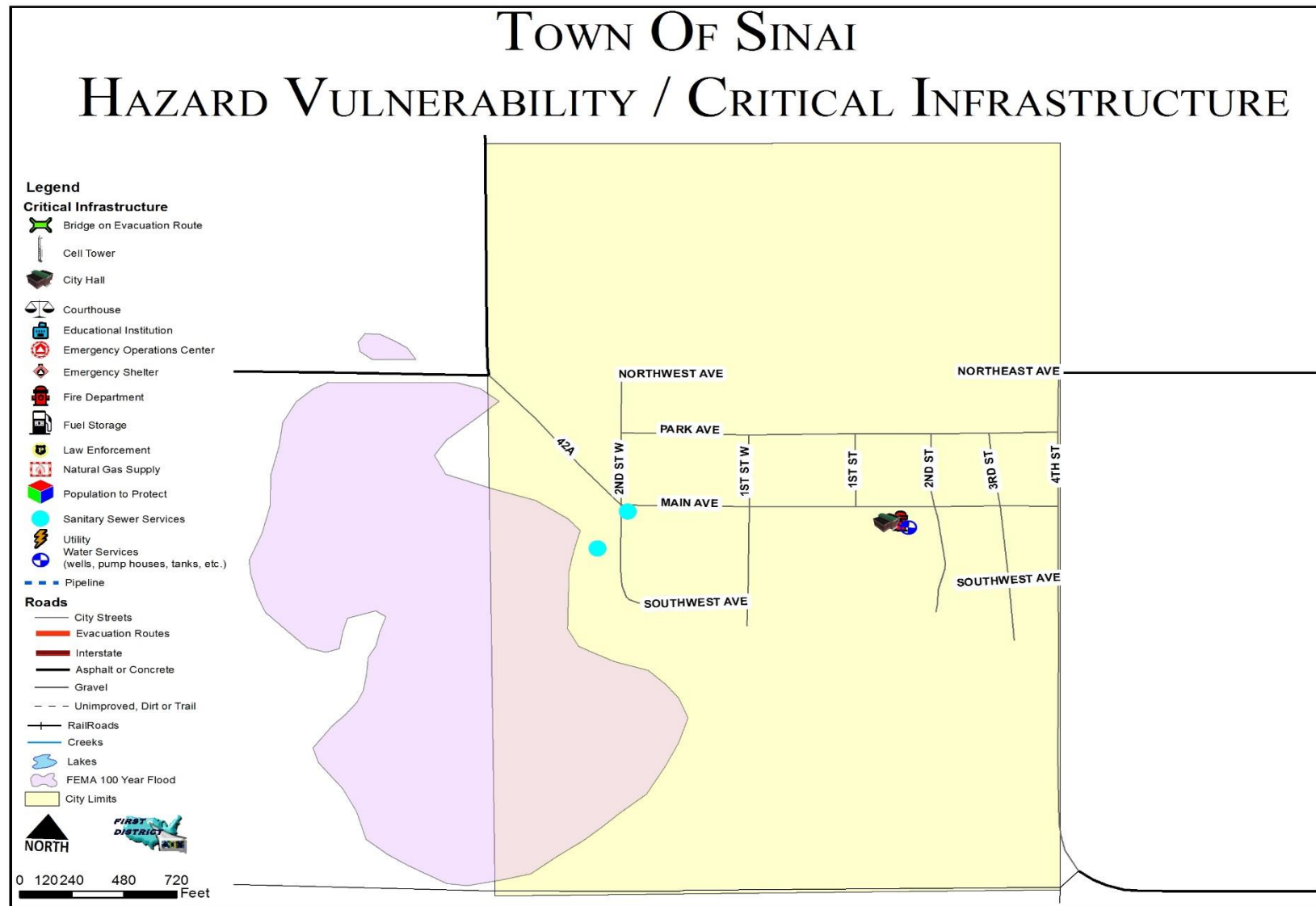


Figure 4.9: City of Volga Hazard Vulnerability Map

CITY OF VOLGA
HAZARD VULNERABILITY / CRITICAL INFRASTRUCTURE

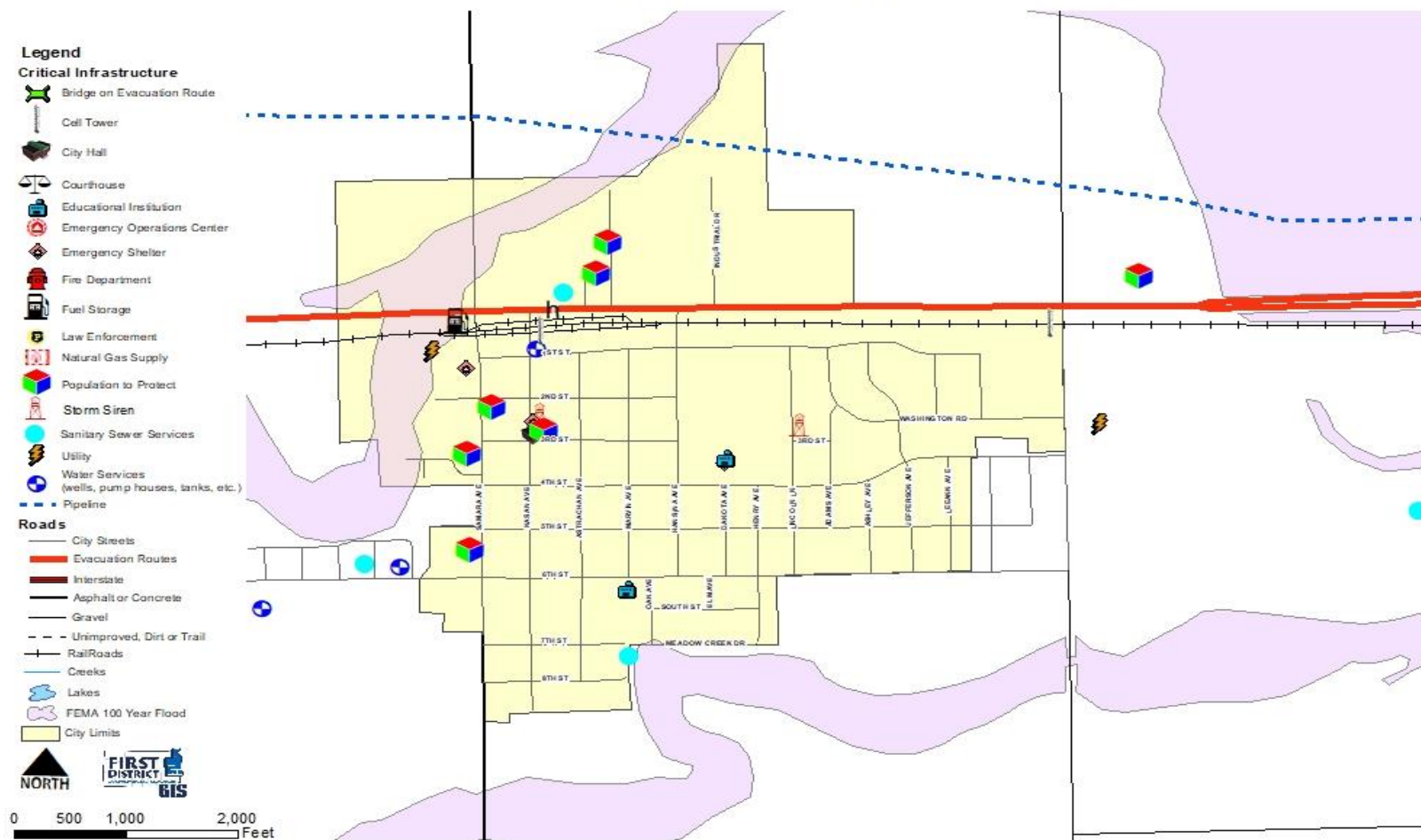
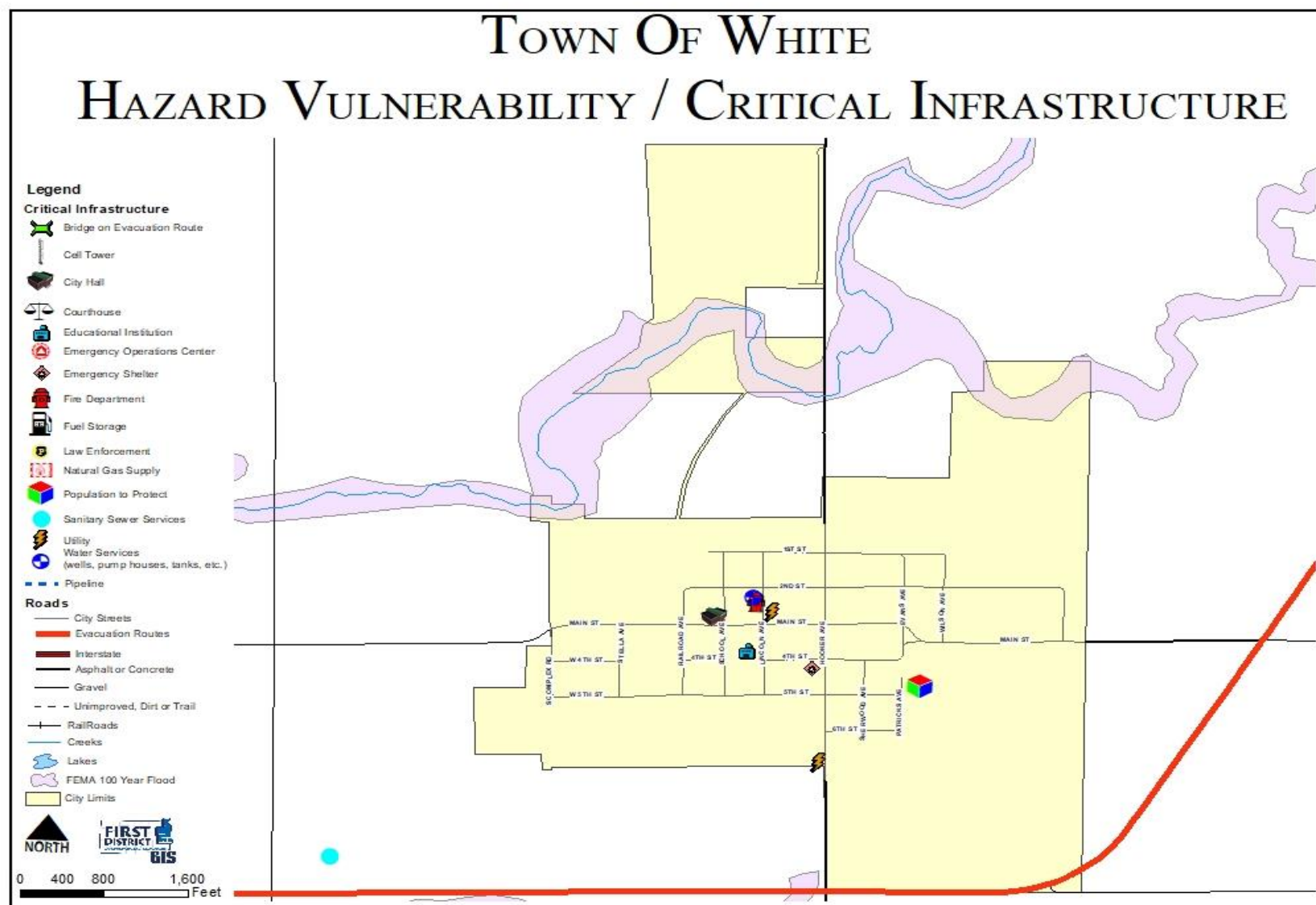


Figure 4.10: City of White Hazard Vulnerability Map



CHAPTER 5 MITIGATION STRATEGY

MITIGATION OVERVIEW

Requirement 201.6(c)(3)(i). Local Mitigation Plan Review Tool – C3.

Requirement 201.6(c)(3)(ii). Local Mitigation Plan Review Tool – C4.

Requirement 201.6(c)(3)(iii) & (iv). Local Mitigation Plan Review Tool – C5.

Requirement 201.6(d)(3). Local Mitigation Plan Review Tool – D3.

The State Hazard Mitigation Plan addresses several mitigation categories including warning and forecasting, community planning, and infrastructure reinforcement. The County and participating entities' greatest needs are mitigating high wind and flood hazards, backup generators for critical infrastructure, construction of storm shelters, and public awareness.

After the completion of the risk assessment (identification of hazards, probability of hazards and vulnerability to hazards), it was the mutual consensus of the PDM Planning Team that mitigation strategies of the PDM should focus on the following hazards: winter storms, severe summer storms, flooding, wildfires (urban/rural).

The PDM Planning Team first reviewed the goals, objectives and priorities of the previous Plan. The goals and objectives of the previous plan were incorporated into the goals of this plan. The PDM Planning Team completed the goal identification process by considering the county's and participating jurisdictions' vulnerability to each identified hazard, and the severity of the threat posed by each hazard. Much of the discussion focused on damage caused by past events, and what could be done to ensure that future damage will be lessened or eliminated. By reviewing each jurisdiction's Comprehensive Land Use Plan (if available), the participants also considered how future development might affect the county's and participating jurisdictions' vulnerability to the hazards they face. When identifying goals, numerous activities or projects were identified with broadly defined benefits to numerous jurisdictions within the County. Numerous actions were agreed by the PDM Planning Team to have broad reaching benefits but due to scope or varying levels of importance to individual jurisdictions no specific cost, timeframe, or priority was assigned. Likewise many infrastructure projects and policies throughout all communities would mitigate hazards but were not located in the most vulnerable areas. All communities reviewed the activities/policies and corresponding problem statements to identify whether they applied to their respective jurisdiction. The results of the community review of those general activities/policies are displayed in Tables 5.1 – 5.12. Specific projects for each community are listed in Table 5.13 Those projects intended to mitigate problems at a specific location are represented in Figures 5.1 to 5.9.

Principal Goals

1. Reduce the loss of life, property, infrastructure, critical facilities, cultural resources and impacts from severe weather, flooding and other natural disasters.
2. Improve public safety during severe weather, flooding and other natural disasters.
3. Improve the County's Emergency Preparedness and Disaster Response and Recovery capabilities.

Mitigation Activities for Flooding Hazards

Goal #1: Protect specific areas of Brookings County from flooding.

Goal #2: Educate and inform Brookings County residents regarding flooding safety.

Goal #3: Reduce the extent to which utility interruptions affect areas during flooding events.

- Actions/Projects to reduce flood risk through policy implementation (See Table 5.1)
- Actions/Projects to change the characteristics or impacts of flood hazards (See Table 5.2)
- Actions to reduce loss potential of infrastructure to flood hazards (See Table 5.3)

Mitigation Activities for Severe Weather Hazards (summer and winter)

Goal #1: Increase public awareness and education on severe weather issues.

Goal #2: Improve public safety during severe weather.

Goal #3: Reduce the extent to which utility interruptions affect areas during severe weather situations.

Goal #4: Reduce crippling effects of winter storms, especially regarding smaller communities.

- Actions/Projects to reduce severe weather risk through policy implementation (See Table 5.4)
- Actions/Projects to change the characteristics or impacts of severe weather hazards (See Table 5.5)
- Actions/Projects to reduce loss potential of infrastructure to severe weather hazards (See Table 5.6)

Table 5.1: Actions/Projects to Reduce Flood Risk through Policy Implementation

Problem Statements	Actions	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County
Public is unaware of scope of flood risk and existing emergency plans	Public education. Disseminate information regarding how to deal with flooding. This would include transportation issues, home protection strategies, safety issues, and how to move forward after a flooding situation.	X	X	X	X	X	X	X	X	X
	Encouraging homeowners in flood-prone areas to purchase flood insurance.	X	X	X	X	X	X	X	X	X
Jurisdiction is unaware potential hydrologic impacts of drainage/ development projects	Conduct necessary studies addressing drainage (storm water flow/runoff, etc).	X	X	X	X	X	X	X	X	X
Residents are not eligible for flood insurance	Begin participation in the National Flood Insurance Program.				X					
Failure to comply with NFIP programs makes the community ineligible for flood insurance and certain funding	Ensure continued National Flood Insurance Program compliance by enforcing flood plain management ordinance.	X	X	X		X	X	X	X	X
Jurisdiction is unaware of opportunities to participate programs to assist in achieving mitigation goals	Work to improve the level of communication and coordination with the State NFIP coordinator.	X	X	X		X	X	X	X	X
Jurisdiction has no legal mechanism to regulate land use	Adoption and enforcement of land use regulation.				X		X			

Problem Statements	Actions	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County
Need to continue to regulate minimum land use and development standards	Continue enforcement of zoning and subdivision ordinances.	X	X	X		X		X	X	X
Jurisdiction has little legal mechanism to regulate drainage	Developing a county/city drainage ordinance.	X	X	X	X	X	X	X	X	X
Need to continue to regulate minimum construction standards	Continue enforcement of building codes.		X							X
No technical analysis or identification of specific mitigation projects	Identify and prioritize capital/structural mitigation projects that are cost effective and technically feasible.	X	X	X	X	X	X	X	X	X

Table 5.2: Actions/Projects to Change the Characteristics or Impacts of Flood Hazards

Problem Statements	Actions	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County
Portions of storm sewer system is not designed to 100 year flood event	Installing or upgrading storm sewer piping.	X	X	X	X	X	X	X	X	
Drainage patterns have changed, culverts are inadequate for conveyance of water	Installing or enlarging drainage culverts.	X	X	X	X	X	X	X	X	X
Certain streets have substandard or no curb and gutter	Curbing and guttering of city streets to improve storm water flow.	X	X	X	X	X	X	X	X	
Capacity of rivers, streams, and retention areas is decreased due to accumulation of debris	Clean out debris in drainage areas, tributaries, etc to improve water flow	X	X	X	X	X	X	X	X	X
Sanitary and/or storm sewer are vulnerable to back-up in flood event	Install valves, plugs in sanitary and storm sewer system.	X	X					X		
Potential for development in flood prone areas.	Preservation and expansion of open space along the river and enhancement of existing berm areas.									X
	Work with property owners to implement deed restrictions for open lots/vacant properties in the flood hazard areas to prevent development.		X							X

Table 5.3: Actions/Projects to Reduce Loss Potential of Infrastructure to Flood Hazards

Problem Statements	Actions	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County
Many roads and bridges were built prior to identification of flood hazard areas	Replace and raise bridges									X
	Elevating roads in flood-prone areas	X	X	X	X	X	X	X	X	X
Some utility poles are located in areas vulnerable to flooding	Flood-proof or replace utility structures in flood-prone areas	X	X	X	X	X	X	X	X	X
Structures constructed in the floodplain prior to identification of flood hazard areas	Making structural retrofits to infrastructure	X	X	X	X	X	X	X	X	X

Table 5.4: Actions/Projects to Reduce Severe Weather Risk through Policy Implementation

Problem Statements	Actions	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County
Public is unfamiliar with certain disaster preparation measures	Public education. Disseminate information regarding how to deal with severe weather (summer/winter). Some of the issues that may be addressed within the information would include: safety issues on downed power lines, electrical and fire dangers, the necessity for generators and advice on using them, protecting property, survival strategies during storms, and purchasing of back-up power for various household and farming operations.	X	X	X	X	X	X	X	X	X
Lack of data regarding vulnerability to winter storms	Gather data to create a more precise loss estimate for winter storms.	X	X	X	X	X	X	X	X	X
Lack of data regarding vulnerability to summer storms	Gather data to create a more precise loss estimate for summer storms.	X	X	X	X	X	X	X	X	X

Table 5.5: Actions/Projects to Change the Characteristics or Impacts of Severe Weather Hazards

Problem Statements	Actions	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County
Certain areas and populations are not served by storm shelters	Construct tornado safe rooms or community shelters.	X	X	X	X	X	X	X	X	X
	Construct storm shelters at manufactured home parks		X					X		X
	Construct storm shelters at RV parks.		X							X
Critical facilities are vulnerable to power failure	Install backup generators	X	X							X
Sirens are out of date	Ensure storm sirens meet federal standards	X	X	X	X	X	X	X	X	X
Certain areas are susceptible to snow drifting	Survey areas in need of snow shelterbelts and plant trees accordingly.									X
	Install or plant living snow fences									X
Certain areas of town cannot hear storm sirens and other emergency warning systems	Construct new or improve existing warning systems	X	X	X	X	X	X	X	X	X

Table 5.6: Actions/Projects to Reduce Loss Potential of Infrastructure to Severe Weather Hazards

Problem Statements	Actions	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County
Utility lines and structures are subject to failure in high wind, heavy rain, ice events	Upgrading of utility lines.	X	X	X	X	X	X	X	X	X
	Burial of utility lines when needed.	X	X	X	X	X	X	X	X	X
	Require upgrading of overhead lines when age or disasters provide an opportunity.	X	X	X	X	X	X	X	X	X
	Removal of trees near power lines.	X	X	X	X	X	X	X	X	X
	Attachment of guy wires to dead-end poles.	X	X	X	X	X	X	X	X	X
	Testing integrity of poles	X	X	X	X	X	X	X	X	X
	Usage of anti galloping devices	X	X	X	X	X	X	X	X	X
	Making structural retrofits to facilities.	X	X	X	X	X	X	X	X	X

Mitigation Activities for Fire and Drought Hazards

Goal #1: Increase fire fighting capabilities.

Goal #2: Reduce the negative effects droughts have on Brookings County.

Goal #3: Reduce the negative effects wildfires have on Brookings County.

- **Actions/Projects to reduce fire and drought risk through policy implementation (See Table 5.7)**
- **Actions/Projects to change the characteristics or impacts of fire and drought hazards (See Table 5.8)**
- **Actions/Projects to reduce loss potential of infrastructure to fire and drought hazards (See Table 5.9)**

General Mitigation Activities

Technological (See Table 5.10):

Planning (See Table 5.11):

Administration/Coordination (See Table 5.12)

Table 5.7: Actions/Projects to Reduce Fire and Drought Risk through Policy Implementation

Problem Statements	Actions	Aurora	Brookings	Bruce	Bushnel I	Elkton	Sinai	Volga	White	Brookings County
Community becomes vulnerable to fire hazard while staff is being trained.	Find funding sources to pay for persons to fill positions while individuals are at training courses.	X	X	X	X	X	X	X	X	X
Potential for development in areas vulnerable to wildfire or urban fire	Adoption and enforcement of property regulations in areas vulnerable to wildfire.	X	X	X	X	X	X	X	X	X
	Establish/require minimum fire suppression standards for subdivisions		X							
Community has no plan/policy for water rationing in emergency	Develop water rationing measures that will be implemented during a drought situation.	X	X	X	X	X	X	X	X	X
Public is unaware of benefits of conserving water	Educate residents on the benefits of conserving water at all times, not just during a drought.	X	X	X	X	X	X	X	X	X

Table 5.8: Actions/Projects to Reduce Loss Potential of Infrastructure to Fire and Drought Hazards

Problem Statements	Actions	Aurora	Brookings	Bruce	Bushnel I	Elkton	Sinai	Volga	White	Brookings County
Fire-fighting equipment becomes out of date quickly	Ensure that fire departments are adequately equipped to respond to wildfires	X	X	X	X	X	X	X	X	
Fire hydrants become unusable	Have rural fire departments locate dry fire hydrants.			X	X	X	X		X	

Table 5.9: Actions/Projects to Change the Characteristics or Impacts of Fire and Drought Hazards

Problem Statements	Actions	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County
Dead or dry plant material creates fire hazard/ location changes seasonally and annually	Burn areas to ensure a fire break rather than ignition fuel.									X
Local economy is very dependent on corn/soybean production	Educate farmers on the benefits of a diversified crop protection plan in the event of a drought	X	X	X	X	X	X	X	X	X
	Work with local farmers to investigate the use of more drought resistant crops.	X	X	X	X	X	X	X	X	X

Table 5.10: Technological Activities

Problem Statements	Actions	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County
Current data and software can become obsolete or out of date	Continue utilizing a working computer aided mapping project for the County. This includes using overlays of GIS data, HazMat, and Roads.		X							X
	Enhance existing computer aided dispatch.	X	X	X	X	X	X	X	X	X
	Use HAZUS software to estimate losses in flooding situations. Information may also be able to be used for other hazard areas.	X	X	X	X	X	X	X	X	X
	Work with South Dakota State University to explore additional methods of estimating losses in natural hazards	X	X	X	X	X	X	X	X	X

Table 5.11: Planning Activities

Problem Statements	Actions	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County
Maintenance of a mitigation plan is beyond the economic capability of this community	Find funding to review and update the regional and local disaster mitigation plans on a five-year cycle.	X	X	X	X	X	X	X	X	X
Disaster mitigation projects have not always been incorporated into other plans	Incorporate disaster mitigation actions into appropriate local and regional plans – Master Plans, land use, transportation, open space, and capital programming.	X	X	X	X	X	X	X	X	X
	Integrate disaster mitigation concerns into subdivision, site plan review, and other zoning reviews. In particular require the consideration of downstream flooding impacts caused by new projects.	X	X	X		X		X	X	X
	Integrate disaster mitigation concerns into transportation projects (e.g. drainage improvements, underground utilities, etc.).	X	X	X		X		X	X	X
This community's mitigation projects are not coordinated with other communities' projects	Develop a means for sharing information on a regional basis about successful disaster mitigation planning and programs.	X	X	X	X	X	X	X	X	X

Table 5.12: Administration/Coordination Activities

Problem Statements	Actions	Aurora	Brookings	Bruce	Bushnell	Elkton	Sinai	Volga	White	Brookings County
This community is not staffed nor does it have funding mechanisms to apply for and administer funding sources for mitigation projects	Identify and pursue funding that builds local capacity and supports grant-writing for mitigation actions identified in the PDM.	X	X	X	X	X	X	X	X	X
Need to improve coordination of activities with other governmental jurisdictions and utility providers	Increase communication /coordination between federal, state, regional, county, municipal, private, and non-profit agencies in the area of pre-disaster mitigation.	X	X	X	X	X	X	X	X	X
	Maintain and enhance working relationships with the utility providers.	X	X	X	X	X	X	X	X	X

After meetings with the local jurisdictions and opportunities for public input, a series of mitigation goals were devised to best aid the County in reducing and lessening the effects of hazards. Projects previously identified in the 2014 PDM were carefully analyzed and discussed to determine which of the projects had enough merit to be included in the updated PDM and to determine if the projects meet the hazard mitigation needs of the county. These projects were evaluated based on a cost/benefit ratio and priority. Although this PDM focuses on disaster mitigation rather than disaster preparedness, some communities discussed disaster preparedness projects as well. It was difficult for individual communities to recognize the difference between providing storm shelters and making sure the storm shelters function properly (for example). Actions considered in this category included the acquisition of emergency generators and erecting or replacing warning sirens in areas that currently are not well served.

Most of the mitigation actions proposed by the jurisdictions were identified by city council members, public works personnel, or PDM Planning Team members from the jurisdiction. Some actions were also proposed by townships and utility providers due to the direct impact of disasters on infrastructure and services they provide. Once each jurisdiction had its list of proposed actions complete, it was submitted to the Emergency Management Director. At the second PDM Planning Team meeting, the actions were reviewed. At the third PDM Planning Team meeting a final opportunity was given for the jurisdictions to add any additional actions or refine information relating to previously identified projects.

Although in some cases additional data will be necessary, a timeframe for completion, oversight, funding sources, and any other relevant issues were addressed. These implementation strategies are geared toward the specific goal and area. Often, these projects will not encounter any resistance from environmental agencies, legal authorities, and political entities. Table 5.13 is a presentation of the mitigation actions proposed by the PDM Planning Team. In addition to identifying the proposed actions, the table includes additional information about each action. Elected officials and staff of each municipality and the county were responsible for providing most of this information for actions in their community, but the other planning participants helped in this process. The following information is provided for each action:

- A statement regarding the specific problem the proposed action will mitigate.
- The local priority rating (discussed in the next section).
- The time frame to accomplish the action – “Short” means actions that are intended to be initiated within two years, “Medium” is for actions that should be started within five years, and “Long” is for actions that are not anticipated to be started for at least five years.
- The party(s) primarily responsible for implementing the action.
- The estimated cost - estimates for many of the actions were obtained from knowledgeable sources based on current information. Estimates are subject to change due to specific details of specific projects.
- Potential sources of funding (discussed below).
- The primary hazard being addressed.
- The goal corresponding to the action.

As mentioned above, jurisdictions and entities integrally involved in the planning for disasters due to wide ranging implications to them include townships and most utility providers. Utility providers were represented on the PDM Planning Team. Each utility provider was asked individually to submit their own mitigation actions. The main mitigation activity proposed by utility providers was the burying of overhead lines in rural areas of the county.

In addition, townships in Brookings County were asked to participate in the process. Township clerks were mailed requests to identify potential mitigation projects. Each individual township was provided maps upon which they were asked to identify potential mitigation activities and vulnerable roads or infrastructure. Primarily these activities included replacing culverts with larger culverts, elevating or rip-rapping roads, and reconstructing roads. The Appendix includes maps of vulnerable sites and potential mitigation actions proposed by the townships in the County.

A High Priority Rating can be defined as a potential project that had received widespread support amongst the local governing body when asked during the planning process and would be first priority when planning future mitigation projects. A Medium Priority Rating also would receive general support amongst the governing body, but was not a first priority project compared to those deemed a High Priority. Low Priority received the least amount of support, but still were believed to be a necessary action to take for hazard mitigation. Where estimated project costs were available, they were considered in establishing priorities. However, no formal cost benefit analysis was performed on any specific project. Ultimately the prioritization of these projects were based upon the perceived needs of the local jurisdiction.

Particular attention needs to be paid to sources of funding for the actions. Given the existing financial reality of very tight county and municipal budgets, some of the proposed actions realistically cannot be implemented without substantial grant assistance. With such assistance, it is likely that many of the high priority projects can be undertaken without placing an onerous burden on local budgets. Resources for some of the actions available from FEMA through the South Dakota Office of Emergency Management include the Hazard Mitigation Grant Program, Pre-Disaster Mitigation grant program, and Flood Mitigation Assistance grant programs. Other possible sources of funding include:

Grant and loan programs/sources

- Community Development Block Grant program
- Economic Development Administration
- FEMA Assistance to Firefighters Grant program
- South Dakota Dept of Environment and Natural Resources
- South Dakota Dept of Transportation
- US Department of Agriculture Rural Development Office

Local resources

- General obligation bonds
- Revenue bonds
- Tax Increment Financing (TIF) districts

Table 5.13 Potential Mitigation Projects

BROOKINGS COUNTY PROBLEM STATEMENTS	BROOKINGS COUNTY ACTIONS	PRIORITY RATING	TIMEFRAME	CONTACT	COST	FUNDING SOURCE	HAZARD	GOAL
Base flood elevation for residentially developed lakes is unknown	Establishment of base flood elevations for Poinsett, Campbell, and Oakwood Lakes	High	Short	Brookings County Floodplain Administrator	\$75,000	County, HMGP	Flooding	Protect Specific Areas of Brookings County from floods.
Poorly defined drainage leads to flooding of manufactured homes and potential development property in and around SW1/4 of Sec 11-T109N-R50W Flood Control measures along Big Sioux River have degraded, and an uncontrolled portion of river has expanded to cause damage to the area	Study and implement drainage improvements in low lying areas to run water into Big Sioux River southwest of Sec 11-T109N-R50W Construct flood control measures (Levee/Dam) along Big Sioux River in South Half of Sec 9-T109N-R50W	High	Medium	Brookings County Emergency Management Director	\$750,000	County, City, HMGP, DOT	Flooding	Protect Specific Areas of Brookings County from floods.
		Medium	Medium	Brookings County Emergency Management Director	Unknown	County, HMGP, DENR	Flooding	Protect Specific Areas of Brookings County from floods

CITY OF AURORA PROBLEM STATEMENTS	CITY OF AURORA ACTIONS	PRIORITY RATING	TIMEFRAME	CONTACT	COST	FUNDING SOURCE	HAZARD	GOAL
New development has occurred in areas that cannot hear storm sirens.	Place additional storm siren in park on Lilac Avenue and Pine Street Intersection.	High	Short	(Aurora) Maintenance Supervisor	\$17,000	HMGP/OEM	Severe Weather Hazards (Summer and Winter)	Improve public safety during severe weather.
Portions of Lilac, Linden Avenues and E. Redmond Road are prone to flooding in heavy rain or rapid snow melt.	Study and implement stormwater drainage improvements in targeting these streets.	Medium	Medium	(Aurora) Maintenance Supervisor	\$250,000	HMGP	Flooding	Protect Specific Areas of Brookings County from floods.

CITY OF BROOKINGS PROBLEM STATEMENTS	CITY OF BROOKINGS ACTIONS	RATING	TIMEFRAME	CONTACT	COST	FUNDING SOURCE	HAZARD	GOAL
Emergency Storm Shelter access within proximity guidelines for Community Park / Athletic Complexes Examples include: Fishback Soccer Complex, Southbrook Softball Complex, Dakota Nature Park, EdgeBrook Golf Course, Sexauer Campground	Discussion and identify existing emergency storm shelters	Low	Short	City of Brookings Parks, Recreation, & Forestry	\$500,000 per structure	HMGP?	Weather/Storm	Designate/Identify location for emergency storm shelter(s) within necessary proximity for park users

CITY OF BRUCE PROBLEM STATEMENTS	CITY OF BRUCE ACTIONS	RATING	TIMEFRAME	CONTACT	COST	FUNDING SOURCE	HAZARD	GOAL
Fire Department does not have a back-up generator for emergency use	Purchase of Portable Back-up Generator	High	Medium	Fire Chief	\$20,000	HMGP/FIRE	Severe Weather Hazards	Reduce the extent to which utility interruptions affect area during severe weather conditions
The western portion of town is located within the 100 year floodplain (Big Sioux River)	Implement Drainage Improvements Including Improving Levy on West Portion of Town	High	Medium	Town Board President	\$200,000	HMGP	Flooding	Protect Specific Areas of Brookings County from floods.
Emergency Warning System & Siren infrastructure needs restoration and repair	Purchase new emergency city sirens	High	Medium	Finance Officer	\$50,000	HMGP	Severe Weather Hazards	Improve public safety during severe weather.
Sanitary Sewer System needs a full assessment of operating status	Perform study and inspection of sewer infrastructure	Low	Medium	Town Board President	UNKNOWN	HMGP	Severe Weather Hazards	Improve public safety during severe weather
City does not have a designated storm shelter/community hall	Construct a multi-use storm shelter for the city.	Medium	Long	Town Board President	\$250,000	HMGP/CDBG	Severe Weather Hazards	Improve public safety during severe weather events for vulnerable populations

TOWN OF BUSHNELL PROBLEM STATEMENTS	TOWN OF BUSHNELL ACTIONS	RATING	TIMEFRAME	CONTACT	COST	FUNDING SOURCE	HAZARD	GOAL
The town does not have a back-up generator for the current emergency shelter.	Purchase of Back-up Generator for Town Hall (Emergency Shelter)	High	Short	(Bushnell) Town Board President	\$50,000	HMGP/OEM	Severe Weather Hazards (summer and winter)	Reduce the extent to which utility interruptions affect areas during severe weather situations.
The town does not have a Tornado Safe Emergency Shelter.	Construction of Tornado Shelter.	Medium	Medium	(Bushnell) Town Board President	\$50,000.00	HMGP	Tornado	Improve public safety during severe weather.
The town has no functioning fire hydrants.	Install water tank for emergency purposes	Medium	Long	(Bushnell) Town Board President	\$25,000	HMGP	Fire	Increase fire fighting capabilities.

CITY OF ELKTON PROBLEM STATEMENTS	TOWN OF ELKTON ACTIONS	RATING	TIMEFRAME	CONTACT	COST	FUNDING SOURCE	HAZARD	GOAL
Old trees are vulnerable to high wind. They fall on power lines.	Bury overhead powerlines	High	Short	(Elkton) Finance Officer	UNKOWN	HMGP	Severe Weather Hazards (summer and winter)	Reduce the extent to which utility interruptions affect areas during severe weather situations.

CITY OF ELKTON PROBLEM STATEMENTS	CITY OF ELKTON ACTIONS	RATING	TIMEFRAME	CONTACT	COST	FUNDING SOURCE	HAZARD	GOAL
Old trees are vulnerable to high wind. They fall on buildings.	Tree replacement program. Offer economic assistance to replace old trees with new/ trim old trees.	High	Short	(Elkton) Finance Officer	\$75,000	HMGP/ Local	Severe Weather Hazards (summer and winter)	Improve public safety during severe weather.
Difficult/impossible to hear siren in SE portion of town.	Install storm siren in SE portion of town.	High	Short	(Elkton) Finance Officer	\$17,000	HMGP/OEM	Severe Weather Hazards (Summer and Winter)	Improve public safety during severe weather.
The campground and ball field do not have tornado shelters.	Develop and implement emergency plan for Tornadoes.	High	Short	(Elkton) Finance Officer	\$2,000	Local	Tornado	Improve public safety during severe weather.
The town does not have a Tornado Safe Emergency Shelter.	Construction of Tornado Shelter.	High	Medium	(Elkton) Finance Officer	\$50,000.00	HMGP	Tornado	Improve public safety during severe weather.
Urban development has exceeded capacity/ capability of stormwater management system.	Comprehensive Drainage Study	Medium	Medium	(Elkton) Finance Officer	\$300,000	HMGP	Flooding	Protect Specific Areas of Brookings County from floods.
Little wind protection outside of town.	Establish living snow fence/ shelterbelts on north and west of community.	Low	Long	(Elkton) Finance Officer	\$20,000	Local	Severe Weather Hazards (Summer and Winter)	Improve public safety during severe weather.

TOWN OF SINAI PROBLEM STATEMENTS	TOWN OF SINAI ACTIONS	RATING	TIMEFRAME	CONTACT	COST	FUNDING SOURCE	HAZARD	GOAL
The town does not have a Tornado Safe Emergency Shelter.	Construction of Tornado Shelter.	Medium	Medium	(Sinai) Finance Officer	\$50,000	HMGP	Tornado	Improve public safety during severe weather.
Low lying areas are prone to overland flooding due to Lake Sinai.	Complete required drainage improvements from engineering study	Medium	Medium	(Sinai) Finance Officer	\$150,000	HMGP	Flooding	Protect Specific Areas of Brookings County from floods.

CITY OF VOLGA PROBLEM STATEMENTS	CITY OF VOLGA ACTIONS	RATING	TIMEFRAME	CONTACT	COST	FUNDING SOURCE	HAZARD	GOAL
The city's water system is vulnerable to electrical failure.	Portable Generator for Water System.	High	Short	(Volga) Finance Officer	\$20,000	HMGP	Severe Weather Hazards (summer and winter)	Reduce the extent to which utility interruptions affect areas during severe weather situations.
Powerlines are vulnerable to damage due to high winds and/or ice.	Bury overhead powerlines	Medium	Short	(Volga) Finance Officer	UNKOWN	HMGP/Rural Development	Severe Weather Hazards (summer and winter)	Reduce the extent to which utility interruptions affect areas during severe weather situations.
The town does not have a Tornado Safe Emergency Shelter.	Construction of Tornado Shelter.	Medium	Short	(Volga) Finance Officer	\$100,000	HMGP/CDBG	Tornado	Improve public safety during severe weather.

CITY OF VOLGA PROBLEM STATEMENTS	CITY OF VOLGA ACTIONS	RATING	TIMEFRAME	CONTACT	COST	FUNDING SOURCE	HAZARD	GOAL
Wastewater Treatment Facility does not have adequate back up generators	Purchase back up generators and support systems	Medium	Medium	(Volga) Finance Officer	\$225,000	HMGP/DENR	Severe Weather Hazards (summer and winter)	Reduce the extent to which utility interruptions affect areas during severe weather situations.
Lift Stations are vulnerable to electrical failure	Portable Generator for Lift Station(s)	Medium	Medium	(Volga) Finance Officer	\$80,000	HMGP/DENR	Severe Weather Hazards (summer and winter)	Reduce the extent to which utility interruptions affect areas during severe weather situations.
Stormwater system infrastructure on 2 nd Street from Astrachan to Samara Avenue require extensive on-going maintenance and are unable to handle increased water levels	Implement improvements listed in Volga Stormwater Plan (Banner 2018)	High	Long	(Volga) Finance Officer	\$777,000	HMGP/DENR/General Fund-Rural Development	Severe Weather Hazards (summer and winter)	Reduce the extent to which utility interruptions affect areas during severe weather situations.
Stormwater system infrastructure on 6 th Street require extensive on-going maintenance and are unable to handle increased water levels	Implement improvements listed in Volga Stormwater Plan (Banner 2018)	High	Long	(Volga) Finance Officer	\$1,800,000	HMGP/DENR/General Fund-Rural Development	Severe Weather Hazards (summer and winter)	Reduce the extent to which utility interruptions affect areas during severe weather situations.

CITY OF WHITE PROBLEM STATEMENTS	CITY OF WHITE ACTIONS	RATING	TIMEFRAME	CONTACT	COST	FUNDING SOURCE	HAZARD	GOAL
The city does not have a back-up generator for the current emergency operations center.	Back-up Generator at McKnight Hall (City Offices)	High	Short	(White) Finance Officer	\$50,000	HMGP	Severe Weather Hazards (summer and winter)	Reduce the extent to which utility interruptions affect areas during severe weather situations.
The town does not have a Tornado Safe Emergency Shelter.	Create Tornado Safe Shelter in McKnight Hall (City Offices)	High	Medium	(White) Finance Officer	\$80,000	HMGP	Tornado	Improve public safety during severe weather.
Powerlines are vulnerable to damage due to high winds and/or ice. Land use regulations and plans become out of date over time.	Bury overhead powerlines	Medium	Medium	(White) Finance Officer	UNKOWN	HMGP/Otter Tail	Severe Weather Hazards (summer and winter)	Reduce the extent to which utility interruptions affect areas during severe weather situations.
Policies need to comply with this and other plans.	Update Comprehensive Land Use Plan and Zoning Regulations	Low	Long	(White) Finance Officer	\$5,000	City	Flooding	Improve public safety during severe weather.
Current Fire Hall underserves staff and volunteers	Construct new Fire Hall	High	Short	(White) Finance Officer/ Fire Chief	UNKNOWN	FIRE/HMGP/CDBG	Fire	Improve fire-fighting capabilities

SIOUX VALLEY ENERGY PROBLEM STATEMENTS	SIOUX VALLEY ENERGY ACTIONS	RATING	TIMEFRAME	CONTACT	COST	FUNDING SOURCE	HAZARD	GOAL
Overhead lines are vulnerable to freezing rain/sleet/ice.	Bury power lines in ice prone areas where feasible	Medium	Medium	Sioux Valley Energy	Dependent on type of line and construction method	FEMA-HMGP / Utility Funds	Severe Weather Hazards (summer and winter)	Improve public safety during severe weather
Overhead lines are vulnerable to freezing rain/sleet/ice.	Bury or rebuild critical overhead power lines to make them more resistant to damage from ice	High	Medium	Sioux Valley Energy	Dependent on type of line and construction method	FEMA-HMGP / Utility Funds	Severe Weather Hazards (summer and winter)	Reduce the extent to which utility interruptions affect areas during severe weather situations.
Overhead lines are vulnerable to ice and high wind events.	Bury power lines in areas of high traffic volume where feasible	Medium	Medium	Sioux Valley Energy	Dependent on type of line and construction method	FEMA-HMGP / Utility Funds	Severe Weather Hazards (summer and winter)	Improve public safety during severe weather
Overhead lines are vulnerable to ice and high wind events.	Bury power lines in heavily treed areas or rebuild overhead lines away from heavily treed areas	Medium	Medium	Sioux Valley Energy	Dependent on type of line and construction method	FEMA-HMGP / Utility Funds	Severe Weather Hazards (summer and winter)	Reduce the extent to which utility interruptions affect areas during severe weather situations.
Overhead lines and support structures are vulnerable to flooding.	Bury or rebuild overhead power lines away from flood-prone areas	Medium	Medium	Sioux Valley Energy	Dependent on type of line and construction method	FEMA-HMGP / Utility Funds	Flooding	Reduce the extent to which utility interruptions affect areas during severe weather situations.

Figure 5.1: Brookings County Potential Mitigation Project Map

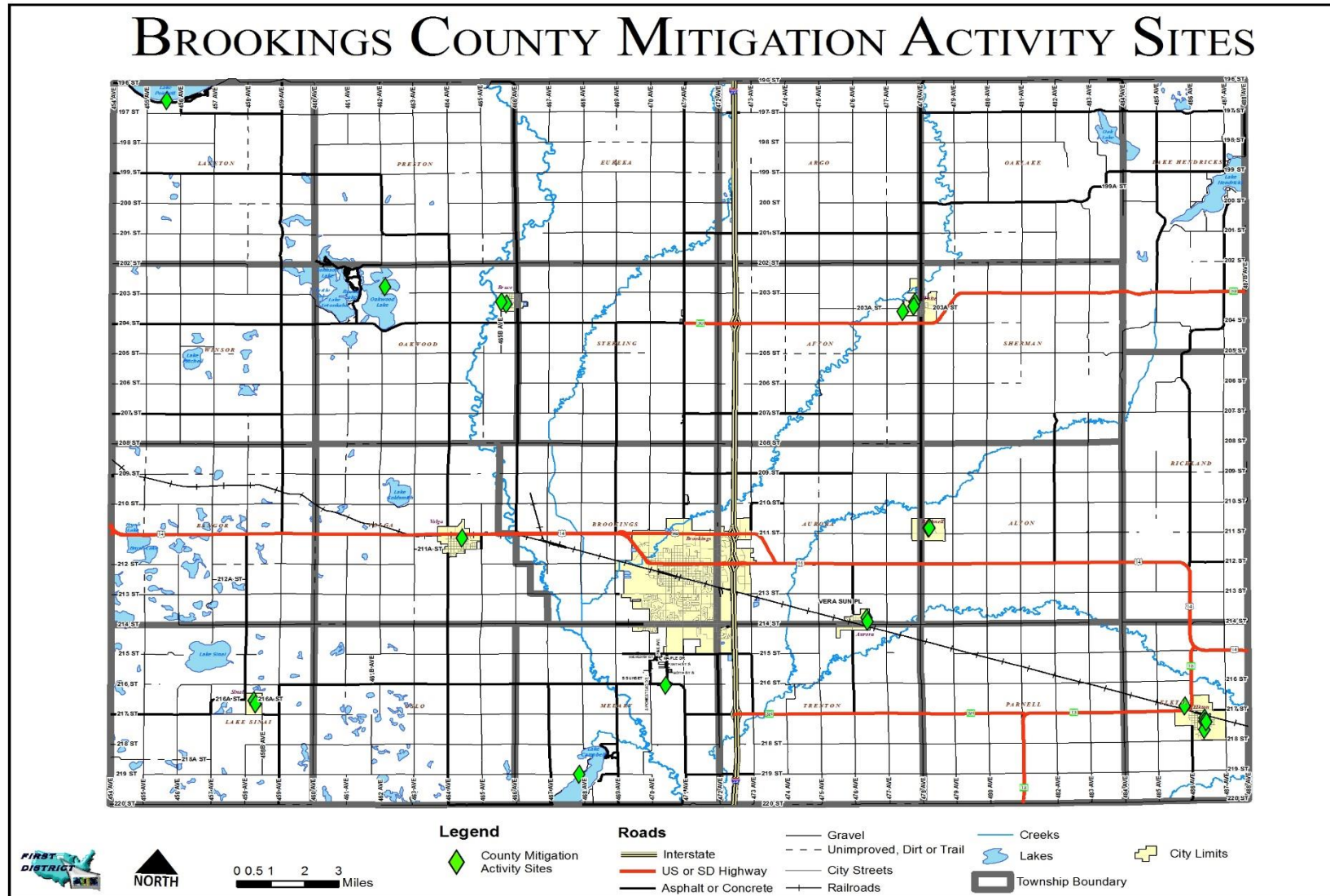


Figure 5.2: City of Aurora Potential Mitigation Project Map

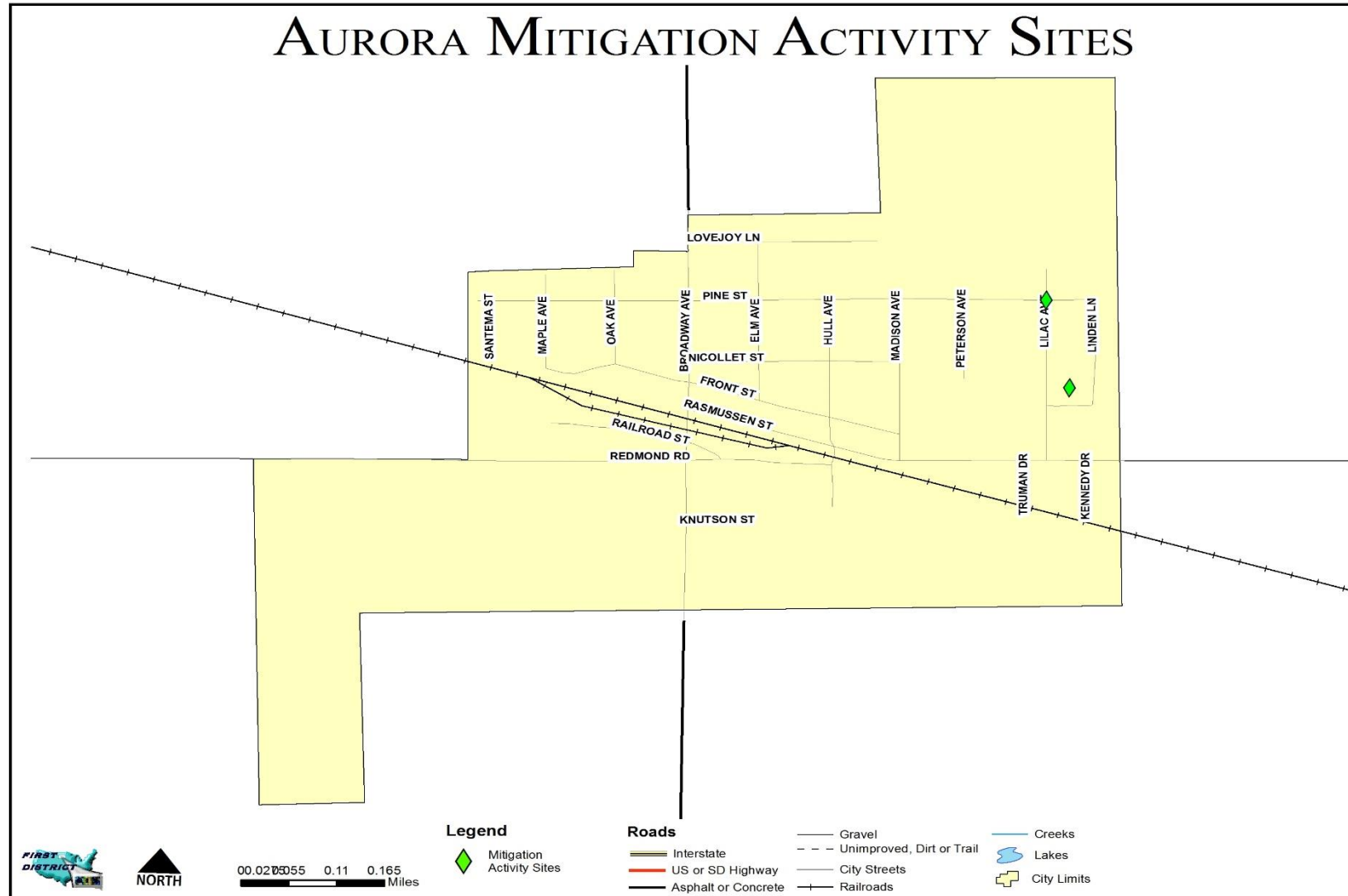


Figure 5.3: City of Brookings Potential Mitigation Project Map



Figure 5.4: City of Bruce Potential Mitigation Project Map

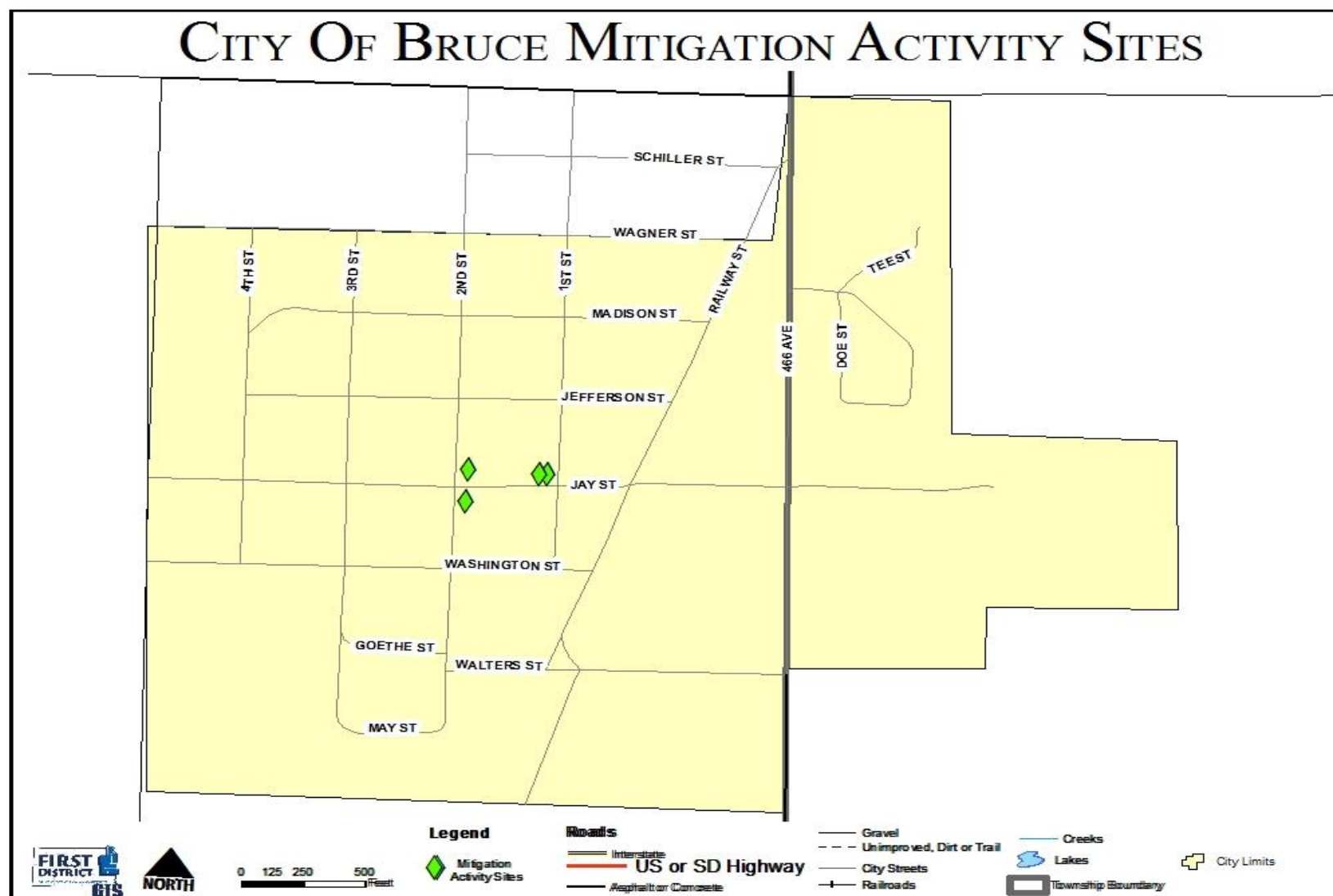


Figure 5.5: Town of Bushnell Potential Mitigation Project Map

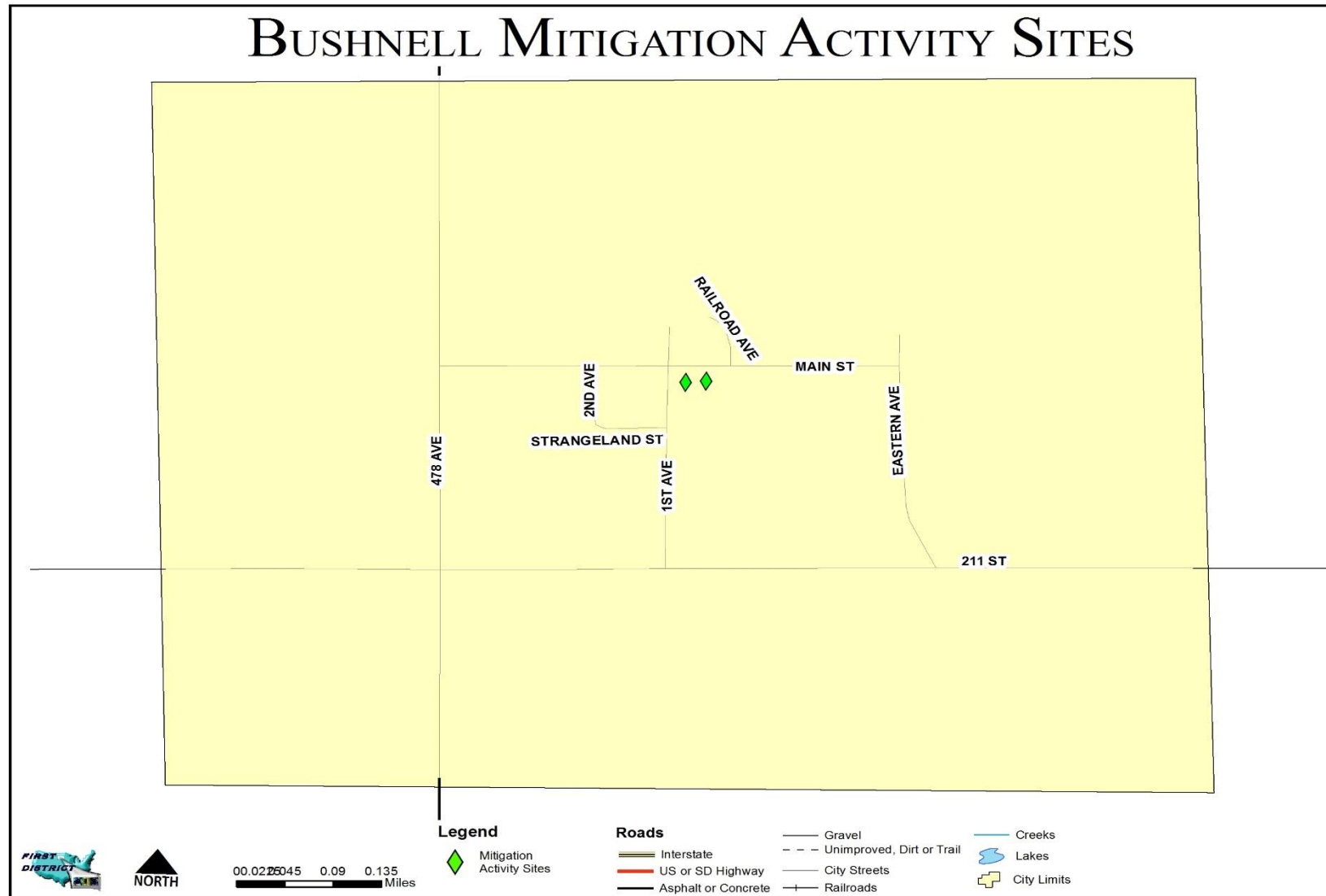


Figure 5.6: City of Elkton Potential Mitigation Project Map

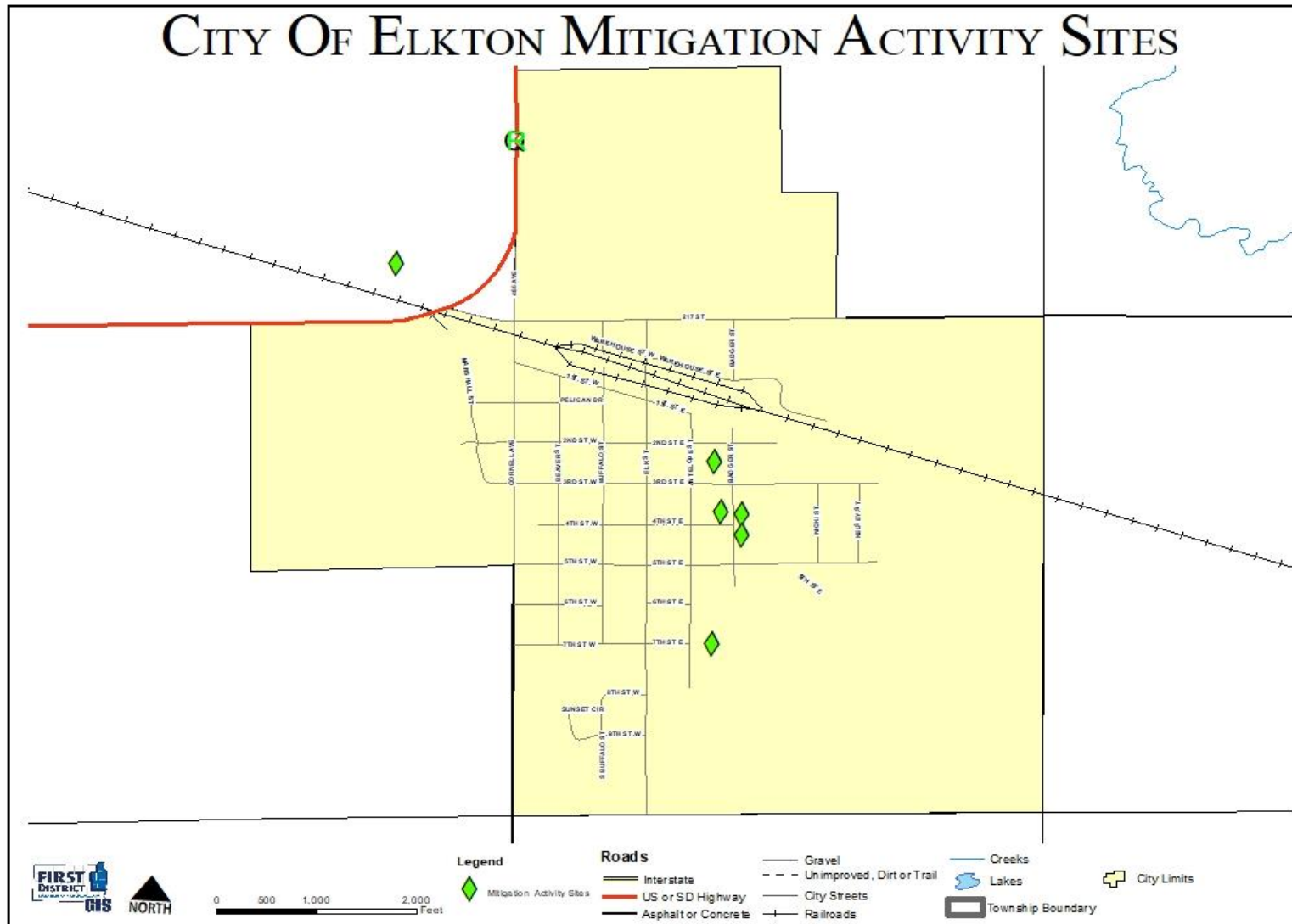


Figure 5.7: Town of Sinai Potential Mitigation Project Map

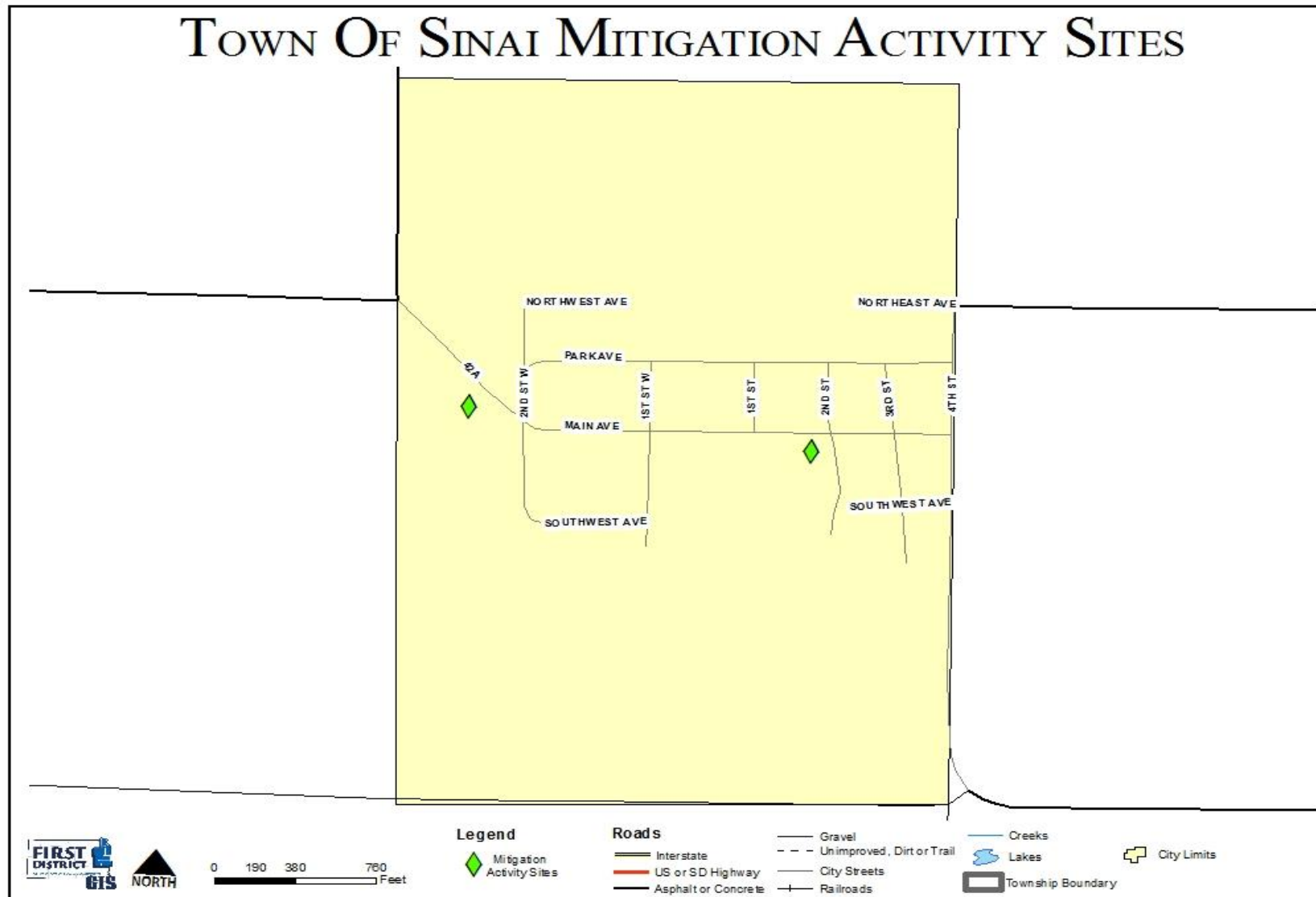


Figure 5.8: City of Volga Potential Mitigation Project Map

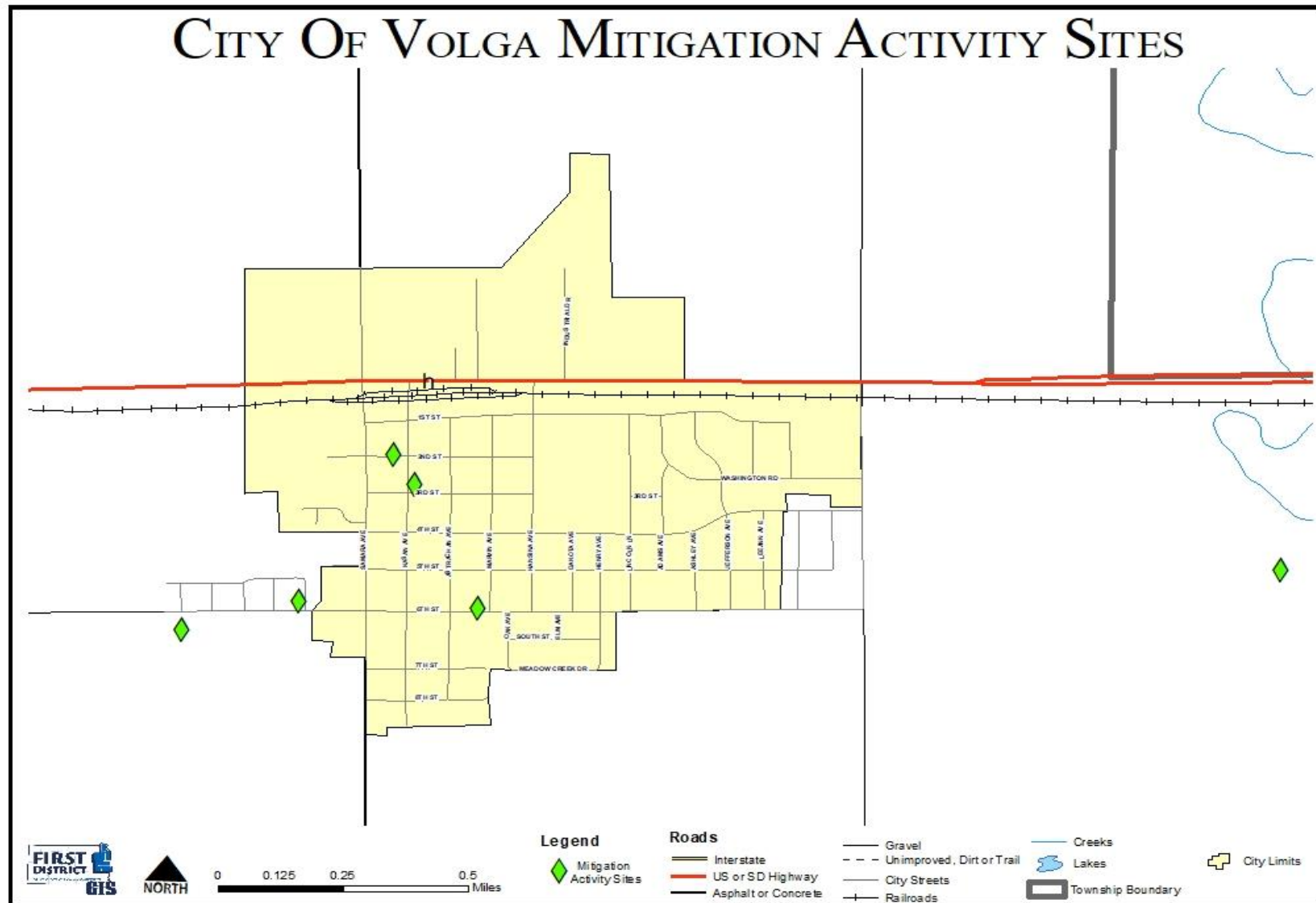
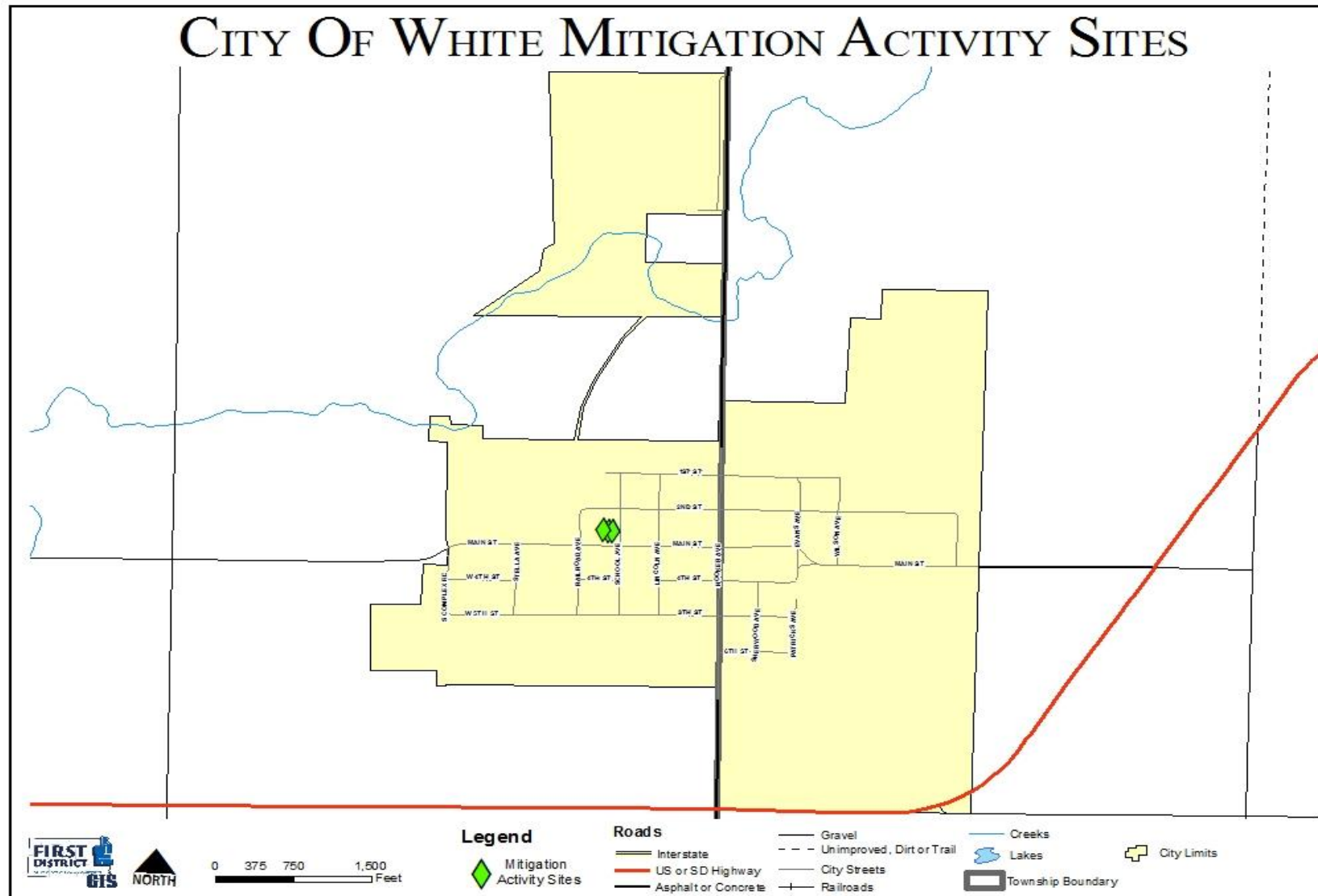


Figure 5.9: City of White Potential Mitigation Project Map



IMPLEMENTATION OF MITIGATION ACTIONS

Requirement 201.6(c)(4)(ii). Local Mitigation Plan Review Tool – C6.

Requirement 201.6(d)(3). Local Mitigation Plan Review Tool – D3.

Upon adoption of the updated Brookings County PDM, each jurisdiction will become responsible for implementing its own mitigation actions. The planning required for implementation is the sole responsibility of the local jurisdictions and private businesses that have participated in the PDM update. All of the municipalities have indicated that they do not have the financial capability to move forward with projects identified in the PDM at this time, however, all will consider applying for funds through the State and Federal Agencies once such funds become available. If and when the municipalities are able to secure funding for the mitigation projects, they will move forward with the projects identified. A cost-benefit analysis will be conducted on an individual basis after the decision is made to move forward with a project.

CHAPTER 6 PLAN MAINTENANCE

MONITORING, EVALUATING, AND UPDATING THE PLAN

Requirement 201.6(c)(4)(ii). Local Mitigation Plan Review Tool – C6.

The County and all of the participating local jurisdictions thereof will incorporate the findings and projects of the PDM in all planning areas as appropriate. Periodic monitoring and reporting of the PDM is required to ensure that the goals and objectives for the County PDM are kept current and that local mitigation efforts are being carried out. Communities will establish an annual review of projects and infrastructure listed in the plan. As funding becomes available, projects are completed, or the inevitable new project needs to be added, communities will report to the Brookings County Emergency Management Director. Communities should adopt a schedule which corresponds with the annual report of the Emergency Management Director to the County Commissioners in November of each year.

During the process of implementing mitigation strategies, the county or communities within the county may experience lack of funding, budget cuts, staff turnover, and/or a general failure of projects. These scenarios are not in themselves a reason to discontinue and fail to update the PDM. A good plan needs to provide for periodic monitoring and evaluation of its successes and failures and allow for appropriate changes to be made.

CONTINUED PUBLIC PARTICIPATION/INVOLVEMENT

Requirement 201.6(c)(4)(iii). Local Mitigation Plan Review Tool – A5.

Requirement 201.6(c)(4)(ii). Local Mitigation Plan Review Tool – C6.

During interim periods between the five year re-write, efforts will be continued to encourage and facilitate public involvement and input. The PDM will be available for public view and comment at the Brookings County Emergency Management Office located in the Brookings City, County Government Center, and the First District Association of Local Governments office. The PDM will also be available for review on the web at the Brookings County website (www.brookingscountysd.gov) and at the First District Association of Local Governments homepage (www.1stdistrict.org). Comments will always be received whether orally, written or by e-mail.

All ongoing workshops and trainings will be open to the public and appropriately advertised. Ongoing press releases and interviews will help disseminate information to the general public and encourage participation.

As implementation of the mitigation strategies continues in each local jurisdiction, the primary means of public involvement will be the jurisdiction's own public comment and hearing process. State law as it applies to municipalities and counties requires this as a minimum for many of the proposed implementation measures. Effort will be made to encourage cities, towns and counties to go beyond the minimum required to receive public input and engage stakeholders.

ANNUAL REPORTING PROCEDURES

Requirement 201.6(c)(4)(ii). Local Mitigation Plan Review Tool – C6.

The PDM shall be reviewed annually, as required by the County Emergency Management Director, or as the situation dictates such as following a disaster declaration. The Brookings County Emergency Management Director will review the PDM annually in November and ensure the following:

1. The County Elected body will receive an annual report and/or presentation on the implementation status of the PDM;
2. The report will include an evaluation of the effectiveness and appropriateness of the mitigation actions proposed in the PDM; and
3. The report will recommend, as appropriate, any required changes or amendments to the PDM.

FIVE-YEAR PDM REVIEW

Requirement 201.6(c)(4)(i). Local Mitigation Plan Review Tool – A6.

Requirement 201.6(c)(4)(ii). Local Mitigation Plan Review Tool – C6.

Every five years the PDM will be reviewed and a complete update will be initiated. All information in the PDM will be evaluated for completeness and accuracy based on new information or data sources. New property development activities will be added to the PDM and evaluated for impacts. New or improved sources of hazard related data will also be included.

In future years, if the County relies on grant dollars to hire a contractor to write the PDM update, the County will initiate the process of applying for and securing such funding in the third year of the PDM to ensure the funding is in place by the fourth year of the PDM. The fifth year will then be used to write the PDM update, which in turn will prevent any lapse in time where the county does not have a current approved PDM on file.

The goals, objectives, and mitigation strategies will be readdressed and amended as necessary based on new information, additional experience and the implementation progress of the PDM. The approach to this PDM update effort will be essentially the same as the one used for the original PDM development.

The Emergency Management Director will meet with the PDM Planning Team for review and approval prior to final submission of the updated PDM.

PLAN AMENDMENTS

Requirement 201.6(c)(4)(ii). Local Mitigation Plan Review Tool – C6.

PDM amendments will be considered by the Brookings County Emergency Management Director, during the PDM's annual review to take place the end of each county fiscal year. All affected local jurisdictions (cities, towns, and counties) will be required to hold a public hearing and adopt the recommended amendment by resolution prior to considerations by the PDM Planning Team.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

Requirement 201.6(B)(3). Local Mitigation Plan Review Tool – A4.

All municipalities in the County, with the exceptions of the Town of Bushnell, City of Bruce, and Town of Sinai have a comprehensive and/or capital improvements plan. The City of Brookings mitigation projects will be considered and prioritized in conjunction with non-mitigation projects, such as water and wastewater infrastructure improvements, new construction of schools, libraries, parks, etc. All other towns with existing comprehensive land use plans will review mitigation projects annually when reviewing their comprehensive land use plan, as is recommended in each of their plans. In addition, all municipalities, including the towns without comprehensive land use plans, will consider the mitigation requirements, goals, actions, and projects when it considers and reviews the budget and other existing planning documents. Preparation of the budget is an opportune time to review the plan since municipalities are required by state law to prepare budgets for the upcoming year and typically consider any expenditure for the upcoming year at that time.

The local jurisdictions will post a permanent memo to their files as a reminder for them to incorporate their annual review of the mitigation actions identified into the budget preparation process. This does not require the projects be included in the budget, it merely serves as a reminder to the City officials that they have identified mitigation projects in the PDM that should be considered if the budget allows for it.

POTENTIAL FUNDING SOURCES

Although all mitigation techniques will likely save money by avoiding losses, many projects are costly to implement. None of the local jurisdictions have the funds available to move forward with mitigation projects at this time; thus, the Potential Funding Sources section was included so that the local jurisdictions can work towards securing funding for the projects. Inevitably, due to the small tax base and small population most of the local jurisdictions do not have the ability to generate enough revenue to support anything beyond the basic needs of the community. Thus mitigation projects will not be completed without a large amount of funding support from State or Federal programs.

The County jurisdictions will continue to seek outside funding assistance for mitigation projects in both the pre- and post-disaster environment. Primary Federal and State grant programs have been identified and briefly discussed, along with local and non-governmental funding sources, as a resource for the local jurisdictions

Federal

The following federal grant programs have been identified as funding sources which specifically target hazard mitigation projects:

Title: Pre-Disaster Mitigation Program

Agency: Federal Emergency Management Agency

Through the Disaster Mitigation Act of 2000, Congress approved the creation of a national program to provide a funding mechanism that is not dependent on a Presidential Disaster Declaration. The Pre-Disaster Mitigation (PDM) program provides funding to states and communities for cost-effective hazard mitigation activities that complement a comprehensive mitigation program and reduce injuries, loss of life, and damage and destruction of property.

The funding is based upon a 75% Federal share and 25% non-Federal share. The non-Federal match can be fully in-kind or cash, or a combination. Special accommodations will be made for “small and impoverished communities”, who will be eligible for 90% Federal share/10% non-Federal.
--

FEMA provides PDM grants to states that, in turn, can provide sub-grants to local governments for accomplishing the following eligible mitigation activities: State and local hazard mitigation planning, Technical assistance (e.g. risk assessments, project development), Mitigation Projects, Acquisition or relocation of vulnerable properties, Hazard retrofits, Minor structural hazard control or protection projects
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Community outreach and education (up to 10% of State allocation)
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Title: Flood Mitigation Assistance Program

Agency: Federal Emergency Management Agency

FEMA’s Flood Mitigation Assistance program (FMA) provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes and other structures insurable under the National Flood Insurance Program (NFIP). FMA was created as part of the National Flood Insurance Reform Act of 1994 (42 USC 4101) with the goal of reducing or eliminating claims under the NFIP.

FMA is a pre-disaster grant program, and is available to states on an annual basis. This funding is available for mitigation planning and implementation of mitigation measures only, and is based upon a 75% Federal share/25% non-Federal share. States administer the FMA program and are responsible for selecting projects for funding from the applications submitted by all communities within the state. The state then forwards selected applications to FEMA for an eligibility determination. Although individuals cannot apply directly for FMA funds, their local government may submit an application on their behalf.
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Title: Repetitive Flood Claims Program

Agency: Federal Emergency Management Agency

FEMA's Repetitive Flood Claims (RFC) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108–264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al).

Up to \$10 million is available annually for FEMA to provide RFC funds to assist States and communities reduce flood damages to insured properties that have had one or more claims to the National Flood Insurance Program (NFIP).

FEMA may contribute up to 100 percent of the total amount approved under the RFC grant award to implement approved activities, if the Applicant has demonstrated that the proposed activities cannot be funded under the Flood Mitigation Assistance (FMA) program.

Title: Hazard Mitigation Grant Program

Agency: Federal Emergency Management Agency

The Hazard Mitigation Grant Program (HMGP) was created in November 1988 through Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The HMGP assists states and local communities in implementing long-term mitigation measures following a Presidential disaster declaration.

To meet these objectives, FEMA can fund up to 75% of the eligible costs of each project. The state or local cost-share match does not need to be cash; in-kind services or materials may also be used. With the passage of the Hazard Mitigation and Relocation Assistance Act of 1993, federal funding under the HMGP is now based on 15% of the federal funds spent on the Public and Individual Assistance programs (minus administrative expenses) for each disaster.

The HMGP can be used to fund projects to protect either public or private property, so long as the projects in question fit within the state and local governments overall mitigation strategy for the disaster area, and comply with program guidelines. Examples of projects that may be funded include the acquisition or relocation of structures from hazard-prone areas, the retrofitting of existing structures to protect them from future damages; and the development of state or local standards designed to protect buildings from future damages.

Eligibility for funding under the HMGP is limited to state and local governments, certain private nonprofit organizations or institutions that serve a public function, Indian tribes and authorized tribal organizations. These organizations must apply for HMPG project funding on behalf of their citizens. In turn, applicants must work through their state, since the state is responsible for setting priorities for funding and administering the program.

Title: Public Assistance (Infrastructure) Program, Section 406

Agency: Federal Emergency Management Agency

FEMA's Public Assistance Program, through Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, provides funding to local governments following a Presidential Disaster Declaration for mitigation measures in conjunction with the repair of damaged public facilities and infrastructure. The mitigation measures must be related to eligible disaster related damages and must directly reduce the potential for future, similar disaster damages to the eligible facility. These opportunities usually present themselves during the repair/replacement efforts.

Proposed projects must be approved by FEMA prior to funding. They will be evaluated for cost effectiveness, technical feasibility and compliance with statutory, regulatory and executive order requirements. In addition, the evaluation must ensure that the mitigation measures do not negatively impact a facility's operation or risk from another hazard.

Public facilities are operated by state and local governments, Indian tribes or authorized tribal organizations and include:

- | | |
|--|----------------------------------|
| *Roads, bridges & culverts | *Water, power & sanitary systems |
| *Draining & irrigation channels | *Airports & parks |
| *Schools, city halls & other buildings | |

Private nonprofit organizations are groups that own or operate facilities that provide services otherwise performed by a government agency and include, but are not limited to the following:

- | | |
|---------------------------------|---|
| *Universities and other schools | *Power cooperatives & other utilities |
| *Hospitals & clinics | *Custodial care & retirement facilities |
| *Volunteer fire & ambulance | *Museums & community centers |

Title: SBA Disaster Assistance Program

Agency: US Small Business Administration

The SBA Disaster Assistance Program provides low-interest loans to businesses following a Presidential disaster declaration. The loans target businesses to repair or replace uninsured disaster damages to property owned by the business, including real estate, machinery and equipment, inventory and supplies. Businesses of any size are eligible; along with non-profit organizations. SBA loans can be utilized by their recipients to incorporate mitigation techniques into the repair and restoration of their business.

Title: Community Development Block Grants

Agency: US Department of Housing and Urban Development

The Community Development Block Grant (CDBG) program provides grants to local governments for community and economic development projects that primarily benefit low- and moderate-income people. The CDBG program also provides grants for post-disaster hazard mitigation and recovery following a Presidential disaster declaration. Funds can be used for activities such as acquisition, rehabilitation or reconstruction of damaged properties and facilities and for the redevelopment of disaster areas.

Local

Local governments depend upon local property taxes as their primary source of revenue. These taxes are typically used to finance services that must be available and delivered on a routine basis to the general public. If local budgets allow, these funds are used to match Federal or State grant programs when required for large-scale projects.

Non-Governmental

Another potential source of revenue for implementing local mitigation projects are monetary contributions from non-governmental organizations, such as private sector companies, churches, charities, community relief funds, the Red Cross, hospitals, Land Trusts and other non-profit organizations.

APPENDIX

Appendix A - Resolution of Adoption by Jurisdiction

Appendix B - PDM Planning Team Agendas, Sign-in Sheets, and Minutes

Appendix C – Community Meeting Agendas and Sign-in Sheets

Appendix D - Hazard Identification/Vulnerability Worksheets

Appendix E - Township Vulnerable and Potential Mitigation Project Site Maps

Appendix F - Review of 2014 PDM Mitigation Project Implementation

Appendix G – Comprehensive Land Use Maps

Appendix H - References

Appendix A
Resolution of Adoption by Jurisdiction

Brookings County Resolution
Reserved

City of Aurora Resolution
Reserved

City of Brookings Resolution
Reserved

City of Bruce Resolution
Reserved

Town of Bushnell Resolution
Reserved

City of Elkton Resolution
Reserved

Town of Sinai Resolution
Reserved

City of Volga Resolution
Reserved

City of White Resolution
Reserved

Sioux Valley Energy Resolution
Reserved

Appendix B
PDM Planning Team Agendas, Sign-in Sheets, and Minutes

**Brookings County
Pre-disaster Mitigation Plan Kickoff Meeting
12:30 p.m. Wednesday, September 26, 2018
Brookings City & County Government Center
Community Room (Room 300)**

Agenda

- **Introduction of team members**
- **What is mitigation planning**
- **Why is Brookings County updating the Pre-Disaster Mitigation Plan**
- **Review plan components**
- **Review timeline/scope**

Brookings COUNTY PRE-DISASTER MITIGATION PLANNING MEETING

KICKOFF MEETING

September 26, 2018

Name	Organization	Email*
Tom Nealon	1st District	
Luke Matter		
Mark McLaughlin		
Robert Hill	Brookings County EM	rhill@brookingscountysd.gov
Mike Bartley	Brookings Co. Commissioner	mbartley@mcac.org
Quinn Gross	Highway	lgross@brookingscountysd.gov
DARREN HARTMANN	BROOKINGS FIRE	dhartmann@cityofbrookings.org
Randy Santems	City of Volga	rjsantems@gmail.com
Jeremy Hinkle	East Dakota WDD	edward5@brookings.net
Jamison Berroth	City of Volga	jamison@volgacity.com
Dave Erickson	Brookings PD	derickson@brookingsleo.org
Jackie Lanning	City of Brookings	jlaning@cityofbrookings.org
Jayne Trygstad	SDSU	jayne.trygstad@sdstate.edu
Gordon Dekkenga	Brookings Amb Brookings Health System	gdekkenga@brookingshealth.org
Stacy Steffensen	Brookings County	ssteffensen@brookingscountysd.gov

* It is intended to send "draft" documents via email if possible.

Minutes
Brookings County Pre-Disaster Mitigation Plan Team Kick-Off Meeting
September 26, 2018
Brookings City & County Government Center
Community Room (Room 300)
12:30PM

15 individuals were in attendance:

Robert Hill, Brookings County Emergency Management
Mike Bartley, Brookings County Commission
Jackie Lanning, Brookings City Engineering
Darrell Hartmann, Brookings City Fire Department
Dave Erickson, Brookings City Police Department
Jameson Berreth, Volga City Manager
Randy Santema, Volga Mayor
Jayme Trygstad, SDSU
Jeremy Hinke, East Dakota Water Development District
Linda Gross, Brookings County Highway Department
Gordon Dekkanga, Brookings Health System
Stacy Steffensen, Brookings County Staff
Luke Muller, First District
Thomas Nealon, First District
Mark McLaughlin, First District

Brookings County Emergency Management Director Robert Hill welcomed those in attendance and had Team members introduce themselves and what entity they represented. Struwe then introduced Luke Muller, Thomas Nealon, and Mark McLaughlin of the First District Association of Local Governments.

Muller and Nealon provided an overview of what is mitigation planning and why the county is required to update their Pre-Disaster Mitigation (PDM) Plan. Muller also provided a review of the components to be included within the plan (risk assessment, vulnerability, proposed mitigation actions).

Planning Team representatives provided information regarding mitigation activities within their own respective entities. A general review of the existing Pre-Disaster Mitigation Plan started by defining work responsibilities, having the First District doing background and research, and the PDM Team providing oversight and guidelines throughout the process. The timeline and scope of project were reviewed.

Meeting adjourned at 1:10 p.m. Date and time for the next meeting to be scheduled later.

Minutes recorded by Thomas Nealon.

2nd Meeting Agenda

Brookings County Pre-Disaster Mitigation Plan
Mitigation Planning Team Meeting
12:00PM Wednesday February 27, 2019
Brookings City and County Government Center, Room 300

Agenda

- Introduction
- Review of Previous Meetings and Plan Development History
- Review of PDM Preliminary Draft
 - Plan Authority and Purpose
 - Community Profile
 - Plan Process
 - Risk Assessment/Critical Infrastructure
 - Review of Goals and Objectives
 - Project Identification
 - Plan Maintenance
- Questions
- Next Steps in PDM Draft Process

[illegible]

2nd Meeting Minutes

Brookings County Pre-Disaster Mitigation Team Meeting Minutes

February 27, 2019

Brookings City and County Government Center, Room 300

12:00 p.m.

Thirteen team members were in attendance. Team meeting began with introductions.

Thomas Nealon of the First District provided a brief review of previous meetings and plan development activities conducted since the last Team meeting in September 2018.

Nealon provided a summary and review of the draft Brookings County Pre-Disaster Mitigation Plan.

Nealon discussed plan authority and purpose. He provided an overview of the community profile information and information sources. Nealon covered the multi-jurisdictional plan and plan participation requirements. The plan development process was discussed in more detail.

Nealon provided an in-depth discussion of risk assessment and vulnerability in Brookings County. He covered the risk assessments conducted with each community and utility provider. The risk assessment review with those entities dealt with identification of potential hazards, generating a hazard profile, and vulnerability assessment. Nealon discussed vulnerabilities and potential losses in the county. He went over the administrative and technical capabilities within Brookings County.

The Team reviewed and revised goals and objectives of the previous PDM Plan. The Team agreed to incorporate the new goals and objectives into the updated plan.

Goals and Objectives

- Reduce the loss of life, property, infrastructure, critical facilities, cultural resources and impacts from severe weather, flooding and other natural disasters.
- Improve public safety during severe weather, flooding and other natural disasters.
- Improve the County's emergency preparedness, disaster response and recovery capabilities.

Severe Weather, Flooding, Fire and Drought Administration.

Nealon discussed potential mitigation projects throughout the county and communities.

Nealon explained the plan maintenance requires for the next five years.

Discussion and questions occurred during and after the summary process.

Consensus of the Team was to spend more time on individual review of the document and to provide First District staff with any corrections/updates.

Meeting adjourned at 12:35 p.m., with a tentative date of the final meeting to be in March 19, 2019.

Minutes recorded by Thomas Nealon

3rd Meeting Agenda

Brookings County Pre-Disaster Mitigation Plan

Mitigation Planning Team Meeting #3

12:00 p.m. March 19, 2019

Brookings City and County Government Center, Room 300

Agenda

- Final Review of PDM Plan
- Recommendation of Approval and Submission to FEMA

3rd Meeting Sign in Sheet

BROOKINGS COUNTY PRE-DISASTER MITIGATION PLANNING MEETING

3rd PDM Meeting

March 19th, 2019

[illegible]

3rd Meeting Minutes

Brookings County Pre-Disaster Mitigation Team
PDM Meeting #3
March 19, 2019
Brookings City and County Government Center, Room 300
12:00 p.m.

Eleven people were in attendance:

- Nine PDM team members
- Thomas Nealon, First District Association of Local Governments
- Luke Muller, First District Association of Local Governments

Thomas Nealon of First District provided an overview of the changes to the Pre-Disaster Mitigation Plan received since the last meeting. The draft plan was posted on the First District and Brookings County websites on February 15, 2019. Plan discussion and comments were received from those in attendance.

Motion by Bartley, second by Trygstad to approve the final draft of the plan and submit to State of South Dakota and FEMA for their review. Motion passed unanimously.

Nealon reviewed the community and county adoption process after approval by FEMA.

Meeting adjourned at 12:15 p.m.
Minutes recorded by Thomas Nealon

Appendix C

Community Meeting Agendas, Sign-in Sheets, and Minutes

Appendix C includes Agendas, “Sign-in Sheets”, and Minutes from the meetings held at the community level for the Brookings County Pre-Disaster Mitigation Plan. Meetings were held at the regular monthly meetings for the following Towns:

Town	Date
Aurora	December 10, 2018
Brookings	January 8, 2018
Bruce	January 8, 2019
Bushnell	November 5, 2018
Elkton	December 3, 2018
Sinai	December 3, 2018
Volga	December 17, 2018
White	February 4, 2019

At all of the previously described meetings each individual in attendance was asked to identify the probability of each specific hazard's occurrence. Following discussion on each individual hazard, Board members categorized these hazards as high probability to occur, low probability to occur, or unlikely to occur. The result was recorded on a master sheet for each town. Next, each individual in attendance was asked to identify the town's vulnerability to each specific hazard. Following discussion on each individual hazard, Board members classified the town's vulnerability to each hazard as high vulnerability, low vulnerability, or noted that the hazard was not a hazard in the jurisdiction. The result was recorded on a master sheet for each town. Finally, the Town Board was asked to identify critical infrastructure within the community. All master sheets compiled at those meetings can be found in Appendix E. A master infrastructure list was compiled for each town (Table 4.16).

City of Brookings Staff reviewed and completed the information regarding hazards and critical infrastructure. The responses were submitted on a master sheet for the City of Brookings. As with the data gathered from the smaller towns, all responses are included within Appendix E.

First District Association of Local Governments contacted each township requesting the identification of areas most vulnerable to natural hazards (on a map) and return them to the Emergency Management Director or First District. Those maps are included in Appendix F. For townships that did not return the maps it is assumed that they do not perceive any areas to be more vulnerable than others to natural hazards.

Attendance sign-in sheets, agendas, and minutes for each of the above described meetings are included below.

City of Aurora Agenda

CITY OF AURORA MEETING AGENDA

**Regular Council Meeting
Monday, December 10, 2018
6:00 p.m.**

1. Call to Order – Mayor Weekes
2. Approval of Agenda
3. Invitation for citizens to schedule a time on the commissions agenda for an item that it not listed on the agenda.
4. Minutes – November meeting
5. November Financial Reports
6. December Bill
7. 1st Reading - Ordinance 312 - Supplemental
8. Brookings County Pre-Disaster Mitigation Plan Update
9. AEC - Pat Tingle
10. 2018 Meeting Dates
10. Fire Department – Mike Ahartz
11. Maintenance Report – John Muller
 - a.
 - b.
12. Executive Session if needed
13. Adjourn

Next Meeting December 17, 2018 at 6:00 PM

DATE[illegible]

City of Aurora Minutes

The Aurora City Council met in regular session at 6:00 PM on December 10, 2018 at the Little Hall. Present: Mayor Frederick Weekes and Council members Dale Dixon, Jon Geise, Josh Kukrall, and Patrick Peterson.

Meeting was called to order at 6:00 PM by Mayor Fred Weekes.

M/S Peterson, Dixon to approve the Agenda. Carried.

M/S Peterson to approve meeting minutes from November with a clarification of an item. Geise second to approve November meeting minutes. Carried.

M/S Dixon, Geise to approve November Financial Reports. Carried.

M/S Geise, Peterson to approve payment of December Bill listing. Carried.

Appears \$142.24 government building cleaning supplies, Aurora Quick Stop \$808.61 gas, Bowes Construction \$24,759.45 services for road project, Brookings County Hwy Dept. \$31.21 salt/sand, Brookings Municipal Utilities \$6,973.77 water purchase, Brookings Register \$38.70 publishing, CarQuest \$14.37 parts shop, Century Business \$206.48 printer supplies and fees, City of Aurora \$1,737.00 electric, Cook's Wastepaper \$3,710.41 garbage collection, Core & Main \$625.00 supplies, Culligan \$9.50 water cooler, Dakota Pump and Control \$1,744.89 lift station service and parts, Data Technologies \$1,529.89 annual fees, Dept. of Energy \$3,842.59 electric purchase, First Bank and Trust \$139,960.62 electric loan payment, First Bank & Trust Visa \$305.19 supplies/parts, Foerster Supply \$122.60 office supplies, Heartland Power \$58,600.50 ITC \$478.90 phone/internet, Lowes \$371.60 supplies/materials, North Western Energy \$361.90 natural gas, Running's \$33.93 lift station, SD Federal Property \$240.00 supplies, SD State Treasurer \$4,401.33 garbage/electric sales tax, SDFFA \$725.00 fees, SDMEA \$418.00 fees, South Dakota One Call \$45.92 locates, Spilde Electric \$1,562.66 services for electric, Wendy Olson \$1,483.55 FD Retirement.

M/S Geise, Kukrall to approve 1st Reading and Adoption of Ordinance 312 - supplemental. Carried.

Luke Muller with First District was present to present the Brookings County Pre-disaster Mitigation plan updates to the council and the city residents. Mr. Muller asked the council to review the documents add any changes they feel necessary. It was asked to include flooding as a higher risk concern.

Mark Potthast gave the Fire Department report. He reported 1 EMS and 1 Fire call. January 11-12 will be the annual state instructor school. Saturday the 15 of December will be the Santa Claus party.

John Muller gave the maintenance report. The lift station got the needed repairs done. Discussion on the ongoing issues with the lift station and the lagoon.

M/S Geise, Peterson to adjourn. Carried.

Shannon Freng

Finance Officer

Published _____ time(s) at the approximate cost of \$ _____

City of Brookings Agenda

City Council

Meeting Agenda

January 8, 2019

- 3.D. [RES 19-003](#) Action on Resolution 19-003, a Resolution Authorizing the City of Brookings to Amend the Cooperative Fire Suppression Agreement.

Attachments: [Resolution](#)
[Letter](#)
[2019 SDWF Mini Mobilization Guide](#)
[Authority to Sign Appointment 2019](#)
[Cooperative Fire Suppression Agreement](#)
[Cooperative Agreement](#)

- 3.E. [RES 19-008](#) Action on Resolution 19-008, A Resolution Directing Preparation Of The Assessment Roll, Dividing Assessments Into Installments, And Providing For The Collection Thereof For Sanitary Sewer Assessment Project 2018-12SSA, Western Ave. between Martin Blvd. and 20th St. S.

Attachments: [Resolution](#)
[Map](#)

- 3.F. [ID 2019-0022](#) Action on an appointment to the Sustainability Council.

4. Items removed from Consent Agenda.

Action: Motion to Approve, Request Public Comment, Roll Call

5. Open Forum/Presentations/Reports:

5.A. Open Forum.

At this time, any member of the public may request time on the agenda for an item not listed. Items are typically scheduled for the end of the meeting; however, very brief announcements or invitations will be allowed at this time.

5.B. SDSU Student Association Report.

- 5.C. [ID 2019-0005](#) Brookings County / City of Brookings Pre-Disaster Mitigation Plan Update Review

Attachments: [Brookings PDM Worksheets](#)
[Hazard Vulnerability Map](#)
[Mitigation Activities Map](#)

6. Contracts/Change Orders: None

7. Ordinance First Readings:

No vote is taken on the first reading of an Ordinance. The title of the Ordinance is read and the date for the public hearing is announced.

City of Brookings Sign-in Sheet

Brookings County PDM – City of Brookings Meeting

January 8th, 2019 at 6:00 P.M. Brookings City and County Government Center 520 3rd Street, Chambers Room 310 Brookings, SD

Contact Person: Bonnie Foster, BFoster@cityofbrookings.org

Attendance:

Keith Corbett

Mary Kidwiler

Dan Hansen

Holly Tilton Bryne

Nick Wendell

Patty Bacon

Ope Niemeyer

Paul Briseno

Steve Britzman

Shari Thornes

Angie Ritter

Luke Muller

City of Brookings Minutes

Dividing Assessments into Installments, and Providing for the Collection Thereof
for Sanitary Sewer Assessment Project 2018-12SSA,
Western Ave. between Martin Blvd. and 20th St. S.

Be It Resolved by the City Council of the City of Brookings, South Dakota, as follows:

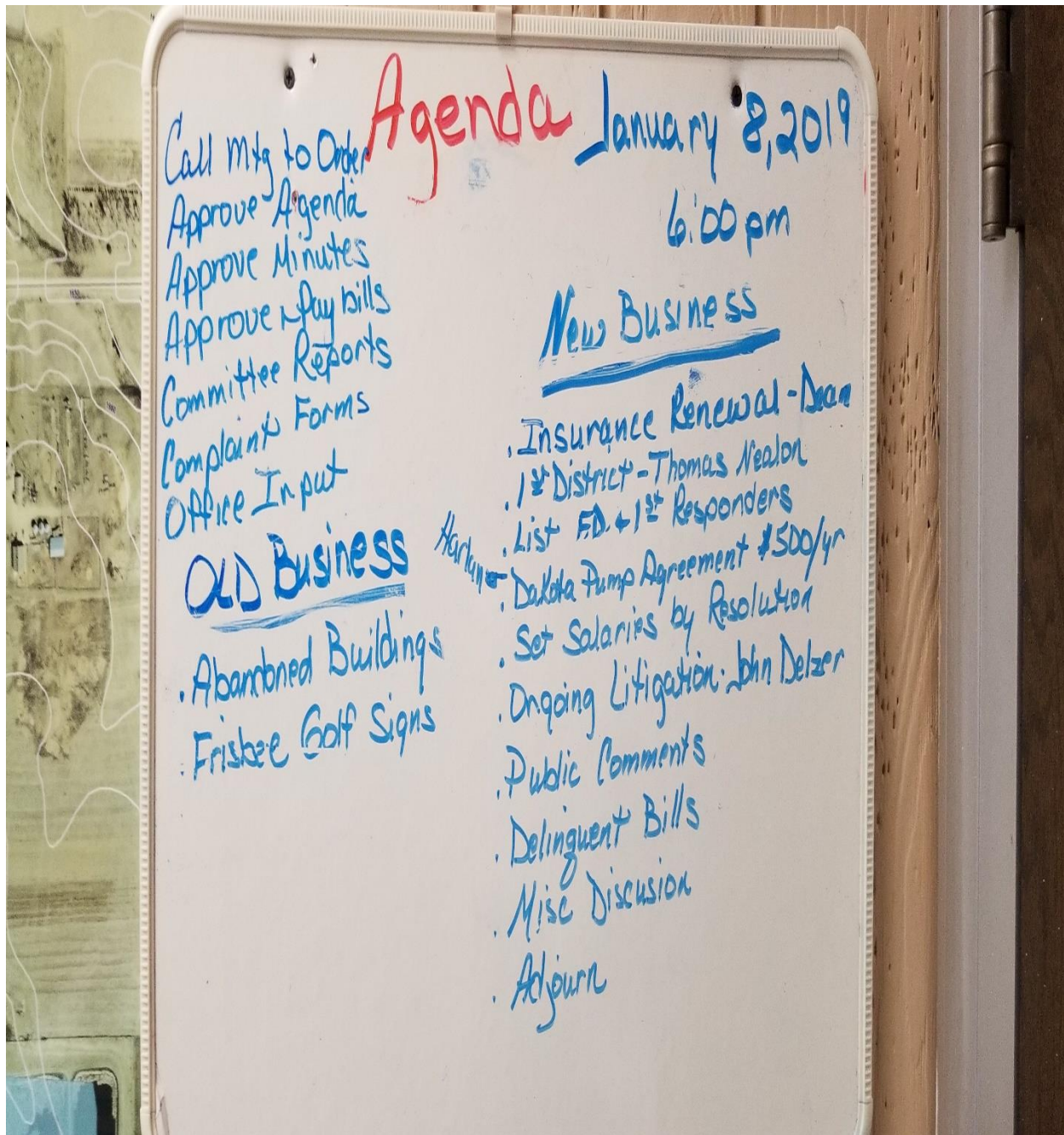
1. More than twenty days have elapsed since the adoption and publication of Resolution of Necessity No. 18-042 for Sanitary Sewer Assessment Project 2018-12SSA. The referendum has not been invoked, and no written protests against the making of said improvement have been filed with the City Manager.
 2. A contract for Sanitary Sewer Assessment Project 2018-12SSA has been duly executed, and the City Council is authorized to levy special assessments pursuant to the provisions of chapter 9-43, SDCL 1967, as amended.
 3. The City Engineer has caused an estimate of the expense of the work to be made and filed in her office showing the total cost of said improvement as follows: Contract price \$33,504.00
 4. The total cost of said improvement shall be paid as follows: Assessable costs \$33,504.00
 5. There shall be made and filed in the office of the City Clerk an assessment roll for said improvement. The costs shall be assessed equally against three assessable lots and tracts of land on the basis of special benefits received upon each lot or tract of land contiguous to the sanitary sewer and receiving said improvement.
 6. The assessment for all properties shall be divided into ten (10) equal annual installments and interest of ten (10) percent per annum shall accrue on the unpaid balance of the assessment.
 7. Unless paid to the City in advance of maturity, the assessments shall be collected by the City Manager in accordance with the procedure for Plan One in Chapter 9-43, SDCL 1967, as amended.
- 3.F. Action on an appointment to the Sustainability Council:** Reappoint Jennifer McLaughlin (term expires 01/01/2022)

Brookings County / City of Brookings Pre-Disaster Mitigation Plan Update

Review. Luke Muller from the First District Association of Local Governments provided an update on the Brookings County/City of Brookings Pre-Disaster Mitigation Plan.

Ordinance 19-001. First Reading was held on Ordinance 19-001, an Ordinance Amending Article II of Chapter 42 of the Code of Ordinance of the City of Brookings, and Pertaining to the Board of Health. Public Hearing: January 22, 2019.

City of Bruce Agenda



City of Bruce Sign-in Sheet

BROOKINGS COUNTY PRE-DISASTER MITIGATION PLANNING MEETING

TOWN OF BRUCE

DATE: 5/108/2019

[illegible]

City of Bruce Minutes

BRUCE CITY COUNCIL MEETING JANUARY 8, 2019

Mayor Jeff Anderson called the Bruce City Council to order on Tuesday, January 8, 2019 at 6:00 p.m. with council members Cook, Edler, Emmett, Hawley, Lewis, Moir, Finance Officer Ribstein, City Maintenance Richard Stokes present. Also attending the meeting were Dean Skoglund and Thomas Nealon.

Motion by Moir and seconded by Lewis to approve the agenda as posted. All present voted in favor of motion. Motion carried.

Motion by Hawley and seconded by Moir to approve the minutes of the December 11th meeting as written. All present voted in favor of motion. Motion carried.

Motion by Moir and seconded by Lewis to approve and pay the following claims presented by the Finance Officer. All present voted in favor of motion. Motion carried.

Insert Bills

Thomas Nealon, 1st District Association of Local Government out of Watertown reviewed with the council their previous Risk Assessment-Hazard Identification Worksheet. Most areas will stay the same as the last assessment but adding the need to update the current generator; emergency siren; lift station auto protection; continue to improve the Cities drainage; replace City Office building to name a few.

Dean Skoglund of Skoglund Insurance Agency reviewed with the Council the 2019-2020 Insurance package. Premium paid with bills was \$13,702.00. Dean has the 2019-2020 Premium at \$15,803.00, an additional cost of \$2,101.00. Motion by Hawley and seconded by Cook to renew the City Insurance with Skoglund Insurance. All present voted in favor of motion. Motion carried.

Motion by Moir and seconded by Cook to approve the following members of the Volunteer Bruce Fire and Rescue for 2019—Josh Diedrich, Harlan Feldhus, Chad Ford, Luke Fredrickson, Ryan Jensen, Justin Kor, Trenton Kor, Denver Kruse, Pennie Lutz, Rob Lutz, Jason Marlette, Bill McCracken, David Novak, Micheala Novak, Jason Oines, Ben Olsen, Colin Pierce, Mike Reitz, Brad Ruden, Levi Smith, Chris Stokes, Larae Stokes, Richard Stokes, Zack Stokes, Shad Vanderwal. All present voted in favor of motion. Motion carried.

Motion by Hawley and seconded by Emmett to accept the 2019 Annual Inspection Agreement with Dakota Pump for the main lift station at \$500.00 per year, paid with the bills. All present voted in favor of motion. Motion carried.

At 7:07 p.m. motion by Lewis and seconded by Cook to go into executive session to discuss wages.

Mayor Anderson declared the council out of executive session at 7:19 p.m.

Motion by Lewis and seconded by Hawley to leave the mayor wage @ \$150.00 per meeting attended, with \$20.00 per phone conference; Council wages @ \$100.00 per meeting attended, with \$20.00 per

Town of Bushnell Agenda

**Town of Bushnell Council Meeting Agenda
November 5, 2018**

Call to Order

Old Business

New Business

Bills

Ordinance #106

Pre-Disaster Mitigation – 1st District

Adjournment

Town of Bushnell Sign-in Sheet

Pre-Disaster Mitigation
Plan Meeting
(Brookings County)
Bushnell, SD
Attendance

Name

Tim Huber

Roger Herrick

Luke Muller

Charlotte Meyer

Beth Jessen

Danitas Fischer

DAVE HUEBNER

Town of Bushnell Minutes

The Bushnell Town Board met in regular session on Monday November 5, 2018, at the Town Hall.
Present: President Dave Huebner and Trustees Beth Jessen and Charlotte Meyer.

M/S Jessen, Meyer to approve agenda. Carried.

M/S Meyer, Jessen to approve minutes of the October 9 meeting. Carried.

M/S Jessen, Meyer to approve the October financial reports. Carried.

M/S Meyer, Jessen to approve payment of November bills. Carried.

Danita Fischer \$83.11 wages, Ottertail Power \$227.57 lighting, SDML \$82.42 annual dues, SD Gov Finance Association \$40.00, T. Huber \$85.00 parks, FB & T Visa \$39.59 flags for park

M/S Jessen, Meyer to approve 1st reading Ordinance 106 – Appropriations. Carried.

Luke Muller from First District was present to discuss the Pre Mitigation Plan for the Town of Bushnell.

M/S Meyer, Jessen to adjourn. Carried.

Danita Fischer

Finance Officer

Published _____ time(s) at the approximate cost of \$ _____

City of Elkton Agenda

Elkton City Council Agenda December 3, 2018

7:00 PM

Roll Call

Pledge of Allegiance

*Approval of Agenda

Approval of Minutes

1. *November 5, 2018 – Regular Meeting Minutes
2. *November 14, 2018 – Special Meeting Minutes

Hearing for SRF Water/Wastewater Projects

Resolution 2018-12.01

Resolution 2018-12.02

Brookings County Pre-Disaster Mitigation update

Citizen Comments

Petitions & Communications

1. Building Permits

City Employee Reports

1. Public Works Supervisor
2. Bar Manager
3. Finance Officer
4. Fire Department
5. Ambulance
6. Library
7. Park & Rec

Financial Reports

1. 2018 Budget Overviews

Committee Reports

Ordinances & Resolution

1. Resolution 2018-12.03 – transfer funds
2. 2019 Budget Supplement Ord. #364 – 2nd reading
3. Ordinance #365 – Golf Carts

Unfinished Business

1. 5 Year plan
2. Concession stand design
3. Council code of Ethics
4. Economic Development
5. City Infrastructure projects
6. Job Descriptions
7. Employee Group Insurance

City of Elkton Sign-in Sheet

Brookings County PDM – City of Elkton Meeting

December 3rd, 2018 at 7:00 P.M. 109 Elk St, Elkton, SD 57026

Contact Person: Susan Schuurman, cityelk@itctel.com

Attendance:

David Landsman

Deanna Lundgren

John Miraglia

Stewart Salzman

Nancy Spiering

Nieema Thasing

Christina Weimer

Dave McMahon

Bill Fargen

Victor Cajiao

Greg Nelson

Jeff McCormick, SPN

Greg Maag, First District

City of Elkton Minutes

Elkton City Council Minutes December 3, 2018

The Elkton City Council meeting was called to order by Mayor David Landsman at 7:00 PM. Council members present were Deanna Lundgren, John Miraglia, Stewart Salzman, Nancy Spiering, Nieema Thasing, and Christina Wiemer. Also in attendance was Dave McMahon, Bill Fargen, Victor Cajiao, Greg Nelson, Jeff McCormick with SPN and Greg Maag with First District.

Motion by Spiering, second by Wiemer to approve the agenda as presented. All in favor – motion carried.

Motion by Lundgren, second by Thasing to approve the November 5, 2018 regular meeting minutes. All in favor – motion carried.

Motion by Spiering, second by Salzman to approve the November 14, 2018 special meeting minutes. All in favor – motion carried.

The council held a hearing for the proposed water and wastewater infrastructure improvements. Jeff McCormick, city engineer took the floor to discuss and answer any questions about the infrastructure replacement project. A water study was conducted and showed 45% of the current water lines are old cast iron in town. The proposed phase #1 project has a total cost of \$5.6 million. Bonds for these projects will be paid back by revenue collected on utility accounts over a 30 year period. Resolution 2018-12.01 was read to approve the submission of the City's application to the DENR for the proposed sewer project. Motion by Salzman, second by Wiemer to approve Resolution 2018-12.01. All in favor – motion carried. Resolution 2018-12.02 was read to approve the submission of the City's application to the DENR for the proposed water project. Motion by Salzman, second by Thasing to approve Resolution 2018-12.02. All in favor – motion carried.

Greg Maag with First District Association of Local Governments reviewed the Brookings County Pre-Disaster Mitigation plan with the council. The council made a few changes to the plan.

During citizen comments Greg Nelson asked if there was an ally behind his property at 903 Elk Street. Nelson also discussed street light placement for additional street lights. The council approved placement of one on North Drive. There was discussion of adding another light on South Elk Street.

A list of building permits issued during 2018 was available for council to review.

Public Works Director, Steve Jensen was on hand to give his report. All but three of the trees in the tree bank have been replanted. A culvert has been dug out on the west side of Cornell Ave to help drain the water from Tim Anderson's pumps. A lift station pump burned out from being jammed with flushable wipes over the weekend. Replacement cost is just under \$3000.00. Liberty septic has been called to vacuum out the sewer system. Stop signs will be placed at Buffalo and 4th Street on the north and south side of streets.

Denise Aldrich, Bar Manager was not in attendance and there was no report.

Finance Officer, Susan Schuurman was on hand and gave her report. Almost caught up on financials in the office. Schuurman will call the auditor to schedule a 2 year audit for 2017 and 2018. Discussion about water and sewer rate increases. Schuurman will continue the 3% water rate increase as allowed by resolution in January. Schuurman proposes a \$0.75 increase to \$4.00 per 1000 gallon usage for sewer rates to become effective January 15, 2019.

There were no reports for the Ambulance or Fire Department.

Town of Sinai Agenda

**Town of Sinai
Town Board Meeting
Agenda
December 3rd, 2018**

**Call to Order
1st District Pre-Disaster Mitigation
Maintenance Items**

**Old Business
New Business
Bills**

Adjournment

Town of Sinai Sign in Sheet

Town of Sinai
Town Board Meeting
December 3, 2018
Pre-Disaster Mitigation Plan Meeting
Attendance

Luke Muller
Gene Weiler

Doyle Johnson Mayor

Donald E. Keolane FO

Hunt Nelson Councilman

Bert McD Councilman

Town of Sinai Minutes

Sinai Town Council Proceedings December 3, 2018

The regular meeting of the Sinai Town Council was held December 3, 2018 at 6:00 pm at the Sinai Fire Hall. The following members were present: Nelson, Johnson, Mitchell and Jacobsma. Gene Wiehr was also present. Read minutes of the October 1, 2018 regular meeting. Minutes approved as read.

Luke Miller from First District was at the meeting to review the disaster mitigation Plan for the city. Went reviewed the plan that was done approximately five years ago and updated as needed. This will be included with the county wide plan.

Reviewed quote for spare sewer pump. The cost for this would be \$7,500. Motion made by Mitchell seconded by Nelson to approve this purchase. Motion carried.

The final price for auto dialer and installation will be \$3,850. This was approved at the last meeting.

Motion by Nelson seconded by Mitchell to approve the payments of the following claims for November- Gene Wiehr \$731.15(wages), Donald Jacobsma \$330.08(wages), SVSW \$917.86(electricity), SD Municipal League \$154.36(dues), Arlington Ins \$100.00(bond), Sinai Coop \$78.69(fuel), Runnings 12.97(supplies).

The next meeting will be held January 7, 2019 at 6:00 pm.
There being no further business the meeting was adjourned.

Donald L Jacobsma
Finance Officer

City of Volga Agenda



City of Volga Council Agenda
12:00 pm, Monday, December 17, 2018
City Hall Conference Room
226 Kasan Avenue, Volga, SD

A. CALL TO ORDER

B. PLEDGE OF ALLEGIANCE

C. ROLL CALL

____ Randy Santema ____ Ken Fideler ____ Jody Havrevold ____ Nichole Hofer
____ Matt Jaquet ____ Kelly VanderWal ____ Doug Wermedal

D. APPROVAL OF AGENDA

E. APPROVAL OF MINUTES

1. December 3, 2018 Regular Meeting Minutes

F. VISITORS, TIMED ITEMS, AND/OR PUBLIC HEARINGS

1. SD District 4 Legislators – Sen. John Wiik, Rep. John Mills, and Rep. Fred Deutsch
2. Greg Maag, 1st District Association of Local Governments – Brookings County Pre-Disaster Mitigation Plan

G. COMMITTEE REPORTS

1. **Community Development**VanderWal & Fideler
 - a. Second reading of Ordinance 2018-08 – Adopting 2018 International Building Codes
 - b. Discussion on Recodification of City Ordinance – Chapters 4, 5, 11, 17, & 18
2. **Public Safety**Havrevold & Wermedal
3. **Electric**Jaquet & Hofer
4. **Public Works**.....Wermedal & VanderWal
5. **Parks, Recreation, and Buildings**Hofer & Havrevold
 - a. Resolution 2018-42 – Blending & Consumption – Watson
 - b. Resolution 2018-43 – Blending & Consumption – Matson
 - c. Resolution 2018-44 – Blending & Consumption – Wozniak
6. **Finance & Economic Development**Fideler & Jaquet
 - a. Resolution 2018-41 – LIIP Grant Approval
 - b. Resolution 2018-45 – Contingency Transfer
 - c. Approve Claims

H. TOPICS FOR FUTURE DISCUSSION

I. PUBLIC COMMENTS (Limited to 5 minutes per citizen. No action will be taken.)

J. ADJOURN

IF YOU REQUIRE ASSISTANCE, ALTERNATIVE FORMATS AND/OR ACCESSIBLE LOCATIONS CONSISTENT WITH THE AMERICANS WITH DISABILITIES ACT, PLEASE CONTACT THE CITY FINANCE OFFICER AT 627-9113 AT LEAST 48 HOURS PRIOR TO THE MEETING.

City of Volga Sign in Sheet

BROOKINGS COUNTY PRE-DISASTER MITIGATION PLANNING MEETING

City of Volga Meeting

Date: December 17, 2018

Name	Organization	Email*
Dave Graeb		dave.graeb@volga1918@gmail.com
Paul Wink	City of Aurora	mayor@2412.com
Josh Kunkall	City of Aurora	josh.kunkall@hotmail.com
Patricia Peterson	City of Aurora	pete9272@gmail.com
Charles Tiltrum	Aurora P&Z	ketiltrum@gmail.com
Kathi Grammer	Volga Tribune	rfdnews@mchsi.com
JOHN MILLS	REP. DISTRICT 4	mills4SD@gmail.com
JOHN WINK	SENATOR DISTRICT 4	winkfor4@gmail.com
Jameson Berrett	City of Volga	jameson@volgacity.com
Doug Wernedzi	City of Volga	doug.wernedzi@volgacity.com
Jody Harrevold	City of Volga	harrevoldj@epic.com
Kenneth Fidler	City of Volga	ken.fidler@usio.com
Randy Santema	City of Volga	rsantema@gmail.com
Kelly VanderWal	City of Volga	Kelly.VanderWal@2412egmail.com
Matt Jaquet	City of Volga	mattJaquet@hotmail.com
Ashley Rentsch	City of Volga	ashley@volgacity.com
Mary Ries	City of Volga	maryr@volgacity.com

* It is intended to send "draft" documents via email if possible.

City of Volga Minutes

MINUTES OF REGULAR MEETING

The City Council of the City of Volga, SD met for a regular meeting Monday, December 17, 2018 at 12:00 PM in the conference room of City Hall; Mayor Randy Santema presiding. Members present: Ken Fideler, Jody Havrevold, Nichole Hofer, Matt Jaquet, Kelly VanderWal, and Doug Wermedal. Also present: City Attorney Steve Britzman, City Administrator Jameson Berreth, Finance Officer Ashley Rentsch, Deputy Finance Officer Mary Ries, District 4 Legislators John Mills, John Wiik, and Fred Deutsch, Luke Muller with First District Association of Local Governments, Aurora Mayor Fred Weekes, Aurora City Council Members Josh Kukral, Patrick Peterson, and Charles Tiltrum, and Kathi Granum with the Volga Tribune.

Following the Pledge of Allegiance, Wermedal made a motion to approve the agenda. Havrevold seconded the motion. All in favor; motion carried.

Havrevold made a motion to approve the December 3, 2018 regular meeting minutes. VanderWal seconded the motion. All in favor; motion carried.

Luke Muller with First District Association of Local Governments appeared before the Council to discuss the Brookings County Pre-Disaster Mitigation Plan, which involves identifying the level of risk associated with potential disasters and City facilities that may be affected. Muller said Volga's plan is being developed in conjunction with the plan for Brookings County. The final report is due in June 2019, and will be brought to the Council for approval in May.

District 4 Legislators John Mills, John Wiik and Fred Deutsch were present to discuss the upcoming legislative session with the Council. Of particular interest is potential legislation regarding an electric service territory freeze. Volga staff and Council, as well as city officials from Aurora, expressed concerns regarding how this freeze would negatively affect future growth, as the municipalities would not generate electric revenue on land currently outside service territory that could be annexed into the municipality due to future residential or economic growth. Electric revenue helps to support services such as street maintenance, snow removal, and fire protection.

Community Development

VanderWal made a motion to approve the second reading of **ORDINANCE NO. 2018-08 AN ORDINANCE AMENDING THE ORDINANCES OF THE CITY OF VOLGA, SOUTH DAKOTA TO UPDATE BUILDING CODES IN THE CITY OF VOLGA, SOUTH DAKOTA**. Hofer seconded the motion. Discussion was held. Berreth stated that Ordinance 2009-01 includes all items specific to the City of Volga, and this simply amends that ordinance to update the edition of the International Building Code to be used. On roll call: Fideler, Yes; Havrevold, Yes; Hofer, Yes; Jaquet, Yes; VanderWal, Yes; Wermedal, Yes. Motion carried. The ordinance reads as follows:

ORDINANCE NO. 2018-08 AN ORDINANCE AMENDING THE ORDINANCES OF THE CITY OF VOLGA, SOUTH DAKOTA TO UPDATE BUILDING CODES IN THE CITY OF VOLGA, SOUTH DAKOTA. BE IT ORDAINED by the Council of the City of Volga, State of South Dakota that Ordinance 2009-01, Section 1 of the City of Volga be amended to read as follows: **I. Adoption of International Building Code** There is adopted by the City of Volga those certain codes known as the 2018 Edition of the International Building Code, the 2018 International Residential Code, the 2018 Edition of the International Mechanical Code, and the 2018 Edition of the International Fire Code, collectively referred to as the "International Building Code", "building code", or "code". In the event of a conflict between the provisions of the International Building Code hereby adopted, and any other provisions of City ordinance, state laws, rules, or regulations of the City of Volga, the provisions of City ordinance, state laws, and the rules and regulations of the City shall prevail. A copy of the above-

City of White Agenda

**City of White
Council Meeting
Agenda
February 4, 2019**

**Call to Order
1st District Pre-Disaster Mitigation**

**Old Business
New Business
Bills**

Adjournment

Ed.

City of White Minutes

The White City Council held it's regular meeting at 7:00 pm at the McKnight Community Hall on Monday, February 5, 2018. City council members present were Hopfinger, Cutler, Westberg, Kelm, Wilts and Mayor Wright. Also present were Finance Officer Raine, Maintenance Dept DeYoung, Kenneth and Becky Goens, Janice and John Kregel, Randy Hanson, Loren McKinney, Jeff Thomsen, Jon and Jodi Ekern, Ralph Engelstad, Mike Glazier, Paul Ekern, Rick Timm and Mary Nosbush.

All motions were unanimous unless otherwise noted. Motion by Westberg, seconded by Wilts to approve the minutes from last meeting. Motion by Westberg seconded by Hopfinger to approve the following bills as presented: SDML Workman's Comp \$3055.00; batteries \$19.57; SD Dept of Ag, \$50.00; First Bank & Trust \$12.00; Cooks Wastepaper & Recycling \$1917.40; Western Area Power \$3037.23; Post Office \$280.00; SDRS \$42.88; Heartland Power \$32,157.41; Hillyard \$191.70; US Post Office \$56.00; SDPAA \$13,380.91; Itc, Inc \$266.82; Itc, Inc \$52.02; AT & T \$54.36; SDAT&T \$311.25; Wright, Arlen \$36.00; SD Water & Wastewater \$10.00; B&B Auto Service \$69.66; Appeara \$45.00; Office Peeps, Inc \$24.18; Running's \$60.74; Omni-Pro Software \$2800.00; Brkgs Municipal Utilities \$224.49; Anderson Oil, Inc \$1,149.22; Lowary, Anita \$675.00; Mary Raine \$94.28; Midwest Pest Control \$85.00; BDRW \$2,387.15; cleaning wages \$398.75; finance dept wages \$3517.50; cleaning hall \$352.50; Maint. Dept \$3325.19; council and mayor wages \$1735.00.

Randy Hanson gave an update on progress of Farmstead. Mike Glazier and Ralph Engelstad presented what they wanted to due with their development Prairie Ridge Addition. After presenting to the council, some inputs from residents, they changed the lot sizes and will adopt the same covenants of the addition closest to them. Once the covenants are registered with the register of deed, the council will than vote on plotting of the addition. Dan DeYoung, Maint. Dept. gave his report. Finance Officer Raine gave her report. Delinquent utility bills were presented, motion by Wilts seconded by Kelm to send disconnection notice to those indicated. Council moved into executive session at 9:01 pm. Council came out of executive session at 9:40 pm. Motion by Wilts, seconded by Kelm to adjourn.

Terry Wright
Mayor
Mary Raine
Finance Officer

Appendix D - Hazard Identification/Vulnerability Worksheets

Appendix D includes master worksheets for Hazard Identification and Vulnerability for jurisdictions compiled as described in Appendix C. Lists were gathered by the City of Brookings and Brookings County Staff for their respective entities and at meetings for the other communities as described below:

Entity	Date
Aurora	December 10, 2018
Brookings	January 8, 2019
Bruce	January 8, 2019
Bushnell	November 5, 2018
Elkton	December 3, 2018
Sinai	December 3, 2018
Volga	December 17, 2018
White	February 4, 2019

Master worksheets for Hazard Identification and Vulnerability for jurisdictions below. The probability of each hazard event differs from each community and overall county area based upon the local governing body opinions of the probability of an event occurring. Appendix D represents a subjective analysis of opinions regarding hazard identification and vulnerabilities by residents of the communities. The empirical data regarding probability of hazards is discussed in the hazard profile in Chapter 4. Overall, based upon the topography and similar weather patterns in the county the probability of future occurrences is expected to be the same across Brookings County.

City of Aurora

City of Aurora PDM Worksheet #1 (PDM Team) Risk Assessment Worksheet – Hazard Identification

What is the probability of occurrence of the following hazards?

Hazard	High Probability to Occur (At least once in a year)	Low Probability to Occur (Hazards that may have occurred in the past or could occur in the future but do not occur on a yearly basis)	Unlikely to Occur (Hazards or disasters that have never occurred in the area before and are unlikely to occur)
Dam Failure			X
Drought		X	
Earthquake			X
Extreme Cold	X		
Extreme Heat	X		
Flood		X	
Freezing Rain/Sleet/Ice	X		
Hail	X		
Heavy Rain	X		
Heavy Snow	X		
Ice Jam			X
Landslide			X
Lightning	X		
Rapid Snow Melt		X	
Strong Winds	X		
Subsidence			X
Thunderstorm	X		
Tornado		X	
Urban Fire		X	
Wild Fire		X	

**City of Aurora PDM
Worksheet #2 (PDM Team)
Risk Assessment Worksheet – Hazard Vulnerability**

How vulnerable is the community from the following hazard? In other words if the hazard occurs is there a potential to impact the community? If so, what would be impacted?

Hazard	High Vulnerability Significant risk/major damage potential (for example, destructive, damage to more than 10% of the jurisdiction and/or regular occurrence)	Medium Vulnerability Moderate damage potential (causing partial damage to 5-10% of the jurisdiction, and irregular occurrence)	Low Vulnerability Little damage potential (minor damage to less than 5% of the jurisdiction)	NA Not a hazard to the jurisdiction
Dam Failure				X
Drought		X		
Earthquake				X
Extreme Cold		X		
Extreme Heat		X		
Flood			X	
Freezing Rain/Sleet/Ice			X	
Hail		X		
Heavy Rain			X	
Heavy Snow			X	
Ice Jam				X
Landslide				X
Lightning		X		
Rapid Snow Melt			X	
Strong Winds	X			
Subsidence				X
Thunderstorm		X		
Tornado	X			
Urban Fire		X		
Wild Fire		X		

City of Brookings

City of Brookings PDM Worksheet #1 (PDM Team) Risk Assessment Worksheet – Hazard Identification

What is the probability of occurrence of the following hazards?

Hazard	High Probability to Occur (At least once in a year)	Low Probability to Occur (Hazards that may have occurred in the past or could occur in the future but do not occur on a yearly basis)	Unlikely to Occur (Hazards or disasters that have never occurred in the area before and are unlikely to occur)
Dam Failure			X
Drought		X	
Earthquake	X		X
Extreme Cold	X		
Extreme Heat	X		
Flood	X		
Freezing Rain/Sleet/Ice	X		
Hail	X		
Heavy Rain	X		
Heavy Snow	X		
Ice Jam		X	
Landslide			X
Lightning	X		
Rapid Snow Melt		X	
Strong Winds	X		
Subsidence			X
Thunderstorm	X		
Tornado		X	
Urban Fire	X		
Wild Fire		X	

**City of Brookings PDM
Worksheet #2 (PDM Team)
Risk Assessment Worksheet – Hazard Vulnerability**

How vulnerable is the community from the following hazard? In other words if the hazard occurs is there a potential to impact the community? If so, what would be impacted?

Hazard	High Vulnerability Significant risk/major damage potential (for example, destructive, damage to more than 10% of the jurisdiction and/or regular occurrence)	Medium Vulnerability Moderate damage potential (causing partial damage to 5-10% of the jurisdiction, and irregular occurrence)	Low Vulnerability Little damage potential (minor damage to less than 5% of the jurisdiction)	NA Not a hazard to the jurisdiction
Dam Failure				X
Drought	X			
Earthquake				X
Extreme Cold			X	
Extreme Heat			X	
Flood		X		
Freezing Rain/Sleet/Ice			X	
Hail			X	
Heavy Rain		X		
Heavy Snow			X	
Ice Jam			X	
Landslide				X
Lightning			X	
Rapid Snow Melt		X		
Strong Winds			X	
Subsidence				X
Thunderstorm			X	
Tornado	X			
Urban Fire			X	
Wild Fire			X	

Handwritten note:
Hazardous to health

City of Bruce

Brookings County PDM Worksheet #1 City of Bruce Risk Assessment Worksheet – Hazard Identification

What is the probability of occurrence of the following hazards?

Hazard	High Probability to Occur (At least once in a year)	Low Probability to Occur (Hazards that may have occurred in the past or could occur in the future but do not occur on a yearly basis)	Unlikely to Occur (Hazards or disasters that have never occurred in the area before and are unlikely to occur)
Dam Failure			X
Drought		X	
Earthquake			X
Extreme Cold	X		
Extreme Heat	X		
Flood		X	
Freezing Rain/Sleet/Ice	X		
Hail	X		
Heavy Rain	X		
Heavy Snow	X		
Ice Jam		X	
Landslide			X
Lightning	X		
Rapid Snow Melt		X	
Strong Winds	X		
Subsidence			X
Thunderstorm	X		
Tornado		X	
Urban Fire		X	
Wild Fire		X	

Brookings County PDM
Worksheet #2 City of Brule
Risk Assessment Worksheet – Hazard Vulnerability

How vulnerable is the community from the following hazard? In other words if the hazard occurs is there a potential to impact the community? If so, what would be impacted?

Hazard	High Vulnerability Significant risk/major damage potential (for example, destructive, damage to more than 10% of the jurisdiction and/or regular occurrence)	Medium Vulnerability Moderate damage potential (causing partial damage to 5-10% of the jurisdiction, and irregular occurrence)	Low Vulnerability Little damage potential (minor damage to less than 5% of the jurisdiction)	NA Not a hazard to the jurisdiction
Dam Failure				X
Drought			X	
Earthquake				X
Extreme Cold			X	
Extreme Heat			X	
Flood	X			
Freezing Rain/Sleet/Ice			X	
Hail			X	
Heavy Rain		X		
Heavy Snow			X	
Ice Jam			X	
Landslide				X
Lightning			X	
Rapid Snow Melt			X	
Strong Winds		X		
Subsidence				X
Thunderstorm			X	
Tornado	X			
Urban Fire			X	
Wild Fire		X		

Town of Bushnell

Brookings County PDM Worksheet #1 Town of Bushnell Risk Assessment Worksheet – Hazard Identification

What is the probability of occurrence of the following hazards?

Hazard	High Probability to Occur (At least once in a year)	Low Probability to Occur (Hazards that may have occurred in the past or could occur in the future but do not occur on a yearly basis)	Unlikely to Occur (Hazards or disasters that have never occurred in the area before and are unlikely to occur)
Dam Failure			X
Drought		X	
Earthquake			X
Extreme Cold	X		
Extreme Heat	X		
Flood		X	
Freezing Rain/Sleet/Ice	X		
Hail	X		
Heavy Rain	X		
Heavy Snow	X		
Ice Jam			X
Landslide			X
Lightning	X		
Rapid Snow Melt		X	
Strong Winds	X		
Subsidence			X
Thunderstorm	X		
Tornado		X	
Urban Fire		X	
Wild Fire		X	

Brookings County PDM
Worksheet #2 Town of Bushnell
Risk Assessment Worksheet – Hazard Vulnerability

How vulnerable is the community from the following hazard? In other words if the hazard occurs is there a potential to impact the community? If so, what would be impacted?

Hazard	High Vulnerability Significant risk/major damage potential (for example, destructive, damage to more than 10% of the jurisdiction and/or regular occurrence)	Medium Vulnerability Moderate damage potential (causing partial damage to 5- 10% of the jurisdiction, and irregular occurrence)	Low Vulnerability Little damage potential (minor damage to less than 5% of the jurisdiction)	NA Not a hazard to the jurisdiction
Dam Failure				X
Drought		X		
Earthquake				X
Extreme Cold		X		
Extreme Heat			X	
Flood				X
Freezing Rain/Sleet/Ice	X			
Hail		X		
Heavy Rain			X	
Heavy Snow	X			
Ice Jam				X
Landslide				X
Lightning			X	
Rapid Snow Melt				X
Strong Winds	X			
Subsidence				
Thunderstorm				X
Tornado	X			
Urban Fire	X			
Wild Fire	X			

City of Elkton

Brookings County PDM Worksheet #1 City of Elkton Risk Assessment Worksheet – Hazard Identification

What is the probability of occurrence of the following hazards?

Hazard	High Probability to Occur (At least once in a year)	Low Probability to Occur (Hazards that may have occurred in the past or could occur in the future but do not occur on a yearly basis)	Unlikely to Occur (Hazards or disasters that have never occurred in the area before and are unlikely to occur)
Dam Failure			X
Drought		X	
Earthquake			X
Extreme Cold	X		
Extreme Heat	X		
Flood		X	
Freezing Rain/Sleet/Ice	X		
Hail	X		
Heavy Rain	X		
Heavy Snow	X		
Ice Jam		X	
Landslide			X
Lightning	X		
Rapid Snow Melt		X	
Strong Winds	X		
Subsidence			X
Thunderstorm	X		
Tornado		X	
Urban Fire		X	
Wild Fire		X	

Brookings County PDM
Worksheet #2 City of Elkton
Risk Assessment Worksheet – Hazard Vulnerability

How vulnerable is the community from the following hazard? In other words if the hazard occurs is there a potential to impact the community? If so, what would be impacted?

Hazard	High Vulnerability Significant risk/major damage potential (for example, destructive, damage to more than 10% of the jurisdiction and/or regular occurrence)	Medium Vulnerability Moderate damage potential (causing partial damage to 5-10% of the jurisdiction, and irregular occurrence)	Low Vulnerability Little damage potential (minor damage to less than 5% of the jurisdiction)	NA Not a hazard to the jurisdiction
Dam Failure				X
Drought				X
Earthquake	X			
Extreme Cold	X			
Extreme Heat	X			
Flood				X
Freezing Rain/Sleet/Ice	X			
Hail		X		
Heavy Rain		X		
Heavy Snow		X		
Ice Jam				X
Landslide				X
Lightning			X	
Rapid Snow Melt			X	
Strong Winds	X			
Subsidence				X
Thunderstorm		X		
Tornado	X			
Urban Fire			X	
Wild Fire			X	

Town of Sinai

Brookings County PDM Worksheet #1 Town of Sinai Risk Assessment Worksheet – Hazard Identification

What is the probability of occurrence of the following hazards?

Hazard	High Probability to Occur (At least once in a year)	Low Probability to Occur (Hazards that may have occurred in the past or could occur in the future but do not occur on a yearly basis)	Unlikely to Occur (Hazards or disasters that have never occurred in the area before and are unlikely to occur)
Dam Failure			X
Drought		X	
Earthquake			X
Extreme Cold	X		
Extreme Heat	X		
Flood		X	
Freezing Rain/Sleet/Ice	X		
Hail	X		
Heavy Rain	X		
Heavy Snow	X		
Ice Jam			X
Landslide			X
Lightning	X		
Rapid Snow Melt		X	
Strong Winds	X		
Subsidence			X
Thunderstorm	X		
Tornado		X	
Urban Fire		X	
Wild Fire		X	

Brookings County PDM
Worksheet #2 Town of Sini
Risk Assessment Worksheet – Hazard Vulnerability

How vulnerable is the community from the following hazard? In other words if the hazard occurs is there a potential to impact the community? If so, what would be impacted?

Hazard	High Vulnerability Significant risk/major damage potential (for example, destructive, damage to more than 10% of the jurisdiction and/or regular occurrence)	Medium Vulnerability Moderate damage potential (causing partial damage to 5- 10% of the jurisdiction, and irregular occurrence)	Low Vulnerability Little damage potential (minor damage to less than 5% of the jurisdiction)	NA Not a hazard to the jurisdiction
Dam Failure				X
Drought			X	
Earthquake				X
Extreme Cold			X	
Extreme Heat			X	
Flood			X	
Freezing Rain/Sleet/Ice	X			
Hail		X		
Heavy Rain			X	
Heavy Snow			X	
Ice Jam				X
Landslide				X
Lightning			X	
Rapid Snow Melt			X	
Strong Winds	X			
Subsidence				X
Thunderstorm			X	
Tornado	X			
Urban Fire	X			
Wild Fire				X

City of Volga

**Brookings County PDM
Worksheet #1 City of Volga
Risk Assessment Worksheet – Hazard Identification**

What is the probability of occurrence of the following hazards?

Hazard	High Probability to Occur (At least once in a year)	Low Probability to Occur (Hazards that may have occurred in the past or could occur in the future but do not occur on a yearly basis)	Unlikely to Occur (Hazards or disasters that have never occurred in the area before and are unlikely to occur)
Dam Failure			X
Drought		X	
Earthquake			X
Extreme Cold	X		
Extreme Heat	X		
Flood		X	
Freezing Rain/Sleet/Ice	X		
Hail	X		
Heavy Rain	X		
Heavy Snow	X		
Ice Jam			X
Landslide			X
Lightning			X
Rapid Snow Melt	X		
Strong Winds	X		
Subsidence			X
Thunderstorm		X	
Tornado		X	
Urban Fire		X	
Wild Fire		X	

Brookings County PDM
Worksheet #2 City of Volga
Risk Assessment Worksheet – Hazard Vulnerability

How vulnerable is the community from the following hazard? In other words if the hazard occurs is there a potential to impact the community? If so, what would be impacted?

Hazard	High Vulnerability Significant risk/major damage potential (for example, destructive, damage to more than 10% of the jurisdiction and/or regular occurrence)	Medium Vulnerability Moderate damage potential (causing partial damage to 5-10% of the jurisdiction, and irregular occurrence)	Low Vulnerability Little damage potential (minor damage to less than 5% of the jurisdiction)	NA Not a hazard to the jurisdiction
Dam Failure				X
Drought			X	
Earthquake				X
Extreme Cold		X		
Extreme Heat		X		
Flood			X	
Freezing Rain/Sleet/Ice		X		
Hail		X		
Heavy Rain		X		
Heavy Snow		X		
Ice Jam				X
Landslide				X
Lightning			X	
Rapid Snow Melt			X	
Strong Winds		X		
Subsidence				X
Thunderstorm	X		X	
Tornado	X			
Urban Fire			X	
Wild Fire			X	

City of White

Brookings County PDM Worksheet #1 City of White Risk Assessment Worksheet – Hazard Identification

What is the probability of occurrence of the following hazards?

Hazard	High Probability to Occur (At least once in a year)	Low Probability to Occur (Hazards that may have occurred in the past or could occur in the future but do not occur on a yearly basis)	Unlikely to Occur (Hazards or disasters that have never occurred in the area before and are unlikely to occur)
Dam Failure			X
Drought		X	
Earthquake			X
Extreme Cold	X		
Extreme Heat	X		
Flood		X	
Freezing Rain/Sleet/Ice	X		
Hail	X		
Heavy Rain	X		
Heavy Snow	X		
Ice Jam			X
Landslide			X
Lightning	X		
Rapid Snow Melt		X	
Strong Winds	X		
Subsidence			X
Thunderstorm	X		
Tornado		X	
Urban Fire		X	
Wild Fire		X	

Brookings County PDM
Worksheet #2 *City of White*
Risk Assessment Worksheet – Hazard Vulnerability

How vulnerable is the community from the following hazard? In other words if the hazard occurs is there a potential to impact the community? If so, what would be impacted?

Hazard	High Vulnerability Significant risk/major damage potential (for example, destructive, damage to more than 10% of the jurisdiction and/or regular occurrence)	Medium Vulnerability Moderate damage potential (causing partial damage to 5-10% of the jurisdiction, and irregular occurrence)	Low Vulnerability Little damage potential (minor damage to less than 5% of the jurisdiction)	NA Not a hazard to the jurisdiction
Dam Failure				X
Drought		X		
Earthquake				X
Extreme Cold		X		
Extreme Heat			X	
Flood				X
Freezing Rain/Sleet/Ice	X			
Hail		X		
Heavy Rain			X	
Heavy Snow	X			
Ice Jam				X
Landslide				X
Lightning			X	
Rapid Snow Melt				X
Strong Winds	X			
Subsidence				X
Thunderstorm			X	
Tornado	X			
Urban Fire	X			
Wild Fire	X			

Sioux Valley Energy
Brookings County PDM
Worksheet #1 (Sioux Valley Energy)
Risk Assessment Worksheet – Hazard Identification

What is the probability of occurrence of the following hazards?

Hazard	High Probability to Occur (At least once in a year)	Low Probability to Occur (Hazards that may have occurred in the past or could occur in the future but do not occur on a yearly basis)	Unlikely to Occur (Hazards or disasters that have never occurred in the area before and are unlikely to occur)
Dam Failure			X
Drought		X	
Earthquake			X
Extreme Cold	X		
Extreme Heat	X		
Flood	X		
Freezing Rain/Sleet/Ice	X		
Hail	X		
Heavy Rain	X		
Heavy Snow	X		
Ice Jam		X	
Landslide			X
Lightning	X		
Rapid Snow Melt		X	
Strong Winds	X		
Subsidence			X
Thunderstorm	X		
Tornado	X		
Urban Fire		X	
Wild Fire		X	

**Brookings County PDM
Worksheet #2 (Sioux Valley Energy)
Risk Assessment Worksheet – Hazard Vulnerability**

How vulnerable is the community from the following hazard? In other words if the hazard occurs is there a potential to impact the community? If so, what would be impacted?

Hazard	High Vulnerability Significant risk/major damage potential (for example, destructive, damage to more than 10% of the jurisdiction and/or regular occurrence)	Medium Vulnerability Moderate damage potential (causing partial damage to 5-10% of the jurisdiction, and irregular occurrence)	Low Vulnerability Little damage potential (minor damage to less than 5% of the jurisdiction)	NA Not a hazard to the jurisdiction
Dam Failure				X
Drought				X
Earthquake				X
Extreme Cold			X	
Extreme Heat			X	
Flood			X	
Freezing Rain/Sleet/Ice	X			
Hail			X	
Heavy Rain			X	
Heavy Snow			X	
Ice Jam			X	
Landslide				X
Lightning			X	
Rapid Snow Melt			X	
Strong Winds		X		
Subsidence				X
Thunderstorm		X		
Tornado		X		
Urban Fire			X	
Wild Fire		X		

Appendix E

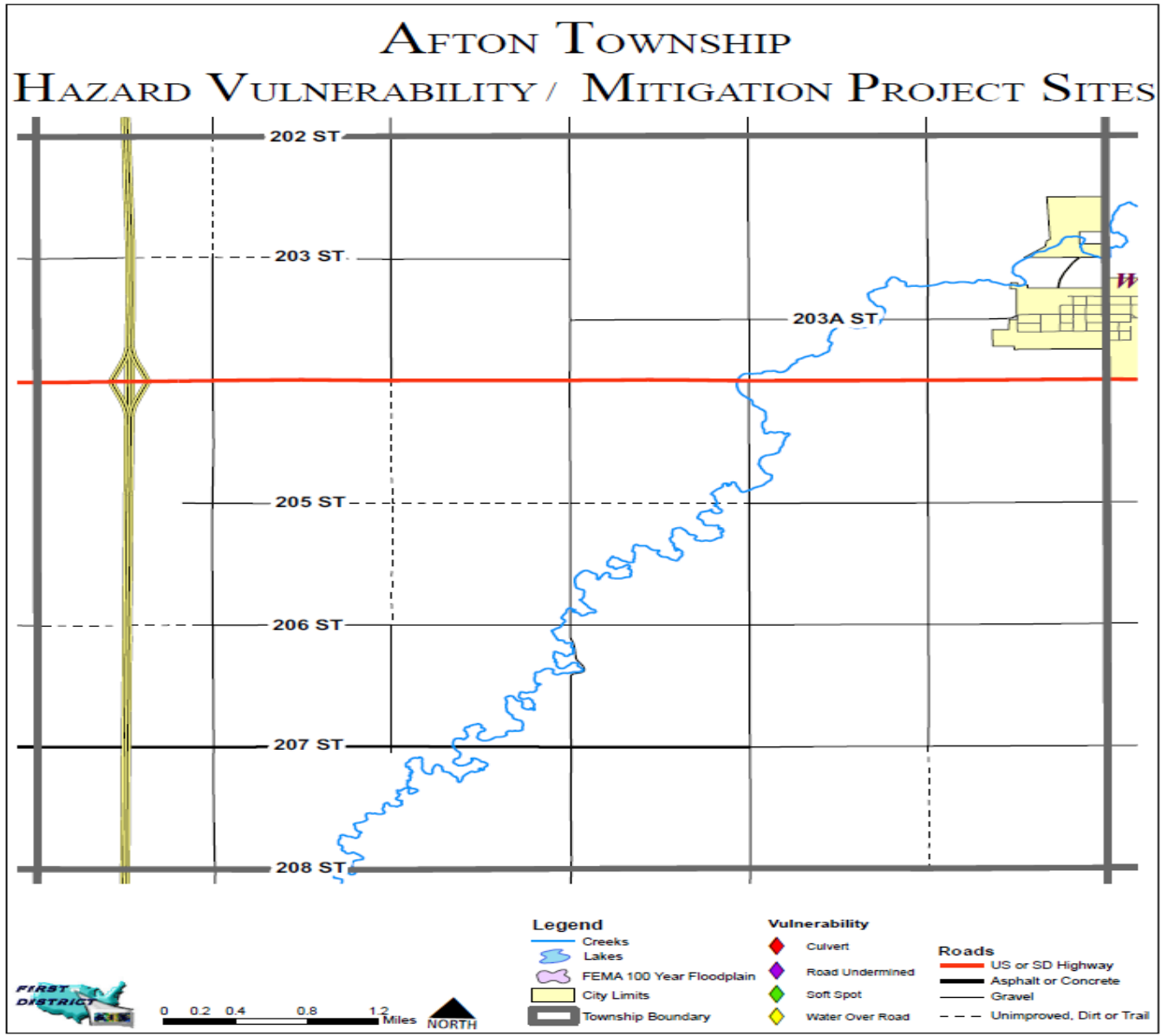
Township Vulnerable and Potential Mitigation Project Site Maps

In October of 2018 First District mailed a request to the Township Clerk or Road Supervisor of every township in Brookings County. They were requested to list any critical infrastructure and identify (on a map) any areas which are most vulnerable to natural hazards, specifically flooding. It was assumed that any townships which did not respond to the information request had no critical infrastructure or vulnerable areas which may require mitigation activities. Of the 23 requests sent, ten were returned with vulnerable areas identified (see table below).

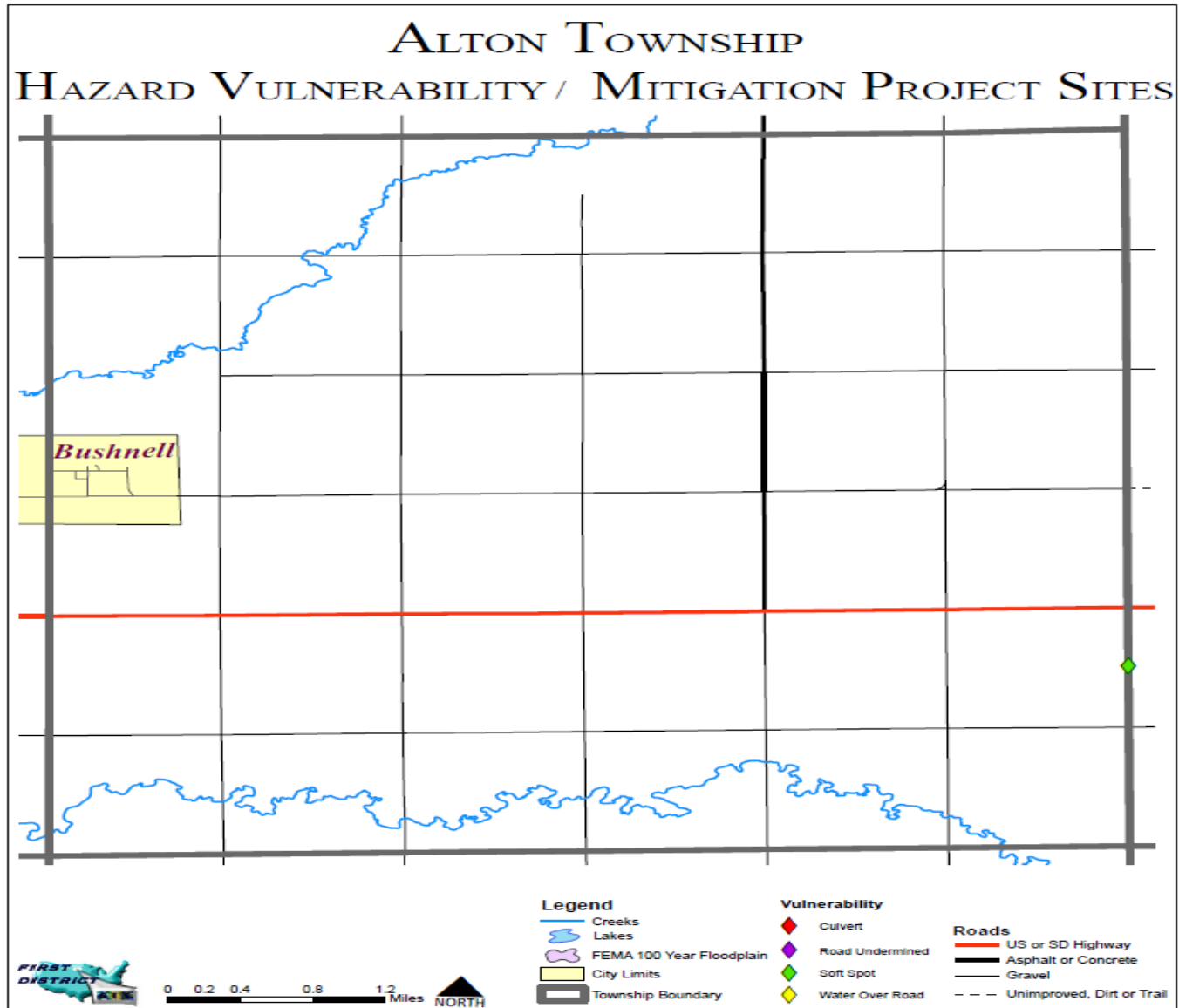
<u>Township Name</u>	<u>Response</u>
Afton Township	Not returned/ No vulnerabilities
Alton Township	Not returned/ No vulnerabilities
Argo Township	Identified vulnerabilities
Aurora Township	Identified vulnerabilities
Bangor Township	Not returned/ No vulnerabilities
Brookings Township	Identified vulnerabilities
Elkton Township	Identified vulnerabilities
Eureka Township	Identified vulnerabilities
Lake Hendricks Township	Not returned/ No vulnerabilities
Lake Sinai Township	Identified vulnerabilities
Laketon Township	Not returned/ No vulnerabilities
Medary Township	Not returned/ No vulnerabilities
Oaklake Township	Not returned/ No vulnerabilities
Oakwood Township	Not returned/ No vulnerabilities
Oslo Township	Not returned/ No vulnerabilities
Parnell Township	Not returned/ No vulnerabilities
Preston Township	Not returned/ No vulnerabilities
Richland Township	Not returned/ No vulnerabilities
Sherman Township	Identified vulnerabilities
Sterling Township	Identified vulnerabilities
Trenton Township	Identified vulnerabilities
Volga Township	Identified vulnerabilities
Winsor Township	Not returned/ No vulnerabilities

Maps identifying vulnerable areas for those townships which identified such areas are shown below. Townships with no returned information are represented by 2014 PDM Maps

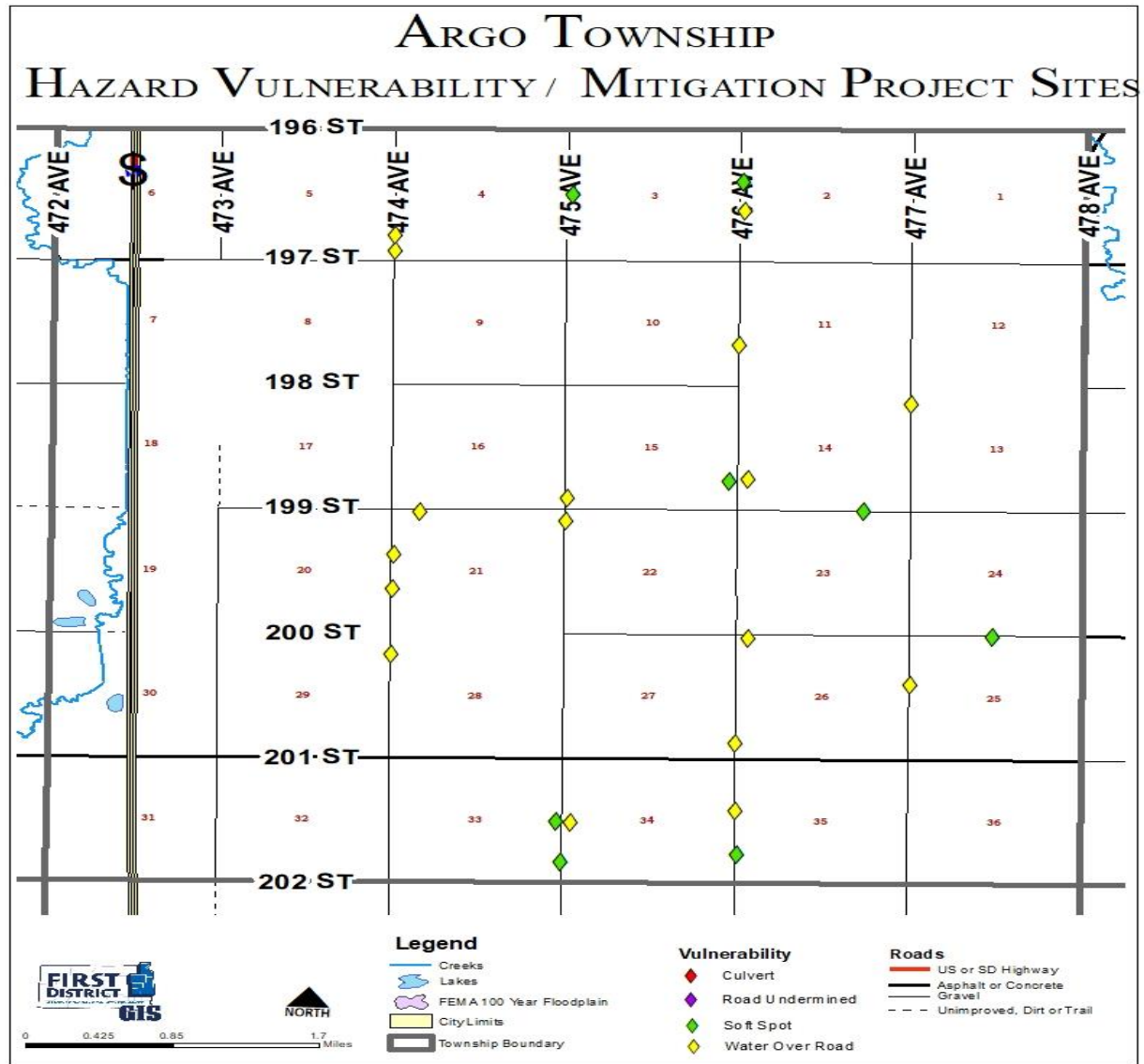
Afton Township



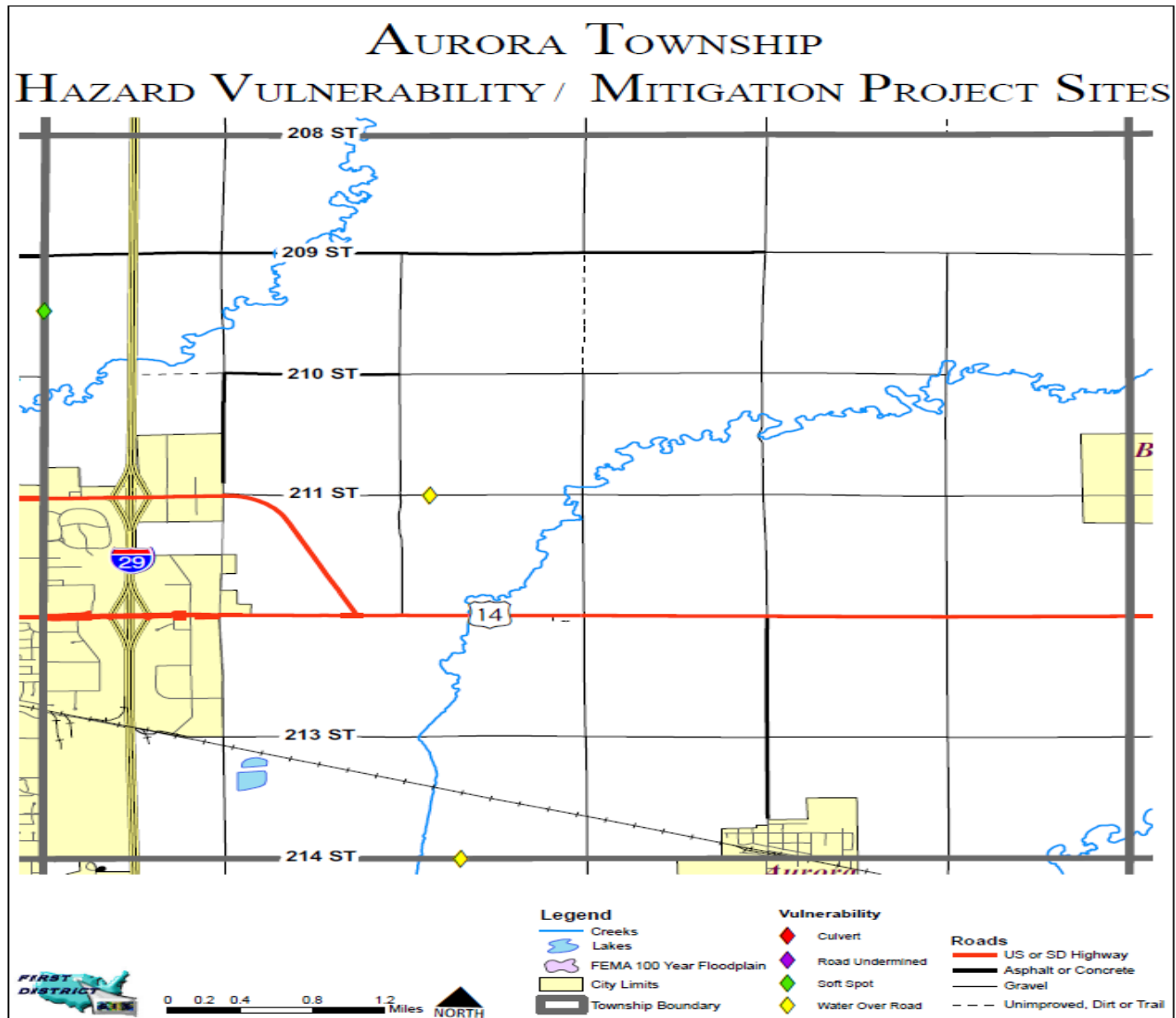
Alton Township



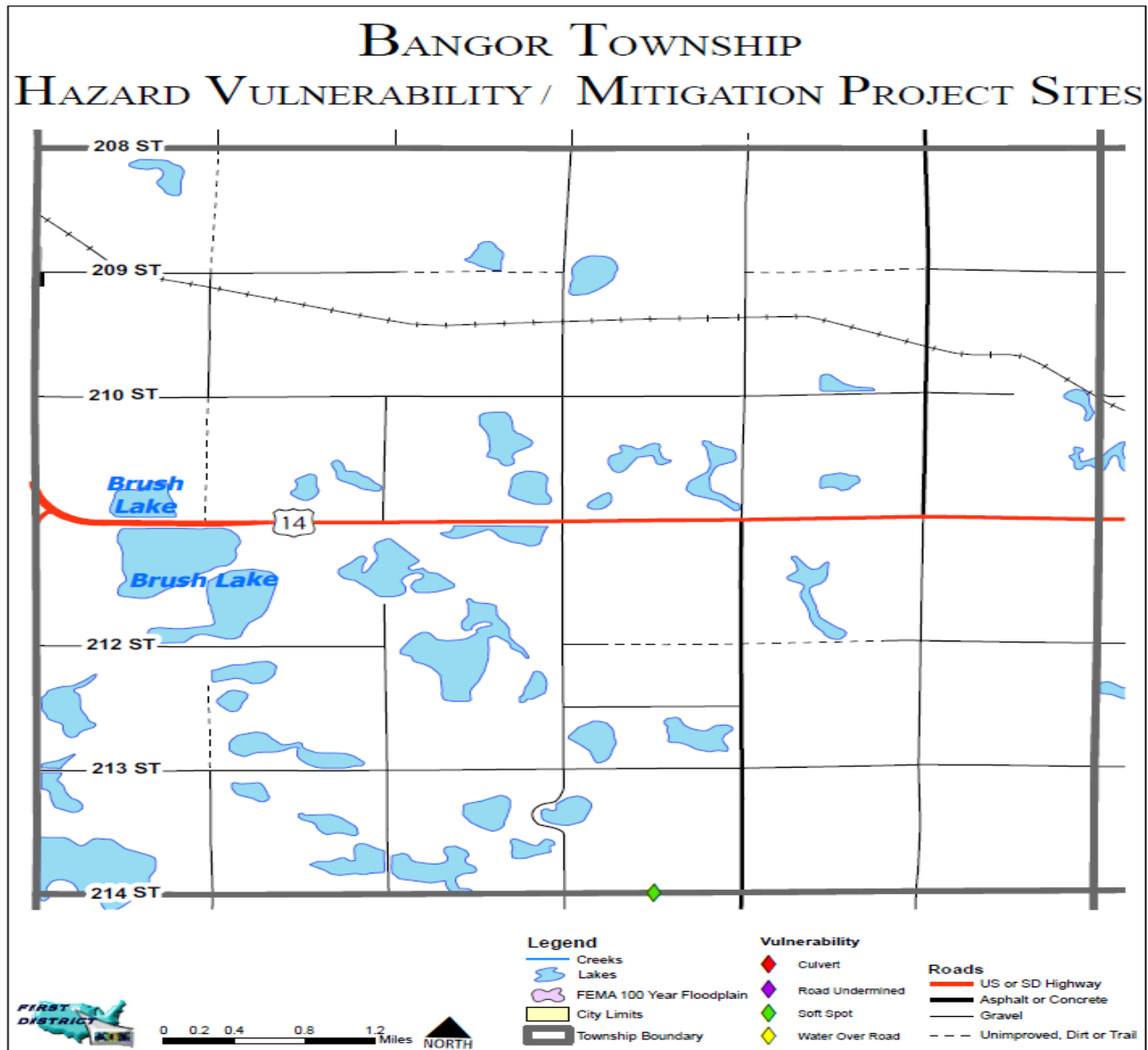
Argo Township



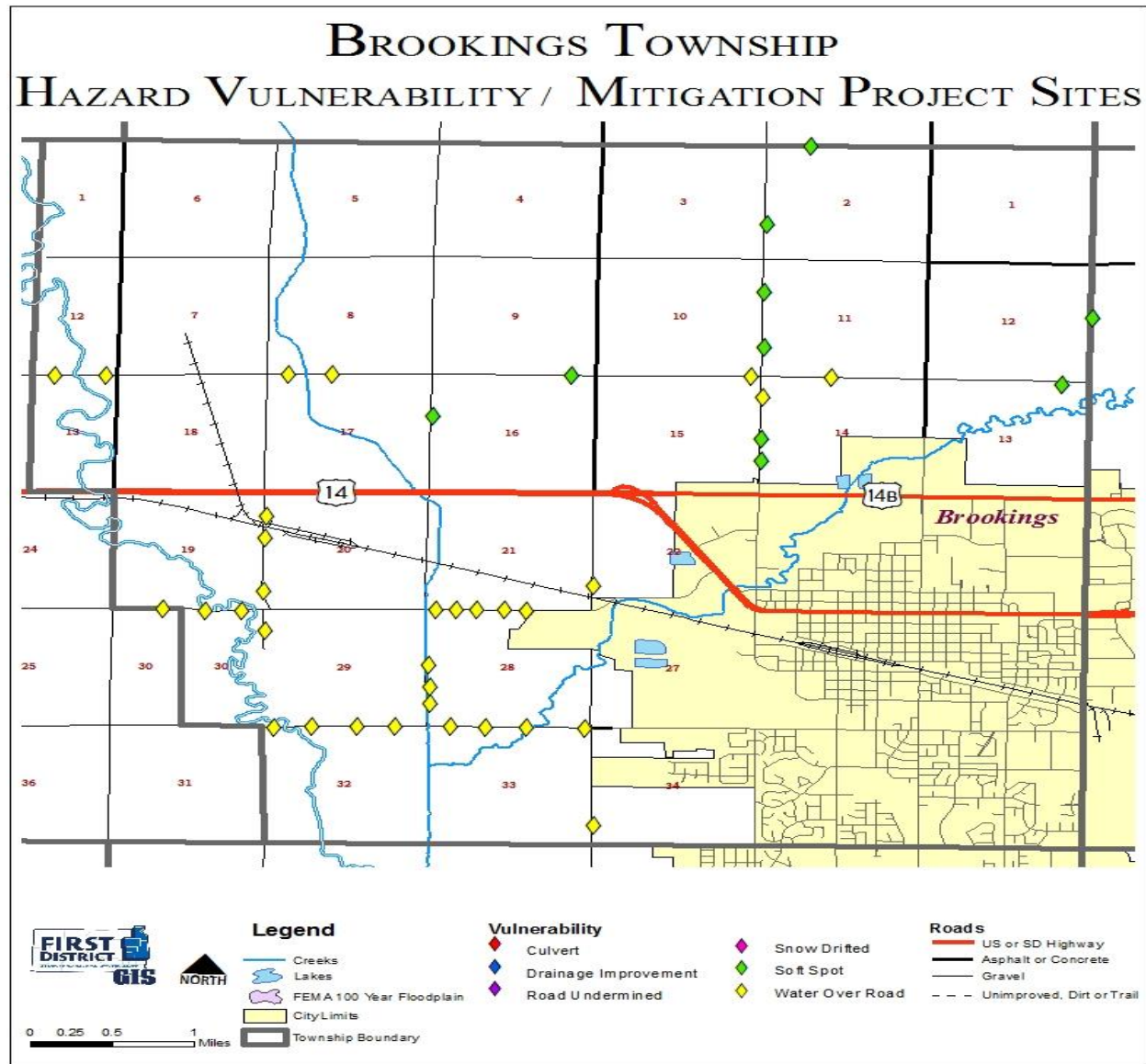
Aurora Township



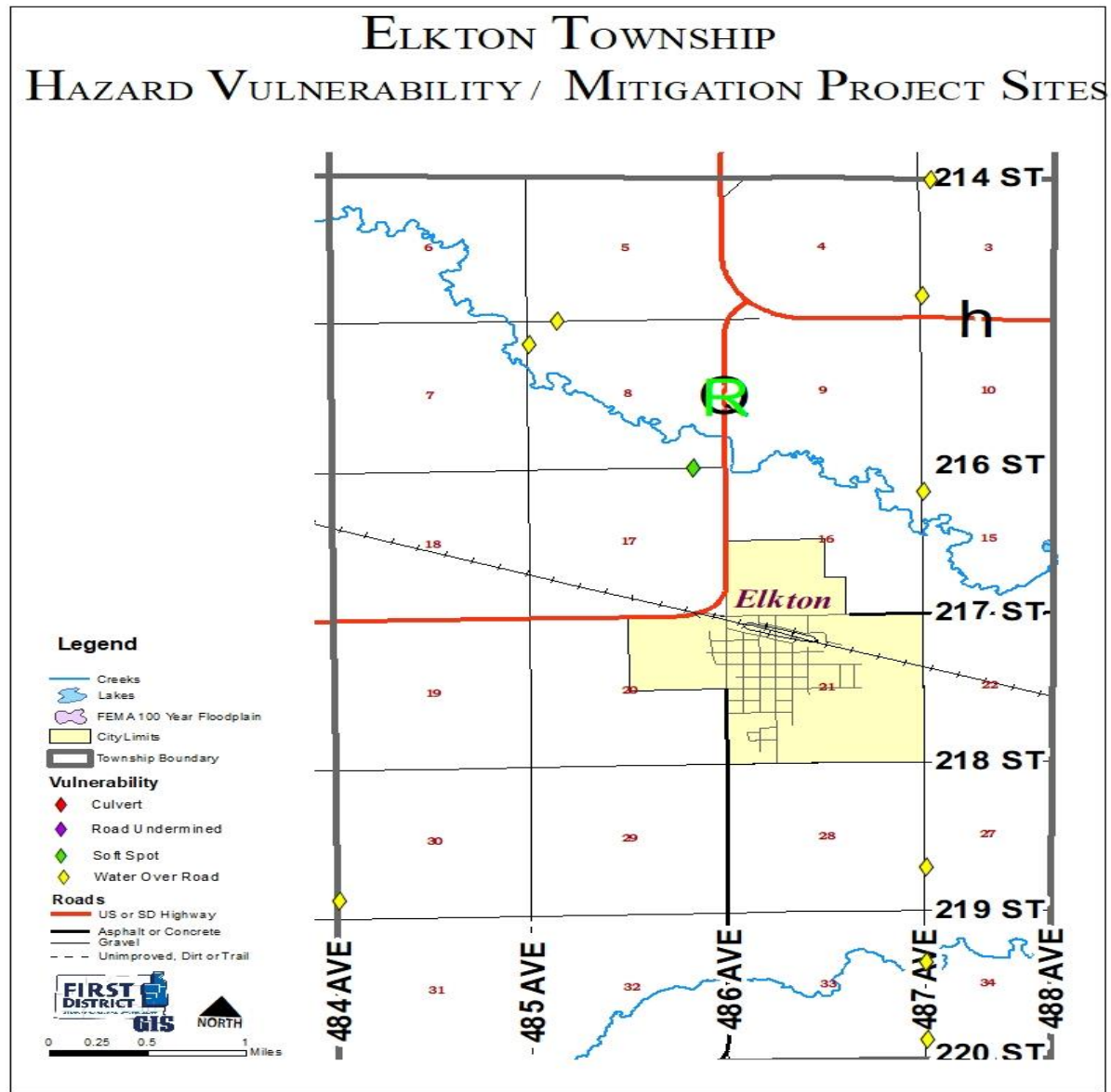
Bangor Township



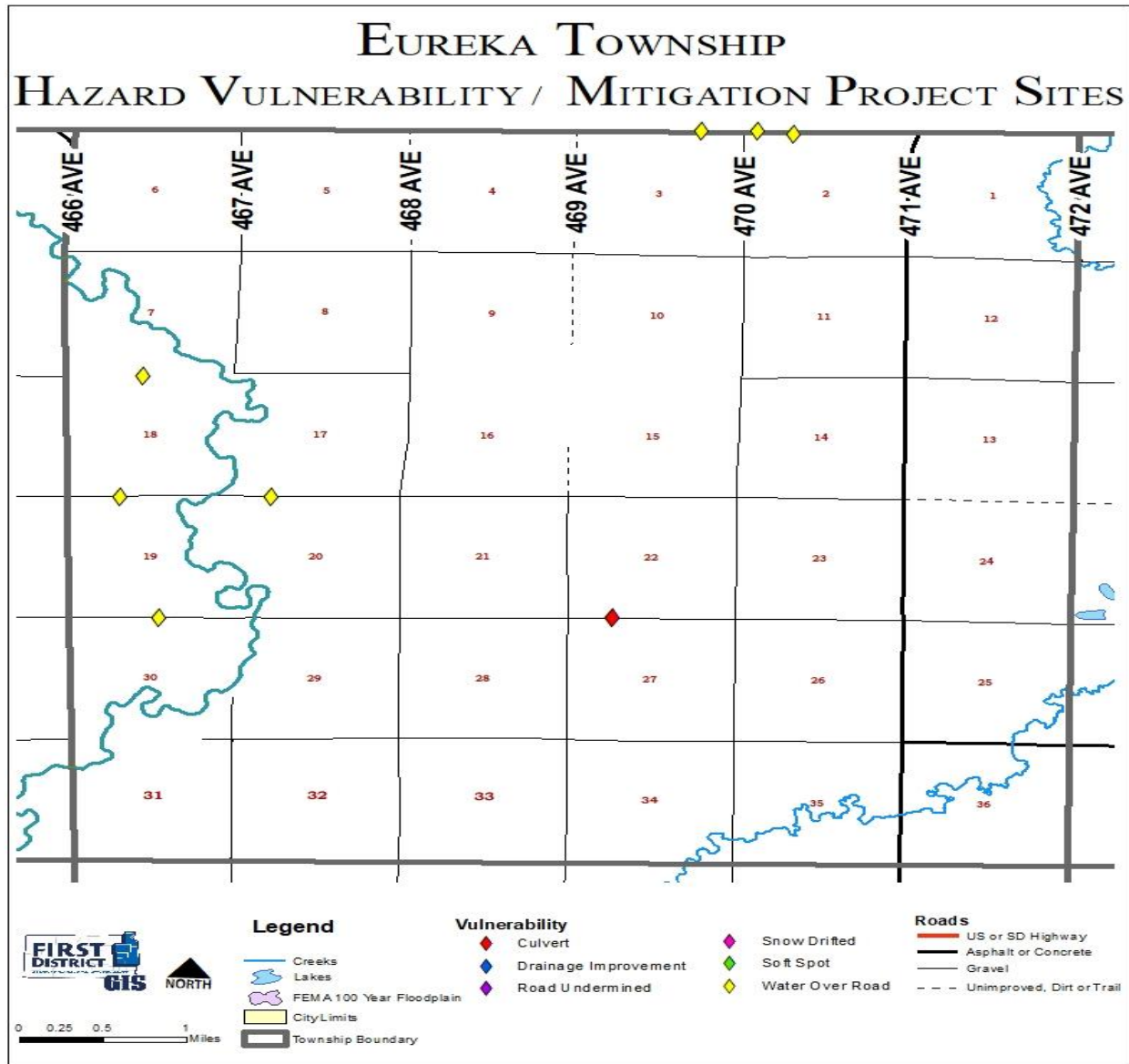
Brookings Township



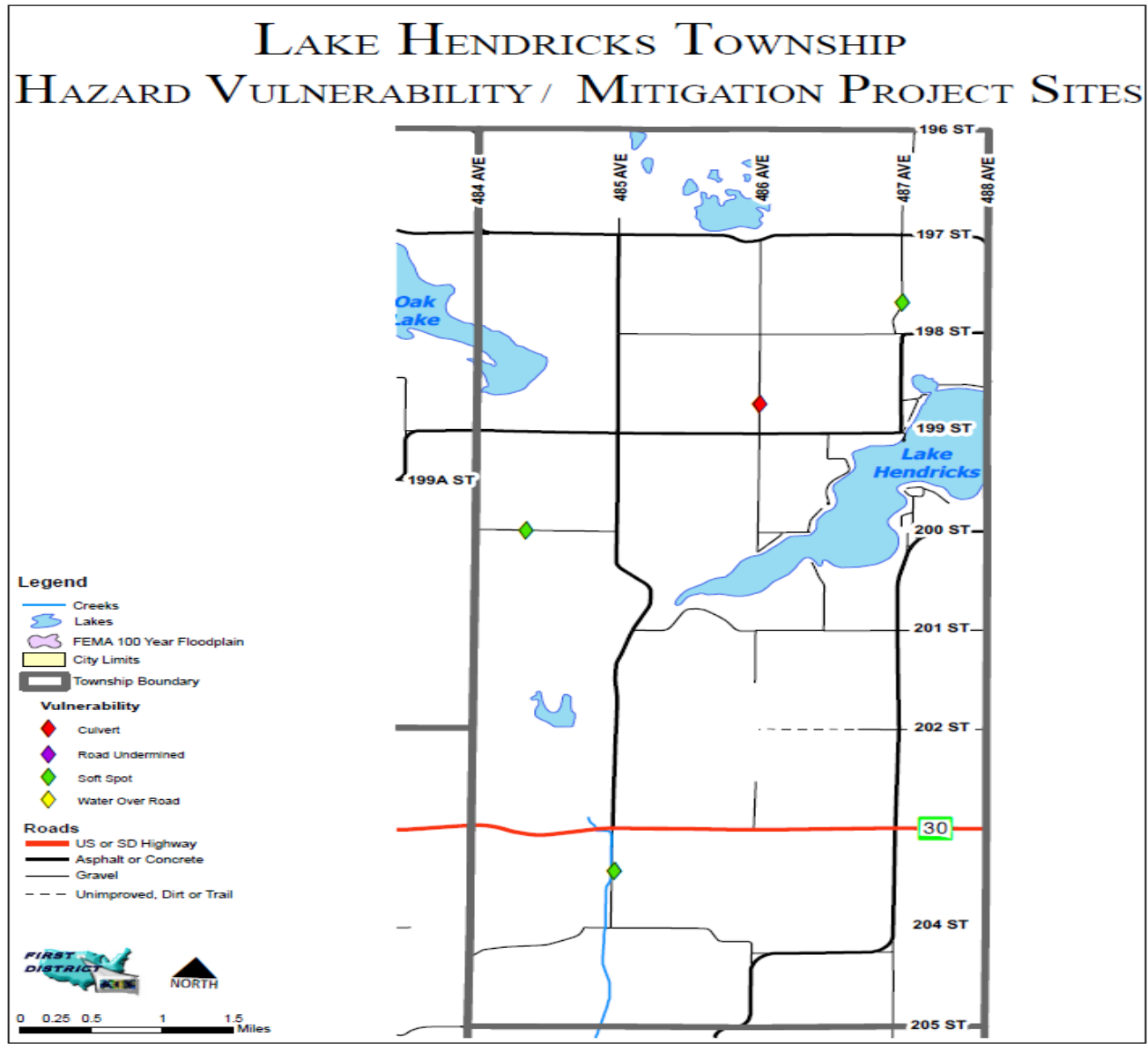
Elkton Township



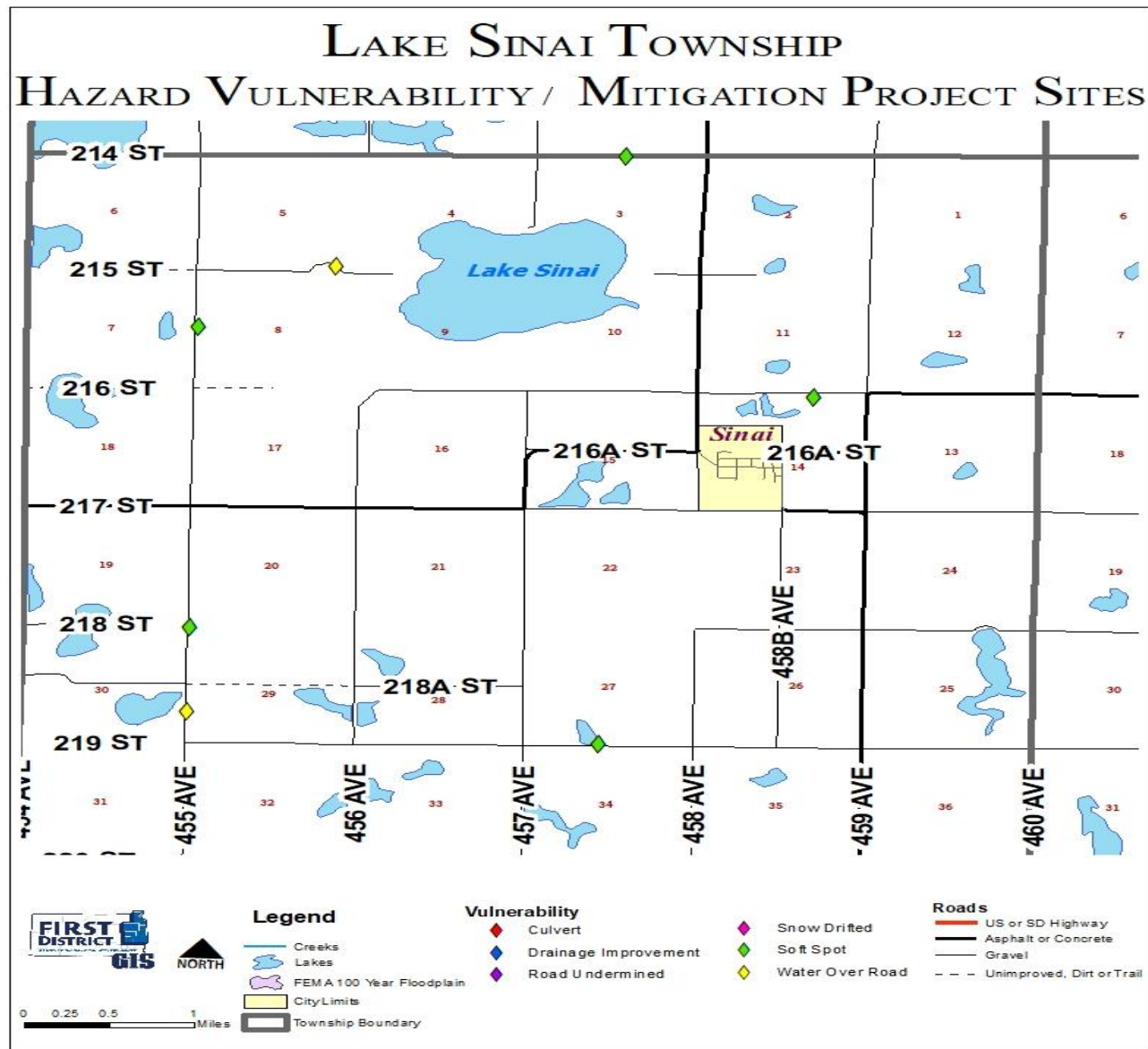
Eureka Township



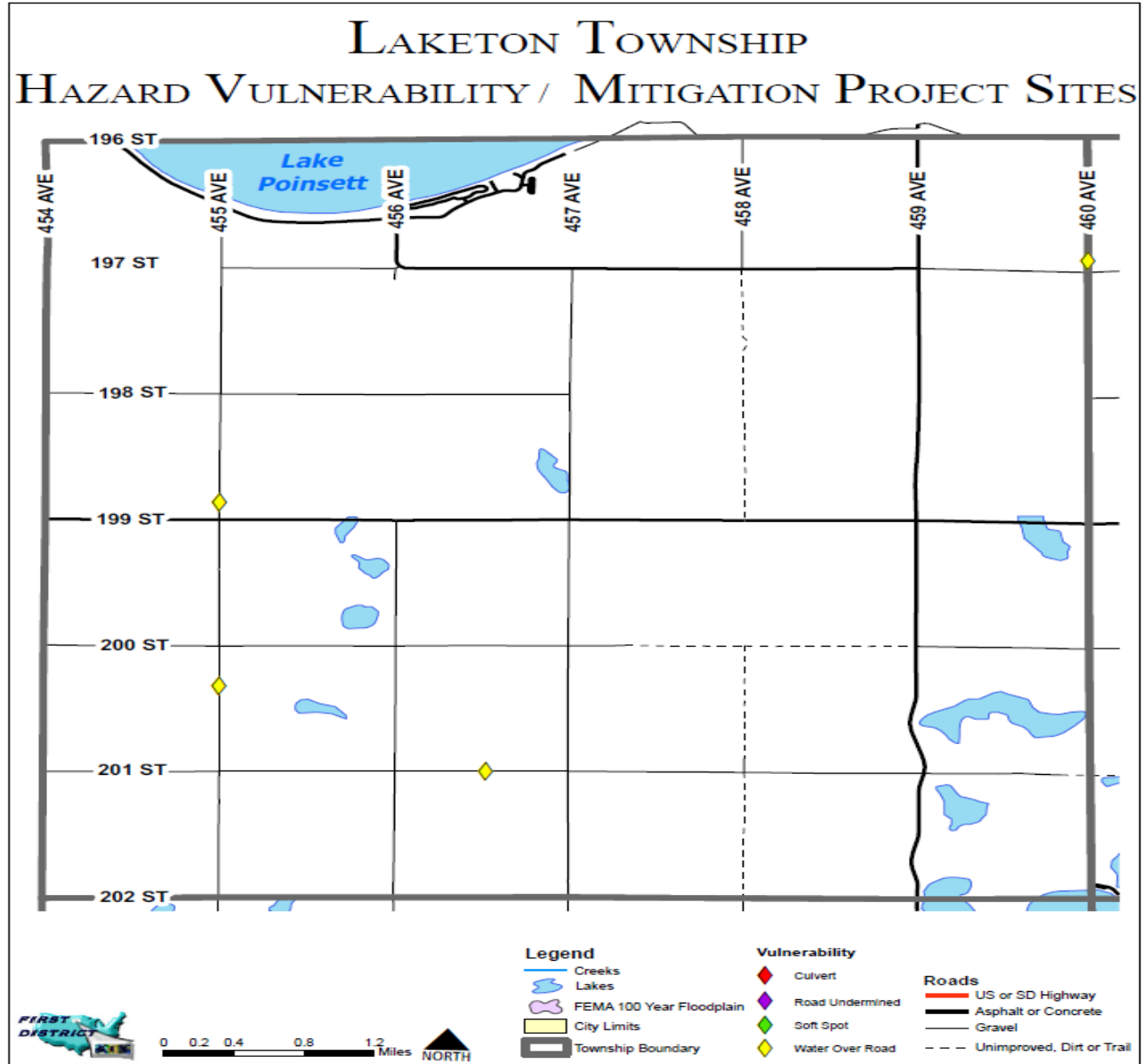
Lake Hendricks Township



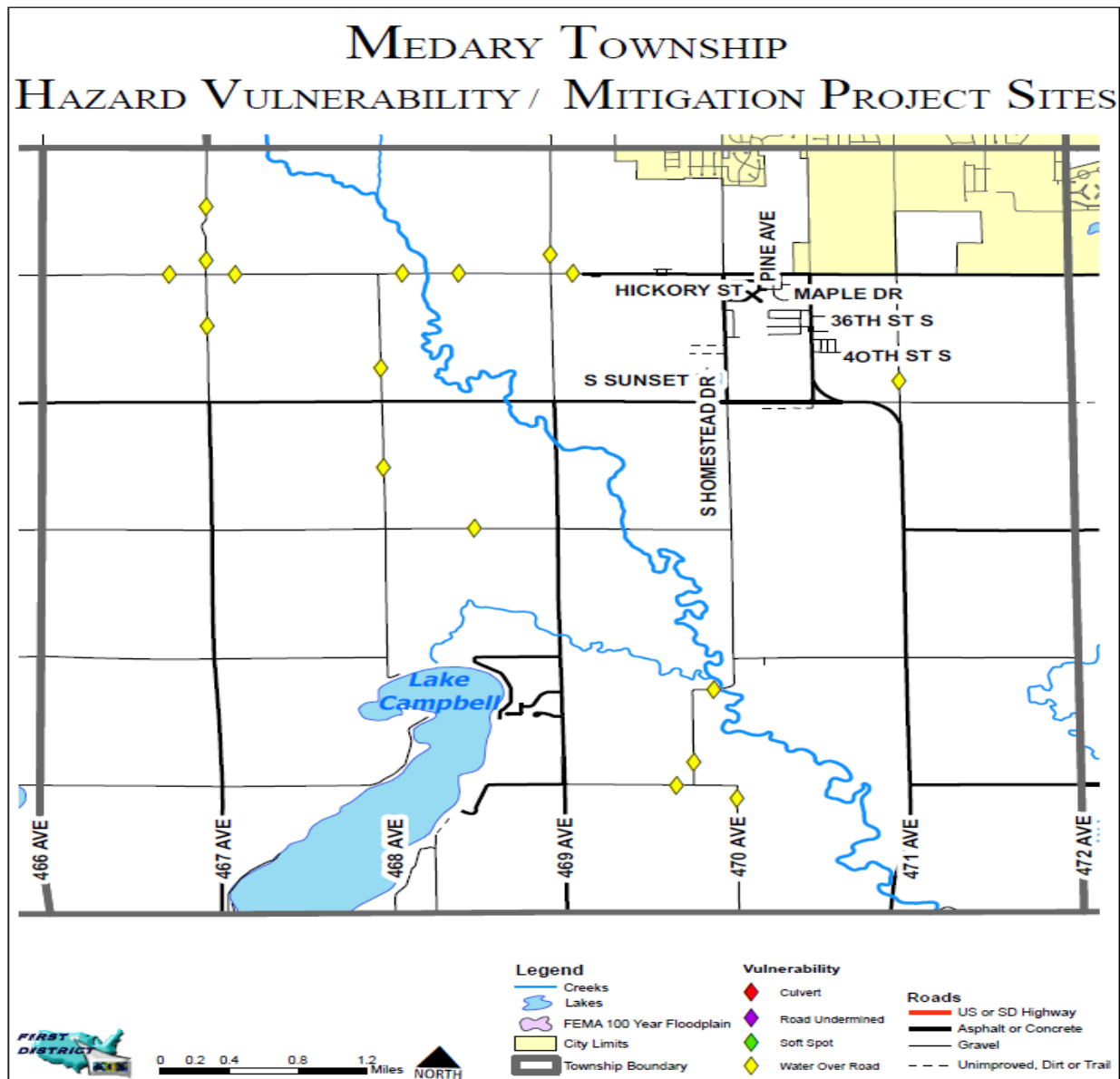
Lake Sinai Township



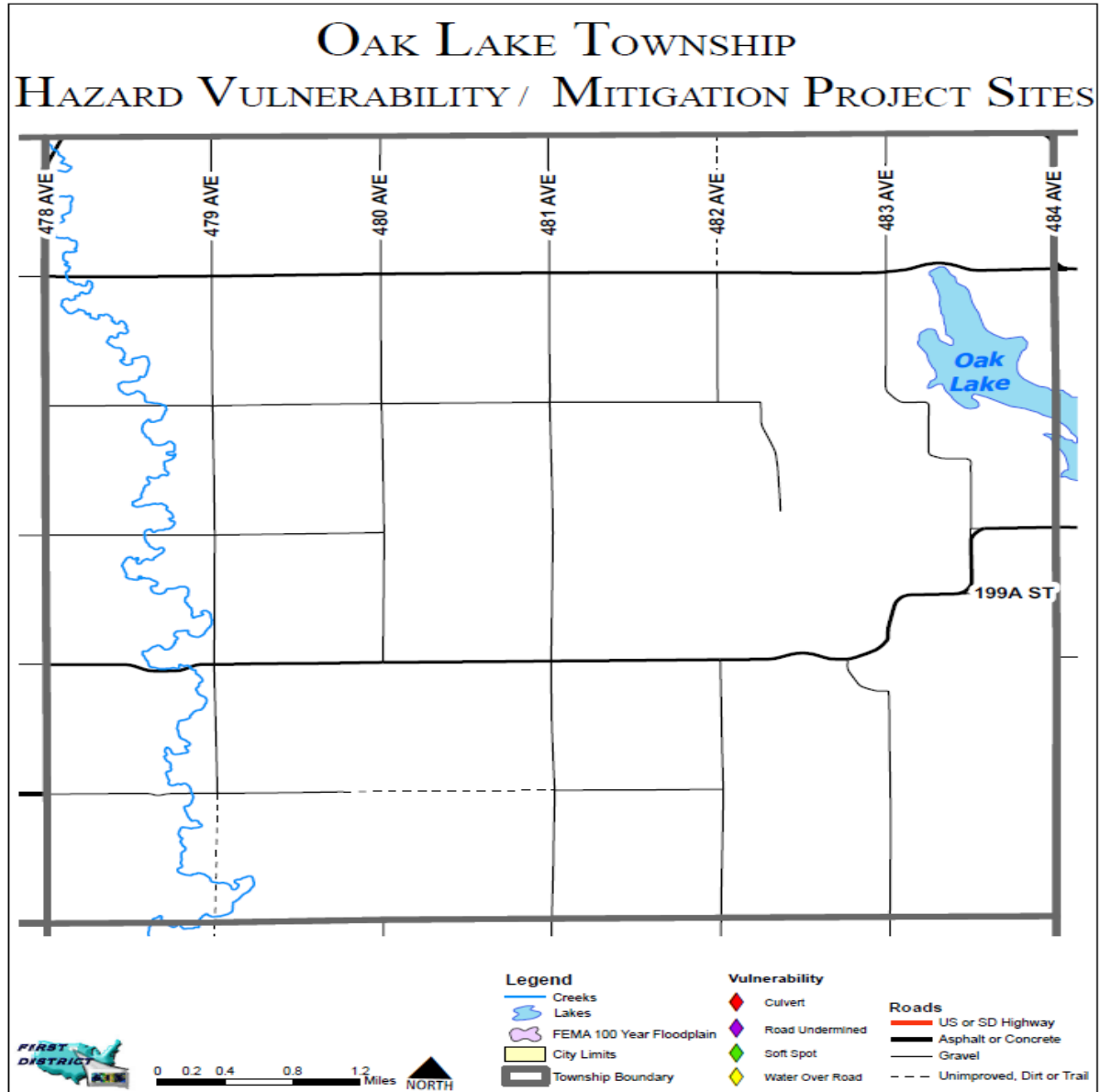
Laketon Township



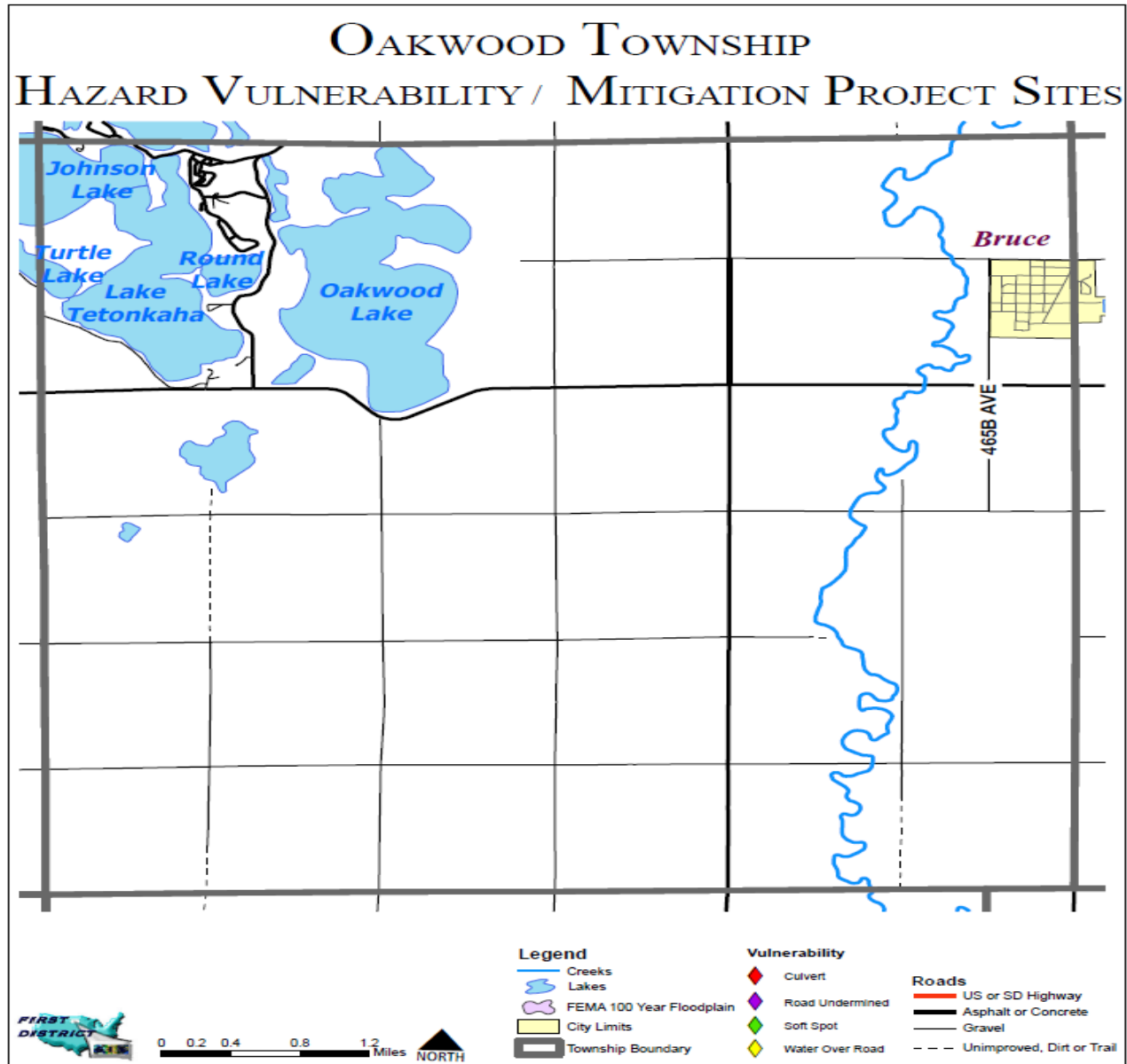
Medary Township

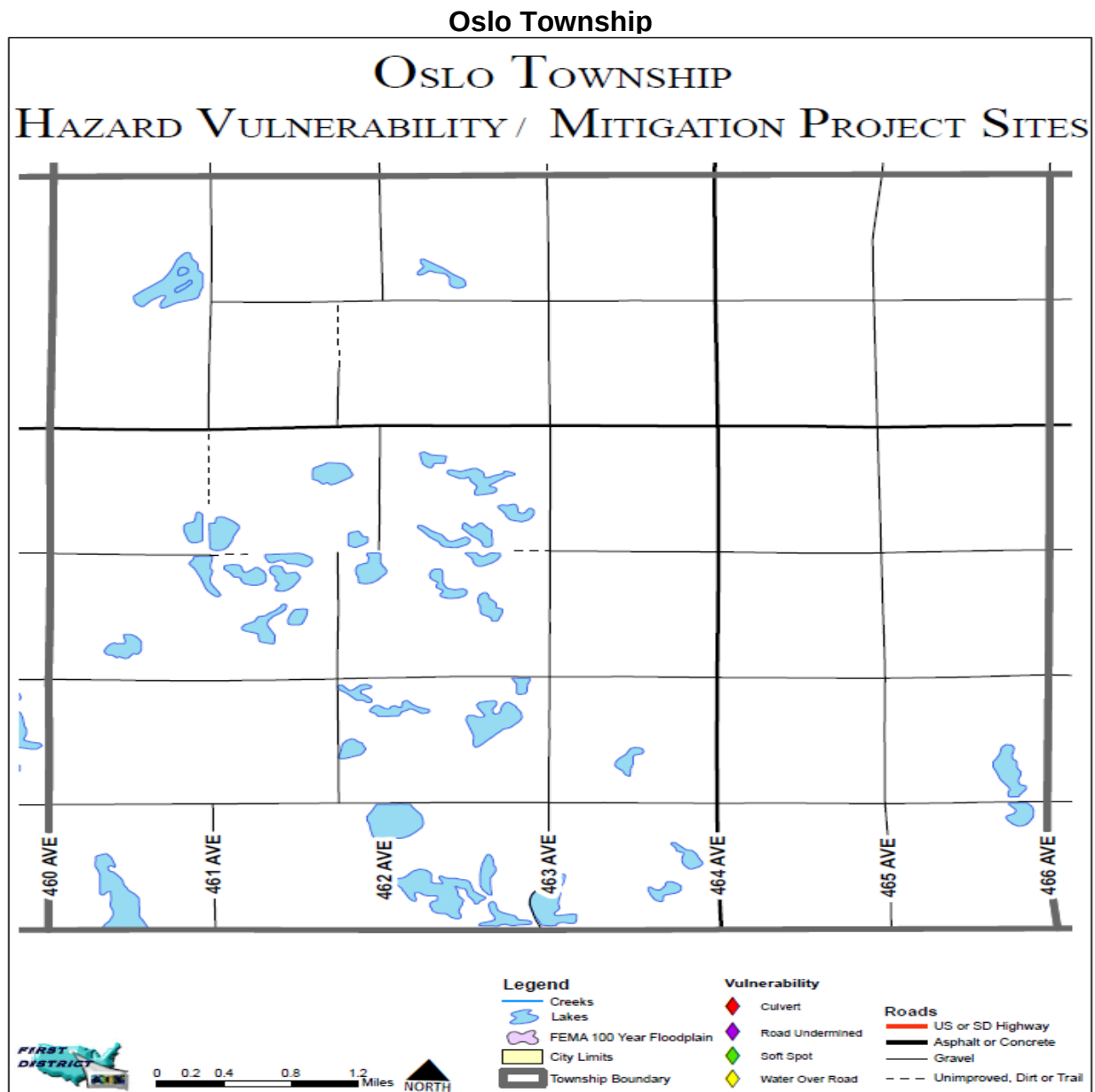


Oak Lake Township

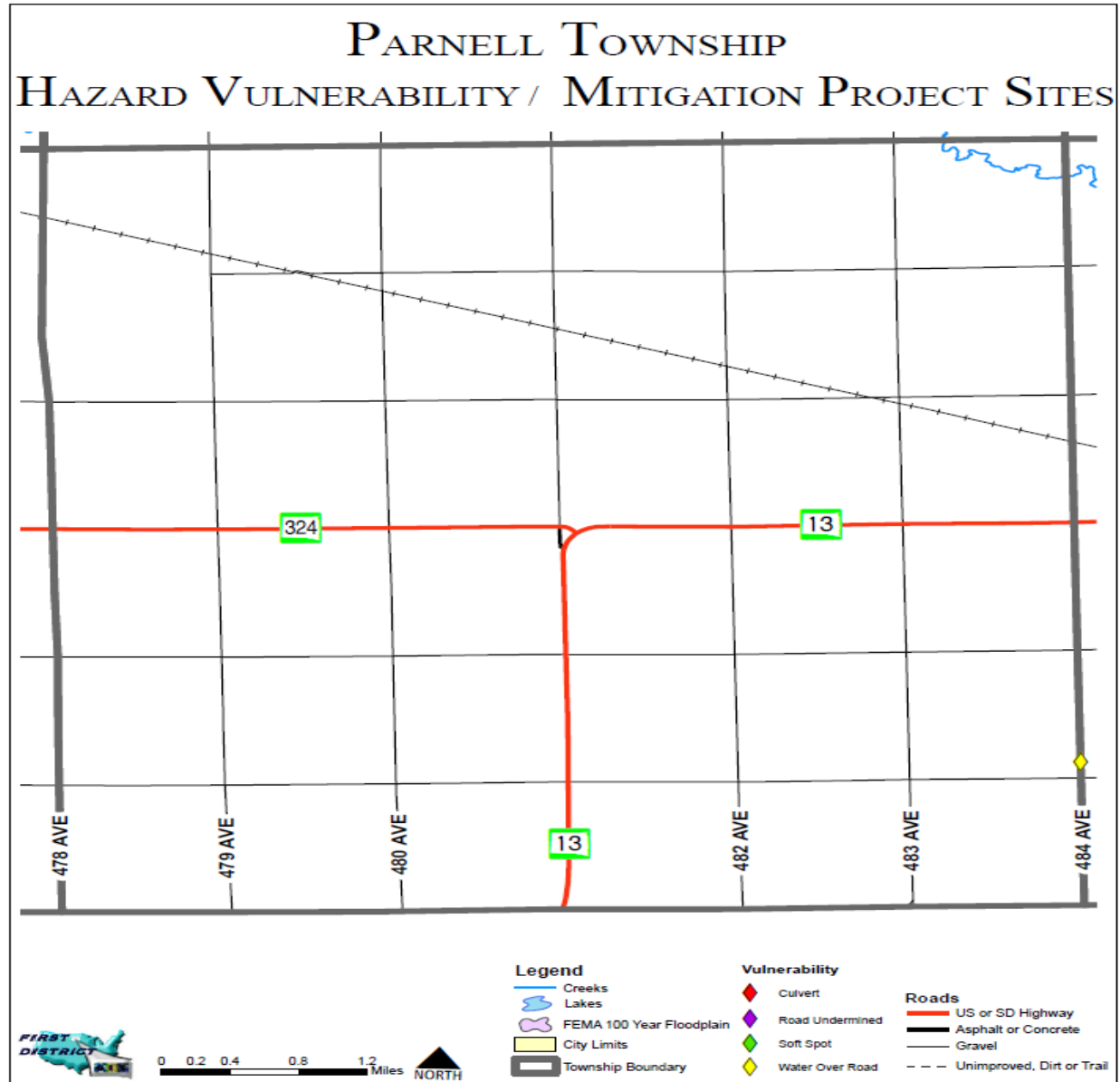


Oakwood Township

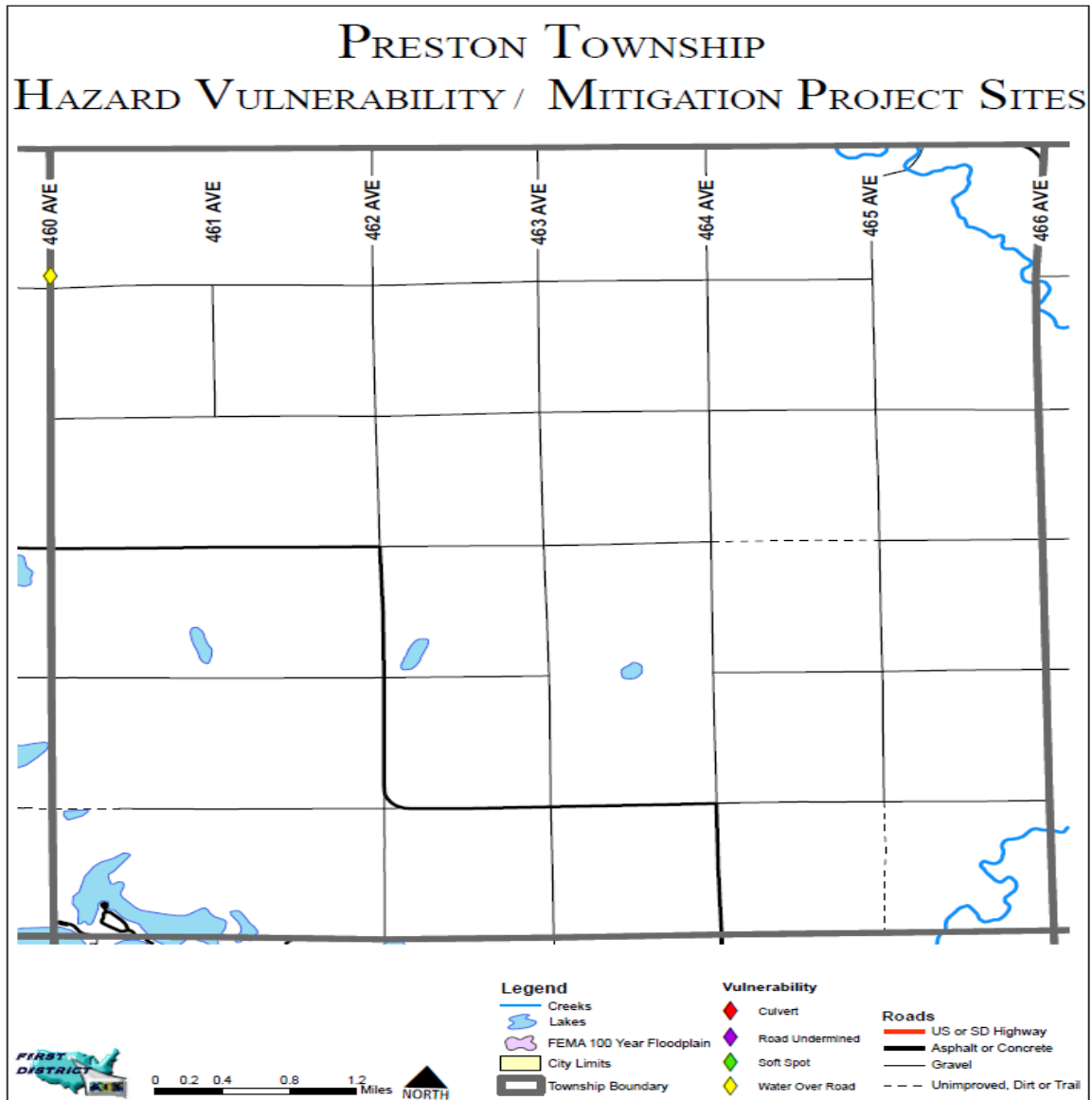




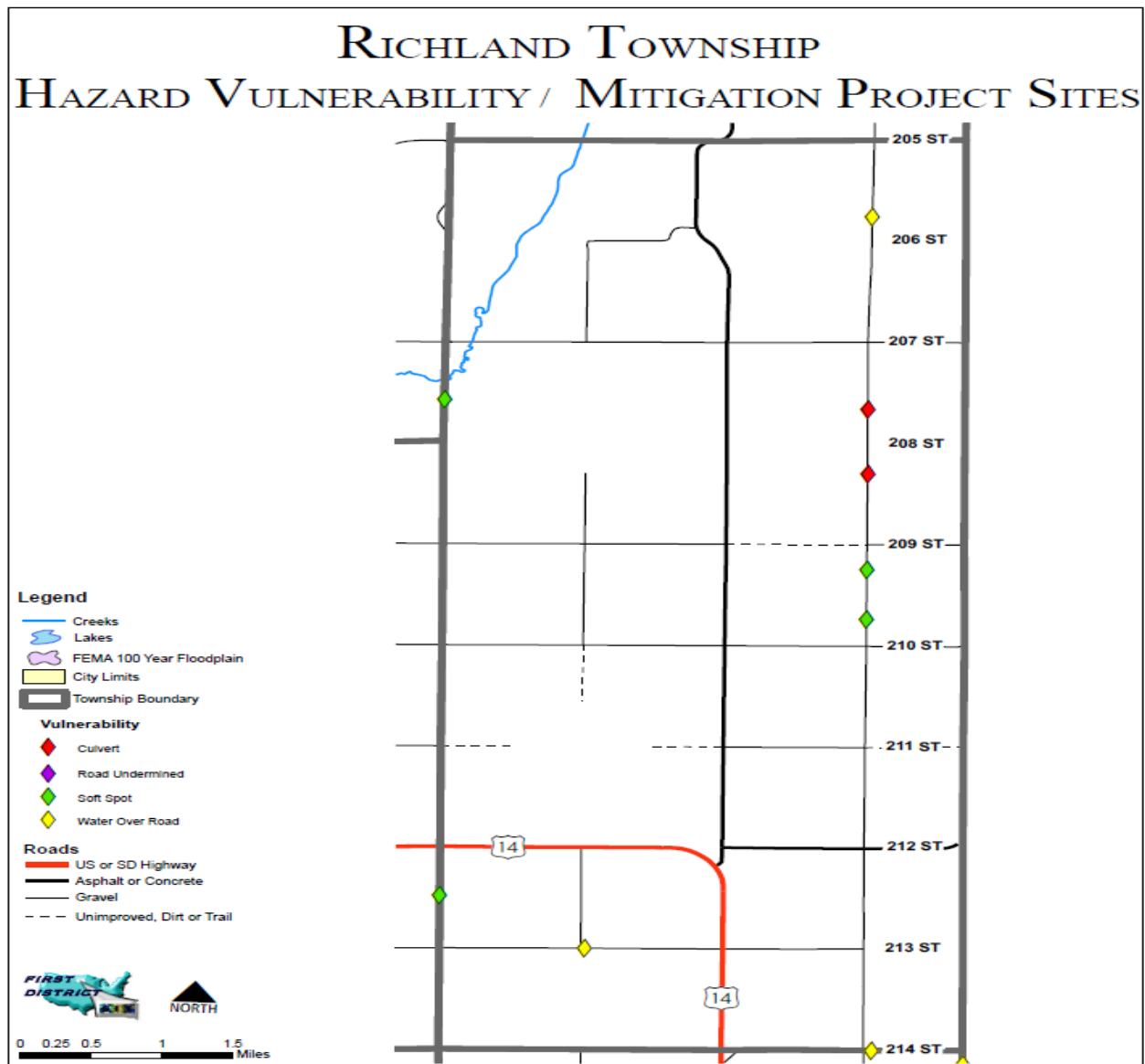
Parnell Township



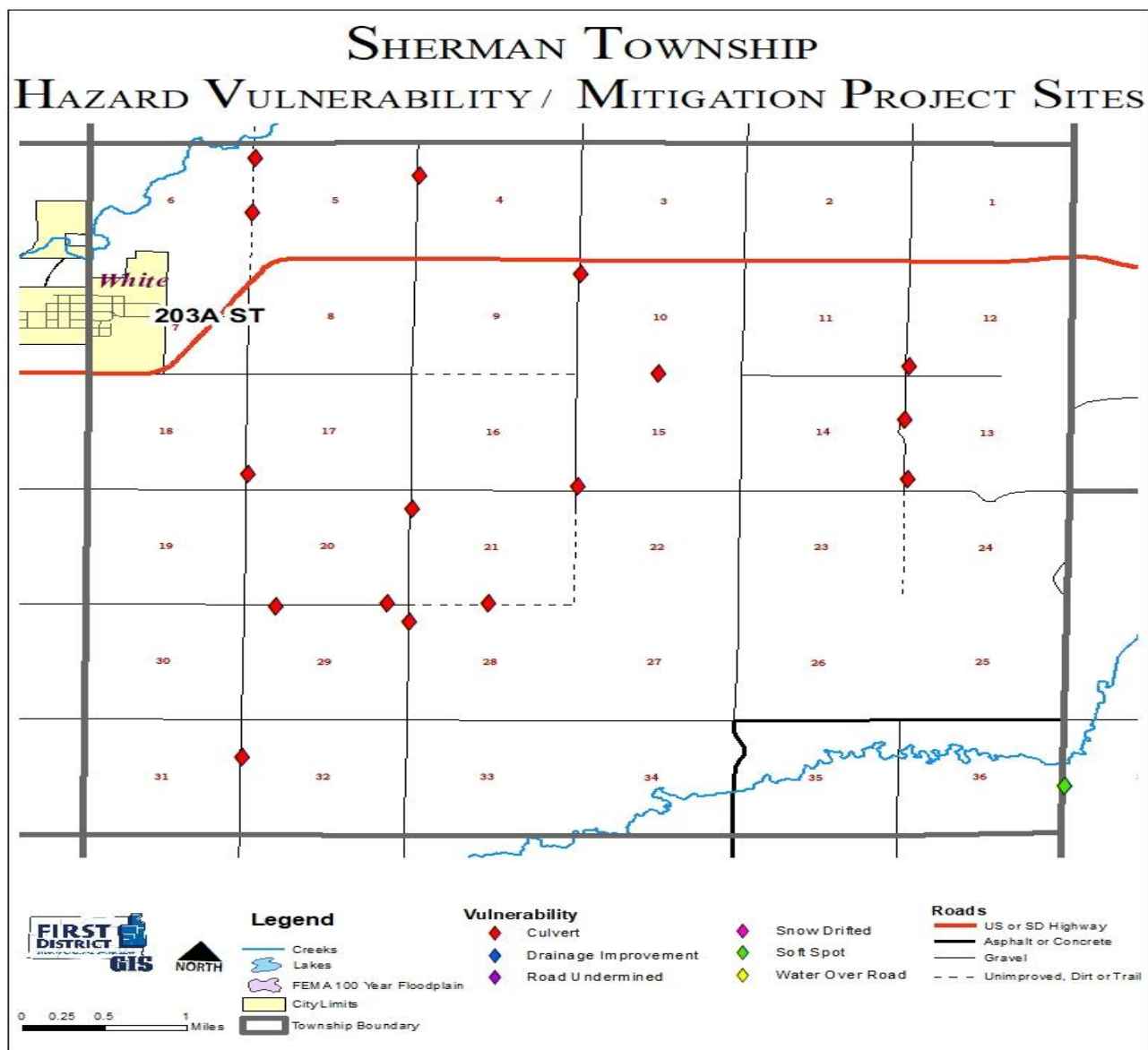
Preston Township



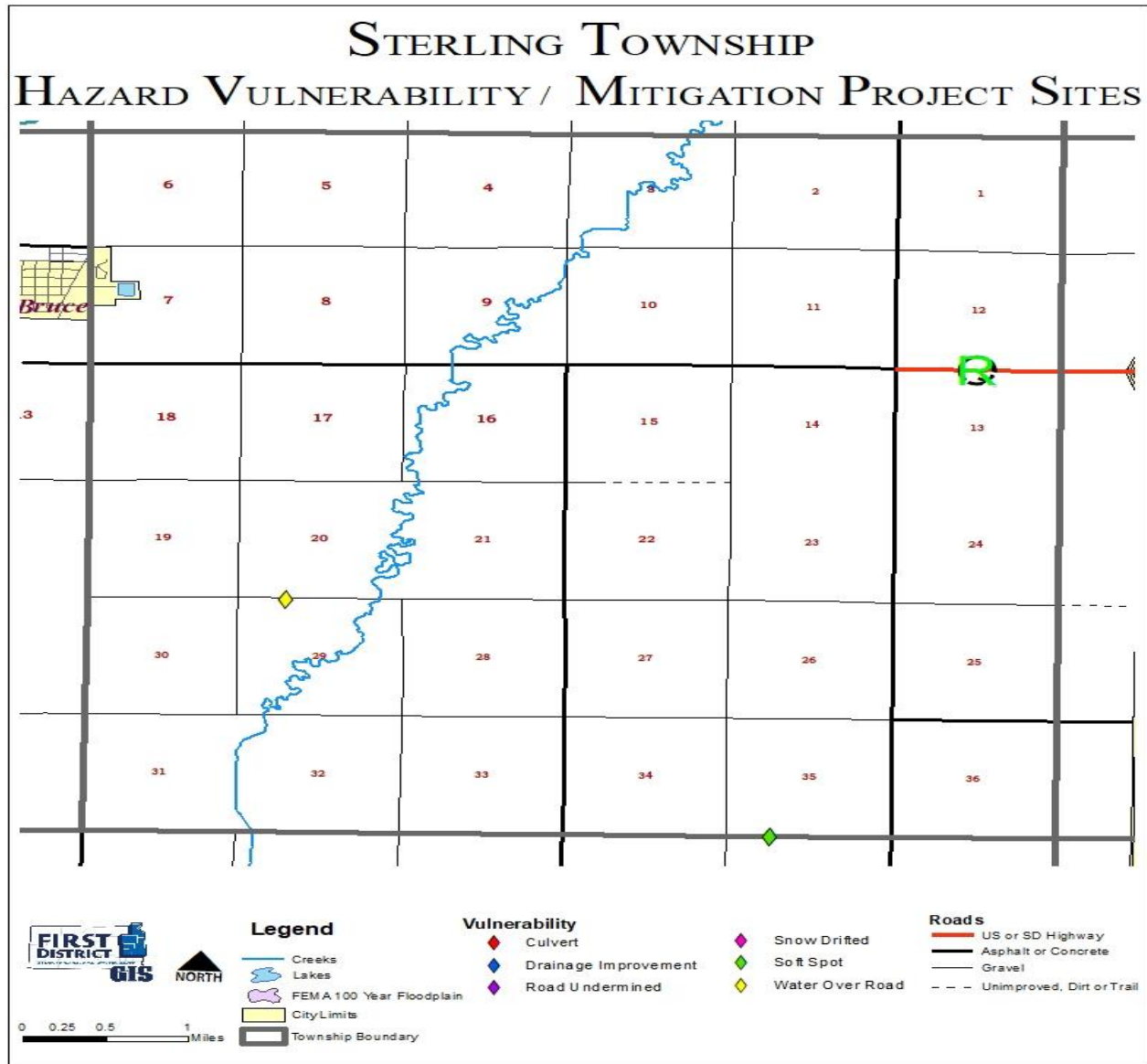
Richland Township



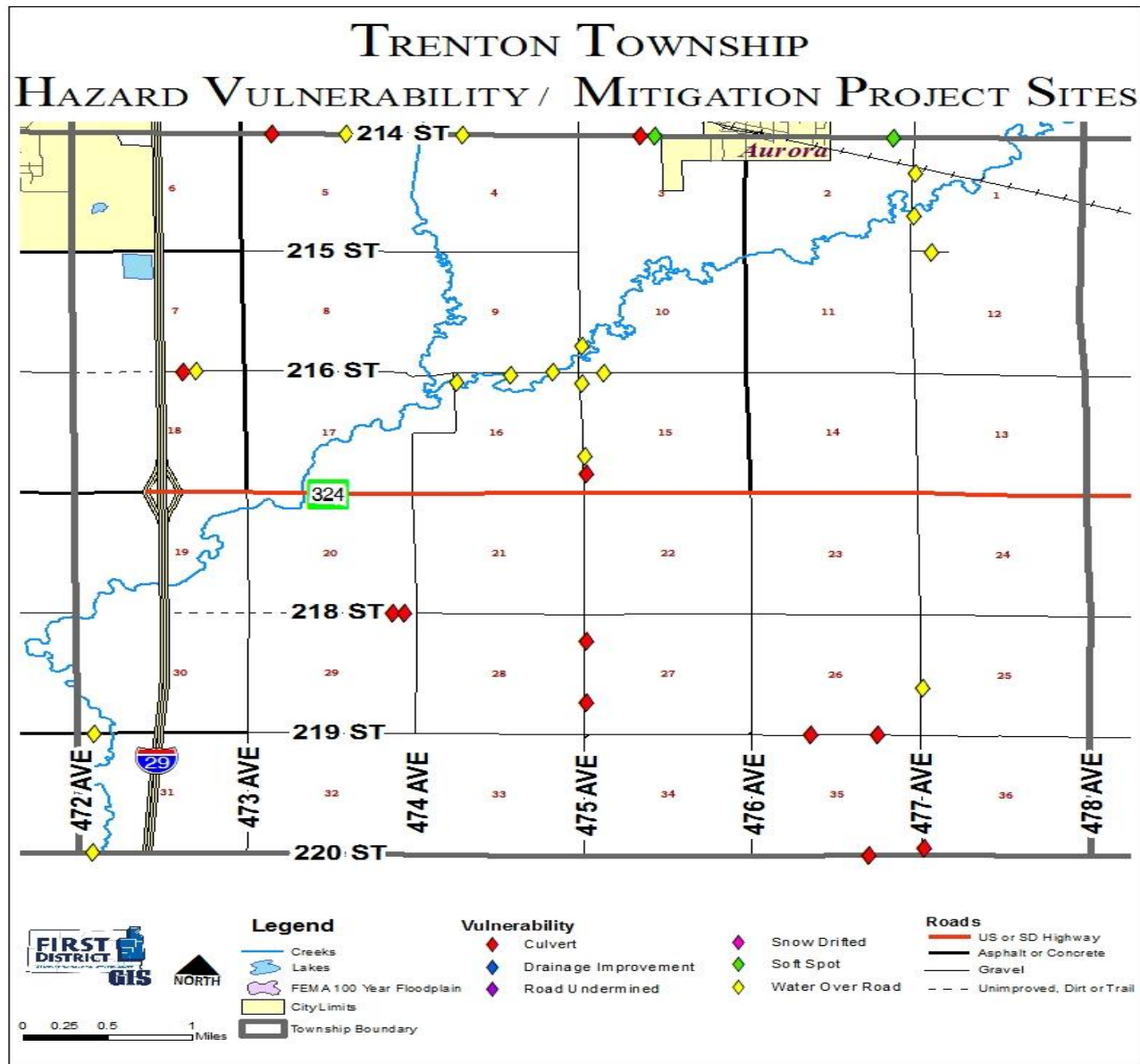
Sherman Township



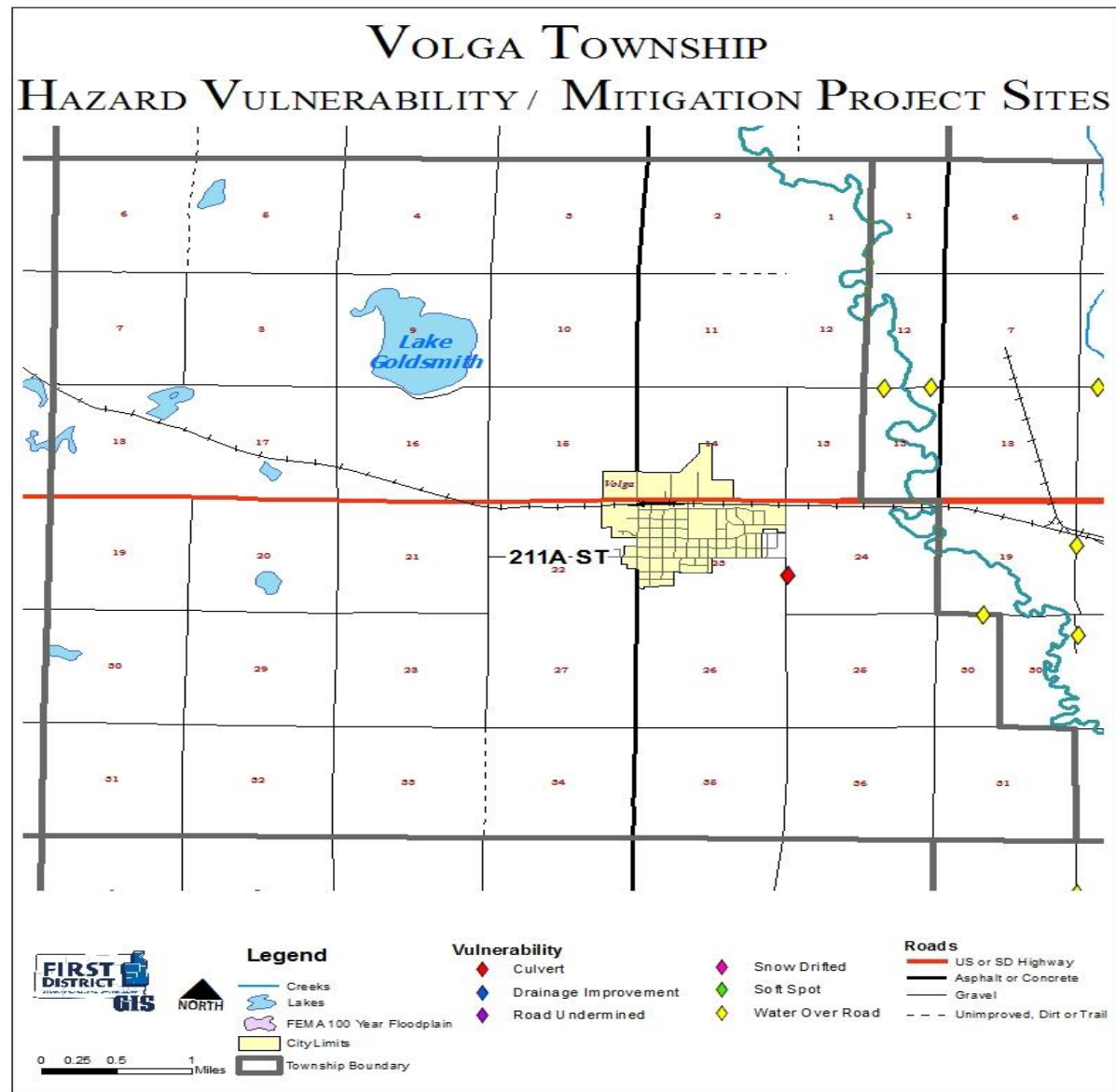
Sterling Township



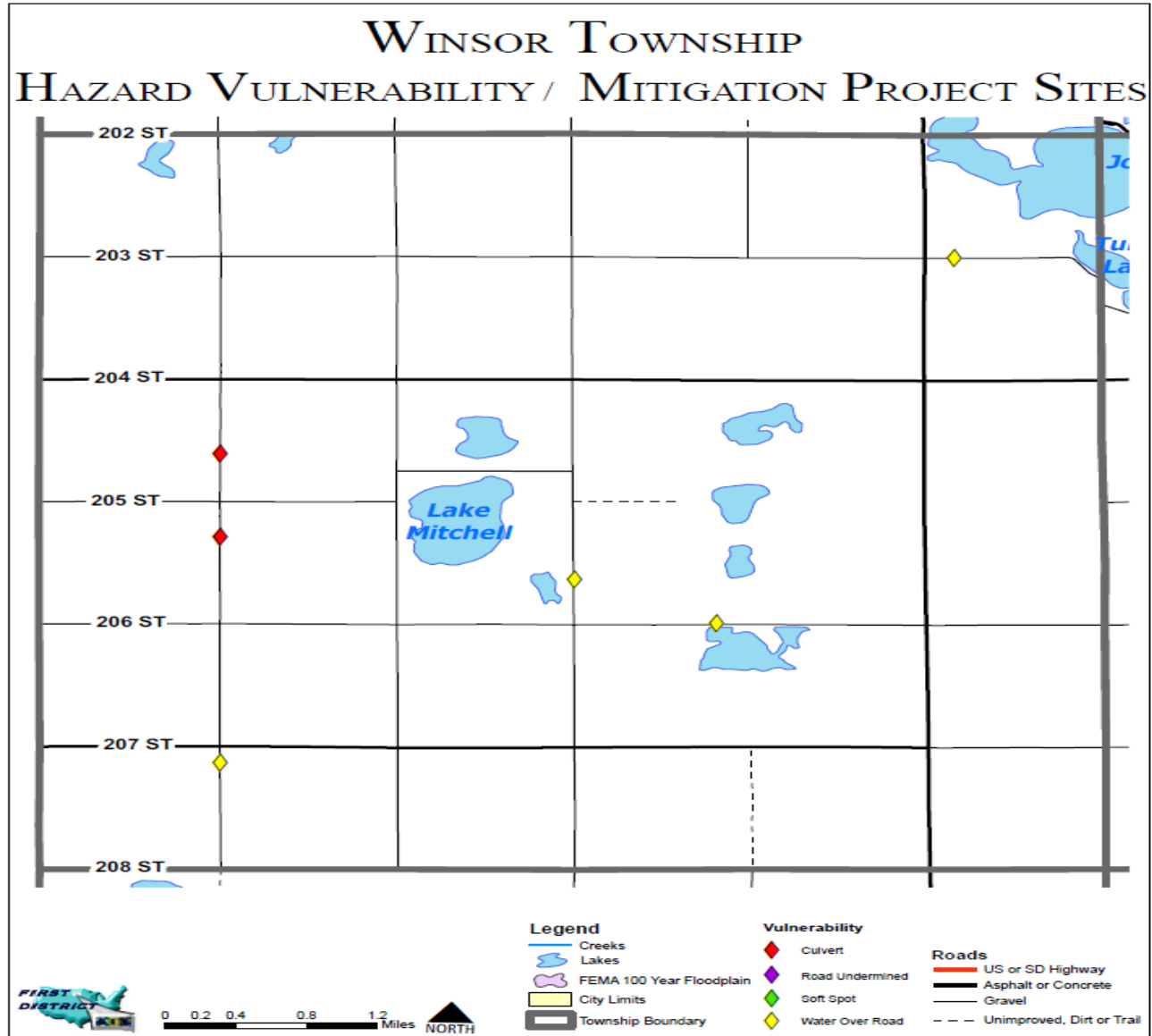
Trenton Township



Volga Township



Winsor Township



Appendix F – Review of 2014 PDM Mitigation Project Implementation

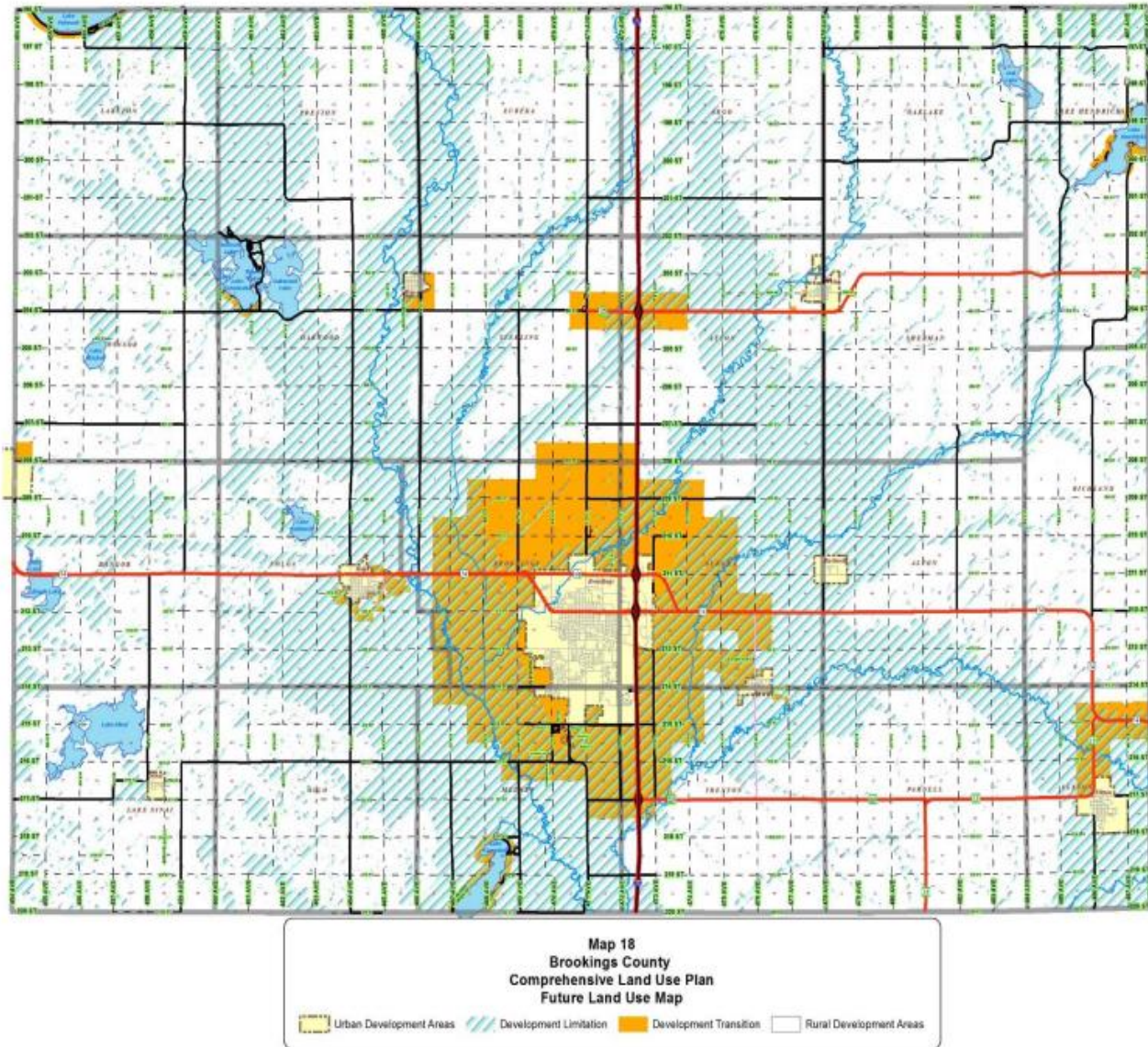
COMMUNITY	POTENTIAL MITIGATION PROJECTS	HAZARD	INCLUDED IN 2018 PLAN?	STATUS
Brookings County	Establish base flood elevation for Lake Poinsett, Campbell, and Oakwood Lakes	Flooding	Yes	Ongoing
Brookings County	Study and Implement drainage improvements in low lying areas	Flooding	Yes	Ongoing
City of Aurora	Storm Siren improvements	Severe Weather Hazards	Yes	Ongoing
City of Aurora	Stormwater Drainage Improvements	Flooding	Yes	Ongoing
City of Brookings	Point Data for routing on SDSU Campus	Fire	Yes	Ongoing
City of Bruce	Purchase Backup Generator	Severe Weather Hazards	No	Completed
City of Bruce	Conduct Engineering Study on Drainage Improvements	Flooding	No	Completed
City of Bruce	Implement Drainage Improvements	Flooding	Yes	Ongoing
Town of Bushnell	Purchase Backup Generator for Town Hall	Severe Weather	Yes	Ongoing
Town of Bushnell	Construct Tornado Shelter	Tornado	Yes	Ongoing
Town of Bushnell	Install water tanks	Fire	Yes	Ongoing
City of Elkton	Tree Replacement Program	Severe Weather Hazards	Yes	Ongoing

COMMUNITY	POTENTIAL MITIGATION PROJECTS	HAZARD	INCLUDED IN 2018 PLAN?	STATUS
City of Elkton	Install Storm Siren in SE portion of town	Severe Weather Hazards	Yes	Ongoing
City of Elkton	Construct Tornado Shelter at Baseball Field/Campground	Tornado	Yes	Ongoing
City of Elkton	Construct Tornado Shelter at City Park	Tornado	Yes	Ongoing
City of Elkton	Conduct Comprehensive Drainage Study	Flooding	Yes	Ongoing
City of Elkton	Bury overhead powerlines	Severe Weather Hazards	Yes	Ongoing
City of Elkton	Establish living snow fence/shelterbelts on north and west side of town	Severe Weather Hazards	Yes	Ongoing
Town of Sinai	Purchase of Backup Generator	Severe Weather Hazards	No	Completed
Town of Sinai	Replace Weather Sirens	Severe Weather Hazards	No	Completed
Town of Sinai	Purchase snow removal equipment	Severe Weather Hazards	No	Completed
Town of Sinai	Construct Tornado Shelter	Tornado	Yes	Ongoing
Town of Sinai	Conduct Drainage Study	Flooding	No	Completed
City of Volga	Portable Generator for Water System	Severe Weather Hazards	Yes	Ongoing
City of Volga	Bury overhead powerlines	Severe Weather Hazards	No	Ongoing

COMMUNITY	POTENTIAL MITIGATION PROJECTS	HAZARD	INCLUDED IN 2018 PLAN?	STATUS
City of Volga	Construct Tornado Shelter	Tornado	Yes	Ongoing
City of White	Drainage Study and implement suggested improvements	Flooding	Yes	Ongoing
City of White	Purchase Backup Generator for McKnight Hall	Severe Weather Hazards	Yes	Ongoing
City of White	Create Storm Shelter at McKnight Hall	Severe Weather Hazards	Yes	Ongoing
City of White	Construct Storm Shelter near City Park	Severe Weather Hazards	Yes	Ongoing
City of White	Purchase Firefighting Equipment	Fire	No	Completed
City of White	Bury overhead powerlines	Severe Weather Hazards	Yes	Ongoing
City of White	Update Comprehensive Land Use Plan and Zoning Regulations	Flooding	Yes	Ongoing

Appendix G – Comprehensive Land Use Maps

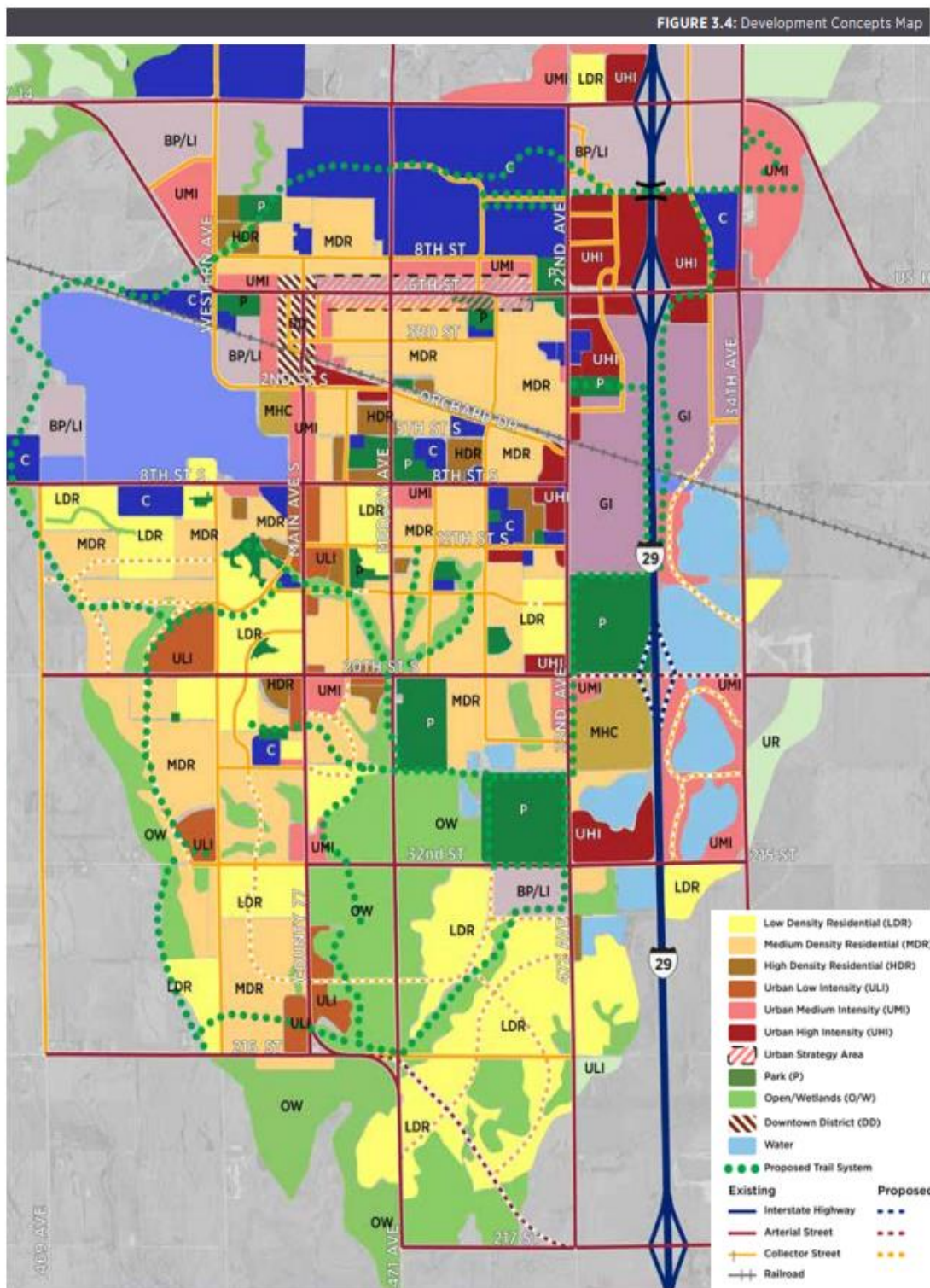
Brookings County Future Land Use Map



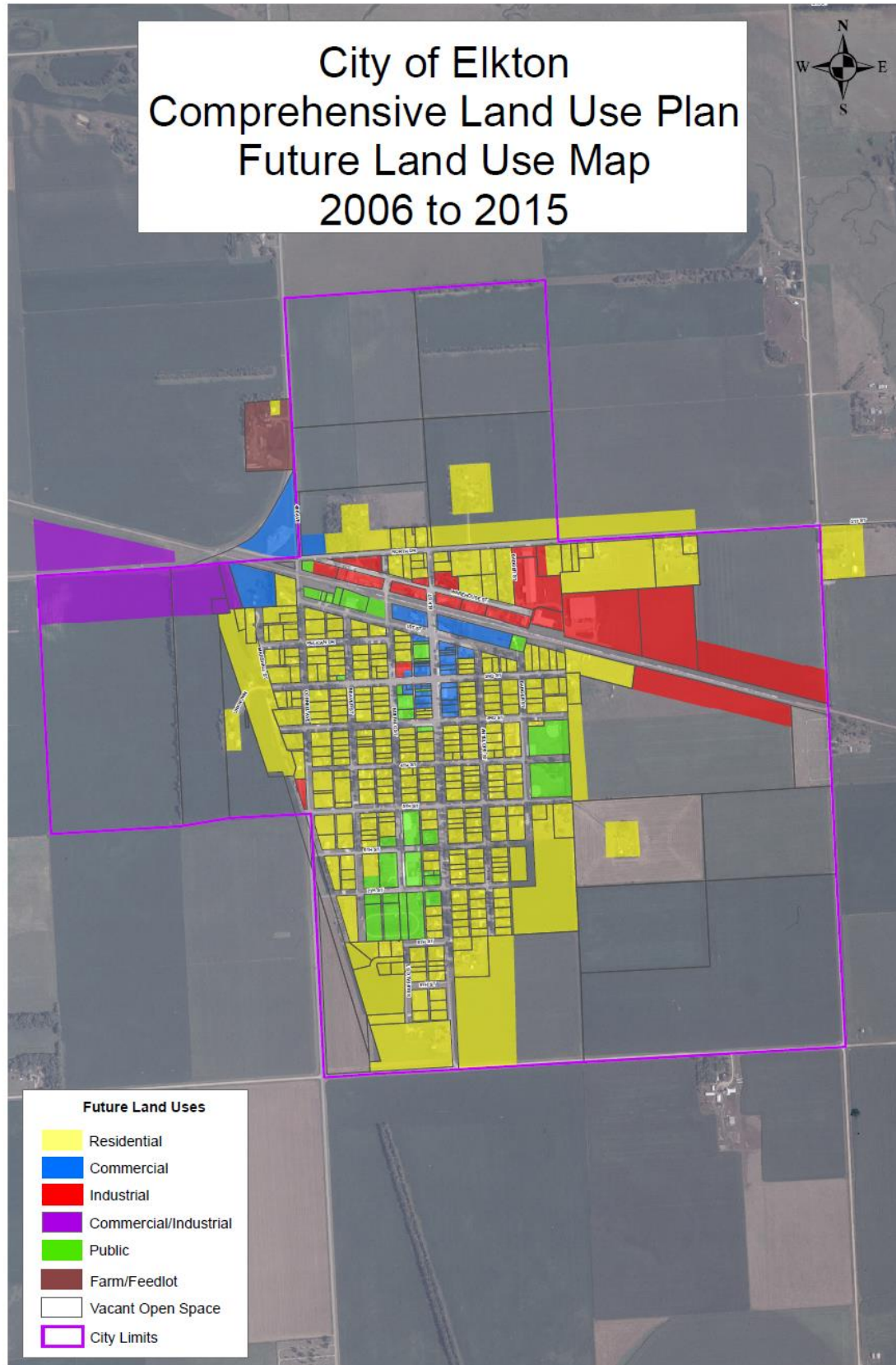
City of Aurora Future Land Use Map



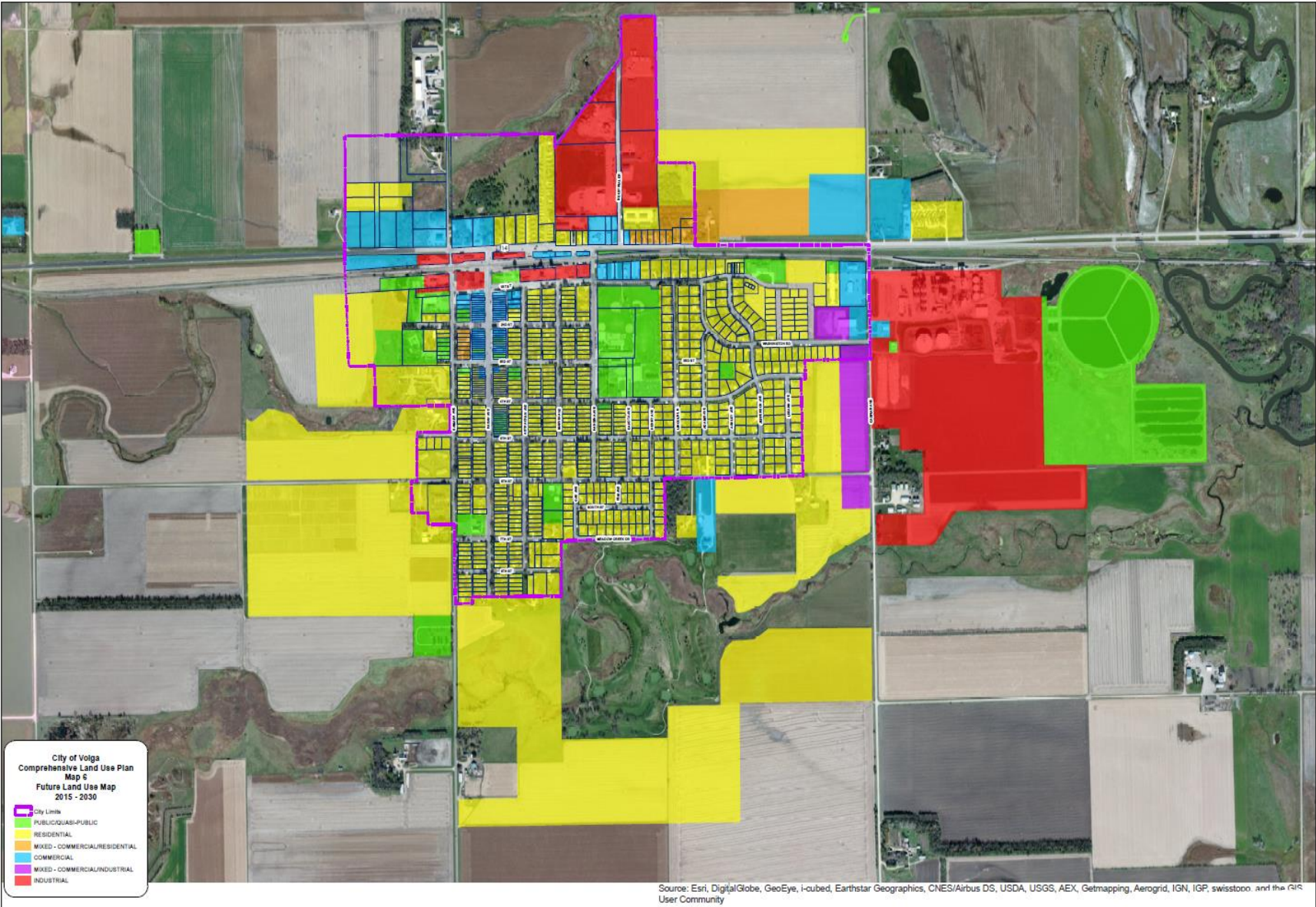
City of Brookings Future Land Use Map



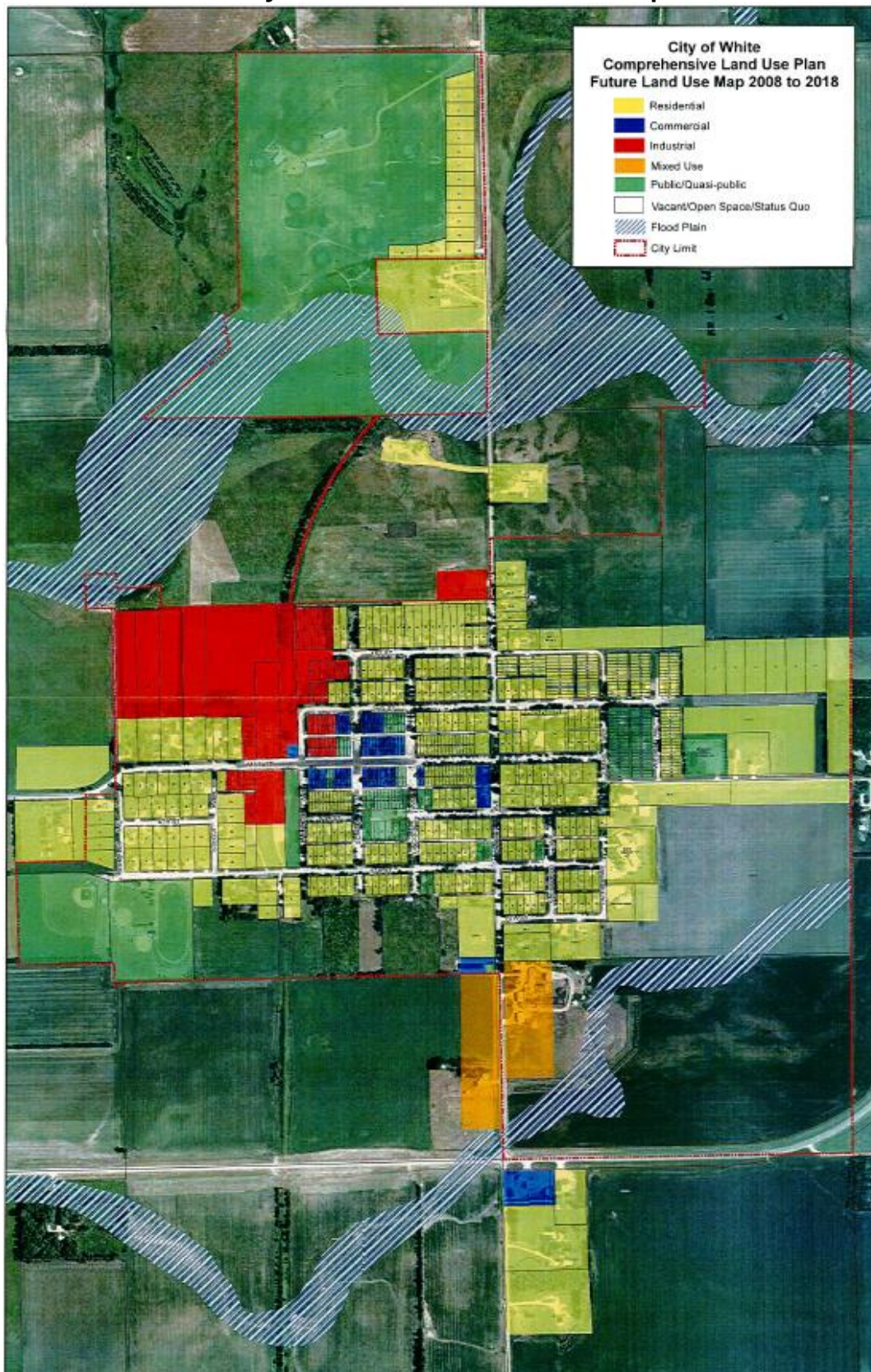
City of Elkton Future Land Use Map



City of Volga Future Land Use Map



City of White Future Land Use Map



Appendix H - References

Brookings County Comprehensive Land Use Plan – First District Association of Local Governments, 2000

Brookings County Pre-Disaster Mitigation Plan, 2004 & 2014

City of Aurora Comprehensive Land Use Plan and Zoning Ordinance - First District Association of Local Governments, 2012

City of Elkton Comprehensive Land Use Plan and Zoning Ordinance - First District Association of Local Governments, 2006

City of Volga Future Land Use Map and Major Street Plan – First District Association of Local Governments, 2015

City of White Comprehensive Land Use Plan and Zoning Ordinance - First District Association of Local Governments, 2008

Federal Emergency Management Agency. 2011. Local Hazard Mitigation Planning Tool.

NFIP Flood Insurance Rate Maps

State of South Dakota Hazard Mitigation Plan. South Dakota Office of Emergency Management. 2014.

Brookings, SD Comprehensive Plan 2040, 2018