

FLOODING

Floods are one of the most common and widespread of all natural disasters. Most communities in the United States can experience some kind of flooding after spring rains, heavy thunderstorms, or winter snow thaws. Floods can be slow or fast rising but generally develop over a period of days.

Dam failures are potentially the worst flood events. A dam failure is usually the result of neglect, poor design, or structural damage. When a dam fails, a gigantic quantity of water is suddenly let loose downstream, destroying anything in its path. Flooding can also occur in streets when rainwater can't flow into a storm sewer. Basements can flood when rainwater can't flow away from the house or when sewers back up. These problems are usually caused by heavy local rains and are often unrelated to bank flooding or floodplain locations. Flash floods usually result from intense storms dropping large amounts of rain within a brief period. Flash floods occur with little or no warning and can reach full peak in only a few minutes.

Floods can be deceptively dangerous, particularly to drivers who may try to ford flooded roads. A car will float in less than 2 feet of moving water and can be swept downstream into deeper waters. This is one reason floods kill more people trapped in vehicles than anywhere else. Victims of floods have often put themselves in perilous situations by ignoring warnings about travel.

During the heavy physical exertion required to fight a flood, some people may suffer heart attacks. Electrocution is a cause of flood deaths, claiming lives in flooded areas that carry a live current. Floods can also damage gas lines, floors, and stairs, creating secondary hazards such as gas leaks, unsafe structures, and fires. Fires are particularly damaging in areas made inaccessible to fire-fighting equipment by high water or flood-related road or bridge damage

Sibley County Floodplains Maps

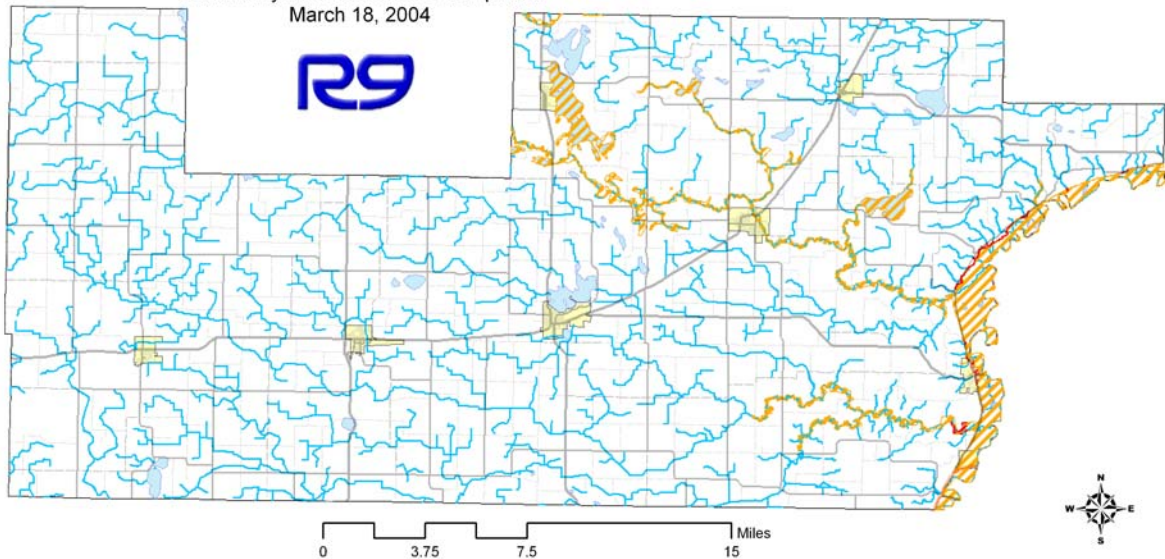
The map on the following page depicts floodplain areas (as identified by FEMA) throughout Sibley County. This map has been prepared for Region Nine Development Commission by the land use planning/mapping consultant to the organization. Additionally, FEMA Flood Insurance Rate Maps (FIRMs) for Sibley County are also included on the CD that contains this plan. They are specifically left out of this document due to the sheer size and quantity of the maps, and the fact that they cannot be properly read at the scale required to fit them into the pages of this document. The users of this All-Hazard Mitigation Plan are encouraged to review these included digital FIRMs for their reference in flood-hazard mitigation.

Sibley County FEMA Floodplains

Region Nine Development Commission
Community and Economic Development
March 18, 2004



Legend	
DOT Roads	FEMA Floodplains
— US Highway	100-Year
— MN Highway	500-Year
— County Highway	Streams
— County Road	Lakes
— Township Road	Cities
— City Streets	County Boundary



Statewide Examples of Flood Hazard Events

As a demonstration of the possible effects that a significant flood event can have on Sibley County, the following example of a large-scale flood event that occurred throughout the state is included as a reference.

Heavy snowfall during winter remained on the ground through the end of March 2001 and then rapidly melted, resulting in river stages close to record levels. Water began to gush through drainage ditches, streams and into the main stem rivers during midday April 1. Heavy rain April 7-8 over much of central Minnesota prolonged the high water and also added one or two feet to many crests during mid April. Another period of heavy rain April 22-23 caused rivers to crest again in late April and early May; in some cases the crest was higher than the first. Many rivers remained well above flood stage into mid-May. The crest at Montevideo on the Minnesota River was the second highest ever recorded, only 1.3 feet lower than in 1997. The crest on the Minnesota River at Henderson came within one half foot of its record level that was set in 1965. Numerous roads and bridges were closed, millions of sandbags used, and approximately 200 homes and businesses were partially submerged with floodwaters throughout the state. About 100 homes and businesses were damaged beyond repair. Part of the Marsh Lake Dam southwest of Appleton (Swift County) eroded on April 7, but officials shored it up with 9000 tons of rock and gravel. Three fatalities were attributed to the flooding. Two boys (ages 5 and 8) in Olivia

(Renville County) were playing on top of melting snow along a deep drainage ditch. They died when the snow collapsed into the drainage ditch with its torrential flow. The other fatality came when two men drove around a barricade on Highway 101 at Shakopee (Scott County) and drove into the Minnesota River. One 19-year-old man died and the other was injured.

Sibley County Vulnerability to and History of Flooding

The most recent major floods to hit Sibley County occurred in 1993, 1997, and 2001 due to the Minnesota River. In Sibley County, there were 13 reported floods or flash floods, causing three deaths and one injury between 1950 and 2006. The river reached flood stage at Henderson on March 15, 1997 and continued to slowly flood from the last half of March continuing through the first half of May. Snow depth rank was in the 80 to 90th percentile over the area as measured on March 20, 1997. The flooding resulted in severe losses to both public and private property. Damage was extensive to roads, bridges, culverts, agricultural drainage areas, homes and businesses. Many smaller rivers also overflowed their banks resulting in road closures and structural flooding. Ice chunks two feet thick and ten to twenty feet across washed out or closed five bridges over the Rush River. Telephone service was interrupted for a time because a fiber optic cable was attached to a washed-out bridge. In a flood event in 2001, the crest on the Minnesota River at Henderson came within half a foot of its 1965 record.

Sibley County Flooding Concerns

The City of Henderson and the City of Arlington have noted that they have buildings located in the 100-year floodplain, including approximately 90 homes in Henderson and 6 homes, in addition to 3 businesses, in Arlington. The City of Winthrop has indicated that there is some concern that flooding events could create a risk of contamination for the public water supply. The City of Arlington has noted that High Island Creek is prone to flooding. The City of Henderson has also noted that while they are protected by a levee, there are four bridges in the community that are vulnerable to flooding, including the Mill Creek Bridge and bridges in the City Park and Cedar Creek areas, as well as Highway 19. The City of New Auburn has also indicated that they have some flood concerns due to their location next to a lake, which can create localized flooding due to high waters. They are also concerned with flooding in the areas of Fifth Street Ease of Fifth Avenue and Sixth Avenue. The table below depicts reported concerns of Sibley County communities, as listed in the returned community questionnaires.

JURISDICTION	RISK ASSESSMENT (PROBABILITY)	IMPACT ASSESSMENT	TOP PRIORITY?
Arlington	High	Medium	No
Green Isle	Concern	Unreported	No
Henderson	High	Medium	Yes
SIBLEY COUNTY	HIGH	MEDIUM	NO

Probability: High – Annually to 2yrs, Medium - 5yrs, Low – 10yrs

Impact: High – Loss of life and \$500,000 plus property damage, Medium – bodily injuries and \$250,000 property damage, and Low – bodily discomfort and less than \$100,000 in property damage

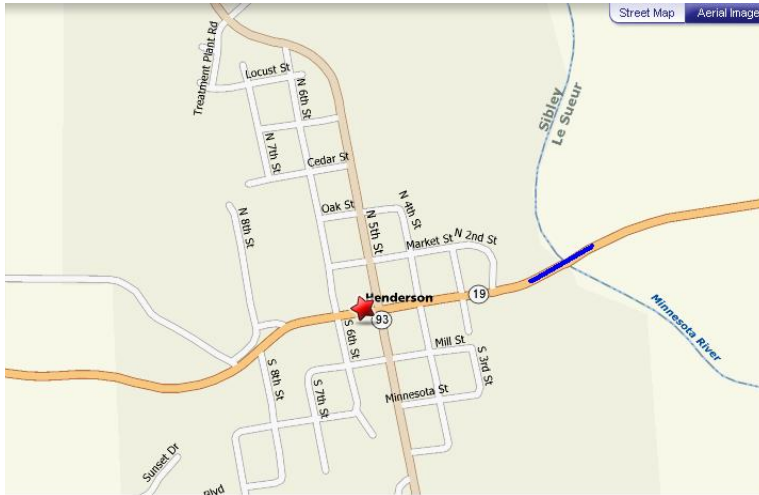
Sibley County Flood Hazard Risk Assessment

Hazard:	100-Year Floods	Other Flooding/Flash Floods
Location	Along Minnesota River, particularly at Henderson	Countywide
Historic Events	Floods along Minnesota River in 1993, 1997, 2001	None
Likely to happen now?	Yes	Yes
How often?	Possible 2-3 times every 10 years	Possible 2-3 times every 10 years
Where would event occur?	Along Minnesota River, particularly at Henderson	Anywhere in Sibley County, but especially areas located along Minnesota River, such as Henderson
Severity of event?	Severe losses to private and public property	Sudden large amount of fast-moving water could be damaging, especially with minimal warning
When would hazard likely occur?	Spring, likely to be connected with temperature increases and melting snow	Spring/Summer (flash flooding connected with heavy rain/storm events)
What other hazards could occur at the same time?	Infrastructure/utility failure, landslide, erosion issues, flow of debris in flood waters, interruption of transportation routes and access for emergency services	Infrastructure/utility failure, landslide, erosion issues, flow of debris in flood waters, interruption of transportation routes and access for emergency services
Economic impacts	Expense incurred by sandbagging and repair of damaged roads, utilities, agricultural loss	Expense incurred by damage to roads, properties, agricultural loss
Loss of life impacts		
Risk Level VH – Very High H – High L – Limited M – Minimal	Citizens/People: L Animals/Livestock: L Housing: H Critical Structures: H Infrastructure: H Total: L/H	Citizens/People: L Animals/Livestock: L Housing: L Critical Structures: L Infrastructure: L Total: L
<u>Risk Assessment</u>		
Unlikely – 1 Occasional – 2 Likely – 3 Highly Likely – 4	<u>Frequency of Occurrence</u> 2	<u>Frequency of Occurrence</u> 1
More than 12 hours – 1 6-12 hours – 2 3-6 hours – 3 Minimal-None – 4	<u>Warning Time</u> 2	<u>Warning Time</u> 4
Limited – 1 Minor – 2 Major – 3 Substantial – 4	<u>Potential Severity</u> 4	<u>Potential Severity</u> 3
Minimal – 1 Limited – 2 High – 3 Very High – 4	<u>Risk Level</u> 4	<u>Risk Level</u> 2
(Total divided by 4) Very Low – 1 Low – 2 Moderate – 3 High – 4	<u>Overall Priority</u> 3 Moderate	<u>Overall Priority</u> 2.5 Low/Moderate

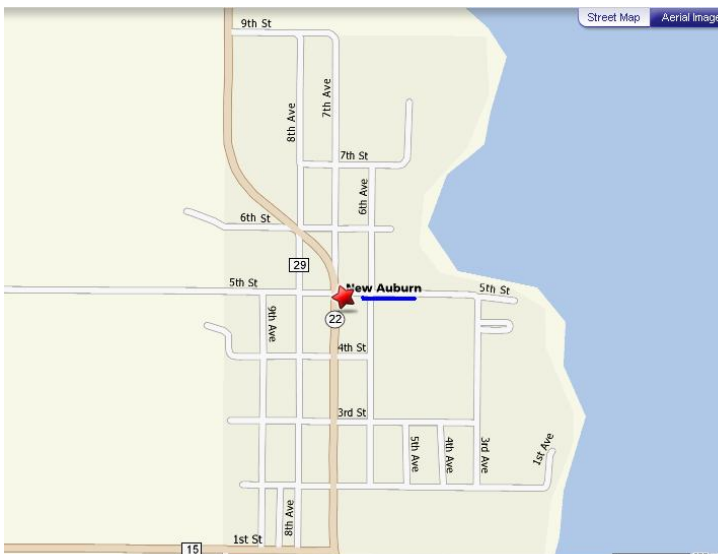
Individual Community Flooding Maps

The maps below identify the areas of flood concern in the communities identified in the Sibley County Vulnerability and History of Flooding and the Sibley County Flooding Concerns section above, which include the City of Arlington, the City of Henderson, the City of New Auburn, and the City of Winthrop. Flood-prone areas, as identified by city questionnaires completed by city staff and returned to Region Nine Development Commission, are depicted in dark blue. Identified bridges were purposefully left out of the maps because their locations could not be confirmed via the available maps.

City of Henderson Flood-Prone Area



City of New Auburn Flood-Prone Area



Potential Impacts and Cascading Effects

Flooding can lead to loss of life or physical injuries sustained as people try to either ford flooded areas or evade them, although there is nothing on record for Sibley County to demonstrate this has occurred thus far in the history of the county. Floods also are an immediate cause of destruction of property (including loss of agricultural crops and their subsequent economic value), overloaded city sewer and wastewater systems, and structural damage to public and private buildings. Flooded areas can also contribute to power outages due to damage to power company equipment and increased demand for electricity, transportation concerns as roads are rendered impassable, and riverbank erosion issues. Flooding can also place a strain on human and physical resources, including city staff and equipment, which can be quickly overwhelmed in a severe flood event. Roads that have been flooded may limit accessibility by emergency vehicles and/or equipment, and possibly even prevent passage entirely. Floods may be connected to outbreaks of disease from lack of fresh, clean water availability, and may also lead to an increased level of insect/pest infestation due to increased humidity and moisture levels.

Flooding Gaps and Deficiencies

- The City of Henderson and the City of Arlington have noted that they have buildings located in the 100-year floodplain, including approximately 90 homes in Henderson and 6 homes, in addition to 3 businesses, in Arlington.
- The City of Winthrop has indicated that there is some concern that flooding events could create a risk of contamination for the public water supply
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- The City of Henderson has also noted that while they are protected by a levee, there are four bridges in the community that are vulnerable to flooding, including the Mill Creek Bridge and bridges in the City Park and Cedar Creek areas, as well as Highway 19.
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ACTIONABLE MITIGATION STEPS:

Actionable Mitigation Steps are more elaborately explained with project, timeframe, responsible jurisdictions/staff, possible funding sources, and priority level in the Action Plan section of this document.

1. Flood-Prone Area Focus (Countywide) - Using the provided mapping of city-identified flood-prone areas, individual cities may identify strategies for minimizing flooding effects in these areas, as well as individual response plans for when/if they do flood.

2. Maintenance of Levee and Research Ways to Strengthen Bridges (Henderson) – City public works department and engineer will work to ensure good operation of city levees and assessment of its bridges.
3. Have Items Readily Available for Victims and Response (Henderson, Green Isle, Arlington, and County) - staff (police, administration, and fire) with assistance from the county emergency management will provide educational information to be made available at all public buildings where citizens seek such information. In cases of victims and response, emergency management responders and facilities will be equipped with such material that they may assist those in need.
4. Educate Key Personnel in Environmental Hazards (Henderson, Green Isle, Arlington) - Staff (police, administration, and fire) with assistance from the county emergency management will provide educational information to personnel and citizens with the assistance of county emergency management personnel. This information will also be provided on the city and county websites. Information will be provided in 2007-2008 and reassessed annually. Assessment would be done by city staff and county-wide emergency task force.
5. Coordination with Other Agencies (Countywide) – In the event of a flood emergency, local, state, and federal agencies will have to work together effectively and efficiently in response to the event. Local resources alone are not adequate for a severe flood event with a prolonged duration.
6. Communication (Countywide)- Staff (police, administration, and fire), with assistance from the county emergency management, will identify how to communicate with citizens, and perform equipment establishment in a timely manner during such as event.
7. Wetland Projects (Countywide) – Wetland replacements or restorations performed in Sibley County are carefully surveyed, designed, and constructed to ensure that the retained water is not a hazard to roads and/or adjoining landowners in the vicinity. This may be the responsibility of the local city government, the private landowner, or the developer of an area, depending on the location, size, and scope of the project.
8. Establish Proactive Goals to Prevent Future Disasters (Henderson) - Adapted an emergency plan pre the corps of engineer for flood protection and other emergency management procedures, newspapers, meeting & displays.