

# **Big Stone County**

Multi-Jurisdictional

# **All-Hazard Mitigation Plan**

Adopted  
November 2015



Upper Minnesota Valley  
**REGIONAL  
DEVELOPMENT  
COMMISSION**

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## CHAPTER 1: OVERVIEW

### *DEFINITIONS*

#### **Hazard Mitigation**

Hazard mitigation is defined as any action taken to eliminate or reduce the long-term risk to human life and property from natural and technological hazards. Potential types of hazard mitigation measures include the following:

- Structural hazard control or protection projects
- Retrofitting of facilities
- Acquisition and relocation of structures
- Development of mitigation standards, regulations, policies, and programs
- Public awareness and education programs
- Development or improvement of warning systems

#### **Hazard Mitigation Plan**

Hazard mitigation planning can break the cycle of disaster-repair-disaster within a community and prepare it for a more sustainable future. The development and application of long-term strategies that reduce or alleviate loss of life, injuries and property damage or destruction resulting from natural or human caused hazards accomplish the goals of hazard mitigation planning. These long-term strategies must incorporate a range of community resources including planning, policies, programs and other activities that can make a community more resistant to disaster. Mitigation planning efforts should both protect people and structures and minimize costs of disaster response and recovery. Mitigation is the cornerstone for emergency management and is a method for decreasing demand on scarce and valuable disaster response resources.

#### **Disaster Mitigation Act of 2000**

As a result of the Disaster Mitigation Act of 2000, the Federal Emergency Management Agency (FEMA) requires jurisdictions to first have in place a multi-hazard mitigation plan, in order to be eligible for Hazard Mitigation Grant Program (HMGP) funds. Effective November 1, 2004, jurisdictions must update their plan within five years. FEMA has provided states with funding to assist local governments in funding these plans.

The Disaster Mitigation Act of 2000 amended the Stafford Act (42 U.S.C. 5121 et seq.), which established a national program for pre-disaster mitigation. The program is meant to control Federal costs of disaster assistance and streamline the administration of disaster relief.

#### **Hazard**

A hazard is something that is potentially dangerous or harmful and is often the root cause of an unwanted outcome.

## HAZARD MITIGATION

### Goal

The goal of hazard mitigation is to eliminate and reduce vulnerability to significant<sup>1</sup> damage and/or repetitive damage from one or more hazards.

### Benefits

The benefits of hazard mitigation include the following:

- Saving lives, protecting public health, reducing injuries
- Preventing or reducing property damage
- Lessen economic losses
- Minimizing social dislocation and stress
- Decreasing agricultural losses
- Maintaining critical facilities in functioning order
- Protecting infrastructure from damage
- Protecting mental health
- Reducing legal liability of government and public officials

### Process

The process of hazard mitigation involves numerous steps, including:

- Identification and screening of major hazards
- Analysis of the risks posed by those hazards
- Review of existing capabilities and resources
- Development, implementation, and maintenance of specific hazard mitigation measures

Although most mitigation measures are implemented on a continual basis, the post-disaster period often presents special hazard mitigation opportunities. Mitigation opportunities are often more apparent immediately following a disaster making both public officials and the general public more willing to consider taking mitigation actions and proactive in seeking special funding to assist implementation efforts.

Several post-disaster mitigation activities are "automatically" implemented in the event of a Presidential Disaster Declaration. One of the state's most notable activities involves the activation of the Minnesota Recovers Disaster Task Force. The task force is comprised of both state and federal agencies<sup>2</sup>, and is chaired by the Department of Homeland Security and Emergency Management. In the event of a Presidential Disaster Declaration, all or part of the task force is activated and normally meets on a weekly or monthly basis. The meetings facilitate a coordinated and timely distribution of state/federal post-disaster recovery/mitigation funds by

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<sup>1</sup> Defined as damage greater than 50% from one event.

<sup>2</sup>The state and federal agencies requested to provide a representative for the Minnesota Recovers Disaster Task Force will generally include those that typically provide personnel to serve on an Interagency Hazard Mitigation Team/Hazard Mitigation Survey Team and/or a damage survey team. These members include Minnesota Department of Public Safety's Division of Emergency Management, FEMA, Department of Natural Resources, Department of Trade and Economic Development, Housing Finance Agency, Pollution Control Agency, and the state Historic Preservation Office. In addition, other agencies that have applicable programs, regulations, and/or funding may be asked to provide a representative. The specific agencies selected will be determined by the nature of the disaster.

establishing mutually agreed upon (project) priorities, identifying eligible projects, and mixing and maximizing available funds in order to implement projects.

Another post-disaster mitigation activity involves the implementation of state and federal disaster recovery assistance and hazard mitigation programs, including the FEMA Programs and other Federal and State programs. More information on FEMA can be found at <http://www.fema.gov/>.

**RELATED DOCUMENTS**

The following documents have been used in compiling information for this All-Hazard Mitigation Plan:

**Table 1.1 Documents Applicable to Hazard Mitigation in Big Stone County**

| <b>Name of Plan</b>                        | <b>Date Completed or Updated</b> | <b>Available</b>                   | <b>Relevant Information</b>  |
|--|----------------------------------|------------------------------------|--|
| Minnesota State Hazard Mitigation Plan     | 2014                             | MN Department of Public Safety     | Risk assessment, hazard profiles, county plan must conform to State Hazard Mitigation Plan |
| Big Stone County Comprehensive Plan        | 2002                             | Planning and Zoning                | Population profile, population projections, vision statement                               |
| Big Stone County Land Management Ordinance | 1998                             | Planning and Zoning                | Land use, general info to obtain permits   |
| Big Stone County Flood Ordinance           | 2006                             | Planning and Zoning                | Regulating flood areas and identifying flood areas   |
| Ortonville Comprehensive Plan              | 2008                             | City of Ortonville                 | Emergency operation plans, responsibility, critical facilities                             |
| Graceville Comprehensive Plan              | 2002                             | City of Graceville                 | Population profile, city land statistics, and maps   |
| Big Stone County Water Plan                | 2014                             | Planning and Zoning                | Water and wastewater information   |
| Minnesota River Basin Plan                 | 2001                             | Minnesota Pollution Control Agency | Pollution, ground water, and clarity   |

### *THE PLANNING PROCESS*

Big Stone County chose to engage in a comprehensive planning process to update its All-Hazard Mitigation Plan for several reasons: first, as a process, it helps the county determine its current state – social, economic and environmental trends in addition to the hazards that affect the county; second, it lays out a process that will guide the county on how it deals with both current and potential hazards; and third, it gives the public an opportunity to decide what projects they want the county and cities to complete in the future.

After passage of the Disaster Mitigation Act of 2000, the county board contracted with the Upper Minnesota Valley Regional Development Commission (UMVRDC) to write the original grant and County Hazard Mitigation plan. The Big Stone County Emergency Manager, Jim Hasslen, was in charge of project coordination between the county and cities. All cities within the county participated in the original plan through adopted participation resolutions and task force delegates. Big Stone County completed and adopted its initial All-Hazard Mitigation Plan, with FEMA approval, in May 2005.

An additional requirement of the Disaster Mitigation Act of 2000 requires a full All-Hazard Mitigation Plan update within five-years of adoption. To meet this requirement, Big Stone County again contracted with the UMVRDC to write the plan update grant in 2008 and complete an All-Hazard Mitigation Plan update for the county by July 2010. In 2013, Big Stone County and the UMVRDC collaborated to complete a plan update for 2015. Big Stone County requested the continued participation from all cities within the county in updating the All-Hazard Mitigation Plan. The chart below provides information specifying county and city and participation in the 2015 plan update process.

**Table 1.2 Big Stone County & Cities Participation in All-Hazard Mitigation Plan Update**

| Jurisdiction | Adopted Current Plan (2010) | Documented Participation in Planning Process | Task Force Mtg. 1 (7/24/2014) | Task Force Mtg. 2 (9/18/2014) | Task Force Mtg. 3 (11/13/2014) | Task Force Mtg. 4 (5/21/2015) |
|--------------|-----------------------------|--|-------------------------------|-------------------------------|--------------------------------|-------------------------------|
| BSC          | x                           | x  | x                             | x                             | x                              | x                             |
| Barry        | x                           | x  |                               |                               |                                |                               |
| Beardsley    | x                           | x  |                               |                               |                                | x                             |
| Clinton      | x                           | x  | x                             |                               |                                |                               |
| Correll      | x                           | x  |                               |                               |                                |                               |
| Graceville   | x                           | x  |                               | x                             |                                | x                             |
| Johnson      | x                           | x  |                               |                               |                                |                               |
| Odessa       | x                           | x  |                               |                               |                                |                               |
| Ortonville   | x                           | x  | x                             | x                             | x                              | x                             |
| Townships    | x                           | x  | x                             | x                             |                                | x                             |

In the spring of 2014, staff from the UMRDC met with Jim Hasslen and Dawn Koch, the Big Stone County Emergency Managers, to begin discussions on how to accomplish the county All-Hazard Mitigation Plan update. At this meeting, Big Stone County decided to complete a comprehensive update to the Big Stone County All-Hazard Mitigation Plan to improve every chapter of the plan, with a large emphasis on adding a Hazus Flood Analysis to the plan. Chapter 3: Hazard Inventory was updated with hazardous event occurrences from 2010 to 2014, when data was available. The Local Task Force provided information on new hazards not included in the initial plan. The Risk Assessment Chapter was updated using a ranking activity completed by Local Task Force members and includes an updated historical account of frequency, severity, and economic/human impacts. The Goals, Objectives, and Mitigation Strategies Chapters were updated by addressing each strategy of the previous plan and determining its current status. Following existing strategies, new goals, objectives and strategies were discussed. This section is divided between natural and technological hazards. The city-specific mitigation strategy lists were also updated and can be found in Appendix 2. Finally, the Plan Maintenance/Implementation Chapter (Chapter 7) was reviewed by the Local Task Force and Emergency Manager to determine necessary updates.

To accomplish this plan update, Big Stone County created a Local Hazard Mitigation Task Force to foster coordination, provide direction to the planning process, and ultimately develop the county's All-Hazard Mitigation Plan. Members appointed to the Local Task Force by Jim Hasslen, Big Stone County Emergency Management Director, included the County staff, County Commissioners, the County Administrator, representatives from participating cities and townships, as well as school superintendents, hospital administrators, utility company representatives, and more. In order to solicit other potential task force members and special interested parties, press releases were sent to newspapers (see Appendix 12) in the county discussing the upcoming All-Hazard Mitigation plan update process and contact information for anyone interested in the joining the task force or providing additional input.

### **Big Stone County Hazard Mitigation Task Force**

**Jim Hasslen**, Big Stone County Emergency Director

**Dawn Koch**, Big Stone County Assistant Emergency Director

**Walter Wulff**, Big Stone County Commissioner

**Wade Athey**, Big Stone County Commissioner

**Brent Olson**, Big Stone County Commissioner

**Roger Sandberg**, Big Stone County Commissioner

**Joseph Berning**, Big Stone County Commissioner

**Darren Wilke**, Big Stone County Environmental Officer

**Nick Anderson**, Big Stone County Engineer

**John Haukos**, Big Stone County Sheriff

**Neila Gary**, City of Barry

**Mary Sykora**, City of Beardsley Mayor

**Martin Heck**, City of Beardsley Maintenance

**David Stotesbery**, City of Clinton Clerk

**Shirley Finberg**, City of Clinton Mayor  
**Dianne Keopp**, City of Correll Mayor  
**Joshua Stock**, City of Correll Water Operator  
**Scott Bauer**, City of Graceville Clerk  
**Audrey Rahrlien**, City of Graceville Mayor  
**Donald Johnsrud**, City of Johnson  
**Elaine Johnsrud**, City of Johnson  
**Catherine Teske**, City of Odessa Mayor  
**Jim Hasslen**, City of Ortonville Council Member

**Richard Guse**, Akron Township  
**Roger Rheingans**, Akron Township  
**Greg Athey**, Almond Township  
**Milt Stenstuen**, Artichoke Township  
**Steve Jagow**, Artichoke Township  
**Donald Diekmann**, Browns Valley Township  
**William Stallman**, Foster Township  
**Edward Holker**, Foster Township  
**Terry Gillespie**, Malta Township  
**Diane Vogt**, Moonshine Township  
**Paul Maas**, Odessa Township  
**Wayne Athey**, Prior Township  
**Mark Kleindl**, Toqua Township

**Becky Pansch**, Graceville Hospital Emergency Preparedness  
**Neva Foster**, Ortonville Hospital Emergency Preparedness  
**Dianne Radermacher**, Upper Minnesota River Watershed  
**Amber Amdahl**, Countryside Public Health  
**Gloria Tobias**, Countryside Public Health  
**Vicki Grimli**, Ortonville and Graceville Public Libraries  
**Jeanne Krueger**, Prairie Five Big Stone County  
**Pam Rud**, Big Stone County Family Services Director

While required by the Disaster Mitigation Act of 2000, the county emphasizes public participation in the plan update as it is a key way to ensure ongoing support for the plan. The general public was invited to two meetings and was notified through press releases sent to the newspaper prior to these meetings. At these meetings, the public was invited to review and provide comments on the draft plan chapters.

The planning process occurred over a twelve-month period. During that time, the Local Task Force met four times. Individuals involved in the public meetings had two primary responsibilities: 1) to comment on draft stages of the plan and 2) provide input on the next stages of the plan. It was important to include long-time residents of the county in the process for a historical perspective. As noted, press releases were sent out for all of our public meetings to local and neighboring newspapers and local radio stations. The UMVRDC's telephone number was offered as a point of contact for the public if they had questions on how or why to get involved in the mitigation process, or could not attend the meetings in person but still had input for the plan.

The first Local Task Force meeting was held on July 24, 2014 in Clinton, MN to identify potential hazards and perform a hazard inventory. To publicize the meeting and introduce the Hazard Mitigation Plan update process, a press release was sent to local newspapers prior to the meeting. Twelve people attended the first Local Task Force meeting and provided information on recent hazardous events and new hazards previously left unconsidered. Gaps and deficiencies were also brought up to date for each hazard type. Cities with representatives in attendance at this task force meeting were provided with a city survey in order to document any changes over the last five years. A second meeting was announced at the end of this meeting.

The second Local Task Force Meeting was held on September 18, 2014 in Clinton, MN. All Local Task Force members were notified of this meeting in advance. Prior to the meeting, the task force was provided with hazard inventory ranking information that provided a historical perspective on past hazardous events. During the meeting, the twelve task force members present performed a ranked hazard inventory, included in Chapter 4. The Local Task Force team members were informed that the following meeting would occur after cities completed individual risk assessments and reviews of the previous plan's mitigation strategies.

From September 2014 through March 2015, all cities in Big Stone County participated in the update of the All-Hazard Mitigation Plan by providing updated information for land use surveys, city-specific risk assessments, and mitigation strategy surveys. The information was gathered through individual city meetings with mayors, city staff, city council members, and emergency response workers. The land use surveys provided city-specific information regarding land use changes and development trends, while the risk assessment surveys identified specific risks that may affect a city and determined city vulnerability to hazardous events. The mitigation strategy survey identified which mitigation strategies a city had completed, actively participated in, or wished to remove from its list. Finally, each city was asked to create a ranked mitigation strategy list for their municipality.

The third Local Task Force meeting was held on November 13, 2014 in Clinton, MN to discuss the final hazard prioritization and review mitigation strategies from the previous All-Hazard



Mitigation Plan. The Local Task Force was presented with their hazard prioritization (derived from the hazard inventories completed at the second meeting) and held a discussion about the final result. The public and task force were presented with the previous plan's hazard prioritization for comparison. A group participation activity was then completed, where Local Task Force members were asked to comment on the previous plan's mitigation strategies and determine (to the best of their knowledge) whether each strategy was completed, considered an recurring strategy (no end of strategy), not yet completed the strategy was still feasible, or if a strategy was no longer relevant. The final chapter on plan maintenance and implementation was also reviewed at this meeting.

Following the third meeting, electronic copies of the plan chapters were sent to Local Task Force members for comment. This comment period was offered to the general public through a newspaper press release by visiting the UMRDC website to review the plan online. Contact information for questions or comments was provided in the press release. During this time, the plan was also reviewed by county staff including the highway department and planning and zoning.

The fourth Local Task Force meeting took place on May 26<sup>th</sup>, 2015 in Clinton. This meeting was open to the public for questions and comments on the draft plan. The public meeting was advertised through a press release in the local newspaper. The Big Stone County Emergency Manager was present throughout the meeting to offer information and incorporate the public's comments into the All-Hazard Mitigation Plan. The Local Task Force will be informed that the final draft version of Big Stone County's All-Hazard Mitigation Plan will be sent to the Federal Emergency Management Agency (FEMA) for review. The Task Force will be informed when the comments are received.

Prior to Big Stone County adoption, a public hearing will be held during a Big Stone County Planning Commission meeting to discuss the plan and send a recommendation to the Big Stone County Board of Commissioners for approval. Once the All-Hazard Mitigation Plan is approved by the County Board, all corresponding participating cities shall adoption the plan within one year of the County adoption. Each city will be sent an electronic copy of the plan and staff will be available at a city council meeting to answer questions and facilitate the local adoption of the county's plan. A copy of the Big Stone County resolution adopting the All-Hazard Mitigation Plan and a list of the resolutions passed by the county's cities will be included in Appendix 13.

The following tables summarize Big Stone County’s prioritized hazards and strategies. The processes that defined these priorities are detailed in Chapters 4-6.

**Table 4.12 Overall Hazard Priority Levels in Big Stone County**

| <b>Hazard</b>  | <b>Big Stone County</b> | <b>Special Areas of Concern</b>                             |
|--|-------------------------|---|
| <b>1. Flash/Other Flooding</b>   | <b>3.18</b>             | <b>County, Clinton, Ortonville, Graceville</b>              |
| <b>2. Summer Weather</b><br>Thunderstorm, Lightening, Hail, Wind (excluding tornado)<br>Extreme Heat | <b>2.86</b>             | <b>County</b>   |
| <b>3. Tornado</b>  | <b>3.17</b>             | <b>County</b>   |
| <b>4. Winter Weather</b><br>Blizzard, Ice Storms, Heavy Snow, Extreme Cold                           | <b>2.34</b>             | <b>County</b>   |
| <b>5. Water Supply Contamination</b>   | <b>3.17</b>             | <b>County</b>   |
| <b>6. Hazardous Materials</b>  | <b>3.07</b>             | <b>All Cities</b>   |
| <b>7. Structure Fire</b>   | <b>2.93</b>             | <b>County</b>   |
| <b>8. Civil Disturbance/ Terrorism</b>   | <b>2.65</b>             | <b>County</b>   |
| <b>9. Drought</b>  | <b>2.59</b>             | <b>County</b>   |
| <b>10. 100-year Floods</b>   | <b>2.33</b>             | <b>County, Ortonville, Odessa</b>                           |
| <b>11. Infectious Disease</b>  | <b>2.26</b>             | <b>County</b>   |
| <b>12. Wastewater Treatment System Failure</b>   | <b>2.09</b>             | <b>County</b>   |
| <b>13. Wildfire</b>  | <b>2.07</b>             | <b>County, CREP &amp; CRP Lands, grasslands and forests</b> |
| <b>14. Dam Failure</b>   | <b>2.06</b>             | <b>Odessa</b>   |

**Table 5.3 BSC Prioritized Strategies (Natural Hazards)**

| <b>Ranked</b> | <b>Hazard</b>                         | <b>Strategy</b>  | <b>Affected Participating Jurisdiction</b> |
|---------------|---------------------------------------|--|--|
| 1             | Violent storms & Extreme Temperatures | Underground burial of power lines.   | County, All Cities, Minnesota Valley REC   |
| 1             | Violent storms & Extreme Temperatures | Build safe rooms at city, county, and state campgrounds and parks, and other locations of unprotected populations (i.e. schools, manufactured home parks, all recreational parks, religious camps, apartment buildings, nursing homes, medical facilities, etc.) to protect users from violent storms. | All Cities and County                      |
| 1             | Violent storms & Extreme Temperatures | Research and obtain funding for implementing cell phone notifications for severe weather events and other hazardous events.  | County Emergency Manager and County        |
| 2             | Drought                               | Establish and adopt an ordinance to restrict water use in times of drought.  | County and All Cities                      |
| 2             | Wildfire                              | Encourage carefully controlled burns. FSA allows controlled burns on CREP and CRP. The FSA offers cost share for controlled burns on CREP and CRP land. Encourage landowner responsibility.  | FSA, SWCD, DNR, USFWS                      |
| 2             | Erosion                               | Review, update, and enforce zoning ordinances that prohibit building in area that are susceptible to water erosion, landslides, and slope failure.   | County, All Cities                         |
| 3             | Flooding                              | Identify roads that continually flood during spring and work to find funding resources to raise or stabilize roads as needed.  | County Engineer and Townships              |
| 3             | Flooding                              | Monitor and clear waterways, culverts, and ditches.  | County Engineer and Township               |
| 3             | Wildfire                              | Encourage DNR to give training locally. Look for funds for training if necessary.  | DNR, All City Fire Departments             |

**Table 6.3 BSC Prioritized Strategies (Manmade/Technological Hazards)**

| <b>Ranked</b> | <b>Hazard</b>                   | <b>Strategy</b>  | <b>Affected Participating Jurisdiction</b> |
|---------------|---------------------------------|--|--|
| 1             | Hazardous Materials             | Encourage that emergency responder groups, fire departments, and emergency managers are trained to at least the Hazardous Material Awareness Level.  | All Cities                                 |
| 1             | Hazardous Materials             | Review and update the Big Stone County Emergency Operations Plan that outline procedures for dealing with hazardous material on an annual basis.   | County EM                                  |
| 2             | Civil Disturbance/<br>Terrorism | Schedule discussions with school leaders, hospital administrators, law enforcement and local units of government to address performance in response to terrorism (such as active shooters, bombs, chemical, cyber-attacks, etc.) focusing on schools, local government, and hospitals. | County EM,<br>Law Enforcement              |
| 3             | Water Supply Contamination      | Provide adequate drinking water in the event of ground water contamination.  | County EM                                  |
| 3             | Structure Fire                  | Inspect abandoned buildings and remove as needed.  | County                                     |

## CHAPTER 2: COMMUNITY PROFILE

### *RELATED DOCUMENTS*

The Community Profile is an important piece of the updated Big Stone All-Hazard Mitigation Plan. This profile is used as a factual data point and includes the most recent available data.

To create this Community Profile, other Big Stone County documents were referenced including:

- Comprehensive Plan
- Water Plan
- Zoning Map
- Zoning Ordinance
- Land Use Map
- FEMA Regulations

The coordinated use and implementation of these combined documents create a sound foundation for all hazard mitigation projects, plans, and activities to ensure they are tied to the county's land use and environmental regulations.

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### *GENERAL COUNTY PROFILE*

#### **Location**

Big Stone County is approximately 500 square miles located in southwestern Minnesota. It is approximately 212 miles northwest of Minneapolis- St. Paul and 132 miles west of St. Cloud. Big Stone County is bordered by Traverse County to the north, Stevens County to the northeast, Swift County to the east, Lac qui Parle County to the south, and state of South Dakota to the west.

#### **History**

Research has found that men lived on the shores of Big Stone Lake and Lake Traverse nearly 12,000 years ago. A skeleton, thought by some investigators to be one of these people, was exhumed from a gravel pit in Browns Valley Village, a few miles north of the Big Stone County line in 1934. Six flint artifacts were found with the skeleton, now known as "the Browns Valley Man". These tools are classified as the oldest type found in America to date.

In 1874, Big Stone County officers were appointed, the boundaries of three commissioner districts were laid out, and Ortonville was chosen as the county. As railroad companies in Minnesota established settlements along their rail lines, Big Stone County saw a dramatic increase in population from 200 people in 1870 to 9,000 people in 1910. The only city in Big Stone County that is not located along a railroad is the city of Clinton.

In 1881, the cities of Ortonville and Graceville were incorporated and the city of Correll was recorded. Also in 1881, a legislative act declared Big Stone County legally organized and Ortonville was selected as the county seat by majority vote. The other cities were incorporated

as follows: city of Clinton in 1890, city of Beardsley in 1891, city of Odessa in 1895, city of Barry in 1900, and city of Johnson in 1903.

## Physical Characteristics

### *Climate and Precipitation*

Big Stone County is characteristic of the Continental Climate Zone with its wide variation in temperature. Big Stone County experiences short, warm summers and cold winters. The average high in Big Stone County is 82° F in July and the average low is 1° F in January.

Big Stone County also experiences extreme temperatures. The warmest day recorded in Big Stone County was 108° F in 1988. The coldest day on record was –36° F in 1994. More specific temperature averages and records can be found in Table 2.1 below.

**Table 2.1 BSC Average Monthly Temperature from 1971 - 2013 & Record Highs & Lows from 1959 - 2013**

| Month     | Average High | Average Low | Mean  | Record High          | Record Low           |
|-----------|--------------|-------------|-------|----------------------|----------------------|
| January   | 20° F        | 1° F        | 11° F | 63° F (1981)         | -33° F (1977)        |
| February  | 26° F        | 7° F        | 17° F | 60° F (1987)         | <b>-36° F (1994)</b> |
| March     | 37° F        | 20° F       | 29° F | 77° F (2012)         | -30° F (1962)        |
| April     | 55° F        | 35° F       | 45° F | 97° F (1980)         | -1° F (1975)         |
| May       | 69° F        | 47° F       | 58° F | 95° F (1987)         | 22° F (1976)         |
| June      | 77° F        | 57° F       | 67° F | 106° F (1988)        | 35° F (1969)         |
| July      | 82° F        | 62° F       | 72° F | <b>108° F (1988)</b> | 41° F (1972)         |
| August    | 79° F        | 59° F       | 69° F | 105° F (1959)        | 36° F (1964)         |
| September | 71° F        | 50° F       | 60° F | 100° F (1959)        | 21° F (1965)         |
| October   | 57° F        | 37° F       | 47° F | 92° F (1963)         | 11° F (1991)         |
| November  | 39° F        | 22° F       | 31° F | 78° F (1978)         | -18° F (2013)        |
| December  | 25° F        | 8° F        | 16° F | 60° F (1998)         | -31° F (1993)        |

Source: Midwestern Regional Climate Center Monthly Data Summary. Data pertains to station at Artichoke Lake.

As found in Table 2.2, the average annual precipitation in Big Stone County is 24 inches. About 63% of the annual precipitation occurs between May and September. Snowfall in winter months averages approximately 42 inches.

The sun shines 65% of the time in summer and 45% percent in winter. Prevailing winds are from the south.

**Table 2.2 Big Stone County Average Monthly Precipitation & Snowfall  
from 1971 - 2013**

| Month         | Precipitation in Inches | Snowfall in Inches |
|---------------|-------------------------|--------------------|
| January       | 0.80                    | 9.40               |
| February      | 0.80                    | 8.00               |
| March         | 1.46                    | 7.70               |
| April         | 2.10                    | 2.70               |
| May           | 2.71                    | 0.00               |
| June          | 3.74                    | 0.00               |
| July          | 3.72                    | 0.00               |
| August        | 2.90                    | 0.00               |
| September     | 2.29                    | 0.00               |
| October       | 2.22                    | 0.80               |
| November      | 1.07                    | 5.80               |
| December      | 0.66                    | 7.40               |
| <b>Annual</b> | <b>24.47</b>            | <b>41.80</b>       |

Source: Midwestern Regional Climate Center Monthly Data Summary. Data pertains to station at Artichoke Lake.

### *Geology and Topography*

Big Stone County is comprised of approximately 500 square miles of land and water, all influenced by glaciation. The county is covered by a mixture of glacial till (a combination of clay, sand, and silt along with gravel, cobbles and boulders), glacial lake sediments (particles consisting primarily of clay and silt), and glacial outwash (sand and gravel-sized particles).

The topography of the Big Stone County is closely related to glacial activity, which is responsible for most of its natural features. The county is characterized by a gently rolling glacial drift plain, containing many closed depressions occupied by an abundance of small lakes and wetlands. A majority of the upland prairie is used for agriculture. Tree cover is concentrated on the banks of the Minnesota River Valley and its tributaries and around many of the lakes.

### *Soil*

Soils develop from the breakdown of rock minerals and from plant and animal remains. The changing of rock into soil occurs over thousands of years. The soil in Big Stone County has been created from deposits originally left by glaciers. As an agricultural county, soils are one of its most valuable resources.

Big Stone County has a wide variety of soil types due to the assortment of glacial material left behind. In addition, the county's diverse landforms all contribute to a range of soil characteristics. Other important factors involved in the formation of Big Stone County's soils were climate, vegetation, and topography.

According to the Big Stone County Water Plan (2014), all of Big Stone County is prone to wind and/or water erosion. Water erosion results from soil removed from its original location by the force of water to lower slopes and plots. The potential for wind erosion occurs when wind velocities increase above 12 mph. Soil erosion by wind or water is dependent on soil type and

amount of protective cover. For additional information refer to the Water Plan (2014), Comprehensive Plan, and Soil Survey.

*Land Use and Cover*

Today, land use in Big Stone County is divided into four general categories: agricultural land, woodland, water and wetlands, and other, which includes urban uses. Agriculture is the largest land use composing about 86% of the county land. Woodland covers 3%, and water and wetlands make up 6% of the land. Four percent of the land is categorized as other. A more detailed land use breakdown is shown in Table 2.3 below.

**Table 2.3 Big Stone County Land Use & Cover**

| Land Use                    | Acreage        | Percentage of Total |
|-----------------------------|----------------|---------------------|
| Urban and Rural Development | 4,668          | 1%                  |
| Cultivated Land             | 251,987        | 75%                 |
| Hay/Pasture/Grassland       | 39,384         | 12%                 |
| Brush Land                  | 790            | 0.2%                |
| Forested                    | 9,431          | 3%                  |
| Water                       | 19,095         | 6%                  |
| Bog/Marsh/Fen               | 12,545         | 4%                  |
| Mining                      | 270            | 0.1%                |
| <b>Total</b>                | <b>338,170</b> | <b>100%</b>         |

Source: Minnesota Land Management Information Center "Minnesota Land Use and Cover: 1990's Census of the Land (8 category statewide)".

**Agriculture.** Agricultural activities are a vital industry in Big Stone County. According to the U.S. Department of Agriculture, the total market value of Big Stone County's agricultural products sold in 2012 exceeded \$164 million. This was a 47% increase from 2007. In comparison, the total increase in Minnesota for the same time period was 38%, putting Big Stone County well above the state as a whole in terms of agricultural growth.

In 2012, cropland sales accounted for 84% of the market value of Big Stone County's agricultural products sold, while livestock sales accounted for 16%. In comparison, 65% of agricultural products sold in Minnesota were from cropland, while 35% was from livestock. The high percentage of cropland sales in Big Stone County shows that, while feedlots are becoming more prevalent in other counties, cropland continues to be the mainstay of the agricultural economy in Big Stone County. Table 2.4 outlines the changes that have taken place in the last 100 years in Big Stone County:



**Table 2.4 BSC Crops by Type**

|              | <b>Corn-1919</b> | <b>Corn - 2012</b> | <b>Wheat-1919</b> | <b>Wheat-2012</b> | <b>Oats-1919</b> | <b>Oats-2012</b> |
|--------------|------------------|--------------------|-------------------|-------------------|------------------|------------------|
| Acres        | 25,738           | 88,680             | 79,517            | 12,448            | 30,343           | 50               |
| Bushels/acre | 26               | 156.6              | 7.8               | 52.1              | 24               | 79.2             |

Source: USDA National Agriculture Statistics Services: Census of Agriculture, 1919 & 2012

Eighty percent of the total cropland in Big Stone County is harvested cropland. Corn, soybeans, and sugar beets are the main crops grown. Organic farming includes smaller crops such as vegetables, beef, dairy, and other niche markets. Organic Farming has grown significantly in the past 20 years.

A recent trend in land use in some parts of the county has resulted in the loss of prime farmland to industrial and urban uses, shown in Table 2.5 below. The loss of prime farmland to other uses adds pressure on marginal lands, which generally are less productive because they are more erodible, subject to drought, or difficult to cultivate. Government programs such as CPR and CREP have been established to keep marginal land out of production and have helped to prevent erosion. These programs also work to improve water quality in the region.

**Table 2.5 BSC Farm Comparisons from 1987-2012**

| <b>Farms</b>                                | <b>1987</b> | <b>1992</b> | <b>1997</b> | <b>2002</b> | <b>2007</b> | <b>2012</b> |
|---|-------------|-------------|-------------|-------------|-------------|-------------|
| Farms (number)                              | 504         | 460         | 420         | 446         | 452         | 400         |
| Land in farms (acres)                       | 277,071     | 262,207     | 253,988     | 274,038     | 252,291     | 248,778     |
| Land in farms, average size of farm (acres) | 550         | 570         | 605         | 614         | 558         | 622         |

Source: USDA, National Agricultural Statistics Service, 2014

CREP, CRP and other Government Programs. The Conservation Reserve Program (CRP) is the federal government’s single largest environmental improvement program and one of its most productive and cost-efficient. There are 7,371 acres in Big Stone County enrolled in CRP, according to the Minnesota Board of Soil and Water Resources 2013.

Established in 1985, the CRP encourages farmers to voluntarily plant permanent areas of grass and trees on land that needs protection from erosion. The purpose of planting is meant to act as windbreaks or in places where vegetation can improve water quality or provide food and habitat for wildlife. Farmers must enter into contracts with the Commodity Credit Corporation (CCC) lasting between ten and fifteen years. In return, they receive annual rental payments, incentive payments for certain activities, and cost-share assistance to establish the protective vegetation. Land eligible for enrollment includes cropland that is physically and legally capable of being cropped in a normal manner and that has been planted or considered planted to an agricultural commodity in any two years from 1992 to 1996. The acreage must also be determined eligible and suitable for any of the following practices: filter strips, riparian buffers, shelter belts, field

windbreaks, living snow fences, grass waterways, shallow water areas for wildlife, salt-tolerant vegetation, and wellhead protection areas.

The Reinvest in Minnesota (RIM) Program protects water quality, reduces soil erosion, and enhances fish and wildlife habitat through retiring marginal lands from agricultural production and restoring previously drained wetlands. The program pays landowners a percentage of the value of their land to enroll it in a conservation easement. Types of land eligible for the program include drained wetlands (for restoration), highly erodible cropland, riparian agricultural land, pastured hillsides and sensitive ground water areas. The state legislature created the RIM Program in 1986 as a response to the concern of a coalition of environmental, conservation, and agricultural groups. As of August 2013, Big Stone County has 683 acres enrolled in the RIM program (Minnesota Board of Soil and Water Resources 2013).

One way the county has been able to address pollution issues are with the Minnesota River Conservation Reserve Easement Program (CREP). CREP gives landowners an opportunity to voluntarily enroll marginal cropland in a conservation easement program with 15 annual payments and a one-time bonus payment. Big Stone County has 772 acres enrolled in the CREP program (Minnesota Board of Soil and Water Resources 2013). With this program, landowners in the Minnesota River Basin can get paid to take cropland out of production as a way to improve water quality and wildlife habitat.

CREP combines the federal Conservation Reserve Program (CRP) with the State RIM Reserve Program. The program's goal is to protect and enhance up to 100,000 acres of environmentally sensitive land in the 37-county Minnesota River Basin; presently as of August 2013 Minnesota has 110,858 acres involved in the program. The Minnesota River CREP ended in September 2002.

The Wetlands Reserve Program (WRP) is the federal government's wetlands restoration program. It is a voluntary program that offers landowners the means and the opportunity to protect, restore, and enhance wetlands on their property. The USDA Natural Resources Conservation Service (NRCS) manages the program as well as provides technical and financial support to help landowners who participate in WRP. In all cases, the landowner retains ownership and responsibility for the land, including any property taxes based on its reassessed value as wetland or nonagricultural land. The landowner controls access to the land; has the right to hunt, fish, trap, and pursue other appropriate recreational uses; and may sell or lease land enrolled in WRP. Big Stone County has 1,120 acres in permanent easement through WRP.

Waterfowl Production and Wildlife Management Areas. Waterfowl Production Areas (WPAs) preserve wetlands and grasslands that are critical to waterfowl and other wildlife. These public lands, managed by the U.S. Fish and Wildlife Service, were included in the National Wildlife Refuge System in 1966 through the National Wildlife Refuge Administration Act. Part of the money collected through purchasing a Duck Stamp in Minnesota goes toward the acquisition and maintenance of these areas. Wildlife Management Areas are regulated by the Department of Natural Resources. Big Stone County has 83 Waterfowl Production and Wildlife Management Areas.

Big Stone National Wildlife Refuge. The Big Stone National Wildlife Refuge is located approximately two miles southeast of Ortonville. The 11,586-acre refuge was established in 1975 and is part of the Big Stone-Whetstone River Project of Minnesota and South Dakota authorized under the Flood Control Act of 1965. The Army Corps of Engineers purchased the lands in fee title in 1971 and built a dam to create a large reservoir. The lands were then transferred to the U.S. Fish and Wildlife Service in 1975. Through a cooperative agreement, the Army Corps of Engineers still maintains the water control facilities, but the Service has management responsibility for all refuge lands.

The dam in the Minnesota River created an additional 4,250 acres of wetlands, which provide resting places for migrating waterfowl and shorebirds and homes for summer residents such as common egrets, great blue herons, cormorants and many species of ducks.

The refuge still contains approximately 1,700 acres of native or unplowed prairie. Big Stone County has a great amount of tall prairie grass with wide expanses of grassland and only occasional oak trees. As many exotic grasses, woody shrubs and flowers seed themselves among native prairie species, refuge staff conducts controlled burns to restore and promote vigorous growth of native prairie plants.

#### *HYDROLOGY*

Big Stone County has abundant surface water resources with a large number of lakes, wetlands and numerous streams. The surface water bodies receive runoff and act as temporary reservoirs, making them very important in flood prevention and control. Big Stone County has a dozen lakes amounting to more than 300 acres. Approximately 30 square miles of the county's total 532 square miles are covered with water.

The Upper Minnesota River Watershed is estimated to have a positive water balance during both normal and dry years. A negative water balance exists when demand (withdrawal) exceeds input (precipitation, stream flow, rechargeable ground water). The average water supply and in stream flow for the Upper Minnesota River Watershed is about 49,000 acre-feet annually; the annual usage is about 3,000 acre-feet. The Bois de Sioux and the Pomme de Terre Watersheds both have only a trace of use and have stream flows that are equivalent to their annual availability of water.

Groundwater. Principal aquifers within the county's glacial drift outwash are of two main types: surficial drift aquifers, which are unconfined and are usually shallow and buried drift aquifers, which are pockets of confined sand and gravel separated by glacial till. Surficial drift aquifers are localized and usually do not cover a wide area. Buried drift aquifers are usually found at deeper depths. The county also has two minor aquifer types: Cretaceous and Precambrian. Both of these minor aquifers are contained within bedrock. These bedrock aquifers differ from the outwash aquifers in that they typically deeper and do not yield as many gallons per minute.

*Wellhead Protection.* Wellhead protection is a means of protecting public water supply wells by preventing contaminants from entering an area that contributes water to the well or well field over a period of time. The wellhead protection area is determined by using geologic and hydrologic criteria, such as physical characteristics of aquifers and the effects that pumping has on the rate and direction of groundwater movement. A management plan is developed for the wellhead protection area that includes inventorying potential sources of groundwater contamination, monitoring for the presence of specific contaminants, managing existing and future lands, and water uses that pose a threat to ground water quality. The goals of wellhead protection are to reduce use of costly treatment facilities, avoid having to drill new wells, and to avoid the need treat contaminated ground water.

Public water suppliers have completed a wellhead protection plan adopted by the Minnesota Department of Health for Ortonville and Odessa (Minnesota Department of Agriculture, 2015). A public water supplier to be brought into the program will be the Big Stone Hutterite Colony. Other public water suppliers, and their assigned current phasing number, are: Beardsley (273), Lismore Colony (286), Graceville (648), Clinton (716), Correll (861), Big Stone Hutterite (887), and Johnson (908) (the lower the phasing number the sooner the city will be implemented into the program).

*Surface Water.* For additional information on Big Stone County surface water, refer to the 2014 Big Stone County Water Plan and the 2002 Comprehensive Plan.

*Watersheds.* Big Stone County lies in three major watersheds: the Upper Minnesota River, the Bois de Sioux, and the Pomme de Terre. The Minnesota River drainage system covers almost 80% of the county. Major sub-watersheds draining into the Minnesota River include Fish Creek, Salmonsens Creek, Stony Run, and Five Mile Creek. The west branch of the Mustinka River into the Mustinka-Bois de Sioux Watershed drains the northeast portion of the county. The eastern corner of the county is drained by Drywood Creek into the Pomme de Terre Watershed.

*Wetlands.* The term "wetlands" refers to low depressions in the landscape covered with shallow and sometimes intermittent water. Wetlands are also commonly referred to as marshes, swamps, potholes, sloughs, shallow lakes, and ponds. Wetlands differ in size, shape, and types of wet environment and derive their unique characteristics from climate, vegetation, soils and hydrologic conditions. Some have surface water only in the springtime during thaws or after rainstorms, while others may form shallow lakes that rarely dry up. They are classified according to their depth of water, total area, and seasonal life span.

Originally, wetlands were located throughout the entire county. With the advent of intensive agriculture practices and the application of land drainage techniques, many of the wetlands located on lands that were flat and suited to agricultural use have been drained. As a result, there are now relatively few wetlands in the flat till plain areas of the county. Most of the remaining wetlands are found in the moraine areas of the northern half of the county where the wetlands have either been preserved or where drainage is not economically feasible.

Rivers. The Minnesota River is the only prominent river in Big Stone County. The mouth of the Minnesota River is the little Minnesota River that meets in Browns Valley just north of Big Stone County. The Minnesota then heads south into Big Stone Lake, a widening of the river.

Lakes. Big Stone County has three prominent lakes, East Toqua, Artichoke, and Big Stone. East Toqua Lake is located in Graceville in the south and southwestern part of the city. The northern shore of the lake is within Graceville’s corporate boundary and the southern end of the lake is located in Graceville Township. Big Stone Lake is located at the foot of Ortonville and forms the western border that separates Minnesota from South Dakota for 30 miles. Big Stone Lake is important to Ortonville for both its aesthetic value as well as its recreational value. Artichoke Lake is located on the eastern portion of the county, about 10 miles outside of Correll.

Efforts to maintain, control and improve the quality of Big Stone Lake have been ongoing for a number of years. Currently the Minnesota Pollution Control Agency Lake Water Quality Database lists Big Stone Lake’s swimming use as “non-supported.”

MPCA indicates that the lakes and streams are polluted with mercury, phosphorus, animal waste, and other contaminants. More specific information from the Minnesota Department of Natural Resources can be found in Table 6.

**Table 2.6 BSC Characteristics for Big Stone, East Toqua, & Artichoke Lakes**

| Lake Name  | Lake Area    | Littoral Area | Maximum Depth | Water Clarity |
|------------|--------------|---------------|---------------|---------------|
| Big Stone  | 12,610 Acres | 12,484 acres  | 16 Feet       | 8.63 Feet     |
| East Toqua | 428 Acres    | 428 Acres     | 9 Feet        | 2 Feet        |
| Artichoke  | 1,964 Acres  | 1,964 Acres   | 15.5 Feet     | 2 feet        |

Source: Minnesota Department of Natural Resources

Recreational Use of Water Resources. There are numerous recreational uses of surface water in Big Stone County. Hunting, canoeing, boating, and bird watching along Big Stone Lake and Marsh Lake are becoming popular activities. Big Stone Lake is a state canoe and boating route and the Minnesota River below the Lac qui Parle dam is a scenic river.

Pollution. As the surface waters in Big Stone County are limited, it is important to preserve and protect the water resources. The need to establish lake water quality criteria or standards have been recognized at the local, state, and federal levels of government. The Minnesota Pollution Control Agency (MPCA) is the primary agency charged with pollution monitoring, control, and abatement. The MPCA develops water quality standards for all water bodies in the state and sets effluent limits for each discharger that will maintain the appropriate standards.

Non-permitted waste disposal is a problem in some unincorporated areas. Sewage that is dumped directly into ditches contributes to the pollution problems of surface waters.

The Surface Water Toxic Control Program has identified for Section 304(1) of the Clean Water Act, Minnesota waters affected by pollutants. Point or non-point source discharges of toxicants

and conventional or non-conventional pollutants, both impact the north and south portions of Lac qui Parle Lake because of nutrient pollution. Artichoke and Big Stone Lake have poor water clarity.

*Drainage and Flooding.* Large amounts of public and private capital have been invested in draining water from the landscape. This infrastructure radically improves the drainage efficiency of the landscape that benefits agricultural production. Drainage has also changed hydrology in recent years. As water storage on the landscape is reduced, peak stream flows come faster and higher in response to rain events and run off. Another issue is the recent explosion of pattern tiling that has accelerated these conditions. Older drainage infrastructure and receiving waters are often not adequate to meet the new peak flows generated with pattern tiling. Water flowing into these tiles, ditches, streams and rivers exceed the capacity of receiving waters; water backs up on and floods other lands within the drainage system causing great economic damage.

Big Stone County has an elaborate system of public ditches as well as many private ditches that drain into the legal drain system. As the landscape hydrology has been altered, higher peak flows are carving out larger channels. Unfortunately, this often results in the destabilization of the riverbanks.

Debris can also add to flooding issues. Downed trees caused problems at various bridges over the Minnesota River in the last round of major flooding. The trees commonly float into bridges and then get caught in the bridges forming logjams. Contractors are hired to lift fallen trees over bridges and return them to the river downstream of the bridge. Usually, the result of such actions causes trees to flow into succeeding bridges, again needing services for removal. Large flood events can and do kill trees within the floodplain, including large cottonwood and maples. In subsequent flood events these standing dead trees may be knocked down and washed away.

In 1991, Minnesota legislation approved the Wetland Conservation Act (WCA). The Act moves toward its no-net-loss goal by requiring persons proposing to drain or fill a wetland to: try to avoid disturbing the wetland, try to minimize any impact to the wetland, or to replace any lost wetland functions and values. The basic requirement is that wetlands must not be drained or filled, wholly or partially, unless replaced by restoring or creating wetlands areas of at least equal public value under an approved replacement plan. The law mandates that counties and cities administer the Wetland Conservation Act. All cities in Big Stone County have by resolution requested the county to administer the Wetland Conservation Act within its incorporated boundaries. Big Stone County in turn has appointed the Big Stone Soil and Water Conservation District (SWCD) to administer this Act.

### *Climate Change*

The United States Environmental Protection Agency (EPA) defines climate change as any significant change in the measures of climate lasting for an extended period of time. It includes major changes in temperature, precipitation, wind patterns, or other effects, that occur over several decades or longer.

According to the EPA, the Earth's average temperature has risen by 1.4° F over the past century, and is projected to rise another 2 to 11.5° F over the next hundred years. Rising global temperatures are accompanied by changes in weather and climate. Several places have seen changes in rainfall, resulting in more floods, droughts, intense rain, and more frequent and severe heat waves. As these changes in weather and climate changes become more pronounced in the coming decades, they will likely present challenges to our society and our environment.

### **History of Climate Change in Big Stone County**

According to the Minnesota State Hazard Mitigation Plan 2014, climate change in Minnesota is already occurring in ways that will affect the environment, the economy and everyday life. Historical weather data show changing trends in some weather phenomenon over the past few decades, and future changes are likely. Intense study of these topics will continue into the future.

In addition, the state hazard mitigation plan provides historical climate trends for the Midwest and notes that

“The NOAA Technical Report NESDIS 142-3, Regional Climate Trends and Scenarios for the U.S. National Climate Assessment, provides physical climate information for use by the authors of the Third National Climate Assessment (NCA) report, in draft form as of late 2013. One section summarizes historical conditions in the U.S. Midwest and trends in temperature and precipitation metrics that are important in the region. The historical climate conditions are meant to provide a perspective on what has been happening in each region and what types of extreme events have historically been noteworthy, to provide a context for assessment of future impacts. Some key characteristics of the Midwest historical climate identified in this report that relate to the All-Hazard Mitigation Plan include:

- *Climatic and hydroclimatic phenomena that have major impacts on the Midwest include floods, severe thunderstorms, summer drought, heat, excess rain, heat waves and winter storms.*
  - *Historical, annual temperatures increased during the early 20th century to a peak in the 1930s, decreased into the 1960s/1970s, and increased thereafter. Annual temperatures have generally been well above the 1901-1960 average since the late 1990s and the decade of the 2000s is the warmest on record.*
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- *Precipitation has been near or above the 1901-1960 average for most years during the last 4 decades, and there have been no years with major precipitation deficiencies during the last 2 decades. The overall trend in annual precipitation is upward and statistically significant.*
  - *The frequency and intensity of extreme precipitation has increased, as indicated by multiple metrics of extremes, including the number of 5-year storms and total accumulated precipitation during the top 10 wettest days of the year.*
  - *Frequency of intense cold waves has been very low prior to the mid-1990s. Freeze-free season length averaged about 155-160 days before the 1930s; increased to about 160 days from the 1930s to 1980s; and since the 1980s has increased gradually and now averages about one week longer than during the 1930s to 1980s.*
  - *Frequencies of summertime minimum temperatures of 70°F or greater have increased in many of the larger urban areas in the region, equaling very high nighttime humidity. Statistically significant positive trends were found for five cities from 1950 to 2009.*

*• Recent heat waves, such as the 1995 event in Chicago which led to 700 fatalities, have been accompanied by very high humidity levels and high nighttime temperatures, but not quite as extreme daytime high temperatures (Kunkel et al. 1996; Rogers et al. 2007)”. (Department of Public Safety and Division of Homeland Security and Emergency Management 2014)*

Big Stone County is not exception to this phenomena and its location in the Midwest makes it subject to these historical climate trends that will continue in the future.

### **Climate Change Risks for Big Stone County**

Every four years, the United States Global Change Research Program publishes a National Climate Assessment Report (<http://nca2014.globalchange.gov/highlights/regions/midwest>) The 2014 report identified the following climate change impacts to the Midwest:

“Extreme heat, heavy downpours, and flooding will affect infrastructure, health, agriculture, forestry, transportation, air and water quality, and more. Climate change will also exacerbate a range of risks to the Great Lakes.”

According to the Minnesota State Hazard Mitigation Plan 2014, temperatures are rising and weather patterns are changing, with increases in severe weather events and extreme precipitation. As a result, more flooding, ice storms, drought, and higher night time temperature lows create the risks of flood damage, dangerous driving conditions and power outages due to downed power lines (Seeley presentation 2013), wild fire and health risks, and unsafe ice cover on lakes.

The state hazard mitigation plan also notes that climate change will likely have different effects on different geographical regions of the country as well as within the state of Minnesota. These effects may include relative temperature increases and precipitation trends. In the absence of smaller scale modeling, specific predictions for smaller geographical areas are not available. Therefore, the climate change risks associated with Big Stone County are not mutually exclusive, but rather the effects in the county may differ from those of the Midwest region.

### **Climate Change Adaptation for Big Stone County**

The climate change associated with Big Stone County leads to increased risks from natural disasters of various types and requires that an increase in emergency preparedness will be needed to mitigate the risks that are most likely. Reducing greenhouse gas emissions are still a valuable mitigation strategy that is still being addressed by many levels of government, however the purpose of this plan is to prepare and adapt to the changes that are likely to come.

Big Stone County can contact and/or utilize the state Interagency Climate Adaptation Team (ICAT) report, the Minnesota Health Department Extreme Heat Toolkit, the Climate Adaptation Partnership (CAP), and the Insurance Federation of Minnesota (IFM) to access data or information on how adaptation to climate change can be better planned for and carried out.



## Socioeconomic Profile

### *Population Trends*

Big Stone County has lost residents over every decade since 1940, declining to its 2000 population of 5,820 people. The rate of decline has been steady except for a large drop in population during the 1980s. The current population consists of 48.9% males (2,571) and 51.1 % females (2,679). According to the 2010 census, 98.3% of Big Stone County residents identified as white. One percent of residents identified with two or more races. Of those, “White and American Indian or Alaska Native” made up over half this group. Table 2.7 identifies population projections for Big Stone County. Individual cities are profiled below.

**Table 2.7 Big Stone County Population Projections**

|                             | 2010<br>Population | 2012<br>Estimate | 2020<br>Projection | 2025<br>Projection | 2030<br>Projection | 2035<br>Projection | 2040<br>Projection | 2045<br>Projection |
|-----------------------------|--------------------|------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| <b>Big Stone<br/>County</b> | <b>5,820</b>       | <b>5,250</b>     | <b>5,388</b>       | <b>5,371</b>       | <b>5,336</b>       | <b>5,277</b>       | <b>5,215</b>       | <b>5,156</b>       |

Source: Minnesota State Demographic Center 2014

Big Stone County is home to eight cities and fourteen townships. The following is a brief city-specific overview. Table 2.8 provides a breakdown between township and city populations in the county and Table 2.9 provides detailed data of the county’s population. A population distribution map can be found in Appendix 1.

### *Barry*

The city of Barry is located approximately six miles west of Graceville along Minnesota Highway 28. Barry is the county’s smallest city with 16 residents and 7 households (U.S. Census Bureau, 2008-2012 American Community Survey, 5-Year Estimates). Minnesota State Highway 28 runs east/west along the southern edge of the city and County Road 7 runs north/south through the center of the city. The Burlington Northern Railroad runs parallel to Highway 28. Barry shares borders with Toqua Township.

### *Beardsley*

The city of Beardsley is located approximately five miles east of the South Dakota border in northern Big Stone County. The city is situated along State Highway 28. The community is within five miles of Big Stone Lake, the county’s largest lake. Beardsley shares borders with Browns Valley Township. The city’s 192 residents and 94 households make it the county’s fourth largest city (U.S. Census Bureau, 2008-2012 American Community Survey, 5-Year Estimates).

### *Clinton*

The city of Clinton is located 11 miles north of Ortonville and 8 miles south of Graceville along U.S. Highway 75. County Road 11 dissects the city from the northwest to the southeast. County

Road 6 runs along the southern edge of the city. In addition, Eli Lake creates the majority of the city's eastern border. Clinton shares borders with Almond Township. Clinton is the county's third largest city with 403 residents and 172 households (U.S. Census Bureau, 2008-2012 American Community Survey, 5-Year Estimates).

### *Correll*

The city of Correll is located approximately 15 miles southeast of Ortonville. County Road 25 runs north out of Correll from the southern part of the city. State Highway 7 runs through the center of town in a southeast to northwest direction. Correll shares borders with Akron Township. The city is located within a mile of Marsh Lake. Correll is Big Stone County's third smallest city with approximately 47 residents and 23 households (U.S. Census Bureau, 2008-2012 American Community Survey, 5-Year Estimates). Correll is the only city in Big Stone County that has gained residents over the past 10 years.

### *Graceville*

Graceville is located on East Toqua Lake at the intersection of Minnesota State Highway 28 and U.S. Highway 75. Graceville is located 20 miles north of Ortonville and is surrounded by Graceville Township. County Roads 13 and 20 run north out of town and the Burlington Northern/Santa Fe Railroad parallels State Highway 28 through Graceville. The city's estimated 2012 population was 563 residents and 283 households (U.S. Census Bureau, 2008-2012 American Community Survey, 5-Year Estimates).

### *Johnson*

The city of Johnson is located approximately eight miles east of Graceville along Minnesota State Highway 28. County Highway 21 runs north/south through town and the Burlington Northern/Santa Fe Railroad runs east/west through town paralleling Highway 28. Johnson has an estimated population of 5 residents (U.S. Census Bureau, 2008-2012 American Community Survey, 5-Year Estimates).

### *Odessa*

The city of Odessa is located in the southern portion of Big Stone County, approximately six miles east of Ortonville. Odessa is located along the Minnesota River, which forms part of the southern boundary of the city. U.S. Highway 7 joins with U.S. Highway 75 as it runs along the northern edge of town. County Road 21 forms the eastern border of the city running north/south and County Road 19 runs north/south through the city. County Road 28 runs east/west paralleling the Burlington Northern Railroad as it runs through Odessa. The community is located in the southeastern part of Odessa Township. Odessa has an estimated population of 163 residents and 75 households (U.S. Census Bureau, 2008-2012 American Community Survey, 5-Year Estimates).

## Ortonville

The city of Ortonville is Big Stone County's largest city with an estimated population of 1,908 residents and 905 households (U.S. Census Bureau, 2008-2012 American Community Survey, 5-Year Estimates). It is located in the southern part of the county at the foot of Big Stone Lake on the South Dakota border. Ortonville is located at the junction of U.S. Highways 12 and 75 and Minnesota State Highway 7. The city is located almost entirely within Ortonville Township. A small section of the city extends up into Big Stone Township.

As shown in Table 2.8 below, the distribution of population within Big Stone County has not significantly changed from 1970 to 2012. Notably, the main trend shows an increase of people living in cities versus rural townships. The greatest change from 1970 to 2007 is the overall decrease in population from 9,428 to 5,473, a loss of 3,955 residents. Table 2.9 identifies population, household units, households, persons per household, and person in group quarter comparisons from 1970 to 2012 for the county as a whole.

**Table 2.8 BSC Distribution of Population between Cities & Rural Areas from 1960 -2012**

|              | 1960         |             | 1970         |             | 1980         |              | 1990         |             | 2000         |             | 2010         |             | 2012 (Est.)  |             |
|--------------|--------------|-------------|--------------|-------------|--------------|--------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|
|              | Population   | Percentage  | Population   | Percentage  | Population   | Percentage   | Population   | Percentage  | Population   | Percentage  | Population   | Percentage  | Population   | Percentage  |
| Townships    | 4,497        | 48%         | 3,592        | 43%         | 3,461        | 2,127        | 2,127        | 39%         | 2,419        | 40%         | 2,127        | 39%         | 1,953        | 37%         |
| Cities       | 4,931        | 52%         | 4,738        | 57%         | 4,656        | 3,346        | 3,346        | 61%         | 3,695        | 60%         | 3,346        | 61%         | 3,297        | 63%         |
| <b>Total</b> | <b>9,428</b> | <b>100%</b> | <b>8,330</b> | <b>100%</b> | <b>8,117</b> | <b>5,473</b> | <b>5,473</b> | <b>100%</b> | <b>6,114</b> | <b>100%</b> | <b>5,473</b> | <b>100%</b> | <b>5,250</b> | <b>100%</b> |

Source: U.S. Census Bureau, 2008-2012 American Community Survey, Minnesota State Demographic Center and Metropolitan Council

**Table 2.9 BSC Population Profiles**

|                           | 1970  | 1980  | 1990  | 2000  | 2010  | 2012  | 2000-2010 Change |         | 2010-2012 Change |         |
|---------------------------|-------|-------|-------|-------|-------|-------|------------------|---------|------------------|---------|
|                           |       |       |       |       |       |       | Actual           | Percent | Actual           | Percent |
| Population                | 7,941 | 7,716 | 6,285 | 5,820 | 5,269 | 5,250 | -551             | -9%     | -19              | 0%      |
| Housing Units             | 3,024 | 3,493 | 3,192 | 3,171 | 3,115 | 3,129 | -56              | -2%     | 14               | 0%      |
| Households                | --    | 2,873 | 2,463 | 2,377 | 2,293 | 2,329 | -84              | -4%     | 36               | 2%      |
| Persons per Household     | --    | 2.69  | 2.55  | 2.38  | 2.24  | 2.19  | 0                | -6%     | 0                | -2%     |
| Persons in Group Quarters | --    | 269   | 298   | 173   | 137   | 156   | -36              | -21%    | 19               | 14%     |

Source: U.S. Census Bureau, 2008-2012 American Community Survey, Minnesota State Demographic Center and Metropolitan Council

Household characteristics have a direct impact on land use, housing needs, social services, and educational expenses. Changes in household size have a direct and proportional effect on demand exerted and types of housing necessary for communities. As household size decreases, the demand for housing units will increase. Big Stone County had an estimated 3,129 housing units in 2012. Table 2.10 identifies the status of vacant houses in 2012. The conditions, type and variety of housing offered by communities directly influence the sustainability and vitality of the entire county. General county-wide housing characteristics are shown in Table 11.

**Table 2.10 BSC Vacancy Status in 2012**

| Vacancy Status                                | Number of Units |
|---|-----------------|
| For rent                                      | 39              |
| For sale only                                 | 20              |
| Rented or sold, not occupied                  | 11              |
| For seasonal, recreational, or occasional use | 455             |
| For migrant workers                           | 0               |
| Other vacant                                  | 275             |
| <b>Total</b>                                  | <b>800</b>      |

Source: U.S. Census Bureau, 2008-2012 American Community Survey

**Table 2.11 BSC Housing Characteristics in 2012**

| Total Housing Units | Total Structures Built | Owner Occupied | Renter Occupied | Total Occupied | Vacant     |
|---------------------|------------------------|----------------|-----------------|----------------|------------|
| 2010 or later       | 14                     | 5              | 2               | 7              | 7          |
| 2000 to 2009        | 135                    | 92             | 25              | 117            | 18         |
| 1990 to 1999        | 241                    | 111            | 57              | 168            | 73         |
| 1980 to 1989        | 324                    | 177            | 77              | 254            | 70         |
| 1970 to 1979        | 297                    | 181            | 47              | 228            | 69         |
| 1960 to 1969        | 406                    | 239            | 88              | 327            | 79         |
| 1940 to 1959        | 701                    | 395            | 82              | 477            | 224        |
| 1939 or earlier     | 1,011                  | 659            | 92              | 751            | 260        |
| <b>Total</b>        | <b>3,129</b>           | <b>1,859</b>   | <b>470</b>      | <b>2,329</b>   | <b>800</b> |

Source: U.S. Census Bureau, 2008-2012 American Community Survey

### *Age and Sex Characteristics*

Since 1970, the county’s population has “aged.” Minnesota Planning predicts that the percent increase in elderly population will grow at a faster rate than the total population over the next 30 years. It is during this time frame that “baby boomers” will reach retirement age. This is a strong indicator of the need for many senior-related services, including senior housing and transit services.

Tables 2.12 and 2.13 show the age and sex characteristics of Big Stone County. Each of the cities within the county had very similar distribution to the county as a whole. The entire county has a greater percentage of elderly people than the state of Minnesota as a whole.

**Table 2.12 BSC Age Characteristics in 2012**

|                  | <b>Under 18</b> | <b>18 and Older</b> | <b>Under 65</b> | <b>65 and Over</b> |
|------------------|-----------------|---------------------|-----------------|--------------------|
| Minnesota        | 24%             | 76%                 | 87%             | 13%                |
| Big Stone County | 21%             | 79%                 | 74%             | 26%                |
| Barry            | 6%              | 94%                 | 100%            | 0%                 |
| Beardsley        | 23%             | 77%                 | 82%             | 18%                |
| Clinton          | 25%             | 75%                 | 70%             | 30%                |
| Correll          | 0%              | 100%                | 72%             | 28%                |
| Graceville       | 16%             | 84%                 | 65%             | 35%                |
| Johnson          | 0%              | 100%                | 60%             | 40%                |
| Odessa           | 22%             | 78%                 | 80%             | 20%                |
| Ortonville       | 18%             | 82%                 | 72%             | 29%                |

Source: U.S. Census Bureau, 2008-2012 American Community Survey

**Table 2.13 BSC Sex Characteristics in 2012**

|                  | <b>Male</b> | <b>Female</b> |
|------------------|-------------|---------------|
| Minnesota        | 49%         | 51%           |
| Big Stone County | 49%         | 51%           |

Source: U.S. Census Bureau, 2010 Census

### *Economic Synopsis*

Big Stone County's economic atmosphere supports an agricultural base, recreation, tourism, services, retail, trade and government. With strong and mature manufacturing and service-related industries, Big Stone County provides an ideal location for expansion of established businesses, as well as additional ventures. With excellent access to transportation systems, and close proximity to the major urban centers, Big Stone County is positioned to have a vibrant economy for many years to come.

Fifty-eight percent of Big Stone County residents 16 years old and over are in the labor force and three percent are unemployed, according to the 2012 Census. Tables 2.13 and 2.14 provide an in-depth breakdown of labor statistics and occupations by business and industry types in Big Stone County from 2012. In short, over 50 percent of the civilian labor force population was employed and likely in the Educational/Health/Social Services, Agriculture, Forestry, Fishing and Hunting, and Mining industries, or in retail trade. Table 2.15 identifies the major employers in Big Stone County.

**Table 2.13 BSC Labor Statistics in 2012**

| <b>Employment Status</b>                  | <b>Number</b> | <b>Percent</b> |
|---|---------------|----------------|
| <b>Population 16 years and older</b>      | 4,270         | 100%           |
| In labor force                            | 2,508         | 59%            |
| Civilian labor force                      | 2,506         | 59%            |
| Employed                                  | 2,421         | 57%            |
| Unemployed                                | 85            | 2%             |
| Percent of civilian labor force           | 2             | 0%             |
| Armed Forces                              | 1,762         | 41%            |
| Not in labor force                        | <b>2,378</b>  | <b>100%</b>    |
| <b>Commuting to Work</b>                  | 1,708         | 72%            |
| Car, truck, or van – drove alone          | 216           | 9%             |
| Car, truck, or van -- carpooled           | 15            | 1%             |
| Public transportation (including taxicab) | 141           | 6%             |
| Walked                                    | 39            | 2%             |
| Other means                               | 259           | 11%            |
| Worked at home                            | 17.8          | (X)            |
| Mean travel time to work (minutes)        | 4,270         | 100%           |

Source: U.S. Census Bureau, 2008-2012 American Community Survey

**Table 2.14 BSC Industries for the Employed Civilian Population in 2012**

|   |              |
|---|--------------|
| Agriculture, Forestry, Fishing and Hunting, and Mining                              | 330          |
| Construction  | 202          |
| Manufacturing   | 185          |
| Wholesale Trade   | 94           |
| Retail Trade  | 265          |
| Transportation and Warehousing, and Utilities                                       | 157          |
| Information   | 19           |
| Finance, Insurance, Real Estate and Rental and Leasing                              | 111          |
| Professional, Scientific, Management, Administrative, and Waste Management Services | 95           |
| <b>Educational, Health and Social Services</b>                                      | <b>677</b>   |
| Arts, Entertainment, Recreation, Accommodation and Food Services                    | 73           |
| Other Services (except public administration)                                       | 100          |
| Public Administration   | 113          |
| <b>Total</b>  | <b>2,421</b> |

Source: U.S. Census Bureau, 2008-2012 American Community Survey

**Table 2.15 BSC Major Employers**

| <b>Employer</b>                              | <b>Location Employee Size Range</b> |
|--|-------------------------------------|
| Ortonville Area Health Services              | 100 to 249                          |
| Graceville Health Center                     | 100 to 249                          |
| City of Ortonville                           | 50 to 99                            |
| Ortonville Public School District #62        | 50 to 99                            |
| Clinton Graceville Beardsley School District | 50 to 99                            |
| Big Stone County                             | 50 to 99                            |
| Bituminous Paving, Inc.                      | 50 to 99                            |

Source: Department of Employment and Economic Development, 2015

As shown in Table 2.16 below, the highest percentages of households (58 percent) and families (60 percent) fall into the income range of \$15,000 to \$49,999 in Big Stone County. The median household income for Big Stone County in 2000 was \$30,721. This amount is slightly higher than the estimated Regional Income Estimate found in Table 2.17 below, with Big Stone County's estimate income of \$30,091 for 2006.

**Table 2.16 BSC Income Statistics in 2012**

|  | Households      |             | Families        |             |
|--|-----------------|-------------|-----------------|-------------|
|  | Number          | Percentage  | Number          | Percentage  |
| Less than \$10,000                       | 171             | 7%          | 44              | 3%          |
| \$10,000 to \$14,999                     | 204             | 9%          | 97              | 6%          |
| \$15,000 to \$24,999                     | 269             | 13%         | 164             | 10%         |
| \$25,000 to \$34,999                     | 229             | 10%         | 149             | 9%          |
| \$35,000 to \$49,999                     | 394             | 17%         | 291             | 18%         |
| \$50,000 to \$74,999                     | 525             | 23%         | 386             | 24%         |
| \$75,000 to \$99,999                     | 213             | 9%          | 185             | 12%         |
| \$100,000 to \$149,999                   | 183             | 8%          | 170             | 11%         |
| \$150,000 to \$199,999                   | 68              | 3%          | 66              | 4%          |
| \$200,000 or more                        | 46              | 2%          | 44              | 3%          |
| <b>Total</b>                             | <b>2,302</b>    | <b>100%</b> | <b>1,596</b>    | <b>100%</b> |
| <i>Median household or family income</i> | <i>\$45,545</i> | -           | <i>\$52,500</i> | -           |

Note: Household count contains both families and persons living alone.  
Source: U.S. Census Bureau, 2008-2012 American Community Survey

**Table 2.17 Median Household Income within Region and Statewide**

| Region           | 2000             | 2010             | 2012             | % Change: 2000-2012 |
|------------------|------------------|------------------|------------------|---------------------|
| Minnesota        | \$ 47,111        | \$ 57,243        | \$ 59,126        | 20.3%               |
| Yellow Medicine  | \$ 34,393        | \$ 50,288        | \$ 52,134        | 34.0%               |
| <b>Big Stone</b> | <b>\$ 30,721</b> | <b>\$ 42,870</b> | <b>\$ 45,545</b> | <b>32.5%</b>        |
| Swift            | \$ 34,820        | \$ 41,486        | \$ 45,984        | 24.3%               |
| Chippewa         | \$ 35,582        | \$ 43,956        | \$ 46,579        | 23.6%               |
| Lac qui Parle    | \$ 32,626        | \$ 45,550        | \$ 50,203        | 35.0%               |

Source: U.S. Census Bureau American Community Survey 5-Year Estimates, 2008-2012



Tables 2.18 and 2.19 compare monthly housing expenses for renter-occupied units and owner-occupied units. In 2012, nearly half of renters had rent lower than \$499 dollars a month, while one third of mortgage holding owner-occupied units (32 percent) spent between \$700 and \$999 dollars per month.

**Table 2.18 BSC Gross Rent in 2012**

| Monthly Rent                  | Number       | Percent     |
|-------------------------------|--------------|-------------|
| Less than \$200               | 62           | 16%         |
| \$200 to \$299                | 31           | 8%          |
| \$300 to \$499                | 100          | 25%         |
| \$500 to \$749                | 106          | 27%         |
| \$750 to \$999                | 47           | 12%         |
| \$1,000 to \$1,499            | 44           | 11%         |
| \$1,500 or more               | 9            | 2%          |
| No cash rent                  | 71           | x           |
| <b>Total</b>                  | <b>470</b>   | <b>100%</b> |
| <i>Median of rented units</i> | <i>\$514</i> |             |

Source: U.S. Census Bureau, 2008-2012 American Community Survey

**Table 2.19 BSC Owner-Occupied Selected Monthly Owner Costs in 2012**

| Monthly Payments                     | Number       | Percent    |
|--------------------------------------|--------------|------------|
| <i>With a mortgage</i>               | 858          | 46%        |
| Less than \$300                      | 6            | 1%         |
| \$300 to \$499                       | 49           | 6%         |
| \$500 to \$699                       | 149          | 17%        |
| \$700 to \$999                       | 277          | 32%        |
| \$1,000 to \$1,499                   | 248          | 29%        |
| \$1,500 to \$1,999                   | 77           | 9%         |
| \$2,000 or more                      | 52           | 6%         |
| <i>Median of mortgaged units</i>     | <i>\$931</i> | <i>X</i>   |
| Not mortgaged                        | 1,001        | 54%        |
| <i>Median of not mortgaged units</i> | <i>\$372</i> | <i>X</i>   |
| <b>Total</b>                         | <b>1,859</b> | <b>100</b> |

Source: U.S. Census Bureau, 2008-2012 American Community Survey

## Community Infrastructure

This section identifies Big Stone County’s schools, public facilities, parks and natural resources, and available modes of transportation offering transit, airport facilities, roads, and a multitude of trail opportunities. A complete listing of telecommunication and power facilities has been provided along with city-specific water and sewer systems currently in place throughout the county.

### *Schools*

Big Stone County has three school districts Clinton-Graceville-Beardsley, Ortonville, and Lac qui Parle Valley. Clinton-Graceville-Beardsley host four cities: Clinton, Graceville, Beardsley, and Johnson. Ortonville hosts two cities: Ortonville and Odessa. Lac qui Parle Valley hosts the city of Correll.

**Table 2.20 BSC Schools & Locations**

| <b>Big Stone County Schools</b>                     | <b>Addresses</b>                                |
|---|---|
| James Knoll Elementary                              | 200 Trojan Drive, Ortonville, MN 56278          |
| Ortonville High School                              | 200 Trojan Drive, Ortonville, MN 56278          |
| Ortonville Community Education                      | 200 Trojan Drive, Ortonville, MN 56278          |
| Clinton-Graceville-Beardsley Middle and High School | 712 Third Street, Graceville, MN 56240          |
| Clinton-Graceville-Beardsley Elementary             | 601 1 <sup>st</sup> Street, Clinton, MN 56225   |
| Big Stone Colony Elementary                         | 26051 Big Stone Colony Rd, Graceville, MN 56240 |
| Lismore Colony Elementary                           | 80391 330 <sup>th</sup> St, Clinton, MN 56225   |

### *Public Facilities*

Public Facilities have been mapped in the appendix. Important public facilities include city and town halls, county courthouse, libraries, parks, churches and historic resources. These places provide both public services and create an important sense of community character. Most public facilities are located in the cities. There are parks and wildlife management areas located in the county.

**Table 2.21 BSC City Facilities**

| <b>Beardsley</b>               |                       |
|--------------------------------|-----------------------|
| Fire Hall/City Hall            | Main Street           |
| <b>Clinton</b>                 |                       |
| Memorial Building              | Main Street, PO Box 5 |
| Fire Hall/City Hall            | 111 Main Street       |
| <b>Correll</b>                 |                       |
| Fire Hall/City Hall            | Main Avenue           |
| <b>Graceville</b>              |                       |
| City Hall/Fire Hall/Ambulance  | 415 Studdart Ave      |
| Public Library                 | 415 Studdart Ave      |
| Senior Center                  | 418 Studdart Ave      |
| Water Treatment Plant          | US-75 & State Hwy 28  |
| <b>Odessa</b>                  |                       |
| Fire Hall/City Hall            | County Hwy 28         |
| <b>Ortonville</b>              |                       |
| Swimming Pool and Skating Rink | 328 Otto Ave          |
| Police Station                 | 225 3rd Street NW     |
| Public Library                 | 412 2nd Street NW     |
| Armory                         | 309 Madison Ave       |
| Senior Center                  | 200 Monroe Ave        |
| Waste Treatment Plant          | Jackson Street        |
| Water Department               | 400 O'Neil Street     |

*Parks*

Big Stone County Toqua Park is located in Graceville. The park offers 12 campsites, playground, softball field, volleyball court, swimming beach and a golf course.

Big Stone Lake State Park is located on the shores of Big Stone Lake, a border lake between Minnesota and South Dakota and the source of the Minnesota River. Established in 1961, the park consists of three distinct units: the Meadowbrook Area, the Overlook Area, and the Bonanza Area. Eight miles northwest of Ortonville on Highway 7, the Meadowbrook Area is the largest of the three. Once farmland, this area is slowly being restored to prairie, woodland, and wet-meadow communities.

Big Stone National Wildlife Refuge is located two miles southwest of Ortonville. The Minnesota River winds 11.5 miles through the refuge. It consists of 11,521 acres of which 1,700 acres are native prairie. A four-mile auto tour route provides a view of major habitats. Enjoy hiking trails, fishing, hunting, canoeing, snow shoeing and cross country skiing. The refuge also is a favorite for bird watching enthusiasts.

*Transportation*

**Roads**

Big Stone County is well served by an extensive roadway network that connects the county with the rest of the region and Minnesota. State, county, township, and city roads are all included in

the roadway network. It is the primary means of transportation for both goods and people within and out of the county. A map of the big Stone County Transportation system can be found in Appendix 1.

#### ***Trunk Highway System***

Big Stone County has two U.S. Trunk highways: 12 and 75, and two Minnesota Trunk Highways: 7 and 28. These roads are constructed and maintained by the Minnesota Department of Transportation (Mn/DOT). There are 51.7 miles of U.S. Highways and 59 miles of MN Highways in Big Stone County.

#### ***County Roads***

These roads are established, constructed, and improved by the County Board. They are under the sole authority of the county board. There are 197.8 miles of county roads.

#### ***Township Roads***

Roads established by and under the authority of the township board, or reverted to township jurisdiction by the county board. These roads are constructed and maintained by township boundaries. Township roads stretch to 349.5 miles.

#### ***City Streets***

These roads serve as direct access from residential properties and/or commercial establishments and are classified as any street under the jurisdiction of a municipality not otherwise designated as a trunk highway, county state aid street, and highway or county highway. City streets stretch 15.1 miles.

#### **Transit**

Mass transit is an essential public service to provide for increased capacity on heavily traveled roads, transportation access to disabled persons or those otherwise unable to drive, supports dense land use development, decreases dependence on car use, and helps prevent the creation of additional air pollution from diminished individual car use.

Big Stone County has one large mass transit provider, Prairie Five Rides. Prairie Five Community Action Council, Inc. serves the entire five county region. It began serving the public with buses in July of 1995, and merged with Ortonville Area Transit July 1, 1999. Prairie Five started with five buses in 1995. The buses run from approximately 7 a.m. until 5:00 p.m., Monday through Friday and Prairie Five RIDES now operates 10 vehicles (small buses). In 2007, Prairie Five RIDES gave 76,851 rides driving 407,018 miles, compared to 2008 where they provided 83,405 rides and drove 399,071 miles.

#### **Airports**

Graceville and Ortonville have airports in the county. The Kapaun-Wilson Airport near Graceville has a turf runway 2,495 feet in length and 150 feet wide. The Ortonville Municipal Airport has a paved, 3,417 ft. runway 74 ft. wide. It also has a turf runway, 2,158 ft. in length and 300 ft. wide.

## Railroads

There are two active rail lines in Big Stone County. Burlington Northern/Santa Fe (BNSF) operates a class two-rail line that runs along the northern edge of the county, running on the northern side of State Highway 28 through the communities of Johnson, Graceville, Barry and Beardsley. BNSF owns 1,626 miles of rail line within Minnesota, approximately 35 percent of the total mileage in the state. The other rail line in Big Stone County is operated by Twin Cities & Western Railroad Company (TC&W). The TC&W line is a class three line that runs parallel to State Highway 7 on the southern edge of the county to Ortonville. It runs through the communities of Correll, Odessa, and Ortonville.

Mn/DOT's Office of Freight, Rail and Waterways has identified both the rail lines in Big Stone County as primary rail lines. Primary rail lines make national and international connections between producers and markets and ensure protection of the current and future broad economic interests of the state.

A key element in rail transportation is the availability and capacity of elevators, especially considering the importance of grain movement in Minnesota. Four grain elevators have access to rail lines in Big Stone County that are licensed to buy and/or sell grain. Considering the importance of the rail lines and how much they handle in freight shipments, the elevators' role in the rail network is significant. Below is Table 23 listing the four grain elevators that are adjacent to rail lines in the county. In addition to the four elevators located along rail lines, there is an elevator in Clinton with a storage capacity of 20,000 bushel that is not located on a rail line.

**Table 2.22 BSC Grain Elevators along Rail Lines**

| Location   | Storage Capacity |
|------------|------------------|
| Barry      | 652,000 bushels  |
| Beardsley  | 978,000 bushels  |
| Odessa     | 220,000 bushels  |
| Ortonville | 854,000 bushels  |

## Trails

Big Stone County has a variety of trails available to the public located throughout the entire county. Table 2.23 below identifies all major trail systems and their particular uses including snowmobiling, walking, and horse trails.

**Table 2.23 BSC Trails**

| Trail Name                    | County              | Location/ Descriptions     | Length (miles)                     | Surface | Use                                  |
|-------------------------------|---------------------|----------------------------|------------------------------------|---------|--------------------------------------|
| Ridgerunners Snowmobile Trail | Big Stone, Swift    | Routes throughout counties | 140                                | Snow    | Snowmobile                           |
| Sno Riders Trail              | Big Stone, Traverse | Hwy 28/Hwy 75              | 96.6 GPS-verified<br>26 additional | Snow    | Snowmobile                           |
| Big Stone Lake State Park     | Big Stone           | In State Park              | 51                                 | Natural | Walk 19<br>Snowmobile 16<br>Horse 16 |

Source: UMRVDC Trail Planning Guide (2000)

*Telecommunication and Power Facilities*

**Internet, Electric, Gas and Phone**

Table 2.24 below indicates the telecommunication and power facilities within Big Stone County. The southern portion of the rural county is served by Agrilite Electric Cooperative and the northern portion is covered by Traverse Electric Cooperative.

**Table 2.24 BSC Telecommunication and Power Facilities**

| <b>City</b> | <b>Telecommunication<br/>Internet, Cellular, Cable</b> | <b>Electric</b>    | <b>Gas</b>          | <b>Phone</b>            |
|-------------|--|--------------------|---------------------|-------------------------|
| Barry       | Cell 2000 (Ortonville)                                 | Otter Tail Power   | LP                  | CenturyLink             |
| Beardsley   | Verizon, Info Link                                     | Otter Tail Power   |                     | CenturyLink             |
| Clinton     | Verizon, MediaCom, NatesNet                            | Otter Tail Power   | Border States Co-op | Verizon, CenturyLink    |
| Graceville  | Verizon<br>Century Link<br>MediaCom                    | Otter Tail Power   | LP Tri County Co-op | CenturyLink<br>MediaCom |
| Johnson     | Verizon, Federated Tel                                 | Otter Tail Power   |                     | CenturyLink             |
| Odessa      | Verizon, Federated Tel                                 | Otter Tail Power   | LP Cenex            | Federated Tel           |
| Ortonville  | Verizon<br>Nate's Net                                  | City of Ortonville | Peoples Natural Gas | CenturyLink             |

**Radio**

Big Stone County has one radio station located in Ortonville. The radio station identification is KDIO on AM 1350. KDIO gives weather updates that are provided by the National Weather Service.

*Sewer and Water Systems*

Johnson and Correll do not have a city wastewater system and depend on Individual Sewage Treatment Systems (ISTS). ISTS are used for the treatment and disposal of wastewater from individual homes, isolated communities, industries or institutional facilities. ISTS is an effective way to treat wastewater but can have the reverse effect if improperly designed, installed or maintained. For more information on ISTS, refer to the Big Stone County local Water Management Plan 2014. Table 2.25 indicates sewer and water systems for all communities in the county.

**Table 2.25 BSC Sewer and Water Systems**

| City/Location | Storm Sewer | Sanitary Sewer | Public Water |
|---------------|-------------|----------------|--------------|
| Barry         |             |                | X            |
| Beardsley     |             | X              | X            |
| Clinton       | X           | X              | X            |
| Correll       | X           |                | X            |
| Graceville    | X           | X              | X            |
| Johnson       |             |                | X            |
| Odessa        | X           | X              | X            |
| Ortonville    | X           | X              | X            |

Source: Big Stone County Local Water Management Plan

### Emergency Response

A county's ability to respond to an emergency situation or event is based on service areas, facilities, and equipment. An understanding of response times and abilities is critical in protecting the citizens of Big Stone County. The existing facilities and equipment in the county are intended to address local needs and support regional needs. Big Stone County is considered a mutual aid county and provides and receives support from adjacent counties. The following summary and description serves as an inventory of the response facilities for Big Stone County.

### Medical Facilities

Big Stone County is served by two hospitals and one clinic (Table 2.26). Ortonville has two ambulances and Graceville has one ambulance.

**Table 2.26 BSC Hospitals & Clinics**

| Hospitals & Clinics             | Location                                     |
|---------------------------------|--|
| Clinton Community Clinic        | Box 366 Main Street, Clinton, MN             |
| Graceville Essentia Health      | 115 W 2 <sup>nd</sup> Street, Graceville, MN |
| Ortonville Area Health Services | 450 Eastvold Avenue, Ortonville, MN          |

### Fire Services

There are no full-time fire departments in Big Stone County. All fire departments are volunteer-based with responsibilities divided into four response zones. The Department of Natural Resources (DNR) is responsible for fire protection on state forest and parkland and the U.S. Fish and Wildlife Service (USFWS) is responsible for fire protection the Big Stone National Wildlife Refuge. The DNR and USFWS work closely with local fire units for protection of these lands through contracting agreements. Additionally, all fire departments have mutual aid agreements.

**Table 2.27 BSC Fire Capabilities**

| City       | Pumpers | Tankers | Grass Rigs | Air Packs | Number of Firemen |
|------------|---------|---------|------------|-----------|-------------------|
| Beardsley  | 2       | 1       | 2          | 14        |                   |
| Clinton    | 4       | 3       | 2          | 7         |                   |
| Correll    | 2       | 2       | 1          |           |                   |
| Graceville | 3       | 2       | 2          | 12        | 25                |
| Odessa     | 3       | 1       | 1          |           |                   |
| Ortonville | 7       | 6       | 2          | 12        | 25                |

Source: Big Stone County, City Surveys 2015



## Public Safety

### Emergency Operations Center

The Emergency Operations Center is located in the Big Stone County Sheriff's Department in the courthouse.

### Emergency Warning Systems

The Big Stone County Public Service Answering Point (PSAP) is the Big Stone County warning point. The Big Stone County Sheriff has overall responsibility for ensuring that all notifications received by the warning point are handled properly. The Big Stone County warning point is responsible for proper receipt and dissemination of all emergency notifications.

The Aberdeen NOAA is responsible for disseminating all watches and warnings to the Big Stone County warning point, except warnings for conditions generated within the county itself. The Big Stone County warning points is at the sheriff's office in Ortonville, which has 24-hour warning capability.

### Police Departments

There is one police department in Big Stone County, located in Ortonville. The other cities in Big Stone County contract with the sheriff's office for police services (Table 2.28).

**Table 2.28 BSC Law Enforcement Capabilities**

| Location                     | Officers                    | Squad Cars                           |
|------------------------------|-----------------------------|--------------------------------------|
| Big Stone County Sheriff     | 4 full-time,<br>4 part-time | 7 vehicles<br>1 boat<br>1 snowmobile |
| Ortonville Police Department | 3 full-time,<br>3 part-time | 2 vehicles                           |

Source: Big Stone County Emergency Manager

### Countryside Public Health

Countryside Public Health Services is the County Department of Health for Chippewa, Swift, Lac qui Parle, Big Stone and Yellow Medicine counties. Part of their mission is designed to protect the health of the general population by emphasizing the prevention of disease, injury, disability and death through effective coordination, use of community resources, and provide education, training, WIC program, disease prevention and control and environmental programs. Countryside Public Health has the ability to respond to health emergencies and is currently developing a Medical Reserve Corp (MRC) for volunteers.

## Heavy Equipment Inventory

### Private Contractors

Private contractors in Ortonville, Odessa and Graceville have equipment that can be used in emergencies found in Table 2.29.

**Table 2.29 BSC Heavy Equipment Inventory**

| City/Location | Private Contractors  | Equipment Available  |
|---------------|--|--|
| Beardsley     | Greg Schmidt Construction<br>Sibson Gravel   |  |
| Graceville    | Sullivan Excavating<br>J & J Earthworks<br>States Border Cooperative   | Backhoes and other heavy equipment that would be useful for helping out in a disaster      |
| Odessa        | Hillman Bros Excavating<br>Ronglein Excavating<br>Bituminous Paving Inc  | Backhoe and sometimes helps with snow removal with a pay loader, road graders and backhoes |
| Ortonville    | Ronglien Excavating<br>Sev' Gravel and Excavating<br>Hoxtell's Dray Line<br>Royal Flush Sanitation<br>Hasslen Construction<br>Ridgeview Excavating | All equipment<br>Trucks and backhoes<br>Trucks and backhoe<br>Septic service<br>Skid Steer |

### Property

#### Land Uses

Land uses are regulated in Big Stone County through the county ordinance. Cities in Big Stone County have zoning ordinances that regulate the building construction and location of manufactured home parks.

#### Manufactured Home Parks

There is one manufactured home park in Big Stone County located in Ortonville. Manufactured home parks must follow guidelines as set forth in the Ortonville Ordinance Code.

#### Current Codes

Ortonville, Odessa, Graceville and Big Stone County have floodplain ordinances which regulate the structures that can be built in the floodplain. Big Stone County has numerous ordinances pertinent to hazard mitigation including a Solid Waste Management Ordinance which regulates residential and commercial garbage disposal, recycling and household hazardous waste, Shoreland Management Ordinance that lays out development densities, minimum lot sizes, structure and sewage treatment setbacks and vegetation removal limitations. Big Stone County also has a Floodplain Management Ordinance that helps the community stay ahead of flooding issues.

## CHAPTER 3: HAZARD INVENTORY

The hazard inventory chapter is divided into two parts: Natural Hazards and Manmade/Technological Hazards, defined by the Minnesota State Hazard Mitigation Plan.

### Definition – Natural Hazard

*Natural hazards are those presented by the physical world, rather than those presented by humans. In a natural hazard, there is an interaction between the physical world, the constructed environment, and the people that occupy them. Natural Hazards are primarily atmospheric or geologic.*

### Definition – Technological Hazard

*Technological hazards are those presented by humans, rather than those presented by nature. They are comprised of substances and processes that are flammable, combustible, explosive, toxic, noxious, corrosive, oxidizers, irritants, or radioactive.*

During the first BSC All-Hazard Mitigation Task Force Meeting, the hazards included in the previous plan were reviewed. The task force felt it was important to include erosion as a hazard in this plan update as soil and wind erosion have been increasing issues in Big Stone County over the last decade as more and more land has been converted into cropland. The task force also decided that adding a section on climate change to all applicable hazards would be a good way to introduce the hazard into the plan. As climate change becomes more prevalent in the region, subsequent plans can further explore this topic in terms of mitigation strategies. Table 3.1 lists each of the hazards previously included in the plan, as well as the new hazards included in this plan update.

**Table 3.1 Hazards in BSC**

| Hazard                      | In Previous Plans | Addition to 2015 Plan |
|-----------------------------|-------------------|-----------------------|
| Violent Storms              | X                 |                       |
| Extreme Temperatures        | X                 |                       |
| Floods                      | X                 |                       |
| Erosion                     |                   | X                     |
| Drought                     | X                 |                       |
| Wildfires                   | X                 |                       |
| Dam Failures                | X                 |                       |
| Climate Change              |                   | X                     |
| Infectious Disease          | X                 |                       |
| Fire                        | X                 |                       |
| Hazardous Material          | X                 |                       |
| Water Supply Contamination  | X                 |                       |
| Civil Disturbance/Terrorism | X                 |                       |

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## NATURAL HAZARDS – PRESENTED BY THE PHYSICAL WORLD

### Introduction

Source: Minnesota State Hazard Mitigation Plan

Guarding against the unpredictable forces of nature has always been a goal of society. Ways to accomplish this goal include informing society of known hazards and constructing building environments to prevent serious damage from occurring. As the forces of nature can strike with unpredictable fury, there is always an element of risk associated with natural hazards. To inventory hazards that have occurred in Big Stone County the Local Task Force committee identified hazards, established relationships between hazards, recognized current plans and programs in place to mitigate hazards, and highlighted gaps and overall deficiencies in current plans and programs.

For the purposes of this plan, natural hazards identified are organized into these groups:

#### 1. Violent Storms

##### a. Winter Storms

*Blizzards, Ice Storms, Sleet Storms, Heavy Snow or Snow Storm*

##### b. Summer Storms

*Thunderstorms, Lightning, Tornadoes, Hailstorms, Windstorms*

#### 2. Extreme Temperatures

**Summer Heat, Winter Cold**

#### 3. Floods

#### 4. Drought

#### 5. Wildfires

#### 6. Dam Failures

## Violent Storms

Violent storms can occur throughout the year in Big Stone County. For practical purposes, violent storms are categorized as summer or winter storms although there is no sharp end or beginning to when they might occur.

### *Winter Storms*

Big Stone County experiences three basic types of winter storms: blizzards, heavy snow events and ice storms. Ice storms include freezing rain, freezing drizzle and sleet.

**Table 3.1 BSC Winter Events from 1993 - 2013**

| Winter  | 1993-1994 | 1994-1995 | 1995-1996 | 1996-1997 | 1997-1998 | 1998-1999 | 1999-2000 | 2000-2001 | 2001-2002 | 2002-2003 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Number of Events</b>   | 6         | 3         | 10        | 13        | 1         | 2         | 0         | 7         | 2         | 0         |
| Winter  | 2003-2004 | 2004-2005 | 2005-2006 | 2006-2007 | 2007-2008 | 2008-2009 | 2009-2010 | 2010-2011 | 2011-2012 | 2012-2013 |
| <b>Number of Events</b>   | 2         | 1         | 4         | 1         | 6         | 11        | 5         | 10        | 3         | 9         |
| Events include: blizzards, winter storm, heavy snow, ice storm, low and extreme wind chills |           |           |           |           |           |           |           |           |           |           |

Source: National Climatic Data Center – Event Query 2014

***Blizzards*** Blizzards, the most violent of winter storms, are characterized by low temperatures usually below 20° F, strong winds in excess of 35 miles per hour, and blowing snow that creates visibility issues at one-quarter mile or less for at least three hours. Blowing snow can result in whiteouts and drifting on the roadways, leading to stranded motorists and the difficulty or inability of emergency vehicles to respond to incidents. While blizzards can occur in Big Stone County from October through April, they most commonly occur from November through the end of March.

***Ice Storms*** Freezing rain, the most serious of ice storms, occurs during a precipitation event when warm air aloft exceeds 32° F while the surface remains below the freezing point. When precipitation originating as rain or drizzle contacts physical structures on the surface, ice forms on all surfaces creating problems for traffic, utility lines, and tree limbs.

***Sleet Storms*** Sleet forms when precipitation originating as rain falls through a rather large layer of the atmosphere with below freezing temperatures, allowing raindrops to freeze before reaching the ground. Sleet is also commonly referred to as ice pellets. Sleet storms are usually of shorter duration than freezing rain and generally create fewer problems.

***Heavy Snow or Snowstorm*** In Minnesota, six or more inches of snow in a 12-hour period or eight or more inches of snow in a 24-hour period defines a heavy snow event. Snow is considered heavy when visibility drops below one-quarter mile regardless of wind speed.

### History of Winter Storms in Big Stone County

Between January 1996 and March 2013, the National Climatic Data Center reported 30 blizzards. The winters of 1995–1996 and 1996–1997 were exceptionally extreme. Six blizzards were reported during both the 1995-1996 and 1996-1997 seasons. In addition, heavy snow, high wind and winter storms made these two winters difficult for Big Stone County. The winter of 1996-1997 was declared a Presidential disaster because of the snow emergency. There were many school closings during this winter. Snow removal was extremely expensive and large snow load both damaged and destroyed buildings. More recently, there were record setting snowfalls in December of 2010 and April of 2008.

There are two weather stations in or near Big Stone County, located in Artichoke Lake and Browns Valley. Tables 3.2 and 3.3 show the snowfall records for these two weather stations.

**Table 3.2 BSC Snowfall Extremes by Month from 1973 - 2013**

| Month                   | Artichoke Lake |                  | Browns Valley |                  |
|-------------------------|----------------|------------------|---------------|------------------|
|                         | High (in)      | Year             | High (in)     | Year             |
| January                 | 26.0           | 2001             | 30.7          | 1975             |
| February                | 22.6           | 2001             | 24.2          | 2001             |
| March                   | 18.1           | 2008             | 24.5          | 1997             |
| April                   | 17.0           | 2008             | 26.0          | 2008             |
| May                     | 0              | -                | 0             | -                |
| June                    | 0              | -                | 0             | -                |
| July                    | 0              | -                | 0             | -                |
| August                  | 0              | -                | 0             | -                |
| September               | 0              | -                | 0             | -                |
| October                 | 7.5            | 1995             | 4.2           | 2009             |
| November                | 18.7           | 1977             | 26.0          | 1985             |
| December                | 31.1           | 2010             | 21.7          | 2009             |
| <b>Season (Jul-Jun)</b> | <b>68.3</b>    | <b>1993-1994</b> | <b>86.5</b>   | <b>1996-1997</b> |

Source: Midwest Regional Climate Center 2014

**Table 3.3 BSC Largest One-day Snowfall  
in Artichoke Lake and Browns Valley from 1973 - 2013**

| Month                   | Artichoke Lake |                 | Browns Valley  |                 |
|-------------------------|----------------|-----------------|----------------|-----------------|
|                         | 1-Day Max (in) | Date            | 1-Day Max (in) | Date            |
| January                 | 10             | 1/4/1997        | 17.5           | 1/5/1997        |
| February                | 10             | 2/10/2013       | 12             | 2/21/2011       |
| March                   | 10.5           | 3/21/2008       | 15             | 3/20/1982       |
| April                   | 8              | 4/28/1994       | 12             | 4/26/2008       |
| May                     | -              | -               | -              | -               |
| June                    | -              | -               | -              | -               |
| July                    | -              | -               | -              | -               |
| August                  | -              | -               | -              | -               |
| September               | -              | -               | -              | -               |
| October                 | 4              | 10/24/1995      | 2              | 10/15/2009      |
| November                | 8.5            | 11/9/1977       | 10.5           | 11/25/1993      |
| December                | 10             | 12/9/2012       | 9              | 12/25/2009      |
| <b>Season (Jul-Jun)</b> | <b>10.5</b>    | <b>1/4/1997</b> | <b>17.5</b>    | <b>1/5/1997</b> |

Source: Midwest Regional Climate Center 2014

### Relationship to Other Hazards – Cascading Effects

Because most of Big Stone County is relatively flat, dangerous winter conditions are created when the wind blows including drifting, white outs and wind chills. Drifting and blizzard conditions can occur even if there are no new snow accumulations. During the winter of 1996-1997, drifts were higher than most street vehicles. The winter of 1996-1997 also contributed to record spring flooding. This event is discussed in the flooding section.

### Summer Storms

Thunderstorms Thunderstorms are the most common summer storm in Big Stone County, occurring primarily during the months of May through August with the most severe storms most likely to occur from mid-May through mid-July. Thunderstorms are usually localized and produced by cumulonimbus clouds, always accompanied by lightening, and often have strong wind gusts, heavy rain, and sometimes hail or tornadoes.

Lightning While windstorms and tornadoes are significant hazards associated with severe thunderstorms, lightning is the most frequent hazard associated with thunderstorms and the hazard that results in the greatest loss of life. Lightning occurs to balance the difference between positive and negative discharges within a cloud, between two clouds and between the cloud and the ground. For example, a negative charge at the base of the cloud is attracted to a positive charge on the ground. When the difference between the two charges becomes great enough a lightning bolt strikes. The charge is usually strongest on tall buildings, trees and other objects protruding from the surface. Consequently, such objects are more likely to be struck than lower objects.

While cloud-to-ground lightning poses the greatest threat to people and objects on the ground it actually accounts for only 20 percent of all lightning strikes. The remaining lightning occurs

within the cloud, from cloud to cloud, or from the ground to the cloud. Within-cloud lightning is the most common type.

*Tornadoes* Tornadoes are the most violent of all storms. A tornado is a rapidly rotating column of air, spawned by a cumulonimbus cloud. When it drops to the ground it can create significant damage and loss of life. Tornadoes always occur in association with thunderstorms. While somewhat more common in southern Minnesota, they have occurred in all counties in the state.

Tornadoes are most likely to occur during warm, humid spells during the months of May, June, July, and August but have occurred as early as March and as late as November in Minnesota. On occasion tornadoes called cold air funnels occur after the passage of a cold front when air is much less humid but the air aloft is very cold creating enough instability to make funnel clouds. Most tornadoes occur during the warm part of the day – late afternoon or early evening; over 80 percent of tornadoes occur between noon and midnight.

The tornado's path typically ranges from 250 feet to a quarter of a mile in width. The speed of a tornado varies, but commonly is between 20 and 30 mph. However, larger and faster tornadoes have occurred in Minnesota. Most tornadoes stay on the ground for less than five minutes. Tornadoes frequently move from the southwest to the northeast but can vary in direction during some instances.

*Hailstorms* Hail is considered ice and is a result of severe thunderstorms. Hail is formed when strong updrafts within the cumulonimbus cloud carry water droplets above the freezing level or when ice pellets in the cloud collide with water droplets. The water droplets freeze or attach themselves to the ice pellets and begin to freeze as strong updraft winds toss the pellets and droplets back up into colder regions of the cloud. Both gravity and downdrafts in the cloud pull the pellets down, where they encounter more droplets that attach and freeze as the pellets are tossed once again to higher levels in the cloud. This process continues until the hailstones become too heavy to be supported by the updrafts and fall to the ground as hail.

Most hail in Minnesota ranges in size from pea-size to golf-ball sized hail. Larger hailstones have been reported but are much less common. Strong updrafts are usually associated with severe thunderstorms. The area covered by individual hailstorms is highly variable because of the changing nature of the cumulonimbus cloud. While almost all areas of southern Minnesota can expect some hail during the summer months, most hail is not large enough to cause significant crop or property damage.

*Windstorms* Windstorms can and do occur in all months of the year but the most severe windstorms usually occur during severe thunderstorms in the warm months. These include tornadoes and downburst or straight line winds. Winds of greater than 60 mph are also associated with intense winter, spring, and fall low-pressure systems. These inflict damage to buildings and in some cases overturn high profile vehicles.

A downburst is a severe, localized downdraft from a thunderstorm or a rain shower. This outflow of cool or colder air can create damaging winds. Winds up to 130 mph have been reported in the strongest thunderstorms. Downburst winds can cause as much damage as a small tornado



and are frequently confused with tornadoes because of the extensive damage they cause. As these downburst winds spread out they are often referred to as straight-line winds. They can cause major structural and tree damage over a relatively large area.

Strong winds combined with saturated soils can lead to wide spread loss of trees. This becomes a problem in communities when downed trees injure people, damage property, knock down power lines, or impede traffic. Downed power lines present a risk of electrocution or fire. Risks associated with downed trees can be managed through proper tree selection and proper maintenance programs. Some communities desire the look and feel of tree-shaded roads. This desire may lead a community to encourage the planting of trees that are too large for the boulevards, resulting in a greater risk of property damage.

### History of Summer Storms in Big Stone County

Big Stone County has experienced all of the summer storms described above. Thunderstorms, hail storms, and windstorms are relatively common and can topple trees, cause destruction to homes, and destroy agriculture crops. Table 3.4 lists the number of summer storm events between 1955 and 2013 reported by the National Climatic Data Center. The average number of each type of events per year in Big Stone County is also calculated.

**Table 3.4 BSC Summer Storms from 1955 - 2013**

|                     | <b>Thunderstorm Wind<br/>1955-2013</b> | <b>High Wind<br/>1955-2013</b> | <b>Hailstorms<br/>1955-2013</b> | <b>Tornados<br/>1955-2013</b> |
|---------------------|--|--------------------------------|---------------------------------|-------------------------------|
| Events              | 42                                     | 17                             | 46                              | 6                             |
| Years               | 58                                     | 58                             | 58                              | 58                            |
| Average<br>per year | 0.72                                   | 0.29                           | 0.79                            | 0.10                          |

Source: National Climatic Data Center – Event Query 2014

According to the Storm Database, the county has experienced six tornadoes since 1967. None have been very strong and none have affected urban areas, and in general the county has been spared from significant tornado damage.

Clinton Tornado, May 17, 1996. The Clinton Tornado occurred eight miles southwest of Clinton. An F3 tornado crossing Big Stone Lake from Roberts County, South Dakota destroyed one cabin at the Meadow Brook Resort, took the roof off another cabin, and a third cabin was demolished when a large tree fell onto it. Several boats on Big Stone Lake were overturned. Approximately 150 buildings sustained damage or were destroyed as the tornado moved northeast across Big Stone County through the townships of Prior, Big Stone, Almond, Malta, and Moonshine. Southwest of Clinton, a pontoon boat and a camper were destroyed. East of Clinton, a farm lost all buildings in addition to the severe damage to their home. The cupboards fell off the walls and doors would not close, signifying a twisted frame. Northeast of Clinton, another farm suffered rambler home was completely destroyed and several barns and machine sheds were ruined, before the tornado lifted. Many trees were uprooted in the path of the

tornado across Big Stone County and much of the power was out in the county as power lines were downed.

### **Relationship to Other Hazards – Cascading Effects**

Flooding. Thunderstorms and heavy rain can cause flooding and property damage as well as disrupt emergency response, transportation, and communication.

Transportation, Emergency Services, and Utility Disruption. Violent storms of all types can cause property damage, loss of life, personal injury, disrupt transportation, communication, and emergency services, and threaten public health and safety. Summer storms can present significant threats to essential public infrastructure and services such as power, water supply systems, and sanitary systems. Utility disruptions, in particular, are most likely to occur if a violent storm were to destroy an “electrical center” located in cities. It could take up to a full day to restore communication power, pending the service provider.

Fire. The storms listed above could down power lines, which could lead to fires.

### **Violent Storms and Climate Change**

Source: Minnesota State Hazard Mitigation Plan 2014

Winter Storms and Climate Change Winter storms have had a large impact on public safety in Minnesota historically. Snowstorm frequency and annual total snowfall have the potential to increase in the future. These events increase energy demand and pressure on the systems that provide energy that can result in power outages. As these events increase in the future there is a risk of reduced reliability in services, increased number of outages, and rising energy costs that can affect public health.

Climate change will likely have different effects on different geographical regions of the country as well as within the state of Minnesota. In the absence of downscaled modeling, more specific predictions for smaller geographical areas are not available at this time. Therefore, the climate change risks associated with Big Stone County are not mutually exclusive, but rather the effects in the county may differ from those of the state and Midwest region.

### Summer Storms and Climate Change

#### Lightning and Climate Change

According to the Draft National Climate Assessment (NCA), projections for the intensity and frequency of tornadoes, hail, and the damaging thunderstorm winds and the conditions associated with lightning are not certain (NCA, 2013, p. 26). The plan also stated that severe rain events are becoming more common and may include an additional risk of lightning.

#### Tornadoes and Climate Change

Tornadoes and other severe thunderstorm phenomena in the U.S. cause more deaths and similar amounts of annual property damage as hurricanes. Recent research has provided connections between global warming and the factors that cause tornadoes and severe thunderstorms. However, there is still a lot of research that has gone unexplored due to the

challenges of observing these events and creating the computer models to simulate them (NCA, page 60).

#### *Hail and Climate Change*

The NCA reports uncertainty in predicting storm events associated with summer storms. However, during recent decades, the occurrence of very heavy precipitation has increased in Minnesota and it is predicted that this trend will continue into the future.

#### *Windstorms and Climate Change*

The NCA reported a slight increase of the frequency and intensity of winter storms and that the tracks of winter storms have shifted northward over the U.S. However, the lack of quality data sets makes assessment of these patterns difficult. Trends of storms remain uncertain and research will continue to investigate the connections between climate change and severe storms” (NCA, page 59).

### **Plans and Programs for all Severe Storms**

Severe Storm Spotters Network. This program, sponsored by the National Weather Service (NWS), enlists the help of trained volunteers to spot severe storm conditions and report this information to the NWS. No tornado warning is given unless the storm has been spotted by someone or is confirmed by NWS radar reports. Big Stone County has 80 emergency responders that have been trained as severe weather spotters and always has enough volunteers to make this an effective program.

Severe Weather Awareness Week. Each spring Big Stone County Emergency Management personnel conduct a severe weather-training workshop for schools, hospitals and nursing home personnel.

Severe Weather Shelters The Armory in Ortonville has been designated as a safe shelter for all campers in the area.

Windbreaks. Mn/DOT and the Big Stone County Soil and Water Conservation District have been promoting a living snow fence program. Strategically planted strips of trees, shrubs and or native grasses can use natural snow fences to protect highways and dramatically reduce blowing and drifting snow. Mn/DOT has worked with the USDA to access CRP resources to help implement this program.

Live Weather Conditions. NOAA weather radios were distributed to most schools and nursing homes in the county.

Severe Weather Warning System. All the county’s cities have emergency sirens to warn residents in the event of severe summer weather.

Hourly Data. Hourly weather data is available online from various websites, including the MnDOT Website.

### **Gaps and Deficiencies**

- Some homes in the county lack basements that would provide shelter in the event of a tornado or damaging winds from a severe thunderstorm. Moreover, none of the county's nursing homes have basement shelters or other suitable shelter for residents. In the event of a violent storm residents are moved to an interior hall away from windows.
- The manufactured home park in Ortonville is quite old and may not provide adequate safety shelters for residents.
- Graceville has no place for campers at Toqua Park in Big Stone County for storms.

### *Extreme Temperatures*

Located in the center of the continent, Minnesota and Big Stone County experience the extremes of summer heat and winter cold. Summer temperatures in Big Stone County have been as high as 110° F while winter temperatures have been as cold as -41° F. Both heat and cold pose risks for people, animals, equipment, and infrastructure.

### *History of Summer Heat in Big Stone County*

In July, the warmest month of the year, the average high temperature is 84° F in most of Big Stone County. On average the county experiences 19 - 20 days of 90° F or higher during a summer. The all-time recorded high is 110° F in Browns Valley, which occurred in 1988.

**Table 3.5 BSC Temperature Extremes**

|                | Highest Temp | Date          | Lowest Temp | Date             |
|----------------|--------------|---------------|-------------|------------------|
| Artichoke Lake | 108° F       | July 31, 1988 | -36° F      | February 9, 1994 |
| Browns Valley  | 110° F       | July 6, 1988  | -41° F      | February 9, 1994 |

Source: Midwest Regional Climate Center 2014

While summers are typically warm but pleasant in Big Stone County, it is not uncommon to experience high dew points and temperatures in the 90s for several days in a row. Extended periods of warm, humid weather can create significant risks for people, particularly those that may lack air conditioning or proper insulation or ventilation in their homes. Animals are also at risk during extended periods of heat and humidity.

Heat Index has been developed as a measure that combines humidity and temperature to better reflect the risk of warm weather to people and animals. The index measures the apparent temperature in the shade. People exposed to the sun would experience an even higher apparent temperature. A heat index of 105° F is considered dangerous. With prolonged exposure, it could result in heat stroke, heat exhaustion, and heat cramps. People are reminded to use extreme caution when the heat index is between 90° and 105° F. A heat index of 95° F occurs when the temperature is 90° F and the relative humidity is 50 percent. This is more of a problem when these conditions are present for several days in a row, allowing buildings to become hotter and hotter as the conditions persist.

According to the State Climatologist, there is some evidence that current dew points are not only higher but are occurring with greater frequency than was true in the past. If that is true, Big Stone County residents can expect an increasing number of hours with heat indexes in the danger category.

### *History of Winter Cold in Big Stone County*

On average, January is the coldest month, with daytime highs of averaging 22° F and nighttime lows of 0° F. These averages, however, do not tell the entire story. Maximum temperatures in January have been as high as 69° F and minimums as low as 40° F below zero in Big Stone County. The winter months, on average, produce about 37-42 days of 0° F or lower.

Cold weather is often accompanied by winds creating a dangerous wind chill effect, putting both people and livestock at risk. Most of the county is at risk of this kind of weather because of its relatively flat, open character. More wooded, hilly areas of the county are less severely affected by wind chill. Wind chills of -35° F and lower can present significant risk, particularly if people are not properly clothed or protected. A -15° F air temperature with wind speeds of 10 miles per hour creates a wind chill of 35 degrees below zero. Under these conditions, frostbite can occur in just minutes on exposed skin.

### ***Relationship to Other Hazards – Cascading Effects***

*Violent Storms.* Temperature extremes are often associated with weather extremes such as snowstorms and blizzards.

*Drought.* Extended high temperature extremes can phase into drought.

*Wildfire.* Dry, hot conditions can increase the risk of wildfires.

*Collapsed Structures.* Structural weakness results from building material failure, settling, and other factors. Tornadoes, floods, high winds, snow, heavy rainfall, may cause major damage to structures.

*Utility Failure.* Heavy utility use to heat or cool buildings can cause utility damage or failure.

### **Extreme Temperatures and Climate Change**

Source: Minnesota State Hazard Mitigation Plan 2014

The average temperature in Minnesota has increased more than 1.5° F since recordkeeping began in 1895 and that increased warming has been occurring in recent decades (Interagency Climate Adaptation Team, p. 4). Midwest annual temperatures have generally been well above the 1901-1960 average since the late 1990s. The warmest decade on record occurred during the 2000s (Kunkel, K.E. et al, 2013). In addition, the Midwest has experienced major heat waves and their frequency has increased over the last six decades (Perera et al. 2012). In the U.S., mortality rates increase 4% on days with heat waves in comparison with non-heat wave days (Anderson and Bell 2011). It's been projected that heat stress will increase as summer temperatures and humidity continue to increase (Schoof, 2012).

In regards to extreme cold temperatures, the Minnesota State Hazard Mitigation Plan 2014 states that there is not yet any observable trend related to extreme cold events and climate change in Minnesota. Historically, cold temperatures have always been a part of Minnesota's climate and extreme cold events will continue. However, an increase in extreme precipitation or ice storms due to climate changes could lead to a higher risk of exposure to cold temperatures during power outages or other storm-related hazards during extreme cold.

The state hazard mitigation plan also notes that climate change will likely have different effects on different geographical regions of the country as well as within the state of Minnesota. In the absence of downscaled modeling, more specific predictions for smaller geographical areas are not available at this time. Therefore, the climate change risks associated with Big Stone County

are not mutually exclusive, but rather the effects in the county may differ from those of the state and Midwest region.

### ***Plans and Programs for Extreme Temperatures***

The following programs and projects are in addition to the ones already mentioned for violent storms:

*School Closings.* The county's school districts each have their own school closing policy. The superintendents decide when to send students home based on current weather forecasts. Local radio stations partner with the districts to make sure school closure announcements are out by 6:00 a.m. or earlier.

*Heat Advisories.* The local radio and TV media in concert with the National Weather Service issues a heat advisory when the combination of temperature and humidity create risks for people and animals. A heat index of 105 to 114° F warrants a heat advisory. This occurs when air temperature reaches 95° F and the relative humidity is 50 percent. An excessive heat warning is issued when the heat index reaches 115° F. This occurs with an air temperature of 95° F and relative humidity of 60 percent. An index of 115° F or higher creates severe risk for both humans and animals.

*Wind Chill Warnings.* The local radio and TV media collaborate with the National Weather Service and issue wind chill warnings when temperatures are 30° F or below. Severe wind chill warnings are provided when conditions warrant and when severe risk and safety is a factor. Wind chills of -40° F or lower frequently prompt the closing of schools to protect children, particularly those that might have to wait outside for extended periods of time.

### ***Program Gaps or Deficiencies for Extreme Temperatures***

- There are no identified locations, with backup generators for heating/cooling, in the county that are available for residents to go in case of a power outage during extreme temperatures and weather events. Clinton has a location for residents to go, although it is not in a written policy.

### ***Flooding***

A flood is defined as an overflowing of water onto an area of land that is normally dry. The term "100-year flood" is misleading - it is not a flood that will occur once every 100 years; rather, it is the flood elevation that has a one percent chance of being equaled or exceeded each year. Thus, a 100-year flood could occur more than once in a relatively short period of time. The 100-year flood, which is the standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. A structure located within a flood hazard area has a 26 percent chance of suffering flood damage during the term of a 30-year mortgage. One-hundred year floodplains have been identified, mapped and used for further analysis using a Geographic Information System (GIS).

Floods generally occur from natural causes, usually weather-related, such as a sudden snowmelt, often in conjunction with a wet or rainy spring or with sudden and very heavy rain

falls. However, floods can result from human causes such as a dam impoundment bursting. Additional water hazards considered in this section include flash floods, washouts, and ice freezes that have potential to affect dams and culverts. In the spring of 2009 and 2010, a great amount of water overflowed roads causing a major washout and road closures throughout the county.

### ***History of Flooding in Big Stone County***

*Issues that arose from the 1997 and 2001 flood events:*

#### Entire County

- Roads damaged from hauling of sand, etc.
- Flooded county and township roads, bridges and culverts.
- Flooded county ditches.
- High groundwater all over.
- Flooding all over county – streams, creeks and wetlands as well as the major rivers and lakes.
- Many roads closed.
- Lives at risk, especially in 1997.
- In 1997 only, septic tanks backed up into homes (many rural septic systems have been updated since).
- Eighty-two cabins and/or residences in the county were flooded. This does not include residences within city limits.
- Every road in Big Stone County had some flooding. A portion of every road was closed because of the flooding.
- In 2001 flooding was much less because of weather conditions. The lake was four feet lower.

#### Townships

High water over township road in Otrey Township. The road has been under water for three years but was not a mail or bus route. Other roads often flood during large rain events.

- Slough – erosion - gravel road is eroding away. Animals (muskrats) are causing erosion and rip-rap is needed for river banks. Safety issues arise as roads are continually used by public.

#### Clinton

- Slough within community, no natural runoff – which led to flooded homes:
  - Currently a pump system is used, but it is a slow process.
  - A solution would be to put in a stand pipe in storm sewers.

#### Graceville

- Northwest corner of Graceville flooded in 1997 and 2001.
- Since the 2001 floods, ditches and dikes have increased in capacity to hold floodwaters by four times. Graceville should be safe from future flood events.



## Ortonville

- One house flooded by creek in 1997.
- Overflow for dike along Big Stone Lake.
- Eleven homes flooded in 1997 and twelve in 2001. All these homes are located on the Peninsula. Another home flooded in 2001 due to ice buildup. After the 1997 flood, these homes raised main floors or built homes higher. The residences near the flood area do not have basements and all residents had an opportunity to be bought out, but not all owners choose to do so.
- Other repairs on the Peninsula included replacing water mains and bad sewer mains. The road was redone above these utilities to protect in future flood events. The lift station was also replaced and raised from the original location. The city was only able to do one-half of the bad sewer main; they would like to finish the three-fourths mile.

Figure 3.1

**Flooding Reports from the National Climatic Data Center (NCDC)  
Storm Event Database**  
<http://www4.ncdc.noaa.gov/cgi-win/wwwcgi.dll?wwevent~storms>

**100-year Flood, 1997**  
As temperatures began to warm up towards the end of March, the near record to record snow pack across Big Stone and Traverse Counties began to melt and runoff, filling up ditches, lakes, creeks, streams, and low-lying areas. The extensive amount of water, inundated many county and township roads as well as some highways. Many sections on the roads were broken up or washed out. Some culverts were damaged or blown out and some bridges were damaged or washed out by ice chunks and high water flows. Thus, road closures occurred with rerouting taking place for school buses, mail carriers, farmers, ranchers, etc. Many acres of farmland and pastureland were underwater. Due to the high ground water level, some homes received water in their basements. Also, some farms were surrounded by water and were inaccessible, leaving some people and livestock stranded. The flooding continued into April.

Late March flooding from the meltdown of the near record to record snow pack continued throughout April. Most of the snowmelt across Big Stone and Traverse Counties occurred in early April. Ditches, lakes, creeks, streams, and low-lying areas continued to rise and flood into April. Many sections of county and township roads as well as some highways were inundated, broken up, or washed out. Many culverts were damaged or blown out and some bridges were damaged or washed out by ice chunks and high water flows. Thus, road closures were extensive with rerouting taking place for almost everyone, especially school buses, mail carriers, farmers, ranchers, etc. Some of the roads were closed up to several weeks. Countless acres of farmland and pastureland were under water. As a result, many of the crops were not planted or there were significant delays in planting. High ground water resulted in water in many basements. Also, some farms were surrounded by water and were inaccessible, leaving some people and livestock stranded. In early April, President Clinton declared Big Stone and Traverse Counties a federal disaster area. The total damage estimate for the flooding was \$5 million.

Near record to record snowmelt runoff combined with heavy rains of 1.5 to 2.5 inches on April 5th caused the Big Stone Lake to rise to a record level of 973.45 feet above sea level, two feet above the old record in 1952. The rising lake threatened to breach the Big Stone Dam. As a result, extensive evacuations took place downstream from the Whetstone River and the Big Stone Dam. If the earthen dam would break, water from the lake and river would travel down the Minnesota River flooding homes and farms in low areas. Residents were urged to move to higher ground. Hundreds of people worked around the clock filling sandbags to fortify the dam. All of the residents of the town of Odessa were evacuated on the 6th. People on the peninsula in Ortonville were ordered to move out on the 5th and traffic on Highway 12 was stopped. As Big Stone Lake rose to a record level, many homes, resorts, and businesses in parts of Ortonville and along the lake were flooded and significantly damaged. This was the worst flooding for this area in history.

**Flooding, April 7, 2001**  
Heavy rains of one to two and one-half inches combined with snowmelt runoff brought flooding to parts of Traverse and Big Stone Counties. Several roads were flooded with some receiving damage.

E 7

### ***Relationship with Other Hazards – Cascading Effects***

**Hazardous Materials.** Structures that house hazardous materials may be flooded causing leaks or transportation routes may be washed out, causing overturned vehicles.

**Infectious Disease.** Water issues often translate into issues around infectious diseases. Water contamination and wastewater removal many times go along with flooding issues. Diseases such as hepatitis A, giardia, cryptosporidium, and West Nile virus are potential hazards that have direct links to water.

**Transportation, Emergency Services, and Utility Disruption.** Violent storms of all types can cause property damage, loss of life, personal injury, disrupt transportation and communication and emergency services. Further, public health and safety, and essential public infrastructure and services such as power, water supply systems and sanitary systems, could be threatened. Utility disruptions in particular, are most likely to occur if a flood were to destroy an “electrical center” located in cities and may take up to a day to restore communication power, pending the service provider.

**Landslide and Debris Flow.** Destabilized stream banks are related to flooding. As rivers evolve they carve out a channel adequate to handle typical peak flows (1-2 year flood events). As landscape hydrology alters, higher peak flows carve out larger channels. Unfortunately, this often results in riverbanks being destabilized. Across the region these unstable banks have threatened farmlands, roads and homes. Bank stabilization projects are expensive and often only shift the problem to a different place along the stream. Long term mitigation for riverbank stabilization is 1) holding water on the landscape and 2) proper setback of infrastructure and building from rivers.

Debris flow includes downed trees being carried by floodwaters. These trees caused problems at various bridges over the Minnesota River in the last round of major flooding. The trees ran into bridges and got caught forming logjams. Contractors lifted the trees over bridges and returned them to the river downstream of the bridge, with the end result of trees floating to succeeding bridges to be lifted over again. Large flood events can and do kill trees within the flood plain, including large cottonwood and maples. In subsequent flood events, these standing dead trees can be knocked down and washed away, causing havoc to communities and counties.

### **Floods and Climate Change**

Source: Minnesota State Hazard Mitigation Plan 2014

The change in the amount of precipitation has led to an increased magnitude of flooding. In conjunction with increased precipitation, seasonal changes have occurred with trends of wetter springs and drier summers and falls.

### ***Plans and Programs for Floods***

**County Flood Area Map and Controls.** The current county official Flood Insurance Rate Map (FIRM) identifies the 100-year flood areas. The county zoning ordinance controls the permitted land uses in these areas, what can be built and how.

Ortonville and Graceville Flood Map and Controls. Both Ortonville and Graceville have identified 100-year flood areas on the official FIRM maps and adopted in its zoning ordinance appropriate zoning and land use controls governing these areas.

Response Plan. A response plan to a flood emergency has been developed and local resources and personnel have been committed to it.

#### ***Program Gaps or Deficiencies for Flooding***

- The Peninsula along Big Stone Lake is subject to large flood events.
- Some of the Township roads left under water after the 1993 and 1997 floods still need to be addressed.
- Township roads that receive repeated flooding need to be rip-rapped. Lake Toqua near Graceville could also have its banks rip-rapped.

### **Erosion**

Erosion is the gradual wearing-away of land surface materials, especially rocks, sediments, and soils, by the action of water, wind, or a glacier. Usually erosion also involves the transfer or eroded material from one place to another (The American Heritage Dictionary of Student Science). Erosion can occur on farmland, stream banks, bluffs, and coastlines and can be the result of both natural and man-made activities.

#### **History of Erosion in Big Stone County**

The soils of Big Stone County are subject to both water and wind erosion. Water erosion results from soil removed from its original location by the force of water to lower slopes and plots. The potential for wind erosion occurs when wind velocities exceed 12 mph. The Big Stone County Water Plan (2014) states that approximately 75% of the land in Big Stone County is used for agriculture. A majority of this land is filled with cash crops, which causes soil to be more susceptible to both wind and water erosion.

#### **Erosion and Climate Change**

The Minnesota State Hazard Mitigation Plan (2014) states that flash flooding can contribute to erosion of stream banks. Impervious surfaces from human development as well as the predicted increases in heavy rain events in the future may contribute to flash flooding leading to erosion for stream and river banks in Big Stone County.

#### **Plans and Programs for Erosion**

Big Stone County Water Plan (2014) The Big Stone County Water Plan Update (2014) still lists erosion and sediment control as a priority concern for the county. The plan provides five action steps for the next five years to address soil and stream bank erosion in Big Stone County.

#### **Program Gaps or Deficiencies for Erosion**

- None listed.

## *Drought*

Drought is defined as a prolonged period of dry weather or a lack of rainfall.

### *History of Drought in Big Stone County*

Big Stone County has experienced prolonged periods without rainfall. The most severe in climatic records occurred during the 1930's. None so prolonged has been experienced since. The famous dust storm of 1934 was the "very worst dust storm in the history of the county". The wind was not particularly strong that day, but the dust was so thick in the air that at 4:00 p.m. it was pitch dark. Car lights were barely visible and lights in buildings looked murky.

Record annual low precipitation according to the Artichoke Lake Data Station was 11.2 inches in 1976. The record low for the summer was 2.08 inches in 1922 and for the month of July was .29 inches in 1936.

*Drought of 1920's & 1930's.* Perhaps the most devastating weather-driven events in American history were the droughts of the 1920's and 1930's, which significantly impacted Minnesota's economic, social, and natural landscapes. Abnormally dry and hot weather during the growing season throughout the better part of two decades turned Minnesota farm fields to dust and small lakes into muddy ponds. The parched soil was easily taken up by strong winds, often turning day into night. The drought peaked with the heat of the summer of 1936, setting many high temperature records that still stand today.

*Drought of 1974-77.* Drought-like conditions began in the winter of 1974 and extended through the summer of 1977. The dry conditions of these years lowered water levels in wells and caused record low stream flows throughout the state. Late summer forest fires broke out, and conflicts arose between domestic well owners and neighboring high capacity well owners. The DNR Division of Waters formulated new policies to resolve these resource management problems and user conflicts. Many of these new policies formed the basis of subsequent amendments to agency rules and state statutes.

*Drought of 1987-89.* The warm, dry winter of 1986-87 was the beginning of this period of little rainfall and extreme dryness. Drought conditions became very serious in mid-June 1988 when Mississippi River flow levels threatened to drop below the Minneapolis Water Works intake pipes at the City of Fridley. Below normal precipitation coupled with declining lake levels, ground water levels, and stream flow to create statewide concern. To facilitate coordination of drought response actions, a State Drought Task Force was convened by the director of the Division of Waters. The State Drought Task Force brought together local, state, and federal officials to share information and coordinate drought response strategies. Several actions were taken following the summer of 1988 to better prepare the state for the next drought. Minnesota Governor Rudy Perpich appointed a "Twin Cities Water Supply Task Force" specifically to make recommendations on how to meet future water demands in the event of low flow conditions on the Mississippi River. The Corps of Engineers initiated review of its operating plans for the Mississippi River headwaters reservoirs, and the 1989 legislature charged the Metropolitan Council with preparing water use and supply plans for the metropolitan area. In the summer of 1988, rains finally came in August, but not soon enough to save agriculture crops.

*Drought of 2003.* For a three-month period from mid-July through mid-October, a stubbornly persistent weather pattern resulted in extremely dry weather across the state of Minnesota. Few widespread rain events moved through the state during this time period and precipitation totals were less than six inches across much of Minnesota. Total rainfall for the mid-July through mid-October period fell short of historical averages by four or more inches in many areas. Rainfall deficits exceeded seven inches in parts of southeastern Minnesota. When compared with other July 15 through October 20 time periods in the historical database, mid-July through mid-October 2003 rainfall totals rank among the lowest on record for many areas of south central and southeastern Minnesota, as well as a small portion of west central Minnesota.

*Drought of 2006.* From August 1<sup>st</sup> to August 29<sup>th</sup>, Big Stone County experienced severe drought conditions that hit west central Minnesota. Rains from two to six inches late in the month alleviated drought conditions in the county and improved the drought situation by the end of August.

### ***Relationship with Other Hazards – Cascading Effects***

*Wildfires.* Woods, brush land, and non-cultivated fields stressed by drought, significantly increases the risks of wildfire.

### **Drought and Climate Change**

Source: Minnesota State Hazard Mitigation Plan 2014

Drought events have occurred throughout Minnesota's history. However, the Minnesota State Hazard Mitigation Plan 2014 reports that the impact of climate change on droughts is uncertain. During the past century there was no change that occurred for the duration of droughts in the Midwest, but the average number of days without precipitation is anticipated to increase in the future. In addition, the projection of higher air temperatures can cause increases in surface evaporation and water loss from plants. This could lead to drier soils where the sun heats the soil and the adjacent air instead of moisture with the result of hotter summers and drier climatic conditions.

### ***Plans and Programs of Drought***

*Water Plan.* The current DNR hydrology map identifies the major and minor aquifers serving the county and has mapped them.

*Shoreline Zoning.* Big Stone County has adopted via ordinance the state's statutory shoreline and riparian zoning classifications and minimum standards.

### ***Program Gaps and Deficiencies for Droughts***

- Semi-annual or annual water consumption by various major consumers, urban residential, industrial/commercial or agricultural, is not documented or known.
- Water conservation provisions and use restrictions in times of drought are not included in county or city ordinances.

## *Wildfire*

A wildfire is an uncontrolled fire spread through vegetative fuels, posing danger and destruction to property. Wildfires can occur in undeveloped areas and spread to urban areas where structures and other human development are more concentrated. While some wildfires are started by natural causes such as lightning, humans cause four out of every five wildfires. Burning debris, arson, and carelessness are the leading causes of wildfires. As a natural hazard, a wildfire is often the direct result of a lightning strike that may destroy personal property and public land areas, especially on state and national forest lands. The greatest risks of wildfires are the destruction of timber, property, wildlife, and injury or loss of life to people living in or using the area for recreational activities.

Wildfire risks are not limited to public lands. There are extensive tracts of privately owned grasslands as well. These include both conservation program lands (CRP, RIM, CREP, etc.) and “rough ground” that has been hayed, pastured, or left wild. These private lands particularly in combination with public lands (such as WMA, SNA, State Parks, WPA, etc.) can combine to create substantial blocks of grasslands.

To date, there has been very little injury or loss of property resulting from wildfire in the Upper Minnesota Valley Region. However, there are some risks that should be managed to mitigate potential disasters.

### ***History of Wildfires in Big Stone County***

Wildfires occur throughout the state of Minnesota. According to the Minnesota State Fire Marshal, there are more than 2,000 annual wildfires with an estimated loss of more than \$13 million dollars.

In the past couple of years, there has been at least one major fire. The Dismal Swamp Fire burned about 300 acres. In neighboring counties near the city of Milan, a huge wildfire burned over 3,000 acres in 2003. In 2004, a wildfire started in the Big Stone Wildlife Refuge in Lac qui Parle County and due to southeasterly winds, burned over a thousand acres in Lac qui Parle County. Had the winds been different, the entire river bottom could have burned.

Yearly occurrences are wildfires started along the railroads and farmland. Two other potential wildfire hazards are along power lines and utility structures and timber bridges. Farm equipment’s hot exhaust can also start fields on fire.

Wildfire behavior is based on three primary factors: fuel, topography and weather. When dry weather mixes with windy conditions, areas with fuel have the potential for a wildfire to spread out of control as it did in the 2003 fire near Milan. Big Stone County currently has 10,011.7 acres enrolled in CREP, RIM, CRP and the Wetland Reserve Program. These areas are left for wildlife habitat and are not burned on a regular basis. As a result, years of dead grasses accumulate on these lands and are a good fuel for any fire that may start. The Minnesota River Valley and the Wildlife Management Areas also provide an abundance of fuel for wildfires. Wildlife Management Areas occupy about 3,261 acres in Big Stone County.

Topography is also important in determining wildfire potential, because it affects the movement of air and fire over the ground surface and the majority of Big Stone County is relatively flat. The slope and shape of terrain can change the rate of speed at which the fire travels.

Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity and wind affect the severity and duration of wildfires. These conditions are similar throughout the county. Although higher wind speeds are possible in the northern portion of the county due to the lack of vegetation and slope, the area is dominated by agricultural uses and lacks major stands of forests.

### ***Relationship with Other Hazards – Cascading Effects***

***Flooding and Erosion.*** Major wildfires can completely destroy ground cover which can cause heavy erosion and loss of all vegetation. If heavy rains follow a major fire, flash floods, landslides and mudflows can occur since vegetation is essential in deterring flooding during heavy rainfalls or spring runoff.

***Hazardous Materials.*** Anhydrous ammonia tanks that sit in the countryside or on farms are at risk if a wildfire occurred. While most tanks can be moved quickly, fire departments and response teams may not be aware of their presence.

### **Wildfires and Climate Change**

Source: Minnesota State Hazard Mitigation Plan 2014

On a global scale, fire risk will increase by 10-30% because of higher summer temperatures. The Minnesota Forest Ecosystem Vulnerability Assessment and Synthesis by the U.S.D.A. Forest Service and Northern Institute of Applied Climate Science report that national and global studies agree wildfire risk will increase in the region, however there are a lack of studies that specifically address wildfire potential in assessment areas.

Droughts and drought fires have occurred throughout the history of Minnesota. No change has been found in the duration of Midwest droughts during the past century, but the average number of days without rain is predicted to increase along with temperatures. As a result, extreme heat events and associated wildfire risks are predicted to become more prevalent.

In addition, the increase of the fluctuations between drought, extreme rain events, and the increase in temperature will lead to changes in forest composition and distribution. These changes also will contribute to drier conditions that may cause increased fire risk as well.

### ***Plans and Programs for Wildfires***

***Fire Districts and Departments.*** Fire departments (FD) respond to any structure fires that are in their fire district and help when needed in other districts (West Central Firefighters Association) to work together on large fires. All the FDs in the county are on the city level and are a part of the West Central Firefighters Association (also includes fire departments in surrounding counties).



West Central Firefighters Association. Fire departments in the county agree to make their fire-fighting equipment and personnel available to each other in the case of emergencies, and each has the legal authority to send its fire-fighting equipment and personnel into other communities.

Zoning. The Big Stone County Zoning Department, which includes the county building inspector, regulates the development of new housing. The department also is in charge of enforcing safety restrictions including setbacks, lot coverage, lot depth and structure height. In addition, the Unified Building Code sets standards for roofing in cities. The fire marshal inspects commercial structures for potential fire hazards..

DNR Training. County firefighters participate in annual wildfire training classes offered by the Minnesota Department of Natural Resources-Forestry Department. The DNR also works with local firefighters in promoting their Fire Smart program, a fire prevention program involving local public schools geared towards children.

State Land Management. The DNR operates and regulates all state lands within the county, including management of Lac qui Parle State Park and Lac qui Parle Wildlife Management Area. The park currently is primarily managed for recreational activities. Wildfires are minimized by thinning brush and vegetation around the park, particularly around the campground areas.

Federal Land Management. The U.S. Fish & Wildlife Service manages the Big Stone National Wildlife Refuge.

Mutual Aid Agreements. A mutual aid agreement exists between the Big Stone National Wildlife Refuge and the city of Odessa.

FireWise. The DNR participates in a national wildfire education program called FireWise. This program provides tools for risk assessment and risk reduction and is available to communities who would like to do a detailed risk assessment. Small grants are available for 50 percent of projects.

Evacuation Plan. The county's cities have evacuation plans delineating routes residents should take in the event of large fires.

Dry Hydrants. Currently, there are three dry hydrants in Big Stone County. Dry hydrants have been demonstrated as an effective tool in assuring a steady and close by source of water for responding to both major wild land and structural fires in rural areas. Dry Hydrants use a non-pressurized pipe system and are hooked directly into a natural water source such as a pond or stream. Assessments should be made to determine where existing dry hydrants are, where fire risks are greatest, and where water bodies suitable to support a dry hydrant are located. Suitable placement of additional dry hydrants may be difficult as the area to fight wildfires is extremely large.

Education and Outreach. Education is available through existing resources and channels, such as the University of Minnesota Extension Service and Soil and Water Conservation Districts.



Evacuation Plan. The county's cities have evacuation plans delineating routes residents should take in the event of large fires.

Training for Fire Departments. Most of the fire departments in Big Stone County are well trained for fighting wildfires.

Equipment. All fire departments have 4-wheelers and other equipment for fighting wildfires.

Communication. Dispatch is notified when DNR or any other major burn is started in order to better prepare for fires that lose control or re-ignite at a later time.

Dry Hydrants. Currently there are three dry hydrants in Big Stone County: one at Artichoke Lake, one at the Louisburg road and one at Meadowbrook Access on Big Stone Lake. Dry hydrants have been demonstrated as an effective tool in assuring a steady and close by source of water for responding to major wild land and structural fires in rural areas. Assessments should be made to determine where existing dry hydrants are, where fire risks are greatest, and where water bodies suitable to support a dry hydrant are located. Otre Lake may be a suitable place for a dry hydrant. Suitable placement of additional dry hydrants may be difficult as the area to fight wildfires is extremely large.

#### ***Program Gaps or Deficiencies for Wildfires***

- Currently, there is no program to ensure that fire is considered when planning conservation plantings that include woody cover. Firebreaks should be included to protect homes and woody cover as well as allowing the use of fire as a management tool. (If a tree and shrub planting is placed in the middle of a prairie planting, it may be difficult to accomplish a prescribed management burn of that property without damaging or destroying the woody component. It may also be impossible to protect that planting in the event of a wildfire.)
- There are many CRP, CREP and other natural areas that are not managed with prescribed burns. These areas should continue to work with professional agencies to manage the land with prescribed burns to help reduce trash and debris that can create a large wildfire hazard.

## *Dam Failure*

Dam failure is defined as the collapse or failure of an impoundment resulting in downstream flooding. Dam failures can cause loss of life and extensive property damages; and could result from an array of situations, including flood events, poor operation, lack of maintenance and repair, and terrorism.

The main purpose of dams is to hold water, which is important during high water or floods, especially during spring runoff and immediately after heavy rains. Although dams act to prevent harm from flooding, they do pose potential threats in the event of failure. Dam failure can push a wall of water down to the valley below, causing serious destruction in its path.

### *History of Dam Failure in Big Stone County*

The worst recorded dam failure in U.S. history occurred in Johnstown, Pennsylvania, in 1889. More than 2,200 people were killed when a dam failed, sending a huge wall of water downstream, completely destroying the town below. Although risks are minimal, dam failure can occur in Minnesota. Several dam failures have occurred in Minnesota in the past, but none have been reported in Big Stone County.

Lac qui Parle Flood Control and Water Conservation Project were authorized by Congress in 1936 and were partially constructed as a W.P.A. project. The Corps completed construction of their portion of the project from 1941-1951 and operation of the project was transferred from the state to the Corps of Engineers in 1950. This project is located on the Upper Minnesota River in western Minnesota near the South Dakota border. It consists of the Lac qui Parle Dam, Marsh Lake Dam, Highway 75 Dam, Watson Sag Weir and diversion channel on the Big Stone River.

Long Tom Dam is located up river from the city of Odessa. If this dam failed, there could be some damage to the city of Odessa.

### *Relations with Other Hazards – Cascading Effects*

Flood. Dam failure, although the risk is minimal, has the potential to be devastating to the areas within the floodplain and around the stream directly below the dam in Montevideo and Granite Falls. If the Lac qui Parle Dam were to fail, Montevideo and Granite Falls would be impacted. Dam failure would cause immediate flash flooding, destruction of property, erosion of crops, and the potential destruction of infrastructure.

### **Dam Failure and Climate Change**

Source: Minnesota State Hazard Mitigation Plan 2014

Dams are designed based on assumptions about a river's annual flow behavior. These assumptions will determine the volume of water behind the dam and the amount of water flowing through the dam at any one time. Changes in weather patterns due to climate change may change the hydrograph, or expected flow pattern.

Spillways are put in place on dams as a safety measure in the event of the reservoir filling too quickly. Spillway overflow events are a mechanism that also results in increased discharges downstream. It is conceivable that bigger rainfalls at earlier times in the year could threaten a dam's designed margin of safety, causing dam operators to release greater volumes of water

earlier in a storm cycle in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream.

While climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures. Climate change is adding a new level of uncertainty that needs to be considered with respect to assumptions made during the dam construction.

#### ***Plans and Programs for Dam Failure***

***Floodplain Ordinance.*** The county floodplain ordinance prohibits further development on the properties in the floodplain, including property directly below the dam.

***Dam Inspection.*** The Minnesota Department of Natural Resources regulates nearly 900 of the numerous dams in the state. The DNR and U.S. Army Corps of Engineers regularly inspect the dam and reservoir capabilities for flooding and dam failure. Their report indicates that dam sizes are adequate for any major floods or spring runoff.

#### ***Program Gaps or Deficiencies for Dam Failure***

- None Listed.

## **Introduction**

Source: Minnesota State Hazard Mitigation Plan

Technological hazards are a part of everyday life, a result the modern world in which we live. The challenge is to benefit from the use of technology while limiting potential harm to the community. In order to fully realize the benefits of technology, it is necessary to plan an effective response to unwanted technological emergencies before they occur.

From a hazard mitigation perspective, the existence of technological hazards in the community poses a risk to life, health, or property, just as natural hazards do. The use of hazardous materials in manufacturing and transportation can be extremely harmful if an unwanted release occurs and the use of nuclear materials in the presence of a community creates risks that must be managed. While dam failure can result from natural hazards, dams will still have a catastrophic impact on those downstream if poor engineering or construction cause it to fail. Further, the furnishings in our homes make a pleasant living environment, but are often flammable and produce toxic gases if ignited.

For the purposes of this plan, technological hazards identified are organized into these groups:

- 1. Infectious Diseases**
- 2. Fire**
- 3. Hazardous Material**
- 4. Water Supply Contamination**
- 5. Wastewater Treatment System Failure**
- 6. Civil Disturbance/Terrorism**
- 7. Airplane Incidents/Accidents**

## **Infectious Diseases**

An infectious disease is defined as an organism or virus that has the potential to spread or affect a population in adverse ways. Infectious diseases have the potential to affect any form of life at any time based on local conditions, living standards, basic hygiene, pasteurization, and water treatment. Despite breakthroughs in both medicine and technology, infectious diseases continue to pose a major public health risk. Today, the issue of emerging and re-emerging infectious diseases is at the forefront of public health concern. The very young, older adults, immunocompromised individuals, and hospitalized or institutionalized patients are at an increased risk for many infectious diseases. Changes in demographics, lifestyle, technology, land use practices, food production and distribution methods, child care practices, immunization, as well as increasing poverty, have roles in emerging infections.

Many infectious diseases are preventable and controllable. Prevention and control of infectious diseases involve collection of accurate condition assessment data. Outbreak detection and investigation and the development of appropriate control strategies (both short and long term) are based on specific epidemiological data. These activities require close collaboration among

clinical providers (especially infection-control practitioners within hospitals), clinical laboratories, state and local health departments, and federal agencies. Furthermore, a need exists for continued education of food industry professionals, health-care students and providers, as well as research to improve immunizations, diagnostic methods, and therapeutic modalities. The prevention of infectious diseases requires multidisciplinary interventions involving public health professionals, medical practitioners, researchers, community-based organizations, private and volunteer groups, industrial representatives, and educational systems.

### **History of Infectious Diseases in Big Stone County**

Big Stone County has experienced individual cases of infectious diseases over the last 50 years that have been considered isolated occurrences or minor exposures. In contrast to typical natural disasters in which critical components of the physical infrastructure may be threatened or destroyed, an infectious disease outbreak may also pose significant threats to the people responsible for critical community services due to wide spread absenteeism in the workforce. In the non-health sector, this might include highly specialized workers in the public safety, utility, transportation, or food service industries, and will likely vary from jurisdiction to jurisdiction. State and local officials should carefully consider which services and key personnel within relevant firms or organizations are essential. It is important to identify where absenteeism would pose a serious threat to public safety or would significantly interfere with the ongoing response to the outbreak. To offset this issue, Countryside Public Health has collaborated with Big Stone County to create a Continuity of Operations Plan that determines priority activities that will help to ensure an office will be able to remain open during times of high absenteeism.

In general, infectious diseases would have no effect on physical property but there could be a negative impact on the economy if a widespread outbreak were to occur. As a result of an outbreak, businesses may be forced to shut down for an extended period. Big Stone County's entire population is susceptible to exposure from an infectious disease because of the random nature of diseases. Infection rates and exposure risk will vary based on the disease, individual sanitation habits and personal behaviors. Large population concentrations and sites with large numbers of people are especially at risk in the event of an outbreak. The following infectious diseases, divided by type, could be considered a health risk and disaster if a large outbreak occurred.

#### ***Human Health***

***Pandemic*** A pandemic occurs when a disease is prevalent throughout an entire country, continent, or world, greatly affecting the human population. Many pandemics have occurred throughout history including small pox, cholera, measles, tuberculosis, and more recently HIV/AIDS and influenza. In November 2005, the U.S. Department of Health and Human Services (HHS) released a comprehensive plan to address responding to a possible pandemic (Minnesota Department of Health 2009). Numerous state, local, and private entities have defined responsibilities to fulfill in the event of pandemic. For instance, the Department of Public Safety is responsible for organizing and coordinating a statewide response to a pandemic and the Minnesota Department of Health along with the Countryside Public Health and other local healthcare providers will work to minimize the impact of a pandemic on human health.

## Vaccine Preventable Diseases

While most medicines treat diseases, vaccines prevent diseases by stimulating the immune system with the same germs that can cause the disease. Vaccines contain germs that have either been killed or weakened, which cause the immune system to produce antibodies as if a person was exposed to the disease. This process gives people immunity to a particular disease without actually having the disease. There exist a number of vaccine preventable diseases that could adversely affect residents of Big Stone County. More information on vaccine preventable diseases can be found on the Center for Disease Control and Prevention website:

<http://www.cdc.gov/vaccines/vpd-vac/>.

It is important that all people in good health have completed recommended vaccination schedules to prevent a disease outbreak. Certain vaccinations are required for children to attend school (DTap, Polio, MMR, HepB, Varicella, TD). Data collected for the 2013-14 school year show that over 90% of children who attend school are vaccinated against diphtheria, tetanus, pertussis, polio, measles, mumps, rubella, hepatitis B and varicella. Some individuals such as the very young, those in poor health, and the elderly should not get particular vaccinations. This is when 'Herd Immunity' helps to prevent the spread of these diseases. Legal exemptions in Minnesota for kindergarten and seventh grade remain low. Less than 3 percent of students have a conscientious objection from all vaccines, and less than 0.05% have a medical exemption from all vaccines.

Seasonal Influenza According to the CDC, influenza (flu) is a contagious respiratory illness caused by influenza viruses that infect the nose, throat, and lungs. Flu viruses are believed to spread via droplets made when people with flu cough or sneeze. Possible symptoms of the seasonal flu include fever, cough, sore throat, runny or stuffy nose, muscle or body aches, headaches, fatigue, and possible vomiting and diarrhea. The best way to prevent seasonal influenza is to get vaccinated. Each year, a new vaccination is created that works to protect against new strains of Influenza Type A and Influenza Type B. One of the most severe strains in recent years was H1N1, also known as Swine Flu, which was first detected in 2009. More information can be at <http://www.cdc.gov/flu/>.

Hepatitis A Hepatitis A is an enterically transmitted viral disease that causes fever, malaise, anorexia, nausea, and abdominal discomfort, followed within a few days by jaundice. The disease ranges in clinical severity from no symptoms to a mild illness lasting from one to two weeks to a severely disabling disease lasting several months. In developing countries, hepatitis A virus is usually acquired during childhood, most frequently as a symptomatic or mild infection. Transmission can occur by direct person-to-person contact; exposure to contaminated water, ice or shellfish harvested from sewage-contaminated water; or from fruits, vegetables, or foods eaten uncooked, which can become contaminated during harvesting or subsequent handling. Minnesota saw 145 cases of Hepatitis A in 1998 and just 19 cases in 2014 (Minnesota Department of Health 2015). It has however, become more prevalent again as people eat outside of the home more frequently.

Other vaccine preventable diseases include but are not limited to small pox, measles, mumps, rubella, pertussis (Whooping Cough). More detailed information can be found at [www.cdc.gov/vaccines/vpd-vac/](http://www.cdc.gov/vaccines/vpd-vac/).

### **Vector Borne Diseases**

Vector borne diseases are bacterial and viral diseases transmitted by mosquitoes and ticks. According to the Center for Disease Control and Prevention (CDC), vector borne diseases include some of the world's most destructive diseases. They have become an increasing threat to human health as globalization increases and as changes in the environment and climate become prevalent. Many vector borne diseases can infect animals as well as humans. Common vector borne diseases in Minnesota include West Nile Virus, La Crosse Encephalitis, and Lyme Disease. Although rare in Minnesota, isolated cases of Rocky Mountain Spotted Fever have been reported from various parts of the state. Chikungunya is a mosquito transmitted disease that has been found in parts of Africa, Southern Europe, Southeast Asia, and islands in the Indian and Pacific Oceans. In 2013, chikungunya was found for the first time in the Americas. Since then it has spread to the Caribbean, South and Central America and in North America. In 2014, there were 11 locally transmitted cases reported in Florida. In Minnesota, 24 travel-associated cases were reported. More information on vector borne diseases can be found at <http://www.cdc.gov/ncezid/dvbd/>.

*West Nile Virus (WNV)* The virus made its first appearance in Minnesota in July 2002. In the fall of 2003, the first West Nile death in Minnesota was reported. Since 1999 Minnesota has reported 635 human cases of West Nile Virus and a total of seven deaths. Big Stone County has experienced 3 cases since 2010 (Countryside Public Health).

Most people with the West Nile virus will experience only mild symptoms – or no symptoms at all. Twenty percent of those bitten by an infected mosquito will develop the symptoms of West Nile fever. One out of every 150 people who become infected will become severely ill and develop West Nile encephalitis, an inflammation of the brain. Approximately 10 percent of these encephalitis cases are fatal. Symptoms of the illness usually show up two to six days after being bitten, although the incubation period can be as long as 15 days. Symptoms of West Nile fever can include headache, high fever, nausea, vomiting, sore throat, backache, joint pain, prominent muscle aches and weakness, prolonged fatigue, rash and swollen lymph nodes. West Nile encephalitis symptoms can include mental status changes, vomiting, sensitivity to light, altered reflexes, seizures, coma and acute flaccid paralysis. People who suspect that they may have West Nile are recommended to see a physician.

### **Respiratory Illnesses**

Respiratory Illnesses such as Pertussis (Whooping Cough), SARS (Severe Acute Respiratory Syndrome), MERS (Middle East Respiratory Syndrome), Enterovirus 68, and other flu viruses are common in the United States and around the world. Many of these illnesses could be prevented with vaccination. However, viruses and bacteria are constantly changing and mutating making vaccines and antibiotics outdated quickly. This is the reason new flu vaccines

come out each year. More information on respiratory illnesses can be found at <http://www.cdc.gov/ncird/>.

### **Gastrointestinal Illnesses**

Many gastrointestinal illnesses in humans are a result of germs passed on by animals or other humans through water, food, and direct contact. Common illnesses include Salmonella, E.Coli, Norovirus (Norwalk Virus), and Cryptosporidium (Crypto). Hand washing is the first step to prevent the transfer of these illnesses. More information can be found at <http://www.cdc.gov/zoonotic/gi/>.

*Ebola Virus* The 2014 Ebola epidemic is the largest in history, killing over 10,000 people in West Africa. Since it was discovered in 1976, there have been sporadic outbreaks in humans in Africa. Although the Ebola virus was reported in the United States on a few occasions in 2014, no cases have been reported in Minnesota. Symptoms of Ebola include fever, headache, muscle pain, weakness, fatigue, diarrhea, vomiting, abdominal pain, and unexplained hemorrhaging. Further information on the Ebola virus can be found at <http://www.cdc.gov/vhf/ebola/>.

### ***Animal Health***

Wildlife diseases are a major area of concern in colonial water birds or major concentrations of waterfowl. Diseases, such as Newcastles disease or avian influenza, exist in the wild and outbreaks will occur. However, the extent to which animals die or disease is spread can be minimized through early identification.

Animal diseases of concern, particularly in cattle and flocks in Big Stone County and nearby areas include Mad Cow Disease (Bovine Spongiform Encephalopathy), Foot-and Mouth disease, Chronic Wasting Disease, Rabies, and Brucellosis. Most recently, in early 2015, H5N2 Avian Influenza was found in commercial turkey flocks in seven counties near Big Stone, including Lac qui Parle and Swift Counties, immediately to the south. Precautions are being taken to prevent the spread of this virus and efforts are being made to identify the source. The United States Department of Agriculture is the lead investigator in this outbreak. Minnesota Department of Health is monitoring workers for illness. More information on these and other animal health issues can be found at <http://www.aphis.usda.gov/wps/portal/aphis/home/>.

### **Relationship to Other Hazards – Cascading Effects**

*Associated with Other Disasters* Infectious disease outbreaks can occur as primary events themselves, or they may be secondary events that occur during another disaster or emergency such as a terrorist attack, biological accident or natural hazard event.

*Riots/Civil Disturbance.* If an epidemic event were to occur, deaths, fear and misinformation could trigger large-scale riots, panic and lawlessness. Infectious diseases have the potential to be local, regional, statewide or national in scope and magnitude.



## **Plans and Programs for Infectious Diseases**

*Emergency Operations Plan* Big Stone County currently has an emergency operations plan. This plan outlines procedures for county and local governments for contacting appropriate state and federal agencies, guidelines and strategies for dealing with infectious diseases, and command structures with the County Health Department and the Emergency Manager for Big Stone County. Public education lies with public health as well. Much of the information is coordinated with the Center for Disease Control and Prevention and the Minnesota Department of Health.

*Emergency Response Plan* Response plans are incorporated into the Emergency Operations Plan and are added as needed. Countryside Public Health maintains emergency response plans and the state provides a framework as new plans are necessary.

*Cooperation with State Health Department* Countryside Public Health works with the Minnesota Department of Health to address infectious diseases that are listed in Chapter 4605.7040 Disease and Reports (such as Encephalitis, Hepatitis, Influenza, Lyme Disease, Tuberculosis and Syphilis). If any of these or other listed diseases should appear in Big Stone County, the county works in cooperation with both the state health department and the Centers for Disease Control and Prevention.

*Notification* Communication between Countryside Public Health, the Minnesota Department of Health and the Center for Disease Control operates 24 hours, seven days a week depending on where an outbreak first occurs. Countryside Public Health, Big Stone County Answering Point and the County Emergency Manager receive health alerts via email and fax with instruction with how to proceed. Hospitals, clinics, city administrators, emergency managers and county commissioners are notified by both Countryside Public Health and the Minnesota Department of Health.

*Health Alert Network* The Health Alert Network has been developed as part of CDC's Public Health Emergency Preparedness & Response Program. This network is tested twice yearly. The Health Alert Network coordinates and maintains the CDC's Public Health Emergency Preparedness & Response Website (<http://www.bt.cdc.gov/>). The Health Alert Network (HAN) is a nationwide, integrated information and communications system serving as a platform for distribution of health alerts, dissemination of prevention guidelines and other information such as distance learning, national disease surveillance and electronic laboratory reporting, as well as for CDC's bioterrorism and related initiatives to strengthen preparedness at the local and state levels. The Health Alert Network ensures:

- High-speed, secure Internet connections for local health officials, providing access to CDC's prevention recommendations, practice guidelines, and disease data.
- Capacity for rapid and secure communications with first responder agencies and other health officials.
- Capacity to securely transmit surveillance, laboratory, and other sensitive data.
- On-line, Internet- and satellite-based distance learning systems.
- Early warning broadcast alert systems.

- Public health agencies achieve high levels of organizational capacity.

Vaccination Program Minnesota Vaccine for Children (MVFC) is a program that offers affordable vaccines for all children at local clinics and is designed to assist families of need in protecting their children from infectious diseases. Children (0-18 years) who fall within any of the following categories are eligible for this program:

- Uninsured
- American Indian/Alaskan Native
- Covered by a Minnesota Health Care Program (MHCP) including:
  - Fee-for-service Medical Assistance (MA)
  - MinnesotaCare (MnCare)
  - Prepaid Medical Assistance Plan (PMAP)
  - Underinsured (patients with private insurance that does not cover the vaccine itself or has a cap).

Quarantine/Isolation Plan The state is ultimately responsible to handle quarantine/isolation issues. Countryside Public Health has developed a Quarantine/Isolation Plan that would provide follow-up to those in isolation/quarantine and ensure their basic needs are met.

### Program Gaps or Deficiencies for Infectious Diseases

- Countryside Public Health has a plan in place with multiple ways to reach the public. This plan requires and receives continuous review, constant monitoring, and updates as necessary.

### Fire

Urban fires are blazes that spread through structures, posing danger and destruction to property. These fires include any instance of uncontrolled burning which results in structural damage to residential, commercial, industrial, institutional or other properties in developed areas. Fires can occur in any community, and pose threats year round.

### History of Fires in Big Stone County

According to the State Fire Marshal Division through the Fire Reporting System updated in 2007, Big Stone County has had two fire-related deaths in the last 24 years.

Fires have occurred throughout the entire county (See Table 3.6) and in 2007; Big Stone County had a total of 25 fire runs, 21 “other” runs, and lost a total of \$217,200 dollars. A grain elevator in Beardsley exploded into fire 25 years ago from dust particles. This is one example of the fire hazards in Big Stone County. However, fires are more probable in the cities due to the density and number of both residential and commercial structures, thus cooking, electrical failure and chimneys cause many of the residential fires, in Big Stone County.

**Table 3.6 Big Stone County and Community Breakdowns of Fire-related Information in 2012**

| Community                                     | Total Fire Run | Total Other Run | Dollar Loss |
|---|----------------|-----------------|-------------|
| Big Stone County                              | 41             | 28              | \$155,800   |
| Barry   | *              | *               | *           |
| Beardsley                                     | 8              | 7               | \$0         |
| Correll                                       | *              | *               | *           |
| Graceville                                    | 9              | 3               | \$80,600    |
| Johnson                                       | *              | *               | *           |
| Odessa  | 12             | 3               | \$0         |
| Ortonville                                    | 2              | 6               | \$0         |
| *Cities did not report to State Fire Marshal. |                |                 |             |

Source: MN Dept of Public Safety’s “Fire in Minnesota: Annual Report 2012”

### Relationship with Other Hazards – Cascading Effects

Service Disruptions. Major fires can completely destroy structures, including essential public facilities. Utilities such as electric and gas lines can be damaged and even destroyed.

Health Risks. Destruction or damage to essential infrastructure such as water and wastewater facilities can cause public health risk. Firefighting is a high risk job and can put a person in danger of harm at any time.

Hazardous Materials. Many times hazardous materials are highly flammable, causing fires to spread rapidly and increasing danger to human lives in the event of explosion.

### ***Plans and Programs for Fires***

Fire Districts and Departments. Structure fires are served by local fire districts and fire departments and each district is responsible for fires within their jurisdiction; however, they often work together on larger fires. All fire departments in the county are on the city level, and are also a part of the West Central Firefighters Association (which includes fire departments in the surrounding counties).

West Central Firefighters Association. Fire departments that are members of the West Central Firefighters Association agree to make their fire-fighting equipment and personnel available to each other in the case of emergencies. Each department has the legal authority to send its fire-fighting equipment and personnel into other communities.

Zoning. The Big Stone County Zoning Department control development of new construction, including the enforcement of safety restrictions like setbacks, coverage, depth and structure height requirements. The city building inspector is responsible for all new construction in cities.

State Training. County firefighters participate in mandatory firefighting training classes offered by the state.

Evacuation Plans. Evacuation plans exist in the all cities.

### ***Program Gaps or Deficiencies for Fires***

- None Listed.

### *Hazardous Materials*

Hazardous materials are chemical substances, which if released or misused can threaten the environment and/or health of a community. These chemicals are used in industry, agriculture, medicine, research, and consumer goods throughout Big Stone County. Hazardous materials are found in the county in the forms of explosives, flammable and combustible substances, corrosives, poisons, and radioactive materials.

A hazardous material spill or release poses risks to life, health, and property. An incident can force the evacuation of a few people, a section of a facility, or an entire neighborhood or community, resulting in significant economic impact and possible property damage. Spilled material is costly to clean up and may render the area of the spill unusable for an extended period of time. Hazardous materials incidences are generally associated with transportation accidents or accidents at fixed facilities.

### *History of Hazardous Materials in Big Stone County*

Hazardous materials exist as part of everyday life in Big Stone County. These materials make life easier and more comfortable for residents throughout the county. The challenge is to use, store, and transport hazardous materials in a safe way that does not harm communities and prepare an effective response to unwanted releases of hazardous materials when they occur. A hazardous materials accident can occur anywhere at any time.

According to the Minnesota Pollution Control Agency (see Table 3.7 next page), 14 spills have occurred in Big Stone County from July 2002 to July 2009. Two of the 14 hazardous material events had spills totaling over 2,500 gallons of material and one spill totaling 100 pounds of fertilizer. Of the 14 spills, 10 took place in Ortonville. Five communities, Barry, Correll, Graceville, Johnson, and Odessa, had no reported spills during the time frame, and Beardsley had a single event in 2009 at the Farmers Coop Grain Elevator. For a complete list of all hazardous spill events and amount of product released, see Appendix 5. The specific hazards created by a release are dependent on the hazardous characteristics of the material, the amount released, the location of the release, and the weather and topographic conditions in the area. Identifying specific materials and those involved in transportation can provide a more specific assessment of the vulnerability.

**Table 3.7 BSC Hazardous Spills from 2002 – 2014**

| City         | Number of Spills | Product Type  |
|--------------|------------------|---|
| Barry        | 0                | N/A   |
| Beardsley    | 2                | Barrel Spill – Unknown Material/Amount, Diesel  |
| Clinton      | 6                | Agriculture Pesticide, Anhydrous Ammonia (Fertilizer), dry fertilizer, turkey manure            |
| Correll      | 0                | N/A   |
| Graceville   | 0                | N/A   |
| Johnson      | 1                | Grain Cars  |
| Odessa       | 1                | Transformer oil   |
| Ortonville   | 15               | Fertilizer, Sewage/Wastewater, Mercury, Light Fuel Oil, Used Oil, Asbestos, Chlorine, herbicide |
| <b>Total</b> | <b>25</b>        |   |

Source: Minnesota Pollution Control Agency, 2015

The major concern for hazardous materials events for fixed facilities are primarily in the cities of Big Stone County along transportation corridors. Ortonville contains the majority of the county's population and employers. The transportation of hazardous materials in Big Stone County is highly unpredictable. People and property on or immediately adjacent to transportation corridors throughout the county are at higher risk than those located one mile or more from a major county corridor. Big Stone County assumes that the highest risk of an incident would be to areas in proximity to both rail lines and major roads and from large quantities of hazardous materials moving into and out of Big Stone County.

### ***Transportation***

Road, rail, aircraft, and pipeline all move hazardous materials presenting differing levels of risk. Transported products include hazardous materials passing from producers to users, between storage and use facilities as well as hazardous waste from generators to treatment and disposal facilities.

The road system in Big Stone County provides a network to transport both hazardous and non-hazardous material throughout the region and between local communities. Risks of a hazardous material events vary based on the classification of the road and its proximity to people and property. The risk of a major event is most severe in more populated western portions of the county and along state highways. According to the most recent findings at the Minnesota Department of Transportation (MnDOT), more than half of all accidents involving hazardous materials have occurred on the state roadways. Roads are a major concern in Big Stone County due to the lack of information available regarding what is traveling on the road system on a daily basis.

Approximately 11% of all statewide transportation incidents involving hazardous material in 2002 were from rail transport, according to MnDOT statistics. Valve leakage and safety valve releases are sources of material spills on pressurized and general service tank cars or other hazardous materials containers such as covered hoppers, inter-modal trailers/containers or portable tanks. Leaks manifest themselves as odors or vaporous clouds from tanker top valves; spraying or splashing from tanker top valves; wetness on the side of the car; or drainage from the bottom outlet valve. Depending on the type of rail car involved, a leak or spill could result in hundreds to thousands of gallons/pounds of a substance being released.

Big Stone County has one small municipally-run airport that operates a general use facility for small businesses and pleasure uses only. Large amounts of flammable liquids, lubricants and chemicals are stored at the facility. Accidents involving aircraft and chemicals related to their operation create a potential situation where hazardous material could be released. In addition, any hazardous cargo brought into the facility for transport further increases the risk of an incident.

### ***Fixed Facilities***

A variety of hazardous materials exist in fixed facilities throughout Big Stone County, ranging from stored flammable liquids to radioactive materials and chemical agents. Some materials are particularly lethal even in small amounts, while others require strong concentrations with prolonged exposure periods to cause harm. Businesses housing hazardous materials are listed in the Emergency Operations Plan.

Facilities storing or using hazardous materials above minimum amounts have developed and filed a Risk Management Plan with the Local Emergency Planning Committee, State Emergency Response Commission and the Environmental Protection Agency. Each plan identifies significant hazards for the facility, likely release scenario for the hazards, estimated population impacted by the release, and specific steps to take in the event of a release to protect a population from harm. Power outages are an ongoing issue in Big Stone County as a result of blizzards, flooding, and other weather related extremes. Power outages are common for a few hours during the day in the summer time.

### ***Methamphetamine and Clandestine Drug Labs***

A clandestine drug lab (or “clan lab”) is a collection of materials and ingredients used to manufacture illegal drugs. Methamphetamine (meth) is the drug most commonly made in Minnesota labs. The Minnesota Department of Health (MDH) received information from 75 counties when they surveyed all 87 counties twice in 2005 from January to June and July to December to track the number of meth lab discoveries. A total of 128 labs were found throughout all counties, 95 from January to June and 33 from July to December. In 2006, the total number of meth lab discoveries declined with only 73 discoveries in total (Minnesota Department of Health 2006, 2007). The majority of these labs were located away from the largest population centers, in rural or semi-rural areas. Big Stone County has not found any meth labs in the area.

Each drug lab is a potential hazardous waste site requiring evaluation and possibly cleanup by hazardous waste (HazMat) professionals. There are possible health effects in people exposed to lab chemicals before, during and after the drug-making process. While many of the ingredients used to make illicit drugs are common household products, both the production process and the mixtures produced can be extremely dangerous. In Minnesota, numerous law enforcement officers and staff from health, social service and other agencies have collapsed or become ill at clan lab sites. Jail and hospital staff members have become ill from exposure to meth lab chemicals on the clothing of people living or working at lab sites. The Minnesota Department of Health has received reports of people who have moved into former lab sites and have suffered chest and respiratory symptoms months after lab chemicals were removed.

The impact of illegal drug-making labs is also felt by neighbors and occupants when labs catch fire, explode, and cause the release of chemicals and chemical waste into the surrounding environment. Finally, clan labs have been associated with increased crime in the surrounding community, including domestic abuse, theft and child endangerment.

Roughly 50 percent of Minnesota residences where drug labs have been discovered have also housed children. Recognizing the special risks to children living in lab environments, the Minnesota legislature has recently expanded child neglect and endangerment law to include endangerment through exposure to illegal drug manufacture and sales. In 2005, the Minnesota Legislature passed a law intended to reduce the number of meth labs and increase penalties for illegal meth usage.

In many Minnesota communities, there are no laws requiring cleanup of a hazardous waste site (particularly one contaminated by non-standard use of common household products) in a private residence. The Minnesota Bureau of Criminal Apprehension is usually involved in the case and the cleanup to make sure it is thoroughly investigated and cleaned.

### ***Relationship to Other Hazards – Cascading Effects***

*Water Supply Contamination.* If a spill occurred and polluted potable groundwater.

*Wastewater Treatment System Failure.* System failure would have direct impact on human and animal health.



### ***Plans and Programs for Hazardous Materials***

***State Agency Cooperation.*** Big Stone County works directly with the appropriate state agencies to address needs for responding to and mitigating the impacts of a hazardous event.

***Emergency Operations Plan.*** Big Stone County currently has an emergency operations plan, known as the Big Stone County Emergency Operations Plan, which outlines procedures for dealing with hazardous material accidents, spills or releases.

***Hazardous Chemicals Collection.*** Big Stone County's Emergency Manager works with the Department of Public Safety and Emergency Response Commission to assist in the statewide collection of hazardous chemicals including household waste.

***Water Plan.*** The Big Stone County Local Comprehensive Water Plan recognizes that the county's ground water is impacted by both agricultural and residential fertilizer and pesticide applications. It further recognizes the number of hazardous waste generators by minor civil division from the Minnesota Pollution Control Agency.

***Environmental Health Regulations.*** Big Stone County and the cities of Montevideo and Granite Falls have worked to develop environmental health regulations and a County Safety Procedures and Policy Guide. These documents are cross-departmental plans that deal with hazardous material and act as guidelines to protect the county citizens.

***GIS System.*** Big Stone County contracted with ProWest and Associates to develop an internet-based mapping system that utilizes GIS data. This program will be made available to the general public and to private industries on a fee-based system. The program will be operational in 2011.

***Training of Emergency Personnel.*** All emergency personnel are trained to at least the minimum Hazardous Materials Awareness level and all first responder a CHMEPACK groups conduct the required Occupational Health and Safety Administration training on a yearly basis.

***Southwest Emergency Preparedness Team (SWEPT).*** SWEPT maintains cash in the southwest region for EMS and hospital staff to use for treatment of chemical spills or terrorism event.

### ***Program Gaps or Deficiencies for Hazardous Materials***

- A countywide warning system for a hazardous material disaster is currently being implemented. More education for the general public is needed. The alternative emergency response would require people to go door to door to inform residents of a major catastrophe. Many residents would be left without a prompt warning in the event of a major catastrophe.
- Although some provisions have been made, policies and procedures are not in place to deal with a Meth lab incident in the county.

### *Water Supply Contamination*

Water supply contamination is the introduction of point and non-point source pollutants into public ground water and/or surface water supplies. Although minimal, water supply contamination does pose a threat in Big Stone County.

Microbiological and chemical contaminants can enter water supplies. Chemicals can leach through soils from leaking underground storage tanks, feedlots, and waste disposal sites. Human wastes and pesticides can also be carried to lakes and streams during heavy rains or snow melt.

### *History of Water Supply Contamination in Big Stone County*

Drinking water in Big Stone County comes from groundwater and all cities in Big Stone County have municipal water systems. All water plants are in good working condition, and undergo annual inspections by their municipal employees. Individual wells provide drinking water for the remaining cities and rural residences within Big Stone County.

The entities in Big Stone County that will be required to develop a wellhead protection plan are: Beardsley, Lismore Colony, Graceville, Clinton, Correll, Big Stone Hutterite, and Johnson and will do so in the five to ten years. The city of Odessa's wellhead protection plan has been completed, but not yet approved by the Minnesota Department of Health; and the City of Ortonville is currently completing their plan.

### *Relationships with Other Hazards – Cascading Effects*

Infectious Diseases. Polluted human water sources can produce illness and epidemics in both humans and animals.

### *Plans and Programs for Water Supply Contamination*

Drinking Water Standards, Requirements. The U.S. Environmental Protection Agency (EPA), as required by the Safe Drinking Water Act of 1974, sets uniform nationwide minimum standards for drinking water. State public health and environmental agencies have the primary responsibility for ensuring that each public water supplier meets these federal drinking water standards or more stringent ones established by the state.

Public Water Supply Monitoring. The EPA requires an ongoing water quality-monitoring program to ensure public water systems are working properly. Local officials work together with the Minnesota Department of Health and the EPA to ensure that all public water supplies are safe. The EPA also requires all local suppliers to promptly inform the public if their supply becomes contaminated. Countryside Public Health Service inspects inspections of drinking water in restaurants, bars and other private businesses at least annually.

Wellhead Protection Program. Big Stone County is in its first stage of setting up a wellhead protection plan that is required by the state of Minnesota. The cities in the county will be doing wellhead protection plans to comply with state and federal guidelines set up for wellheads.

Well Construction and Testing. Since 1974, all water wells (public and private) constructed in Minnesota must meet the location and construction requirements of the Minnesota Well Code.

Countryside Public Health has a certified lab to test for well contamination. Big Stone County urban residents will not have to cover the costs for the initial phase since they fall under the 33,000 populations, the Minnesota Department of Health will cut the costs for this phase. For public water supplies, water is tested every year for somewhere between 85 and 90 different pollutants and has to meet high expectations to pass. If a business does not meet these criteria, an engineer is asked to check the water more frequently.

*Feedlot Pollution Prevention.* Several steps are being taken to protect ground water sources from feedlot runoff. County ordinances require that all feedlots within the county participate in the state's feedlot programs and county extension services promote best management practices to minimize runoff from feedlots into rivers. County zoning ordinances also limits feedlot locations. To expand an existing feedlot is allowed according to feedlot management ordinance MN Rule Chapter 7020.

*Sealed Wells.* Soil and Water Conservation District has received grant money to help home owners seal their unused wells.

*Emergency Water Source.* The National Guard would provide drinking water in the event of contamination.

#### ***Program Gaps and Deficiencies for Water Supply Contamination***

- Although many have been removed, there are still some existing wells that are not in compliance with the 1974 standards.

#### ***Wastewater Treatment System Failure***

Wastewater treatment and disposal is an important part of our need to protect and preserve Minnesota's water resources. Although minimal, failure of wastewater treatment systems poses a potential risk in Big Stone County. Numerous hazards can disable water treatment plants, including severe flooding.

#### ***History of Wastewater Treatment System Failure in Big Stone County***

Wastewater systems typically pose higher risks of failure during the spring, when melting snow and runoff can cause flooding. The City of Ortonville's wastewater treatment system was close to danger in the 1997 flood. A levee has been installed to decrease damage during flood events.

#### ***Relationships with Other Hazards – Cascading Effects***

*Infectious Diseases.* The failure of septic treatment facilities and systems can have immediate adverse impacts on human health through communicable diseases and epidemics.

*Water Supply Contamination.* The failure of septic treatment facilities and systems can have immediate adverse impacts on potable water supplies.

#### ***Plans and Programs for Wastewater Treatment System Failure***

*Certified Operators and Inspections.* The Minnesota Pollution Control Agency (MPCA) requires routine inspections of all public wastewater systems. These operators are required to take state training to maintain their certified operator status.

*State Permit Enforcement.* The Minnesota Pollution Control Agency (MPCA) regulates wastewater systems. State staff in the water-quality point-source program issue permits, monitors compliance through data review and inspections, and enforce permit conditions.

*Individual Septic Tank Inspections.* Big Stone County inspects individual septic tanks at the point of sale. There is also a fund to help owners upgrade their septic tanks to MPCA standards.

***Program Gaps or Deficiencies for Wastewater Treatment System Failure***

- Not all emergency plans address necessary steps to take in the event of a facility failure.
- Human-induced events, like terrorism, are not addressed in all emergency plans.

***Civil Disturbance/Terrorism***

Human-caused hazards can be intentional, criminal, malicious uses of force and violence to perpetrate disasters against people or property. They can be the result of terrorism – actions intended to intimidate or coerce a government or the civilian population to further political or social objectives – which can be either domestic or international, depending on the origin, base and objectives of the terrorist organization.

Hazards can result from the use of weapons of mass destruction, including biological, chemical, nuclear and radiological weapons; arson, incendiary, explosive and armed attacks; industrial sabotage and intentional hazardous materials releases; and cyber terrorism.

***History of Terrorism/Civil Disturbances in Big Stone County***

Big Stone County has no history of terrorist or individual acts designed to cause disasters against people or property. Vandalism, assaults and other criminal acts do occur, but these isolated incidents fall within the purview of local law enforcement.

*School Violence.* Violence in schools has become an increasingly important topic among teachers, students, and police; focusing on bullying, school shootings, vandalism, and overall safety. Regardless of the availability of drugs, alcohol, and weapons to youth, it appears as though school incidences are decreasing. This fact is demonstrated in the Minnesota Student Surveys completed in 2001 and 2007 in Big Stone County. The majority of students “strongly agree or agree” to feeling safe walking to and from school and at school.

From 2001 to 2007, the data remained generally consistent in terms of the number of days students brought a gun onto school property. Ninety-eight percent of all students and 91% of males in 12<sup>th</sup> grade reported never bringing guns to school. Over 90% of all students reported never bringing non-gun weapons to school. However, 12<sup>th</sup> grade males reported bringing a non-gun weapon to school at a slightly higher rate.

### ***Relationship to Other Hazards – Cascading Effects***

Cascading effects of an intentional human-caused disaster are highly dependent on the specific mode used and asset targeted. Many of these have been detailed in the technological hazards portion of the plan covering dam failure and hazardous materials incidents. Fires and secondary explosions are possible with explosive attacks, and fires from arson attacks can extend beyond the intended target.

### ***Plans and Programs for Terrorism/Civil Disturbances***

Cooperation with State, Federal Officials. Big Stone County officials are working with state and federal officials on domestic preparedness efforts, including with the Department of Health to ensure that health care facilities are prepared for bio-terrorism events.

School Multi-Hazard Emergency Plans. Since 2003, every school district in Minnesota has been mandated by state statute to institute multi-hazard emergency planning including at least quarterly drills and exercises. Each plan and practice is required to include prevention and response strategies – in particular to school violence. Each school implements their plans differently, while holding to the same basic tenets and working with their respective law enforcement.

Emergency Plans. The hospital plan, EMS Plan, Countryside Public Health Plan, and Big Stone County's Emergency Operations Plan identify the CHEMPAK cache that can be requested for treatment if chemical exposure is identified.

### ***Program Gaps and Deficiencies for Terrorism***

- The Big Stone County Courthouse, Ortonville's City Hall, and Graceville's Community Building do not have fire suppression systems.
- Design and operations of facilities in the county were not developed with terrorism prevention in mind.

*PUBLIC ASSISTANCE AND INDIVIDUAL ASSISTANCE GRANT PROGRAM*

Table 3.10 summarizes the Public Assistance Grant Program funds dispersed in Big Stone County. Big Stone County has not received any Individual Assistance Grant Program funds.

**Table 3.10 Public Assistance Grant Program in BSC**

| Disaster Declaration | Disaster Type                                    | Project Amount | Federal Share Obligated |
|----------------------|--|----------------|-------------------------|
| 1370                 | Severe Winter Storms, Flooding, and Tornadoes    | \$784,228.48   | \$611,943.92            |
| 1900                 | Flooding   | \$348,731.52   | \$261,548.64            |
| 1982                 | Severe Storms and Flooding                       | \$392,429.05   | \$294,321.83            |
| 4131                 | Severe Storms, Straight-line Winds, and Flooding | \$74,256.79    | \$55,692.59             |

## CHAPTER 4: RISK ASSESSMENT

### OVERVIEW

The following risk assessment is divided into three parts. The first part consists of Hazard Prioritizations for each hazard, which are based on the information provided in Chapter Three. The second part discusses county vulnerability to natural hazards (Vulnerable Areas within Big Stone County), and the third part consists of maps of each city's land use and critical facilities.

### PRIORITIZED RISK ASSESSMENT

The following pages summarize important information about each hazard in the form of the subsequent risk assessment. This risk assessment was completed by the Big Stone County All-Hazard Mitigation Task Force, who considered each of the following hazards in terms of four criteria. The four criteria included frequency of occurrence, warning time, potential severity, and risk level. The values for the prioritized risk assessment were determined by a variety of resources including meetings and discussions with the Local Task Force, Technical Task Force team, city representatives, and the County Emergency Manager to determine a ranking for each hazard based on the risk assessment criteria. The ranking method quantified each hazard's risk level by assigning numeric values to the criteria. From the numeric value assigned, an overall ranking for each hazard was determined, which allowed the hazards to be compared in order to assess which hazards pose the greatest risk in Big Stone County. Information from the community profile, analysis of historic disasters, and information provided by the task force and public to identify past, present and future disasters were also taken into consideration.

**Frequency of Occurrence:** This projects how often it may happen and the likelihood that the hazard will occur. The number values are determined by:

- 1 Unlikely
- 2 Occasional
- 3 Likely
- 4 Highly Likely

**Warning Time:** This projects how much warning time is available prior to the event.

- 1 More than 12 Hours
- 2 6-12 Hours
- 3 3-6 Hours
- 4 None-Minimal

**Potential Severity:** This projects how severe the impact will be in a general sense.

- 1 Limited
- 2 Minor
- 3 Major
- 4 Substantial

**Risk Level:** The risk level looks at the amount of risk there will be overall as a result of the event.

- 1 Minimal
- 2 Limited
- 3 High
- 4 Very High

**Table 4.1 Hazard: Violent Storms and Extreme Temperatures**

| <b>Hazard</b>   | <b>Winter Weather</b><br>Blizzard, Ice Storms, Heavy Snow,<br>Extreme Cold  | <b>Summer Weather</b><br>Thunderstorm, Lightning, Hail,<br>Straight Line Winds, Extreme<br>Heat   | <b>Tornado</b>  |
|---|---|---|---|
| <b>Location</b>   | County  | County  | County  |
| <b>Historic events</b>  | 3-6 storms per year<br>0-3 blizzards per year<br>Extreme cold 1-5 days per year   | 0-2 storms per year<br>1-5 days of extreme heat per year  | 6 tornado occurrences<br>in past 56 years,<br>F3 in 1996 near Clinton   |
| <b>Likely to happen now?</b>  | Yes   | Yes   | No  |
| <b>How often?</b>   | 3-6 storms per year<br>1-3 blizzards per year<br>Often below freezing<br>Extreme cold 1-5 days per year   | 1-2 storms per year<br>1-5 days of extreme heat per year  | 0 per year  |
| <b>Where would it strike?</b>   | County  | County  | County  |
| <b>How bad could hazard get?</b>                                      | 2-3 days / storm, multiple storms in one season, limited visibility, record snow is 17.5 in./day and 86.5 in. in one season, record, cold is -41°, wind chill is factor | Lightning, strong wind and hail<br>Record temp. is 110°<br>Humidity is a factor   | F4 reported<br>in neighboring county  |
| <b>When would hazard likely occur?</b>                                | November – March  | Spring - Fall   | Spring - Fall   |
| <b>What other hazards could occur simultaneously?</b>                 | Wind, transportation accidents, extreme temp, collapsed structure/gas leaks, spring flooding, disruption of utilities   | Flooding, lightning, hail, wind, trans. accidents, drought, violent storms, wildfire, collapsed structure   | Hazardous materials, utility failure, fire, collapsed structure, gas leaks  |
| <b>Economic impacts</b>   | Cost of snow removal, loss of livestock, school closing, store closing  | Loss of livestock, fire potential, agriculture and property damage  | Structure loss and community shut down  |
| <b>Loss of life impacts</b>   | Dangerous to transport emergencies, heat turn-off, transportation accidents   | Lightning strike, heat stroke, rare   | Extremely dangerous   |
| <b>Risk Level</b><br>1 Minimal<br>2 Limited<br>3 High<br>4 Very High  | Citizens/People: <b>3</b><br>Animals/Livestock: <b>3</b><br>Housing: <b>2</b><br>Critical Structures: <b>2</b><br>Infrastructure: <b>2</b><br><b>Total: 2</b>           | Citizens/People: <b>3</b><br>Animals/Livestock: <b>3</b><br>Housing: <b>2</b><br>Critical Structures: <b>2</b><br>Infrastructure: <b>3</b><br><b>Total: 3</b> | Citizens/People: <b>3</b><br>Animals/Livestock: <b>3</b><br>Housing: <b>3</b><br>Critical Structures: <b>3</b><br>Infrastructure: <b>3</b><br><b>Total: 3</b> |
| <b>Risk Assessment</b>  |   |   |   |
| 1 Unlikely<br>2 Occasional<br>3 Likely<br>4 Highly Likely             | <u>Frequency of Occurrence</u><br><br>3.38  | <u>Frequency of Occurrence</u><br><br>3.71  | <u>Frequency of Occurrence</u><br><br>2.38  |
| 1 More than 12 Hours<br>2 6-12 Hours<br>3 3-6 Hours<br>4 None-Minimal | <u>Warning Time</u><br><br>2.43   | <u>Warning Time</u><br><br>2.83   | <u>Warning Time</u><br><br>3.13   |
| 1 Limited<br>2 Minor<br>3 Major<br>4 Substantial                      | <u>Potential Severity*</u><br><br>2.75  | <u>Potential Severity*</u><br><br>3.8   | <u>Potential Severity*</u><br><br>2.88  |
| 1 Minimal<br>2 Limited<br>3 High<br>4 Very High                       | <u>Risk Level**</u><br><br>2.63   | <u>Risk Level**</u><br><br>3.0  | <u>Risk Level**</u><br><br>2.75   |
| (Total divided by 4)<br>1 Very low<br>2 Low<br>3 Moderate<br>4 High   | <u>Overall Priority</u><br><br>2.80   | <u>Overall Priority</u><br><br>3.34   | <u>Overall Priority</u><br><br>2.79   |



**Table 4.2 Hazard: Flood**

| <b>Hazard</b>   | <b>100-year Floods</b>  | <b>Other Flooding/Flash Floods</b>  |
|---|---|---|
| <b>Location</b>   | Along the Minnesota River, Big Stone Lake and Toqua Lake near Graceville  | County, Clinton, Graceville   |
| <b>Historic events</b>  | 1997, 2001, 2010  | 2009, 2011, 2014  |
| <b>Likely to happen now?</b>  | Yes   | Yes   |
| <b>How often?</b>   | 1% likelihood annually;<br>2 times per 10 years   | 2 times per 10 years  |
| <b>Where would it strike?</b>   | Along Big Stone Lake, especially Peninsula  | Along rivers, drainage ditches, wetlands, basements, etc.   |
| <b>How bad could hazard get?</b>  | 1997 was record year  | Fast moving water, unable to prepare for floods   |
| <b>When would hazard likely occur?</b>  | Spring  | Spring/Summer   |
| <b>What other hazards could occur simultaneously?</b>   | Utility failure, landslide, debris flow, interrupt transportation routes (emergencies), infectious diseases, hazardous material spills                        | Utility failure, landslide, debris flow, interrupt transportation routes (emergencies), infectious diseases, hazardous material spills                        |
| <b>Economic impacts</b>   | Sandbagging and repair roads, expensive, agricultural loss  | Repair roads expensive, agriculture loss  |
| <b>Loss of life impacts</b>   | Danger if sandbagging   | Danger if sandbagging   |
| <b>Risk Level</b><br>1 Minimal<br>2 Limited<br>3 High<br>4 Very High                            | Citizens/People: <b>2</b><br>Animals/Livestock: <b>2</b><br>Housing: <b>2</b><br>Critical Structures: <b>2</b><br>Infrastructure: <b>3</b><br><b>Total: 2</b> | Citizens/People: <b>3</b><br>Animals/Livestock: <b>2</b><br>Housing: <b>2</b><br>Critical Structures: <b>2</b><br>Infrastructure: <b>2</b><br><b>Total: 2</b> |
| <b>Risk Assessment</b>  |   |   |
| 1 Unlikely<br>2 Occasional<br>3 Likely<br>4 Highly Likely                                       | <u>Frequency of Occurrence</u><br><br>2.0   | <u>Frequency of Occurrence</u><br><br>2.86  |
| 1 More than 12 Hours<br>2 6-12 Hours<br>3 3-6 Hours<br>4 None-Minimal                           | <u>Warning Time</u><br><br>1.0  | <u>Warning Time</u><br><br>2.71   |
| 1 Limited<br>2 Minor<br>3 Major<br>4 Substantial  | <u>Potential Severity*</u><br><br>3.0   | <u>Potential Severity*</u><br><br>2.86  |
| 1 Minimal<br>2 Limited<br>3 High<br>4 Very High   | <u>Risk Level**</u><br><br>2.5  | <u>Risk Level**</u><br><br>2.17   |
| (Total divided by 4)<br>1 <b>Very low</b><br>2 <b>Low</b><br>3 <b>Moderate</b><br>4 <b>High</b> | <u>Overall Priority</u><br><br>2.13   | <u>Overall Priority</u><br><br>2.65   |

**Table 4.3 Hazard: Drought**

| <b>Hazard</b>   | <b>Drought</b>  |
|---|---|
| <b>Location</b>   | County  |
| <b>Historic events</b>  | 1976, 1988, 2003  |
| <b>Likely to happen now?</b>  | Occasionally  |
| <b>How often?</b>   | One time per 15-20 years  |
| <b>Where would it strike?</b>   | County  |
| <b>How bad could hazard get?</b>  | 1930's dust bowl  |
| <b>When would hazard likely occur?</b>  | Summer  |
| <b>What other hazards could occur simultaneously?</b>   | Utility failure (water, wastewater), Wildfires  |
| <b>Economic impacts</b>   | Crops/Agriculture   |
| <b>Loss of life impacts</b>   | Unlikely  |
| <b>Risk Level</b><br>1 Minimal<br>2 Limited<br>3 High<br>4 Very High                            | Citizens/People: <b>2</b><br>Animals/Livestock: <b>3</b><br>Housing: <b>1</b><br>Critical Structures: <b>1</b><br>Infrastructure: <b>1</b><br><b>Total: 2</b> |
| <b>Risk Assessment</b>  |   |
| 1 Unlikely<br>2 Occasional<br>3 Likely<br>4 Highly Likely                                       | <u>Frequency of Occurrence</u><br><br>2.13  |
| 1 More than 12 Hours<br>2 6-12 Hours<br>3 3-6 Hours<br>4 None-Minimal                           | <u>Warning Time</u><br><br>1.25   |
| 1 Limited<br>2 Minor<br>3 Major<br>4 Substantial  | <u>Potential Severity*</u><br><br>2.5   |
| 1 Minimal<br>2 Limited<br>3 High<br>4 Very High   | <u>Risk Level**</u><br><br>2.43   |
| (Total divided by 4)<br><b>1 Very low</b><br><b>2 Low</b><br><b>3 Moderate</b><br><b>4 High</b> | <u>Overall Priority</u><br><br><b>2.08</b>  |

**Table 4.4 Hazard: Wildfire**

| <b>Hazard</b>   | <b>Wildfire</b>   |
|---|---|
| <b>Location</b>   | County – especially along the MN River Valley and CRP/CREP land   |
| <b>Historic events</b>  | 2004  |
| <b>Likely to happen now?</b>  | Yes   |
| <b>How often?</b>   | Each year the potential increases as natural areas increase and managed burns do not take fuel away.<br>7,330.5 acres burned 4/16/2004 - 4/20/2004<br>40 acres burned 4/25/2000 to 5/8/2000 |
| <b>Where would it strike?</b>   | County – especially along the MN River Valley and CRP/CREP land   |
| <b>How bad could hazard get?</b>  | Potential for hundreds of acres to burn   |
| <b>When would hazard likely occur?</b>  | Summer  |
| <b>What other hazards could occur simultaneously?</b>   | Erosion/landslide, severe wind, scrap tire fires, structure fires, hazardous materials, utility failure   |
| <b>Economic impacts</b>   | Extremely expensive for local fire departments  |
| <b>Loss of life impacts</b>   | Extremely dangerous for firefighters<br>2 deaths in past 24 years   |
| <b>Risk Level</b><br>1 Minimal<br>2 Limited<br>3 High<br>4 Very High                            | Citizens/People: <b>2</b><br>Animals/Livestock: <b>2</b><br>Housing: <b>2</b><br>Critical Structures: <b>1</b><br>Infrastructure: <b>1</b><br><b>Total: 2</b>                               |
| <b>Risk Assessment</b>  |   |
| 1 Unlikely<br>2 Occasional<br>3 Likely<br>4 Highly Likely                                       | <u>Frequency of Occurrence</u><br><br>1.75  |
| 1 More than 12 Hours<br>2 6-12 Hours<br>3 3-6 Hours<br>4 None-Minimal                           | <u>Warning Time</u><br><br>3.13   |
| 1 Limited<br>2 Minor<br>3 Major<br>4 Substantial  | <u>Potential Severity*</u><br><br>2.17  |
| 1 Minimal<br>2 Limited<br>3 High<br>4 Very High   | <u>Risk Level**</u><br><br>1.71   |
| (Total divided by 4)<br><b>1 Very low</b><br><b>2 Low</b><br><b>3 Moderate</b><br><b>4 High</b> | <u>Overall Priority</u><br><br><b>2.19</b>  |

**Table 4.5 Hazard: Dam Failure**

| <b>Hazard</b>   | <b>Dam Failure</b>  |
|---|---|
| <b>Location</b>   | Along Minnesota River   |
| <b>Historic events</b>  | None  |
| <b>Likely to happen now?</b>  | No  |
| <b>How often?</b>   | Unlikely  |
| <b>Where would it strike?</b>   | Big Stone Lake Dam  |
| <b>How bad could hazard get?</b>  | Could affect Odessa   |
| <b>When would hazard likely occur?</b>  | Spring/Summer/Fall – due to thaw or rain event  |
| <b>What other hazards could occur simultaneously?</b>   | Flooding  |
| <b>Economic impacts</b>   | Could impact all of Odessa’s businesses   |
| <b>Loss of life impacts</b>   | If sudden event, people could die   |
| <b>Risk Level</b><br>1 Minimal<br>2 Limited<br>3 High<br>4 Very High                            | Citizens/People: <b>2</b><br>Animals/Livestock: <b>2</b><br>Housing: <b>2</b><br>Critical Structures: <b>2</b><br>Infrastructure: <b>2</b><br><b>Total: 2</b> |
| <b>Risk Level</b>   |   |
| 1 Unlikely<br>2 Occasional<br>3 Likely<br>4 Highly Likely                                       | <u>Frequency of Occurrence</u><br><br>1.13  |
| 1 More than 12 Hours<br>2 6-12 Hours<br>3 3-6 Hours<br>4 None-Minimal                           | <u>Warning Time</u><br><br>2.29   |
| 1 Limited<br>2 Minor<br>3 Major<br>4 Substantial  | <u>Potential Severity*</u><br><br>3.22  |
| 1 Minimal<br>2 Limited<br>3 High<br>4 Very High   | <u>Risk Level**</u><br><br>1.25   |
| (Total divided by 4)<br><b>1 Very low</b><br><b>2 Low</b><br><b>3 Moderate</b><br><b>4 High</b> | <u>Overall Priority</u><br><br><b>1.97</b>  |

**Table 4.6 Hazard: Infectious Diseases**

| <b>Hazard</b>   | <b>All Infectious Diseases</b>  |
|---|---|
| <b>Location</b>   | County  |
| <b>Historic events</b>  | No major events   |
| <b>Likely to happen now?</b>  | Unlikely  |
| <b>How often?</b>   | Infrequent  |
| <b>Where would it strike?</b>   | Hospitals/Schools – large vulnerable populations  |
| <b>How bad could hazard get?</b>  | Major outbreak of life-threatening disease  |
| <b>When would hazard likely occur?</b>  | Year-round  |
| <b>What other hazards could occur simultaneously?</b>   | Riots, terrorist attack, natural hazard event   |
| <b>Economic impacts</b>   | Tourism industry<br>All industries with workers not at jobs   |
| <b>Loss of life impacts</b>   | Major if life-threatening outbreak  |
| <b>Risk Level</b><br>1 Minimal<br>2 Limited<br>3 High<br>4 Very High                            | Citizens/People: <b>3</b><br>Animals/Livestock: <b>2</b><br>Housing: <b>1</b><br>Critical Structures: <b>2</b><br>Infrastructure: <b>1</b><br><b>Total: 2</b> |
| <b>Risk Assessment</b>  |   |
| 1 Unlikely<br>2 Occasional<br>3 Likely<br>4 Highly Likely                                       | <u>Frequency of Occurrence</u><br><br>1.88  |
| 1 More than 12 Hours<br>2 6-12 Hours<br>3 3-6 Hours<br>4 None-Minimal                           | <u>Warning Time</u><br><br>1.38   |
| 1 Limited<br>2 Minor<br>3 Major<br>4 Substantial  | <u>Potential Severity*</u><br><br>3.0   |
| 1 Minimal<br>2 Limited<br>3 High<br>4 Very High   | <u>Risk Level**</u><br><br>1.75   |
| (Total divided by 4)<br><b>1 Very low</b><br><b>2 Low</b><br><b>3 Moderate</b><br><b>4 High</b> | <u>Overall Priority</u><br><br><b>2.0</b>   |

**Table 4.7 Hazard: Fire**

| <b>Hazard</b>   | <b>Structure Fire</b>   |
|---|---|
| <b>Location</b>   | Buildings/Cities/County   |
| <b>Historic events</b>  | Grain Bins, Downtown Buildings  |
| <b>Likely to happen now?</b>  | Yes   |
| <b>How often?</b>   | Potential is always there   |
| <b>Where would it strike?</b>   | Structures throughout county  |
| <b>How bad could hazard get?</b>  | Entire structure could burn   |
| <b>When would hazard likely occur?</b>  | All year-round  |
| <b>What other hazards could occur simultaneously?</b>   | Wildfire, hazardous materials, service disruptions, other weather events  |
| <b>Economic impacts</b>   | Could destroy business if fire is bad enough  |
| <b>Loss of life impacts</b>   | Potential if hazardous materials present<br>Elderly and very young at risk<br>2 lives lost in past 24 years   |
| <b>Risk Level</b><br>1 Minimal<br>2 Limited<br>3 High<br>4 Very High                            | Citizens/People: <b>3</b><br>Animals/Livestock: <b>2</b><br>Housing: <b>3</b><br>Critical Structures: <b>3</b><br>Infrastructure: <b>2</b><br><b>Total: 2</b> |
| <b>Risk Assessment</b>  |   |
| 1 Unlikely<br>2 Occasional<br>3 Likely<br>4 Highly Likely                                       | <u>Frequency of Occurrence</u><br><br>2.14  |
| 1 More than 12 Hours<br>2 6-12 Hours<br>3 3-6 Hours<br>4 Non-Minimal                            | <u>Warning Time</u><br><br>3.71   |
| 1 Limited<br>2 Minor<br>3 Major<br>4 Substantial  | <u>Potential Severity*</u><br><br>3.14  |
| 1 Minimal<br>2 Limited<br>3 High<br>4 Very High   | <u>Risk Level**</u><br><br>2.71   |
| (Total divided by 4)<br><b>1 Very low</b><br><b>2 Low</b><br><b>3 Moderate</b><br><b>4 High</b> | <u>Overall Priority</u><br><br><b>2.93</b>  |

**Table 4.8 Hazard: Hazardous Materials**

| <b>Hazard</b>   | <b>Hazardous Materials</b>  |
|---|---|
| <b>Location</b>   | Major transportation routes (railroads, highways)<br>Pipeline locations<br>All cities have at least one major highway   |
| <b>Historic events</b>  | 2007  |
| <b>Likely to happen now?</b>  | Occasionally<br>Potential increases as hazardous materials increase<br>14 hazardous material spills in 6 years, (2 annual likelihood)                                   |
| <b>How often?</b>   | 14 hazardous material spills in 6 years, (2 annually)   |
| <b>Where would it strike?</b>   | Specific locations throughout county, along transportation routes in county and local businesses that have hazardous materials delivered, Meth Labs can occur anywhere. |
| <b>How bad could hazard get?</b>  | Major spill could be devastating to human and animal life<br>Meth Labs make people extremely sick.  |
| <b>When would hazard likely occur?</b>  | Year-round  |
| <b>What other hazards could occur simultaneously?</b>   | Wildfire, storm, water supply contamination, wastewater contamination   |
| <b>Economic impacts</b>   | Could shut down area of spill   |
| <b>Loss of life impacts</b>   | Potential depending on material   |
| <b>Risk Level</b><br>1 Minimal<br>2 Limited<br>3 High<br>4 Very High                            | Citizens/People: <b>3</b><br>Animals/Livestock: <b>2</b><br>Housing: <b>2</b><br>Critical Structures: <b>2</b><br>Infrastructure: <b>2</b><br><b>Total: 2</b>           |
| <b>Risk Assessment</b>  |   |
| 1 Unlikely<br>2 Occasional<br>3 Likely<br>4 Highly Likely                                       | <u>Frequency of Occurrence</u><br><br>1.88  |
| 1 More than 12 Hours<br>2 6-12 Hours<br>3 3-6 Hours<br>4 Non-Minimal                            | <u>Warning Time</u><br><br>4.0  |
| 1 Limited<br>2 Minor<br>3 Major<br>4 Substantial  | <u>Potential Severity*</u><br><br>2.63  |
| 1 Minimal<br>2 Limited<br>3 High<br>4 Very High   | <u>Risk Level**</u><br><br>1.63   |
| (Total divided by 4)<br>1 <b>Very low</b><br>2 <b>Low</b><br>3 <b>Moderate</b><br>4 <b>High</b> | <u>Overall Priority</u><br><br><b>2.54</b>  |

**Table 4.9 Hazard: Water Supply Contamination**

| Hazard  | Water Supply Contamination  |
|---|---|
| <b>Location</b>   | County<br>Cities<br>point and non-point sources   |
| <b>Historic events</b>  | None  |
| <b>Likely to happen now?</b>  | Unlikely  |
| <b>How often?</b>   | Flood events – 2 times every 10 years   |
| <b>Where would it strike?</b>   | County  |
| <b>How bad could hazard get?</b>  | Water source could be contaminated for large population   |
| <b>When would hazard likely occur?</b>  | Year-round  |
| <b>What other hazards could occur simultaneously?</b>   | Infectious diseases   |
| <b>Economic impacts</b>   | Tourism, expensive to ship water in   |
| <b>Loss of life impacts</b>   | Potential to be life threatening  |
| <b>Risk Level</b><br>1 Minimal<br>2 Limited<br>3 High<br>4 Very High                            | Citizens/People: <b>3</b><br>Animals/Livestock: <b>3</b><br>Housing: <b>2</b><br>Critical Structures: <b>2</b><br>Infrastructure: <b>3</b><br><b>Total: 3</b> |
| <b>Risk Assessment</b>  |   |
| 1 Unlikely<br>2 Occasional<br>3 Likely<br>4 Highly Likely                                       | <u>Frequency of Occurrence</u><br><br>1.13  |
| 1 More than 12 Hours<br>2 6-12 Hours<br>3 3-6 Hours<br>4 Non-Minimal                            | <u>Warning Time</u><br><br>3.63   |
| 1 Limited<br>2 Minor<br>3 Major<br>4 Substantial  | <u>Potential Severity*</u><br><br>3.25  |
| 1 Minimal<br>2 Limited<br>3 High<br>4 Very High   | <u>Risk Level**</u><br><br>1.5  |
| (Total divided by 4)<br><b>1 Very low</b><br><b>2 Low</b><br><b>3 Moderate</b><br><b>4 High</b> | <u>Overall Priority</u><br><br><b>2.78</b>  |



**Table 4.10 Hazard: Wastewater Treatment System Failure**

| <b>Hazard</b>   | <b>Wastewater Treatment System Failure</b>  |
|---|---|
| <b>Location</b>   | County  |
| <b>Historic events</b>  | Individual systems and municipal systems have either gotten old or flooding has prevented from working  |
| <b>Likely to happen now?</b>  | Somewhat likely   |
| <b>How often?</b>   | During flood or as systems age  |
| <b>Where would it strike?</b>   | County  |
| <b>How bad could hazard get?</b>  | Water source could be contaminated  |
| <b>When would hazard likely occur?</b>  | Year-round  |
| <b>What other hazards could occur simultaneously?</b>   | Infectious diseases, flood, water supply contamination  |
| <b>Economic impacts</b>   | During flood, losing wastewater system is expensive and inconvenient  |
| <b>Loss of life impacts</b>   | Could affect lives if contaminated water  |
| <b>Risk Level</b><br>1 Minimal<br>2 Limited<br>3 High<br>4 Very High                            | Citizens/People: <b>3</b><br>Animals/Livestock: <b>2</b><br>Housing: <b>2</b><br>Critical Structures: <b>2</b><br>Infrastructure: <b>2</b><br><b>Total: 2</b> |
| <b>Risk Assessment</b>  |   |
| 1 Unlikely<br>2 Occasional<br>3 Likely<br>4 Highly Likely                                       | <u>Frequency of Occurrence</u><br><br>1.75  |
| 1 More than 12 Hours<br>2 6-12 Hours<br>3 3-6 Hours<br>4 Non-Minimal                            | <u>Warning Time</u><br><br>2.75   |
| 1 Limited<br>2 Minor<br>3 Major<br>4 Substantial  | <u>Potential Severity*</u><br><br>2.38  |
| 1 Minimal<br>2 Limited<br>3 High<br>4 Very High   | <u>Risk Level**</u><br><br>1.25   |
| (Total divided by 4)<br><b>1 Very low</b><br><b>2 Low</b><br><b>3 Moderate</b><br><b>4 High</b> | <u>Overall Priority</u><br><br><b>2.03</b>  |

**Table 4.11 Hazard: Civil Disturbance / Terrorism**

| <b>Hazard</b>   | <b>Civil Disturbance / Terrorism</b>  |
|---|---|
| <b>Location</b>   | County, cities, dam, airports, water systems  |
| <b>Historic events</b>  | None  |
| <b>Likely to happen now?</b>  | Unlikely  |
| <b>How often?</b>   | School violence is increasing annually<br>No actual "terrorism" events in County  |
| <b>Where would it strike?</b>   | County  |
| <b>How bad could hazard get?</b>  | Threaten way of life  |
| <b>When would hazard likely occur?</b>  | Year-round  |
| <b>What other hazards could occur simultaneously?</b>   | Infectious diseases, flood, dam failure, water supply contaminations, hazardous materials   |
| <b>Economic impacts</b>   | Potential to be devastating   |
| <b>Loss of life impacts</b>   | Potential to affect lives   |
| <b>Risk Level</b><br>1 Minimal<br>2 Limited<br>3 High<br>4 Very High                            | Citizens/People: <b>2</b><br>Animals/Livestock: <b>2</b><br>Housing: <b>2</b><br>Critical Structures: <b>2</b><br>Infrastructure: <b>2</b><br><b>Total: 2</b> |
| <b>Risk Assessment</b>  |   |
| 1 Unlikely<br>2 Occasional<br>3 Likely<br>4 Highly Likely                                       | <u>Frequency of Occurrence</u><br><br>1.0   |
| 1 More than 12 Hours<br>2 6-12 Hours<br>3 3-6 Hours<br>4 Non-Minimal                            | <u>Warning Time</u><br><br>4.0  |
| 1 Limited<br>2 Minor<br>3 Major<br>4 Substantial  | <u>Potential Severity*</u><br><br>3.13  |
| 1 Minimal<br>2 Limited<br>3 High<br>4 Very High   | <u>Risk Level**</u><br><br>1.38   |
| (Total divided by 4)<br><b>1 Very low</b><br><b>2 Low</b><br><b>3 Moderate</b><br><b>4 High</b> | <u>Overall Priority</u><br><br><b>2.38</b>  |

The Overall Hazard Priority Levels were determined by calculating the average risk level for each hazard. The hazard was determined to be “Very Low” if the average risk number was between 1 and 1.49, “Low” if it was between 1.5 and 2.49, “Moderate” if between 2.5 and 3.49 and “High” if it was 3.5 or above. No hazards were determined to be of very low or high risk at the time of this document. The hazards were listed in numerical order for the Big Stone County Local Task Force to review and comment on at the third Local Task Force meeting in Clinton, MN on November 13, 2014. The team was presented with the Overall Hazard Priority Level determined by their risk assessments and the initial Overall Hazard Priority Level from the previous All-Hazard Mitigation Plan. Staff facilitators discussed differences between the two lists and opened up conversation on changes to be made. During this meeting, Summer Weather and Winter Weather were moved up on the list to numbers 2 and 4 respectively, while Tornado and Water Supply Contamination moved down on the list to their current locations, numbers 3 and 5 respectively. All other hazards kept their same locations on the list.

**Table 4.12 Overall Hazard Priority Levels in Big Stone County**

| <b>Hazard</b>   | <b>Big Stone County</b> | <b>Special Areas of Concern</b>                             |
|---|-------------------------|---|
| <b>1. Flash/Other Flooding</b>  | <b>3.18</b>             | <b>County, Clinton, Ortonville, Graceville</b>              |
| <b>2. Summer Weather</b><br>Thunderstorm, Lightening, Hail, Wind (excluding tornado) Extreme Heat | <b>2.86</b>             | <b>County</b>   |
| <b>3. Tornado</b>   | <b>3.17</b>             | <b>County</b>   |
| <b>4. Winter Weather</b><br>Blizzard, Ice Storms, Heavy Snow, Extreme Cold                        | <b>2.34</b>             | <b>County</b>   |
| <b>5. Water Supply Contamination</b>  | <b>3.17</b>             | <b>County</b>   |
| <b>6. Hazardous Materials</b>   | <b>3.07</b>             | <b>All Cities</b>   |
| <b>7. Structure Fire</b>  | <b>2.93</b>             | <b>County</b>   |
| <b>8. Civil Disturbance/ Terrorism</b>  | <b>2.65</b>             | <b>County</b>   |
| <b>9. Drought</b>   | <b>2.59</b>             | <b>County</b>   |
| <b>10. 100-year Floods</b>  | <b>2.33</b>             | <b>County, Ortonville, Odessa</b>                           |
| <b>11. Infectious Disease</b>   | <b>2.26</b>             | <b>County</b>   |
| <b>12. Wastewater Treatment System Failure</b>  | <b>2.09</b>             | <b>County</b>   |
| <b>13. Wildfire</b>   | <b>2.07</b>             | <b>County, CREP &amp; CRP Lands, grasslands and forests</b> |
| <b>14. Dam Failure</b>  | <b>2.06</b>             | <b>Odessa</b>   |

## *VULNERABLE AREAS OF BIG STONE COUNTY*

The purpose of this section is to identify vulnerable areas in relation to Chapter 3 (Hazard Inventory), which provides detailed information on the potential hazards that may impact Big Stone County and/or cities within Big Stone County. This section identifies vulnerable areas and highlights specific events that have occurred throughout the county, as they pertain to four types of natural hazardous events: tornadoes, flooding, wildfires, and dam failure. The risk assessment maps for Big Stone County identify areas that may be more prone to these hazardous events.

### **Tornados**

According to the National Climatic Data Center, Big Stone County has experienced six tornados since 1950. The three most recent tornadoes were recorded to have magnitudes of F0. None of these tornadoes have been very strong and there hasn't been significant damage to urban areas. In general the county has been spared from significant tornado damage. The most destructive tornado in Big Stone County was an F3 tornado that occurred in Clinton, MN on May 17, 1996. Approximately 150 buildings sustained damage or were destroyed as the tornado moved northeast across Big Stone County through the townships of Prior, Big Stone, Almond, Malta, and Moonshine. See Figure 4.1 for a visual representation of tornado paths in Big Stone County.

Traditionally, tornados are seen as a countywide hazard. In order to predict estimated damage caused by an F4/F5 tornado, Big Stone County based fiscal analysis on the recommendation of the National Weather Service Data Management Department. According to the NWS, an acceptable method to create a damage cost estimate model from a F4/F5 tornado in a small community could be performed by using cost data from a previous tornado event that occurred in Greensburg, Kansas with a population of approximately 1,500 people. The devastation totaled around \$250 million dollars – approximately 95% of the city. To model an F4/F5 tornado, the NWS suggested approximating that ninety percent of each land use category be considered demolished and totaling those losses, produced by 2009 market values. Table 4.13 below highlights this information, providing the number of parcels damaged and estimated damage value by city, with a final damage amount of \$147,231,672 dollars impacting 2,087 parcels of residences, commercial/industrial buildings, schools, churches, and government-owned properties (summation of all city parcels and assessed parcel values).

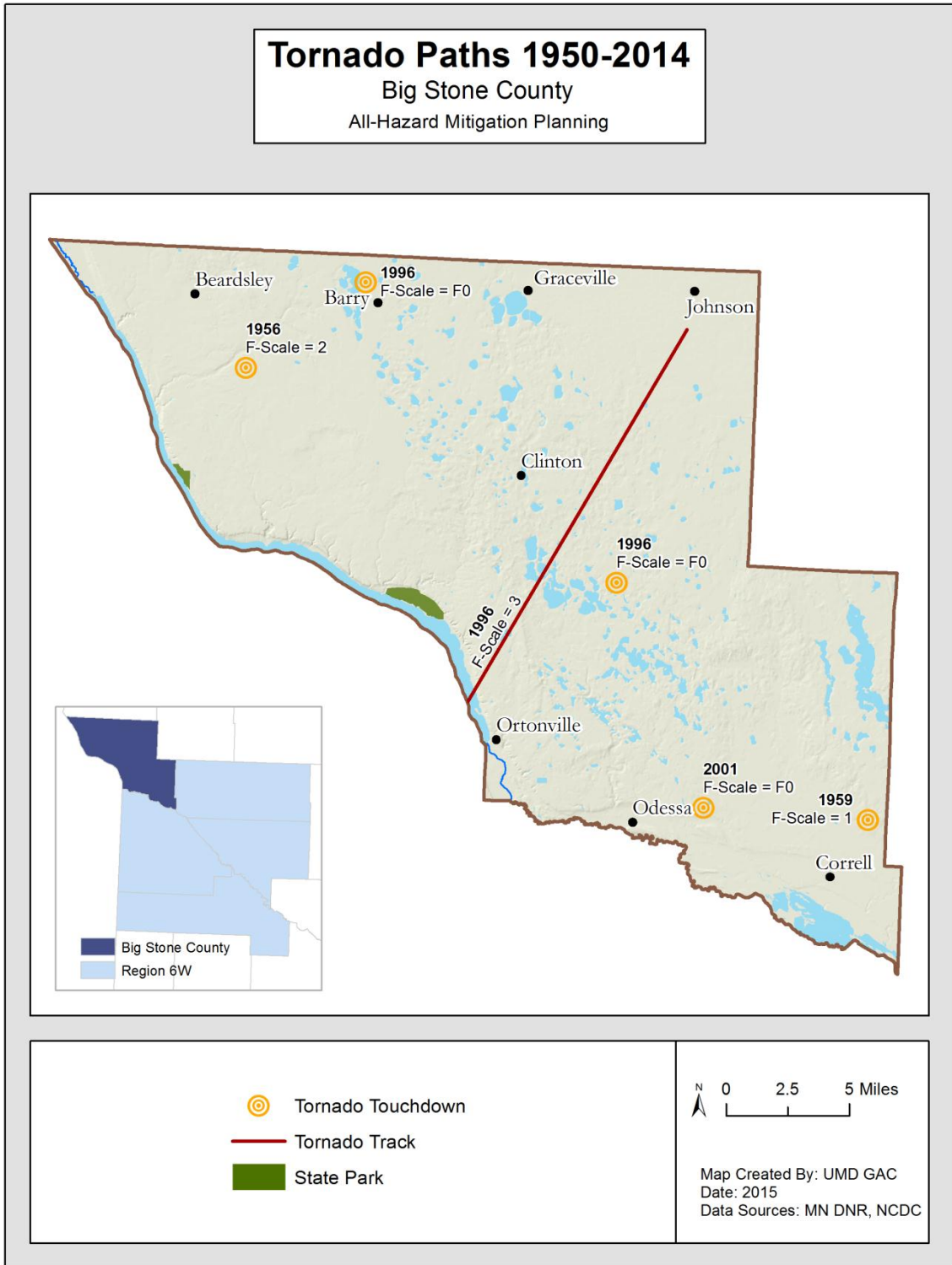
**Table 4.13 BSC Estimated potential damage by an F4/F5 Tornado**

| <b>Geographic Area</b>          | <b>Total Number of Parcels</b> | <b>Total Value of Parcels</b> | <b>90% of Total Parcels</b> | <b>Estimated Damage Value</b> |
|---------------------------------|--------------------------------|-------------------------------|-----------------------------|-------------------------------|
| Barry                           | 36                             | \$1,340,300                   | 32                          | \$1,206,270                   |
| Beardsley                       | 199                            | \$6,952,300                   | 179                         | \$6,257,070                   |
| Clinton                         | 289                            | \$17,660,100                  | 260                         | \$15,894,090                  |
| Correll                         | 71                             | \$1,294,800                   | 64                          | \$1,165,320                   |
| Graceville                      | 348                            | \$26,616,000                  | 313                         | \$23,954,400                  |
| Johnson                         | 14                             | \$305,847                     | 13                          | \$275,262                     |
| Odessa                          | 119                            | \$3,471,100                   | 107                         | \$3,123,990                   |
| Ortonville                      | 1,243                          | \$105,950,300                 | 1,119                       | \$95,355,270                  |
| <b>Total (Big Stone County)</b> | <b>2,319</b>                   | <b>\$163,590,746</b>          | <b>2,087</b>                | <b>\$147,231,672</b>          |

Source: Big Stone County Assessor, 2009

One major tornado occurred in Big Stone County on May 17, 1996, eight miles southwest of Clinton. An F3 tornado crossing Big Stone Lake from Roberts County, South Dakota destroyed one cabin at the Meadow Brook Resort, took the roof off another cabin, and a third cabin was demolished when a large tree fell onto it. Several boats on Big Stone Lake were overturned. Approximately 150 buildings sustained damage or were destroyed as the tornado moved northeast across Big Stone County through the townships of Prior, Big Stone, Almond, Malta, and Moonshine. Southwest of Clinton, a pontoon boat and a camper were destroyed. East of Clinton, a farm lost all of its buildings and sustained severe damage to their home. The cupboards fell off the walls and doors would not close, signifying a twisted frame. Northeast of Clinton, another farm suffered damage to all structures and half the roof was torn from their home. Two miles south of Johnson, a rambler-style home was completely destroyed and several barns and machine sheds were ruined before the tornado lifted. Many trees were uprooted in the path of the tornado across Big Stone County. Many powerlines were downed across the county.

Figure 4.1 Tornado Paths from 1950 to 2014 in Big Stone County



## Floods

Flooding in the county occurs primarily in the spring during periods of peak conditions (rainfall and snowmelt) and in areas where the soil has low permeability qualities. Flood damage may also result from improperly maintained or undersized ditches, excess drainage in the upper reaches of the watershed, or lack of upland retention structures. Major effects of excessive rainfall are the flooding of agricultural lands and road washouts. According to estimates by the US Army Corp of Engineers, Soil Conservation Service, and FEMA, there are approximately 25,914 acres (see Table 51) in the 100-year floodplain and 70.57 acres in the 500-year floodplain in Big Stone County. See Figure 5 (page 20) for a visual representation of 100 and 500-year floodplains in Big Stone County. Table 4.14 below identifies the number of floodplain acres throughout Big Stone County. It is important to note that these acreages were found utilizing digital Flood Insurance Rate Maps from April 17, 2006 and therefore illustrate the most accurate data available for Big Stone County.

**Table 4.14 BSC & Cities 100 & 500-Year Floodplain Acreages**

|                         | Total acres | Acres in 100-Year Floodplain | Acres in 500-Year Floodplain | Total Acres in 100 & 500-Year Floodplain | Percent of land in 100 & 500-Year Floodplains |
|-------------------------|-------------|------------------------------|------------------------------|--|---|
| <b>Big Stone County</b> | 338,316     | 24,969                       | 70                           | 25,039                                   | 7.4%  |
| <b>Graceville</b>       | 351         | 52                           | 0.23                         | 52.23                                    | 14.8%   |
| <b>Odessa</b>           | 618         | 130                          | 0.34                         | 130.34                                   | 21%   |
| <b>Ortonville</b>       | 2,554       | 763                          | 0                            | 763                                      | 29.8%   |

Source: FEMA, 2006

In order to predict an estimated damage value if all 100-year floodplains were flooded throughout the county at a given time; all structures (or parcels when data was unavailable) were identified on individual city basis, in addition to the number of rural housing/farmsteads throughout the county. Table 4.15 provides the number of structures and their assessed 2009 values within 100-year floodplains in all cities and Big Stone County. This data was gathered through city-specific inventories and are detailed further in the City Risk Assessment section of this chapter. The Big Stone County Assessor provided assessed values of structures located within 100-year floodplains and any Critical Facility or parcel located in the floodplain was included in this risk assessment.

**Table 4.15 Summary of Expenses to Fight Flooding**

| Geographic Area  | 1997 Flood  | 2001 Flood | Total       |
|------------------|-------------|------------|-------------|
| Big Stone County | \$1,837,352 | \$410,876  | \$2,248,228 |
| Ortonville       | \$733,002   | \$54,687   | \$787,689   |
| Total            | \$2,570,354 | \$465,563  | \$3,035,917 |

Source: Big Stone County & City of Ortonville, 2002

The following section is a Flood Hazard Analysis for Big Stone County that was completed by the University of Minnesota Duluth Geospatial Analysis Center. This analysis focuses on the potential impacts of a 100-year (1%) flood event, detailing the distribution of potential economic loss in Big Stone County.



# Flood Hazard Analysis for Big Stone County

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*For Upper Minnesota Valley Regional Development Commission  
Level II Flood Hazard Analysis performed using FEMA Hazus-MH*

## Contact Information:

### **Project Coordination:**

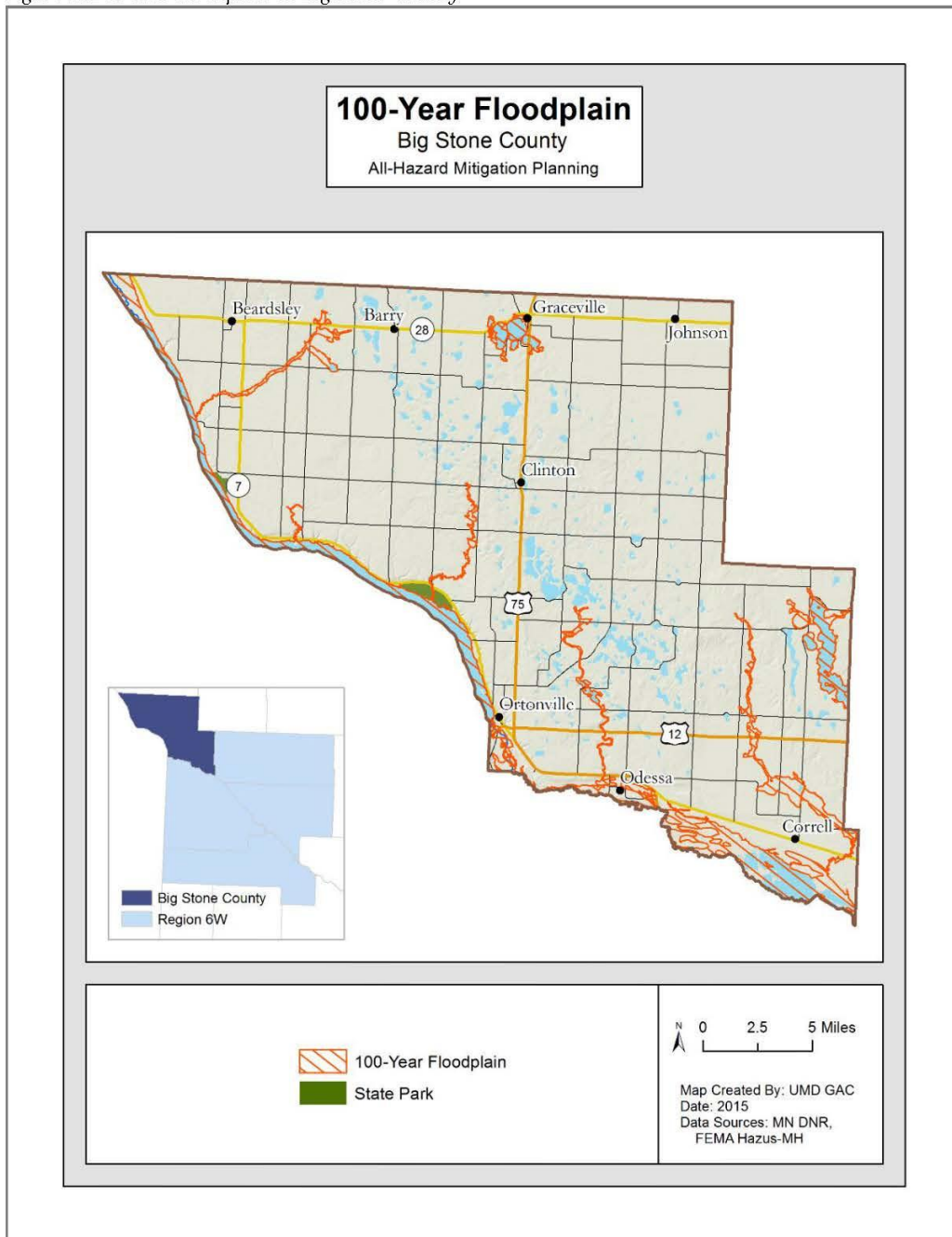
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## Big Stone County Hazus-MH Hazard Analysis

Hazus-MH 2.1 in ArcGIS 10.0 sp3 was used to estimate the damages incurred for a 100-year flood event in Big Stone County using a DFIRM (digital flood insurance rate map) and a 10-meter DEM (digital elevation model) to create a flood depth grid. The resulting depth grid is shown in Figure 1.

Figure 1. 100-Year Floodplain in Big Stone County



Big Stone County specific building data was sourced from the parcel tax and spatial databases to include building valuations, occupancy class, square footage, year built, and number of stories. A shapefile named Parcel\_TaxInfo.shp was obtained from the IT Department at Big Stone County. This spatial dataset included 3365 parcels with buildings and a populated occupancy class field out of 6996. The building values and assessment codes (used as occupancy codes) were obtained from the County Auditor only for those parcels with buildings. The number of stories and year built fields were obtained through the 3<sup>rd</sup> party data management consultant, Computer Professionals Unlimited.

In cases where building value, square footage, year built, or number of stories were missing, values were assigned based on best practices from values in the other 4 fields. The data were then assigned to one parcel centroid, which served as a surrogate for the each parcel's buildings to aggregate to the associated census block for use in the Hazus-MH model.

According to the Big Stone County general building stock [updated with these parcel data], the Hazus-MH model estimates there are 3,365 buildings in the region with a total replacement value (excluding contents) of \$244 million (2006 dollars). Approximately 71% of the buildings (and 57% of the building value) are associated with residential housing. Using the Big Stone County updated general building stock, the Hazus model estimated 36 buildings will be at least moderately damaged. This is over 43% of the total number of buildings in the scenario. There are an estimated 5 buildings that would be completely destroyed.

The total economic loss estimated for the flood is \$5.7 million dollars, which represents 8.5% of the total replacement value of the scenario buildings. Building losses are broken into 2 categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood. The total building-related losses were \$5.7 million dollars. 1% of the estimated losses were related to the business interruption of the region. Residential occupancies made up 64% of the total loss.

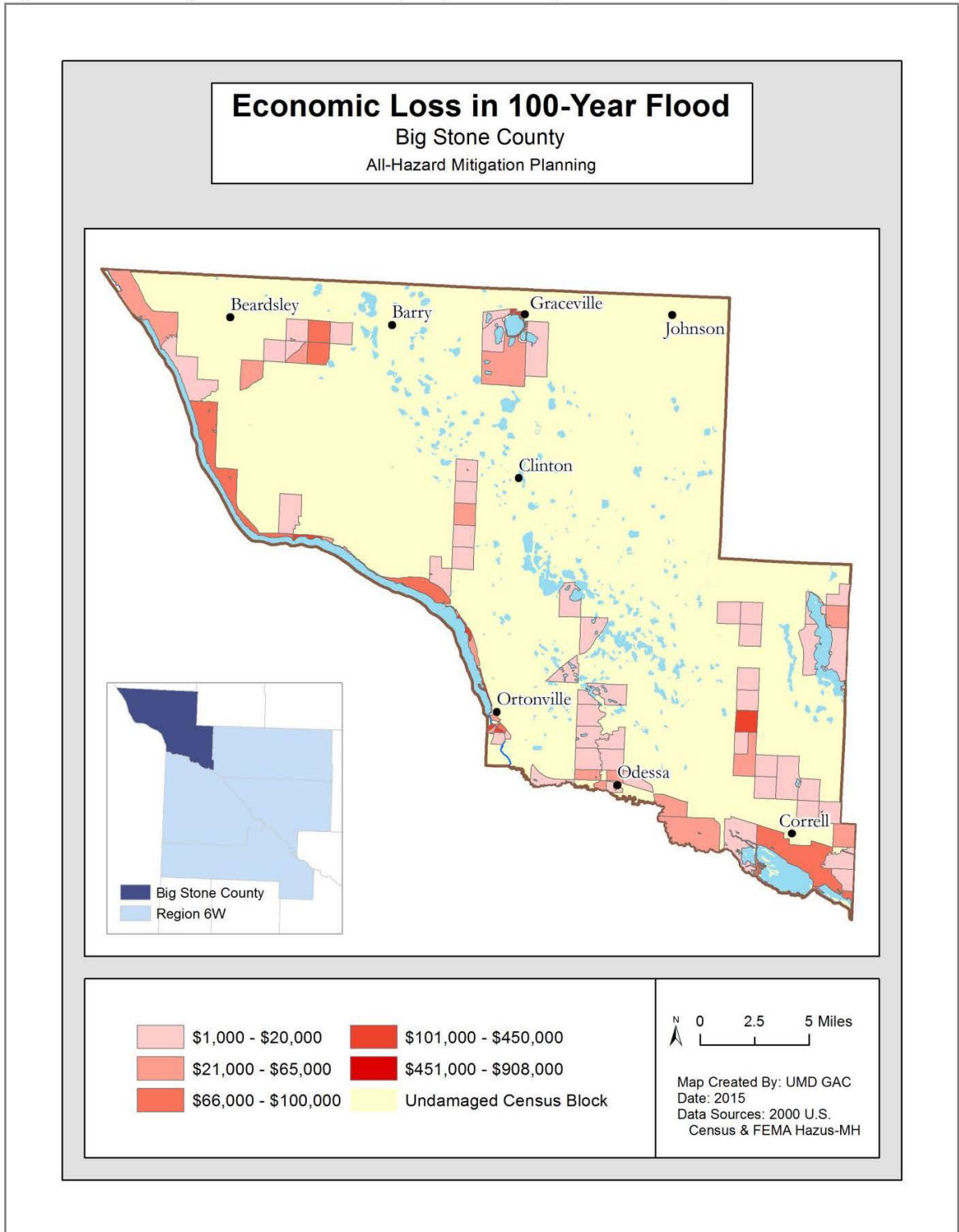
The reported building counts should be interpreted as degrees of loss rather than an exact number of buildings exposed to flooding. These numbers were derived from aggregate building inventories which are assumed to be dispersed evenly across census blocks. Hazus-MH requires that a predetermined amount of square footage of a typical building sustain damage in order to produce a damaged building count. If only a minimal amount of damage to buildings is predicted, it is possible to see zero damaged building counts while also seeing economic losses.

The total estimated number of damaged buildings, total building losses, and estimated total economic losses for the countywide 100-year flood are shown in Table 1. The distribution of economic losses for Big Stone County is depicted in Figure 2.

Table 1. Big Stone County Total Economic Loss from 100-Year Flood

| General Occupancy    | Estimated Total Buildings | Total Damaged Buildings | Total Building Exposure (In \$1000s) | Total Economic Loss (In \$1000s) | Building Loss (In \$1000s) |
|----------------------|---------------------------|-------------------------|--------------------------------------|----------------------------------|----------------------------|
| Agricultural         | 588                       | 1                       | \$47,622                             | \$1,426                          | \$221                      |
| Commercial           | 244                       | 2                       | \$28,999                             | \$351                            | \$58                       |
| Education            | 10                        | 0                       | \$9,320                              | \$0                              | \$0                        |
| Government           | 85                        | 0                       | \$10,396                             | \$249                            | \$34                       |
| Industrial           | 19                        | 0                       | \$912                                | \$15                             | \$2                        |
| Religious/Non-Profit | 43                        | 0                       | \$7,283                              | \$42                             | \$4                        |
| Residential          | 2,376                     | 34                      | \$139,361                            | \$3,640                          | \$2,412                    |
| <b>Total</b>         | <b>3,365</b>              | <b>37</b>               | <b>\$243,893</b>                     | <b>\$5,723</b>                   | <b>\$2,731</b>             |

Figure 2. Distribution of Estimated Economic Loss for Big Stone County in 100-Year Flood by Census Block





Census blocks of concern should be reviewed in more detail to determine the actual percentage of facilities that fall within the flood hazard areas.

Figure 3 shows the census block estimate clipped to the actual 100-year flood boundary for Ortonville, and Figure 4 shows this same information for Graceville.

*Figure 3. 100-Year Flood Loss Estimates in Ortonville*

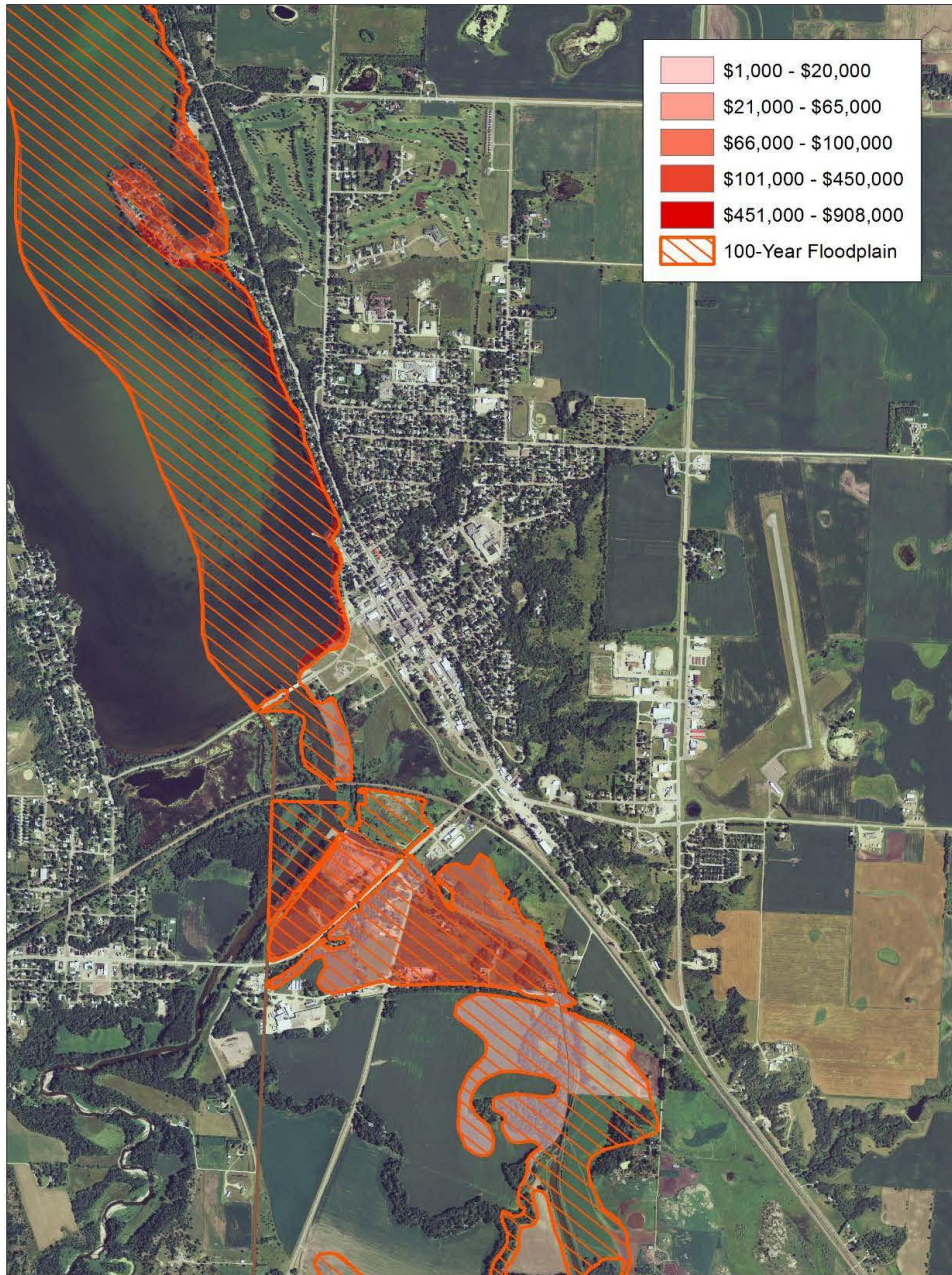
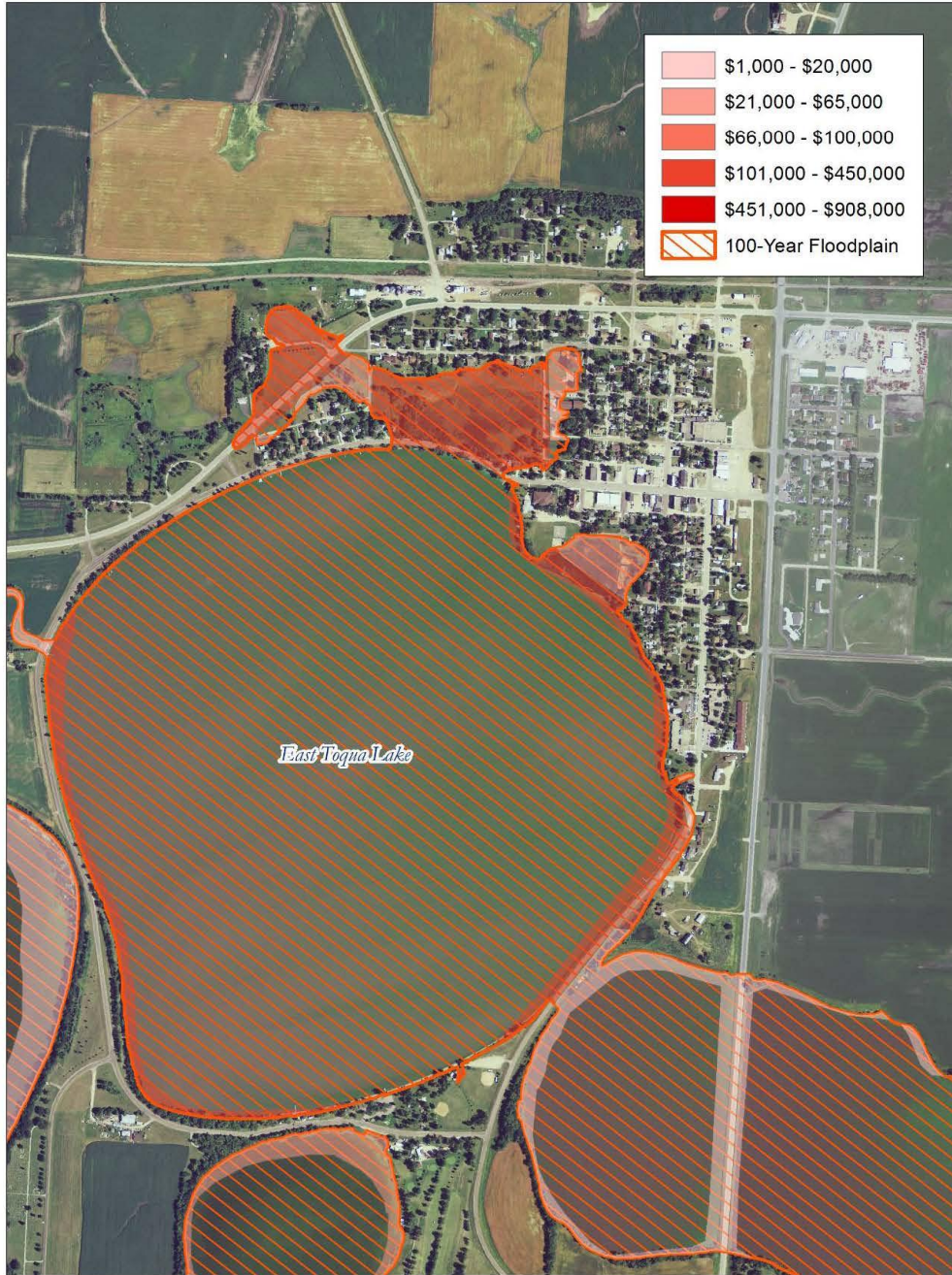




Figure 4. 100-Year Flood Loss Estimates in Graceville



The aggregate losses reported in this study may be overstated because values are distributed evenly in a census block. The 5 census blocks showing the highest estimated loss values are shown in Table 2, with their spatial extents shown in Figure 5, Figure 6, Figure 7, Figure 8, and Figure 9. All 5 census blocks are located in either in Ortonville or Graceville.

*Table 2. Big Stone County Census Blocks with the Greatest Estimated Losses in the 100-Year Floodplain*

| <b>Census Block Number</b> | <b>Total Estimated Loss</b> | <b>Location</b> |
|----------------------------|-----------------------------|-----------------|
| 270119503003008            | \$908,000                   | Ortonville      |
| 270119503003009            | \$450,000                   | Ortonville      |
| 270119502002056            | \$410,000                   | Graceville      |
| 270119502003108            | \$297,000                   | Ortonville      |
| 270119502002069            | \$245,000                   | Graceville      |



Figure 5. Census Block #270119503003008 and 100-Year Floodplain, Ortonville





Figure 6. Census Block #270119503003009 and 100-Year Floodplain, Ortonville





Figure 7. Census Block #270119502002056 and 100-Year Floodplain, Graceville





Figure 8. Census Block #270119502003108 and 100-Year Floodplain, Ortonville

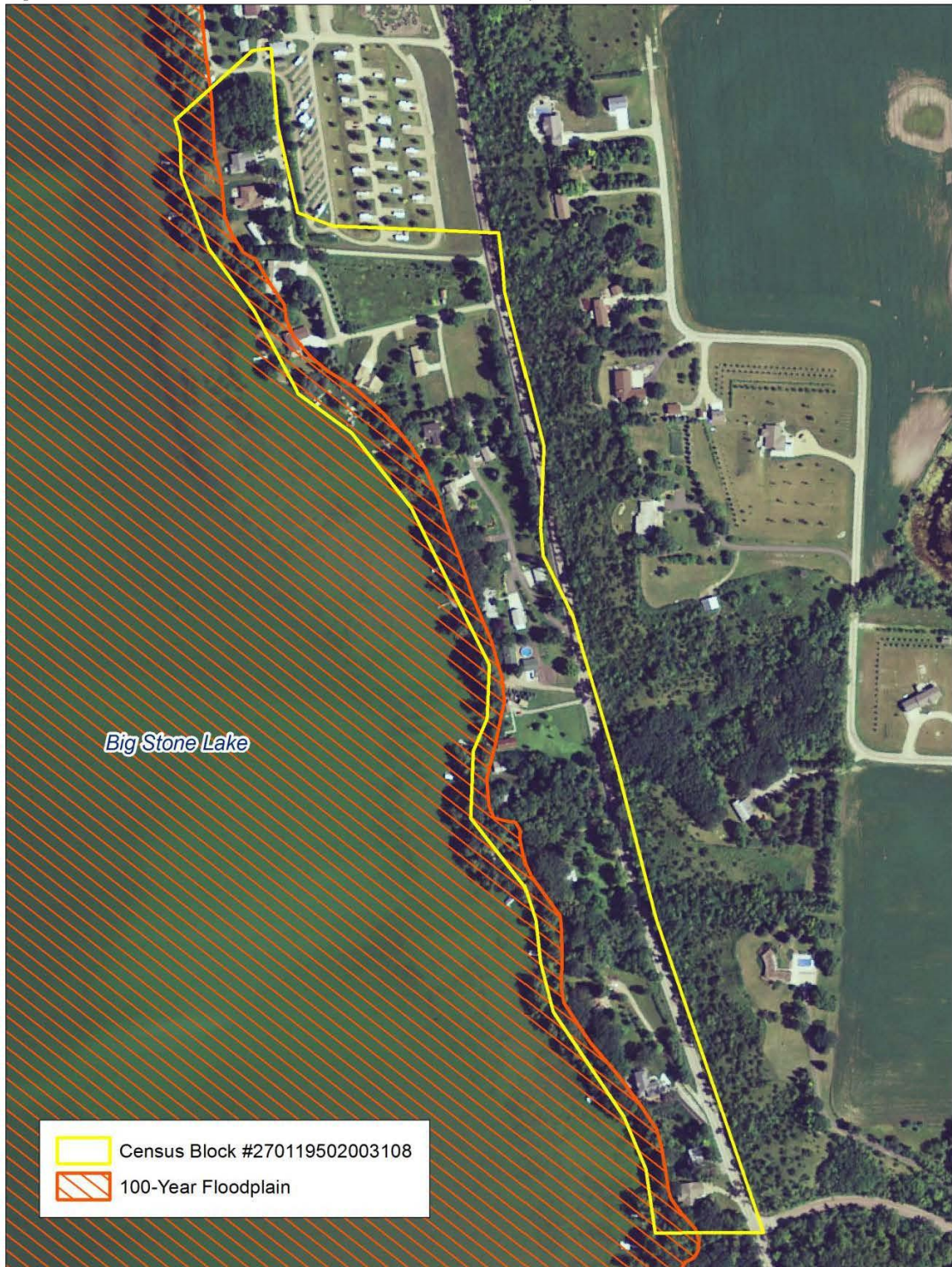




Figure 9. Census Block #270119502002069 and 100-Year Floodplain, Graceville



Another analysis was performed by selecting the parcels with the highest values (building plus contents) that fell within the 100-year floodplain. The results of this analysis (and total building values) are shown in Table 3.

*Table 3. Big Stone County Properties with Highest Building/Contents Value Intersecting 100-Year Floodplain*

| <b>Edited Parcel ID Number</b> | <b>Parcel Building + Contents Total Value</b> | <b>Class Description</b> | <b>Building Area (ft<sup>2</sup>)</b> |
|--------------------------------|---|--------------------------|---------------------------------------|
| 03-0094-000                    | \$653,800                                     | Agriculture              | n/a                                   |
| 05-0237-000                    | \$580,200                                     | Agriculture              | 1,200                                 |
| 22-0690-000                    | \$389,700                                     | Single Family Dwelling   | 970                                   |
| 22-0719-000                    | \$348,300                                     | Single Family Dwelling   | 852                                   |
| 22-0725-000                    | \$333,000                                     | Single Family Dwelling   | 768                                   |
| 13-0224-012                    | \$324,000                                     | Single Family Dwelling   | 1,600                                 |
| 13-0371-000                    | \$259,950                                     | Single Family Dwelling   | 1,464                                 |
| 22-0796-000                    | \$236,100                                     | Single Family Dwelling   | 1,240                                 |
| 13-0337-000                    | \$222,150                                     | Single Family Dwelling   | 672                                   |
| 22-1126-000                    | \$221,700                                     | Single Family Dwelling   | 2,252                                 |
| <b>Total:</b>                  | <b>\$3,568,900</b>                            |                          |                                       |

#### *Hazus-MH Essential Facility Loss Analysis*

Essential facilities encounter the same impacts as other buildings within the flood boundary: structural failure, extensive water damage to the facility, and loss of facility functionality (i.e. a damaged police station will no longer be able to serve the community). No essential facilities (care facilities, fire stations, police stations, and schools) included in the Hazus-MH analysis fall within the 100-year flood boundary.

#### *Hazus-MH Shelter Requirement Analysis*

Hazus-MH estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus-MH also estimates those displaced people that may require accommodations in temporary public shelters. The countywide 100-year flood model estimates 91 households may be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, the model estimates 124 people (out of a 2000 census population of 5,802) may seek temporary shelter in public shelters.

#### *Hazus-MH Debris Generation Analysis*

Hazus estimates the amount of debris that may be generated by the flood. The countywide 100-year flood model breaks debris into 3 general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,078 tons of debris may be generated. Of the total amount, Finishes composes 45% of the total and Structural composes 32% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 43 truckloads (@25 tons/truck) to remove the debris generated by the flood.

## Flood Hazard Analysis for Big Stone County

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*For Upper Minnesota Valley Regional Development Commission  
Level II Flood Hazard Analysis performed using FEMA Hazus-MH*

### Contact information:

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## Wildfires

According to the Minnesota State Fire Marshal, there are more than 2,000 annual wildfires with an estimated loss of more than \$13 million dollars statewide. Every year, wildfires are started along the railroads and farmland. Three other potential wildfire hazards are power lines, utility structures, and timber bridges. Hot exhaust from farm equipment could also start fields on fire.

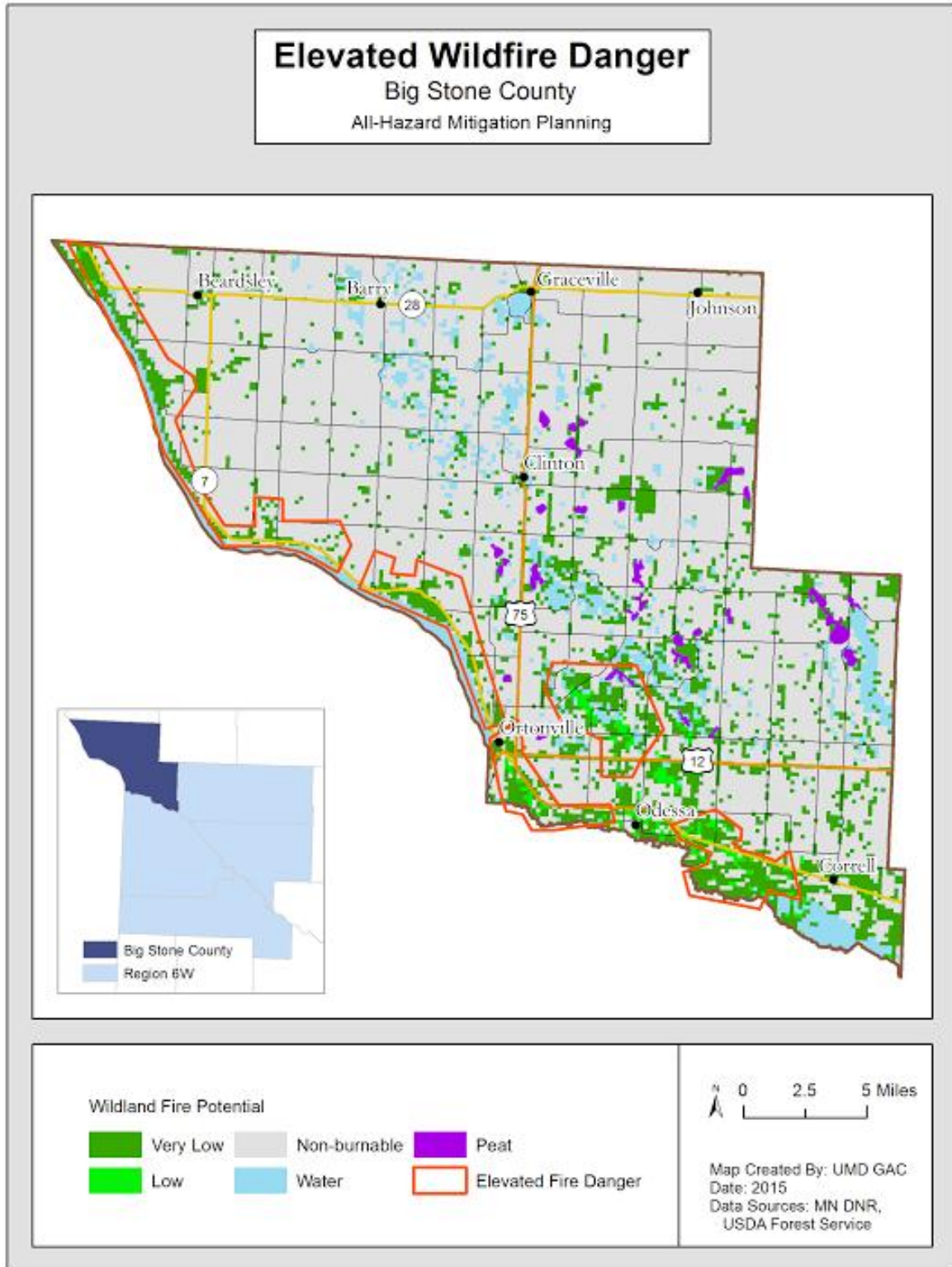
As of May 2014, Big Stone County has 9,576 acres enrolled in CREP, RIM, CRP and the Wetland Reserve Program. These areas are left for wildlife habitat and are not burned on a regular basis. As a result, years of dead grasses accumulate on these lands and are a good fuel for any fire that may start. The Minnesota River Valley and the Wildlife Management Areas also provides an abundance of fuel for wildfires. Wildlife Management Areas occupy approximately 11,877 acres in Big Stone County. Big Stone County currently has 28,479 acres of grasslands and 9,431 acres of forests (See Table 4.16 below). Figure 4.2 identifies five areas across the county, which contain large patches of grasslands (11,856 acres) and forests (3,081 acres). Also, located within the five areas are 171 farmsteads and an additional 94 farmsteads found within a ½ mile radius of the Elevated Fire Danger areas. These areas are primarily located along the western border near the Minnesota River in the Upper Minnesota River Valley.

**Table 4.16 BSC General Wildfire Information**

| <b>Acreages:</b>                  | <b>Grasslands</b>        | <b>Forests</b>                     |
|-----------------------------------|--------------------------|------------------------------------|
| Acres in "Five Large Patch Areas" | 11,856                   | 3,081                              |
| Total Acres in County             | 28,479                   | 9,431                              |
| <b>Farmsteads located within:</b> | <b>Large Patch Areas</b> | <b>½ Mile of Large Patch Areas</b> |
| Number of Farmsteads              | 171                      | 94                                 |



Figure 4.2 Elevated Wildfire Danger in Big Stone County



## **Dam Failure**

Dam failure is defined as the collapse or failure of an impoundment resulting in downstream flooding. Dam failures can result in loss of life and extensive property damages. They may result from an array of situations, including flood events, poor operation, lack of maintenance and repair and terrorism.

Big Stone County has 9 dams located within the boundary, eight of which are considered “Low Head Dams” which means if they failed, it would not be life threatening. Big Stone Lake has a recreational dam that would not impact any structure if it failed, located in the City of Ortonville. The Long Tome Dam is located up river from the City of Odessa. If this dam were to fail, the City could be impacted and sustain damage. The damage could include up to 30 homes and all major businesses within the Community.

Figure 4.3 Dams in Big Stone County



## *COMMUNITY BASED RISK ASSESSMENTS*

In previous Big Stone County All-Hazard Mitigation Plan updates, all cities underwent a broad risk assessment. Each community within Big Stone County received a survey and two inventories to gather information to complete the project with the Emergency Manager. The risk assessment survey requested identification of likely hazards that may affect the community as well as current land use development trends and the potential of future development. The risk assessment inventories were geared toward identifying vulnerable structures that may be affected by different hazard area boundaries and an inventory of community assets. Sample surveys and inventories, as well as information included in the previous plan update are found in Appendix 11<sup>1</sup>. Each community-based risk assessment was divided into four sections: existing development trends, potential of future growth and development vulnerability assessment of structures by hazard, and an inventory of community assets.

The task force had many discussions about the transportation of hazardous materials through the county during the 2015 Hazard Mitigation Plan update. Since the 2010 update, there has been an increase in crude oil transportation throughout western Minnesota coming from the Bakken Oil Fields in North Dakota. This is discussed in further detail in Hazardous Materials section of Chapter 3. It was determined that cities need to be aware of the areas of potential impact from a hazardous material spill. This section contains a map of each city in Big Stone County with a ½ mile buffer around rail lines and U.S. and state highways. It is becoming increasingly important for cities to be cognizant of which of its critical facilities and major employers are located within this hazard zone. In addition to evacuation plans, cities should consider these zones when locating new schools, hospitals, emergency operations centers, etc.

An updated summary of existing development trends as well as potential for future growth and development for each city within Big Stone County is provided below. The second portion of the city specific risk assessments includes land use information and an inventory of community assets for each city in Big Stone County. Each city's asset locations were identified and placed on a map of the city as well as its respective transportation of hazardous material maps. This is to show the connection between hazard boundaries and the location of assets. Assets vary from community to community; so all assets were categorized into one of seven categories:

- Major Employers (as defined by community)
- Police Department
- Fire Department
- Hospitals
- Schools
- Historical Structures (as defined by community and State Historic Preservation Office)
- Institutional Buildings (government-owned structure, not related to Emergency Services)
- Multi-Family Housing

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<sup>1</sup> UMRDC did not have access to data more recent than 2009. Therefore, outlined is the total number of parcels within each land use category and a 2009 market rate value for the parcel for all non-exempt entities. All exempt parcels including hospitals, churches, government-owned facilities, and schools, have market values from 2004 as those properties are only assessed once every six years. It is important to note that Big Stone County's survey underestimates the actual number of structure within each community. Further, the market value utilized for the community-based risk assessment is for both the structure and the land, which causes an over-estimation of structure value.

- Public Facilities (Park, Pool, General Public Asset)
- Schools (Educational-related structure).

For the next update of the All-Hazard Mitigation Plan, the market value for exempt properties should be updated with more recent assessment values and will include updated square footage numbers. Some properties selected as Community Assets did not have accurate square footage measurements.

## City of Barry, Minnesota

### *Existing Development Trends.*

Barry is Big Stone County's smallest city with 13 residents and 5 households (Minnesota State Demographic Center 2013). Barry's population has been declining since 1960, losing 47 residents in 53 years. The city's population projections estimate that Barry should continue to decline at a slow, but steady rate, possibly bringing the population as low as nine residents in the year 2020. While the population of Barry has been declining, the city has only seven fewer households than it did in 1960. Barry has not completed any redevelopment projects or had any land use changes in the last 10 years. The City of Barry's general land use category breakdown exists as the following shown in Table 4.17 below.

**Table 4.17 City of Barry – Land Use Category Allotments**

| Land Use Type | Parcel Count | Percent of Area |
|---------------|--------------|-----------------|
| Residential   | 33           | 50.00%          |
| Commercial    | 4            | 6.06%           |
| Agricultural  | 14           | 21.21%          |
| Government    | 5            | 7.58%           |
| Total         | 66           | 100.00%         |

Source: Big Stone County Assessor, 2009

### *Potential for Future Growth and Development.*

The City of Barry is focusing on maintaining their current residents and working to keep the residences filled with families. The City plans to apply for funding to provide maintenance for small home repairs in the future. As no future development is expected, there is no increase in vulnerability expected over the next five years, but future vulnerability will be re-evaluated during subsequent plan updates.

Figure 4.4 Barry Land Use

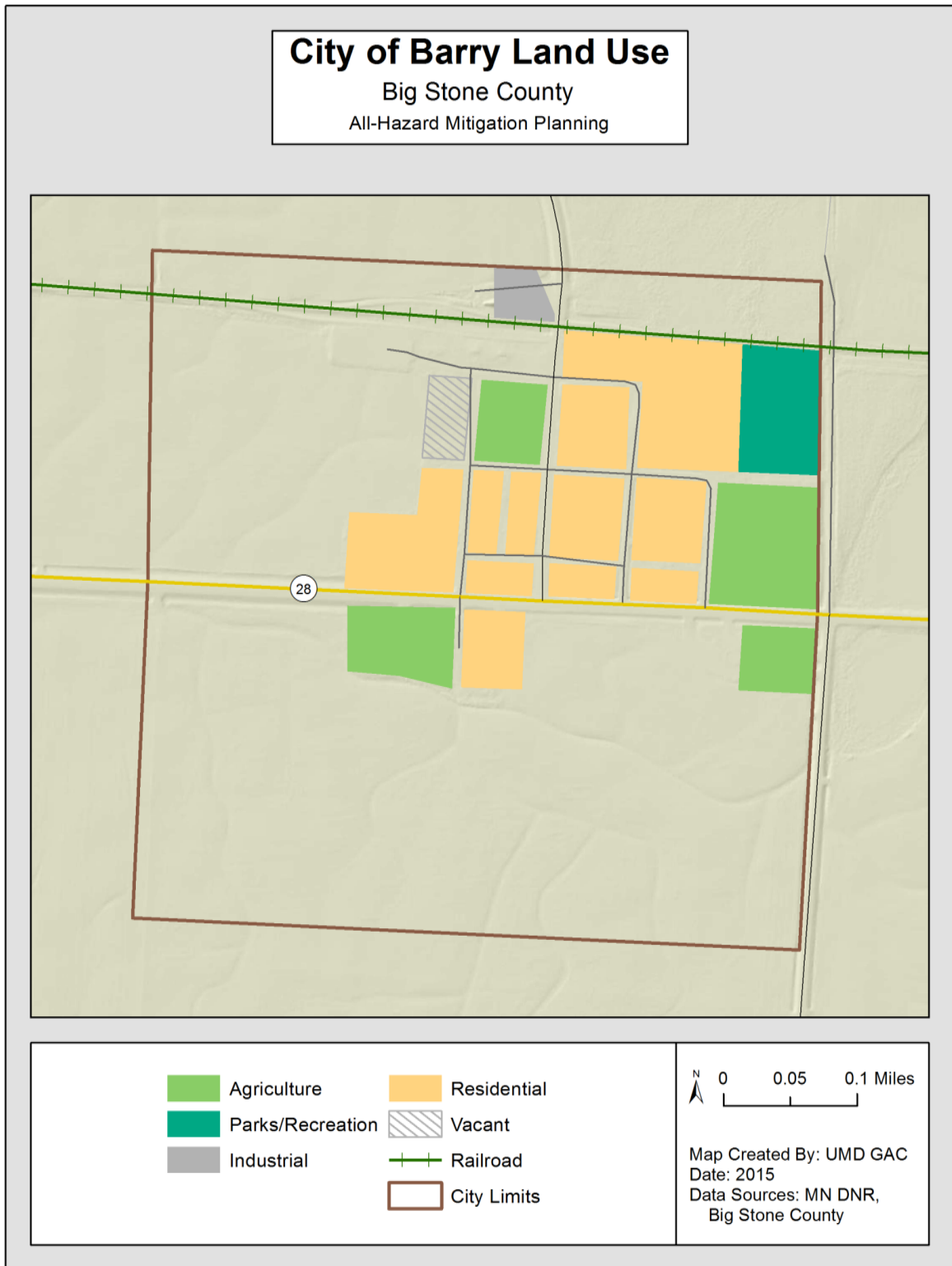


Figure 4.5 Barry Community Assets/Critical Facilities

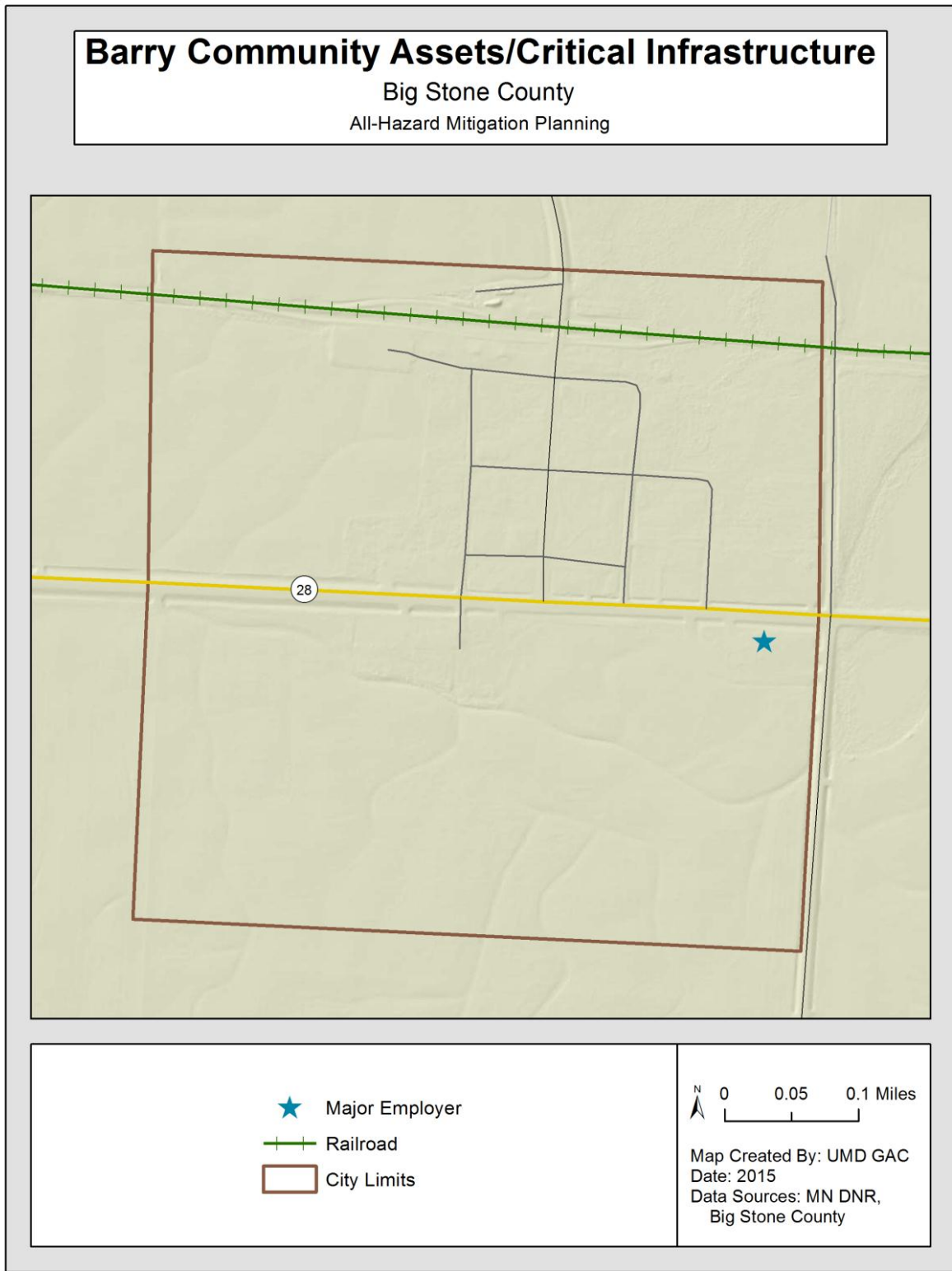
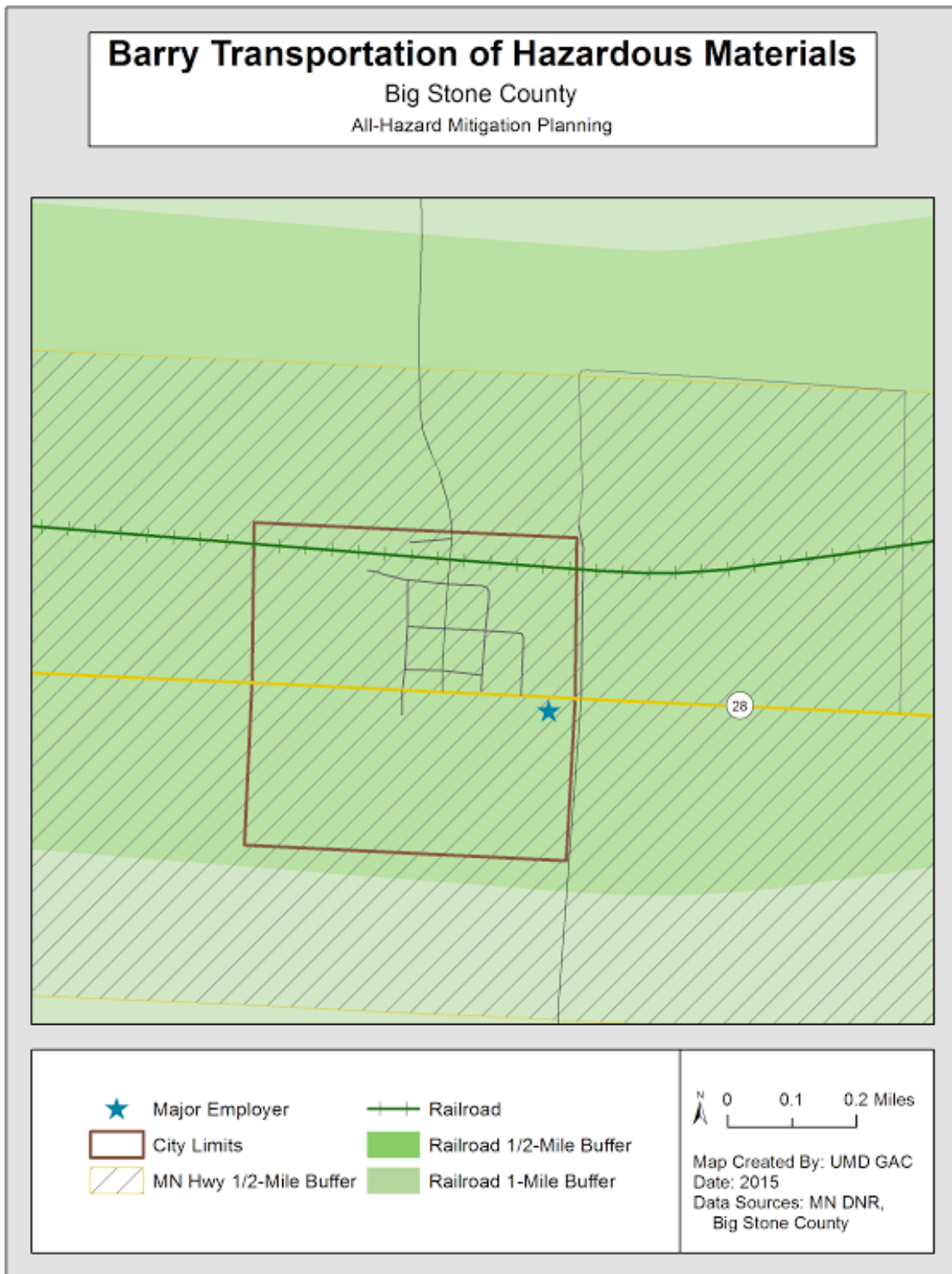




Figure 4.6 Barry Transportation of Hazardous Materials



## City of Beardsley, Minnesota

### *Existing Development Trends.*

The City of Beardsley has approximately 224 people and 103 households making it Big Stone County's fourth largest city (Minnesota State Demographic Center 2013). The city's population has declined since 1960, losing 186 residents. The number and size of households have also seen steady decline since 1980. The city's population projections estimate that Beardsley should continue to decline at a slow but steady rate over the next 20 years, possibly bringing the population to 190 by the year 2020. Beardsley has not completed any redevelopment projects or had any land use changes in the last 10 years. The City of Beardsley's general land use category breakdown exists as the following shown in Table 4.18 below.

**Table 4.18 City of Beardsley – Land Use Category Allotments**

| Land Use Type | Parcel Count | Percent of Area |
|---------------|--------------|-----------------|
| Residential   | 172          | 71.07%          |
| Commercial    | 28           | 11.57%          |
| Agricultural  | 8            | 3.31%           |
| Government    | 24           | 9.92%           |
| Religious     | 5            | 2.07%           |
| <b>Total</b>  | <b>242</b>   | <b>100.00%</b>  |

Source: Big Stone County Assessor, 2009

### *Potential for Future Growth and Development.*

Beardsley's close proximity to Big Stone Lake could play a significant part in the city's future and affect future growth. The zoning is almost entirely residential with a large agriculture zone on the western edge of the city. The northern section of Beardsley, as well as a segment running along the eastern edge has not been zoned. Decisions on what to do with this land will be very important to the city if growth occurs, and Beardsley is be prepared to make these decisions in such a way that will promote orderly growth and prevent vulnerability to structures as these areas may be within potential hazardous areas of tornados and transportation of hazardous materials.

Figure 4.7 Beardsley Land Use

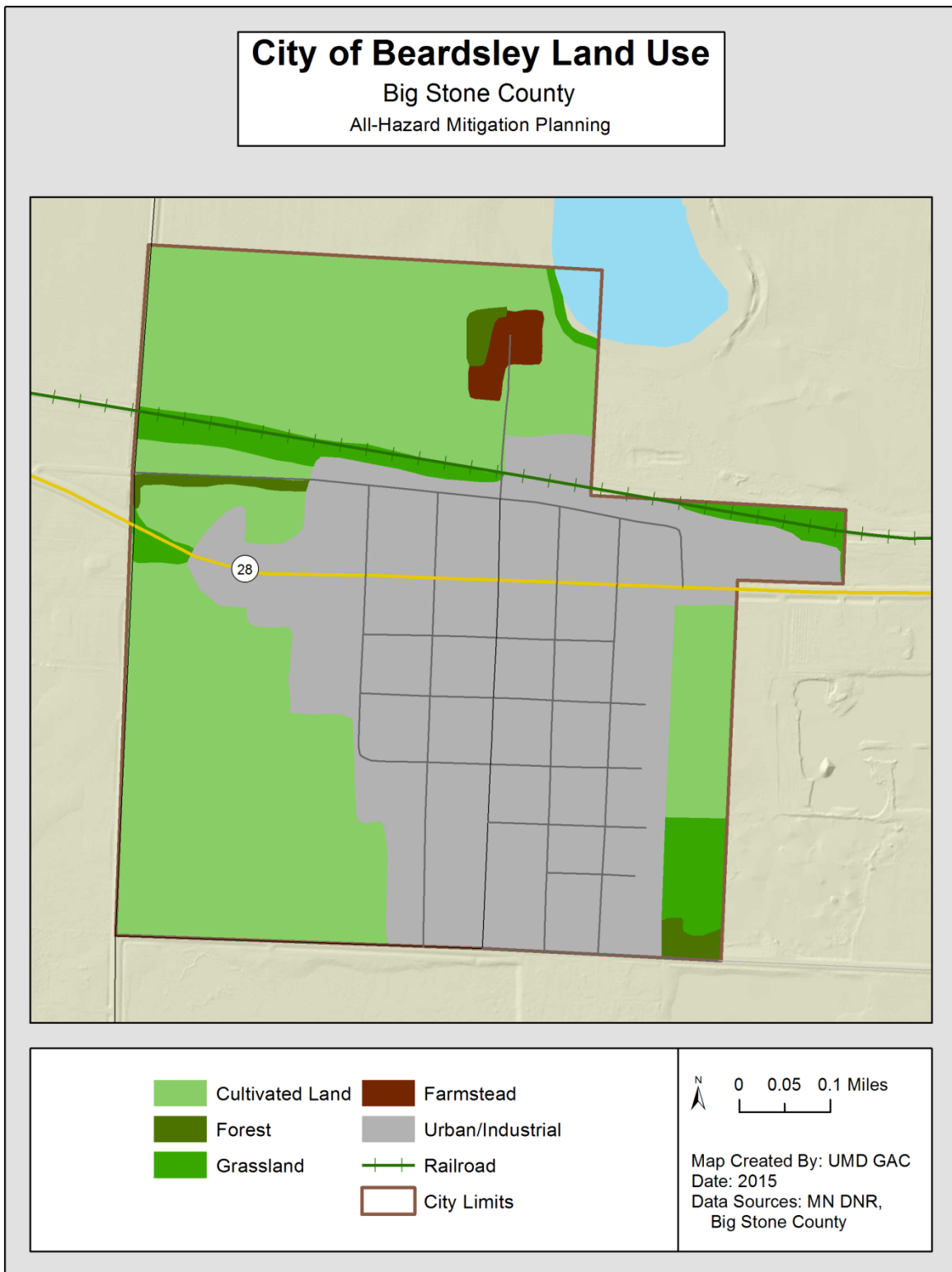


Figure 4.8 Beardsley Community Assets/Critical Facilities

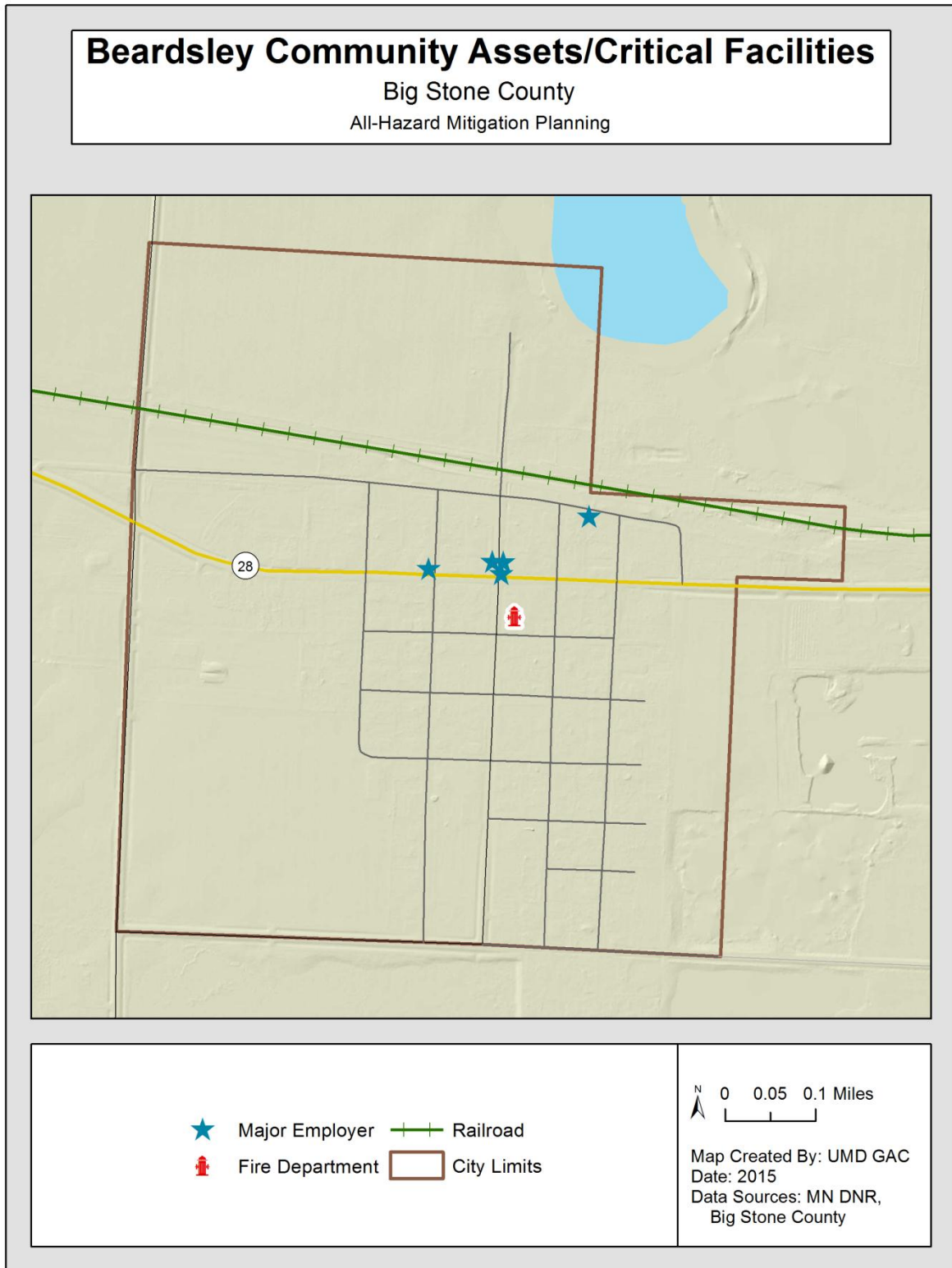
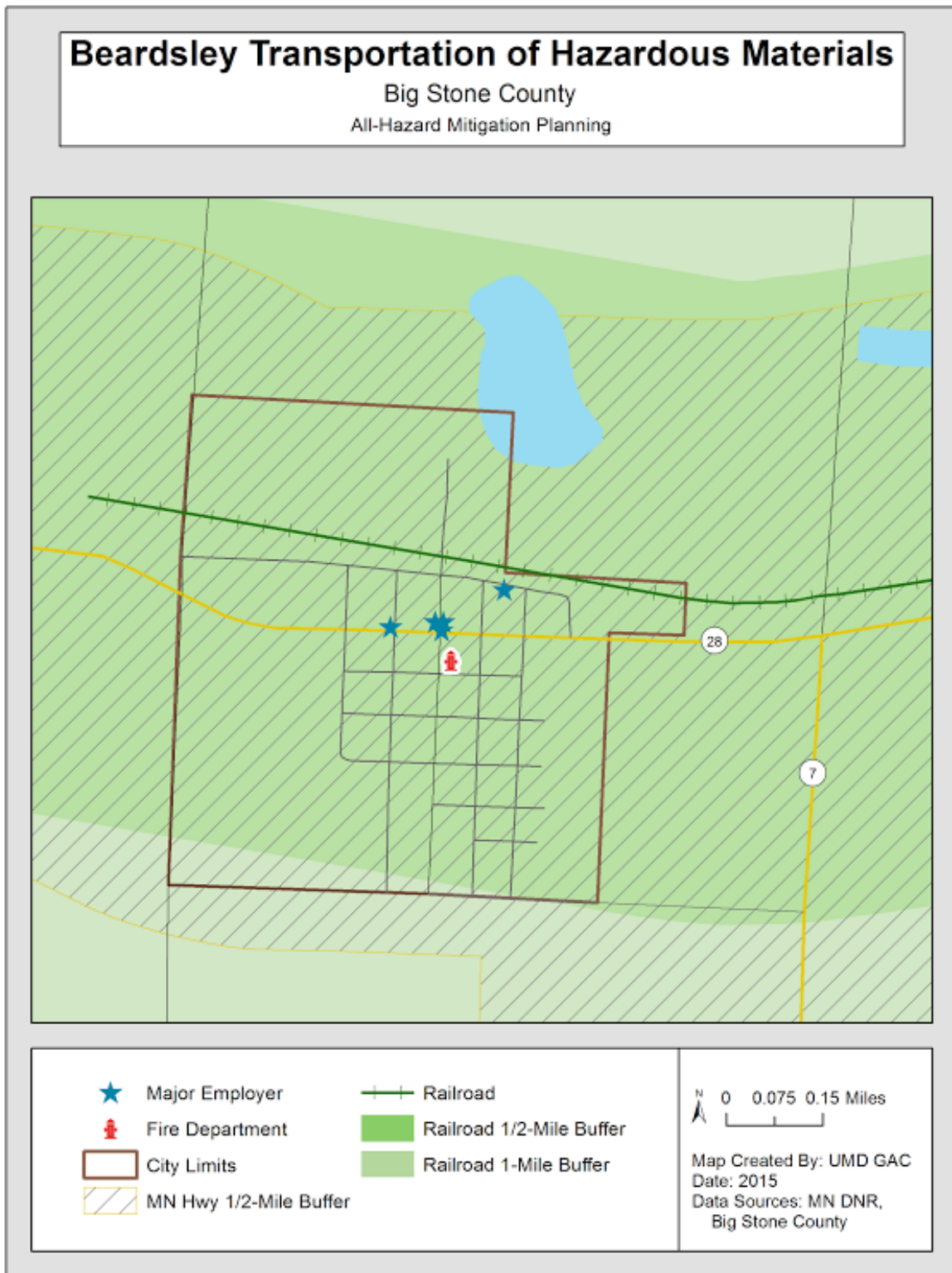


Figure 4.9 Beardsley Transportation of Hazardous Materials



## City of Clinton, Minnesota

### *Existing Development Trends.*

Clinton is the county's third largest city with 435 people and 196 households (Minnesota State Demographic Center, Metropolitan Council 2013). Clinton has experienced some fluctuation in population trends over the last half century, with an overall loss of 130 residents. Clinton's population peaked in 1980 at 622 residents before starting to decline. Between 1990 and 2000 the city lost 121 residents, or 21 percent of the population. Population decline is expected to continue between 2000 and 2020. The average household size has also seen some fluctuation, but is generally decreasing. This is consistent with the shrinking household sizes seen throughout the area. The City of Clinton has not completed any annexations or development projects in the past 10 years. The City of Clinton's general land use category breakdown exists as the following shown in Table 4.19 below.

**Table 4.19 City of Clinton – Land Use Category Allotments**

| Land Use Type | Parcel Count | Percent of Area |
|---------------|--------------|-----------------|
| Residential   | 243          | 71.47%          |
| Commercial    | 34           | 10.00%          |
| Agricultural  | 13           | 3.82%           |
| Government    | 35           | 10.29%          |
| Religious     | 7            | 2.06%           |
| Industrial    | 2            | 0.59%           |
| <b>Total</b>  | <b>340</b>   | <b>100.00%</b>  |

Source: Big Stone County Assessor, 2009

### *Potential for Future Growth and Development.*

Along the western and northern edges of the city limits there are large tracts of land zoned for agricultural purposes, which may be available for development within city limits. However, as no development is expected in the next five years, there is no increase in vulnerability expected and future vulnerability will be re-evaluated during subsequent plan updates.

Figure 4.10 Clinton Land Use

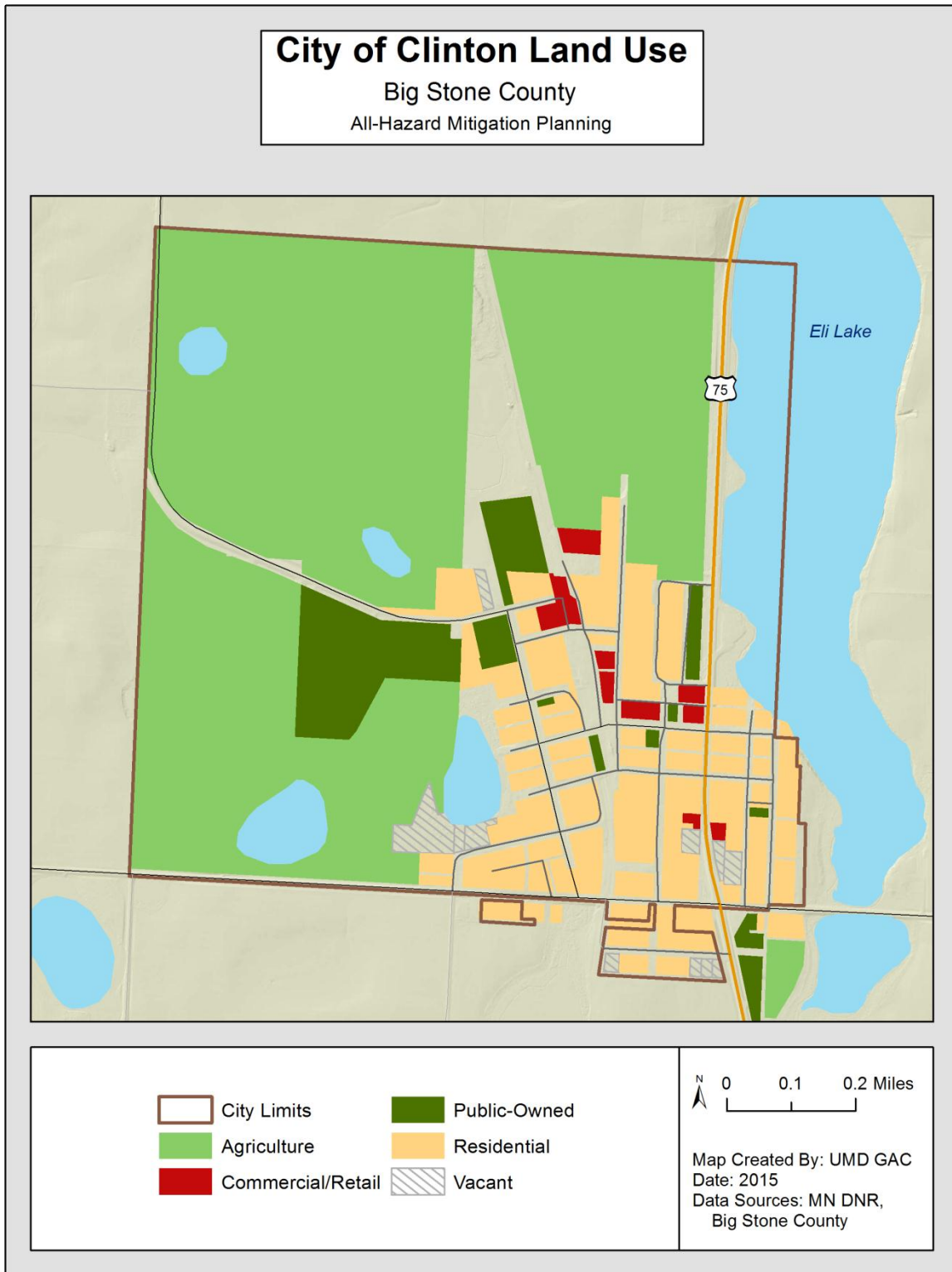




Figure 4.11 Clinton Community Assets/Critical Facilities

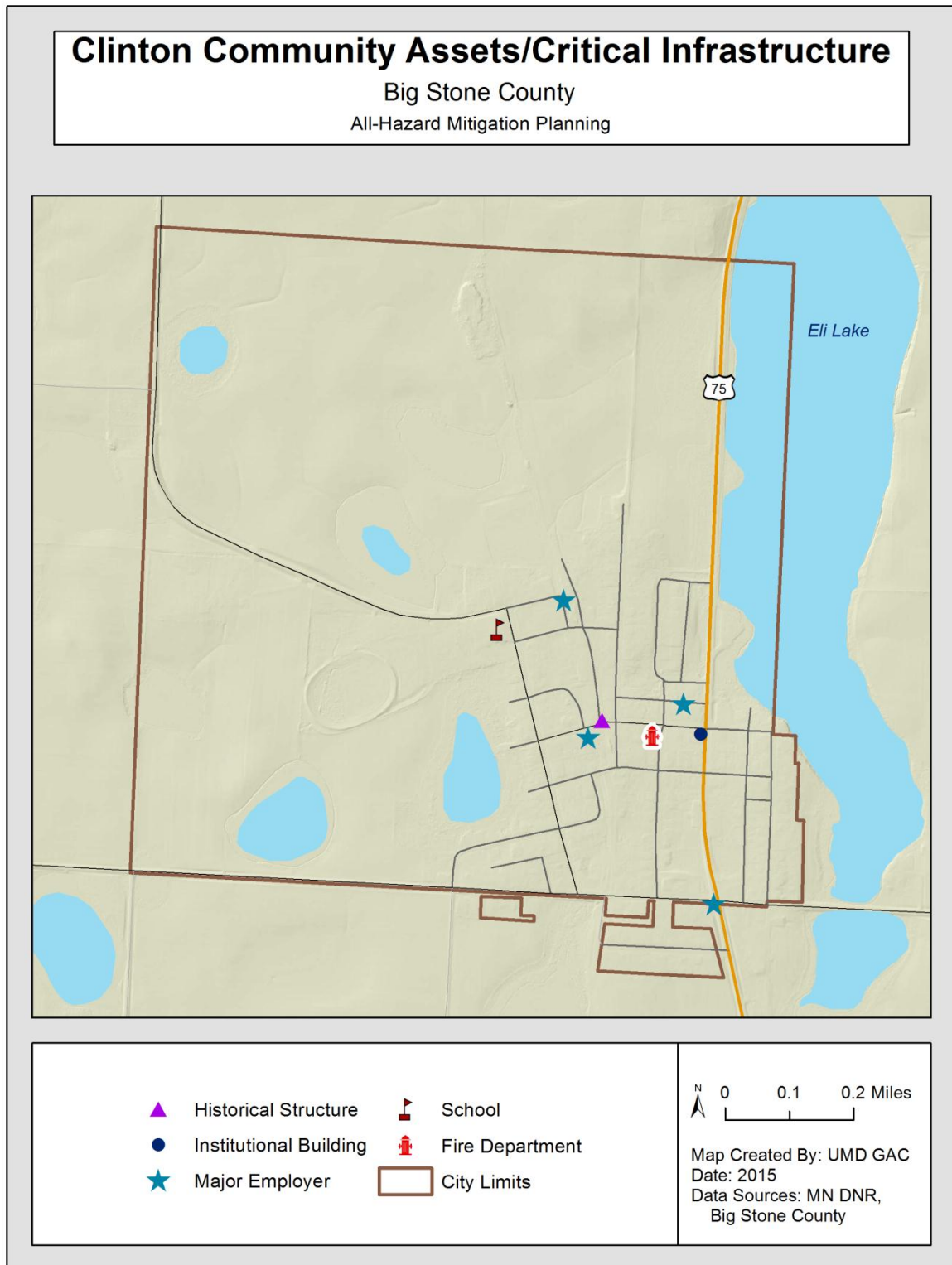
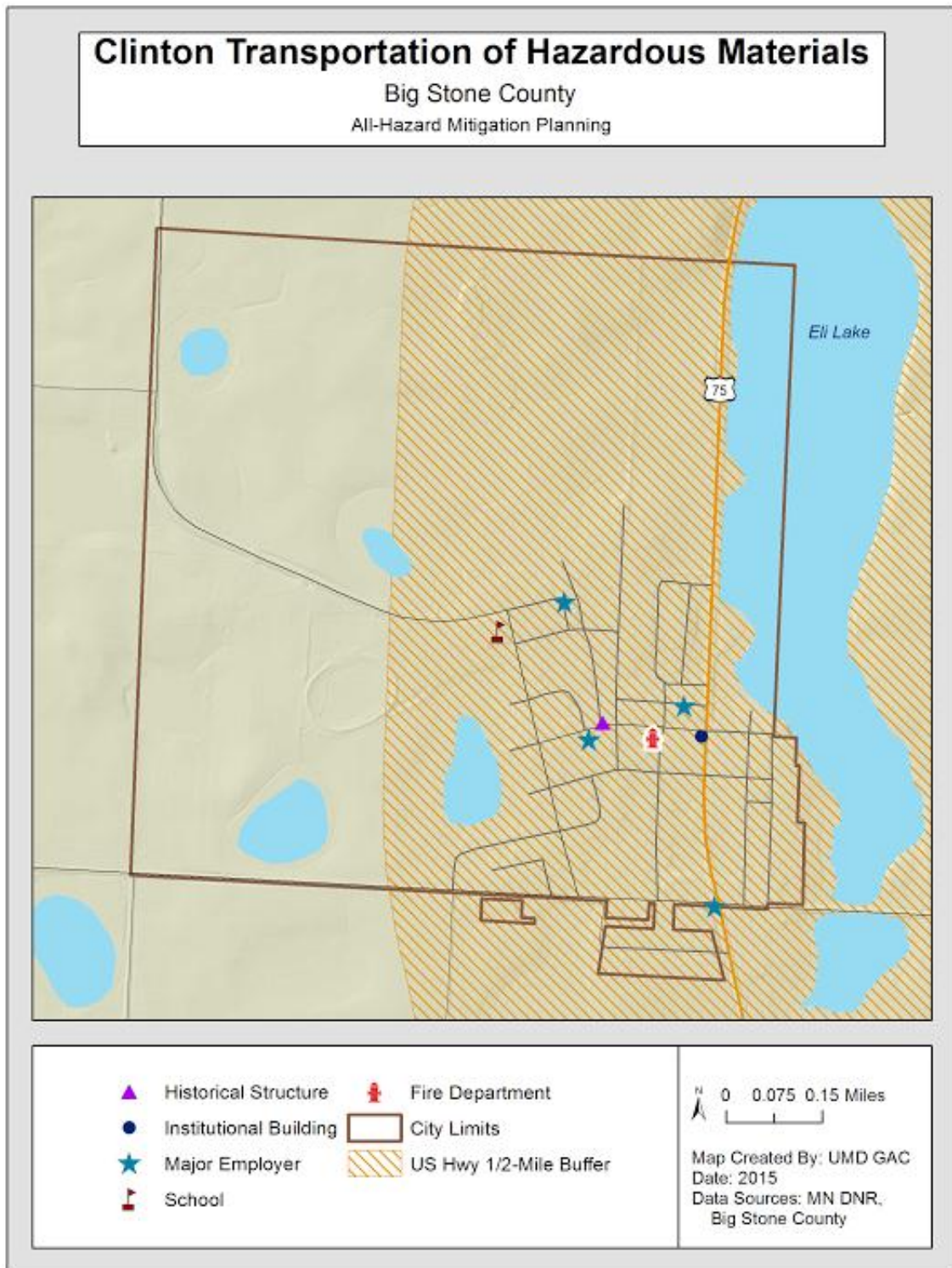




Figure 4.12 Clinton Transportation of Hazardous Materials



## City of Correll, Minnesota

### *Existing Development Trends.*

Correll is Big Stone County's third smallest city with an estimated population of 32 people and 17 households (Minnesota State Demographic Center 2013). Correll's population has declined rapidly since 1960. The most dramatic decrease was between 1980 and 1990, when Correll lost 23 residents. The population is expected to continue to decline. It is important to note, however, that the number of households has not seen quite as dramatic of a decline. There has been an overall loss of ten households since 1960, a loss of only 30 percent compared to a loss of 53 percent of the population since 1960. The average household size in Correll went from 3.06 in 1960 to 1.88 in 2013; this is a loss of slightly more than one person per household. The City of Correll has not completed any annexations or development projects in the past 10 years and its general land use category breakdown exists as the following shown in Table 4.20 below.

**Table 4.20 City of Correll – Land Use Category Allotments**

| Land Use Type | Parcel Count | Percent of Area |
|---------------|--------------|-----------------|
| Residential   | 60           | 60.00%          |
| Commercial    | 15           | 15.00%          |
| Agricultural  | 7            | 7.00%           |
| Industrial    | 1            | 1.00%           |
| Government    | 9            | 9.00%           |
| Religious     | 4            | 4.00%           |
| Total         | 100          | 100.00%         |

Source: Big Stone County Assessor, 2009

### *Potential for Future Growth and Development.*

Most of the land within the city limits is agricultural land and the current focus of the community is to maintain its housing stock with the potential to expand agricultural land in the future. As no future development is expected, there is no increase in vulnerability expected over the next five years, but future vulnerability will be re-evaluated during subsequent plan updates.

Figure 4.13 Correll Land Use

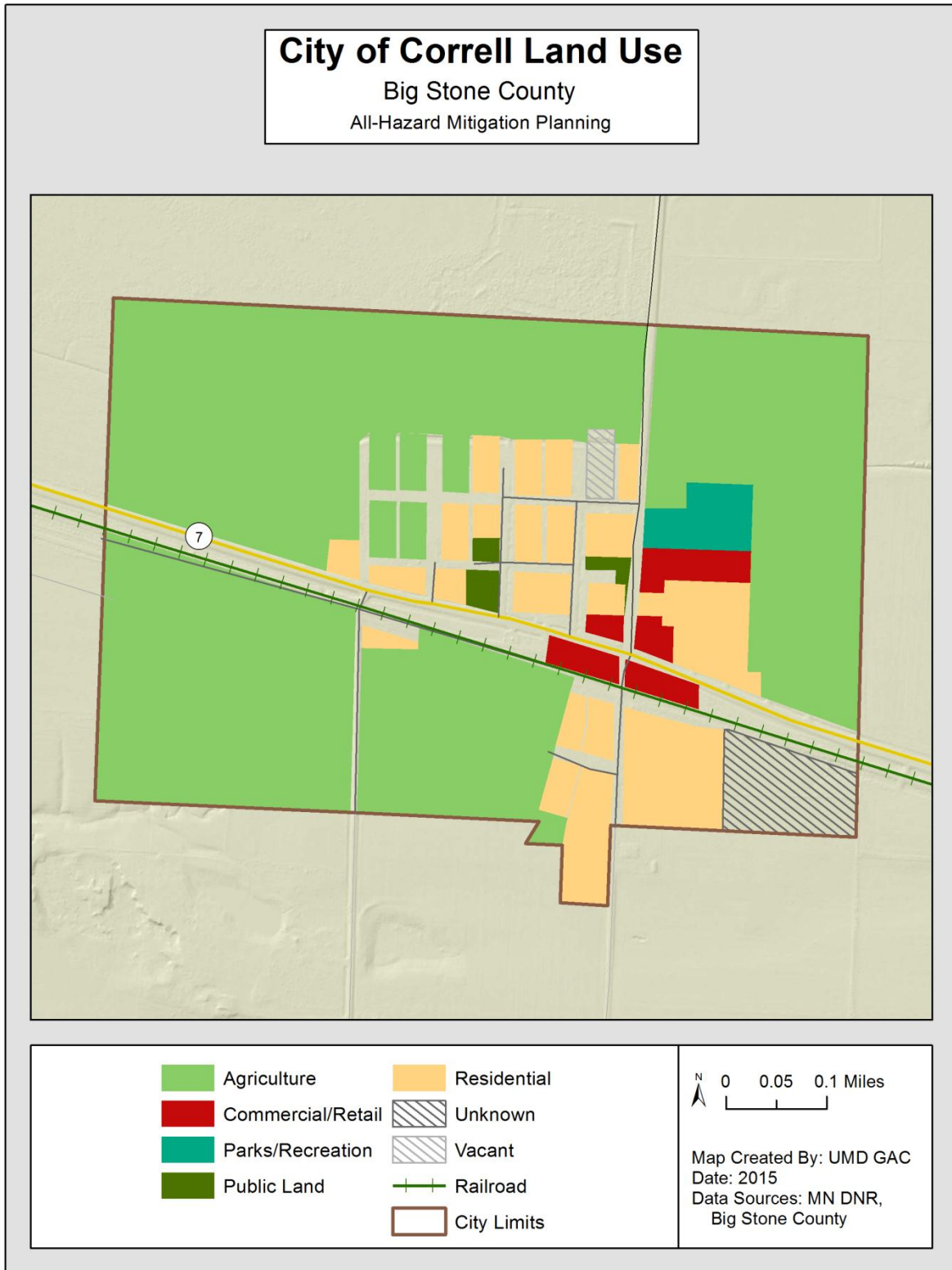


Figure 4.14 Correll Community Assets/Critical Facilities

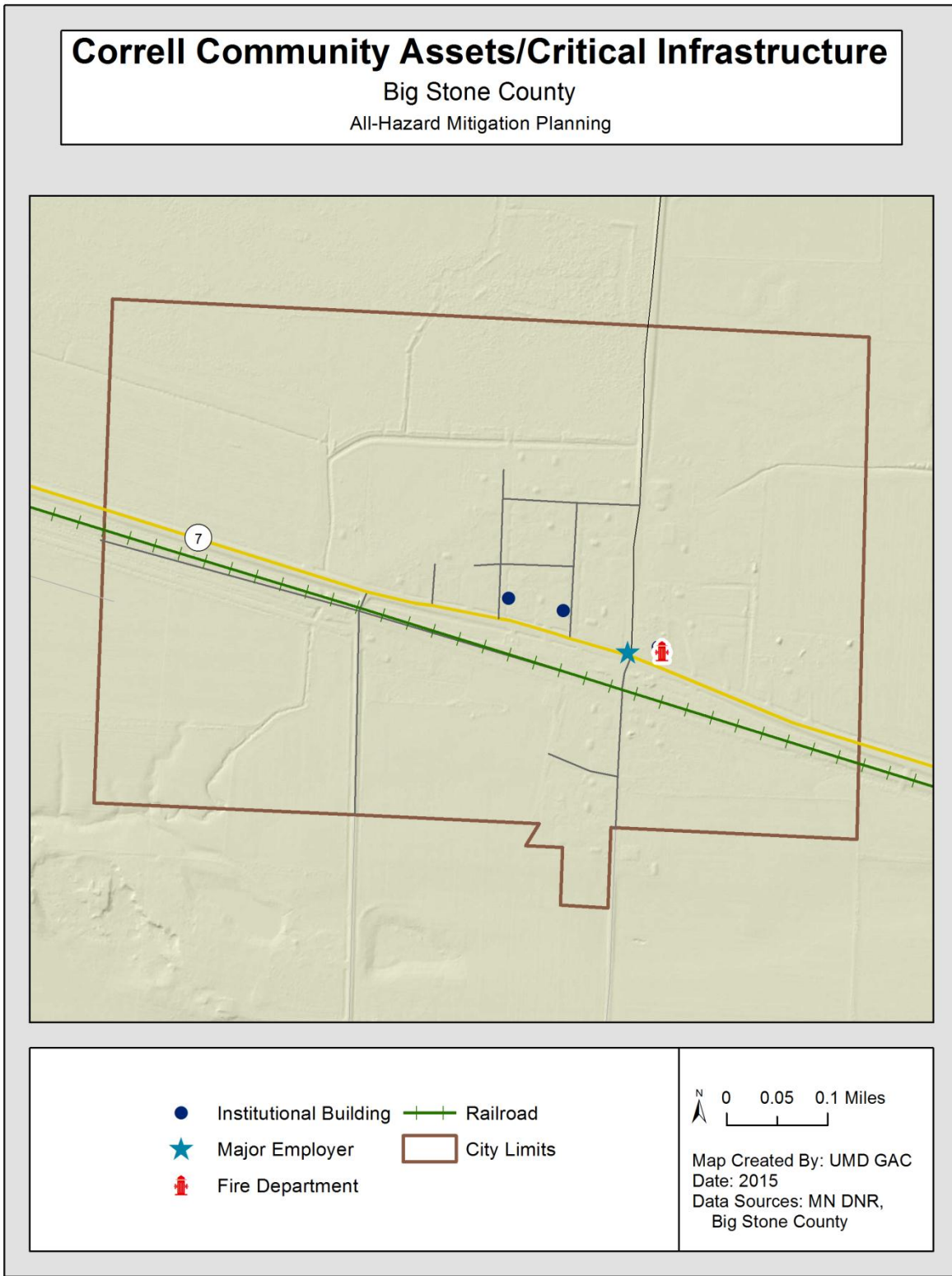




Figure 4.15 Correll Transportation of Hazardous Materials



**City of Graceville, Minnesota**

*Existing Development Trends.*

Graceville’s 2013 estimated population by the Minnesota State Demographic Center is 576, making it the second most populated city in Big Stone County. Graceville has lost nearly 250 residents since 1960; however, the total number of households in Graceville has seen a net increase of 16 households since 1960. The increase in the number of households and decrease in overall population indicates a decrease in overall household size, which is consistent with the general population trends in Big Stone County and rural Minnesota. It is important to note that while the current population trends show decline, Graceville’s location at the intersection of State Highway 28 and U.S. Highway 75, as well as the attraction of East Toqua Lake creates an opportunity for growth that can and could be exploited. In the past 15 years, 13 acres of agricultural land were annexed by the City of Graceville and zoned as residential. As of 2005, eight new homes were built on the newly annexed land. As of 2005, two land use changes occurred in Graceville, from residential to commercial in order to support small business development. One other development project directed by the City took place in 2005. The City developed “Grace Village” a 16-unit assisted living center/nursing home. There is also a new City Shop building on St. Joseph Street next to the water treatment plant. Outside of these projects, no other development ventures have taken place in Graceville. The current land use allotments for the City of Graceville are shown in Table 4.21

**Table 4.21 City of Graceville – Land Use Category Allotments**

| <b>Land Use Type</b> | <b>Parcel Count</b> | <b>Percent of Area</b> |
|----------------------|---------------------|------------------------|
| Residential          | 305                 | 70.44%                 |
| Commercial           | 55                  | 12.70%                 |
| Agricultural         | 8                   | 1.85%                  |
| Government           | 48                  | 11.09%                 |
| Religious/Non-Profit | 7                   | 1.62%                  |
| <b>Total</b>         | <b>433</b>          | <b>100.00%</b>         |

Source: Big Stone County Assessor, 2009

*Potential for Future Growth and Development.*

Graceville’s future growth area for development focuses on residential development. The areas identified are located east of Highway 75 and south of Graceville along the lake. These areas are not located within 100-year floodplains and would not increase the city’s vulnerability in terms of future structures. Currently, one residence and garages/storage sheds are located within the 100-year floodplain. Within defined 100-year floodplains, the City of Graceville will only allow future park development, due to a Floodplain Ordinance passed in 2006.

Figure 4.16 Graceville Land Use

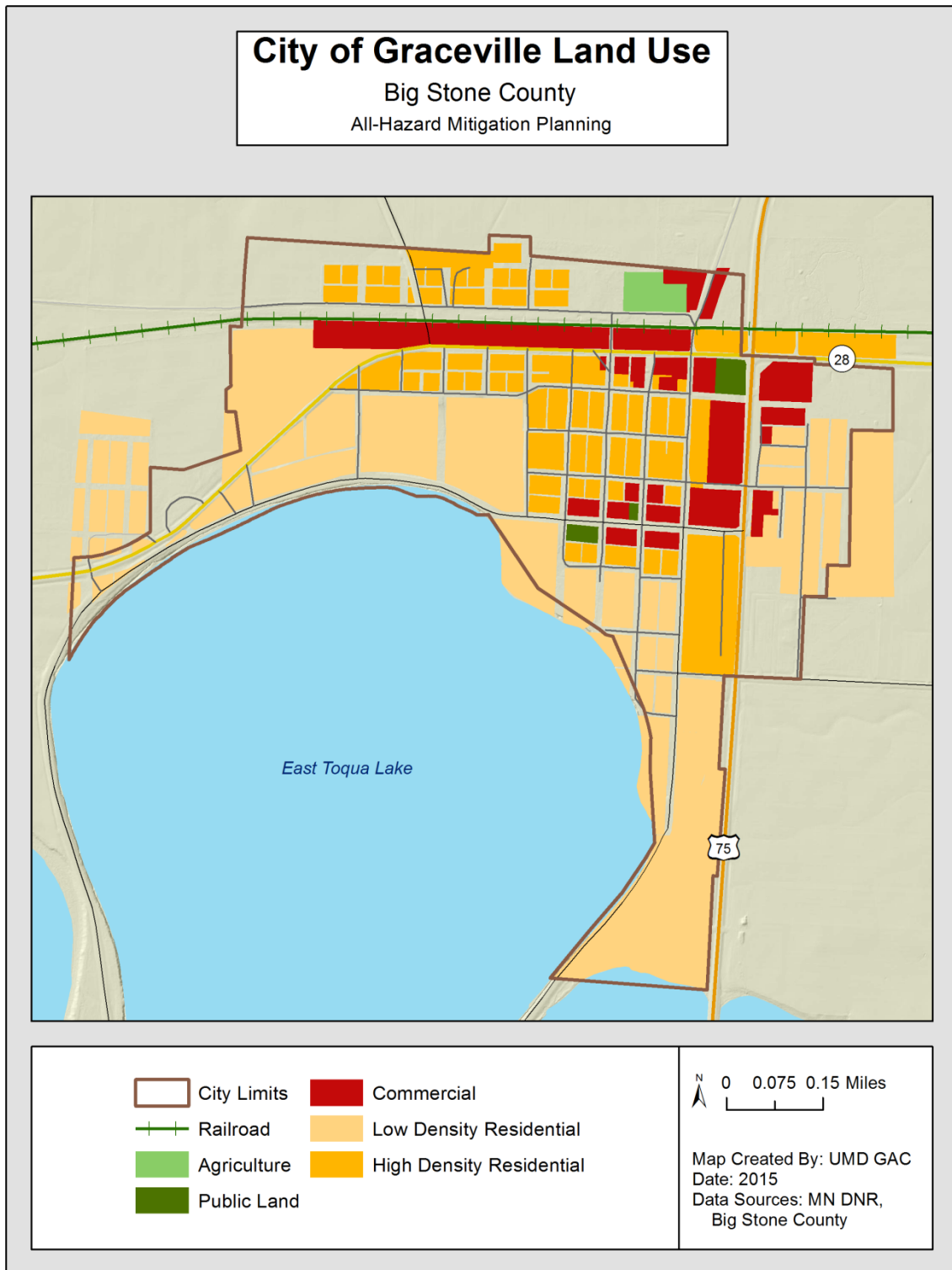


Figure 4.17 Graceville Community Assets/Critical Facilities

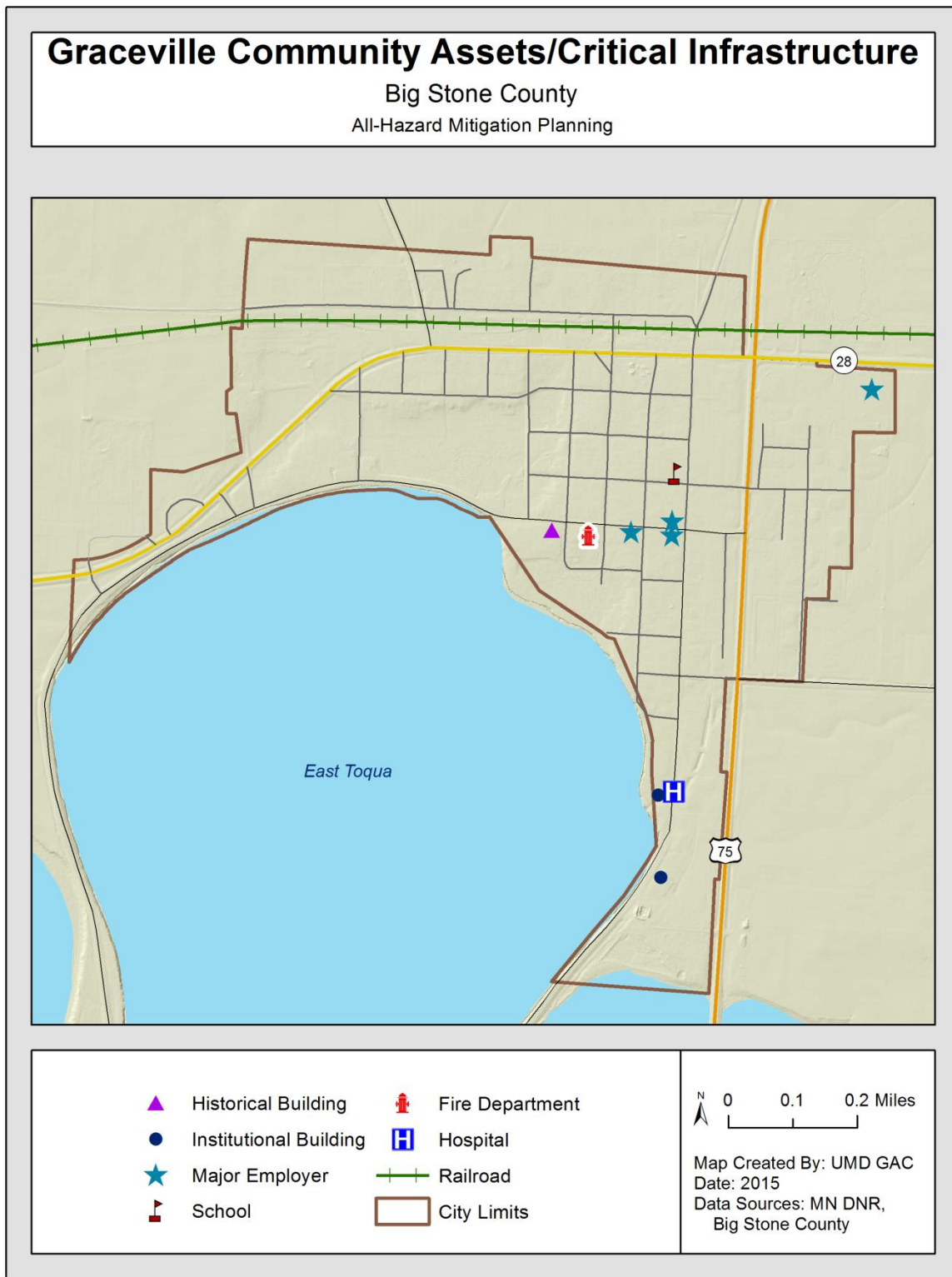
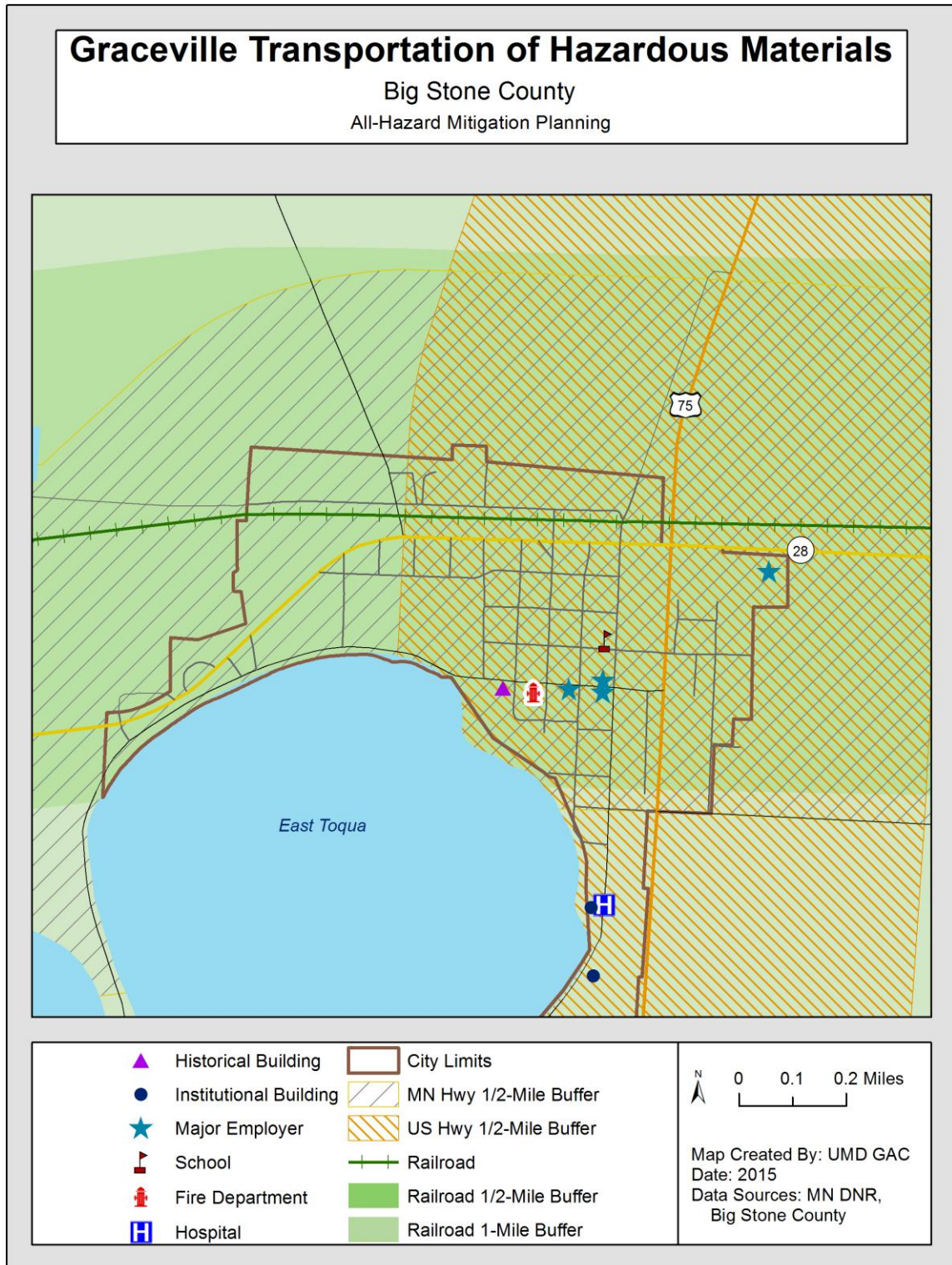




Figure 4.18 Graceville Transportation of Hazardous Materials



## City of Johnson, Minnesota

### *Existing Development Trends.*

The population of Johnson has been generally declining since 1960. The only period of growth since 1960 was in 1980 when Johnson gained four residents. Since 1960, Johnson has lost half its population, going from 64 residents in 1960 to 29 residents in 2013 (Minnesota State Demographic Center 2013). It should be noted that the rate of decline in households is less than that of the population and the decline appears to have leveled off in the 2007 Census estimate. The difference in the rates of decline for population and households indicates fewer persons per household, a trend that is commonly seen throughout Big Stone County and many rural Minnesota communities. While Johnson has not completed any redevelopment projects in the city, the City has removed multiple vacant buildings within city limits. City Hall was removed in 1999-2000 and the Johnson Grain Elevator and storage bins were removed from 2007-2008. The City of Johnson's general land use category breakdown exists as the following shown in Table 4.22 below.

**Table 4.22. City of Johnson – Land Use Category Allotments**

| Land Use Type        | Parcel Count | Percent of Area |
|----------------------|--------------|-----------------|
| Agricultural         | 4            | 7.69%           |
| Residential          | 38           | 73.08%          |
| Government           | 4            | 7.69%           |
| Religious-Non-Profit | 1            | 1.92%           |
| Total                | 37           | 100.00%         |

Source: Big Stone County Assessor, 2009

### *Potential for Future Growth and Development.*

Johnson's future growth area for development is within current city limits. The focus of Johnson is to maintain its current housing stock by sustaining residents and keeping homes updated. As no future development is expected, there is no increase in vulnerability expected over the next five years. Future vulnerability will be re-evaluated during subsequent plan updates.

Figure 4.19 Johnson Land Use



Figure 4.20 Johnson Community Assets/Critical Facilities

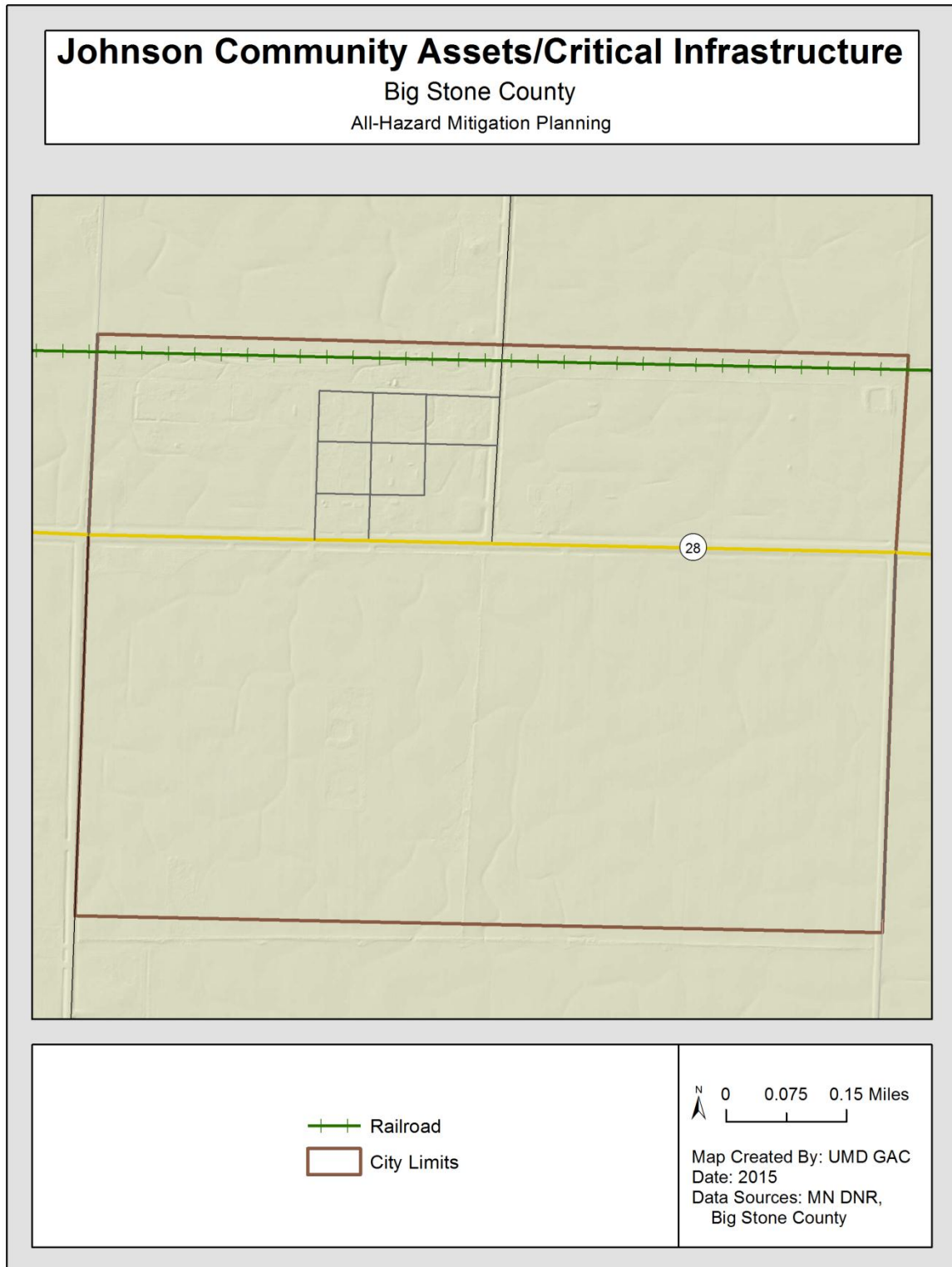
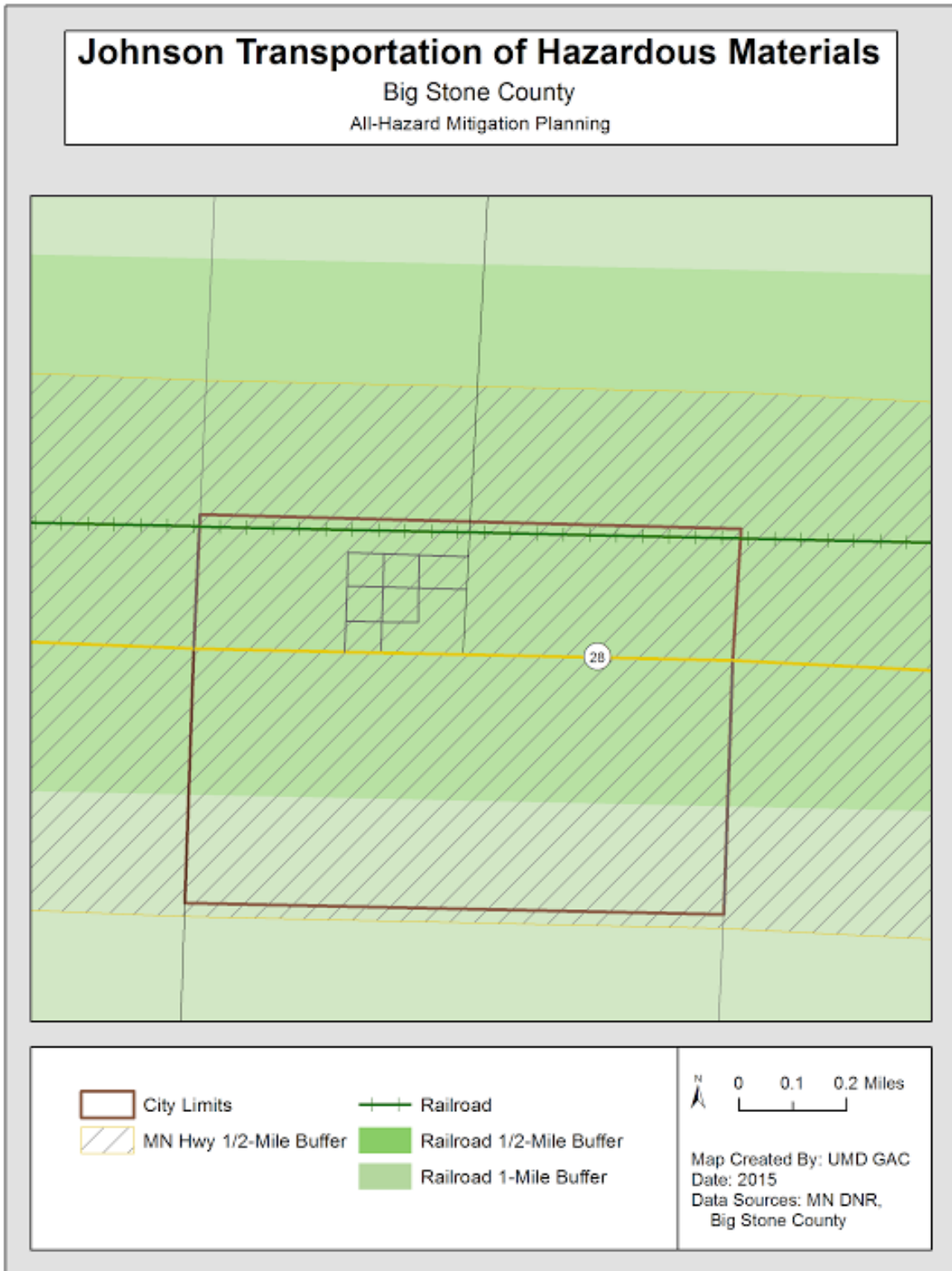


Figure 4.21 Johnson Transportation of Hazardous Materials



## City of Odessa, Minnesota

### *Existing Development Trends.*

In 2007, Odessa had an estimated population of 97. However, in 2013, the estimated population of Odessa increased to 127 (Minnesota State Demographic Center 2013). The 1960s and 1990s showed the most dramatic declines in population losing 40 and 43 residents, respectively. The city saw steady decline in both the number of households and the average household size, until recently. The number of households in the City of Odessa has remained at 55 since 2000. With a population increase, the number of persons per household has increased from 2.05 in 2000 to 2.31 in 2013. While Odessa has not completed extensive redevelopment projects in the city, the City has rezoned land from agriculture to residential. Additionally, in 2010, Odessa built a new fire hall. The City of Odessa's general land use category breakdown exists as the following shown in Table 4.23 below.

**Table 4.23 City of Odessa – Land Use Category Allotments**

| Land Use Type        | Parcel Count | Percent of Area |
|----------------------|--------------|-----------------|
| Agricultural         | 11           | 7.75%           |
| Residential          | 87           | 61.27%          |
| Commercial           | 20           | 14.08%          |
| Government           | 17           | 11.97%          |
| Religious/Non-profit | 6            | 4.23%           |
| Total                | 142          | 100.00%         |

Source: Big Stone County Assessor, 2009

### *Potential for Future Growth and Development.*

Odessa's future growth area for development as identified by Odessa staff is located in the southeast corner and is not located in a 100-year floodplain; therefore future development would not increase City vulnerability. The city intends to focus on residential development and maintain its current housing stock. As no future development is expected, there is no increase in vulnerability expected over the next five years. Future vulnerability will be re-evaluated during subsequent plan updates.



Figure 4.22 Odessa Land Use

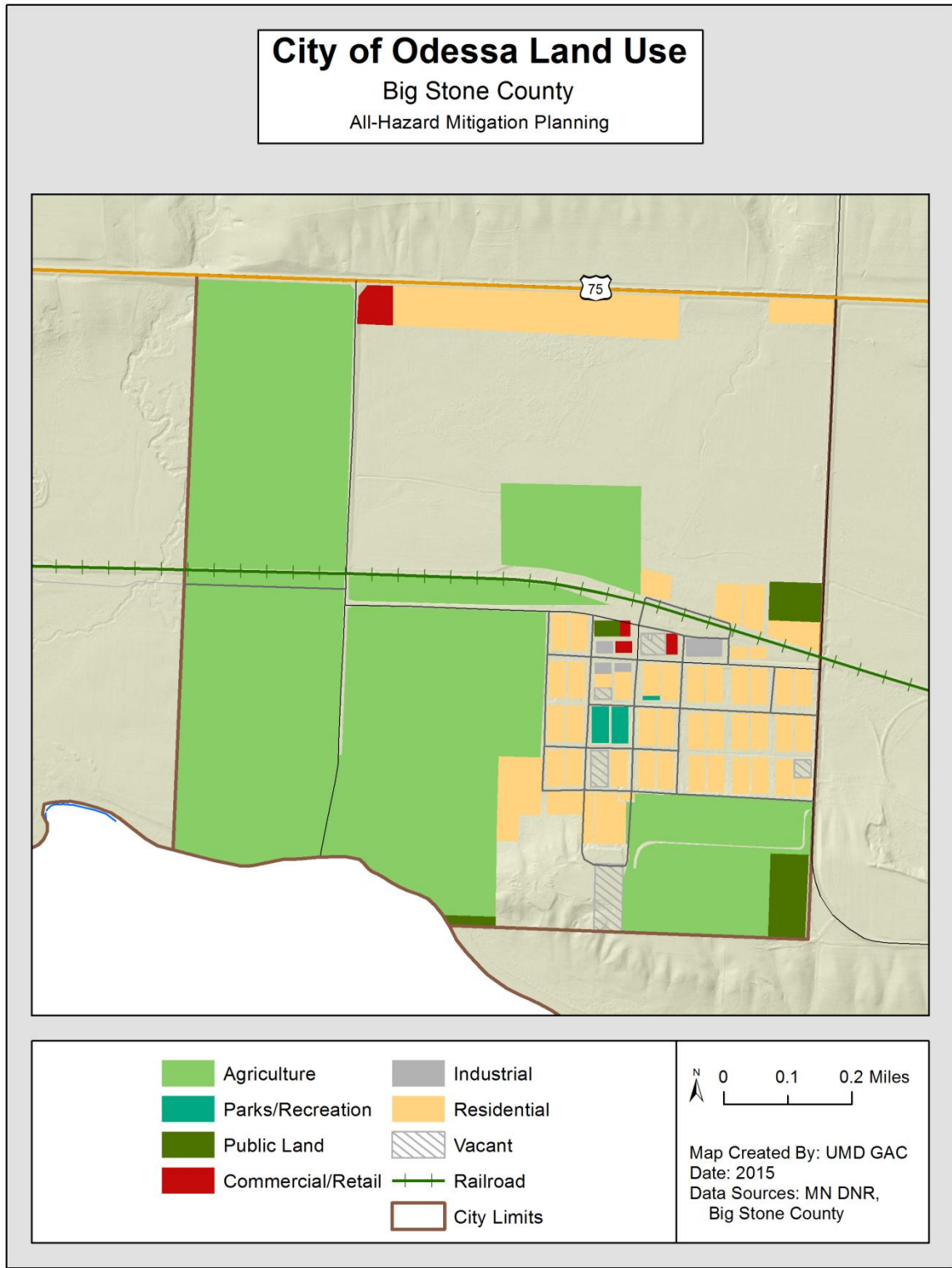


Figure 4.23 Odessa Community Assets/Critical Facilities

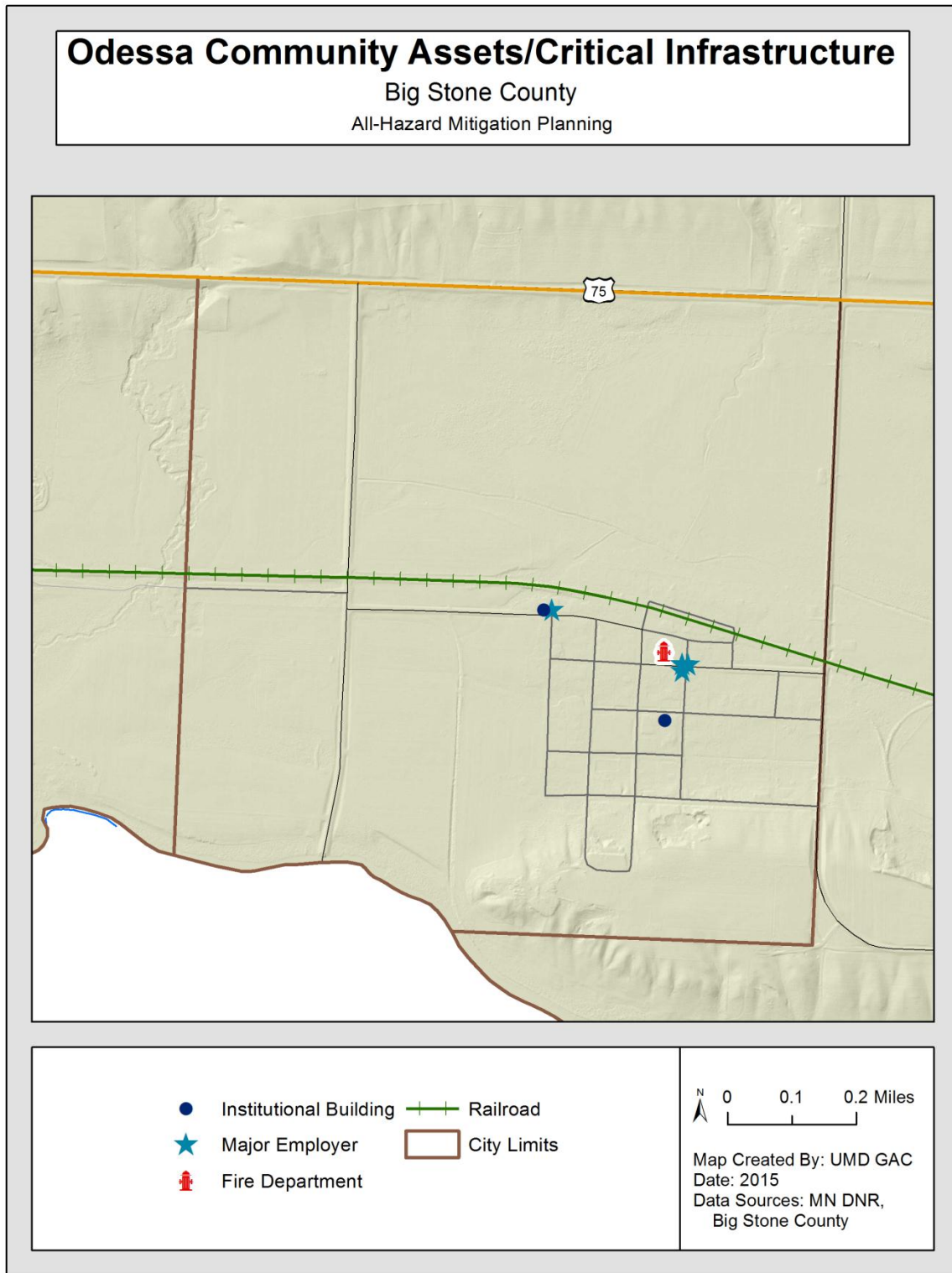
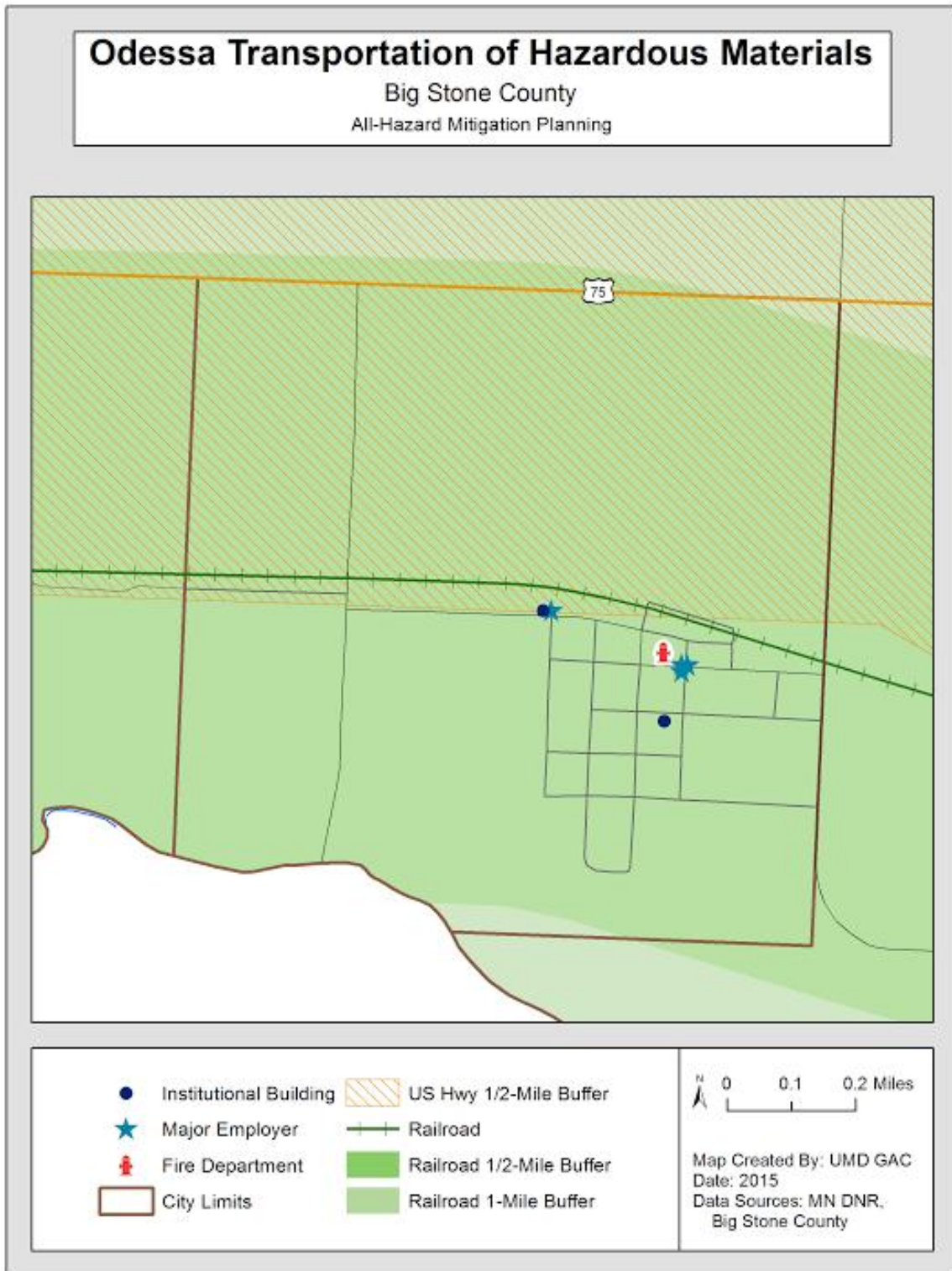




Figure 4.24 Odessa Transportation of Hazardous Materials



## City of Ortonville, Minnesota

### *Existing Development Trends.*

Since 1960, Ortonville's population has seen a steady decline. The biggest drop in population was seen between 1980 and 1990 when the city lost 345 residents. Ortonville's population continued to decrease in recent years. According to population estimates by the Minnesota State Demographic Center, Ortonville had 1,871 residents in 2013. The number of households in Ortonville grew until the 1980 Census after which point the number of households began to decline. Between 2000 and 2013, the number of households decreased 923 to 870. The average household size has seen steady decline in the last half century, which is consistent with other cities in rural and western Minnesota. Ortonville is the economic center of Big Stone County and has many wonderful amenities that would allow for promotion and attraction of new business and residents. Methods of such promotion will be of great concern in the future.

The City of Ortonville undertook a large annexation in 2007 (29.45 acres of agricultural land to residential), in addition to numerous city projects in the past five years. In 2005, the Fairway View Senior Community (Assisted Living Facility) was built with 18 independent room spaces, 8 assisted living rooms, and 6 memory-care rooms. The City has spent funds to acquire tax-forfeited land throughout the city including vacant homes, bare lots, and hotels, in order to gain more tax base and increase the market value of structures. Further, Ortonville offers a portfolio to interested persons highlighting different commercial and residential properties throughout the city primed for redevelopment. These are all infill development opportunities. In August of 2008, the second phase of the Ortonville Area Health Services Hospital began construction and the first phase was completed in December of 2009 and the final phase was completed in September 2010. Ortonville recently annexed land for Strata, a granite mining company. The City of Ortonville's general land use category breakdown exists as the following show in Table 4.24 below.

**Table 4.24 City of Ortonville – Land Use Category Allotments**

| Land Use Type         | Parcel Count | Percent of Area |
|-----------------------|--------------|-----------------|
| Agricultural          | 27           | 1.86%           |
| Residential           | 1,073        | 73.75%          |
| Commercial            | 175          | 12.03%          |
| Industrial            | 7            | 0.48%           |
| Government            | 149          | 10.24%          |
| Religious/Non- Profit | 30           | 2.06%           |
| Total                 | 1,455        | 100.00%         |

Source: Big Stone County Assessor, 2009

### *Potential for Future Growth and Development.*

The City of Ortonville has designated five main areas for future development, along with their desired future land use types. The first is the "Downtown Business District" focusing on commercial, retail, and residential apartments (mixed-use development projects). The second is North of the Ortonville City limits on the shores of Big Stone Lake, zoned for single-family

residential development. The third area focuses on the Golf Course and surrounding area to develop future residential properties and potentially annex additional land for further development. The fourth area is the land located west of the Ortonville Airport, for a mixed-use development, in addition to increased residential and commercial/retail development along U.S. Highway 75. The fifth and final area is at the intersection of U.S. Highway 75/State Highway 7 and U.S. Highway 12 for commercial/retail use and potentially industrial development. None of these areas are within 100-year floodplains or would increase the vulnerability of the City in terms of future development. In addition to these five areas for future development, the City of Ortonville approved the construction of a new Independent/Assisted Living Facility which will be built in 2015. This is a \$19.5 million project that will be attached to the current assisted living facility in Ortonville.

Figure 4.25 Ortonville Land Use

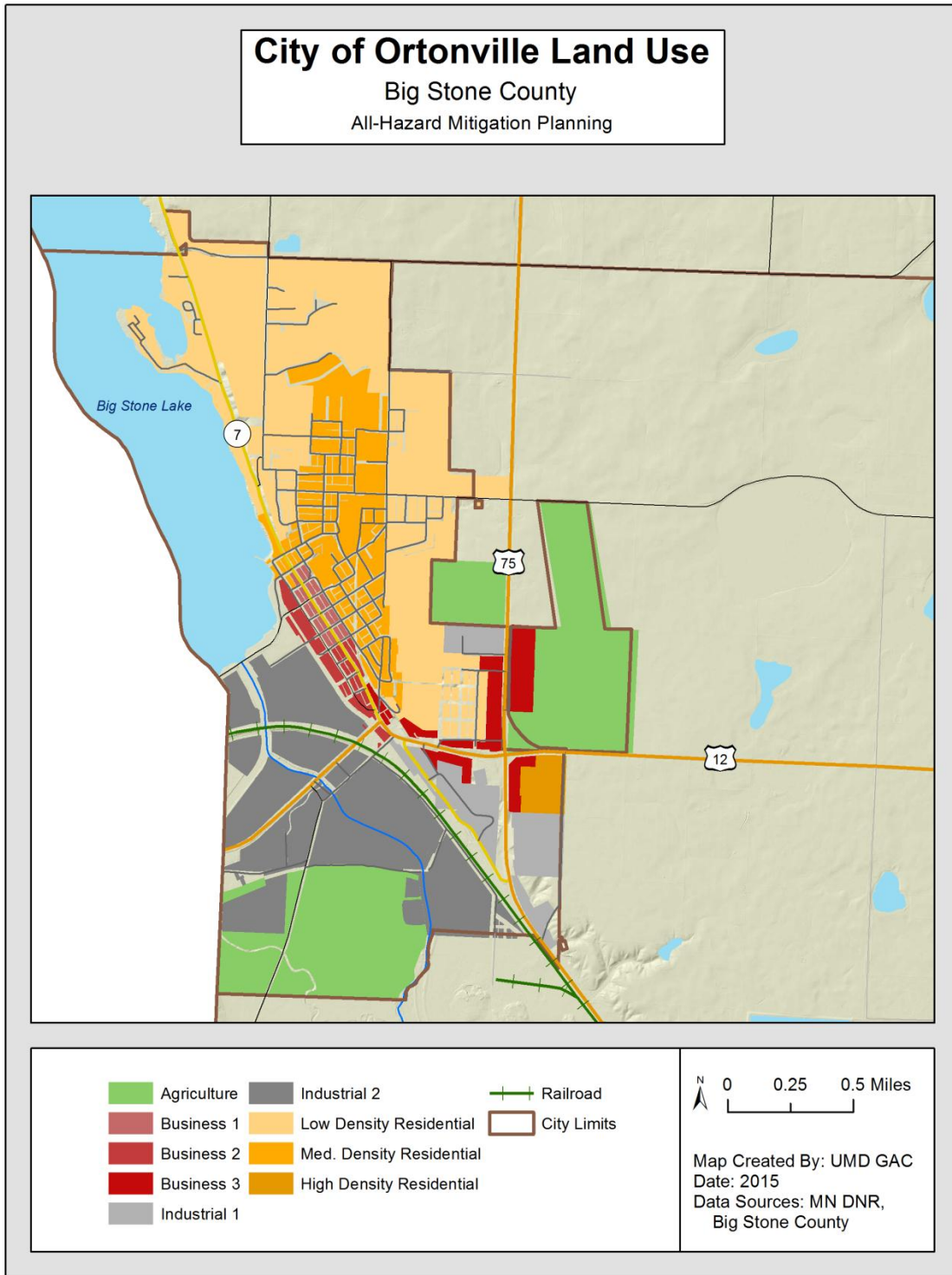


Figure 4.26 Ortonville Community Assets/Critical Facilities

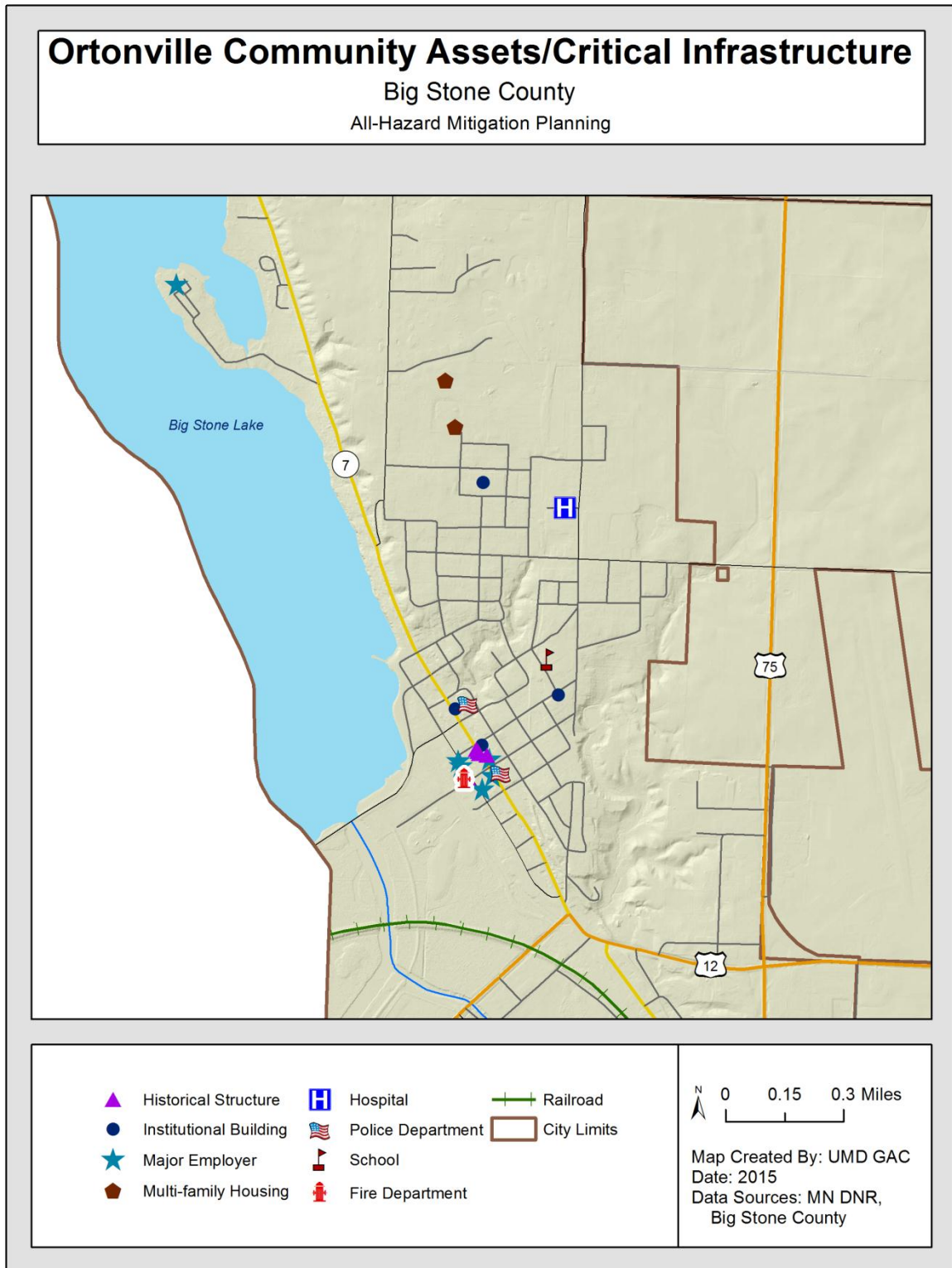
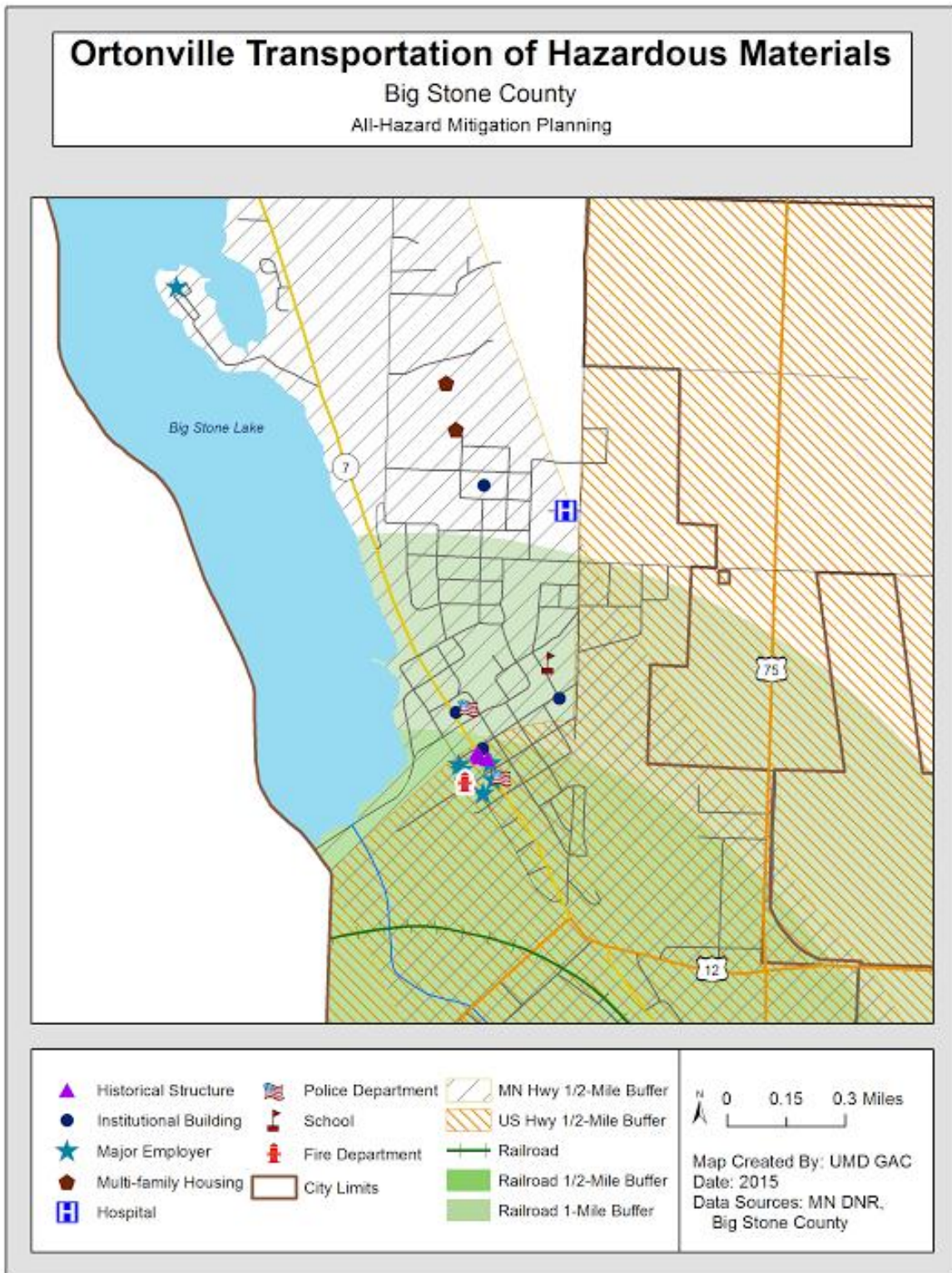




Figure 4.27 Ortonville Transportation of Hazardous Materials



## CHAPTER 5: GOALS, OBJECTIVES, AND STRATEGIES FOR NATURAL HAZARDS

### *OVERVIEW*

The following tables outline the goals, objectives, and mitigation strategies for natural hazards important to Big Stone County. The goals are used as a framework for the objectives and mitigation strategies, which in turn, provide specific information on how mitigation decisions should be made. The goals, objectives, and strategies are based on the issues identified by the Local Task Force and the risk assessment in this plan. The chapter is divided into three sections; completed strategies by Big Stone County and cities, current goals, objectives, and strategies for Big Stone County and cities, and the prioritization of strategies.

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### *DEFINITIONS*

**Goals** are general statements. **Objectives** are action statements and start with an action verb. **Strategies** support the action of the objective.

The **Time Frame** was determined by the task force and the County Emergency Manager as an estimated timeline in which to complete the strategy.

The **Time Frame – Recurring** is a strategy type that does not have a specific length of time. Once the strategy has been completed, the responsible entity will re-start the strategy.

**Responsible Entity** is the entity in charge of initiating and completing the strategy identified. This was determined by the task force and County Emergency Manager as the most likely entity to complete the strategy.

The **Estimated Cost** was an educated guess of the cost of each strategy. Some strategies would not cost extra and were denoted “—”. Some costs were not known and denoted as “unknown”.

The **Funding Partner** is a potential partner for the county/city to obtain funding from in order to complete a strategy.

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### *GENERAL MITIGATION VISION*

“The county will strive to work with surrounding communities and local emergency responders to create and implement a proactive and results-oriented all-hazard mitigation plan that will make the county and region a safer and more sustainable place to live by protecting and enhancing the resources of the county as they relate to hazards that may have an impact in the future.”

## *DEVELOPMENT OF STRATEGIES*

To determine strategies for each hazard identified in the risk assessment (Chapter 4) small group problem-solving techniques were used at the third task force meeting on November 13<sup>th</sup>, 2014. Once the hazards most likely to affect Big Stone County were identified and prioritized, the task force assembled to review these hazards and their rankings and identify strategies to address mitigation for each hazard. Past hazard activities in the county influenced strategy development and strategy ranking (i.e. 1997 and 2001 flooding). In many cases, as the hazards were identified for the inventory, strategies were also discussed, providing a good starting point for the conversation.

The following outlines the plan's strategy development process. 1) Working toward group consensus, each hazard was reviewed individually. 2) Participants offered suggestions and input which stimulated a lively discussion as part of the planning process. All suggestions were considered and recorded by the facilitator. 3) A limited amount of time was set on each hazard by the facilitator to move the group forward. 4) Debate followed before the group was asked to decide if it should be part of the plan – group consensus was needed. 5) The group noted they could not be totally inclusive – some strategies may not even be considered and others may not be feasible.

### **General Criteria**

- |                          |                                    |
|--------------------------|------------------------------------|
| 1. History               | 5. Effectiveness                   |
| 2. Successful Strategies | 6. Building on what already exists |
| 3. Need                  | 7. Legal Authority                 |
| 4. Risks                 | 8. Environmental Impact            |

### **Cost/Benefit Criteria**

- |                        |   |
|------------------------|---|
| 1. Costs/Efficiencies  | 4. Overall Impact                                 |
| 2. Economic Impact     | 5. Resources Needed (Social & Fiscal)             |
| 3. Budget Requirements | 6. Benefits Provided by Project (Social & Fiscal) |

Identifying costs that would be attached to each strategy was the most difficult part of the process. Due to limited time and resources to develop the plan it wasn't feasible to spend a lot of time on estimating the costs. It is critical for the Board to constantly be evaluating the costs as part of implementation and maintenance for the All-Hazard Mitigation Plan. Strategies that dealt with rural areas seemed harder to include in the plan – more costly, harder to regulate, and would need population buy-in. Many strategies are costly, labor intensive, time consuming and it is difficult to identify the lead for the strategy. It was determined that the Emergency Manager will perform a cost-benefit review for all potential future project applications. Participants in the planning process agreed that to implement an ordinance or regulation was not the difficult part of certain strategies – would it be possible and feasible to follow-through? Participants started with strategies that were manageable to see notable progress – “baby steps”. It was reasonable to include strategies that have been started, but not yet completed.



In addition to creating new mitigation strategies for Big Stone County, the Local Task Force analyzed strategies found in the 2010 All-Hazard Mitigation Plan. The process for strategy analysis included two steps: Step 1) Discuss a strategy and determine its “status”, Step 2) Determine why the strategy has that status. Four different “Statuses” were available to assign to a strategy: 1) Completed, 2) Still Feasible 3) Recurring - does not have a specific time length and once the strategy is completed the responsible entity will restart the strategy, and 4) No longer relevant. Once a strategy was assigned a status by the Local Task Force through group consensus, the Local Task Force had to determine **why** it received that status designation. For example, a Flood Strategy that received “not completed – strategy is still feasible” may have not been completed due to fund shortage; however, a jurisdiction may see that flood project as still important to complete in the future.

Following the third Local Task Force meeting, the task force participated in an online survey (located in Appendix 11) to prioritize mitigation strategies. The results of this survey were compared with the prioritized hazard list and the top strategies were pulled out for the top three natural hazards (Violent Storms and Extreme Temperatures, Flooding, and Wildfire). The prioritized strategy list was reviewed, discussed, and verified at the fourth Task Force meeting on May 26<sup>th</sup>, 2015.

*HMPG FUNDED STRATEGIES: BIG STONE COUNTY AND CITIES*

**Table 5.1 BSC & Cities Hazard Mitigation Grant Program Funded Strategies (FEMA-Related)**

| <b>SUBGRANTEE</b> | <b>PROJECT</b>           | <b>FEDERAL SHARE</b> | <b>DR-PROJECT NUMBER</b> | <b>CITY/LOCATION</b>                 | <b>DATE STARTED</b> |
|-------------------|--------------------------|----------------------|--------------------------|--------------------------------------|---------------------|
| Big Stone County  | Overhead Line Conversion | \$2,802,195          | DR-1078                  | Big Stone, Stevens, & Swift Counties | August 1996         |
| City of Clinton   | Living Snow Fence        | \$14,140             | DR-1175.40               | Clinton, MN                          | September 2009      |

Source: MN HSEM Mitigation Database: Appendix L, 2015

COMPLETED STRATEGIES

**Table 5.2 BSC & Cities Completed Strategies in Past 10 Years for Natural Hazards**

| Hazard                                | Strategies  | Responsible Entity  |
|---------------------------------------|---|---|
| Violent Storms & Extreme Temperatures | Worked to find financing for a new ambulance in Ortonville. Purchased a new ambulance in 2006 and a used ambulance in 2009.   | Ortonville  |
| Violent Storms & Extreme Temperatures | Purchased a portable generator for electricity losses for Community Building.   | Graceville  |
| Flood                                 | Adopted Floodplain Ordinances.  | Graceville, Odessa, Ortonville  |
| Flood                                 | Purchased 4 portable water pumps to have on-hand in event of flood.   | Graceville  |
| Flood                                 | Purchased and store 1,000 sandbags in event of flood.   | Graceville  |
| Flood                                 | Completed an Engineering Study that looked at rip-rapping in Central Park and Erosion Control.  | Ortonville  |
| Flood                                 | Determined if existing Regulatory Floodplain Elevation (971) is adequate and adjust accordingly. New dFIRM maps for Big Stone County dated April 2006.  | Big Stone County Zoning   |
| Flood                                 | Built and a purchased a lift station and necessary infrastructure for sewer system.   | Odessa  |
| Flood                                 | Worked to raise the five township roads under water.  | Roads raised and/or rip-rapped in Almond Township (1), Toqua Township (2), Otre Township (1), and Artichoke Township (1). |
| Flood                                 | Monitored and cleared waterways, culverts and ditches. Ortonville Township completed maintenance work on a malfunctioning tile.   | Ortonville Township   |
| Wildfire                              | Created a contract between DNR and local fire departments to organize repose to large wildfires. This contract should address the entities responsible for wildfires on state and federal-owned land. | Correll, Odessa   |
| Wildfire                              | Encouraged DNR to give training locally. Look for funds for training if necessary.  | Beardsley, Correll, Graceville, Odessa, Ortonville  |
| Wildfire                              | Installed a dry hydrant at Otre Lake. Big Stone County currently has 4 active dry hydrants.   | Big Stone County  |

|                             |   |  |
|-----------------------------|---|--|
| Fire                        | Purchased pagers and other needed equipment for local fire departments. | Beardsley, Correll, Graceville, Odessa, Ortonville |
| Water Supply Contamination  | Implemented/Adopted Wellhead Protection Plans.                          | Odessa, Ortonville                                 |
| Water Supply Contamination  | Completed a Water Supply Plan in conjunction with Mn DNR.               | Ortonville   |
| Civil Disturbance/Terrorism | Installed security alarms at Water Treatment Plants/Well houses.        | Johnson, Odessa, Ortonville                        |

GOALS, OBJECTIVES, AND STRATEGIES

**Violent Storms and Extreme Temperatures**

| <b>Goal 1: Provide accessible safe rooms for shelter from violent storms.</b>   |   |                   |                           |                                |                        |
|---|---|-------------------|---------------------------|--------------------------------|------------------------|
| <b>OBJECTIVES</b>   | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b>          | <b>Funding Partner</b> |
| 1. Encourage all new homes without basements to have a safe room where residents may go during violent storms.  | A. Educate homeowners on safe shelters with newspaper or radio announcements or when people apply for building permits.   | Recurring         | All Cities and County     | \$500                          | --                     |
| 2. Require all new manufactured home parks to provide safe room for park residents either through a structure on site or a plan of evacuation to safe shelter off site. | A. Work with the manufactured park in Ortonville to develop a Safe Room Plan. Require that the safe room plan go through the local governing unit each year for review. Through this process, determine a safe room for mobile homes.   | 1 year            | Ortonville                | N/A                            | County                 |
| 3. Ensure that all hospital, school and nursing home facilities have a severe storm plan in place.  | A. The County Emergency Management Director should continue to do periodic visits and review plans annually.  | Recurring         | County EM                 | \$500 per city                 | FEMA                   |
| 4. Ensure that public and open areas have a safe room identified.   | A. Build safe rooms at city, county, and state campgrounds and parks, and other locations of unprotected populations (i.e. schools, manufactured home parks, all recreational parks, religious camps, apartment buildings, nursing homes, medical facilities, etc.) to protect users from violent storms. | Recurring         | All Cities and County     | \$75,000-\$150,000/<br>shelter | FEMA                   |
|   | B. Discuss with City Council to determine whether or not to build a safe room.<br><b>*New Strategy</b>  | 1-2 years         | Clinton                   | Staff Time                     | --                     |
|   | C. Build safe rooms as needed.  | 2-15 years        | All Cities                | \$75,000-\$150,000/<br>shelter | FEMA                   |

## Violent Storms and Extreme Temperatures

| <b>Goal 2: Improve and maintain severe storm warning system for all county residents.</b>                     |  |                   |                                  |                       |                        |
|---|--|-------------------|----------------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>   | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b>        | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Assess adequacy of existing emergency warning sirens.  | A. The County Emergency Management Director should review countywide siren needs and look for funding to provide new/improved warning systems. | Recurring         | County EM                        | --                    | FEMA                   |
| 2. Ensure that all sectors of the county have immediate access to severe weather warnings and weather radios. | A. Educate the public on the use of weather radios.  | Recurring         | County EM                        | \$500                 | FEMA                   |
| 3. Assess adequacy of existing emergency equipment.   | A. The County Emergency Management Director should review emergency equipment needs annually.  | Recurring         | County EM                        | --                    | --                     |
|   | B. Research and obtain funding for implementing cell phone notifications for severe weather events and other hazardous events.                 | 2-5 years         | County Emergency Manager, County | Unknown               | --                     |
| 4. Ensure that roads are kept clear during heavy snow events.<br><br><b>*New Objective</b>                    | A. Build a Living Snow Fence surrounding town.<br><br><b>*New Strategy</b>   | 10 years          | County Engineer, County          | High                  | FEMA                   |

## Violent Storms and Extreme Temperatures

| <b>Goal 3: Protect people and county infrastructure from the impacts of severe weather.</b>             |   |                   |  |                       |                        |
|---|---|-------------------|--|-----------------------|------------------------|
| <b>OBJECTIVES</b>   | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b>                      | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Keep electric lines away from trees.   | A. Work with power companies.                                     | Recurring         | All Cities and County                          | --                    | FEMA                   |
|   | B. Underground burial of power lines.                             | Recurring         | County,<br>All Cities,<br>Minnesota Valley REC | --                    |                        |
| 2. Encourage people to limit travel on state and major county highways when weather conditions warrant. | A. Continue to enforce the current plans and procedures in place. | Recurring         | County Law Enforcement                         | --                    | --                     |

| <b>Goal 4: Provide emergency response to protect people in the event of a severe weather disaster.</b> |  |                   |   |                       |                        |
|--|--|-------------------|---|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b>               | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Ensure that County and City Emergency Operations Plans are kept up-to-date.                         | A. Each community should continue to meet annually with the County Emergency Manager and emergency personnel (Fire, Police, Ambulance – when applicable) to assess the County Emergency Operations Plan. | Recurring         | County Emergency Manager,<br>All Cities | --                    | --                     |

## Flood

| <b>Goal 1: Eliminate nonconforming structures in the identified 100-year floodplain.</b>   |   |                   |   |                       |                        |
|--|---|-------------------|---|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b>                         | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Enforce the current zoning ordinances that provide for the amortization and elimination of existing nonconforming private structures and uses in identified 100-year floodplains. | A. Enforce the County and City Floodplain Ordinance to keep new structures out of floodplains. Review building permits to determine if they want to locate in the floodplain. | Recurring         | County Zoning, Graceville, Ortonville, and Odessa | \$1,000/year          | --                     |
| 2. Protect routinely flooded structures and areas throughout Big Stone County.<br><br><b>*New Objective</b>  | A. Purchase and place two 24-inch culverts under Nursing Home/Assisted Living Center "Link" and Driveway to prevent flooding.<br><br><b>*New Strategy</b>                     | 1-5 years         | Graceville  | \$15,000              | FEMA                   |
|  | B. Flood proof 7 homes.<br><br><b>*New Strategy</b>   | 2-5 years         | Clinton   | Moderate              | FEMA                   |
|  | C. Install twelve new culverts, complete ditching, land excavation, and cleaning of ditches.<br><br><b>*New Strategy</b>  | 5 years           | Johnson   | High                  | FEMA                   |



## Flood

| Goal 2: Minimize the damage from flooding along Big Stone Lake and in Ortonville.                  |  |            |                       |                |                 |
|--|--|------------|-----------------------|----------------|-----------------|
| OBJECTIVES   | STRATEGIES   | Time Frame | Responsible Entity    | Estimated Cost | Funding Partner |
| 1. Determine if existing Regulatory Floodplain Elevation (971) is adequate and adjust accordingly. | A. Work with the DNR to evaluate flood level.  | Recurring  | County Zoning         | \$10,000       | --              |
| 2. Restore the historic Whetstone River channel.   | A. Work with Watershed District to determine the best option for restoration and flood mitigation. | Unknown    | Ortonville and County | \$8,000,000    | --              |

| Goal 3: Minimize the damage from flooding on township roads.                                  |  |            |                               |                         |                 |
|---|--|------------|-------------------------------|-------------------------|-----------------|
| OBJECTIVES  | STRATEGIES   | Time Frame | Responsible Entity            | Estimated Cost          | Funding Partner |
| 1. Assess damage from flood events.   | A. Provide riprap to stabilize roads to prevent repeated flood damage.   | 2-5 years  | County Engineer and Townships | \$500,000               | DNR/FEMA        |
| 2. Raise township roads left under water after the 2009/2010 floods.<br><b>*New Objective</b> | A. Identify roads that continually flood during spring and work to find funding resources to raise or stabilize roads as needed.<br><br><b>*New Strategy</b> | 2-5 years  | County Engineer and Townships | \$500,000 - \$1,000,000 | DNR/FEMA        |
| 3. Keep township roads and fields from flooding.  | A. Monitor and clear waterways, culverts and ditches.  | Recurring  | Townships and County Engineer | Low                     | DNR/FEMA        |

## Flood

| <b>Goal 4: Maintain NFIP Compliance for participating jurisdictions.</b>   |   |   |   |                       |                        |
|--|---|---|---|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>   | <b>Time Frame</b>                               | <b>Responsible Entity</b>                       | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Develop and implement strategies to demonstrate "Continued Compliance". | A. Work with MN DNR to review and update the Floodplain Management Ordinance as required. | Recurring                                       | Graceville, Odessa, Ortonville, County          | --                    | --                     |
|  | B. Work with MN DNR on development applications in identified Flood Prone Areas.          | Recurring                                       | Clinton, Graceville, Odessa, Ortonville, County | --                    | --                     |
|  | C. Encourage property owners in "Flood Prone" areas to purchase flood insurance.          | Recurring                                       | Clinton, Graceville, Odessa, Ortonville, County | --                    | --                     |
|  | D. Discourage zoning variances in Flood Hazard Areas.                                     | Recurring                                       | Graceville, Odessa, Ortonville, County          | --                    | --                     |
|  | <b>*New Goal, Objective, and Strategies</b>   | E. Discourage development in Flood Prone Areas. | Recurring                                       | Clinton               | --                     |

## Erosion

| <b>Goal 1: Minimize property damage and reduce economic impacts of erosion.</b>  |  |                   |   |                       |                        |
|--|--|-------------------|---|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b>               | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| <p>1. Limit the potential loss of property and economic impact from river and ravine erosion, landslides, and slope failure.</p> <p><b>*New Goal, Objectives, and Strategies</b></p> | A. Support demolition and/or relocation of dwellings and infrastructure to prevent loss of property due to erosion, landslides, or slope failure       | Recurring         | County Emergency Manager                | Unknown               | FEMA, MN DNR           |
| <p>2. Prevent possibility of damage from river and ravine erosion, landslides, and slope failure.</p>  | A. Review, update, and enforce zoning ordinances that prohibit building in areas that are susceptible to water erosion, landslides, and slope failure. | 1-2 years         | County, All Cities                      | --                    | --                     |
| <p>3. Educate the public on possible effects of erosion, landslides, and slope failure.</p>  | A. Increase public awareness and knowledge on erosion landslides, and slope failure, targeting individuals and businesses located in high risk areas.  | Recurring         | County Emergency Manager, County Zoning | --                    | --                     |

## Drought

| <b>Goal 1: Monitor the county's ground water supplies and demands.</b> |   |                      |                           |                       |                        |
|--|---|----------------------|---------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>   | <b>Time Frame</b>    | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Establish a comprehensive and ongoing water monitoring program.     | A. Continue to monitor aquifer levels and water quality. Work with DNR to ensure that permitted water use is not depleting water resources in Big Stone Lake and other lakes. | Recurring (annually) | SWCD                      | --                    | MnDNR                  |
| 2. Support conservation.   | A. Continue to support conservation programs in the county that conserve water and decrease the moisture in the soil.   | Recurring            | County SWCD, RCS          | --                    | --                     |
|  | B. Establish an ordinance for water use restrictions in times of drought.<br><br><b>*New Strategy</b>   | 1-3 years            | All Cities, County Zoning | --                    | --                     |

## Wildfire

| <b>Goal 1: Prevent Wildfires</b>   |  |                   |   |                       |                        |
|--|--|-------------------|---|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b>                           | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Minimize the amount of fuel in areas prone to fire damage.                            | A. Encourage carefully controlled burns. FSA allows controlled burns on CREP and CRP. The FSA offers cost share for controlled burns on CREP and CRP land. Encourage landowner responsibility. | Recurring         | FSA, SWCD, DNR, USFWS                               | --                    | --                     |
| 2. Minimize wildfire risks within Big Stone State Park and the National Wildlife Refuge. | A. Work with the U.S. Fish and Wildlife Service to minimize wildfire risks.  | Recurring         | USFWS, DNR  | --                    | --                     |
| 3. Provide education to the public about wildfire prevention.                            | A. Work with the FSA office to provide education to landowners. Some landowners may not realize that burning is allowed and beneficial.  | Recurring         | FSA, Local Fire Departments, County Law Enforcement |                       | --                     |

## Wildfire

| <b>Goal 2: Minimize structure loss from wildfire and protect the safety of residents and firefighters.</b>                  |  |                   |   |                       |                        |
|---|--|-------------------|---|-----------------------|------------------------|
| <b>OBJECTIVES</b>   | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b>                 | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Provide education to the public about wildfire prevention.   | A. Work with neighborhood associations and provide materials to the public on property maintenance.  | Recurring         | County, All City Fire Departments         | \$5,000               | --                     |
| 2. Minimize impact of wildfire in residential areas by creating firebreaks between structures and areas with wildfire fuel. | A. Educate the public about firebreaks. FSA allows firebreaks (tilled or mowed strips) on CREP and CRP land – acreage used for firebreaks can be included in CRP. Provide resources to landowners who may not have equipment to create firebreaks. | Recurring         | FSA, Local Fire Departments, County Board | Low                   | --                     |
| 3. Promote training programs between the DNR and local firefighters.  | A. Encourage DNR to give training locally. Look for funds for training if necessary.   | Recurring         | Local Fire Departments & County EM        | --                    | --                     |
| 4. Increase access to equipment suitable to fighting wildfires.   | A. Do an inventory of equipment available and keep up-to-date list of equipment needed for local fire departments. Look for grants for additional equipment if necessary.  | Recurring         | Local Fire Departments & DNR              | --                    | --                     |
| 5. Install dry hydrants in suitable areas.  | A. Identify locations for dry hydrants and install as needed and as funding is available.  | 2-5 years         | Local Fire Departments & DNR              | --                    | MnDNR/<br>FEMA         |

## Dam Failure

| <b>Goal 1: Prevent structure from cracking or breaking.</b>        |   |                   |                           |                       |                        |
|--|---|-------------------|---------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>                                     | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Ensure dam construction is maintained and functioning properly. | A. Coordinate dam inspections with the DNR and UMRWD. | Recurring         | County, DNR, UMRWD        | --                    | MnDNR                  |

| <b>Goal 2: Provide safety to residents</b>         |  |                   |                           |                       |                        |
|--|--|-------------------|---------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>                                  | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Warn residents of danger if dam failure occurs. | A. Monitor water levels of the reservoir and gauge water capacity. Ensure that emergency plans for dam failures are annually updated. Encourage UMRWD to work with local agencies to keep plans current. | Recurring         | UMRWD                     | --                    | --                     |

### *NATIONAL FLOOD INSURANCE PROGRAM (NFIP)*

The National Flood Insurance Program (NFIP) is a program regulated by the Federal Emergency Management Agency (FEMA). The NFIP provides maps for local floodplain management in an effort to reduce federal expenditures due to flood events throughout the nation. The NFIP is also the primary source for flood insurance for flood-properties and those located in 100 and 500-year floodplains. The NFIP has three basic requirements: floodplain identification and mapping, floodplain management, and the purchasing of flood insurance. Floodplains are found in four cities within Big Stone County. Currently, all four jurisdictions and the County actively participate in the NFIP. Graceville, Odessa, Ortonville, and Big Stone County all have Floodplain Management Ordinances in effect. The City of Clinton also participates in the program, but they have No Special Flood Hazard Areas identified in the community. Four communities, Barry, Beardsley, Correll, and Johnson do not participate in the program as they do not have Special Flood Hazard Areas. The NFIP participation from the initial Big Stone County All-Hazard Mitigation Plan has not changed in the past five years. Table 5.4 identifies NFIP participation, dates of Initial Flood Insurance Rate Maps (FIRM), current effectiveness of map dates, and Emergency Dates if applicable.

**Table 5.4 BSC & Cities NFIP Participation**

| <b>Jurisdiction</b> | <b>NFIP Status</b>       | <b>Initial FIRM Identified</b> | <b>Current Effective Map Date</b> | <b>Emergency Date</b> |
|---------------------|--------------------------|--------------------------------|-----------------------------------|-----------------------|
| Barry               | <b>Not Participating</b> | no data                        | No Special Flood Hazard Areas     | no data               |
| Beardsley           | <b>Not Participating</b> | no data                        | No Special Flood Hazard Areas     | no data               |
| Clinton             | <b>Participating</b>     | <b>4/17/2006</b>               | No Special Flood Hazard Areas     | <b>4/17/2006</b>      |
| Correll             | <b>Not Participating</b> | no data                        | No Special Flood Hazard Areas     | no data               |
| Graceville          | <b>Participating</b>     | <b>4/17/2006</b>               | <b>4/17/2006</b>                  | <b>4/14/2006</b>      |
| Johnson             | <b>Not Participating</b> | no data                        | No Special Flood Hazard Areas     | no data               |
| Odessa              | <b>Participating</b>     | <b>4/17/2006</b>               | <b>4/17/2006</b>                  | <b>1/3/1985</b>       |
| Ortonville          | <b>Participating</b>     | <b>2/19/1986</b>               | <b>4/17/2006</b>                  | <b>2/19/1986</b>      |
| Big Stone County    | <b>Participating</b>     | <b>6/17/1986</b>               | <b>4/17/2006</b>                  | <b>6/17/1986</b>      |

Source: MN DNR 2015



Table 5.5 provides FEMA's NFIP Insurance Report for Odessa, Ortonville, and Big Stone County. Information attained in this report identifies total insurance premium amounts, number of existing policies, total insurance coverage, and total claims and amounts paid to each jurisdiction since 1978.

**Table 5.5 FEMA NFIP Insurance Report**

| Jurisdiction     | Total Premium   | Number of Policies | Total Coverage     | Total Claims Since 1978 | Total Paid Since 1978 |
|------------------|-----------------|--------------------|--------------------|-------------------------|-----------------------|
| Graceville       | \$4,350         | 4                  | \$360,800          | NA                      | NA                    |
| Odessa           | \$1,362         | 4                  | \$633,000          | 3                       | \$2,657               |
| Ortonville       | \$20,989        | 24                 | \$3,062,800        | 40                      | \$384,338             |
| Big Stone County | \$18,465        | 30                 | \$4,800,900        | 44                      | \$498,981             |
| <b>TOTAL</b>     | <b>\$28,757</b> | <b>50</b>          | <b>\$7,637,900</b> | <b>87</b>               | <b>\$537,847</b>      |

Source: FEMA Policy & Claim Statistics for Flood Insurance, 2015

### **NFIP Continued Compliance**

FEMA mandates that all communities participating in the NFIP must identify continued compliance with the program. Following are descriptions of Clinton, Graceville, Odessa, Ortonville, and Big Stone County processes for continued compliance.

#### *Clinton*

Clinton does not have any designated Special Flood Hazard Areas. However, there is one main area considered “flood-prone” as determined by city staff. This area contains seven residential properties that are likely to need flood proofing measures or sandbagging efforts to prevent flooding from occurring. This is in addition to the nursing home, which is at constant risk of flooding. Clinton is committed to working with the MN DNR and FEMA to analyze the “flood-prone” area and determine if they should be considered Flood Hazard Areas. Below are three strategies that Clinton intends to complete as methods to continue compliance with National Flood Insurance Program.

#### *Strategies to Continue NFIP Compliance:*

1. Work with the MN DNR on development applications in identified Flood Prone Areas.
2. Discourage development in “flood-prone” areas.
3. Encourage property owners to purchase flood insurance.

#### *Graceville*

The City of Graceville utilizes digital FIRM maps dated April 17, 2006, to illustrate the location of 100 and 500-year floodplain boundaries within municipal limits. In order to prevent development in the 100-year floodplain, Graceville passed a Floodplain Management Ordinance in March of 2006. The process that Graceville uses to monitor potential development in the floodplain is through tracking building permits and ensuring that all residents, whether within the 100-year

floodplain or not, have their basement or bottom floor above the 1,099 foot elevation level. The high water mark for Graceville was 1,097 feet in 1997 and any person that proposes a building must know the elevation of the bottom floor or take steps to increase the elevation level by adding fill. Further, a person must obtain a certificate of elevation to prove the new elevation of the structure, produced by a Minnesota licensed surveyor. As of 2010, no building permits have been requested for properties within the 100-year floodplain.

The City of Graceville intends to complete the following as methods to continue compliance with National Flood Insurance Program.

*Strategies to Continue NFIP Compliance:*

1. Work with the MN DNR to review and update the Floodplain Management Ordinance as required.
2. Work with the MN DNR on all development applications in identified Flood Hazard Areas.
3. Discourage zoning variances in Flood Hazard Areas.
4. Encourage all property owners in Flood Hazard Areas to purchase flood insurance.

### *Odessa*

The City of Odessa also utilizes digital FIRM maps dated April 17, 2006, to illustrate the location of 100 and 500-year floodplain boundaries within municipal limits. In order to prevent development in the 100-year floodplain, Odessa passed a Floodplain Management Ordinance in March of 2006. The process that Odessa uses to monitor potential development in the floodplain is through tracking building permits. If a permit application is received by an applicant, the applicant must provide information for the Zoning Administrator to determine whether they are within the General Floodplain District. This information includes a valley cross-section showing the channel of the stream, elevation of land areas, and cross-sectional areas to be occupied by the proposed development, a surface view plan showing elevations of the ground, structure, fill, and size/location and spatial arrangement of all proposed and existing structures on site. Further, the applicant must provide photographs of existing land uses, vegetation upstream and downstream, soil types, and a profile showing the slope of the bottom of the channel for at least 500 feet in either direction of the proposed development. The applicant must also submit this information to a designated engineer or expert and have them provide a technical evaluation. This information would be presented to the City Council who could accept the evaluation, submit the documents to FEMA or the MnDNR for review and comment. Below are four strategies that the City of Odessa intends to complete as methods to continue compliance with National Flood Insurance Program.

*Strategies to Continue NFIP Compliance:*

1. Work with the MN DNR to review and update the Floodplain Management Ordinance as required.
2. Work with the MN DNR on all development applications in identified Flood Hazard Areas.
3. Discourage zoning variances in Flood Hazard Areas.

4. Encourage all property owners in Flood Hazard Areas to purchase flood insurance.

### *Ortonville*

The City of Ortonville utilizes digital FIRM maps dated April 17, 2006, to illustrate the location of 100 and 500-year floodplain boundaries within municipal limits. In order to prevent development in the 100-year floodplain, Ortonville passed a Floodplain Management Ordinance in September of 1989. The process that Ortonville uses to monitor potential development in the floodplain is also through tracking building permits. An applicant must fill out a building applicant and the building official/zoning official will review the application to determine whether the property in question is located within a floodplain. Pending a building permit review and investigation the building official/zoning official will make a recommendation to the City Council. Below are four strategies that the City of Ortonville intends to complete as methods to continue compliance with National Flood Insurance Program.

#### *Strategies to Continue NFIP Compliance:*

1. Work with the MN DNR to review and update the Floodplain Management Ordinance as required.
2. Work with the MN DNR on all development applications in identified Flood Hazard Areas.
3. Discourage zoning variances in Flood Hazard Areas.
4. Encourage all property owners in Flood Hazard Areas to purchase flood insurance.

### *Big Stone County*

Big Stone County utilizes digital FIRM maps dated April 17, 2006 to illustrate the location of 100 and 500-year floodplain boundaries within the unincorporated areas of the county. To prevent future development in the 100-year floodplain, Big Stone County passed a Floodplain Management Ordinance on March 7, 2006 that is actively updated as the MN DNR instructs. The permitting process for properties in the floodplain is very dependent on elevations in Big Stone County. The building permit application has a section devoted to the floodplain and a person must fill out that section that specifies elevation levels of the property. If a person does not know whether a property is in the floodplain, the Zoning Administrator will make a determination and have the person fill out the floodplain section of the permit. The Zoning Administrator reviews the entire building application and allows development if the applicant uses specific filling technique and fill to raise the elevation of the property to meet the Floodplain Ordinance guidelines. Once the project is complete, Big Stone County requires a Certificate of Elevation to determine the new elevation, which must be completed by a Minnesota licensed surveyor on FEMA floodplain forms. Once the Certificate of Elevation is received and approved, Big Stone County completes a Certificate of Occupancy and presents it to the applicant. In addition to a Floodplain Management Ordinance, Big Stone County prepared the Big Stone County Plan that identifies flood-related strategies such as creating an incentive to establish buffers in priority area. Below are four strategies that Big Stone County has committed to in order to continue with NFIP compliance.

*Strategies to Continue NFIP Compliance:*

1. Work with the MN DNR to review and update the Floodplain Management Ordinance as required.
2. Work with the MN DNR on all development applications in identified Flood Hazard Areas.
3. Discourage zoning variances in Flood Hazard Areas.
4. Encourage all property owners in Flood Hazard Areas to purchase flood insurance.

### **Repetitive Loss Structures**

Repetitive loss structures are those structures which have sustained damages on two separate occasions of at least \$1,000 each have been paid under the National Flood Insurance Program (NFIP) within a ten-year time span for which the cost of repairs at the time of the flood meets or exceeds 25 percent of the market value of the structure before the damage occurred. Currently, within Big Stone County, there is 1 repetitive loss structure located in Ortonville, Minnesota. The address, ownership and location of the repetitive loss structure has been identified by the Big Stone County Environmental Services Department, although their specific location will not be identified in this plan.

The general land use trend within the repetitive loss property area is a combination of residential properties and parks/green space in Ortonville. Approximately 46 residential properties and four businesses are located nearby the repetitive loss structure. Unique natural features found in the 100-year floodplain in Ortonville include approximately 500 acres of wetlands and Big Stone Lake. Ortonville has a Floodplain Ordinance that prohibits future development opportunities within the 100-year floodplain.

## *PRIORITIZING STRATEGIES*

Members of the Big Stone County Hazard Mitigation Task Force completed an online/print survey in order to indicate which strategies they felt were the most important in each hazard category. Using these survey results, the Emergency Manager and RDC staff created a preliminary “Prioritized Hazards List” for natural hazards. At the fourth Task Force Meeting in Clinton on May 21<sup>st</sup>, 2015, the Local Task Force solidified their priorities by discussing the strategies that were included on the list, and those that were not. Strategies that were a high priority for the Local Task Force contained mitigation measures for violent storms and extreme temperatures, drought, erosion, flooding, and wildfire. Based on the “Hazard Priority Levels” in chapter 4, all of these hazards were determined to be low or moderate hazards in Big Stone County. Any steps taken to minimize the impacts of these types of disasters could prevent a sizeable amount of damage and save lives.

The Local Task Force and the Big Stone County Emergency Manager used the following criteria to prioritize strategies according to need and feasibility. Although some hazards may be a high risk for the county, it did not guarantee a strategy addressing said hazard would also rank high or take priority.

- Current strategies – Could a current strategy be supplemented or enhanced?
- Costs – What is affordable at this time? Are there current funds addressing the hazard or strategy? Does it make sense to delay or does it only postpone higher costs and create other costs? Will it ever be affordable?
- Available resources – At this time, what funds are available? Will there be additional funds in the future? Are there other projects that take a higher priority?
- Length of project – Some projects could be addressed quickly and require minimal investment in time even though it may be fiscally costly.
- Compatibility with other plans – Is the project a high priority in other plans? Could the project be addressed collaboratively for efficiencies in resources? Would there be unnecessary duplication?
- Available information – Can a good decision be made with the current information? Is more research needed or does it make sense to wait for a current study or development for more information before making a decision?
- Impact – Some hazards can be impacted more by mitigation than others (i.e. using strategies to reduce flooding rather than strategies to reduce tornadoes).

**Table 5.6 BSC Prioritized Strategies (Natural Hazards)**

| <b>Ranked</b> | <b>Hazard</b>                         | <b>Strategy</b>  | <b>Affected Participating Jurisdiction</b>     |
|---------------|---------------------------------------|--|--|
| 1             | Violent storms & Extreme Temperatures | Underground burial of power lines.   | County,<br>All Cities,<br>Minnesota Valley REC |
| 1             | Violent storms & Extreme Temperatures | Build safe rooms at city, county, and state campgrounds and parks, and other locations of unprotected populations (i.e. schools, manufactured home parks, all recreational parks, religious camps, apartment buildings, nursing homes, medical facilities, etc.) to protect users from violent storms. | All Cities and County                          |
| 1             | Violent storms & Extreme Temperatures | Research and obtain funding for implementing cell phone notifications for severe weather events and other hazardous events.  | County Emergency Manager and County            |
| 2             | Drought                               | Establish and adopt an ordinance to restrict water use in times of drought.  | County and All Cities                          |
| 2             | Wildfire                              | Encourage carefully controlled burns. FSA allows controlled burns on CREP and CRP. The FSA offers cost share for controlled burns on CREP and CRP land. Encourage landowner responsibility.  | FSA, SWCD, DNR,<br>USFWS                       |
| 2             | Erosion                               | Review, update, and enforce zoning ordinances that prohibit building in area that are susceptible to water erosion, landslides, and slope failure.   | County, All Cities                             |
| 3             | Flooding                              | Identify roads that continually flood during spring and work to find funding resources to raise or stabilize roads as needed.  | County Engineer and Townships                  |
| 3             | Flooding                              | Monitor and clear waterways, culverts, and ditches.  | County Engineer and Township                   |

## CHAPTER 6: GOALS, OBJECTIVES, AND STRATEGIES FOR MANMADE/TECHNOLOGICAL HAZARDS

### *OVERVIEW*

The following table outlines the goals, objectives and mitigation strategies for man-made technological hazards important to Big Stone County. The goals are used as a framework for the objectives and mitigation strategies, which in turn, provide specific information on how mitigation decisions should be made. The goals, objectives, and strategies are based on the issues identified by the task force and the risk assessment in this plan.

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### *DEFINITIONS*

**Goals** are general statements. **Objectives** are action statements and start with an action verb. **Strategies** support the action of the objective.

The **Time Frame** was determined by the task force and the County Emergency Manager as an estimated timeline in which to complete the strategy.

The **Time Frame – Recurring** is a strategy type that does not have a specific length of time. Once the strategy has been completed, the responsible entity will re-start the strategy.

**Responsible Entity** is the entity in charge of initiating and completing the strategy identified. This was determined by the task force and County Emergency Manager as the most likely entity to complete the strategy.

The **Estimated Cost** was an educated guess of the cost of each strategy. Some strategies would not cost extra and were denoted "--". Some costs were not known and denoted as "unknown".

The **Funding Partner** is a potential partner for the county/city to obtain funding from in order to complete a strategy.

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### *GENERAL MITIGATION VISION*

"The county will strive to work with surrounding communities and local emergency responders to create and implement a proactive and results-oriented all-hazard mitigation plan that will make the county and region a safer and more sustainable place to live by protecting and enhancing the resources of the county as they relate to hazards that may have an impact in the future."

## *DEVELOPMENT OF STRATEGIES*

To determine strategies for each hazard identified in the risk assessment (Chapter 4) small group problem-solving techniques were used. Once the hazards most likely to affect Big Stone County were identified and prioritized, the task force assembled to review these hazards and their rankings and identify strategies to address mitigation for each hazard. Past hazard activities in the county influenced strategy development and strategy ranking (i.e. 1997 and 2001 flooding). In many cases, as the hazards were identified for the inventory, strategies were also discussed, providing a good starting point for the discussion.

The following outlines the plan's strategy development process. 1) Working toward group consensus, each hazard was reviewed individually. 2) Participants offered suggestions and input which stimulated a lively discussion as part of the planning process. All suggestions were considered and recorded by the facilitator. 3) A limited amount of time was set on each hazard by the facilitator to move the group forward. 4) Debate followed before the group was asked to decide if it should be part of the plan – group consensus was needed. 5) The group noted they could not be totally inclusive – some strategies may not even be considered and others may not be feasible.

### **General Criteria**

1. History
2. Successful Strategies
3. Need
4. Risks
5. Effectiveness
6. Building on what already exists
7. Legal Authority
8. Environmental Impact

### **Cost/Benefit Criteria**

1. Costs/Efficiencies
2. Economic Impact
3. Budget Requirements
4. Overall Impact
5. Resources Needed (Social & Fiscal)
6. Benefits Provided by Project (Social & Fiscal)

Identifying costs that would be attached to each strategy was the most difficult part of the process. Due to limited time and resources to develop the plan it wasn't feasible to spend a lot of time on estimating the costs. It is critical for the Board to constantly be evaluating the costs as part of implementation and maintenance for the All-Hazard Mitigation Plan. Strategies that dealt with rural areas seemed harder to include in the plan – more costly, harder to regulate, and would need population buy-in. Many strategies are costly, labor intensive, time consuming and it is difficult to identify the lead for the strategy. It was determined that the Emergency Manager will perform a cost-benefit review for all potential future project applications. Participants in the planning process agreed that to implement an ordinance or regulation was not the difficult part of certain strategies – would it be possible and feasible to follow-through? Participants started with strategies that were manageable to see notable progress – “baby steps”. It was reasonable to include strategies that have been started, but not yet completed.



**Table 6.1 BSC & Cities Completed Strategies in Past 10 Years for Manmade/Technological Hazards**

| Hazard                      | Strategy  | Responsible Entity                                 |
|-----------------------------|---|--|
| Fire                        | Purchased pagers and other needed equipment for local fire departments. | Beardsley, Correll, Graceville, Odessa, Ortonville |
| Water Supply Contamination  | Implemented/Adopted Wellhead Protection Plans.                          | Odessa, Ortonville                                 |
| Water Supply Contamination  | Completed a Water Supply Plan in conjunction with Mn DNR.               | Ortonville   |
| Civil Disturbance/Terrorism | Installed security alarms at Water Treatment Plants/Well houses.        | Johnson, Odessa, Ortonville                        |

**Table 6.2 BSC & Cities: Manmade / Technological Strategies – No Longer Relevant**

| Hazard   | Strategy   | Responsible Entity  |
|--|--|---|
| Fire   | Continue Fire Education Programs.  | Beardsley, Clinton, Correll, Graceville, Odessa, Ortonville FDs                               |
| <b>Reasoning:</b> Redundant strategy.  |  |   |
| Hazardous Materials  | Adopt an ordinance for landlords to clean up meth labs before residence is occupied again. Educate business owners and employees to be aware of possible meth purchases. | Big Stone County, Barry, Beardsley, Clinton, Correll, Graceville, Johnson, Odessa, Ortonville |
| <b>Reasoning:</b> The County and cities are covered for meth labs under hazardous wastes that fall under the Environmental Protection Agency jurisdiction. |  |   |
| Civil Disturbance / Terrorism  | Continue to review standoff vehicle distances.   | County Law Enforcement  |
| <b>Reasoning:</b> Issue has been addressed.  |  |   |
| Civil Disturbance / Terrorism  | Continue to monitor actives that would need restriction. (Restricting vehicle access to the County Courthouse and City Halls)  | County Law Enforcement  |
| <b>Reasoning:</b> Issue has been addressed.  |  |   |
| Civil Disturbance / Terrorism  | Continue review of facilities and make changes as needed. (Increase level of security with landscape design and lighting.)   | County Law Enforcement  |
| <b>Reasoning:</b> Threat level has been removed.   |  |   |

GOALS, OBJECTIVES, AND STRATEGIES

Infectious Disease

| <b>Goal 1: Reduce the threat of infectious diseases through education and awareness.</b>         |  |                   |   |                       |                        |
|--|--|-------------------|---|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b>                   | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Support and maintain programs that keep the county healthy and safe from infectious diseases. | A. Continue to support Countryside Public Health programs.   | Recurring         | Countryside Public Health (CPH) & County    | --                    | --                     |
|  | B. Work to make sure mass transportation and mobile community can address infectious disease outbreak.                       | Recurring         | CPH   | --                    | --                     |
|  | C. Work with state on quarantine and isolation strategies.   | Recurring         | CPH   | --                    | --                     |
| 2. Educate the public.   | A. Get uniform, accurate and up-to-date information out to the public through the risk communication service.                | Recurring         | CPH   | --                    | --                     |
|  | B. Continue cooperation with County Emergency Management Director, Countryside Public Health and hospitals and clinic staff. | Recurring         | CPH,<br>County EM,<br>Hospital/Clinic Staff | --                    | --                     |

| <b>Goal 2: Improve the effectiveness and quality of the various efforts addressing infectious diseases that have the potential to impact the county.</b> |   |                   |                           |                       |                        |
|--|---|-------------------|---------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Maintain and update material, plans, and agreements for addressing infectious diseases.   | A. Continue cooperation between Countryside Public Health and County Emergency Management Director. | Recurring         | CPH,<br>County EM         | --                    | --                     |

# Fire

| Goal 1: Protect structures from fire.                                   |   |            |  |                |                 |
|---|---|------------|--|----------------|-----------------|
| OBJECTIVES  | STRATEGIES  | Time Frame | Responsible Entity   | Estimated Cost | Funding Partner |
| 1. Provide residents with adequate knowledge of fire safety.            | A. Continue fire education programs.  | Recurring  | Beardsley, Clinton, Correll, Graceville, Odessa, Ortonville FDs, County EM | --             | --              |
| 2. Ensure that Fire Departments have adequate equipment to fight fires. | A. Have an annual assessment of equipment and personnel needs.                        | Recurring  | Beardsley, Clinton, Correll, Graceville, Odessa, Ortonville FDs, County EM | --             | --              |
|   | B. Purchase needed equipment and secure funding sources.                              | Recurring  | Beardsley, Clinton, Correll, Graceville, Odessa, Ortonville FDs, County EM | Moderate       | FEMA/MnDNR      |
|   | C. Actively seek funds to offer training to firefighters.<br><br><b>*New Strategy</b> | Recurring  | Beardsley, Clinton, Correll, Graceville, Odessa, Ortonville FDs, County EM | Moderate       | FEMA/MnDNR      |

# Fire

| <b>Goal 2: Reduce building hazards.</b>                      |   |                   |                           |                       |                        |
|--|---|-------------------|---------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Manage abandoned buildings.                               | A. Inspect abandoned buildings and remove as needed.  | Recurring         | All Cities                | \$4,000-\$10,000      | --                     |
| 2. Provide residents with adequate knowledge of fire safety. | A. Encourage public safety day and work with ongoing programs to promote fire safety such as National Night Out and Fire Prevention Week. | Recurring         | All Cities                | \$2,000               | --                     |

## Hazardous Materials

| <b>Goal 1: Continue the effective efforts addressing hazardous material that may impact the county.</b> |  |                   |                           |                       |                        |
|---|--|-------------------|---------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>   | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Maintain and update material, plans, and agreements for addressing hazardous material.               | A. Review and update the Big Stone County Emergency Operations Plan that outlines procedures for dealing with hazardous material on an annual basis. | Recurring         | County EM                 | --                    | DHSEM                  |

| <b>Goal 2: Address inconsistencies and county shortcomings in dealing with a hazardous materials event.</b> |   |                   |                           |                       |                        |
|---|---|-------------------|---------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>   | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Implement procedures or programs that address gaps or deficiencies in dealing with hazardous materials.  | A. Work to educate farmers and fertilizer plants to secure ammonia tanks. | Recurring         | Law Enforcement           | --                    | --                     |
| 2. Work with county and cities to address cleanup of meth labs.   | A. Educate the public on the dangers of meth labs.                        | Recurring         | Law Enforcement           | --                    | --                     |

## Hazardous Materials

| Goal 3: Improve overall preparedness and equipment for handling hazardous events.  |   |            |   |                |                                 |
|--|---|------------|---|----------------|---------------------------------|
| OBJECTIVES   | STRATEGIES  | Time Frame | Responsible Entity                                  | Estimated Cost | Funding Partner                 |
| <p>1. Adopt new technology and obtain training to improve the county's ability to respond to a disaster.</p> <p><b>*New Goal, Objectives, and Strategies</b></p> | A. Need proper personal protection equipment to respond to hazardous materials disasters for Fire Departments, Law Enforcement, and Ambulance/EMT Departments as applicable to each city. | 2 years    | County and all Cities                               | \$5,000        | FEMA                            |
|  | B. Continue to participate in regional exercises that test local plans and interaction between local agencies.  | Recurring  | County and all Cities                               | \$4,000/year   | --                              |
|  | C. Continued training in the use of the Nation Incident Management System for all hazard materials incidents that may occur in the county.  | Recurring  | County  | \$3,500        | Fire Grant/<br>Dept. of Justice |
|  | D. Ensure that all Emergency Responders participate in Rail Car Incident Response Training.   | Recurring  | County Emergency Manager, All City Fire Departments | --             | Railroad officials,<br>FEMA     |
|  | E. Encourage that emergency responder groups, fire department, and emergency managers are trained to at least the Hazardous Materials Awareness level.                                    | Recurring  | County  | \$4,000        | HSEM/<br>Dept. of Justice       |
|  | F. Ensure that the first responder groups conduct the required terrorism and hazardous materials training and maintains current records on all completed training.                        | Recurring  | County  | \$10,000       | HSEM/<br>Dept. of Justice       |
|  | G. Create Standard Operating Procedures for how to handle hazardous events.   | 1 year     | County  | --             | --                              |
|  | H. Purchase sensor to detect anhydrous ammonia leaks.   | 3 years    | County  | \$500          | --                              |

## Water Supply Contamination

| <b>Goal 1: Protect the quality of the county's ground water resources.</b> |  |                   |                                    |                       |                        |
|--|--|-------------------|------------------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b>          | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Reduce contamination from feedlots.                                     | A. Enforce MN Rules 7020 and local ordinances.                           | Recurring         | County Environmental Services (ES) | \$7,500/year          | --                     |
| 2. Reduce contamination of private wells.                                  | A. Implement wellhead protection plans.                                  | Recurring         | Odessa, Ortonville, County ES      | Low                   | --                     |
| 3. Minimize contamination of ground water from unused/abandoned wells.     | A. Enforce Minnesota Department of Health rules and sealing requirement. | Recurring         | County ES                          | Low                   | --                     |

| <b>Goal 2: Protect residents from contaminated ground water.</b>               |  |                   |                           |                       |                        |
|--|--|-------------------|---------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Provide adequate drinking water in the event of ground water contamination. | A. Continue to identify in the Emergency Operations Plan.                  | Recurring         | County EM                 | Low                   | --                     |
| 2. Test private wells.   | A. Continue school programs for testing private wells. Educate the public. | Recurring         | CPH, Schools              | --                    | --                     |



## Water Supply Contamination

| <b>Goal 3: Focus on efforts in areas more prone to ground water contamination.</b> |  |                   |                           |                       |                        |
|--|--|-------------------|---------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Implement Wellhead Protection Program.  | A. Continue to monitor feedlot locations and adopt prohibited land uses. | Recurring         | County ES                 | \$5,000               | --                     |

## Wastewater Treatment Facility Failure

| <b>Goal 1: Protect the quality of the county's ground water resources.</b> |   |                   |                           |                       |                        |
|--|---|-------------------|---------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Protect the Ortonville Wastewater Treatment Plant from flooding.        | A. Continue to monitor levee protection at the Ortonville Wastewater Treatment Plant. | Recurring         | Ortonville                | --                    | FEMA                   |
|  | B. Lower water table.   | 2-10 years        | UMRWD                     | --                    | FEMA                   |

| <b>Goal 2: Protect the health of residents.</b>            |   |                   |                           |                       |                        |
|--|---|-------------------|---------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>  | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Ensure that all public facilities are working properly. | A. Continue updating sanitary sewer systems and securing funding to make these updates. | Recurring         | All Cities                | Moderate              | USDA Rural Water       |

## Civil Disturbance / Terrorism

| <b>Goal 1: Protect critical infrastructure.</b>                 |  |                   |                           |                       |                        |
|---|--|-------------------|---------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>   | <b>STRATEGIES</b>                                      | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Install security measures at the city water treatment plant. | A. Install security alarms/make infrastructure secure. | 2-5 years         | All Cities                | Moderate              | --                     |

| <b>Goal 2: Decrease vulnerability of regional and state resources in county.</b>  |   |                   |                            |                       |                        |
|---|---|-------------------|----------------------------|-----------------------|------------------------|
| <b>OBJECTIVES</b>   | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b>  | <b>Estimated Cost</b> | <b>Funding Partner</b> |
| 1. Work with state and federal agencies engaged in the statewide domestic preparedness strategy to identify further options for the county. | A. Schedule discussions with school leaders, hospital administrators, law enforcement and local units of government to address performance in response to terrorism (such as active shooters, bombs, chemical, cyber-attacks, etc.) focusing on schools, local government, and hospitals. | Recurring         | County EM, Law Enforcement | \$5,000               | --                     |

## *PRIORITIZING STRATEGIES*

Members of the Big Stone County Hazard Mitigation Task Force completed an online/print survey in order to indicate which strategies they felt were the most important in each hazard category. Using these survey results, the Emergency Manager and RDC staff created a preliminary “Prioritized Hazards List” for manmade/technological hazards. At the fourth Task Force Meeting in Clinton on May 21<sup>st</sup>, 2015, the Local Task Force solidified their priorities by discussing the strategies that were included on the list, and those that were not. Strategies that were a high priority for the Local Task Force contained mitigation measures for hazardous materials, civil disturbance/terrorism, water supply contamination, and structure fire. These hazards were determined to be low to moderate hazards in Big Stone County. Additionally, any steps taken to minimize the risks of these types of disasters could have a sizeable impact. Although Big Stone County does not have control over what types/amounts of hazardous materials are traveling through the county, they can complete strategies that would minimize risk to communities and citizens in the event of a spill.

The Local Task Force and the Big Stone County Emergency Manager used the following criteria to prioritize strategies according to need and feasibility. Although some hazards may be a high risk for the county, it did not guarantee a strategy addressing said hazard would also rank high or take priority.

- Current strategies – Could a current strategy be supplemented or enhanced?
- Costs – What is affordable at this time? Are there current funds addressing the hazard or strategy? Does it make sense to delay or does it only postpone higher costs and create other costs? Will it ever be affordable?
- Available resources – At this time, what funds are available? Will there be additional funds in the future? Are there other projects that take a higher priority?
- Length of project – Some projects could be addressed quickly and require minimal investment in time even though it may be fiscally costly.
- Compatibility with other plans – Is the project a high priority in other plans? Could the project be addressed collaboratively for efficiencies in resources? Would there be unnecessary duplication?
- Available information – Can a good decision be made with the current information? Is more research needed or does it make sense to wait for a current study or development for more information before making a decision?
- Impact – Some hazards can be impacted more by mitigation than others (i.e. using strategies to reduce flooding rather than strategies to reduce tornadoes).

**Table 6.3 BSC Prioritized Strategies (Manmade/Technological Hazards)**

| <b>Ranked</b> | <b>Hazard</b>                   | <b>Strategy</b>  | <b>Affected Participating Jurisdiction</b> |
|---------------|---------------------------------|--|--|
| 1             | Hazardous Materials             | Encourage that emergency responder groups, fire departments, and emergency managers are trained to at least the Hazardous Material Awareness Level.  | All Cities                                 |
| 1             | Hazardous Materials             | Review and update the Big Stone County Emergency Operations Plan that outline procedures for dealing with hazardous material on an annual basis.   | County EM                                  |
| 2             | Civil Disturbance/<br>Terrorism | Schedule discussions with school leaders, hospital administrators, law enforcement and local units of government to address performance in response to terrorism (such as active shooters, bombs, chemical, cyber-attacks, etc.) focusing on schools, local government, and hospitals. | County EM,<br>Law Enforcement              |
| 3             | Water Supply Contamination      | Provide adequate drinking water in the event of ground water contamination.  | County EM                                  |
| 3             | Structure Fire                  | Inspect abandoned buildings and remove as needed.  | County                                     |

## CHAPTER 7: PLAN IMPLEMENTATION & MAINTENANCE

### Implementation & Maintenance

The Big Stone County All-Hazard Mitigation Plan is intended to serve as a guide for dealing with the impact of both current and future hazards for all county people and institutions. As such, it is not a static document but must be modified to reflect changing conditions if it is to be an effective plan. The goals, objectives, and mitigation strategies will serve as the action plan. Even though individual strategies have a responsible party assigned to it to ensure implementation; overall responsibility, oversight and general monitoring of the action plan has been assigned to the Big Stone County Emergency Manager. It will be their responsibility to gather a Local Task Force to update the All-Hazard Mitigation Plan on a routine basis. Every two years, the County Emergency Manager will call a meeting to review the plan, mitigation strategies and the estimated costs attached to each strategy. All participating parties of the original Local Task Force and cities will be invited to this meeting. Responsible parties will report on the status of their projects. Committee responsibility will be to evaluate the plan to determine whether:

- Goals and objectives are relevant.
- Risks have changed.
- Resources are adequate or appropriate.
- The plan as written has implementation problems or issues.
- Strategies have happened as expected.
- Partners participating in the plan need to change (new and old).
- Strategies are effective.
- Any changes have taken place that may affect priorities.
- Any strategies should be changed.

In addition to the information generated at the Local Task Force meetings, the County Emergency Manager will also annually evaluate the All-Hazard Mitigation Plan and update the plan in the event of a hazardous occurrence. Two-year updates are due on the anniversary of the plan approval date.

After the second update meeting (four years will have passed), the Big Stone County Emergency Manager will finalize a new Local Task Force to begin the required five-year update process. This will be accomplished in coordination with cities and the entire All-Hazard Mitigation Plan shall be updated and submitted to FEMA for approval (within 5 years of plan adoption). These revisions will include public participation by requiring a public hearing and published notice, in addition to multiple Local Task Force meetings to make detailed updates to the plan.

Public participation for updates is as critical as in the initial plan. Public participation methods that were used in the initial writing will be duplicated for future update processes – direct mailing list of interested parties, public meetings, press releases, questionnaires, and resolutions of participation and involvement. Additional methods of getting public input and involvement are

encouraged such as placing copies of the plan in the Big Stone County Emergency Manager's Office and city offices, in addition to placing the plan on the Big Stone County and UMRDC websites. Further, cities will be encouraged to place a notice on their websites stating the plan is available for review at the city offices. Notifications of these methods could be placed in chamber newsletters, the UMRDC newsletter and newspapers. Committee responsibilities will be the same as with updates.

Chapters 5 and 6 focus on mitigation strategies for natural hazards and man-made/technological hazards. Appendix 2 focuses on city-specific mitigation strategies for both natural and manmade/technological hazards. The All-Hazard Mitigation Plan proposes a number of strategies, some of which will require outside funding in order to implement. If outside funding is not available, the strategy will be set aside until sources of funding can be identified. In these situations, Big Stone County and cities will consider other funding options such as the county's/cities' general funds, bonding and other sources. Based on the availability of funds and the risk assessment of that hazard, the county will determine which strategies should be continued and which should be set aside. Consequently, the action plan and the risk assessment serves as a guide to spending priorities but will be adjusted annually to reflect current needs and financial resources.

This last step requires an evaluation of the strategies identified in the goals and policies framework, selecting preferred strategies based on the risk assessment, prioritizing the strategy list, identifying the entity responsible for carrying out the strategy, and the timeframe and costs of strategy completion. Big Stone County and cities have incorporated the preferred strategies including identification of the responsible party to implement, the timeframe and the cost of the activity with the goals and policies framework.

This plan will be integrated into other Big Stone County plans such as the County Comprehensive Plan, County Water Plan, and the Emergency Operations Plan. Chapter 1 will serve as an executive summary to the All-Hazard Mitigation to be attached to those plans as necessary. The County Board and Emergency Manager will encourage cities to implement their city-specific mitigation strategies in their comprehensive plans, land use regulations, zoning ordinances, capital improvement plans and/or building codes by including mitigation strategies in their plans as listed in Table 7.1 on the following page. Further, as each land use mechanism is updated, mitigation strategies will be evaluated to determine whether they can implement or include them at that time. This evaluation will consist of basic cost-benefit analyses, much like what was used to create the mitigation strategies.

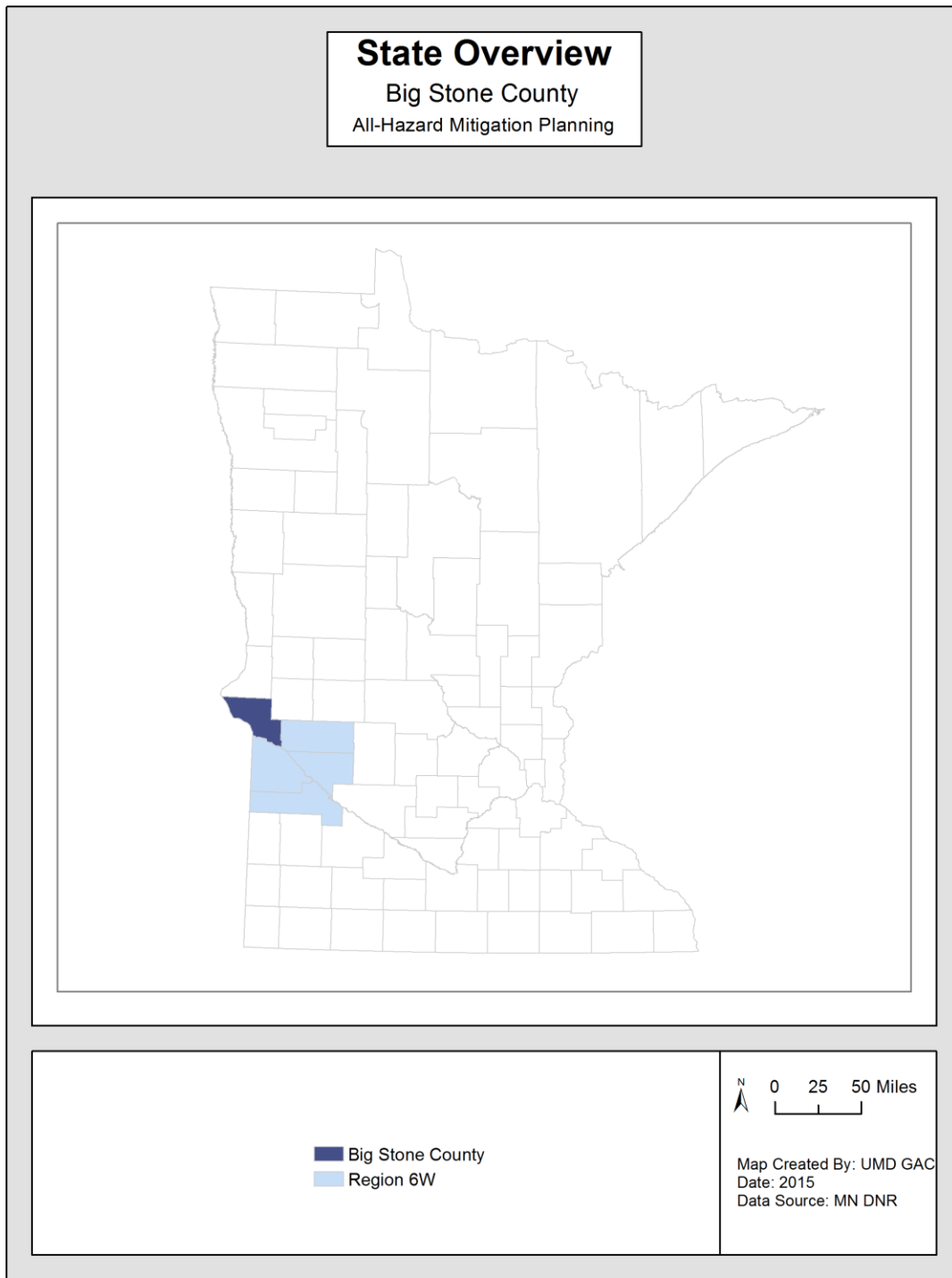
**Table 7.1 BSC & Cities - Local Planning Mechanisms**

| <b>Planning Mechanisms</b> | <b>Jurisdictions</b>                     |
|----------------------------|--|
| Comprehensive Plan         | Big Stone County, Ortonville             |
| Emergency Operations Plan  | Big Stone County                         |
| Capital Improvement Plan   | Clarkfield, Granite Falls, Canby         |
| Water Plan                 | Big Stone County                         |
| Watershed Plan             | UMRWD, BDSWD, PDTRA                      |
| Land Use Plan              | Big Stone County, Ortonville             |
| Wellhead Protection Plan   | Big Stone County, Ortonville             |
| Zoning Ordinance           | Big Stone County, Ortonville, Graceville |
| Building Code              | Big Stone County, Ortonville             |
| Floodplain Ordinance       | Big Stone County, Ortonville             |
| Shoreland Ordinance        | Big Stone County, Ortonville             |

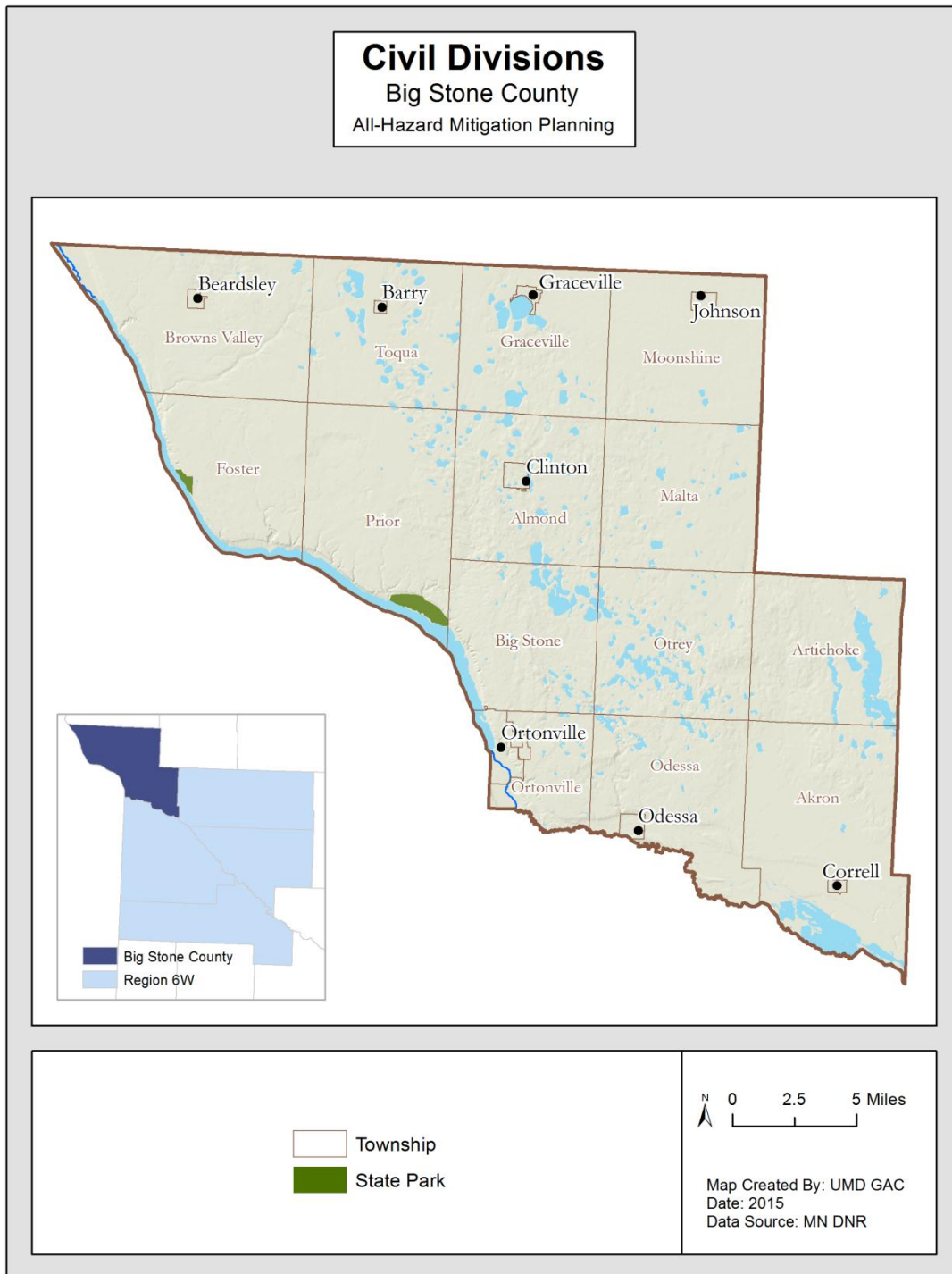
Many of these plans or policies can help implement the goals, objectives, and strategies in Big Stone County’s All-Hazard Mitigation Plan. The Big Stone County Emergency Manager is responsible for meeting with each city within the County two times throughout the next five years. During these meetings, the Emergency Manager will review all Local Planning Mechanisms and collaborate with the cities to ensure the All-Hazard Mitigation Plan is becoming as integrated into local plans as possible. As adopted versions of Big Stone County’s All-Hazard Mitigation Plan will be available at all city offices, during these meetings the Emergency Manager will solicit and collect any public comments relevant to the plan and make a record for the upcoming update process to be discussed at a Local Task Force meeting. These Local Planning Mechanisms are meant to work cooperatively together in order to ensure the health, safety, and welfare of Big Stone County and its cities.



Figure A1.1 State Overview



**Figure A1.2 Big Stone County Civil Divisions**



**Figure A1.3 Big Stone County Land Cover**

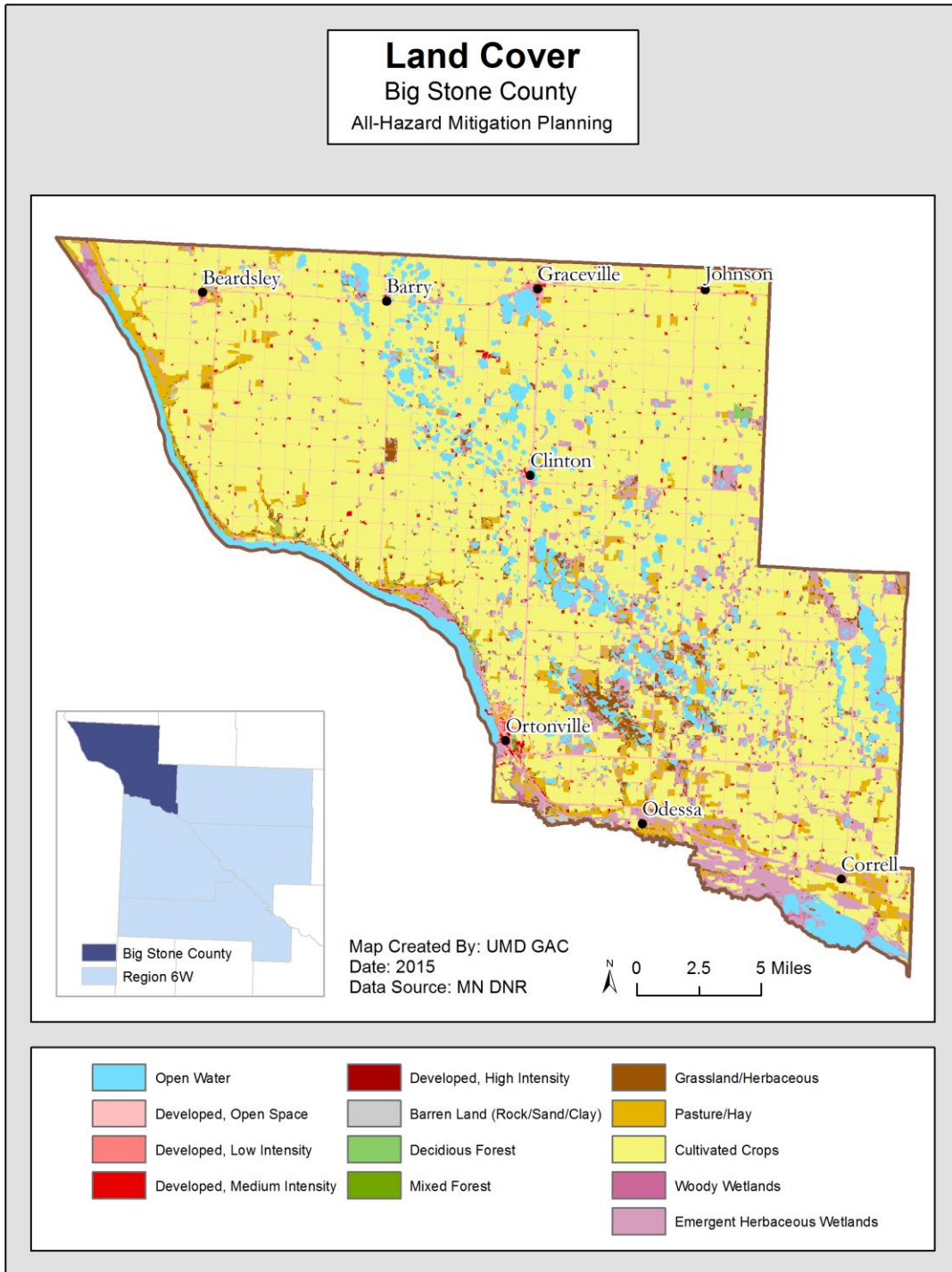


Figure A1.4 Big Stone County Hydrology & Drainage

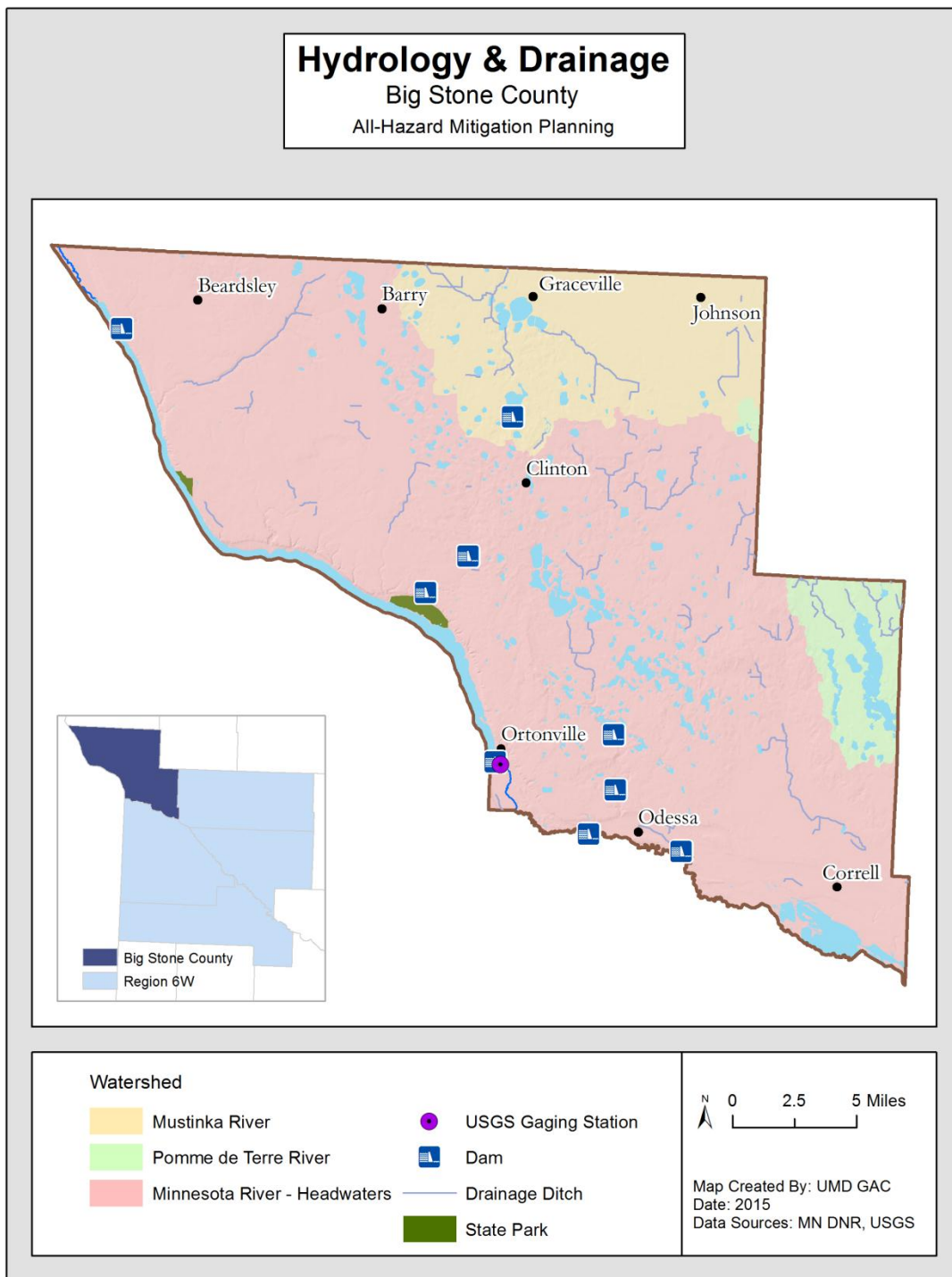


Figure A1.5 Big Stone County Natural Features

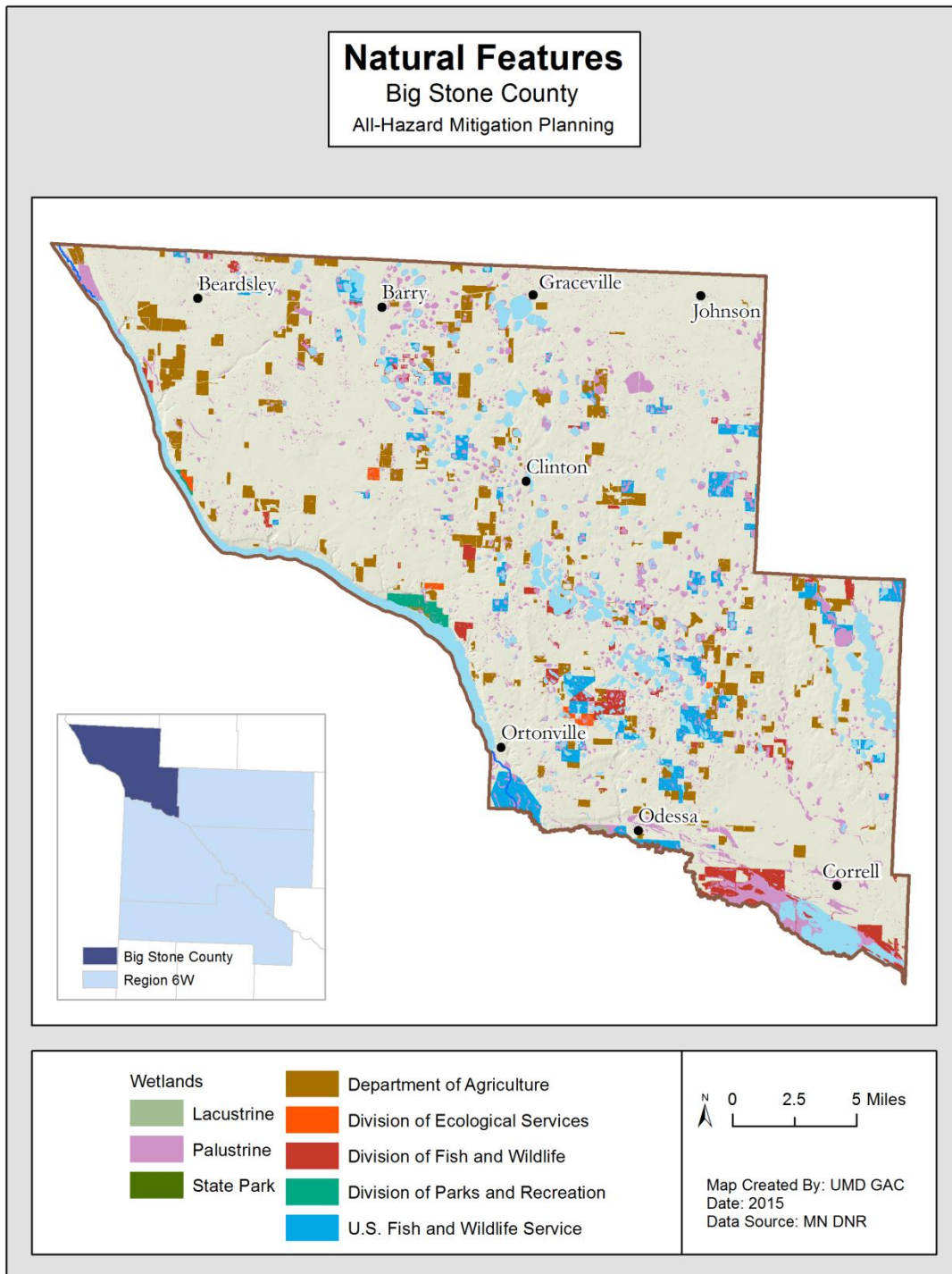
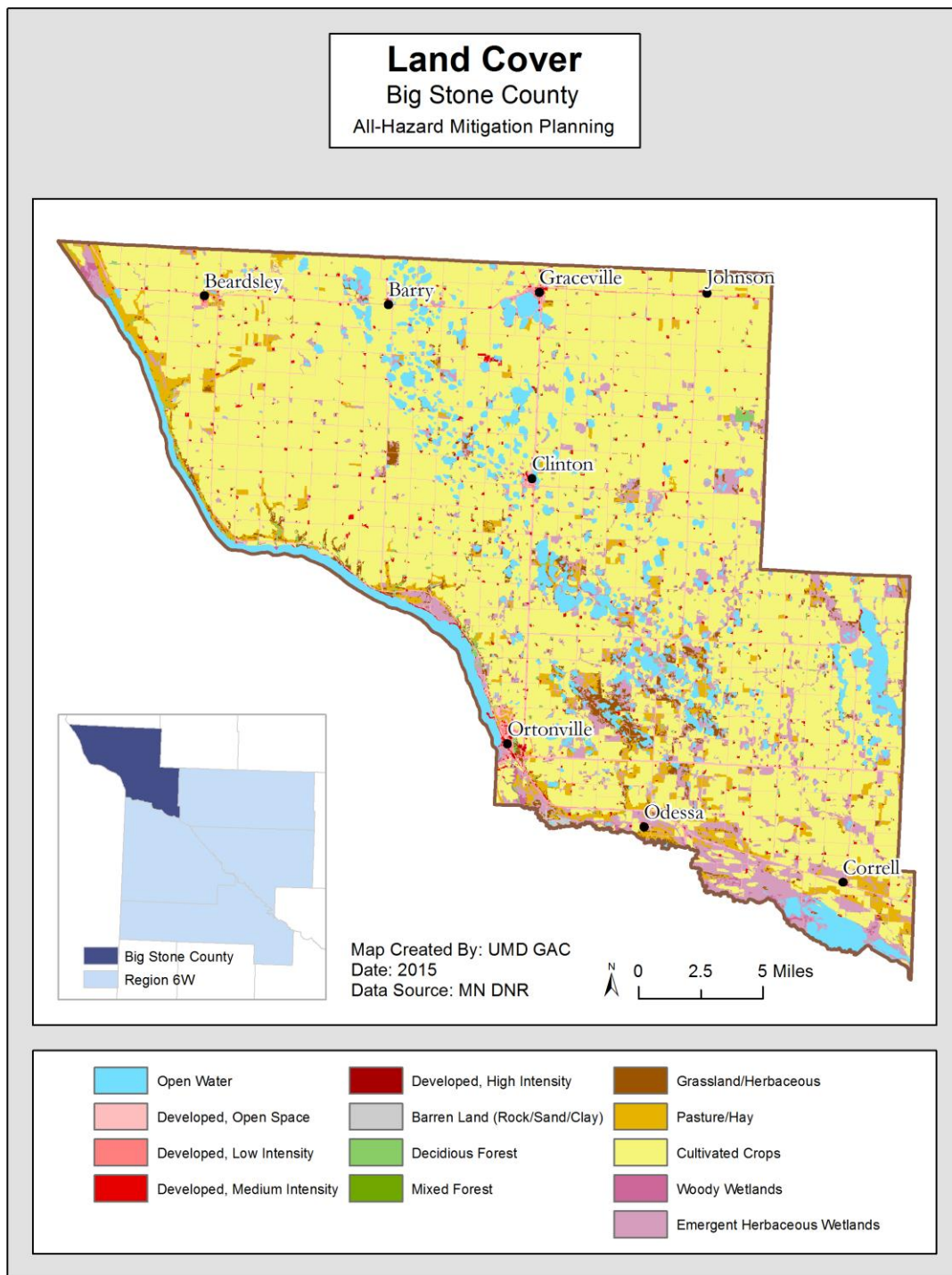




Figure A1.6 Big Stone County Land Cover



**Figure A1.7 Big Stone County Population by Census Block**

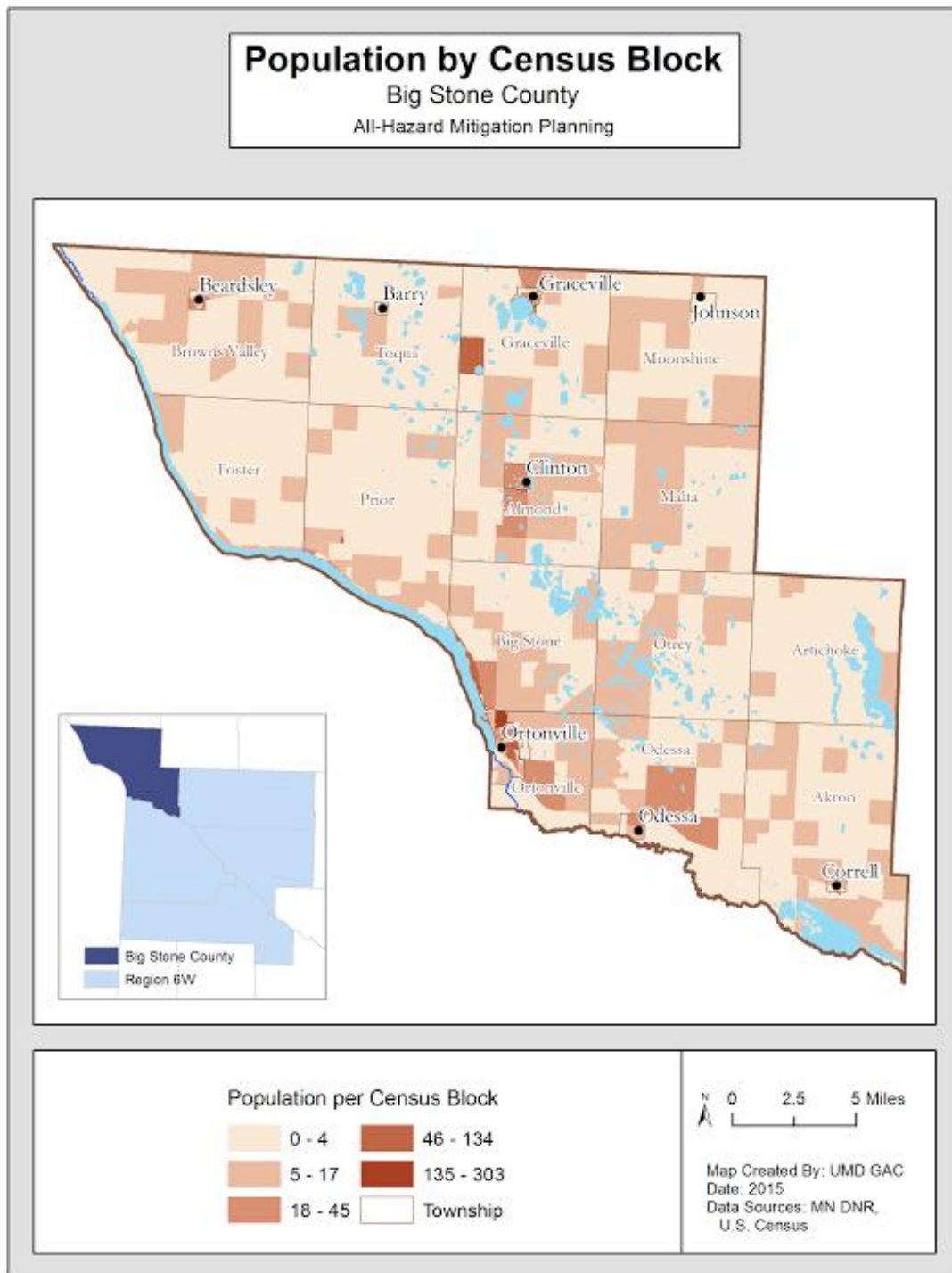


Figure A1.8 Big Stone County Transportation System

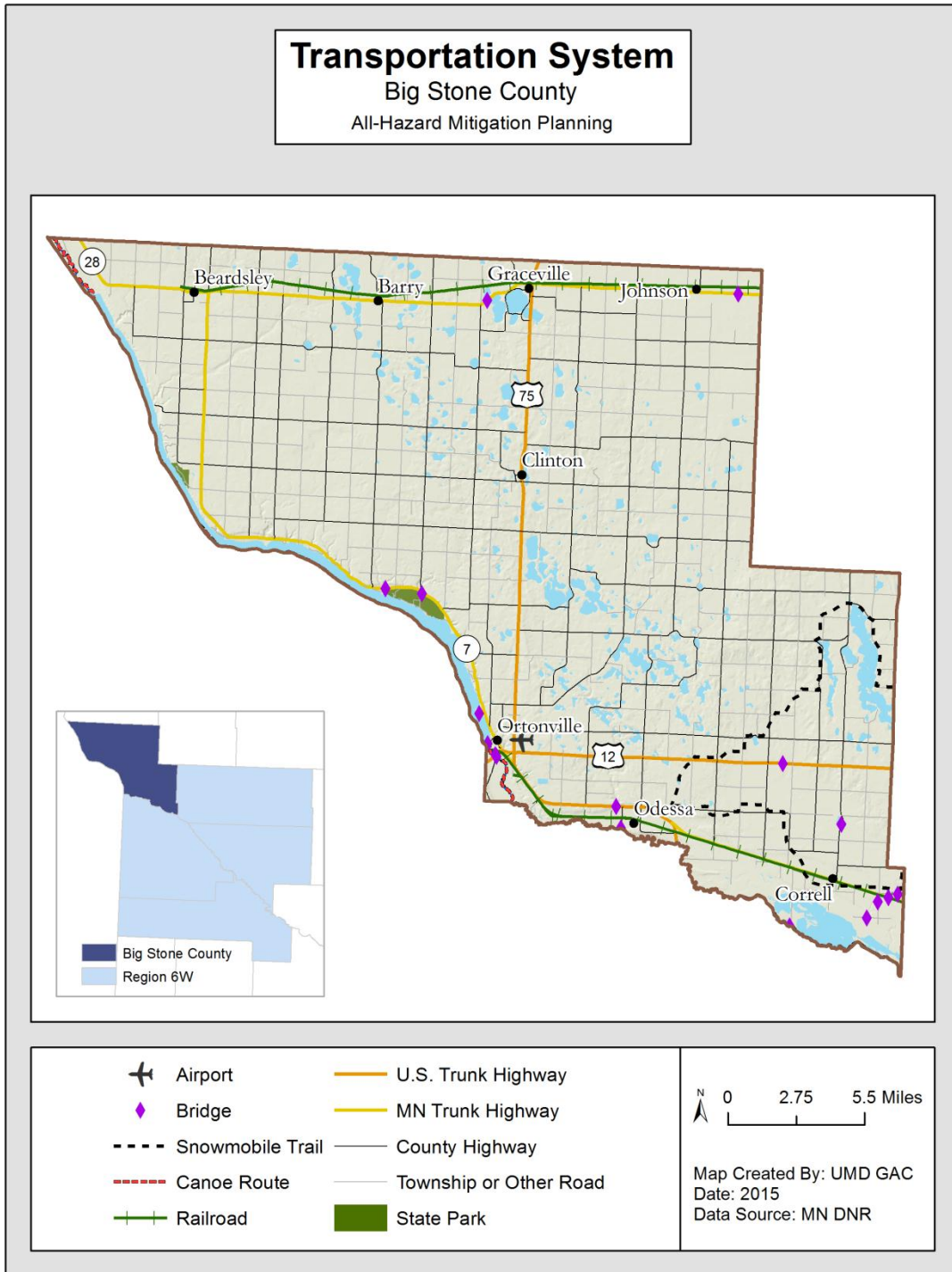
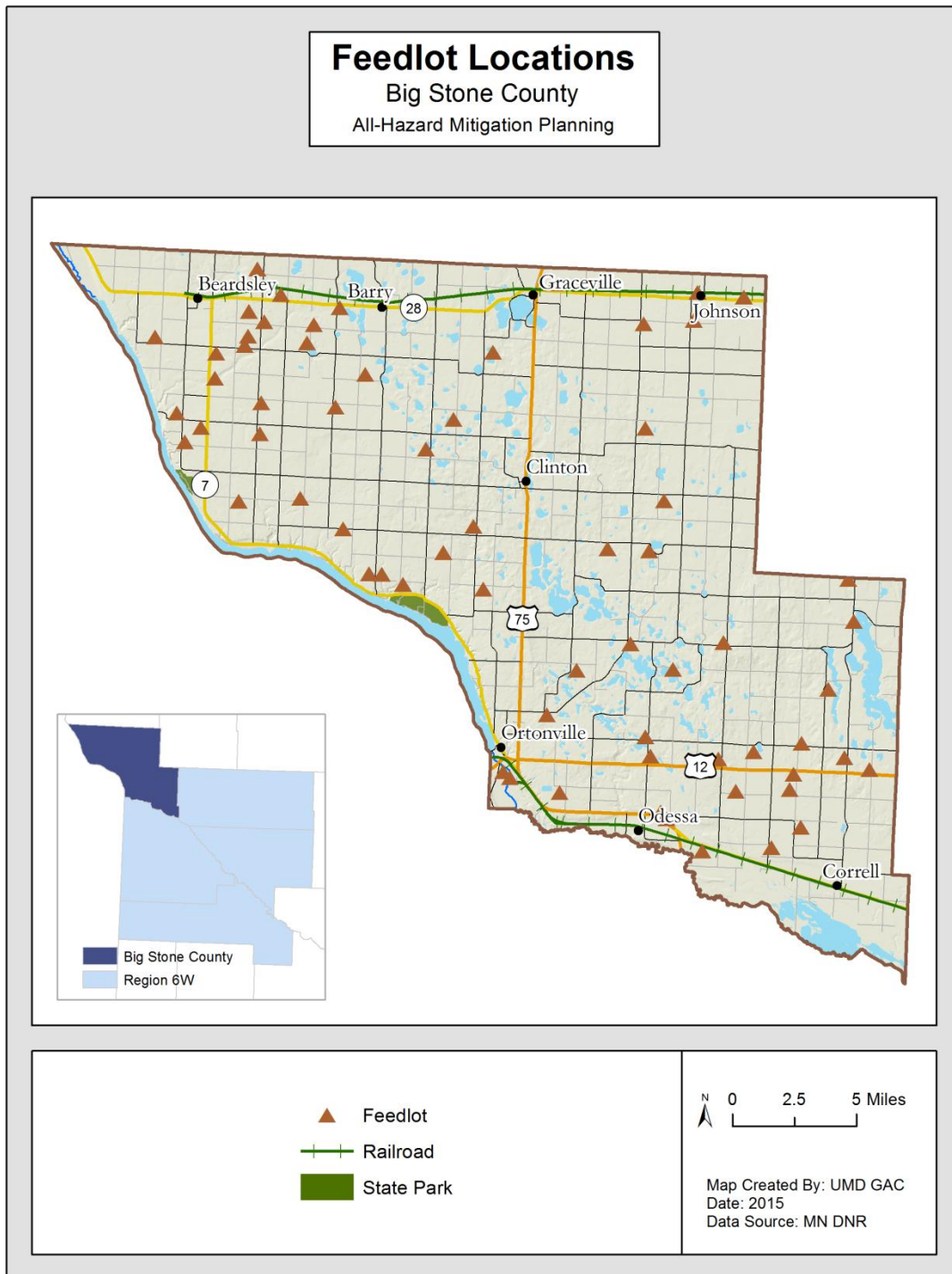




Figure A1.9 Big Stone County Feedlot Location





APPENDIX 2: CITY SPECIFIC GOALS, OBJECTIVES AND MITIGATION STRATEGIES

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**Barry:** Goals, Objectives, and Mitigation Strategies

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**Violent Storms and Extreme Temperatures**

**Goal 2: Improve and maintain Severe Storm Warning System for all county residents.**

| OBJECTIVE   | STRATEGIES   | Time Frame | Responsible Entity | Estimated Cost | Funding Partner | Rank | Reasoning for Rank |
|---|--|------------|--------------------|----------------|-----------------|------|--------------------|
| Assess adequacy of existing emergency warning sirens. | Obtain a warning siren for the community           | 10 years   | City               | \$17,000       | USDA            | 1    | Citizen Safety     |
|   | Purchase a backup generator for the warning siren. | 10 years   | City               | \$5,000        | USDA            | 2    | Citizen Safety     |

**City of Beardsley: Goals, Objectives, and Mitigation Strategies**

**Violent Storms and Extreme Temperatures**

| <b>Goal 2: Improve and maintain Severe Storm Warning System for all county residents.</b>   |   |                   |                           |                       |                        |             |  |
|---|---|-------------------|---------------------------|-----------------------|------------------------|-------------|--|
| <b>OBJECTIVE</b>  | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reason for Ranking</b>                              |
| Ensure that emergency management personnel, county sheriff, emergency response persons are notified as soon as possible in the event of a severe storm. | Increase communication between City and Big Stone County.               | Recurring         | City & Big Stone County   | --                    | --                     | <b>2</b>    | Citizen Safety   |
| Assess adequacy of existing emergency warning sirens.   | Purchase a backup generator for Warning Siren and wells.                | 8 years           | City & Big Stone County   | \$5,000               | USDA                   | <b>1</b>    | Improve immediacy of rural knowledge of weather events |
|   | Purchase 1 new weather siren.   | 5 years           | Big Stone County          | \$17,000              | USDA                   | <b>3</b>    | Improve immediacy of rural knowledge of weather events |
|   | Invest in a Remote System to turn on weather siren if needed.           | 10 years          | City & Big Stone County   | \$1,600               | NOAA/                  | <b>4</b>    | Citizen Safety   |
|   | Purchase an automatic transfer switch for generator (3-phase – 150amp). | 5 years           | City                      | \$1,500               | FEMA                   | <b>5</b>    | Citizen Safety   |

**City of Clinton: Goals, Objectives, and Mitigation Strategies**

**Violent Storms and Extreme Temperatures**

| <b>Goal 1: Promote safe and accessible safe rooms from violent storms.</b>  |  |                   |                           |                       |                        |             |                           |
|---|--|-------------------|---------------------------|-----------------------|------------------------|-------------|---------------------------|
| <b>OBJECTIVE</b>  | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reason for Ranking</b> |
| Encourage homes without basements to have a safe room where household residents may go in case of violent storms. | Create an Educational Brochure on how to prepare for severe weather.           | 1-2 years         | City                      | \$500                 | FEMA                   | 1           | Educate Citizens          |
| Ensure that public and open areas have a safe room identified.  | Discuss with City Council to determine whether or not to purchase a safe room. | 1 year            | City                      | Staff Time            | --                     | 3           | Citizen Safety            |

**Flood**

| <b>Goal 1: Eliminate nonconforming structures in the identified 100-year floodplain.</b> |   |                   |                           |                       |                        |             |                                  |
|--|---|-------------------|---------------------------|-----------------------|------------------------|-------------|----------------------------------|
| <b>OBJECTIVE</b>   | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reason for Ranking</b>        |
| Protect routinely flooded structures and areas throughout Big Stone County.              | Flood proof 7 homes.  | 2-5 years         | City                      | Moderate              | FEMA/MnDNR             | 2           | Prevent Flooding/ Citizen Safety |
| <b>Goal 4: Maintain NFIP Compliance for participating jurisdictions.</b>                 |   |                   |                           |                       |                        |             |                                  |
| <b>OBJECTIVE</b>   | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reasoning for Rank</b>        |
| Develop and implement strategies to demonstrate "Continued Compliance".                  | Work with MN DNR on development applications in identified Flood Prone Areas. | Recurring         | City                      | Staff Time            | --                     | 4           | Prevent Flooding/ Citizen Safety |
|  | Encourage property owners in Flood Prone areas to purchase flood insurance.   | Recurring         | City                      | Staff Time            | --                     | 5           | Prevent Flooding/ Citizen Safety |
|  | Discourage development in Flood Prone Areas.                                  | Recurring         | City                      | Staff Time            | --                     | 6           | Prevent Flooding/ Citizen Safety |

**City of Correll: Goals, Objectives, and Mitigation Strategies**

**Violent Storms and Extreme Temperatures**

| <b>Goal 1: Promote safe and accessible safe rooms from violent storms.</b>  |  |                   |                           |                       |                        |             |                           |
|---|--|-------------------|---------------------------|-----------------------|------------------------|-------------|---------------------------|
| <b>OBJECTIVE</b>  | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reasoning for Rank</b> |
| Encourage homes without basements to have a safe room where household residents may go in case of violent storms.                                       | Create an Educational Brochure on how to prepare for severe weather. | 1 year            | City Clerk                | \$500                 | FEMA                   | 1           | Educate Citizens          |
| <b>Goal 2: Improve severe storm warning system for all county residents.</b>  |  |                   |                           |                       |                        |             |                           |
| <b>OBJECTIVE</b>  | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reasoning for Rank</b> |
| Ensure that emergency management personnel, county sheriff, emergency response persons are notified as soon as possible in the event of a severe storm. | Draft and adopt an Emergency Operations Plan for City.               | 1 year            | City                      | Low                   | Big Stone County       | 2           | Citizen Safety            |

**City of Graceville: Goals, Objectives, and Mitigation Strategies**

**Violent Storms and Extreme Temperatures**

| <b>Goal 1: Promote safe and accessible safe rooms from violent storms.</b> |                                      |                   |                           |                       |                        |             |                                   |
|--|--------------------------------------|-------------------|---------------------------|-----------------------|------------------------|-------------|-----------------------------------|
| <b>OBJECTIVE</b>   | <b>STRATEGIES</b>                    | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reason for Ranking</b>         |
| Ensure safety of storm victims.  | Draft a plan to house storm victims. | 2 years           | EMS/<br>Civil Defense     | Staff Time            | EMS/<br>Civil Defense  | <b>2</b>    | Safety for Vulnerable Populations |

**Flood**

| <b>Goal 1: Eliminate nonconforming structures in the identified 100-year floodplain.</b> |  |                   |                           |                       |                        |             |  |
|--|--|-------------------|---------------------------|-----------------------|------------------------|-------------|--|
| <b>OBJECTIVE</b>   | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reason for Ranking</b>              |
| Protect routinely flooded structures and areas throughout Big Stone County.              | Purchase and place two 24-inch culverts under Nursing Home/Assisted Living Center “Link” and Driveway to prevent flooding. | 1-5 years         | Public Works              | \$15,000              | FEMA                   | <b>1</b>    | Flood Potential during Rainfall Events |
| <b>Goal 4: Maintain NFIP Compliance for participating jurisdictions.</b>                 |  |                   |                           |                       |                        |             |  |
| <b>OBJECTIVE</b>   | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reason for Ranking</b>              |
| Develop and implement strategies to demonstrate “Continued Compliance”.                  | Work with MN DNR to review and update the Floodplain Management Ordinance as required.                                     | Recurring         | City                      | Staff Time            | --                     | <b>3</b>    | Prevent Flooding/<br>Citizen Safety    |
|  | Work with MN DNR on development applications in identified Flood Prone Areas.  | Recurring         | City                      | Staff Time            | --                     | <b>4</b>    | Prevent Flooding/<br>Citizen Safety    |
|  | Encourage all property owners in Flood Hazard Areas to purchase flood insurance.   | Recurring         | City                      | Staff Time            | --                     | <b>5</b>    | Prevent Flooding/<br>Citizen Safety    |
|  | Discourage Zoning Variances in Flood Hazard Areas.   | Recurring         | City                      | Staff Time            | --                     | <b>6</b>    | Prevent Flooding/<br>Citizen Safety    |

**City of Graceville: Goals, Objectives, and Mitigation Strategies (continued)**

**Water Supply Contamination**

| <b>Goal 1: Protect the quality of the County’s groundwater resources.</b> |   |                   |                           |                       |                        |             |                                |
|---|---|-------------------|---------------------------|-----------------------|------------------------|-------------|--------------------------------|
| <b>OBJECTIVE</b>  | <b>STRATEGIES</b>                           | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reason for Ranking</b>      |
| Reduce contamination of private wells.                                    | Draft a Well-head Protection Plan for City. | 3-5 years         | City                      | Staff Time            | City/ County           | <b>3</b>    | Protect Potable Drinking Water |

**Civil Disturbance/Terrorism**

| <b>Goal 1: Protect critical infrastructure.</b>           |  |                   |                           |                       |                        |             |                                      |
|---|--|-------------------|---------------------------|-----------------------|------------------------|-------------|--------------------------------------|
| <b>OBJECTIVE</b>  | <b>STRATEGIES</b>                                      | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reason for Ranking</b>            |
| Install security measures at City Water Treatment Plants. | Install security alarms at City Water Treatment Plant. | 3-5 years         | City                      | Moderate              | DHS                    | <b>4</b>    | Protect Critical City Infrastructure |



**City of Johnson: Goals, Objectives, and Mitigation Strategies**

**Violent Storms and Extreme Temperatures**

| <b>Goal 2: Improve severe storm warning system for all county residents.</b>                |   |                   |                           |                       |                        |             |                             |
|---|---|-------------------|---------------------------|-----------------------|------------------------|-------------|-----------------------------|
| <b>OBJECTIVE</b>  | <b>STRATEGIES</b>                           | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reasoning for Rank</b>   |
| Assess adequacy of existing emergency warning sirens.                                       | Purchase a Warning Siren for City.          | 2 years           | City                      | \$17,000              | NOAA                   | <b>2</b>    | Citizen Safety              |
| <b>Goal 3: Protect people and county infrastructure from the impacts of severe weather.</b> |   |                   |                           |                       |                        |             |                             |
| <b>OBJECTIVE</b>  | <b>STRATEGIES</b>                           | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reasoning for Rank</b>   |
| Ensure that roads are kept clear during heavy snow events.                                  | Build a Living Snow Fence surrounding town. | 10 years          | County Engineer, City     | High                  | FEMA                   | <b>3</b>    | Citizen and Children Safety |

**Flood**

| <b>Goal 1: Eliminate nonconforming structures in the identified 100-year floodplain.</b> |   |                   |                           |                       |                        |             |  |
|--|---|-------------------|---------------------------|-----------------------|------------------------|-------------|--|
| <b>OBJECTIVE</b>   | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reason for Ranking</b>                |
| Protect routinely flooded structures and areas throughout Big Stone County.              | Install new culverts, complete ditching, land excavation, and cleaning of ditches. Estimate for project has been completed by Sullivan Excavating, Inc. | 5 years           | City                      | \$27,925.50           | FEMA                   | <b>1</b>    | Rectify Current Flatland Flooding Issues |

## City of Odessa: Goals, Objectives, and Mitigation Strategies

### Violent Storms and Extreme Temperatures

| <b>Goal 1: Promote safe and accessible safe rooms from violent storms.</b>  |  |            |                    |                |                 |      |                    |
|---|--|------------|--------------------|----------------|-----------------|------|--------------------|
| OBJECTIVE   | STRATEGIES   | Time Frame | Responsible Entity | Estimated Cost | Funding Partner | Rank | Reasoning for Rank |
| Encourage homes without basements to have a safe room where household residents may go in case of violent storms. | Create an Education Brochure with instructions for severe storms (residents and businesses). | 2 years    | City               | \$500          | FEMA            | 3    | Citizen Safety     |
| <b>Goal 2: Improve severe storm warning system for all county residents.</b>                                      |  |            |                    |                |                 |      |                    |
| OBJECTIVE   | STRATEGIES   | Time Frame | Responsible Entity | Estimated Cost | Funding Partner | Rank | Reasoning for Rank |
| Assess adequacy of existing emergency warning sirens.   | Purchase a new Warning Siren.  | 2-3 years  | City               | \$17,000       | NOAA/<br>FEMA   | 2    | Citizen Safety     |

### Civil Disturbance/Terrorism

| <b>Goal 1: Protect critical infrastructure.</b>           |   |            |                    |                |                 |      |                                       |
|---|---|------------|--------------------|----------------|-----------------|------|---------------------------------------|
| OBJECTIVE   | STRATEGIES  | Time Frame | Responsible Entity | Estimated Cost | Funding Partner | Rank | Reason for Ranking                    |
| Install security measures at City Water Treatment Plants. | Increase security around City Infrastructure (water tower). | 2 years    | City               | \$2,500        | --              | 1    | Financial Security and Citizen Safety |

### Flood

| <b>Goal 4: Maintain NFIP Compliance for participating jurisdictions.</b> |  |            |                    |                |                 |      |                                     |
|--|--|------------|--------------------|----------------|-----------------|------|-------------------------------------|
| OBJECTIVE  | STRATEGIES   | Time Frame | Responsible Entity | Estimated Cost | Funding Partner | Rank | Reason for Ranking                  |
| Develop and implement strategies to demonstrate "Continued Compliance".  | Work with MN DNR to review and update the Floodplain Management Ordinance as required. | Recurring  | City               | Staff Time     | --              | 5    | Prevent Flooding/<br>Citizen Safety |
|  | Work with MN DNR on development applications in identified Flood Prone Areas.          | Recurring  | City               | Staff Time     | --              | 6    | Prevent Flooding/<br>Citizen Safety |
|  | Encourage all property owners in Flood Hazard Areas to purchase flood insurance.       | Recurring  | City               | Staff Time     | --              | 7    | Prevent Flooding/<br>Citizen Safety |
|  | Discourage Zoning Variances in Flood Hazard Areas.                                     | Recurring  | City               | Staff Time     | --              | 8    | Prevent Flooding/<br>Citizen Safety |

**City of Ortonville: Goals, Objectives, and Mitigation Strategies**

**Violent Storms and Extreme Temperatures**

| <b>Goal 1: Promote safe and accessible safe rooms from violent storms.</b>   |  |                   |                           |                       |                        |             |                           |
|--|--|-------------------|---------------------------|-----------------------|------------------------|-------------|---------------------------|
| <b>OBJECTIVE</b>   | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reasoning for Rank</b> |
| Ensure that public and open areas have a safe room identified.   | Publish and distribute an Educational Pamphlet that identifies safe rooms in public and open areas.  | 2-3 years         | City                      | \$500                 | FEMA                   | 4           | Citizen Safety            |
| Require all new manufactured home parks to provide safe room for park residents either through a structure on site or a plan of evacuation to safe shelter off site. | Work with the manufactured park in Ortonville to develop a Safe Room Plan. Require that the safe room plan go through the local governing unit each year for review. Through this process, determine a safe room for mobile homes. | 1 year            | City                      | Staff Time            | --                     | 3           | Citizen Safety            |

**Flood**

| <b>Goal 2: Minimize the damage from flooding along the Big Stone Lake and Ortonville.</b> |   |                   |                           |                       |                        |             |                                  |
|---|---|-------------------|---------------------------|-----------------------|------------------------|-------------|----------------------------------|
| <b>OBJECTIVE</b>  | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reason for Ranking</b>        |
| Protect the Peninsula infrastructure in Ortonville.                                       | Finish the three-fourths mile of replacing old sewer main, sealing manholes, and replacing bituminous material. | 5-6 years         | City                      | \$700,000             | City/ Rural Water      | 1           | Citizen Safety and Funding       |
| <b>Goal 4: Maintain NFIP Compliance for participating jurisdictions.</b>                  |   |                   |                           |                       |                        |             |                                  |
| <b>OBJECTIVE</b>  | <b>STRATEGIES</b>   | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reason for Ranking</b>        |
| Develop and implement strategies to demonstrate "Continued Compliance".                   | Work with MN DNR to review and update the Floodplain Management Ordinance as required.                          | Recurring         | City                      | Staff Time            | --                     | 5           | Prevent Flooding/ Citizen Safety |
|   | Work with MN DNR on development applications in identified Flood Prone Areas.                                   | Recurring         | City                      | Staff Time            | --                     | 6           | Prevent Flooding/ Citizen Safety |
|   | Encourage all property owners in Flood Hazard Areas to purchase flood insurance.                                | Recurring         | City                      | Staff Time            | --                     | 7           | Prevent Flooding/ Citizen Safety |
|   | Discourage Zoning Variances in Flood Hazard Areas.  | Recurring         | City                      | Staff Time            | --                     | 8           | Prevent Flooding/ Citizen Safety |

**City of Ortonville: Goals, Objectives, and Mitigation Strategies (continued)**

**Wastewater Treatment System Failure**

| <b>Goal 1: Minimize damage from flooding.</b>                    |  |                   |                           |                       |                        |             |                           |
|--|--|-------------------|---------------------------|-----------------------|------------------------|-------------|---------------------------|
| <b>OBJECTIVE</b>   | <b>STRATEGIES</b>  | <b>Time Frame</b> | <b>Responsible Entity</b> | <b>Estimated Cost</b> | <b>Funding Partner</b> | <b>Rank</b> | <b>Reason for Ranking</b> |
| Protect the Ortonville Wastewater Treatment Plant from flooding. | Continue to monitor levee protection at the Ortonville Wastewater Treatment Plant. | recurring         | Public Works              | Staff Time            | --                     | <b>2</b>    | Citizen Safety            |

## APPENDIX 3: SOLVED GAPS & DEFICIENCIES FOR HAZARDS

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As noted in Chapter 3 Hazard Inventory for Big Stone County, specific gaps and deficiencies were identified for all potential hazardous events. The problem areas identified in the original All-Hazard Mitigation Plan were presented to the Big Stone Local Task Force and representatives from all cities within the county to state whether or not a gap or deficiency has been solved. In the event that efforts have been made to rectify a problem, but has not been fully completed, it remained under current gaps and deficiencies. Below is a list of all resolved gaps and deficiencies sorted according to hazard type.

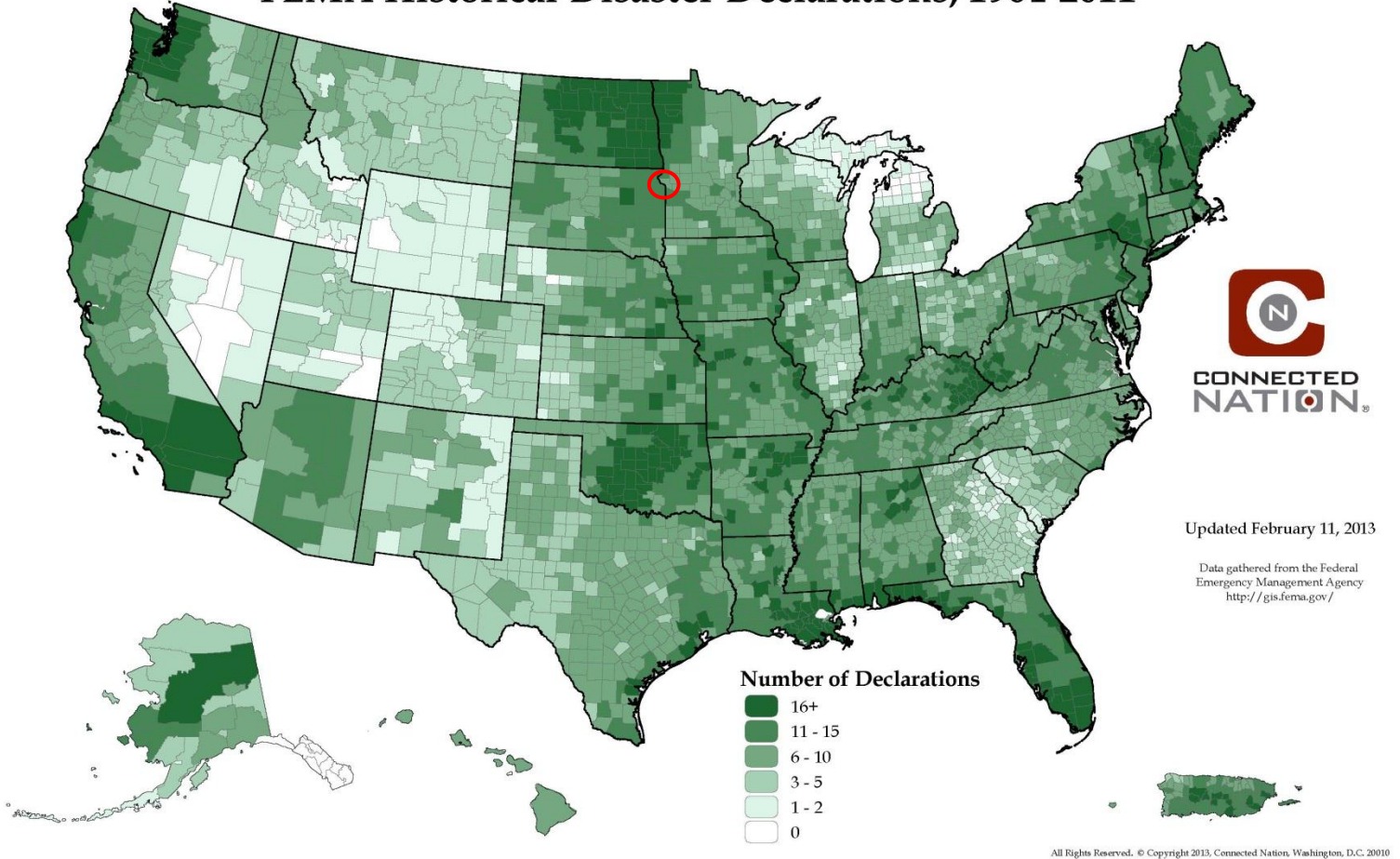
### **Wildfire:**

- All firefighters in Big Stone County are volunteers. The training offered to local Fire Departments should be more local and one-on-one to be more effective and efficient.
- It needs to be defined as to who is responsible for fighting fires and to establish a mutual aid agreement between the MnDNR and local Fire Departments.
- A Plan should be in place regarding proper radio channels between DNR, State Patrol, local Fire Departments, and local Police Departments. The smoke associated with wildfires can present a major hazard on roadways. Without direct contact with Law Enforcement, traffic control can be compromised.
- Updated gear and a plan to use it in cooperation with other Fire Departments are necessary. The MnDNR should have an up-to-date list of equipment available to them in the event of wildfires.

### **Water Supply Contamination:**

- County official's efforts to educate citizens with private wells are not well coordinated with state and federal efforts. Also, citizens are given very little encouragement to remove old wells that are not compliant with the 1974 standards.

## FEMA Historical Disaster Declarations, 1964-2011



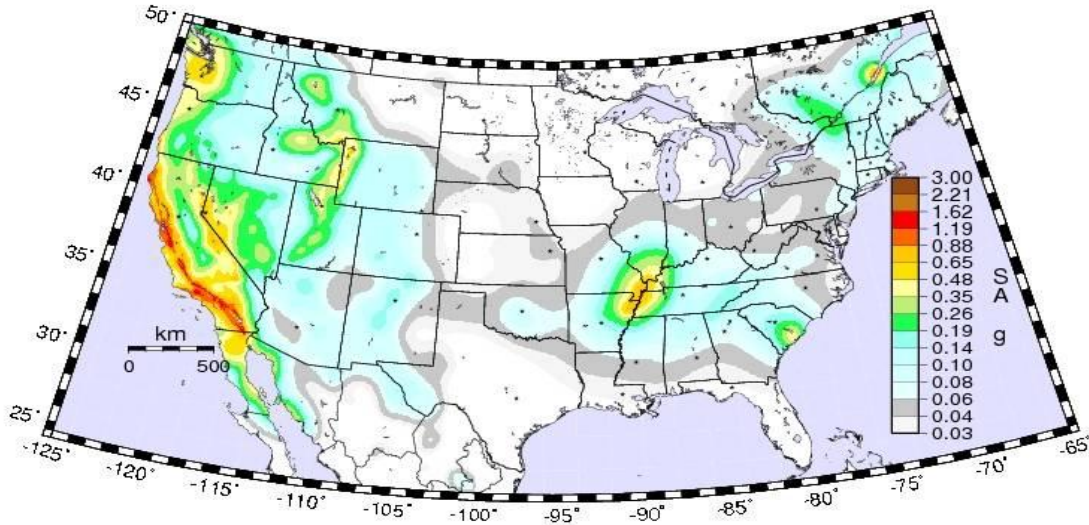
### Presidential Disaster Declarations: 1964-2014

From 1964 to 2011, Big Stone County has witnessed 11-15 Presidential Declarations (see red circle). From 2000 to 2010, Big Stone County has experienced three Presidential Disaster Declarations: 2001 (Flooding), 2006 (Winter Storms), and 2010 (Flood). There was a severe storm and flooding declaration in 2011 and another severe storm and flood declaration during July of 2013.

Image Source: <http://www.connectednation.org/publicsafety>

# Earthquakes

0.1-s SA with 10% in 50 year PE. BC rock. 2008 USGS

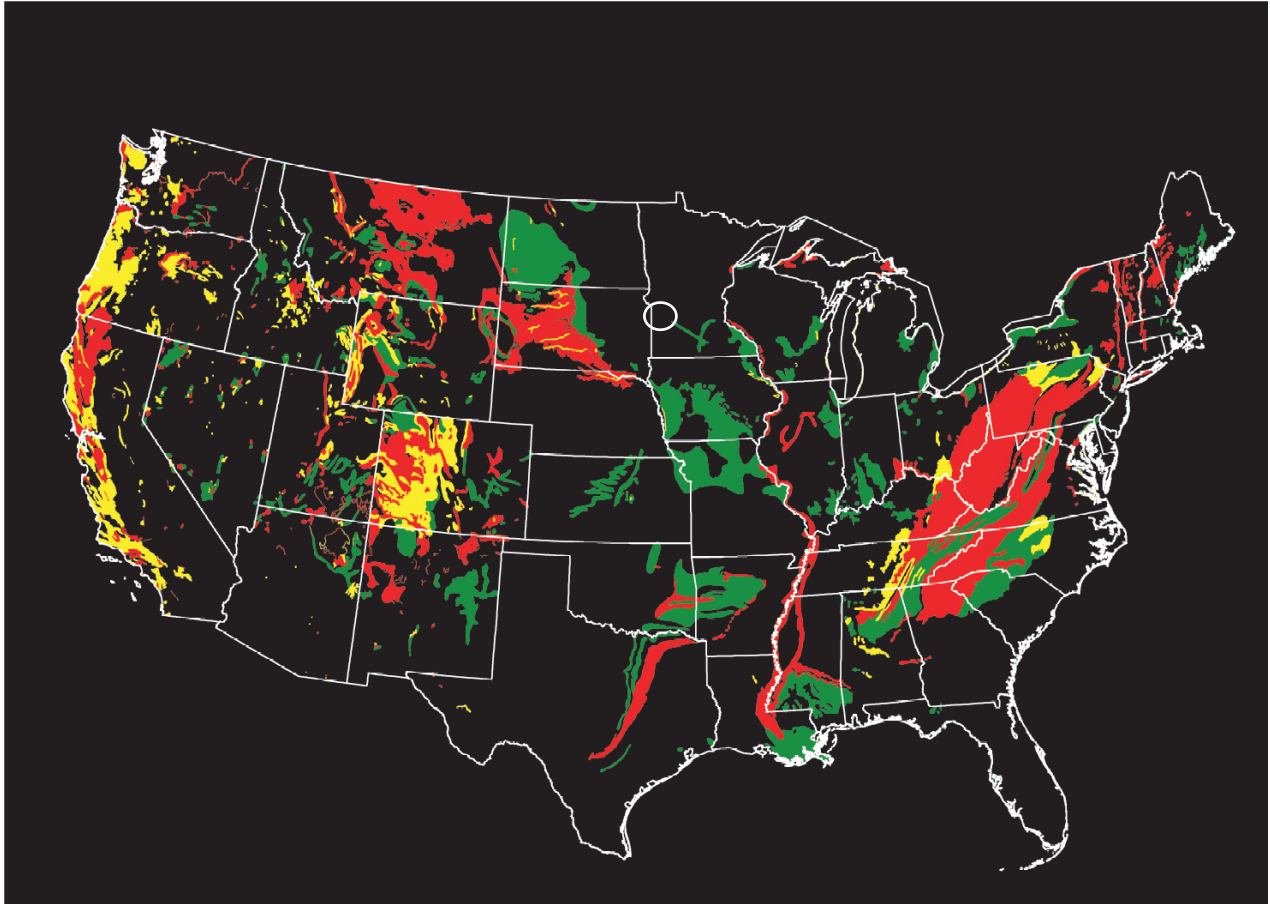


This map identifies the Probability of Exceedance for the United States at 10% in 50 years. The map measures probabilistic ground motion. All 5 counties in our region are below 3% g and therefore have a relatively low seismic risk and will not conduct an earthquake risk assessment.

**Image Source:**

<http://earthquake.usgs.gov/hazards/products/conterminous/2008/maps/us/10hzSA.10in50.usa.jpg>

## Landslides

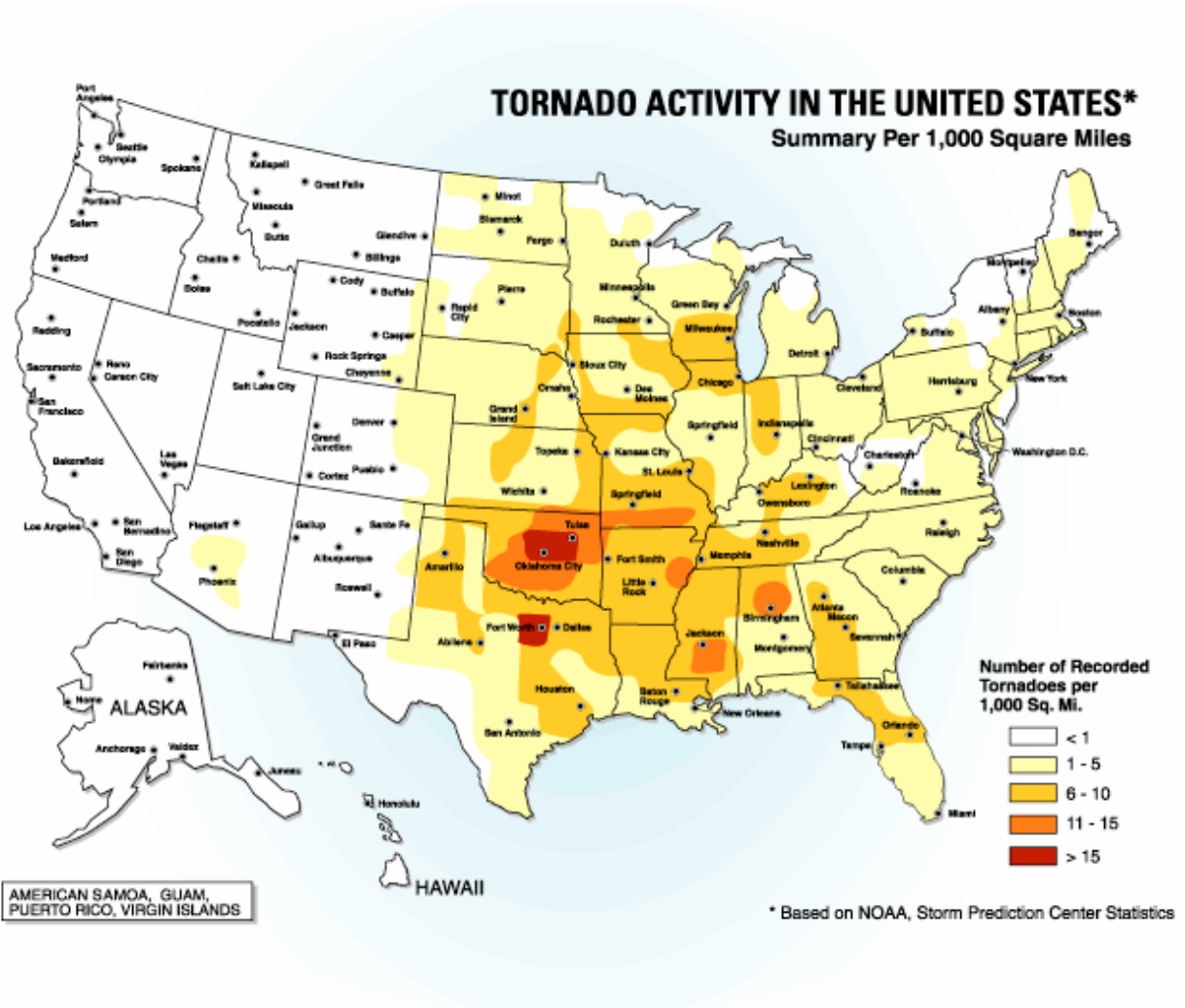


There is very low susceptibility for landslides in Big Stone County.

**Image Source:** <http://pubs.usgs.gov/fs/2005/3156/2005-3156.pdf>

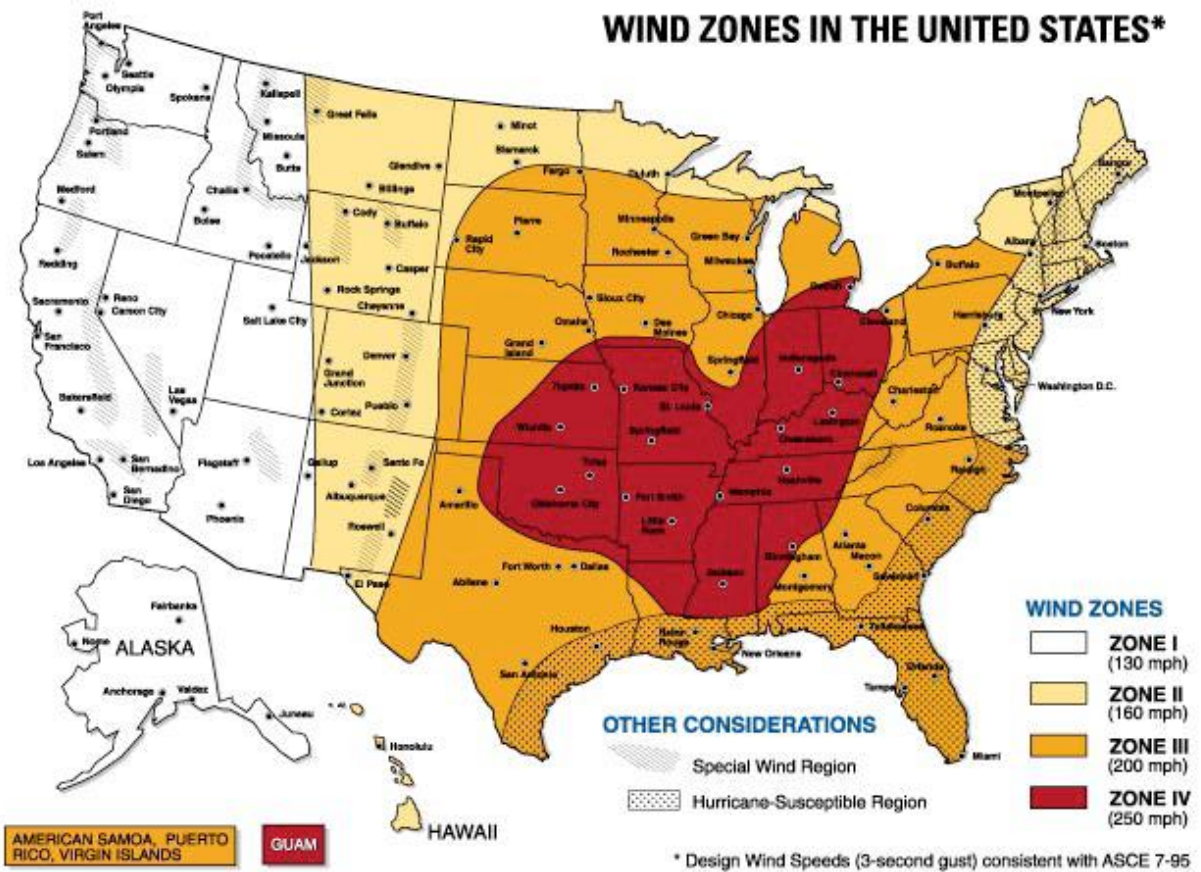


# Tornados



Tornados in Chippewa County fall in the range of 1-5 tornados every 1,000 miles and are within Wind Zone Three (200mph). The combination of these effect put Big Stone County at a “High Risk” for a tornado.

Image Source: <http://www.fema.gov/pdf/library/ism2.pdf>



Big Stone County is located in Wind Zone III (potential for 3-second gusts up to 200 mph). Straight line winds have been an increasing issue in the county causing sizable property damage.

Image Source: <http://www.fema.gov/pdf/library/ism2.pdf>

## APPENDIX 5: CLIMATIC CONDITIONS FOR THE 1997 FLOOD EVENT

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### Spring Flooding of 1997

#### Contributing Climatic Conditions

#### 1. Heavy autumn precipitation

- much of Minnesota **six or more** inches in late October and November of 1996
- many areas **four or more** inches **above** normal
- most of Minnesota in **95th percentile** (one in 20-year event)

#### 2. Extraordinary winter snowfall

- much of Red River and Upper Minnesota River Basins over six feet of snowfall
- some areas over eight feet of snowfall
- many areas two to three times average snowfall
- over 40 percent of Red River Basin (Minnesota portion) and uppermost reaches of Minnesota basin in 99th percentile (near or exceeding record snowfall)
- two thirds of Red River reach in 99<sup>th</sup> percentile
- historically no greater area of Red River Basin in record snowfall category in any past season
- 1996-97 snowfall exceeded 1896-97 (severe Red River flooding a century ago) snowfall by 25 to 50 percent in much of Red River Basin (Minnesota portion)
- less than 10 percent of basin covered by record snowfall in 1896-97
- discussions of earlier Red River flooding are available below

#### 3. Less than ideal snowmelt scenario

- few mid and late winter melting days
- large temperature fluctuations in early April
- up to 10 degrees above normal in first week of month
- up to 20 degrees below normal in second week of month

#### 4. Heavy early spring precipitation

- two or more inches of precipitation (rain and snow) in western Minnesota April 5-6, 1997
- normal monthly April precipitation approximately two inches for region

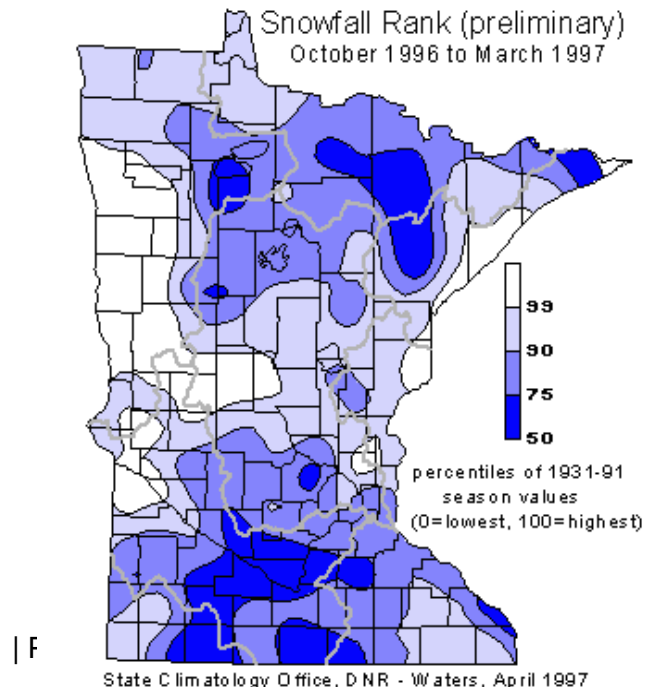
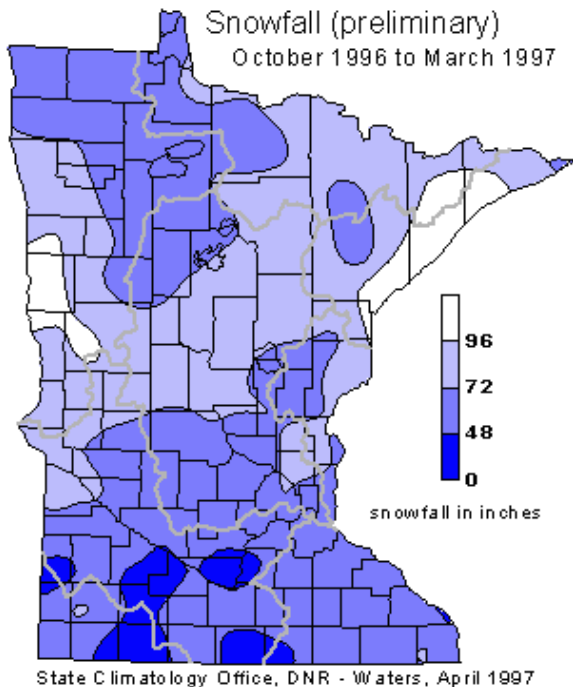
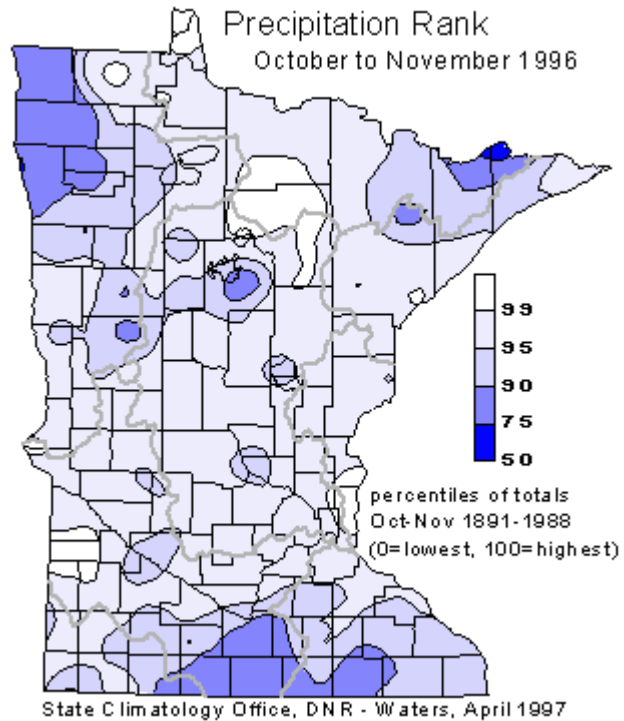
## Fall/Winter of 1996-97

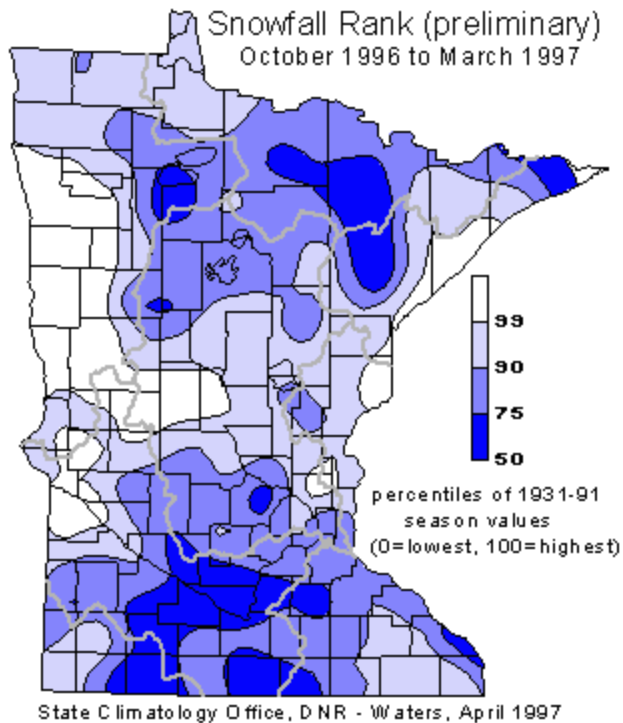
### 1. Heavy autumn precipitation

Much of Minnesota received **six or more** inches of precipitation in late October and November, 1996. For many areas such amounts were **four or more inches above** normal. Over most of Minnesota, such amounts ranked above the **95th percentile**, that is, a one in 20-year event.

### 2. Extraordinary winter snowfall

Over the course of the 1996-97 winter, much of Red River and Upper Minnesota River Basins, and the north shore of Lake Superior received over **six feet** of snowfall. Some areas ended up with over **eight feet**. Those amounts were as much as **two to three times average** snowfall. At Fargo, for instance, 117.0 inches fell in the 1996-97 season, which may be compared with their long-term average snowfall of 38.9 inches and their old seasonal record of 89.1 inches.

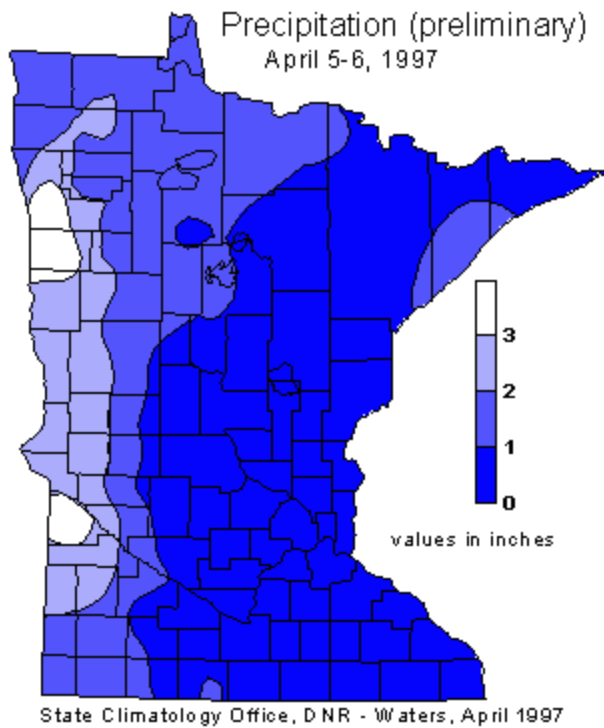




The snowfall map shows that the heaviest snows extended eastward from the Fargo area to the north shore of Lake Superior. In much of the Red River Valley, the upper reaches of the Minnesota River, and along the north shore, those snowfalls were **very near or above the record** conditions in the 60 seasons from 1931 to 1991 (that is, the areas that Ranked 99th percentile or greater).

### 3. Heavy early spring precipitation

At the beginning of the melt period, on April 5-6, 1997, **two or more** inches of precipitation (rain and snow) occurred in western MN. At Crookston, 3.63 inches fell in two days. In an 100 year record there, the largest two-day total for March or April had been 2.35 inches. Normal **monthly** April precipitation is approximately two inches for the region.



#### 4. Less than ideal snowmelt scenario

This season, few mid and late winter melting days occurred. Large temperature fluctuations occurred in early April. Temperatures were up to **10 degrees above normal** in the first week of month followed by up to **20 degrees below normal** in second week of the month.

## APPENDIX 6: CLIMATIC CONDITIONS FOR THE 2001 FLOOD EVENT

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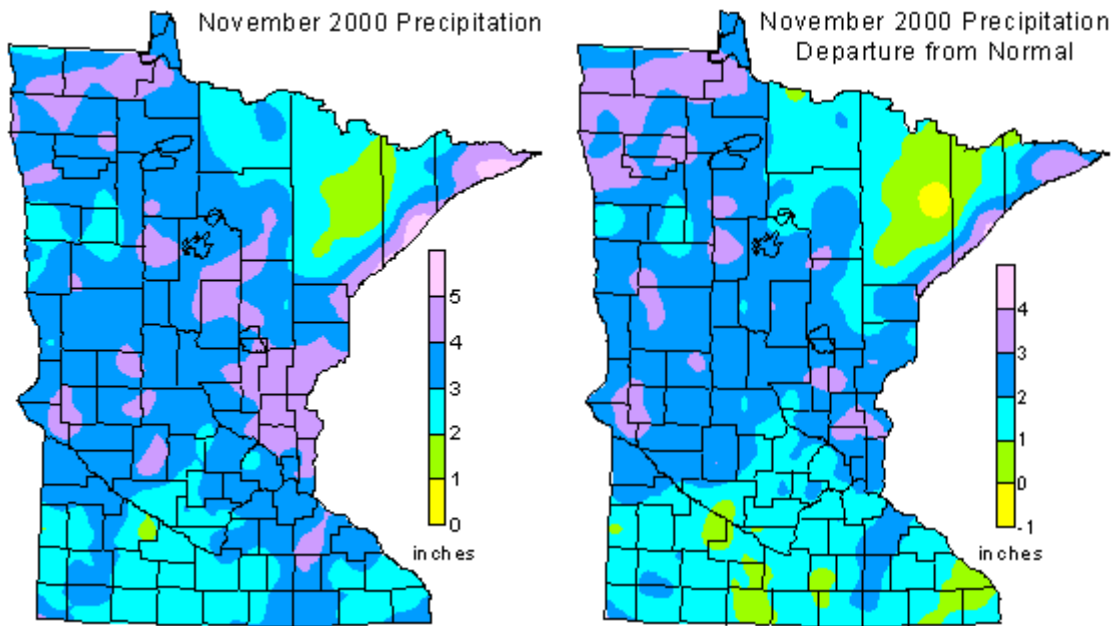
### **Climatic Conditions Leading to the Spring Flooding of 2001**

Major flooding occurred along many of Minnesota's rivers during April 2001. The flooding was caused by four contributing climatic factors:

- **significant autumn precipitation**
- **heavy winter snowfall**
- **less than ideal snowmelt scenario**
- **record-breaking April precipitation**

#### **1) Significant Autumn Precipitation**

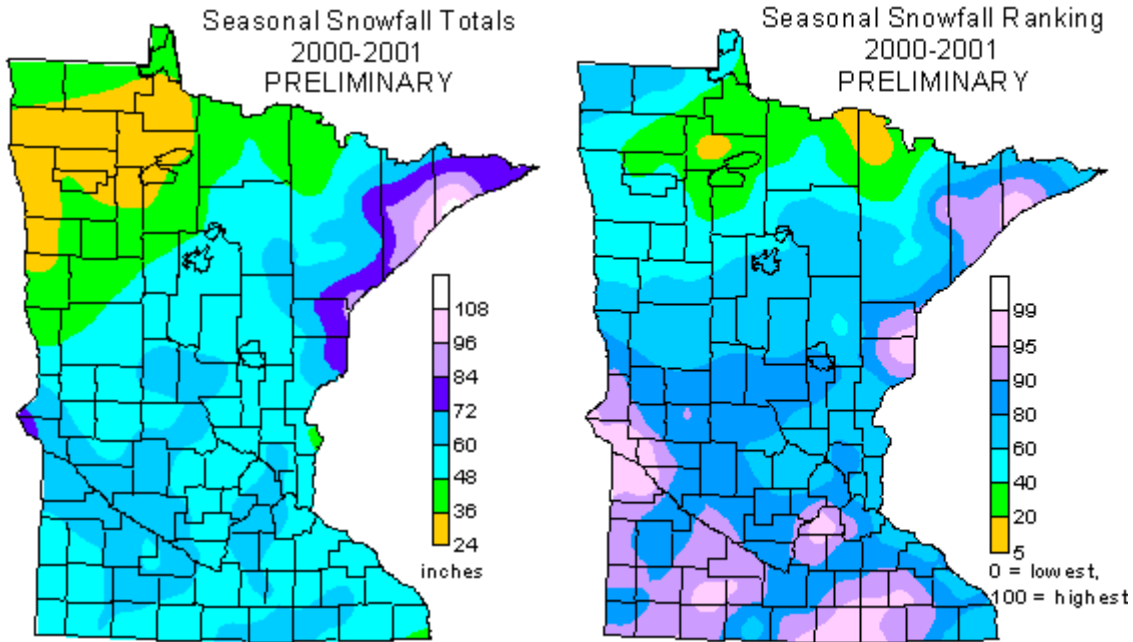
Many southwestern, central, and east central Minnesota locations entered November with water deficits due to below normal growing season rainfall. However, heavy early November rains filled the upper portions of the soil profile before soil freeze-up. The figures below show that November 2000 precipitation exceeded the historical average by more than two inches in many locations.



## 2) Heavy Winter Snowfall (2000-2001)

Mid- and late-November snows blanketed much of the state with a lasting snow cover that was to persist into the early spring. The figure below shows that seasonal snowfall totals exceeding 60 inches were common throughout western and southern Minnesota. Snowfall totals in excess of 72 inches were reported in northeastern Minnesota. As seen below, snowfall totals in 2000-2001 ranked above the 80th percentile across much of southern, western, and northeastern Minnesota. In some communities, seasonal snowfall exceeded the 95th percentile. Normal annual snowfall in the southern one half of Minnesota ranges from 36 inches in the west to around 50 inches in the east. 2000-2001 snowfall topped the historical average by approximately two feet in western Minnesota, and by more than 18 inches in most southern Minnesota counties. Snow water equivalent in the snow pack at the end of the season was three to five inches in many areas. While 2000-2001 snowfall was heavy in many communities, the snowfall totals were far less than the 72 to 96 inch totals that covered most of the Red River basin and much of the Upper Minnesota River Basin in [1997](#).



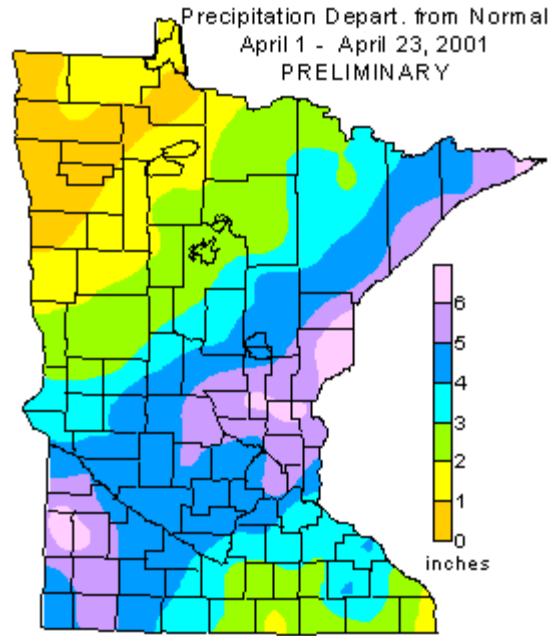
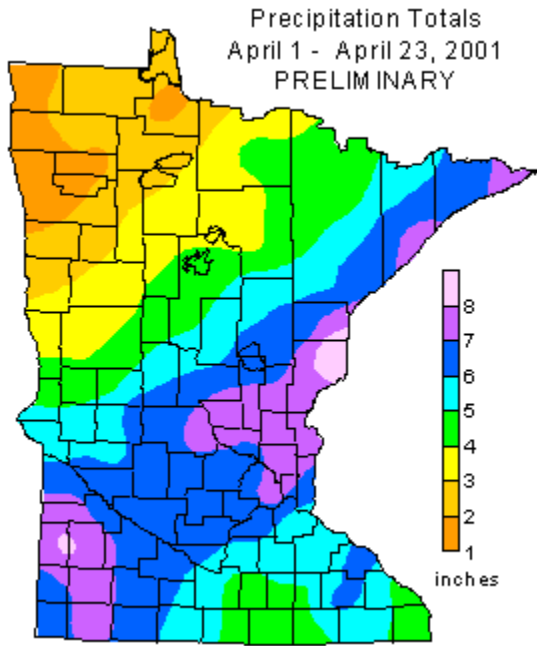


### 3) Less Than Ideal Snowmelt Scenario

The winter of 2000-2001 provided very few mid and late-winter melting days. While January was relatively mild, temperatures were still cold enough to retain most of the snow cover established during November and December. February was quite cold, finishing four to eight degrees below normal. March temperatures were three degrees below normal. The snow pack gradually diminished in depth throughout March, nevertheless snow water content did not change appreciably. Much of the melt water stayed on the landscape in the micro-relief.

### 4) Record-breaking April Precipitation

Extraordinarily heavy precipitation fell across much of Minnesota in April 2001. The figure below shows that a broad swath of southwestern, central, east central, and northeastern Minnesota received over six inches of precipitation from April 1 to April 23, 2001. Precipitation totals surpassed the historical average by more than four inches in these areas. For many communities, all-time April monthly precipitation records were set before the month came to a close.



[Return to the Climate Journal](#)

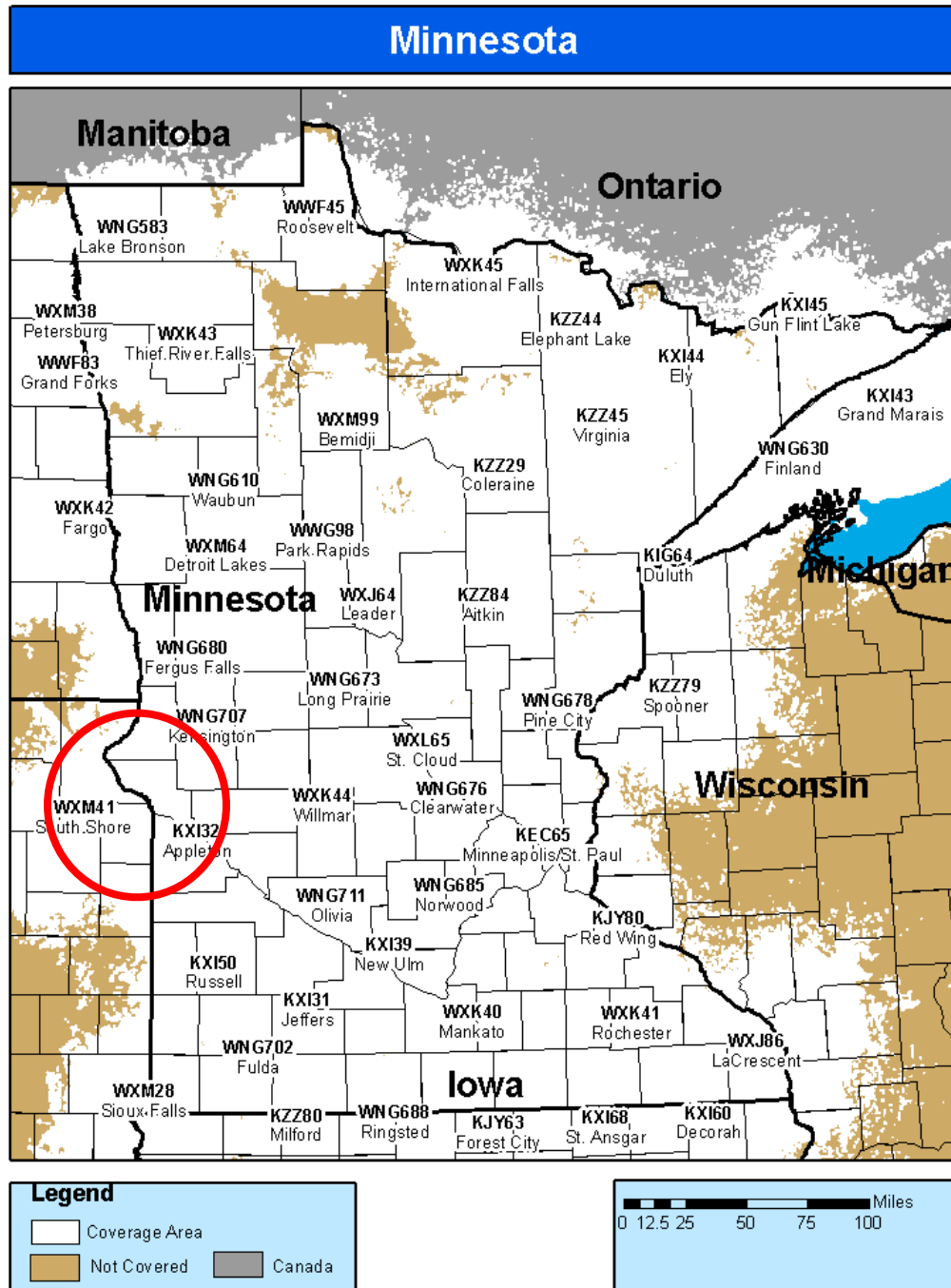
[mcwg@soils.umn.edu](mailto:mcwg@soils.umn.edu)

URL: [http://climate.umn.edu/doc/flood\\_2001/flood\\_2001.htm](http://climate.umn.edu/doc/flood_2001/flood_2001.htm)

Last modified: April 24, 2001

# APPENDIX 7: NOAA WEATHER RADIO BROADCASTS

## Minnesota Weather Radio Broadcast Coverage (2010)

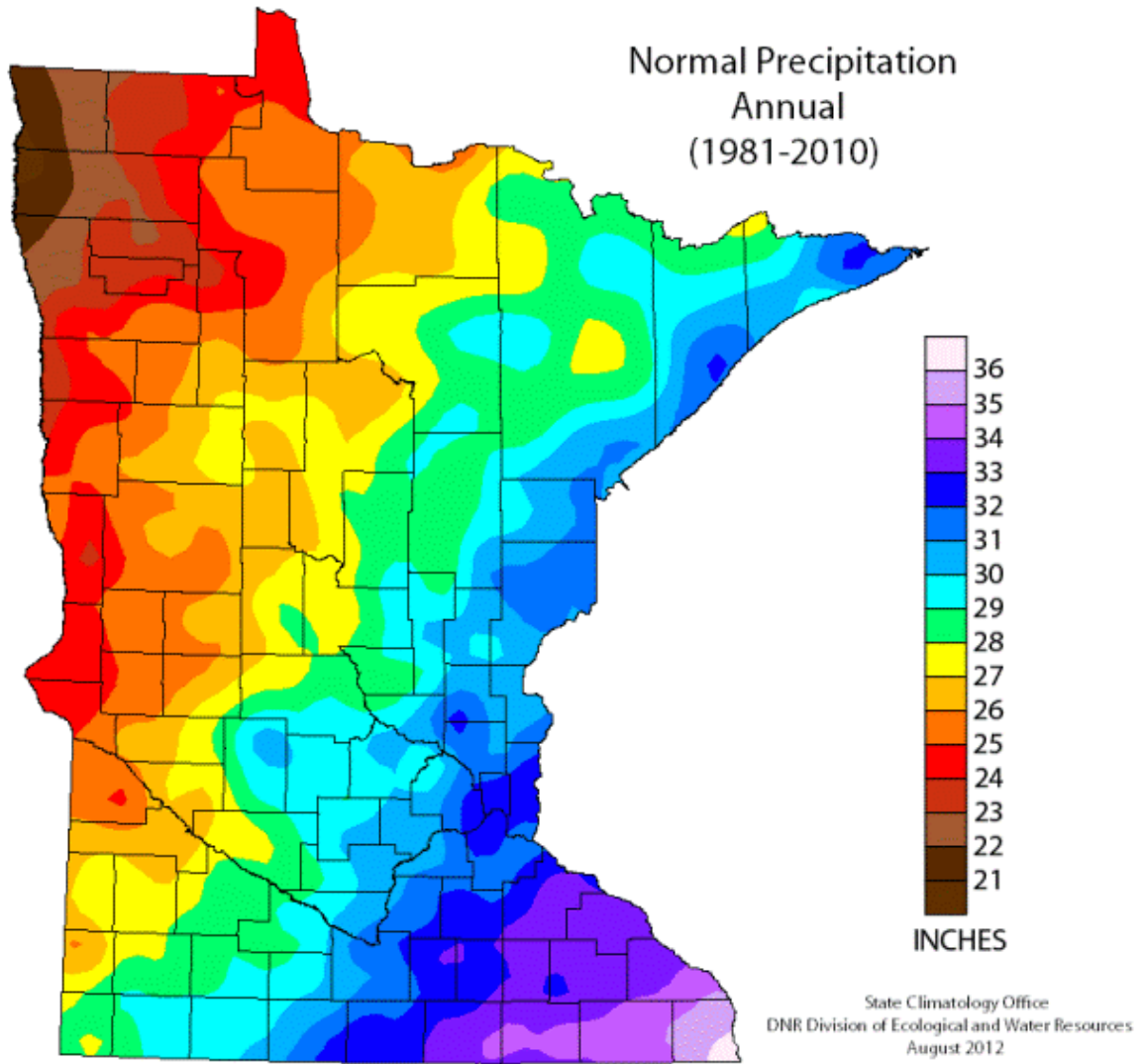


Big Stone County is covered by Appleton KX132 and South Shore WXM41.

Image Source: <http://www.nws.noaa.gov/nwr/Maps/PHP/MN.php>

## APPENDIX 8: NORMAL ANNUAL PRECIPITATION

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Big Stone County normally receives between 24 and 26 inches of precipitation annually.

**Image Source:** [http://www.dnr.state.mn.us/climate/summaries\\_and\\_publications/precip\\_norm\\_1981-2010\\_annual.html](http://www.dnr.state.mn.us/climate/summaries_and_publications/precip_norm_1981-2010_annual.html)

## APPENDIX 9: INVENTORY OF HAZARDOUS MATERIAL SPILLS

| Spill Date | Spill Name   | City       | Spilled Product                    | Quantity Released    | Initially Reported Source Of Spill |
|------------|--|------------|------------------------------------|----------------------|------------------------------------|
| 06/19/2009 | Barrel/Container Spill                                   | Beardsley  | Unknown                            | Unknown              | Barrel/Container                   |
| 01/02/2015 | Beardsley Diesel Fuel Spill                              | Beardsley  | Diesel Fuel                        | 50-60 gallons        |                                    |
| 10/16/2007 | Anhydrous Tank in Road Ditch                             | Clinton    | Fertilizer/Anhydrous Ammonia Tank  | Unknown              | Truck/Vehicle Cargo                |
| 06/16/2002 | Farm Spill   | Clinton    | Agriculture Pesticide/Fertilizer   | 30 Gallons           | Hose/Pipe                          |
| 08/19/2008 | Border States Coop @ City of Clinton                     | Clinton    | Pesticide                          | 3 Gallons            | Barrel/Container                   |
| 10/29/2011 | Lismore Hutterite Colony                                 | Clinton    | Turkey Manure                      | Unknown              | Unknown                            |
| 07/19/213  | Border States Coop                                       | Clinton    | Herbicide                          | 95-105 gallons       | Unknown                            |
| 05/02/2015 | CHS Spill  | Clinton    | Dry Fertilizer                     | 75 gallon            | Unknown                            |
| 08/01/2012 | Alexandria Waste Management                              | Graceville | Hydraulic Oil                      | Less than 20 gallons | Unknown                            |
| 07/04/2013 | Lismore Hutterite Colony                                 | Graceville | Unknown (odor)                     | Unknown              | Unknown                            |
| 04/02/2015 | BNSF   | Johnson    | Unknown                            | Unknown              | Grain Cars                         |
| 04/21/2012 | Otter Tail Power Company                                 | Odessa     | Transformer Oil                    | Less than 8 gallons  | Unknown                            |
| 01/25/2007 | Big Stone City, South Dakota, Grant County, Sewage       | Ortonville | Sewage/Wastewater                  | Unknown              | Pipeline                           |
| 10/26/2006 | Ortonville Force Main Break                              | Ortonville | Sewage/Wastewater                  | Large Amount         | Hose/Pipe                          |
| 11/22/2007 | Valley Queen Milk Spill on Highway 12                    | Ortonville | Other                              | 6,000 Gallons        | Truck/Vehicle Cargo                |
| 03/14/2002 | Bulk Site  | Ortonville | No data                            | No data              | No data                            |
| 04/15/2005 | Ortonville Public School                                 | Ortonville | No data                            | No data              | UST (including Dispenser/Hose)     |
| 05/15/2002 | Highway 7  | Ortonville | Fertilizer (Not Anhydrous Ammonia) | 1,000 Lbs            | Truck/Vehicle Cargo                |
| 06/03/2007 | Ortonville Force Main Break                              | Ortonville | Sewage/Wastewater                  | 2,500 Gallons        | Hose/Pipe                          |
| 06/02/2008 | Abandoned Cabin - Fuel Oil Release to Debris             | Ortonville | Light Fuel/Oil & Diesel            | 30 Gallons           | AST (including lines)              |
| 07/10/2007 | Ortonville Public School – Small HG Spill in Boiler Room | Ortonville | Mercury                            | 1 Ounce              | Other                              |
| 08/12/2008 | Oil Guys Express Lube – Oil Spill Complaint              | Ortonville | Used/Waste Oil                     | Small Amount         | AST (including lines)              |

|            |                                 |            |                                  |         |                               |
|------------|---------------------------------|------------|----------------------------------|---------|-------------------------------|
| 06/20/2010 | Border States Coop              | Ortonville | Fungicide                        | 1 quart | Unknown                       |
| 07/01/2010 | West-Con Grain Elevator         | Ortonville | Grain Dust (possible fertilizer) | Unknown | Unknown                       |
| 06/07/2012 | MnDOT                           | Ortonville | Asbestos                         | Unknown | Bridge Reconstruction Project |
| 02/11/2013 | City of Ortonville- Water Plant | Ortonville | Chlorine                         | Unknown | Unknown                       |
| 07/01/2014 | Resident                        | Ortonville | Herbicide                        | Unknown | Unknown                       |

Source: Minnesota Pollution Control Agency, 2014

## APPENDIX 10: EXAMPLE CITY SURVEY

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### City Land Use

City: \_\_\_\_\_

Date of last Land Use Survey: \_\_\_\_\_

| Land Use             | Parcels | Acres | Percent |
|----------------------|---------|-------|---------|
| Agriculture          |         |       |         |
| Residential          |         |       |         |
| Commercial           |         |       |         |
| Industrial           |         |       |         |
| Public Institutions  |         |       |         |
| Religious/Non-Profit |         |       |         |
| Parks                |         |       |         |
| General Open Space   |         |       |         |
| Water                |         |       |         |
| Floodplain           |         |       |         |
| Other _____          |         |       |         |

## City Risk Assessment Survey – Part 1

City: \_\_\_\_\_

Most Recent Population Count: \_\_\_\_\_ as of \_\_\_\_\_

|  |              |
|--|--------------|
| 1. Have any hazardous events occurred in your city since 2010? Include date, specific event data, affected areas, amount of loss, etc. |              |
| 2. Are there new hazards in your community?  |              |
| 3. Are there any vulnerable structures in: hazard areas, redeveloped areas, or recently annexed areas?                                 |              |
| 4. In proposed annexation areas, are there or will there be more structures in hazard areas?   |              |
| 5. How much land has been annexed in the past 10 years? What are the new land uses of the newly annexed land?                          |              |
| 6. Have any new buildings for high-risk populations been constructed in your city?   |              |
| 7. What actions (if any) have been taken to reduce the vulnerability of these high-risk populations?                                   |              |
| 8. What general types of development are located in 100 and 500 year floodplains?  | 100:<br>500: |
| 9. What are future development opportunities in the 100 and 500 year floodplains?  | 100:<br>500: |



|   |   |
|---|---|
| 10. Based on the City Comprehensive Plan (if applicable), what areas have been identified for future growth?                          |   |
| 11. Are there any unique natural features, natural areas, or other environmental and aesthetic attributes present in the floodplains? |   |
| 12. Have land uses for the parcels in your city changed since 2010? If so, which ones and to what?                                    |   |
| 13. Does your city have an up-to-date zoning map? Is there an electronic version?   |   |
| 14. Have there been any new city facilities built in your city since 2010?  |   |
| 15. Have any new telecommunication and/or power facilities been built in your city since 2010?  |   |
| 16. Have there been any new hospitals/clinics built in your city since 2010?  |   |
| 17. How many ambulances (if any) does your city currently have?   |   |
| 18. Fire Department Numbers   | Firemen _____<br>Pumpers _____<br>Tankers _____<br>Grass Rig/Truck _____<br>Aerial/Ladders _____<br>Air Packs _____ |
| 19. Law Enforcement Numbers   | Full-Time Officers _____<br>Part-Time Officers _____<br>Squad Cars _____  |

## Mitigation Strategies and Objectives

City: \_\_\_\_\_

|   |  |
|---|--|
| <p>1. What mitigation strategies have your City completed since 2010?</p>                                 |  |
| <p>2. What mitigation objectives has your City worked toward since 2010?</p>                              |  |
| <p>3. Would you make any changes to the previous Hazard Mitigation Plan: Goals/Objectives/Strategies?</p> |  |

# Inventory of Community Assets

City: \_\_\_\_\_

Date of Value Assessment: \_\_\_\_\_

Please list all community assets in your city, including the building size, replacement value, and the value of its contents and its function.

| Name of Asset                  | Building Size (Sq.Ft) | Replacement Value (\$) | Content Value (\$) | Function Value (\$) |
|--------------------------------|-----------------------|------------------------|--------------------|---------------------|
| <b>Major Employers</b>         |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
| <b>Business Districts</b>      |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
| <b>Industrial Businesses</b>   |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
| <b>Multi-Family Housing</b>    |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
| <b>Historical Structures</b>   |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
| <b>Institutional Buildings</b> |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
| <b>Schools</b>                 |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |
|                                |                       |                        |                    |                     |

**Big Stone County All-Hazard Mitigation Plan  
Task Force Meeting #1: Hazard Identification**

July 24, 2014

7:00pm – 8:30pm

Memorial Building, Clinton

**Agenda**

- 7:00 Task Force Introductions**
- 7:05 Overview of Planning Process**
  - Hazard Mitigation: Purpose and Plan
  - Timeline for Project
  - Public Participation
- 7:20 Hazard Identification**
  - Historical Hazards
  - Gaps and Deficiencies
  - New Hazards
- 8:15 Questions and Next Meeting: Risk Assessment**
- 8:20 Brief Meeting with City Representatives**

## FOR IMMEDIATE RELEASE

### **ALL-HAZARD MITIGATION PLANNING TO HELP CREATE SAFE, SUSTAINABLE COMMUNITIES**

Big Stone County, MN – Floods, earthquakes, and tornadoes are all functions of the natural environment and become hazardous when they threaten our built environment with destruction. Each year billions of dollars are spent by federal, state, and local governments, not to mention individuals, in response to and recovery from natural disasters. Lives are lost or devastated; property is demolished or devalued; the economic viability of communities is impacted for years to come.

Many techniques have proven effective in reducing or eliminating long-term effects of natural disasters. Such mitigation techniques, when undertaken before the next flood, earthquake or tornado, can lessen the likelihood that a natural hazard will become a disaster. It is important that community planning incorporates hazard mitigation to make a community a safer place to live and work and a more sustainable environment for generations to come.

As a result of the Disaster Mitigation Act of 2000, FEMA required that in order to be eligible for Hazard Mitigation Grant Program (HMGP) funds, a local unit of government (county, city, township) must first have in place a multi-hazard mitigation plan. Big Stone County completed the necessary All-Hazard Mitigation Plans between 2009 and 2010. In order to continue to be eligible for HMGP funds, all counties must update their completed plans within five years.

Chippewa, Big Stone, and Yellow Medicine counties with the assistance of the Upper Minnesota Valley Regional Development Commission (UMVRDC) will update the All-Hazard Mitigation plan to meet the requirements of the Disaster Mitigation Act of 2000. All cities and townships are eligible to participate in the county plan instead of completing one on their own. The process to update, write, review and submit should take approximately 18 months to complete.

It is a goal of Big Stone County to involve a great variety of people to ensure that key interests and issues are not left out and to increase the chance for lasting solutions. A task force will be assembled to represent all participating entities (county, cities, and townships) and to guide the planning process. At least three public meetings will be held to solicit information, ideas, and comments. Press releases will provide periodic updates.

The first local task force meeting for the **Big Stone County All-Hazard Mitigation Plan** will occur on Thursday July 24<sup>th</sup>, 2014 at 7:00pm, at the Memorial Building in Clinton. The main task will be to identify potential hazards. The public is invited to attend and participate in this meeting. Input from the public is extremely important and encouraged. If you have any questions, please contact Emily Zeug-Robertson, UMVRDC, at 320-289-1981 or [emily.zeugrobertson@umvrdc.org](mailto:emily.zeugrobertson@umvrdc.org).

###

**Big Stone County Hazard Mitigation  
Task Force Meeting #1**

| Name                    | Email Address                 | Organization/Government            |
|-------------------------|-------------------------------|------------------------------------|
| Kristi Fernholz + Emily | Zeng-Bobersten                | UMVRC                              |
| DEAN JENSEN             | DM JENSEN @ CENTURY TEL. NET  | ESSENTIAL HEALTH & CITY OF GREGORY |
| Jim Hassler             | jimhassler@hotmail.com        | Emergency Mgmt / Ottumwa City      |
| Bill Stallman           |                               | Township Foster                    |
| Shirley Zumburg, Mayor  |                               | City of Christian                  |
| Neva Foster             |                               | Ottumwa Area Health                |
| Mark Kleindl            |                               | Township                           |
| Gert Hull               | 320-808-8834                  | Big Stone Co - Comm. #1            |
| David Stolberg          | clintonmn@notes.net.com       | City of Clinton                    |
| Paul Mason              | PBSMAAS@FEDTELDIRECT.NET      | Ottumwa Township                   |
| Honda Tobias            | Honda@countryside.roswitmn.us | Countryside P.A.                   |
| Bert Olson              | boolson@fedteldirect.net      | Big Stone County                   |
|                         |                               |                                    |
|                         |                               |                                    |
|                         |                               |                                    |
|                         |                               |                                    |
|                         |                               |                                    |
|                         |                               |                                    |

**Big Stone County All-Hazard Mitigation Plan  
Task Force Meeting #2: Risk Assessment**

September 18<sup>th</sup>, 2014

7:00-8:30pm

Memorial Building, Clinton

**Agenda**

- 7:00** Task Force Introductions and Public Comment
- 7:15** Hazard Inventory Review
- 7:30** Risk Assessment Activity
- 8:00** Discussion/Questions and Next Meeting: Mitigation Strategies
- 8:05** Meeting with City Representatives

FOR IMMEDIATE RELEASE

**BIG STONE COUNTY ALL-HAZARD MITIGATION**  
**PUBLIC MEETING TO BE HELD SEPTEMBER 18<sup>TH</sup>, 2014**

A meeting for the Big Stone County All-Hazard Mitigation Plan will take place on **September 18<sup>th</sup>, 2014 at 7:00p.m. at the Memorial Building in Clinton.** The primary tasks will be to discuss city risk assessments and perform a hazard inventory analysis for Big Stone County. Background information for Big Stone County's Hazard Inventory will be available at <http://www.umvrdc.org> under "What's New at UMRDC" starting September 15<sup>th</sup>, 2014. Comments on the material posted can be made by emailing [emily.zeugrobertson@umvrdc.org](mailto:emily.zeugrobertson@umvrdc.org) or by calling 320-289-1981 x 104. Public input and attendance at meetings is extremely important and encouraged.

As a result of the Disaster Mitigation Act of 2000, FEMA requires local units of government to update their All-Hazard Mitigation Plan every 5 years in order to continue to be eligible for Hazard Mitigation Grant Program (HMGP) funds. Big Stone County, with the assistance of the Upper Minnesota Valley Regional Development Commission (UMVRDC), is in the process of updating their All-Hazard Mitigation Plan for 2015 that meets FEMA requirements. FEMA has provided part of the funding necessary to complete this plan. The projects listed in this plan will be eligible for future HMGP funds.

If you cannot attend this meeting but would like to be involved, or if you have any questions, please contact Emily Zeug-Robertson at 320-289-1981 or [emily.zeugrobertson@umvrdc.org](mailto:emily.zeugrobertson@umvrdc.org)

###



**Big Stone County Hazard Mitigation  
Task Force Meeting #2**

| Name              | Email Address            | Organization/Government |
|-------------------|--------------------------|-------------------------|
| Edward Holker     |                          | Foster Insp.            |
| Bill Stallman     |                          | Foster Insp.            |
| Jim Hasslem       |                          | Big Stone City EM       |
| WALT WULFF        |                          | B.S.Co. Commissioner    |
| Scott Boyer       |                          | Grainlb Council         |
| DEAN JENSEN       | DMJENSEN@CENTURYLINK.NET | CITY OF GRAYVILLE       |
| Dianne Radomacher |                          | UMRWD                   |
| Kristi Fernholz   |                          | UMVRDC                  |
| Caren Koch        |                          | BSC EM                  |
|                   |                          |                         |
|                   |                          |                         |
|                   |                          |                         |
|                   |                          |                         |
|                   |                          |                         |

**Big Stone County All-Hazard Mitigation Plan  
Task Force Meeting #3: Mitigation Strategies**

November 13, 2014

7:00-8:30pm

Memorial Building, Clinton

**Agenda**

- 7:00** Task Force Introductions
- 7:05** Review Hazard Priority List
- 7:15** Identification of Completed and New Strategies
- 8:15** Plan Maintenance and Implementation
- 8:30** Questions/Comments – Next meeting will be held March/April 2015.

**Big Stone County Hazard Mitigation**  
Task Force Meeting #3

| Name              | Contact | Organization/Government |
|-------------------|---------|-------------------------|
| Dianne Rademacher |         |                         |
| Jim Hassler       |         |                         |
| Curtis Poe        |         |                         |
|                   |         |                         |
|                   |         |                         |
|                   |         |                         |
|                   |         |                         |
|                   |         |                         |
|                   |         |                         |
|                   |         |                         |
|                   |         |                         |
|                   |         |                         |

**Big Stone County All-Hazard Mitigation Plan**  
**Task Force Meeting #4: Public Meeting and Final Draft Review**  
May 21, 2015  
7:00-8:30pm  
Memorial Building, Clarkfield

**Agenda**

- 7:00** Welcome
- 7:05** Plan Additions
- Addition of Erosion – Gaps and Deficiencies or Strategies
  - Hazus Flood Analysis
  - Addition of State Parks to Violent Storm Strategies
  - Review Prioritization of Natural and Manmade Hazard Strategies
- 7:15** Plan Review
- Previous Feedback – Changes already made
  - Task Force and Public Comments
- 7:45** Information still needed
- 8:15** Next Steps
- 8:30** Adjourn

**PRESS RELEASE**

**Notice of Public Meeting**

May 1, 2015

FOR IMMEDIATE RELEASE

**PUBLIC MEETING TO BE HELD MAY 14TH, 2015\***

**FOR BIG STONE COUNTY ALL-HAZARD MITIGATION PLAN REVIEW**

A public meeting for the Big Stone County All-Hazard Mitigation Plan will take place on **May 14<sup>th</sup>, 2015 at 7:00pm in the Memorial Building in Clinton**. The primary task for the meeting will be to hear public comment and suggestions on the Big Stone County All-Hazard Mitigation Plan draft. A copy of the draft plan is available at [www.umvrdc.org](http://www.umvrdc.org) under "What's New at UMRDC". Comments on draft plan can also be made by emailing [emily.zandt@umvrdc.org](mailto:emily.zandt@umvrdc.org) or by calling 320-289-1981 x 104. Input from the public is extremely important and encouraged.

As a result of the Disaster Mitigation Act of 2000, FEMA requires local units of government to update their All-Hazard Mitigation Plan every 5 years in order to continue to be eligible for Hazard Mitigation Grant Program (HMGP) funds. Big Stone County, with assistance from the Upper Minnesota Valley Regional Development Commission (UMVRDC), is in the process of updating their All-Hazard Mitigation Plan for 2015 which will meet FEMA requirements. FEMA has provided a portion of the funding necessary to complete this plan. The projects listed in this plan will be eligible for future HMGP funds.

If you cannot attend this meeting but would like to provide input, or if you have any questions, please contact Emily Zandt at 320-289-1981 x 104 or [emily.zandt@umvrdc.org](mailto:emily.zandt@umvrdc.org)

**###**

\*Notice of date change to May 21<sup>st</sup>, 2015 sent and printed.

**Big Stone County Hazard Mitigation  
Task Force Meeting #4**

| Name             | Contact | Organization/Government    |
|------------------|---------|----------------------------|
| Scott Bauer      |         | Graceville                 |
| Jim Hassler      |         | Big Stone EM               |
| Bill Stallman    |         | Foster Boardman            |
| Audrey Rohrlan   |         | Graceville, Mayor          |
| Amber Andahl     |         | Country side Public Health |
| Milton Stenstrom |         | Antelope                   |
| Mark Klemm       |         | Toga Township              |
| Dawn Hob         |         | Big Stone Em               |
|                  |         |                            |
|                  |         |                            |
|                  |         |                            |
|                  |         |                            |
|                  |         |                            |
|                  |         |                            |
|                  |         |                            |
|                  |         |                            |

APPENDIX 12: CITY AND COUNTY PLAN ADOPTION

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# County Capabilities Checklist

| County Name                                      |             |                               |                                  |   |                      |   |                            |
|--|-------------|-------------------------------|----------------------------------|---|----------------------|---|----------------------------|
| Reviewer   |             |                               |                                  |   |                      |   |                            |
| CAPABILITIES                                     | WE HAVE ONE | THIS PLAN IS AVAILABLE ONLINE | POINT PERSON IS ON PLANNING TEAM | POINT PERSON SHOULD BE ON PLANNING TEAM | POINT PERSON CONTACT | LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN | OTHER POINT PERSON CONTACT |
| Local Planning Plans and Tools                   |             |                               |                                  |   |                      |   |                            |
| Capital Improvement Plan                         |             |                               |                                  |   |                      |   |                            |
| Redevelopment Plan                               |             |                               |                                  |   |                      |   |                            |
| Growth Management Plan                           |             |                               |                                  |   |                      |   |                            |
| Emergency Operations Plan                        |             |                               |                                  |   |                      |   |                            |
| County / Local Emergency Plan                    |             |                               |                                  |   |                      |   |                            |
| County / Local Recovery Plan                     |             |                               |                                  |   |                      |   |                            |
| Local Mitigation Plan                            |             |                               |                                  |   |                      |   |                            |
| Economic Development Plan                        |             |                               |                                  |   |                      |   |                            |
| Land-use Plan                                    |             |                               |                                  |   |                      |   |                            |
| Pandemic or Public Health Incident Response Plan |             |                               |                                  |   |                      |   |                            |
| Transportation Plan                              |             |                               |                                  |   |                      |   |                            |
| School Disaster Plan                             |             |                               |                                  |   |                      |   |                            |
| Environment and Natural Resources Plan           |             |                               |                                  |   |                      |   |                            |
| Strategy Implementation Plan                     |             |                               |                                  |   |                      |   |                            |
| County Parks Plan                                |             |                               |                                  |   |                      |   |                            |
| Water / Watershed Management Plan                |             |                               |                                  |   |                      |   |                            |
| SWCD Local Water Management Plan                 |             |                               |                                  |   |                      |   |                            |
| Wildfire Plan                                    |             |                               |                                  |   |                      |   |                            |



|   |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|
| Critical Facilities Plan (Mitigation/Response/Recovery) |  |  |  |  |  |  |  |
| College Campus Plans                                    |  |  |  |  |  |  |  |
| Evacuation Route Map / Plan                             |  |  |  |  |  |  |  |
| Critical Facilities Inventory                           |  |  |  |  |  |  |  |
| Vulnerable Population Inventory                         |  |  |  |  |  |  |  |
| Soil Conservations Plans                                |  |  |  |  |  |  |  |
| Continuity Operations Plan                              |  |  |  |  |  |  |  |
| Storm Water Plan  |  |  |  |  |  |  |  |
| National Flood Insurance Program                        |  |  |  |  |  |  |  |
| Emergency Response Plan                                 |  |  |  |  |  |  |  |
| Emergency Action Plan                                   |  |  |  |  |  |  |  |
| Groundwater Protection Plan                             |  |  |  |  |  |  |  |
| Wellhead Protection Plan                                |  |  |  |  |  |  |  |
| Snow Removal Plan                                       |  |  |  |  |  |  |  |
| Communications Plan                                     |  |  |  |  |  |  |  |
| Regional Development Plans                              |  |  |  |  |  |  |  |
| NFIP Floodplain Management Plan                         |  |  |  |  |  |  |  |
| Emergency Response Plan for Nuclear Generating Plant    |  |  |  |  |  |  |  |
| Local Planning Assistance Mock-Hazard Plan              |  |  |  |  |  |  |  |
| Road Closure Plan                                       |  |  |  |  |  |  |  |
| Human Quarantine Plan                                   |  |  |  |  |  |  |  |
| Wildfire Integrated Response Plan                       |  |  |  |  |  |  |  |

|                                       |  |  |  |  |  |  |  |
|---------------------------------------|--|--|--|--|--|--|--|
| National Fire Plan                    |  |  |  |  |  |  |  |
| Water Emergency and Conservation Plan |  |  |  |  |  |  |  |
| Community Needs Assessment            |  |  |  |  |  |  |  |

| CAPABILITIES   | WE HAVE ONE | THIS PLAN IS AVAILABLE ONLINE | POINT PERSON IS ON PLANNING TEAM | POINT PERSON SHOULD BE ON PLANNING TEAM | POINT PERSON CONTACT | LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN | OTHER POINT PERSON CONTACT |
|--|-------------|-------------------------------|----------------------------------|---|----------------------|---|----------------------------|
| <b>Policies / Ordinance</b>  |             |                               |                                  |   |                      |   |                            |
| Zoning Ordinance   |             |                               |                                  |   |                      |   |                            |
| Building Code  |             |                               |                                  |   |                      |   |                            |
| Planning Ordinance   |             |                               |                                  |   |                      |   |                            |
| Bluff Land Ordinance   |             |                               |                                  |   |                      |   |                            |
| Fire Code  |             |                               |                                  |   |                      |   |                            |
| Floodplain Ordinance   |             |                               |                                  |   |                      |   |                            |
| Subdivision Ordinance  |             |                               |                                  |   |                      |   |                            |
| Nuisance Ordinance   |             |                               |                                  |   |                      |   |                            |
| Storm Water Ordinance  |             |                               |                                  |   |                      |   |                            |
| Drainage Ordinance   |             |                               |                                  |   |                      |   |                            |
| County Park Ordinance  |             |                               |                                  |   |                      |   |                            |
| Site Plan Review Requirements  |             |                               |                                  |   |                      |   |                            |
| Karst Ordinance  |             |                               |                                  |   |                      |   |                            |
| Shoreland Ordinance  |             |                               |                                  |   |                      |   |                            |
| City Ordinance   |             |                               |                                  |   |                      |   |                            |
| Steep Slope Ordinance  |             |                               |                                  |   |                      |   |                            |
| Soil Erosion Control Ordinance   |             |                               |                                  |   |                      |   |                            |
| Sanitary Sewage Treatment System Ordinance / Solid Waste Management Plan & Ordinance |             |                               |                                  |   |                      |   |                            |
| Historic Preservation Ordinance  |             |                               |                                  |   |                      |   |                            |
| Land Use Ordinance   |             |                               |                                  |   |                      |   |                            |
| Methamphetamine Lab Ordinance  |             |                               |                                  |   |                      |   |                            |
| Wild & Scenic River District   |             |                               |                                  |   |                      |   |                            |

| CAPABILITIES  | WE HAVE ONE | POINT PERSON IS ON PLANNING TEAM | POINT PERSON SHOULD BE ON PLANNING TEAM | POINT PERSON CONTACT | LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN | OTHER POINT PERSON CONTACT |
|---|-------------|----------------------------------|---|----------------------|---|----------------------------|
| <b>Local Staff/ Departments</b>                                 |             |                                  |   |                      |   |                            |
| Building Code Official  |             |                                  |   |                      |   |                            |
| Building Inspector  |             |                                  |   |                      |   |                            |
| Mapping Specialist (GIS)  |             |                                  |   |                      |   |                            |
| Engineer  |             |                                  |   |                      |   |                            |
| Land Use Planner  |             |                                  |   |                      |   |                            |
| Public Works Official   |             |                                  |   |                      |   |                            |
| Emergency Management Coordinator / Emergency Management Program |             |                                  |   |                      |   |                            |
| NFIP Floodplain Administrator                                   |             |                                  |   |                      |   |                            |
| Bomb and/or Arson Squad   |             |                                  |   |                      |   |                            |
| Emergency Response Team   |             |                                  |   |                      |   |                            |
| Hazardous Materials Expert                                      |             |                                  |   |                      |   |                            |
| Local Emergency Planning Cmte                                   |             |                                  |   |                      |   |                            |
| County Emergency Mgmt Cmsn                                      |             |                                  |   |                      |   |                            |
| Sanitation Department (or Solid Waste)                          |             |                                  |   |                      |   |                            |
| Transportation Department                                       |             |                                  |   |                      |   |                            |
| Economic Development Department                                 |             |                                  |   |                      |   |                            |
| Environmental Health Department                                 |             |                                  |   |                      |   |                            |
| Public Works Department   |             |                                  |   |                      |   |                            |
| Building Department   |             |                                  |   |                      |   |                            |
| Housing Department  |             |                                  |   |                      |   |                            |

|                                       |  |  |  |  |  |  |
|---------------------------------------|--|--|--|--|--|--|
| Planning Department                   |  |  |  |  |  |  |
| Zoning Department                     |  |  |  |  |  |  |
| Planning Consultant                   |  |  |  |  |  |  |
| Regional Development Commission       |  |  |  |  |  |  |
| Historic Preservation                 |  |  |  |  |  |  |
| Public Health Coordinator/Department  |  |  |  |  |  |  |
| Water / Watershed Planner             |  |  |  |  |  |  |
| Critical Infrastructure Planner       |  |  |  |  |  |  |
| City Administrator                    |  |  |  |  |  |  |
| County Administrator                  |  |  |  |  |  |  |
| County Assessor                       |  |  |  |  |  |  |
| Environment Services Department       |  |  |  |  |  |  |
| Citizen Planning Team                 |  |  |  |  |  |  |
| Soil & Water Conservation District    |  |  |  |  |  |  |
| Sheriff's Department                  |  |  |  |  |  |  |
| Management Information Systems        |  |  |  |  |  |  |
| Social Services                       |  |  |  |  |  |  |
| County Commissioners                  |  |  |  |  |  |  |
| Fire Department                       |  |  |  |  |  |  |
| Red Cross                             |  |  |  |  |  |  |
| Electric Service Providers (involved) |  |  |  |  |  |  |
| Highway Engineer                      |  |  |  |  |  |  |
| Pipeline Companies (involved)         |  |  |  |  |  |  |
| Hospitals (involved)                  |  |  |  |  |  |  |
| Public Library                        |  |  |  |  |  |  |
| Department of Health                  |  |  |  |  |  |  |
| Human Services                        |  |  |  |  |  |  |
| County Auditor                        |  |  |  |  |  |  |

|   |  |  |  |  |  |  |
|---|--|--|--|--|--|--|
| Environmental Quality Board                               |  |  |  |  |  |  |
| Watershed Districts                                       |  |  |  |  |  |  |
| Community Awareness & Emergency Response (CAER)           |  |  |  |  |  |  |
| Police Department   |  |  |  |  |  |  |
| Township Representatives                                  |  |  |  |  |  |  |
| Technical Committee                                       |  |  |  |  |  |  |
| Non-Governmental Organizations                            |  |  |  |  |  |  |
| Hazardous Substances Emergency Events Surveillance System |  |  |  |  |  |  |
| County Attorney   |  |  |  |  |  |  |

| CAPABILITIES   | POINT PERSON IS ON PLANNING TEAM | POINT PERSON SHOULD BE ON PLANNING TEAM | POINT PERSON CONTACT | LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN | OTHER POINT PERSON CONTACT |
|--|----------------------------------|---|----------------------|---|----------------------------|
| <b>State of Minnesota</b>  |                                  |   |                      |   |                            |
| Minnesota Department of Natural Resources  |                                  |   |                      |   |                            |
| Minnesota Department of Agriculture  |                                  |   |                      |   |                            |
| Minnesota Department of Transportation   |                                  |   |                      |   |                            |
| Minnesota Department of Public Safety  |                                  |   |                      |   |                            |
| Minnesota Pollution Control Agency (MPCA)  |                                  |   |                      |   |                            |
| Minnesota Historical Society   |                                  |   |                      |   |                            |
| Minnesota Department of Homeland Security & Emergency Management Programs (HSEM) |                                  |   |                      |   |                            |
| Minnesota Department of Health   |                                  |   |                      |   |                            |
| Minnesota Highway Patrol   |                                  |   |                      |   |                            |
| Minnesota National Guard   |                                  |   |                      |   |                            |

| CAPABILITIES                               | POINT PERSON IS ON PLANNING TEAM | POINT PERSON SHOULD BE ON PLANNING TEAM | POINT PERSON CONTACT | LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN | OTHER POINT PERSON CONTACT |
|--|----------------------------------|---|----------------------|---|----------------------------|
| <b>National Organizations</b>              |                                  |   |                      |   |                            |
| National Weather Service                   |                                  |   |                      |   |                            |
| U.S. Forest Service                        |                                  |   |                      |   |                            |
| U.S. EPA                                   |                                  |   |                      |   |                            |
| U.S. Fish and Wildlife Service             |                                  |   |                      |   |                            |
| U.S. Army Corps of Engineers               |                                  |   |                      |   |                            |
| U.S. Geological Survey                     |                                  |   |                      |   |                            |
| Federal Emergency Management Agency (FEMA) |                                  |   |                      |   |                            |
| USDA Natural Resources Conservation        |                                  |   |                      |   |                            |