

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.

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.

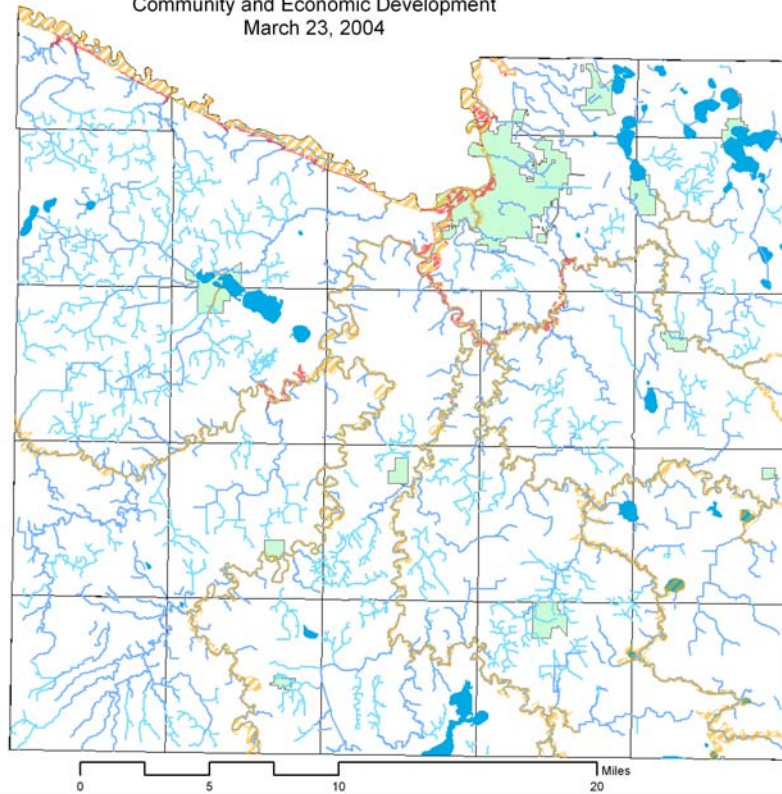
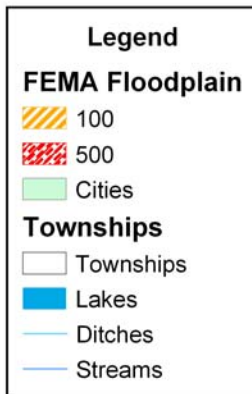
During the heavy physical exertion required to fight a flood, some people may suffer heart attacks. Electrocutation is a cause of flood deaths, claiming lives in flooded areas that carry a live current. Floods can also damage gas lines, floors, and stairs, creating secondary hazards such as gas leaks, 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.

Blue Earth County Floodplain Map

The map on the next page depicts floodplain areas (as identified by FEMA) throughout Blue Earth 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 Blue Earth 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.

Blue Earth County FEMA Floodplains

Region Nine Development Commission
Community and Economic Development
March 23, 2004



Statewide Examples of Flood Hazard Events

As an example of the possible effects that a significant flood event can have on Blue Earth County, this 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.

Blue Earth County Vulnerability to and History of Flooding

On April 2, 1951, the Minnesota River was flowing at six and a half feet. The melting of snow and heavy rains caused the river to increase twelve feet in only three days. On April 7, the mayor of North Mankato stated that the river was rising at a rate of one inch an hour. Over the weekend of April 7, residents of North Mankato packed up necessary possessions and evacuated their homes. Residents were unable to return for a month or more.



It is estimated that 16 to 18 feet of water covered lower North Mankato. Approximately 30,000 acres of farmland were underwater and many of the houses had water in their basements and first floor, if not more. The damage amounts totaled over three million dollars - in 1951!

There were two floods in the 1960's- one in 1965 and the other in 1969. Again, high winter precipitation totals and a warm, rainy spring created flooding conditions. When the 1965 flood hit Mankato, citizens and non-citizen volunteers built a wall out of a million sandbags that reportedly measured 3,000 feet in length and 6 feet in height. In the past 50 years, there have been seven floods reported in Blue Earth County along with several flash flooding reports.

A variety of flood reduction projects have taken place in Blue Earth County and the region since the floods in 1951. Flood walls were installed in Mankato, properties have been acquired to provide flood basins, and other techniques have been used over the years. The effects from the floods in 2001 were greatly reduced as compared to the 1951 flooding.

Blue Earth County Flood Hazard Risk Assessment

Hazard:	100-Year Floods	Other Flooding/Flash Floods
Location	Particularly along Minnesota River	Countywide
Historic Events	Floods along Minnesota River in 1951, 1965, 1969, and 2001	None
Likely to happen now?	Possible	Possible
How often?	Possible 1-2 times every 10 years	Possible 2-3 times every 10 years
Where would event occur?	Most likely areas are nearby to the Minnesota River	Anywhere in Blue Earth County, but especially areas located along Minnesota River or located in low-lying areas.
Severity of event?	Possible flooding of structures in Lake Crystal	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
Risk Assessment		
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

Specific Blue Earth County Areas of Flooding Concern

The chart below depicts Blue Earth County communities with some denoted level of concern for the possibility of a flooding event. Most of the county's population is safe from flooding, although some housing units are known to be within the 100-year floodplain. County staff has identified locations of all housing types within the floodplain, using GIS.

Jurisdiction	Risk Assessment (Probability)	Impact Assessment	Top Three Priority?
Amboy	Medium	Low	Yes
Good Thunder	High	High	No
Lake Crystal	Concerned	Unreported	No
Mankato	Medium	Medium	Yes
Pemberton	High	High	No
St. Clair	High	Medium	Yes
Vernon Center	Low	Low	Yes
Blue Earth County	Low to High	Low to High	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

The City of Amboy has noted that some of their city streets are vulnerable to flooding when their catch basins under-perform. The City of Eagle Lake has indicated that Plainview Street is subject to occasional flooding, as there is no storm sewer and water drains over land to a retention pond where it is held until it drains into wetland areas. The City of Good Thunder has indicated that all of their streets are vulnerable to flooding at times of exceedingly heavy rainfall. The City of Lake Crystal has mentioned that they have approximately 30 homes and businesses located in the 100-year floodplain. They have also noted that Humphrey Street Bridge and County Ditch 56 (located in the east-central area of the city) is also vulnerable. The City of St. Clair has noted that they have several streets vulnerable to flooding, including Park Street North, Fitzloff Avenue, Main Street East, Main Street West, Schalow Drive, and the Park Street North Bridge. The City of Mankato has many streets vulnerable to flooding as well, according to the FEMA maps. Some streets included are Stoltzman Road, Madison Avenue, and Vine Street. Many commercial business areas along the Minnesota River in Mankato are vulnerable to flooding, especially during the 100-year flood. A few residential communities may also be at risk. The FEMA maps below show all areas vulnerable to flooding in the City of Mankato.

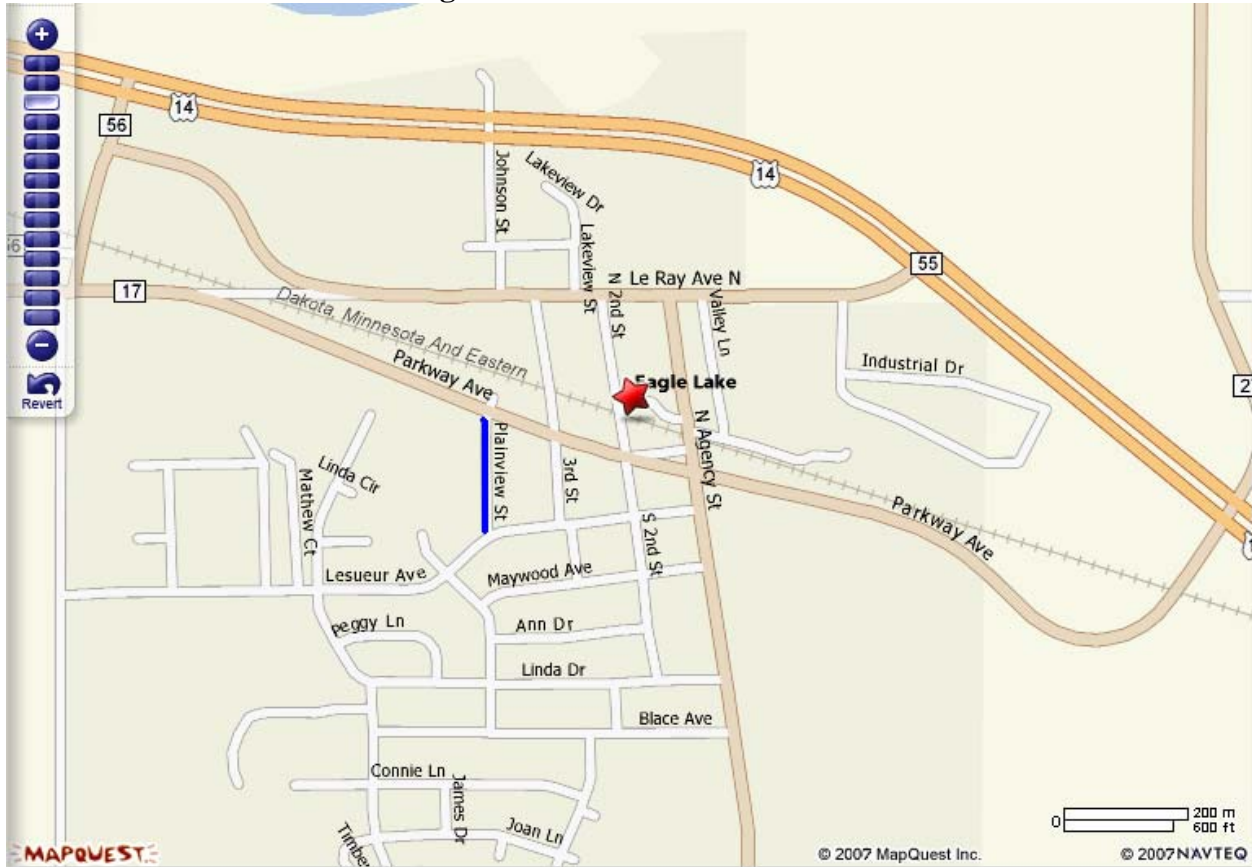
Individual Community Flooding Maps

The maps below identify the areas of flood concern in the communities identified in the Blue Earth County Vulnerability and History of Flooding and the Blue Earth County Flooding Concerns section above, which include the cities and areas mentioned in these sections. Flood-prone streets, as identified by city questionnaires completed by city staff and returned to Region Nine Development Commission, are depicted in dark blue or shaded. Identified bridges were purposefully left out of the maps because their locations could not be confirmed via the available maps.

Mankato Identified Flood Areas



Eagle Lake Identified Flood Area



St. Clair Identified Flood Areas



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. 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

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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. Suggested areas of focus are denoted in parentheses.

1. Put Retention Ponds in Place and Insure Retention (Mankato). The city planning and zoning department shall work through its ordinances, building agreements and permit process to ensure appropriate retention pond development. This will be done with assistance from the city engineer. The planning and zoning committee also plays a role in regulating the appropriate policies.
2. Enlarge and Maintain Storm Sewer Mains and Drainage Ditches (St. Clair). – The city public works department shall have as part of its capitol improvement and road

replacement plan measures to upgrade its mains. During routine construction both mains and ditches can be enlarged and appropriately aligned.

3. Reduce Sources of Inflow and Infiltration that Result in Sewer Back-ups (Amboy). – The public works department will work with the state and engineers to develop measures needed to identify and mitigate inflow and infiltration contributors.
4. Schedule Frequent Inspection and Cleaning of Storm Water Inlets and Grates (St. Clair, Vernon Center). – The cities public works departments will schedule routine system inspections, while researching at the state level appropriate indicators of cleanliness.
5. Educate Key Personnel in Environmental Hazards (Countywide) - County and city staff (sheriff, police, public works, 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 could be provided in 2007-2008 and reassessed annually. City staff and countywide emergency task force would do assessment.
6. Have Items Readily Available for Victims and Response (Countywide) – City 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.
7. 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.
8. 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.
9. Maintain all Bridges and Levees (Countywide) – In order to prevent flood disasters from occurring, these structures need to be working correctly. Upgrades and repairs need to be done in a timely manner to ensure public safety.