Section 4
RISK AND VULNERABILITY ASSESSMENT

4.1 Updates to the Risk and Vulnerability Assessment

There have been several updates to the risk and vulnerability assessment since the 2006 Carver County Hazard Mitigation Plan (HMP) was approved. Many of the updates included in this section are updates of incidents that have occurred in the past five years and updated graphics. Some of these updates change the way that hazards are profiled in the Carver County HMP.

The following changes have occurred since the 2006 Carver County HMP:

- The 2006 Carver County HMP included summer severe weather and tornadoes. The title of the identified hazard "summer severe weather" has been changed to "severe thunderstorms" to reflect the notion that there are multiple forms of summer severe weather, including tornadoes, high winds, hail, and extreme temperatures. The Carver County Multijurisdictional Hazard Mitigation Planning Committee determined that severe thunderstorms, tornadoes, hailstorms, and extreme temperatures should be classified as individual hazards in this plan update.
- The title of the identified hazard "winter storm" has been reclassified as severe winter storms. Minnesota frequently experiences winter weather. Although all winter weather poses a risk to Carver County, severe winter storms produce a higher vulnerability level for emergency response capabilities.
- In the 2006 Carver County HMP, fire was identified as a hazard. In the update, this hazard has been removed and only wildfires are profiled. Historically, the vulnerabilities posed by fires in the county only pose a risk to individual structures and do not threaten countywide areas. County municipalities have robust emergency response capabilities for responding to fires, including part-time, and volunteer fire departments to control this hazard. Wildfires are unpredictable and their severity can vary depending on wind speed and drought. They pose a significant threat to the county because of its rural setting. Therefore, wildfires have been profiled and fires have been omitted in this plan update.
- All flooding activities have been included in the flood profile. In the previous version of the plan, 100-year floods were a separately identified risk.
- Environmental infection/infection diseases have been renamed "epidemics/pandemics" in the updated plan. Outbreaks are included in this section in the plan, although in the 2006 version it was a separately identified risk.
- Bomb threats, originally identified as an individual hazard profile in the previous plan, have been included in the terrorism section of this update.
- The following profiles were omitted from the plan due to low vulnerability and low occurrence in Carver County in the past five years:
    - Water supply contamination
    - Earthquakes
    - Radiological incidents
    - Civic and special events

- Two new hazards have been profiled in this update. Energy/fuel shortage and critical facilities and infrastructure loss were created to reflect communications, electricity, gas, and water outages that pose a threat to the community. The hazard previously identified in the 2006 version of the plan as telephone/utility/HVAC outage has been included in these profiles.

4.2 Risk and Vulnerability Assessment Process

Requirement 44 CFR 201.6(c) (2) (ii)
The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Requirement 44 CFR 201.6(c) (2) (i)
The risk assessment shall include a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

The Multijurisdictional Hazard Mitigation Planning Committee conducted a comprehensive hazard, risk, and vulnerability assessment of Carver County.

To develop effective hazard mitigation strategies, it is first necessary to identify and profile all hazards facing the community. A risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards by assessing the vulnerability of people, buildings, and infrastructure to natural and technological disasters. Several methods were used to identify risks to the community. These methods included evaluating historical data from scientific and news media sources, soliciting opinions and experiences from participating jurisdictions and Carver County residents, and surveying risks identified in the State of Minnesota HMP that were pertinent to Carver County.

Following the risk assessment, a vulnerability assessment was conducted. This analysis predicts the extent of damage that may result from a hazard event of a given intensity in a given area on the existing and future build environment. Determining the community's vulnerability involved identifying the risk posed to people, property, and the environment. This also included identifying critical facilities that could be affected by each hazard.

The following natural and technological hazards were identified:

Hazard	Justification for Inclusion
Severe winter storms	Frequency, previous incidents, countywide hazard
Severe thunderstorms	Frequency, previous incidents, countywide hazard
Tornadoes	Frequency, previous incidents, countywide hazard
Lightning	Frequency, countywide hazard
Extreme temperatures	Frequency, countywide hazard

Hazard	Justification for Inclusion
Hailstorms	Countywide hazard
Wildfires	Frequency, potential adverse impact
Flooding	Frequency, previous incidents
Drought	Previous incidents, countywide hazard
Epidemics/pandemics	Previous incidents
Dam/levee failure	Potential adverse impact
Terrorism	Potential adverse impact
Hazardous materials spills	Frequency, previous incidents, countywide hazard
Energy/fuel shortage	Potential adverse impact
Aircraft accidents	Potential adverse impact
Critical facilities and infrastructure loss	Potential adverse impact

The following hazards were not profiled in this plan due to geographic location, low occurrence, or low potential for damage.

Hazard	Justification for Omission
Avalanche	Geographic proximity
Civil disturbance	Low occurrence
Coastal erosion	Geographic proximity
Earthquake	Low occurrence, low vulnerability
Expansive soils	Low vulnerability
Hurricane/tropical storms	Geographic proximity
Karst topography	Low occurrence
Landslide	Low vulnerability
Sinkholes	Low vulnerability
Tsunami	Geographic proximity
Volcano	Geographic proximity

The following information was included in each hazard profile:

- **Hazard Identification.** The Carver County Multijurisdictional Hazard Mitigation Planning Committee has identified 10 natural and 6 technological hazards that have consistently affected Carver County and its cities and townships. These hazards were identified by using statistical data and records from a variety of sources, including presidential disaster declarations, maps, and hazardous materials response data. The lists of hazards are based upon frequency, severity, probability, potential loss, vulnerability, and large-scale effects on Carver County.
- **Hazard Profile.** Each hazard will be profiled to explain how it will or has affected Carver County. This will include areas prone to specific hazards and the effects that they have had on Carver County infrastructure. It also includes previous events that have affected the county.
- **Assets Exposed to the Hazard.** The plan compares identified hazards with the inventory of affected critical facilities and the effects on the population that is exposed to each hazard. This section will also include a vulnerability assessment for future development, such as schools, water and waste treatment facilities, and other critical infrastructure.
- **Vulnerability.** The vulnerability of each hazard will be summarized based on a common set of definitions and classifications used to estimate vulnerability and rank hazards. Figure 4-1 identifies classifications of vulnerability. Each profile was analyzed on the criteria for frequency of occurrence, amount of warning time prior to the hazard occurring, the amount of area potentially affected by the hazard, and the severity of impact should the hazard occur.

Figure 4-1
Hazard Identifications/Classifications

Frequency of Occurrence: Probability

1 = Unlikely	<1% probability of occurrence in the next 100 years
2 = Occasionally	1–10% probability of occurrence per year, or at least one chance in next 100 years
3 = Likely	>10% but <100% probability per year, at least 1 chance in next 10 years
4 = Highly Likely	100% probable in a year

Warning Time: Amount of time generally given to alert people to hazard
1 = More than 12 hours
2 = 6–12 hours
3 = 3 –6 hours
4 = None–Minimal

Geographic Extent: How large an area would likely be affected
1 = Localized
2 = Community-wide
3= Countywide

Potential Impact: Severity and extent of damage and disruption

1 = Negligible	Isolated occurrences of minor property damage, minor disruption of critical facilities and infrastructure, and potential for minor injuries
2 = Minor	Isolated occurrences of moderate to severe property damage, brief disruption of critical facilities and infrastructure, and potential for injuries
3 = Moderate	Severe property damage on a neighborhood scale, temporary shutdown of critical facilities, and/or injuries or fatalities
4 = Major	Severe property damage on a metropolitan or regional scale, shutdown of critical facilities, and/or multiple injuries or fatalities

Multijurisdictional Concern. This component of the hazard profile will identify what areas of Carver County are most susceptible to effects of the hazard.

- **Land Use Plans and Development Trends.** This component of the plan will identify land use trends, the County's land use and development plans, and reference current plans and regulations are in place in Carver County regarding land use plans and trends that could prevent the impact of the disaster.

44 CFR Requirement 201.6 (c)(2)(iii)

For multijurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

44 CFR Requirement 201.6 (c)(2)(ii)(C)

Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

4.3 Natural Hazards

Natural hazards such as floods, tornadoes, winter storms, and the like are an enduring condition around the human environment. Natural hazards become disasters when they intersect with the human environment. In Minnesota, natural disasters have had devastating effects on human lives, property, the economy, and the community. While most processes present little danger to human well-being, some develop into hazardous situations that place life, property, economy, and community at higher risk.

4.3.1 Atmospheric Hazards

Atmospheric hazards include weather-generated incidents. Each has its own natural characteristics, geographic location and/or aerial extent, seasonality, severity, and associated risks. Though these characteristics allow identification of each individual hazard, many of these hazards are interrelated (FEMA, 1997). For example, tornadoes can be a product of severe thunderstorms or tropical storms/hurricanes, and snow or ice can be a byproduct of nor'easters. These hazards may also be directly linked to other categories of natural hazards (for example, excessive rain can cause the geologic hazard of sinkholes and landslides). In addition, atmospheric hazards can be interlinked with technological hazards (for example, excessive rains can cause dam/levee failure, which can lead to flooding). These linkages make it difficult to attribute damage to one hazard or to assess the risk one hazard has on the planning area, but mitigation strategies quite often have beneficial effects on several types of hazards.

In this subsection, six atmospheric hazards were addressed: severe winter storms, severe thunderstorms, tornadoes, lightning, extreme temperatures, and hailstorms. Each category has a general description of the hazard, a vulnerability summary for the planning area, and specific hazard information for each individual governing jurisdiction.

4.3.1.1 Severe Winter Storms

Hazard Identification

Carver County researched historical data from the National Climatic Data Center (NCDC) and the National Weather Service (NWS) as well as information from past newspaper articles relating to severe winter storms in Carver County. Severe winter storms bring the threat of snow, freezing rain, and ice storms to the county. A heavy accumulation of ice, especially when accompanied by high winds, devastates trees and power lines. Sidewalks, streets, and highways become extremely hazardous to pedestrians and motorists. Severe winter storms originate as mid-latitude depressions of cyclonic weather systems and can cause snowstorms, blizzards, and ice storms. Winter storms can paralyze a county/community by shutting down normal day-to-day operations and can produce an accumulation of snow and ice on trees and utility lines resulting in loss of electric county and blocked transportation routes. These storms can also lead to frozen water pipes, which when erupted, can lead to extensive property damage and the depletion of a natural resource. When counties/communities have long-term loss of utilities, elderly and extremely young populations become more vulnerable to the effects of the extreme temperatures associated with these storms.

Source: University of Minnesota

Hazard Profile

To determine Carver County's vulnerability to severe winter storms, a time period from 1994 to 2010 was examined. Numerous sources were used in identifying the severe winter storm hazards that have occurred in Carver County since 1950 (both primary and secondary). Sources included the Cable News Network, National Oceanic Atmospheric Agency (NOAA), NCDC, NWS, the Spatial Hazard Events and Losses Database (SHELDUS), and The Weather Channel.

Research from the SHELDUS and NCDC indicates there have been 58 severe winter storm occurrences recorded for Carver County in the past 17 years. Although severe winter storms occur infrequently, they have the potential to wreak havoc to the community when they do strike. Statistically, Carver County can expect a severe winter storm every year; the most frequent occurrences were in 1996. A winter storm that struck the Carver County area in December of 2010 was particularly devastating to Carver County. Numerous power lines were downed; several roads, bridges, and buildings were damaged as a result of the heavy snow and ice accumulation; and approximately $18.3 million in damages were reported countywide.

Table 4-1
Winter Storm Events[5][6]

Location or County	Date	Type	Dth	Inj	PrD
Carver County	4/28/1994	Heavy snow and ice	0	0	0
Carver County	11/27/1994	Heavy Snow/ice	0	0	0
Carver County	3/6/1995	Heavy snow	0	0	0
Carver County	11/26/1995	Heavy snow	0	0	0
Carver County	12/8/1995	Heavy snow	0	0	0
Carver County	12/13/1995	Glaze	0	0	0
Carver County	1/10/1996	Heavy snow	0	0	0
Carver County	1/17/1996	Ice storm	0	0	0
Carver County	3/23/1996	Heavy snow	0	0	0
Carver County	11/14/1996	Ice storm	0	0	0
Carver County	11/20/1996	Heavy snow	0	0	0
Carver County	11/22/1996	Heavy snow	0	0	0
Carver County	12/14/1996	Heavy snow	0	0	0
Carver County	12/23/1996	Winter storm	1	0	0
Carver County	3/13/1997	Winter storm	0	0	0
Carver County	1/1/1999	Heavy snow	0	0	0
Carver County	3/8/1999	Winter storm	0	0	0
Carver County	1/12/2000	Heavy snow	0	0	0
Carver County	1/19/2000	Heavy snow	0	0	0
Carver County	12/28/2000	Winter storm	0	0	0
Carver County	1/29/2001	Winter storm	0	0	0
Carver County	2/7/2001	Heavy snow	0	0	0
Carver County	2/24/2001	Winter storm	0	0	0
Carver County	3/11/2001	Heavy snow	0	0	0

[5] Source: National Climatic Data Center, http://www.ncdc.noaa.gov/oa/ncdc.html
[6] Explanation of Storm Data can be found in appendix A

Location or County	Date	Type	Dth	Inj	PrD
Carver County	11/26/2001	Winter storm	0	0	0
Carver County	3/8/2002	Winter storm	0	0	0
Carver County	3/14/2002	Winter storm	0	0	0
Carver County	2/2/2003	Winter storm	0	0	0
Carver County	11/22/2003	Winter storm	0	0	0
Carver County	12/9/2003	Winter storm	0	0	0
Carver County	1/24/2004	Winter storm	0	0	0
Carver County	2/1/2004	Winter storm	0	0	0
Carver County	3/5/2004	Winter storm	0	0	0
Carver County	1/1/2005	Winter storm	0	0	0
Carver County	1/21/2005	Winter storm	0	0	0
Carver County	3/18/2005	Winter storm	0	0	0
Carver County	12/13/2005	Heavy snow	0	0	0
Carver County	12/29/2005	Heavy snow	0	0	0
Carver County	3/12/2006	Winter storm	0	0	0
Carver County	3/15/2006	Winter storm	0	0	0
Carver County	12/31/2006	Winter storm	0	0	0
Carver County	2/23/2007	Winter storm	0	0	0
Carver County	3/1/2007	Winter storm	0	0	0
Carver County	12/1/2007	Winter storm	0	0	0
Carver County	3/20/2008	Winter storm	0	0	0
Carver County	3/31/2008	Heavy snow	0	0	0
Carver County	4/1/2008	Heavy snow	0	0	0
Carver County	12/20/2008	Winter storm	0	0	0
Carver County	2/26/2009	Winter storm	0	0	0
Carver County	10/12/2009	Winter weather	0	0	0
Carver County	12/8/2009	Winter storm	0	0	0

Location or County	Date	Type	Dth	Inj	PrD
Carver County	12/23/2009	Winter storm	0	0	0
Carver County	2/7/2010	Winter storm	0	0	0
Carver County	11/13/2010	Winter storm	0	0	0
Carver County	12/3/2010	Winter storm	0	0	0
Carver County	12/10/2010	Winter storm	0	0	18.3 M
Carver County	12/15/2010	Winter storm	0	0	0
Carver County	12/20/2010	Winter storm	0	0	0

Assets Exposed to Hazard

In evaluating assets that may potentially be impacted by the effects of severe winter storms, the Carver County Multijurisdictional Hazard Mitigation Planning Committee determined that all critical facilities as well as all public, private, and commercial property are susceptible.

- **Property Risk/Vulnerability.** In evaluating assets that may potentially be impacted by the effects of severe winter storms, the committee determined that all critical facilities as well as all public, private, and commercial properties are susceptible to the effects of a winter storm.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined that risk/vulnerability includes the entire population of the county since there is no way to determine the impact/magnitude of a severe winter storm and no way to predict where a storm will hit. People are vulnerable to winter storms through power outages, effects on transportation routes, establishment of shelters, water freezing, etc. This is particularly true due to a 100 percent chance of a winter storm occurring in any given year in Carver County.
- **Environment Risk/Vulnerability.** Risks to the environment are low for a winter storm. Most of the environmental risks would be access to water due to frozen water pipes and supply. In addition, winter thaw can cause flooding, which in turn can affect and create contamination of potable water for public consumption.

Vulnerability

Severe Winter Storms

Frequency of Occurrence	Highly Likely
Warning Time	More than 12 hours
Geographic Extent	Countywide
Potential Impact	Minor

Multijurisdictional Concerns

All of Carver County could be affected by a severe winter storm. As a result, any mitigation steps taken related to severe winter storms should be undertaken on a countywide basis.

Land Use and Development Trends

Carver County currently has no land use or development trends related to severe winter storms.

Hazard Summary

Severe winter storms, unlike other natural hazards, typically afford communities some advance warning. The NWS issues winter storm watches, warnings, and advisories as these storms make their way through the county. Due to the frequency of winter storms in Carver County, most buildings and infrastructure are typically designed to sustain severe winter conditions. However, aging facilities and particularly heavy snowfalls bring the possibility of building collapse and infrastructure damage. Additionally, while many motorists are accustomed to driving in snow and icy conditions, winter weather always brings a possibility for dangerous driving conditions and therefore should be a consideration in hazard mitigation planning.

4.3.1.2 Severe Thunderstorms

Hazard Identification

Carver County used data from the NCDC, the NWS, and Carver County Emergency Operations Plan in researching severe thunderstorms and their impact on Carver County. Severe thunderstorms include thunderstorms and winds associated with the thunderstorms. Thunderstorm winds are generally short in duration, involving straight-line winds and/or gusts in excess of 50 mph. Thunderstorm winds tend to affect areas of the county with significant tree stands as well as areas with exposed property and infrastructure and aboveground utilities. Thunderstorm winds can cause power outages, transportation and economic disruptions, and significant property damage, and pose a high risk for injuries and loss of life. Data from the NCDC contains the following disclosure: All Weather Events from 1955-2010, as entered into Storm Data.

Hazard Profile

The most prevalent natural hazard incident occurring in Carver County is severe thunderstorms and the winds from these thunderstorms. During the spring and summer months, the county typically experiences multiple thunderstorms, some with significant winds. Over the past 20 years, 100 severe thunderstorm wind incidents have been recorded within Carver County. A review of historical weather data indicates there is a very significant chance of severe thunderstorm winds impacting Carver County each year. Severe thunderstorm winds occur more frequently than any other natural hazard incident within Carver County. The most damaging severe thunderstorm/high winds occurred on May 30, 1998, when high winds caused damage costing $9.2 million.

Table 4-2
Thunderstorm Winds[7][8]

Location	Date	Type	Mag	Dth	Inj	PrD	CrD
1 CARVER	7/8/1964	1855	50 kts.	0	0	0	0
2 CARVER	7/8/1965	1351	85 kts.	0	0	0	0
3 CARVER	7/18/1970	1955	0 kts.	0	0	0	0
4 CARVER	7/29/1973	1020	68 kts.	0	0	0	0

[7] Source: National Climatic Data Center: http://www.ncdc.noaa.gov/oa/ncdc.html
[8] For an explanation of the NCDC reports, see appendix A

Location	Date	Type	Mag	Dth	Inj	PrD	CrD
5 CARVER	6/20/1974	1155	0 kts.	0	0	0	0
6 CARVER	6/21/1975	1530	69 kts.	0	0	0	0
7 CARVER	6/29/1975	1307	60 kts.	0	0	0	0
8 CARVER	8/4/1976	1630	52 kts.	0	0	0	0
9 CARVER	5/17/1979	1630	0 kts.	0	0	0	0
10 CARVER	7/15/1980	1858	0 kts.	0	0	0	0
11 CARVER	9/3/1980	2010	65 kts.	0	0	0	0
12 CARVER	5/4/1982	1528	0 kts.	0	0	0	0
13 CARVER	5/4/1982	1557	0 kts.	0	0	0	0
14 CARVER	6/21/1983	545	61 kts.	0	0	0	0
15 CARVER	7/3/1983	1120	0 kts.	0	0	0	0
16 CARVER	7/3/1983	1135	0 kts.	0	0	0	0
17 CARVER	7/19/1983	1510	0 kts.	0	0	0	0
18 CARVER	8/29/1983	2053	52 kts.	0	0	0	0
19 CARVER	8/7/1984	100	0 kts.	0	0	0	0
20 CARVER	4/21/1985	2050	0 kts.	0	0	0	0
21 CARVER	3/31/1986	1600	0 kts.	0	0	0	0
22 CARVER	4/26/1986	2155	61 kts.	0	0	0	0
23 CARVER	7/12/1986	1830	52 kts.	0	0	0	0
24 CARVER	5/13/1987	1830	0 kts.	0	0	0	0
25 CARVER	7/20/1987	1930	0 kts.	0	0	0	0
26 CARVER	8/13/1989	1950	52 kts.	0	0	0	0
27 CARVER	6/19/1990	700	0 kts.	0	0	0	0
28 CARVER	7/8/1990	350	52 kts.	0	0	0	0
29 CARVER	5/28/1991	2110	0 kts.	0	0	0	0
30 CARVER	5/28/1991	2135	0 kts.	0	0	0	0
31 CARVER	6/30/1991	2250	52 kts.	0	0	0	0
32 CARVER	6/30/1991	2310	0 kts.	0	0	0	0

Location	Date	Type	Mag	Dth	Inj	PrD	CrD
33 CARVER	6/16/1992	2250	0 kts.	0	0	0	0
34 Watertown	7/5/1994	340	0 kts.	0	0	0	0
35 Chanhassen	7/7/1994	1600	0 kts.	0	0	0	0
36 Waconia	7/19/1994	1628	52 kts.	0	0	0	0
37 Carver	7/19/1994	1645	52 kts.	0	0	0	0
38 Watertown	8/6/1995	12:00 AM	52 kts.	0	0	0	0
39 Mayer	5/18/1996	11:50 PM	60 kts.	0	0	0	0
40 Chanhassen	5/19/1996	12:05 AM	50 kts.	0	0	0	0
41 Norwood	8/6/1996	9:05 PM	55 kts.	0	0	0	0
42 Waconia	8/6/1996	9:08 PM	55 kts.	0	0	0	0
43 Mayer	8/6/1996	9:17 PM	55 kts.	0	0	0	0
44 Chaska	6/28/1997	2:45 PM	50 kts.	0	0	0	0
45 Watertown	7/1/1997	6:10 PM	52 kts.	0	0	0	0
46 New Germany	7/1/1997	6:45 PM	56 kts.	0	0	0	0
47 Young America	7/1/1997	6:52 PM	60 kts.	0	1	0	0
48 Assumption	7/13/1997	6:52 PM	60 kts.	0	0	0	0
49 Young America	7/13/1997	6:58 PM	55 kts.	0	0	0	0
50 Gotha	7/13/1997	7:00 PM	65 kts.	0	0	0	0
51 Carver	7/13/1997	7:05 PM	55 kts.	0	0	0	0
52 East Union	7/13/1997	7:10 PM	65 kts.	0	0	0	0
53 Chaska	7/13/1997	7:12 PM	52 kts.	0	0	0	0
54 Chanhassen	7/13/1997	7:15 PM	52 kts.	0	0	0	0
55 Waconia	7/17/1997	1:00 AM	60 kts.	0	0	0	0
56 Watertown	7/17/1997	1:05 AM	60 kts.	0	0	0	0
57 Cologne	7/17/1997	1:06 AM	60 kts.	0	0	0	0
58 Mayer	7/17/1997	1:08 AM	60 kts.	0	0	0	0
59 Watertown	7/17/1997	12:50 AM	55 kts.	0	0	0	0

Location	Date	Type	Mag	Dth	Inj	PrD	CrD
60 Cologne	5/15/1998	3:13 PM	52 kts.	0	0	0	0
61 Waconia	5/15/1998	3:20 PM	61 kts.	0	0	0	0
62 Victoria	5/15/1998	3:30 PM	60 kts.	0	0	5.0M	0
63 Hamburg	5/30/1998	9:18 PM	60 kts.	0	0	0	0
64 Norwood	5/30/1998	9:20 PM	63 kts.	0	0	0	0
65 Waconia	5/30/1998	9:25 PM	61 kts.	0	0	0	0
66 Carver	5/30/1998	9:27 PM	65 kts.	0	0	0	0
67 Chaska	5/30/1998	9:30 PM	61 kts.	0	2	9.2M	0
68 Chanhassen	5/30/1998	9:32 PM	55 kts.	0	0	0	0
69 Chanhassen	5/30/1998	9:45 PM	60 kts.	0	0	0	0
70 New Germany	6/18/1998	12:45 PM	50 kts.	0	0	0	0
71 Watertown	6/24/1998	11:34 PM	55 kts.	0	0	0	0
72 Chaska	6/24/1998	11:45 PM	50 kts.	0	0	0	0
73 Waconia	7/14/1998	9:25 PM	60 kts.	0	0	0	0
74 Watertown	7/3/1999	3:45 AM	50 kts.	0	0	0	0
75 Mayer	5/8/2000	12:30 AM	52 kts.	0	0	0	0
76 New Germany	8/7/2000	9:32 PM	52 kts.	0	0	0	0
77 New Germany	6/11/2001	4:36 PM	50 kts.	0	0	0	0
78 Chanhassen	6/11/2001	4:37 PM	54 kts.	0	0	0	0
79 Bongards	8/29/2001	9:15 PM	60 kts.	0	0	0	0
80 Waconia	4/18/2002	2:15 AM	60 kts.	0	0	35K	0
81 Watertown	6/10/2002	10:00 PM	52 kts.	0	0	0	0
82 Chaska	8/3/2002	5:37 PM	61 kts.	0	0	0	0
83 Hamburg	8/16/2002	9:55 PM	52 kts.	0	0	0	0
84 Norwood	8/16/2002	10:00 PM	52 kts.	0	0	0	0
85 Cologne	8/16/2002	11:20 PM	52 kts.	0	0	0	0
86 Waconia	6/24/2003	1:30 AM	50 kts.	0	0	0	0
87 Chaska	7/4/2003	2:05 AM	55 kts.	0	0	0	0

Location	Date	Type	Mag	Dth	Inj	PrD	CrD
88 Waconia	4/18/2004	5:15 PM	50 kts.	0	0	0	0
89 Chaska	4/18/2004	6:37 PM	52 kts.	0	0	0	0
90 Cologne	5/9/2004	4:27 PM	50 kts.	0	0	0	0
91 Chanhassen	5/9/2004	4:35 PM	52 kts.	0	0	0	0
92 Chaska	9/23/2004	12:30 PM	52 kts.	0	0	0	0
93 Chanhassen	10/29/2004	4:30 PM	50 kts.	0	0	0	0
94 Countywide	6/8/2005	2:10 AM	55 kts.	0	0	0	0
95 Watertown	6/8/2005	2:15 AM	54 kts.	0	0	0	0
96 Countywide	6/13/2005	5:45 PM	52 kts.	0	0	0	0
97 Chaska	6/20/2005	12:50 PM	52 kts.	0	0	0	0
98 Chaska	6/29/2005	8:53 PM	52 kts.	0	0	0	0
99 Chaska	6/29/2005	9:19 PM	50 kts.	0	0	0	0
100 Hamburg	9/3/2005	4:04 PM	52 kts.	0	0	0	0
101 Norwood	9/12/2005	10:10 PM	52 kts.	0	0	0	0
102 Norwood	6/24/2006	2:15 PM	55 kts.	0	0	0	0
103 Cologne	6/24/2006	2:38 PM	55 kts.	0	0	0	0
104 Carver	6/24/2006	2:40 PM	55 kts.	0	0	0	0
105 Chaska	7/13/2006	7:33 PM	55 kts.	0	0	0	0
106 Norwood	7/8/2007	14:15 PM	50 kts.	0	0	0K	0K
107 New Germany	7/8/2007	14:20 PM	60 kts.	0	0	0K	0K
108 Victoria	8/11/2007	2:10 AM	54 kts.	0	0	0K	0K
109 Chanhassen	8/11/2007	2:15 AM	50 kts.	0	0	0K	0K
110 Chaska	8/11/2007	2:15 AM	50 kts.	0	0	0K	0K
111 Waconia	8/28/2007	1:33 AM	50 kts.	0	0	0K	0K
112 Waconia	8/28/2007	1:33 AM	55 kts.	0	0	0K	0K
113 Watertown	8/28/2007	1:37 AM	52 kts.	0	0	0K	0K
114 Watertown	9/20/2007	16:10 PM	55 kts.	0	0	0K	0K

Location	Date	Type	Mag	Dth	Inj	PrD	CrD
115 Carver	9/24/2007	16:20 PM	50 kts.	0	0	0K	0K
116 Hamburg	6/11/2008	20:26 PM	55 kts.	0	0	0K	0K
117 Waconia	6/14/2008	20:17 PM	55 kts.	0	0	0K	0K
118 Chaska	6/14/2008	20:20 PM	56 kts.	0	0	0K	0K
119 Chaska	7/7/2008	19:45 PM	52 kts.	0	0	0K	0K
120 Chanhassen	7/10/2008	11:42 AM	51 kts.	0	0	0K	0K
121 Zumbra Hgts	7/10/2008	11:48 AM	55 kts.	0	0	0K	0K
122 Waconia	7/10/2008	11:54 AM	64 kts.	0	0	0K	0K
123 Waconia	7/10/2008	12:07 PM	52 kts.	0	0	0K	0K
124 Mayer	7/11/2008	19:00 PM	50 kts.	0	0	0K	0K
125 Chanhassen	6/17/2010	18:27 PM	52 kts.	0	0	5K	0K
126 Norwood	8/13/2010	12:20 AM	52 kts.	0	0	0K	0K
127 Carver	8/13/2010	1:20 AM	56 kts.	0	0	0K	0K
			TOTALS:	0	3	14.240M	0

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** In evaluating assets that are susceptible to severe thunderstorms, it was determined that all critical facilities as well as all public, private, and commercial property is susceptible to severe thunderstorms.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined that risk/vulnerability includes the entire population of the county since there is no way to determine the impact/magnitude of a severe thunderstorm and no way to predict where a storm will hit. People are vulnerable to severe thunderstorms through power outages, effects on transportation routes, establishment of shelters, roofs blown off structures, etc. This is particularly true for severe thunderstorms, since they occur frequently within the county.
- **Environment Risk/Vulnerability.** Risks to the environment are minimal for a severe thunderstorm. Severe thunderstorms can cause flooding, which in turn can affect and create contamination of potable water for public consumption.

Vulnerability

Severe Thunderstorms

Frequency of Occurrence	Highly Likely
Warning Time	Minimal
Geographic Extent	Community-wide
Potential Impact	Moderate to Major

Multijurisdictional Concerns

All of Carver County could be affected by severe thunderstorm and high winds. As a result, any mitigation steps taken related to severe thunderstorm winds should be undertaken on a countywide basis.

Land Use and Development Trends

Carver County currently has no land use or development trends related to severe thunderstorm winds.

Hazard Summary

Overall, severe thunderstorm winds pose one of the greatest threats to Carver County in terms of property damage as well as injuries and loss of life. Severe thunderstorm winds are the most frequently occurring natural hazard in the county and have the greatest chance of affecting the county each year. Based on the frequency of this hazard as well as its ability to negatively impact the county, the pre-disaster mitigation measures identified in this plan should be aggressively pursued.

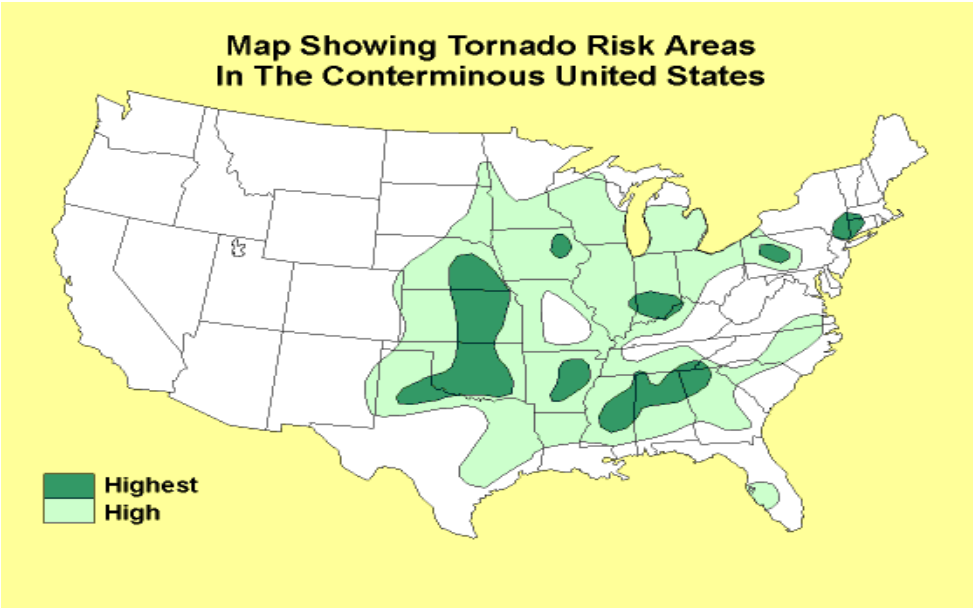
4.3.1.3 Tornadoes

Hazard Identification

Historical data from both SHELDUS and the NCDC was reviewed in researching the past events and effects of tornadoes in Carver County. A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of 1 mile wide and 50 miles long. Tornado season in Minnesota runs ordinarily from March through August; however, tornadoes can strike at any time of the year if the essential conditions are present.[1]

[1] Source: National Weather Service, http://www.nws.noaa.gov

Figure 4-2
Tornado Risk Areas in the Conterminous United States



Hazard Profile

All of Carver County is vulnerable to the threat of a tornado because no one can predict exactly when or where a tornado might strike. Carver County has not experienced a tornado within the last 10 years. In addition, countless tornado watches have been recorded during this period. Trend analysis indicates that a tornado will touch down in Carver County every 10 years. This equates to a 10 percent chance of a tornado touching down in Carver County in any given year. Tornadoes tend to strike in somewhat random fashion, making the task of reliably calculating a recurrence interval extremely difficult. The damage potential associated with a tornado is extremely high. In 2000, a category EF0 tornado touched down in Carver County resulting in no injuries.

Table 4-3[9]
Confirmed Tornadoes

Location	Date	Type	Death	Injuries	Property Damage
Waconia	6/30/1994	F0	0	0	0
Norwood	6/6/1996	F0	0	0	0
Cologne	10/29/1996	F0	0	0	0
Mayer	7/25/2000	F0	0	0	0

[9] Source: National Climatic Data Center, http://www.ncdc.noaa.gov/oa/ncdc.html

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** It can be assumed that all structures and facilities within Carver County could be damaged by a tornado because tornadoes are among the most unpredictable of weather phenomena and are indiscriminate as to when or where they strike.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined that risk/vulnerability includes the entire population of the county since there is no way to determine the impact/magnitude of a tornado and no way to predict when or where a tornado will hit. People are vulnerable to the effects of tornadoes, including power outages, disruption to transportation routes, damage to shelter, flying debris, etc. This is particularly true due to a 10 percent chance of a tornado occurring in any given year in the county.
- **Environment Risk/Vulnerability.** Risks to the environment can be significant. Environmental risks can include flying debris and destruction of critical infrastructure that damage and affect water supply and contamination of potable water for public consumption.

Estimate of Potential Losses

An obstacle to accurate loss estimation is the fact that losses may vary widely even within one category of natural hazard, depending on place and location. For instance, a tornado may hop from one location to another in a primarily rural area of the county, creating virtually no economic damage, whereas a similar hazard incident in an urban area might create millions of dollars in damages. Compounding this obstacle to accurate loss estimation is that tornadoes range considerably in their intensity and duration. When estimating losses related to tornado events, it can be assumed that structures or facilities with the greatest replacement value will be those that sustain the most monetary damage. In addition, facilities with vulnerable populations include nursing homes and personal care homes as well as public and private schools located throughout the county.

Vulnerability

Tornadoes

Frequency of Occurrence	Likely
Warning Time	Minimal
Geographic Extent	Community-wide
Potential Impact	Major

Land Use and Development Trends

Carver County currently has no land use or development trends related specifically to tornadoes. The minimum standards established by these codes provide reasonable protection to persons and property within structures that comply with the regulations for most natural hazards.

Multijurisdictional Concerns

All of Carver County has the same design wind speed of 200 mph, as determined by the American Society of Civil Engineers (ASCE). As stated previously, the entire county could be affected by a tornado. As a result, any mitigation steps taken related to tornadoes should be undertaken on a countywide basis.

Hazard Summary

Overall, Carver County has high exposure to potential damage from tornadoes. Should a tornado hit certain portions of the county that are highly concentrated with homes or any of the critical facilities identified, depending upon the strength and duration of the incident, significant damage could occur. Due to the destructive nature of tornadoes, it is imperative that pre-disaster mitigation measures be identified.

Source: University of Minnesota

SAINT PAUL

PIONEER PRESS

FRIDAY

Lightning bolt stuns the Open

One spectator dies, 5 hurt while taking shelter under tree

Victim remembered as friend, fisherman, but not golfer

Ex-hostages want inquiry into alleged deal

Suspect in attack told his boss he would kill

4.3.1.4 Lightning

Hazard Identification

Carver County researched historical data from the NCDC and the NWS as well as information from past newspaper articles relating to lightning strikes in Carver County. By definition, all thunderstorms are accompanied by lightning. The electrical charge from lightning could be as much as 100 million volts. Lightning strikes proceed from cloud to cloud, cloud to ground, or where high structures are involved, from ground to cloud. Lightning strikes in Carver County are most prevalent in May and August.

Hazard Profile

Lightning, as with many natural hazards, can strike anywhere and at any time. Data from NCDC reported three incidents of lightning strikes in Carver County since 1995 and local knowledge indicates many more instances. In 1991, a lightning strike occurred at the Hazeltine National Golf Course in Chaska, Minnesota. The golf course was hosting the U.S. Open, one of the largest Professional Golf Association (PGA) tournaments, when a storm rolled in on June 13, the first day of the tournament. Lightning struck a tree near the 16th hole, killing one and injuring five other spectators standing underneath it.[10]

[10] http://157.166.226.103/golfonline/2002/pga_championship/news/2002/08/14/storm_ap/

Table 4-4[11]
Lightning 1/01/1950 thru 01/01/2011

Location or County	Date	Time	Type	Magnitude	Death	Injuries	Property Damage
1 Norwood	7/17/1997	1:00 AM	Lightning	N/A	0	0	0
2 Carver	6/5/1999	3:32 PM	Lightning	N/A	0	1	0
3 Chaska	8/9/2005	2:00 PM	Lightning	N/A	0	0	0

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** In evaluating assets that are susceptible to lightning strikes, the committee determined that all critical facilities as well as all public, private, and commercial property are susceptible to being struck by lightning.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined that risk/vulnerability includes the entire population of the county, since there is no way to determine the impact/magnitude of a lightning strike/incident and no way to predict where lightning will hit. People are vulnerable to lightning strikes/events through power outages, effects on transportation routes, establishment of shelters, being struck by lightning, etc. This is particularly true due to a significant chance of a lightning strike occurring in any given year in the county.
- **Environment Risk/Vulnerability.** Risks to the environment are low for a lightning strike/incident.

Multijurisdictional Concerns

All of Carver County could be affected by lightning. As a result, any mitigation steps taken related to lightning should be undertaken on a countywide basis.

Estimate of Potential Losses

Lightning strikes can cause varying degrees of damage to a facility. Most common is lightning destroying the electrical components of a facility or damage related to fire after a lightning strike. Unlike most other natural hazards, lightning could potentially damage or destroy the contents of a structure (computers, televisions, phones, etc.) without any effect on the structure itself. As stated previously, all structures are vulnerable to a lightning strike and were evaluated for potential losses.

Vulnerability

Lightning Strikes

Frequency of Occurrence	Likely
Warning Time	None
Geographic Extent	Localized
Potential Impact	Minor

[11] Source: National Climatic Data Center, http://www.ncdc.noaa.gov/oa/ncdc.html

Land Use and Development Trends

Carver County does not currently have land use or development trends related to lightning.

Hazard Summary

Lightning strikes, although rare in occurrence, have a high danger potential associated with them. Lightning, as with some of the other natural hazards typical to Carver County, can strike anywhere and at any time. Its unpredictability along with its deadly and destructive potential is all the more reason to explore mitigation actions.

4.3.1.5 Extreme Temperatures

Hazard Identification

Extreme temperatures include both cold and hot events, which can have a significant impact on human health and commercial/agricultural businesses, and primary and secondary effects on infrastructure (for example, burst pipes and power failure). What constitutes "extreme cold" or "extreme heat" can vary across different areas of the country based on what the population is accustomed to in their respective climates.

Hazard Profile

Carver County has experienced extreme cold conditions in the past. According to the NCDC, Carver County has experienced extremely cold temperatures/weather nearly every year since 1994.

The NCDC defines extreme heat as temperatures that hover 10 degrees or more above the average high temperature for a region and last for several weeks. Extreme heat does not occur frequently in Carver County, but there were occurrences in 2006, 2001, and 1995.

Table 4-5
Extreme Temperatures Events[12]

Location	Date	Type	Death	Injuries	Property Damage
All Of Minnesota	1/15/1994	Extreme cold	1	0	0
South And Portions Of Minnesota	7/10/1995	Heat wave	2	0	2 M
Carver County	1/18/1996	Extreme windchill	0	0	0
Carver County	1/31/1996	Extreme cold	0	0	0
Carver County	2/1/1996	Extreme cold	0	0	0
Carver County	12/24/1996	Extreme cold	0	0	0
Carver County	1/15/1997	Extreme windchill	0	0	0
Carver County	7/23/1999	Excessive heat	1	0	0
Carver County	7/29/1999	Excessive heat	0	0	0

[12] Source: National Climatic Data Center, http://www.ncdc.noaa.gov/oa/ncdc.html

Location	Date	Type	Death	Injuries	Property Damage
Carver County	7/30/2001	Excessive heat	0	0	0
Carver County	8/1/2001	Excessive heat	1	0	0
Carver County	8/4/2001	Excessive heat	5	0	0
Carver County	7/30/2006	Heat	0	0	0
Carver County	2/10/2008	Cold/windchill	0	0	0
Carver County	2/19/2008	Cold/windchill	0	0	0
Carver County	1/14/2009	Cold/windchill	0	0	0

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** It was determined that all critical facilities as well as all public, private, and commercial property are susceptible to being affected by extreme temperatures.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined that risk/vulnerability includes the entire population of the county since there is no way to determine the impact/magnitude of an extreme temperature incident and no way to predict where and when an extreme temperature incident will hit. People are vulnerable to the effects extreme temperatures, including power outages, effects on transportation routes, establishment of shelters, etc. Those with existing medical conditions affected by extreme temperatures and the elderly population may be at higher risk.
- **Environment Risk/Vulnerability.** Risks to the environment are low should an extreme temperature incident occur, and the frequency of extreme temperatures in the county is high. Environmental concerns include interruption of water supply (such as water pipes freezing, frozen power lines, etc.) and secondary events such as fires and hazardous materials accidents.

Vulnerability

Extreme Temperatures

Frequency of Occurrence	Likely
Warning Time	More than 12 hours
Geographic Extent	Countywide
Potential Impact	Negligible

Multijurisdictional Concerns

All of Carver County is subject to extreme temperatures and therefore should be included in any prospective mitigation projects. The probability of extreme temperatures occurring in the future is relatively low based on previous data. The entire county is at risk of extreme temperature events. Extreme temperatures affect Carver County equally and uniformly.

Land Use and Development Trends

There are no future development trends in Carver County that will be affected by extreme temperatures.

Hazard Summary

Extreme temperatures have occurred across the entire of Carver County area. Extreme temperature effects are seen in different regions and vary depending on normal meteorological conditions such as either extreme heat or extreme cold. Extreme temperatures are possible throughout the planning area, with the northern portion of the state being susceptible for extreme cold temperatures during the winter months of the year.

4.3.1.6 Hailstorms

Hazard Identification

Hail is a form of precipitation composed of spherical lumps of ice. Known as hailstones, these ice balls typically range from 5–50 mm in diameter on average, with much larger hailstones forming in severe thunderstorms. The size of hailstones is a direct function of the severity and size of the storm.

Hazard Profile

Data on the probability and frequency of occurrence of hailstorms is limited, with little recent research. The available data shows that only a localized area along the border of northern Colorado and southern Wyoming experiences hailstorms eight or more days each year. Outside of the coastal regions, most of the United States experiences hailstorms at least two or more days each year.

Hailstorms occur more frequently during the late spring and early summer, when the jet stream migrates northward across the Great Plains. This period has extreme temperature changes from the ground surface upward into the jet stream, which produces the strong updraft winds needed for hail formation.

Peak periods for hailstorms coincide with the Midwest's peak agricultural seasons for crops such as wheat, corn, barley, oats, rye, tobacco, and fruit trees. Long-stemmed vegetation is particularly vulnerable to damage by hail impacts and winds. The land area affected by individual hail events is not much smaller than that of a parent thunderstorm, an average of 15 miles in diameter around the center of a storm. All of Carver County is vulnerable to hail.

Table 4-6
Hail Events[13]

Location	Date	Type	Magnitude	Dth	Inj	PrD	Crd
1 CARVER	7/14/1956	Hail	2.00 in.	0	0	0	0
2 CARVER	7/22/1962	Hail	2.00 in.	0	0	0	0
3 CARVER	7/22/1962	Hail	2.50 in.	0	0	0	0
4 CARVER	4/5/1967	Hail	1.00 in.	0	0	0	0
5 CARVER	6/12/1970	Hail	0.75 in.	0	0	0	0
6 CARVER	5/26/1972	Hail	1.50 in.	0	0	0	0
7 CARVER	7/29/1973	Hail	1.75 in.	0	0	0	0

[13] Source: National Climatic Data Center, http://www.ncdc.noaa.gov/oa/ncdc.html

Location	Date	Type	Magnitude	Dth	Inj	PrD	Crd
8 CARVER	4/17/1975	Hail	1.75 in.	0	0	0	0
9 CARVER	5/25/1975	Hail	0.75 in.	0	0	0	0
10 CARVER	6/4/1975	Hail	1.75 in.	0	0	0	0
11 CARVER	4/29/1981	Hail	1.75 in.	0	0	0	0
12 CARVER	9/17/1983	Hail	1.75 in.	0	0	0	0
13 CARVER	8/7/1984	Hail	1.75 in.	0	0	0	0
14 CARVER	4/20/1985	Hail	1.00 in.	0	0	0	0
15 CARVER	5/13/1987	Hail	0.75 in.	0	0	0	0
16 Chaska	6/30/1994	Hail	1.75 in.	0	0	0	0
17 Victoria	6/30/1994	Hail	2.75 in.	0	0	0	0
18 Hamburg	7/1/1997	Hail	1.00 in.	0	0	0	0
19 Young America	7/1/1997	Hail	1.50 in.	0	0	0	0
20 Chanhassen	7/1/1997	Hail	0.75 in.	0	0	0	0
21 Chaska	7/13/1997	Hail	1.75 in.	0	0	0	0
22 Hamburg	10/6/1997	Hail	0.75 in.	0	0	0	0
23 Carver	10/6/1997	Hail	0.75 in.	0	0	0	0
24 Cologne	5/15/1998	Hail	1.00 in.	0	0	0	0
25 Chanhassen	8/22/1998	Hail	0.75 in.	0	0	0	0
26 East Union	6/5/1999	Hail	1.50 in.	0	0	0	0
27 Carver	6/5/1999	Hail	1.75 in.	0	0	0	0
28 Mayer	6/6/1999	Hail	1.50 in.	0	0	0	0
29 Norwood	6/6/1999	Hail	1.75 in.	0	0	0	0
30 Norwood	6/6/1999	Hail	2.75 in.	0	0	0	0
31 New Germany	8/7/2000	Hail	0.75 in.	0	0	0	0
32 Chanhassen	9/2/2000	Hail	1.75 in.	0	0	0	0
33 Hamburg	5/1/2001	Hail	1.75 in.	0	0	0	0
34 Hamburg	5/1/2001	Hail	1.75 in.	0	0	0	0

Location	Date	Type	Magnitude	Dth	Inj	PrD	Crd
35 Chaska	5/1/2001	Hail	0.75 in.	0	0	0	0
36 Chanhassen	5/1/2001	Hail	0.88 in.	0	0	0	0
37 Chanhassen	5/1/2001	Hail	1.75 in.	0	0	500K	0
38 Norwood	5/9/2001	Hail	0.88 in.	0	0	0	0
39 Carver	5/9/2001	Hail	1.00 in.	0	0	0	0
40 Cologne	5/9/2001	Hail	0.75 in.	0	0	0	0
41 Young America	6/11/2001	Hail	1.00 in.	0	0	0	0
42 New Germany	6/11/2001	Hail	0.75 in.	0	0	0	0
43 Waconia	6/11/2001	Hail	2.75 in.	0	0	15.0M	0
44 Norwood	6/11/2001	Hail	1.00 in.	0	0	0	0
45 Watertown	6/11/2001	Hail	2.50 in.	0	0	0	0
46 Chaska	6/11/2001	Hail	0.75 in.	0	0	0	0
47 Hamburg	4/18/2002	Hail	1.00 in.	0	0	0	0
48 Waconia	4/18/2002	Hail	0.75 in.	0	0	0	0
49 Chaska	5/8/2002	Hail	0.75 in.	0	0	0	0
50 New Germany	6/6/2002	Hail	0.75 in.	0	0	0	0
51 Young America	6/7/2002	Hail	0.75 in.	0	0	0	0
52 Hamburg	6/7/2002	Hail	1.00 in.	0	0	0	0
53 Young America	6/7/2002	Hail	0.75 in.	0	0	0	0
54 Watertown	6/10/2002	Hail	1.75 in.	0	0	0	0
55 Watertown	6/24/2002	Hail	1.75 in.	0	0	0	0
56 Watertown	7/27/2002	Hail	0.75 in.	0	0	0	0
57 Young America	8/3/2002	Hail	0.75 in.	0	0	0	0
58 Norwood	8/16/2002	Hail	1.00 in.	0	0	0	0
59 East Union	9/1/2002	Hail	0.75 in.	0	0	0	0
60 Watertown	9/1/2002	Hail	0.75 in.	0	0	0	0
61 Hamburg	4/18/2004	Hail	0.75 in.	0	0	0	0
62 Cologne	4/18/2004	Hail	0.75 in.	0	0	0	0

Location	Date	Type	Magnitude	Dth	Inj	PrD	Crd
63 Victoria	5/9/2004	Hail	0.75 in.	0	0	0	0
64 Waconia	7/31/2004	Hail	0.75 in.	0	0	0	0
65 Chanhassen	6/7/2005	Hail	0.75 in.	0	0	0	0
66 Waconia	6/20/2005	Hail	1.75 in.	0	0	0	0
67 Hamburg	6/24/2005	Hail	0.75 in.	0	0	0	0
68 Gotha	6/29/2005	Hail	0.88 in.	0	0	0	0
69 Chaska	6/29/2005	Hail	0.75 in.	0	0	0	0
70 Norwood	8/8/2005	Hail	0.75 in.	0	0	0	0
71 Waconia	9/3/2005	Hail	0.75 in.	0	0	0	0
72 Victoria	9/4/2005	Hail	1.00 in.	0	0	0	0
73 Chaska	9/4/2005	Hail	1.75 in.	0	0	0	0
74 Chanhassen	9/4/2005	Hail	0.75 in.	0	0	0	0
75 Chanhassen	9/4/2005	Hail	0.88 in.	0	0	0	0
76 Cologne	9/12/2005	Hail	0.88 in.	0	0	0	0
77 Norwood	9/12/2005	Hail	0.75 in.	0	0	0	0
78 Hamburg	9/21/2005	Hail	0.75 in.	0	0	0	0
79 Norwood	9/21/2005	Hail	1.75 in.	0	0	0	0
80 East Union	9/21/2005	Hail	0.75 in.	0	0	0	0
81 Hamburg	4/6/2006	Hail	1.75 in.	0	0	0	0
82 Norwood	4/6/2006	Hail	0.75 in.	0	0	0	0
83 Cologne	4/6/2006	Hail	0.88 in.	0	0	0	0
84 Cologne	4/6/2006	Hail	1.00 in.	0	0	0	0
85 Chaska	4/6/2006	Hail	0.88 in.	0	0	0	0
86 Chaska	4/6/2006	Hail	0.75 in.	0	0	0	0
87 Young America	6/24/2006	Hail	0.75 in.	0	0	0	0
88 Hamburg	6/24/2006	Hail	0.75 in.	0	0	0	0
89 Bongards	6/24/2006	Hail	1.75 in.	0	0	0	0

Location	Date	Type	Magnitude	Dth	Inj	PrD	Crd
90 Watertown	7/1/2006	Hail	1.25 in.	0	0	0	0
91 Hamburg	8/24/2006	Hail	0.88 in.	0	0	0	0
92 Norwood	8/24/2006	Hail	0.75 in.	0	0	0	0
93 Waconia	4/30/2007	Hail	0.88 in.	0	0	0K	0K
94 Chaska	4/30/2007	Hail	0.75 in.	0	0	0K	0K
95 Watertown	6/20/2007	Hail	1.75 in.	0	0	0K	0K
96 Watertown	6/20/2007	Hail	1.75 in.	0	0	0K	0K
97 Waconia	6/20/2007	Hail	1.00 in.	0	0	0K	0K
98 Chaska	6/20/2007	Hail	1.75 in.	0	0	0K	0K
99 Cologne	6/20/2007	Hail	0.75 in.	0	0	0K	0K
100 Chanhassen	6/20/2007	Hail	1.75 in.	0	0	0K	0K
101 Cologne	6/20/2007	Hail	1.50 in.	0	0	0K	0K
102 Carver	6/20/2007	Hail	1.00 in.	0	0	0K	0K
103 New Germany	7/8/2007	Hail	0.88 in.	0	0	0K	0K
104 Mayer	7/8/2007	Hail	0.75 in.	0	0	0K	0K
105 Watertown	8/11/2007	Hail	0.88 in.	0	0	0K	0K
106 Watertown	8/11/2007	Hail	0.75 in.	0	0	0K	0K
107 Chaska	8/11/2007	Hail	0.88 in.	0	0	0K	0K
108 New Germany	8/28/2007	Hail	0.75 in.	0	0	0K	0K
109 Watertown	9/20/2007	Hail	1.75 in.	0	0	0K	0K
110 Norwood	5/30/2008	Hail	0.75 in.	0	0	0K	0K
111 Mayer	5/30/2008	Hail	0.75 in.	0	0	0K	0K
112 Hamburg	6/5/2008	Hail	0.88 in.	0	0	0K	0K
113 Waconia	6/5/2008	Hail	0.75 in.	0	0	0K	0K
114 Waconia	6/5/2008	Hail	0.75 in.	0	0	0K	0K
115 Victoria	6/5/2008	Hail	0.88 in.	0	0	0K	0K
116 Chaska	6/5/2008	Hail	0.88 in.	0	0	0K	0K
117 Chanhassen	6/5/2008	Hail	1.00 in.	0	0	0K	0K

Location	Date	Type	Magnitude	Dth	Inj	PrD	Crd
118 Chaska	6/5/2008	Hail	0.75 in.	0	0	0K	0K
119 Chaska	6/5/2008	Hail	0.88 in.	0	0	0K	0K
120 Norwood	6/11/2008	Hail	0.88 in.	0	0	0K	0K
121 Young America	6/27/2008	Hail	0.88 in.	0	0	0K	0K
122 New Germany	7/10/2008	Hail	0.88 in.	0	0	0K	0K
123 Waconia	7/10/2008	Hail	1.00 in.	0	0	0K	0K
124 Waconia	7/10/2008	Hail	1.00 in.	0	0	0K	0K
125 Waconia	7/10/2008	Hail	0.88 in.	0	0	0K	0K
126 Coney Is	7/10/2008	Hail	0.88 in.	0	0	0K	0K
127 Maple	7/10/2008	Hail	0.88 in.	0	0	0K	0K
128 Chanhassen	7/10/2008	Hail	0.88 in.	0	0	0K	0K
129 Chaska	7/10/2008	Hail	0.75 in.	0	0	0K	0K
130 Norwood	7/11/2008	Hail	0.75 in.	0	0	0K	0K
131 Watertown	7/21/2009	Hail	1.00 in.	0	0	0K	0K
132 Watertown	7/17/2010	Hail	2.75 in.	0	0	1.5M	2.0M
				TOTALS:	0	17.000M	2.000M

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** It was determined that all critical facilities as well as all public, private, and commercial properties are susceptible to being affected by a hailstorm.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined that risk/vulnerability includes the entire population of the county since there is no way to determine the impact/magnitude of a hailstorm incident and no way to predict where and when a hailstorm will hit. People are vulnerable to the effects of hailstorms, including power outages, effects on transportation routes, damage to homes and cars, etc.
- **Environment Risk/Vulnerability.** Risks to the environment are low should a hailstorm occur.

Vulnerability

Hailstorms

Frequency of Occurrence	Likely
Warning Time	3-6 hours
Geographic Extent	Community-wide
Potential Impact	Minor

Land Use and Development Trends

Future development throughout Carver County will result in the potential damage of property from hailstorms since no property is immune from their effects.

Multijurisdictional Concerns

All of Carver County is subject to hailstorms and therefore should be included in any prospective mitigation projects. The probability of hailstorms occurring in the future is relatively high based on previous data. Hailstorms affect Carver County equally and uniformly.

Hazard Summary

The severity of hailstorms is measured by duration, size of the hail itself, and geographic extent. All of these factors are directly related to the weather phenomena that create hail and thunderstorms. There is wide potential variation in these severity components. The size of the hail is a direct function of the severity and size of the storm. The duration of each storm varies but rarely lasts longer than a couple of hours.

Hailstorms rarely result in the loss of human life but they cause nearly $1 billion in property, livestock, and crop damage in the United States each year. Once a hailstone reaches the size of about 1.5 inches in diameter, damage to cars, windows, and siding will occur. There are no known instances of injuries or death from hailstorm events in Carver County. Although typically not life-threatening, severe hailstorms have the potential to cause significant property damage, particularly to automobiles and some building types. The development of hailstorms from thunderstorm events causes nearly $1 billion in property and crop damage each year. The NCDC database indicates there have been no deaths or injuries from hailstorms between 1950 and 2007.

4.3.2 Wildfires

Hazard Identification

A wildfire is the uncontrolled burning of woodlands, brush, or grasslands. According to FEMA, there are four categories of wildfires that are experienced throughout the United States:

- **Wildland Fires.** Fueled by natural vegetation. Typically occur in national forests and parks, where federal agencies are responsible for fire management and suppression.
- **Interface or Intermix Fires.** Urban/wildland fires in which vegetation and the built-environment provide fuel.
- **Firestorms.** Events of such an extreme intensity that effective suppression is virtually impossible. Occur during extreme weather and generally burn until conditions change or the available fuel is exhausted.
- **Prescribed Fires and Prescribed Natural Fires.** Fires that are intentionally set or selected natural fires that are allowed to burn for beneficial purposes.

Wildfires can be a result of naturally occurring influences such as lightning, extreme drought, and heat as well as human influences such as a discarded cigarette butt, improperly extinguished campfire, or a stray spark from nearby railroad tracks. The potential for threat of wildfires is dependent upon topography and slope, surface fuel characteristics, recent climate conditions, current meteorological conditions, and fire behavior. Once a wildfire threatens a community, it is often too late to protect nearby structures, and populations have to be evacuated for their own safety. These fires have damaged structures and utilities as well as hundreds of acres of woodlands.

Hazard Profile

From 1999 to 2010, there were 1,389 wildfires in the state of Minnesota. In Carver County, the primary months of occurrence are March through October, when high temperatures, possible drought conditions, and high winds increase the likelihood of wildfires.

On October 20, 2003, a combine malfunction led to a cornfield fire fueled by dry conditions and high winds. It destroyed more than 300 acres of fields and woods and all 11 fire departments within Carver County plus neighboring fire departments responded to the fire near Norwood Young America.

On April 2, 2010, a wildfire burned approximately 85 acres of swampland in Carver County. No structures were burned or damaged but 12 fire departments as well as the Minnesota DNR responded to control the blaze. The fire may have been caused by a smoldering recreational fire.

The potential for wildfires in 2012 is above average for the state of Minnesota. As such, this could be a significant hazard and vulnerability facing the community in the coming year.

Assets Exposed to Hazards

- **Property Risk/Vulnerability.** All assets in Carver County are exposed to the threat of wildfires. Any of the assets could be lost during a wildfire. The amount of loss would vary from facility to facility.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined that risk/vulnerability includes the entire population of the county, since there is no way to determine the impact/magnitude of a wildfire incident and no way to predict where a wildfire incident will hit. People are vulnerable to wildfires through burning of structures, power outages,

effects on transportation routes, establishment of shelters, etc. People living in rural areas of the county are more vulnerable than people living in urban areas due to availability of fuel for a wildfire (woods, open spaces, green area, etc.).

- **Environment Risk/Vulnerability.** Risks to the environment are low for a wildfire incident due to the frequency of occurrence. Environmental concerns would be loss of vegetation and risk of erosion in areas that are affected by wildfires.

Vulnerability

Wildfires

Frequency of Occurrence	Occasionally
Warning Time	Minimal
Geographic Extent	Localized to Community-wide
Potential Impact	Minor to Moderate

Multijurisdictional Concerns

All of Carver County is subject to wildfires and therefore should be included in any prospective mitigation projects. Rural areas of the county are more prone to wildfires than urban areas. The smoke from the fires may also affect the urban areas as well as the travel on highways and roads throughout Carver County.

Hazard Summary

Wildfires have the potential to cause extensive property damage in the Carver County area. Although no wildfires have been reported in Carver County in 2011, the entire county is susceptible to a wildfire and it remains a threat.

4.3.3 Flooding

Hazard Identification

Flood information for Carver County was retrieved from the NCDC, the NWS, FEMA, the Carver County Vulnerability Report and the National Flood Insurance Program (NFIP), as well as information from past newspaper articles relating to flooding in Carver County.

Hazard Profile

Research indicates that there have been 19 flood occurrences recorded for Carver County since 1997. Statistically, Carver County can expect flooding every 2–5 years. This equates to a 30 percent chance of flooding occurring in any given year.

In the past two years, FEMA has declared federal disaster assistance for four separate flooding incidents in Carver County. On March 19, 2010, a disaster was declared when the Minnesota River went above moderate flood stage and Crow River went well above major flood stage, causing several road closures. A federal declaration was also made in September 2010 when the Minnesota River crested at 33 feet—8 feet above flood stage—prompting closure of several roads. In May 2011, another federal disaster declaration was made following severe storms and flooding.

Seasonal flooding in the Minnesota River Valley forces road closures that can be costly to Carver County. Flooded roads are generally damaged by rapidly moving floodwaters and these damages have led to the

previously mentioned disaster declaration. The two most vulnerable areas to road damage from flooding in Carver County include Highway 101 between Chanhassen and Shakopee and Highway 41 in Chaska[14] (see figure below). The flooding to these river crossings causes closures that last several days to several weeks. The cost of such road closures to Carver County was $670,000 in 2009 and is projected to grow to $1,675,000 by 2030. The cost and frequency associated with flooding make it particularly hazardous to Carver County.[15] County Road 11 between Jordan and Carver also causes flooding frequently.

[14] Minnesota River Flood Mitigation Study Final Report. Minnesota Department of Transportation. September 28, 2011.
[15] Minnesota River Flood Mitigation Study Final Report. Minnesota Department of Transportation. September 28, 2011.

Figure 4-3
Minnesota River Flood Mitigation Study Final Report
Minnesota Department of Transportation September 28, 2011

FLOOD HAZARD AREAS IN CARVER COUNTY

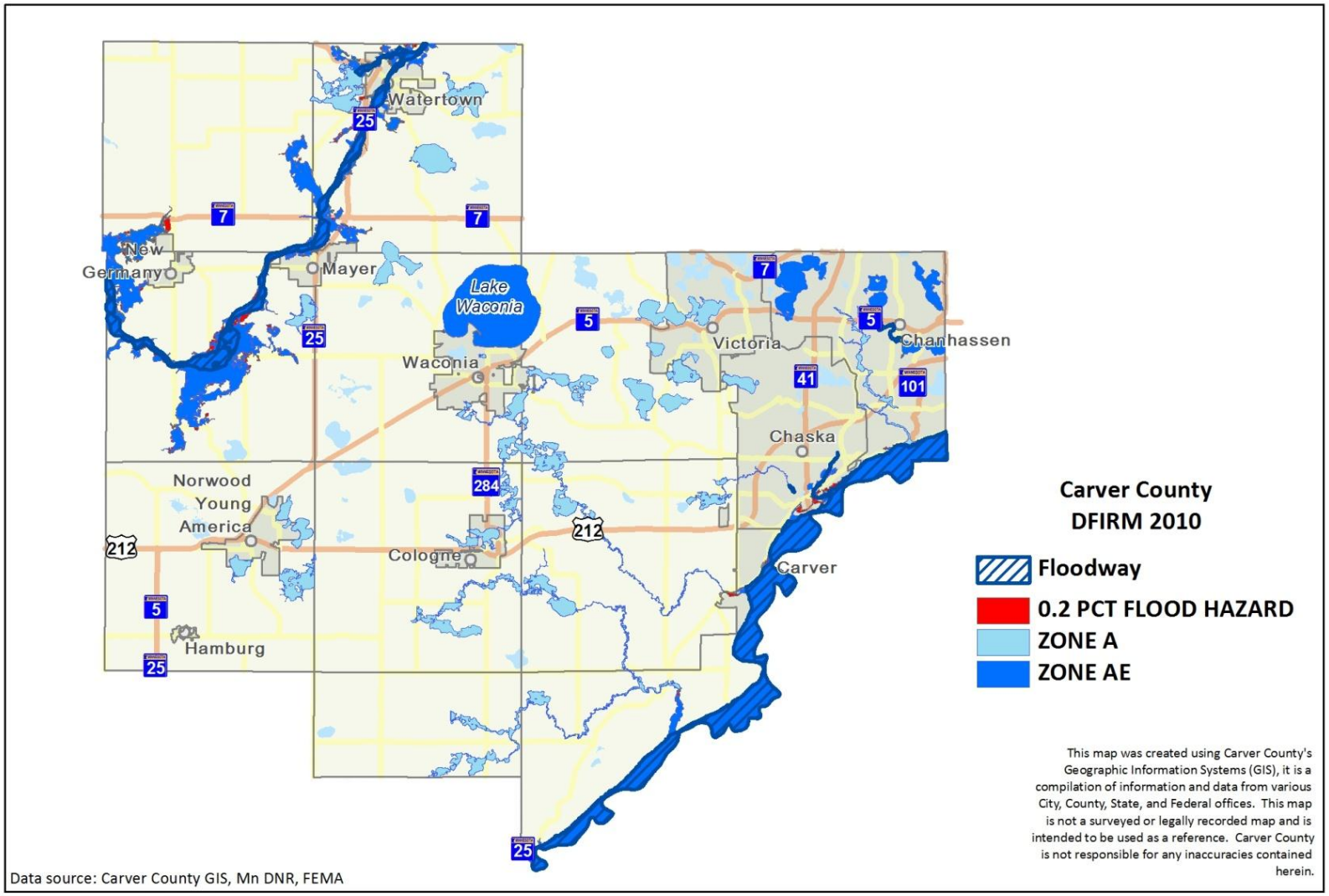


Table 4-7
Significant Floods Events in Carver County

Location	Date	Type	Magnitude	Death	Injuries	Property Damage
Multiple Counties (16)	3/15/1997	Flood	N/A	0	0	0
Multiple Counties (4)	3/31/1997	Flood	N/A	0	0	0
Multiple Counties (14)	4/1/1997	Flood	N/A	0	0	0
Multiple Counties (4)	4/1/1997	Flood	N/A	0	0	0
Multiple Counties (15)	5/1/1997	Flood	N/A	0	0	0
Watertown	7/1/1997	Flash flood	N/A	0	0	0
Multiple Counties (42)	4/1/2001	Flood	N/A	3	1	200 M
Multiple Counties (20)	5/1/2001	Flood	N/A	0	0	0
Watertown	6/24/2002	Flash flood	N/A	0	0	0
Northwest Portion	6/25/2002	Flash flood	N/A	0	0	100 K
Carver	8/3/2002	Flash flood	N/A	0	0	0
Carver	8/21/2002	Flash flood	N/A	0	0	0
Chanhassen	9/4/2005	Flash flood	N/A	0	0	0
Chaska	10/4/2005	Flash flood	N/A	0	0	0
Multiple Counties (6)	10/4/2005	Flood	N/A	0	0	0
New Germany	3/16/2010	Flood	N/A	0	0	0
Watertown	3/16/2010	Flood	N/A	0	0	0
New Germany	3/17/2010	Flood	N/A	0	0	0
East Union	3/18/2010	Flood	N/A	0	0	240 K

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** Carver County is continuing to evaluate and prioritize properties for reconstruction and/or acquisition/removal.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined, that risk/vulnerability includes the entire population of the county. People living in and around identified floodplain areas are more vulnerable to a flooding incident than those who live/work out of floodplain areas, but these areas can still be impacted depending on the severity of the flooding incident. This is particularly true due to a significant chance of a flooding incident occurring in any given year in the county.

- **Environment Risk/Vulnerability.** Risks to the environment are high for a flooding incident should one occur. Most of the environmental risks would be access to water and the effects floodwater has on public water supply. Flooding can affect and create contamination of potable water for public consumption.

Vulnerability

Flooding

Frequency of Occurrence	Likely
Warning Time	More than 12 hours
Geographic Extent	Community-wide
Potential Impact	Major

Estimate of Potential Losses

HAZUS-MH was used to estimate the damages incurred for a 100-year flood incident in Carver County. An estimated 26 buildings could be damaged, totaling $15.7 million in building losses and $32.5 million in total economic losses. HAZUS-MH estimates seven census blocks with losses exceeding $1 million.

Land Use and Development Trends

Carver County has made and continues to make significant efforts to eliminate the placement of structures identified in flood hazard areas. The City of Carver is the only municipality to require funds for repetitive loss properties in Carver County. Due to 5 losses and 2 properties, $49,703 in building payments and $2,589 in contents payments were distributed to the city by the State of Minnesota.

Multijurisdictional Concerns

44 CFR Requirement 201.6 (c)(2)(ii)
The risk assessment **must** also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Previous mitigation measures have occurred at the county level. Carver County participates in the National Flood Insurance Program (NFIP) of the Federal Emergency Management Agency (FEMA). As a participating community, the county has adopted Floodplain Management practices through several ordinances that severely limit the development allowed in 100-year floodplains (the area inundated by a storm that has a 1 percent chance of happening in any year). Carver County standards require all new structures be constructed 2 feet above the existing water surface elevation of the 100-year floodplain or 1 foot above the "ultimate" water surface elevation. Maps detailing structures within floodplains can be found in appendix C.

The following Carver County communities are current participants in the NFIP:

Jurisdiction	Date of Entry into NFIP
Carver County	February 1, 1978
Carver, City of	September 8, 1972
Chanhassen, City of	July 2, 1979
Chaska, City of	September 8, 1972

Jurisdiction	Date of Entry into NFIP
Mayer, City of	May 29, 2002
Norwood Young America, City of	May 13, 1983
Victoria, City of	July 6, 1984
Waconia, City of	January 5, 1978
Watertown, City of	November 1, 1978

Carver County Repetitive Loss Information

Repetitive loss properties are a serious concern from a mitigation standpoint. A repetitive loss property is considered so when there are 2 or more flood insurance claims which were paid more than $1,000 for each loss. The 2 losses must be within 10 years of each other and must be at least 10 days apart. A property is considered a severe repetitive loss property when there are at least 4 losses (each exceeding $5,000), or when there are 2 or more losses where the building payments exceed the property value.

Based on information reported by 2011, two residential properties in Carver County have flood loss histories that meet the definition of repetitive loss.

Table 4-8
Summary of Repetitive Loss Floods Claims, Carver County

Rep Loss Properties	Losses	Total Building Payments	Total Content Payments	Total Payments
2	5	$ 49,703	$ 2,589	$ 52,292

Source: Minnesota All-Hazards Mitigation Plan

Hazard Summary

The hazard for flooding in Carver County remains low, due largely in part to previous mitigation measures. The Carver County Multijurisdictional Hazard Mitigation Planning Committee recognized the dangers posed by flooding and has identified specific mitigation actions that have been taken and would be considered in the future.

4.3.4 Drought

Hazard Identification

Historical data from the NCDC and the Minnesota DNR were included while determining drought hazards in Carver County. By definition, a drought is a prolonged period of moisture deficiency. Drought conditions affect the cultivation of crops as well as water availability and water quality. Drought is also a key factor in wildfire development. Drought conditions make natural fuels (grass, brush, trees, dead vegetation) more fire-prone.

Drought Severity	Return Period (years)	Description of Possible Impacts	Drought Monitoring Indices		
			Standardized Precipitation Index (SPI)	NDMC* Drought Category	Palmer Drought Index
Minor Drought	3 to 4	Going into drought; short-term dryness slowing growth of crops or pastures; fire risk above average. Coming out of drought; some lingering water deficits; pastures or crops not fully recovered.	-0.5 to -0.7	D0	-1.0 to -1.9
Moderate Drought	5 to 9	Some damage to crops or pastures; fire risk high; streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested.	-0.8 to -1.2	D1	-2.0 to -2.9
Severe Drought	10 to 17	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed.	-1.3 to -1.5	D2	-3.0 to -3.9
Extreme Drought	18 to 43	Major crop and pasture losses; extreme fire danger; widespread water shortages or restrictions.	-1.6 to -1.9	D3	-4.0 to -4.9
Exceptional Drought	44+	Exceptional and widespread crop and pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells creating water emergencies.	less than -2	D4	-5.0 or less

*NDMC - National Drought Mitigation Center

Hazard Profile

Carver County experienced its worst drought in the 1930s and again experienced drought conditions in 1976. To date, agricultural losses have been the primary losses associated with drought, as no critical facilities have sustained any damage or functional downtime due to dry weather conditions. Because of the extremely unpredictable nature of drought (including duration), reliably calculating a recurrence interval is difficult.

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** Drought conditions typically pose little or no threat to structures; however, fires can occur as a result of dry weather. The Carver County Multijurisdictional Hazard Mitigation Planning Committee concluded that drought in itself presents no credible threat to critical facilities. The drought could result in the loss of the availability of municipal water supply. This threat has been addressed by mitigation actions. Wildfire because of drought was considered, and the committee determined that since previous instances of wildfire in the county have been relatively minimal, it does not bear a significant threat to the community.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined that risk/vulnerability includes the entire population of the county since there is no way to determine the impact/magnitude of a drought incident. People are vulnerable to the effects of drought, including reduction to the available water supply (both public and private wells), wildfires, and limited ability to grow and water crops.
- **Environment Risk/Vulnerability.** Risks to the environment are high for a drought incident. Environmental concerns would be loss of vegetation and risk of erosion in areas that area affected by drought and reduced availability of water supply (both public and private wells).

Vulnerability

Drought	
Frequency of Occurrence	Likely
Warning Time	More than 12 hours
Geographic Extent	Countywide
Potential Impact	Moderate to Major

Estimate of Potential Losses

No damage to facilities is anticipated as a result of drought conditions. Crop damage cannot be accurately quantified due to several unknown variables, including duration of the drought, temperatures during the drought, and severity of the drought. In addition, different crops require different amounts of rainfall and different growing seasons.

Land Use and Development Trends

Carver County has used water restrictions in the past and conservation programs were in place to address water consumption during the drought of 1976. As the population grows in Carver County and areas currently used for agriculture are urbanized, the county will become less vulnerable to droughts because the economy will not be as dependent on agriculture.

Multijurisdictional Concerns

Agricultural losses associated with drought are more likely to occur in the rural, less concentrated areas of the county.

Hazard Summary

Droughts do not have the immediate effects of other natural hazards, but sustained drought can cause severe economic stress to the agricultural interests in Carver County and the entire state. The potential negative effects of sustained drought are numerous. In addition to an increased threat of wildfires, drought can affect municipal and industrial water supplies, stream-water quality, water recreation facilities, hydropower generation, as well as agricultural and forest resources.

4.3.5 Epidemics/Pandemics

Hazard Identification

A widespread epidemic/pandemic incident is a plausible incident in Carver County. Epidemic/pandemic incidents are a danger to emergency responders, healthcare providers, schools, and the public. This can include influenza (e.g., H5N1), Severe Acute Respiratory Syndrome (SARS), or biological incidents without an available vaccine or treatment. Bioterrorism incidents are also included in this identified hazard area.

Hazard Profile

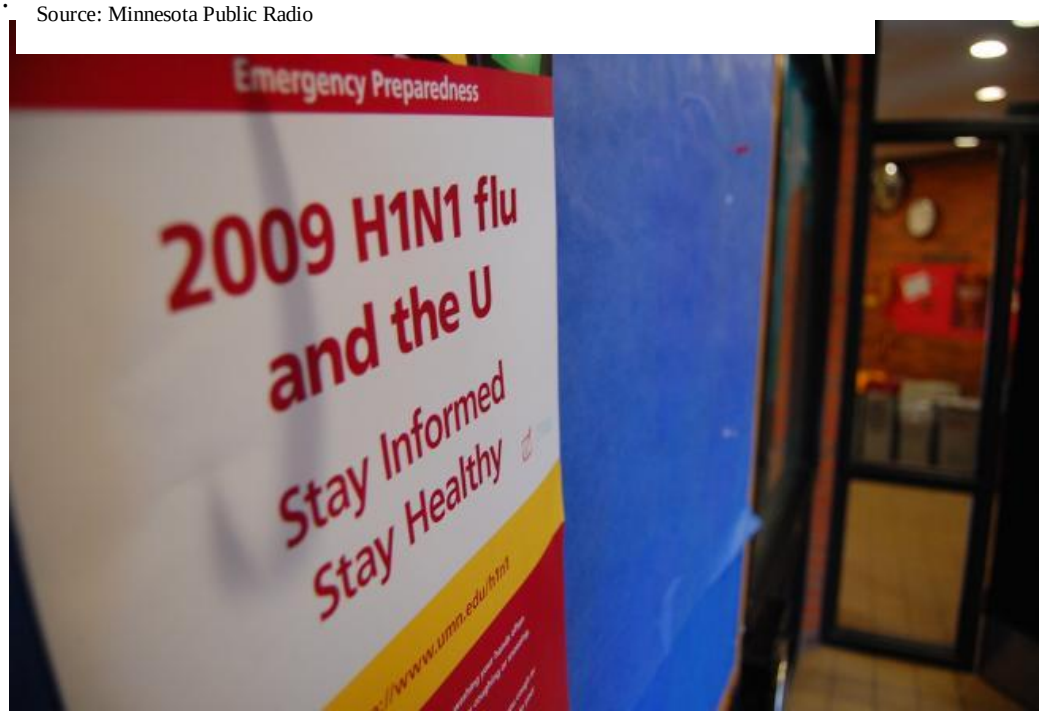
Seasonal influenza comes to Carver County every winter, usually between October and March. Influenza is a specific viral infection that is responsible for a substantial number of hospitalizations and deaths. The Centers for Disease Control and Prevention (CDC) estimates 36,000 excess deaths are caused by influenza each year in the United States. The continuous genetic changes in the virus, called "antigenic drift," means that people can get sick from a slightly different influenza virus each year; last year's flu shot does not prevent this year's illness.

Historians estimate that over the last three centuries, there have been 10 influenza pandemics. A pandemic is an epidemic that affects the entire world. Influenza pandemics occur when the virus undergoes such dramatic changes that virtually no one has resistance to infection and there is no vaccine readily available for use. When this occurs, the number of people infected is much higher than during ordinary flu seasons. In addition, during some pandemics, the severity of illness is higher. For example, in 1918–1919, not only was the number of ill people high, but also the death rate was 50 times higher than usual. Furthermore, there was a shift in the age group most severely affected from the elderly to those 20–40 years of age. In contrast, the more recent pandemics of 1957 and 1968 caused far less dramatic increases in the death rate (only about two times the norm of 36,000 per year from regular flu). The H1N1 novel influenza virus rapidly established itself as a pandemic in 2009–2010, becoming the dominant influenza strain in most parts of the world. The current influenza vaccine includes this strain of virus and protects against H1N1. The outbreak of the H5N1 influenza strain (bird flu) in wild and domestic birds, which began in Asia in late 2003, is being carefully watched as a potential precursor to a pandemic since several hundred humans have been infected and died. Although the number of human infections is quite small, about 60 percent of those infected have died, demonstrating the severity of this infection. The conditions to trigger a pandemic are not yet present since, at this point, the H5N1 virus is not efficiently transmitted from human to human.

Vulnerability Assessment

All populations within Carver County are susceptible to epidemic/pandemic events that occur in the county.

Source: Minnesota Public Radio



Assets Exposed to Hazard

- **Property Risk/Vulnerability.** It was determined that all critical facilities as well as all public, private, and commercial properties are susceptible to being affected by a epidemic/pandemic incident due to people being ill and possibly being unable to maintain the facilities.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined that risk/vulnerability includes the entire population of Carver County since there is no way to determine the impact/magnitude of an epidemic/pandemic incident and no way to predict which target group(s) will be the most susceptible to the virus. In addition to sickness (morbidity) and death (mortality), the impact of human resources would suffer with the potential of 40 percent of the workforce becoming ill. Carver County's current just-in-time economy would suffer major setbacks in community infrastructure such as public water supply, food, trucking, health care delivery, and energy resources.
- **Environment Risk/Vulnerability.** Risks to the environment are low should an epidemic/pandemic incident occur.

Vulnerability

Epidemics/Pandemics

Frequency of Occurrence	Likely
Warning Time	More than 12 hours
Geographic Extent	Countywide
Potential Impact	Minor to Moderate

Although pandemics/epidemics like polio and plague have largely been eradicated from the world and tuberculosis is under control in the United States, past historical complications on human health were devastating and any new infectious diseases introduced to the world could have health emergency implications. Recent SARS, H1N1, and seasonal influenza cases demonstrate that health emergencies are unpredictable, can erupt quickly, and have significant impact on communities, including Carver County.

Land Use and Development Trends

As more and more people move into populated areas, all of Carver County is susceptible to outbreaks of pandemics/epidemics.

Multijurisdictional Concerns

No one area in Carver County is less susceptible than another from the effects of an epidemic/pandemic incident. Of course, the more densely populated the area is, the greater threat of the spread of the epidemic/pandemic.

Hazard Summary

Pandemics/epidemics pose a threat to all of Carver County. As part of a county effort, the staff from the Carver County Public Health department participates in emergency preparedness planning, drills, tabletop and functional exercises, and education and outreach together with local, state, and federal government agencies as well as health care organizations, private businesses, and other individuals from the community.

4.4 Technological Hazards

Technological hazards are distinct from natural hazards primarily in that they originate from human activity. In contrast, while the risks presented by natural hazards may be increased or decreased as a result of human activity, they are not inherently human-induced. The term "technological hazards" refers to the origins of incidents that can arise from human activities such as the manufacturing, transportation, storage, and use of hazardous materials.

4.4.1 Dam/Levee Failure

Hazard Identification

According to the State of Minnesota, dam hazard ranking is based on the National Inventory of Dams (NID) classification located in Carver County. The NID ranks dams according to the potential loss of life as well as the potential impacts on economic, environmental, and important community lifelines.

Hazard Profile

There have been no dam or levee failures in Carver County in the past. There have been no known deaths, injuries, or property damage from dam or levee failures in the County. The effects on life and property in the area could be significant if a dam were to fail because of the nature of the built environment.

There are three levees located in Carver County. There is currently a temporary levee located in Watertown that is in place to protect the wastewater treatment facility and a non-certified levee on the South Fork Crow River. There is a certified levee in Chaska and an uncertified levee in Carver.

Vulnerability Assessment

The probability of any dam failure or levee failure in the area is minimal. The low probability of an incident suggests that the potential for impacts is minimal. Based on historical records from the past 75 years, the probability of future dam and levee failure occurring in Carver County and the planning area is considered low.

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** It was determined that critical facilities as well as public, private, and commercial properties are susceptible to being affected by a dam failure if they are located in the inundation area.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined that risk/vulnerability includes the population of the county that is located in the dam failure inundation area in Chaska. Additionally, the populations of Carver and Watertown are vulnerable to levee failure. People are vulnerable to the effects of dam failure through power outages, effects on transportation routes, establishment of shelters, flooding, etc.
- **Environment Risk/Vulnerability.** Risks to the environment are high should a dam failure occur, but the frequency of dam failures in

Uncertified levee in the city of Carver (Chaska Herald)

Carver County is low. Environmental concerns would be interruption of water supply, water contamination, and loss of properties.

Vulnerability

Dam/Levee Failure

Frequency of Occurrence	Unlikely
Warning Time	3-6 Hours
Geographic Extent	Community-wide
Potential Impact	Major

Multijurisdictional Concerns

Areas located below around the aforementioned levees are susceptible to flooding and therefore should be included in any prospective mitigation projects. The probability of levee failure occurring in the future is relatively low based on previous data.

Hazard Summary

Carver County has experienced no dam or levee failures over the last 75+ years.

4.4.2 Terrorism

Hazard Identification

Terrorism is defined in the Code of Federal Regulations as, "The unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives." The primary objectives of most terrorist groups include the following:

- Gain publicity.
- Stimulate loss of confidence in the government.
- Attract recruits.
- Get public support.
- Gain financial support, and ultimately weaken and overthrow the government.

Techniques used to gain an audience for their platform include hostage-taking, product-tampering, criminal extortion, arson, sabotage, threats against individual family members, assassinations, kidnapping, bombings, and armed attacks. The most likely targets of these forms of terrorism are political leaders, key military personnel, foreign missions, military facilities, corporate executives and facilities, and celebrities.

Hazard Profile

A major terrorism hazard incident has been determined to have a low likelihood of occurrence in Carver County. Therefore, although some hazard characterization information is presented below, no further risk assessment has been performed for this hazard. Additional analyses to further characterize the risks of this hazard and the development of suitable mitigation action

items will be conducted in the future based on periodic reviews of this HMP and available resources

Terrorist incidents in this country prior to the September 11, 2001 attacks have included bombings of the World Trade Center (1993) in New York City, the United States Capitol Building in Washington, D.C., and Mobil Oil corporate headquarters in New York City. There was also the 1995 bombing of the Murrah Federal Building in Oklahoma City. In the United States, most terrorist incidents have involved small extremist groups using terrorism to further a designated objective or obtain publicity for a cause. Bombings have been the most frequent method of attack in the United States. Other possibilities include attacks against transportation facilities, utilities, or other public services, or an incident involving chemical or biological materials.

Unfortunately, the risk of terrorist acts exists in the state of Minnesota and cannot be ruled out for Carver County. Terrorist attacks can take a wide variety of forms, ranging from a verbal threat to sabotage to biological weapons to a bomb.

The most frequently used terrorist methods in the United States include, but are not limited to:

- **Bombs, Guns, and Explosives.** These are the "traditional" weapons used by terrorists worldwide. Typically, these weapons are less technically and resource demanding.
- **Biological Weapons.** These weapons use infectious microbes or toxins to produce illness or death in people, animals, or plants. Potential biological weapons include anthrax, botulism, smallpox, viral hemorrhagic fevers, water safety threats (for example, cholera), and food safety threats (for example, salmonella). Biological weapons are relatively difficult to cultivate and disseminate.
- **Chemical Weapons.** Chemical weapons cause severe health reactions designed to incapacitate or cause death. There is a wide array of potential chemical agents that could be used as weapons. These agents vary in how their effects on the body, required dose, exposure mechanism, length of exposure, toxicity, origination, and form (for example, liquid gas). Examples of chemical agents include sarin, mustard agent, VX, and cyanide.
- **Radiological and Nuclear Weapons.** Although there has been much speculation by media and various governmental agencies regarding the potential for a terrorist to obtain fissionable material or a nuclear bomb, there are no known unclassified cases of any such organization or group actually obtaining weapons-grade material. Constructing a nuclear bomb would be relatively difficult and require special resources, training, and materials.

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** All assets within Carver County are susceptible to being affected by a terrorist incident.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in the County, it was determined that risk/vulnerability includes the entire population of Carver County since there is no way to determine the impact/magnitude of a terrorist incident and no way to predict where and when a terrorist incident will occur. People are vulnerable to terrorist events through physical injury or disease, power outages, effects on transportation routes, establishment of shelters, effect of incident on mental state of the public, confidence of public in law enforcement support, etc.
- **Environment Risk/Vulnerability.** Risks to the environment are high should a terrorist incident occur but the frequency of terrorist events in Carver County are low. Environmental concerns would be interruption or contamination of water or food supplies, secondary events such as fires and hazardous materials accidents (such as gas pipelines rupturing, rupture of hazardous material containers at facilities, etc.).

Vulnerability

Terrorism	
Frequency of Occurrence	Unlikely
Warning Time	None - Minimal
Geographic Extent	Community-wide
Potential Impact	Negligible to Major

Land Use and Development Trends

Future development throughout Carver County will take into consideration possible events.

Multijurisdictional Concerns

All of the County is subject to events and therefore should be included in any prospective mitigation projects.

Hazard Summary

Although there have been no terrorist incidents in Carver County, multiple attacks in different areas of the United States remind us that terrorism is always a threat. Carver County officials work with state and federal officials on domestic preparedness efforts, the details of which go beyond the scope of this plan. The community should always remain vigilant to the threat of an attack, whether it be via explosives, agriculture, or a cyber-attack.

4.4.3 Hazardous Materials Spills

Hazard Identification

Hazardous materials (hazmat) incidents are technological events that involve large-scale releases of chemical, biological, or radiological materials. Hazardous materials are substances that are harmful to the health and safety of people and property. Hazardous materials spills often occur along roadways, highways, and railways. Facilities that produce, process, or store hazardous materials are at risk, as are facilities that treat or dispose of hazardous waste. Carver County is required by the State of Minnesota to regulate generators of hazardous waste.

Hazard Profile

Hazardous materials spills occur occasionally within the county. In recent years, there have been two hazardous materials incidents. In April 2007, a Carver County Sheriff's Deputy discovered an ammonia leak after noticing a strong smell of ammonia near Highway 212 and County Road 36, in Cologne.[16] The leak was from a 2,000-gallon tank and determined to be accidental. The response included the Cologne Fire Department, Waconia Fire department, Carver county hazmat team, Ridgeview Ambulance, and other environmental service crews.

[16] http://www.chaskaherald.com/view/full_story/13405702/article-Ammonia-leak-closes-highway?instance=article_results

The Carver County Hazmat Team was also required at a June 2009 explosion in Waconia.[17] A gas explosion and fire occurred at Waconia Farm supply when an employee was refilling propane tanks. One person was killed. Fire departments from Waconia, Cologne, Hamburg, Norwood Young America, Watertown, and Victoria responded in addition to the Carver County Hazmat Team.

Carver County is also at risk to transportation related hazardous materials incidents. This is directly attributable to the presence of multiple highways (U.S. Hwy 212, MN Hwy 5, 7, 25, 41, 285) running through portions of the county as well as the several railroads that carry materials through the county. This is evidenced by a train derailment that occurred in 2007.[18] A train bridge collapsed near the Minnesota River, derailing six Union Pacific railroad cars. No one was injured in the incident but the sugar from the train spilled into a swampy area, causing environmental services personnel to respond and determine how to remove the sugar from the riverbank. This incident demonstrates the potential for hazardous materials incidents in the county.

Carver County has an average of 15 hazardous materials spills in any given year.

Table 4-9
Hazardous Materials Incidents in Carver County

Location	Date	Type
Cologne	2/28/2003	Hazmat – Anhydrous Ammonia Leak
NYA	3/19/2003	Hazmat – Assist with Meth Lab contents disposal (phone)
Cologne	3/24/2003	Hazmat – Assist with Meth Lab contents disposal (phone)
Chaska	4/24/2003	Hazmat – Natural Gas Line Break
Chaska	4/28/2003	CRASH/Hazmat – Tanker Truck Rollover Highway 212 and Highway 41
San Francisco Twp.	5/20/2003	CRASH/Hazmat – Milk Tanker Truck Rollover County Road 45
Camden Twp.	6/6/2003	CRASH – Cement Truck Rollover (phone)
Benton Twp	7/2/2003	Hazmat – Assist with Meth Lab ID and Clean-up (phone)
Chanhassen	8/2/2003	Hazmat – Sewer Line Break - Lotus Lake
NYA	8/4/2003	Hazmat – ELP Tanker Leak
Chanhassen	8/11/2003	Hazmat – Ammonia Release at Business
Chaska	8/14/2003	Hazmat – Natural Gas Line Break
Chanhassen	8/22/2003	CRASH/Hazmat – Truck rollover Highway 41 and Highway 5
Benton Twp	9/24/2003	Hazmat – Chemical odor at Cologne PW Shop

[17] http://www.chaskaherald.com/view/full_story/13426580/article-Explosion-kills-Waconia-boy?instance=article_results
[18] http://www.chaskaherald.com/view/full_story/13404710/article-Train-bridge-collapses-near-Minnesota-River?instance=article_results

Location	Date	Type
Chanhassen	10/7/2003	Hazmat – Propane Tank Leak
Chaska	10/21/2003	Hazmat – Chemical reaction in a school
Cologne	12/24/2003	CRASH/Hazmat – Bus-Car crash at Hwy 284 and Paul Ave.
Chaska	1/16/2004	Hazmat – Possible Meth Lab in Vehicle
Chaska	2/5/2004	Hazmat – Antifreeze spill from hose failure at Government Center
Chanhassen	5/21/2004	Hazmat – Gas Spill - Holiday - Taken care of by phone
Chanhassen	5/29/2004	Hazmat – Gas Spill - Lotus Lake - Taken care of by phone
Chaska	6/1/2004	Hazmat – Fire/Release - LifeCore Biomedical
Watertown Twp	6/30/2004	CRASH/Hazmat – PI Accident Hwy 7 and Hwy 25
Chaska	7/11/2004	Hazmat – Possible Anhydrous Ammonia Leak
Chaska	9/14/2004	Hazmat – Gas Leak from Vehicle
Chaska	3/17/2005	Hazmat – Suspicious Odor/School Evacuated - Guardian Angles
Chanhassen	3/21/2005	Hazmat/CRASH – Semi Rollover Hwy 41 and Hwy 5
Waconia	4/14/2005	Hazmat – Oil Spill from a Ruptured Hydraulic Line on a Truck
San Francisco Twp	4/22/2005	Hazmat – Assist with Blasting Cap Disposal
YA Twp	5/5/2005	Hazmat – Assist with Blasting Cap Disposal
Waconia	5/10/2005	Terrorism/Suspicious Threats -Package – Assist with incident management
Chanhassen	6/27/2005	Hazmat/CRASH – Semi Rollover Hwy 101 & Pioneer Trail
Dahlgren Twp	7/17/2005	Hazmat – Container along road on Dahlgren Road
Carver	8/8/2005	Hazmat – Oil spill from a ruptured hydraulic line on a truck
San Francisco Twp	8/14/2005	Hazmat/CRASH – Semi vs. car County Road 40/Homestead Road
Victoria	9/19/2005	Hazmat – Fuel Leak (Trailer out of Chan for Absorbents)
Hollywood Twp	11/7/2005	Hazmat/CRASH – Semi vs. car Hwy 7 and Cty Road 33
Watertown Twp	12/16/2005	Hazmat/CRASH – Semi vs. car Hwy 7 and Oxford (Phone consultation)
Chanhassen	1/11/2006	Hazmat – Fuel oil spill at business in Chan that affected storm water system in Chaska
Hollywood Twp	1/29/2006	Hazmat – Possible Fuel spill in area of Hwy 7 and Tacoma Ave (Phone only)
Chaska	1/31/2006	Hazmat – Fuel spill at a Gas Station in Chaska

Location	Date	Type
Waconia	8/23/2006	Hazmat – Smell of gas at Ridgeview Hospital
Cologne	9/13/2006	Hazmat – Anhydrous Ammonia Leak
Waconia	1/13/2007	Gasoline Spill – Parking Lot (Assisted Waconia Fire)
Chanhassen	4/10/2007	Transformer Oil Spill – Ground (Assisted County Environmental Services)
Cologne	4/26/2007	Anhydrous Ammonia Leak – Valve Leak
New Germany	4/26/2007	Anhydrous Ammonia Leak – Valve Leak (Not Sure)
Hamburg	5/25/2007	Spill/Oder – Taken care over the phone
Waconia	8/27/2007	Chemical Odor/Smell
Chanhassen	9/7/2007	Unlabeled 55 Gal Drums (Abandon)
Dahlgren Township	9/10/2007	Fuel Spill (Diesel Fuel)
Chaska	10/9/2007	Gas Line Break – Air Monitor Request
Chanhassen	10/18/2007	Building Explosion – Phone Conversation Only
City of Chaska		Air Monitoring Request (Water Treatment Plant)
City of Chanhassen		Fuel Spill (Holiday)
San Francisco Township	5/16/2008	Hazmat – Taken care of over the phone
City of Waconia	7/7/2008	Hazmat – Taken care of over the phone
City of Chaska	7/8/2008	Hazmat – 4" Gas Line Break
Dahlgren Twp	8/26/2008	Hazmat – Fuel Spill
Watertown Township	10/13/2008	Hazmat – Fuel Spill
Norwood Young America	10/21/2008	Hazmat – Fuel Spill
City of Cologne	12/9/2008	Hazmat – Liquid Spill (Absorbents Used)
Chaska	1/6/2009	Hazmat – Level I - Fuel Spill
Chanhassen	2/25/2009	Hazmat – Check on 55 Gal. Drum in ditch
Carver	3/31/2009	Hazmat – Gas Leak
Waconia	6/10/2009	Hazmat – Propane Explosion with Fatality
Cologne	6/26/2009	Hazmat – Level II – Formaldehyde Spill
Victoria	6/27/2009	Hazmat – Level I – Fuel Spill (Semi Crash)

Location	Date	Type
Chanhassen	7/21/2009	Hazmat – Level III – Ammonia Leak
Cologne	7/28/2009	Hazmat – Level I – Fuel Spill/Taken Care of by Phone
Chaska	8/7/2009	Possible Hazmat – Garbage Truck Rollover – No spill, no report – Assist to Chaska Fire
Chanhassen	8/31/2009	Assist Chanhassen Fire – Gas line break at Hwy 101 So of Pioneer – No report
Victoria	11/10/2009	Hazmat – Level I – Lime Spill
Camden Twp.	11/16/2009	Hazmat – Level I – Fuel Barrel Fire
City of Mayer	1/1/2010	Hazmat – Level I (Requesting Air Monitors for Natural Gas Leak)
City of Mayer	1/2/2010	Hazmat – Level I (Requesting Air Monitors for Natural Gas Leak)
Dahlgren Township	1/8/2010	Hazmat – Level I (Environmental Services – Phone Call)
City of Chaska	3/12/2010	Hazmat – Level I (Anhydrous Ammonia Leak – MGK Companies)
City of Chanhassen	3/22/2010	Hazmat – Level II (Anhydrous Ammonia Leak – General Mills)
City of Chaska	4/9/2010	Hazmat – Level I (Unknown Chemical Smell) – (Used 2 Air Monitors)
City of Chaska	5/27/2010	Hazmat – Level I (Requesting Pool/Plug-N-Dike – Gas Leak)
City of Mayer	7/3/2010	Hazmat – Level I (Soda Ash to Mayer Fire – Acid Spill)
City of Waconia	7/6/2010	Hazmat – Level I (Garbage Truck Rollover)
Hancock Township	7/6/2010	Hazmat – Level I (Milk Truck Rollover)
City of Hamburg	7/6/2010	Hazmat – Level I (Oil Spill)
Camden Township	9/9/2010	Hazmat – Level I (Milk Truck Rollover with Fuel Leak)
City of Chanhassen	10/7/2010	Hazmat – Level I (Gas Leak Assist)
City of Carver	11/17/2010	Hazmat – Level I (Gas Spill – Taken care of over the phone)
Benton Township	12/1/2010	Hazmat – Level I (Gas Leak Assist)

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** With multiple highway system, all critical facilities have the possibility of being affected by a hazardous materials incident.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined that risk/vulnerability includes the entire population of the County since there is no way to determine the impact/magnitude of a hazardous materials incident and no way to predict where and when a hazardous materials incident will occur. People are vulnerable to hazardous materials incidents through effects on transportation routes, establishment of shelters, etc.

- **Environment Risk/Vulnerability.** Risks to the environment are high should a hazardous materials accident occur. Environmental concerns would be interruption of water supply and secondary events such as fires and hazardous materials accidents (such as gas pipelines rupturing, rupture of hazardous material containers at facilities, etc.). When spills do occur, whether inside or outside facilities or along roadways, shutdowns, lost time, and expended man-hours are all factors mitigation planners must take into account. Carver County Emergency Management can provide a listing of facility locations throughout the county if requested.

Vulnerability

Hazardous Materials

Frequency of Occurrence	Highly Likely
Warning Time	None - Minimal
Geographic Extent	Localized to Community-Wide
Potential Impact	Moderate

Damage Assessment

It is difficult to determine the damage to the environment associated with hazardous materials spills. Carver County has no recorded instances of critical facilities and/or other property being damaged as a result of hazardous materials spills.

Land Use and Development Trends

Carver County currently has no land use or development trends related to hazardous materials spills.

Multijurisdictional Concerns

All of Carver County is vulnerable to both fixed location and transportation-related hazardous materials spills. The highways (U.S. Hwy 212, MN Hwy 5, 7, 25, 41, 284) are most vulnerable to transportation-related spills. Fixed location spills are possible in all areas of the county. Carver County Emergency Management can provide a list of the facilities located in the county.

Hazard Summary

Hazardous materials spills are a relatively common occurrence in Carver County. The volume of spills experienced in the past dictates that mitigation measures be considered. The types of hazardous materials passing through Carver County are many and varied. The presence of multiple highways with an unknown quantity of hazardous materials traveling through the county on a daily basis poses a challenge in the development of adequate mitigation measures.

4.4.4 Energy/Fuel Shortage

Hazard Identification

Recent tropical storm events in the past 20 years have identified the possibility of energy/fuel shortage for Carver County. This is due to limited supplies coming into the area following an incident and therefore causing fuel rations or the prioritization of fuel supply for both emergency services and residents of the county. An energy/fuel shortage could also be due to damage to natural gas pipelines post-storm and the need to shut down the pipelines for repairs.

Hazard Profile

There have been no energy/fuel shortages in the past in Carver County. However, in the last five years, events have shown the potential is there for an interruption/shortage of fuel supply.

The probability of energy/fuel shortage is minimal. The low probability of an incident suggests that the potential for impacts is minimal. Based on historical records from the past 10 years, the probability of future energy/fuel shortage occurring in Carver County and the planning area is considered low.

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** All critical facilities are considered as having the possibility of being affected by an energy/fuel shortage.

- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined that risk/vulnerability includes the entire population of the County since there is no way to determine the impact/magnitude of an energy/fuel shortage incident and no way to predict where and when an energy/fuel shortage incident will occur. People are vulnerable to energy/fuel shortage events through effects on transportation routes, pipelines being damage, etc.
- **Environment Risk/Vulnerability.** Risks to the environment are low should an energy/fuel shortage occur. Environmental concerns would be interruption of natural gas fuel supply and secondary events such as fires and hazardous materials accidents (such as gas pipelines rupturing, rupture of hazardous material containers at facilities, etc.). When spills do occur, whether inside or outside facilities or along roadways, shutdowns, lost time, and expended man-hours are all factors mitigation planners must take into account.

Vulnerability

Energy/Fuel Shortage

Frequency of Occurrence	Occasionally
Warning Time	More than 12 hours
Geographic Extent	Countywide
Potential Impact	Moderate

Damage Assessment

Interruption of fuel supply to the County would have a detrimental effect on the county. The magnitude of the interruption and the long-term expectations of the incident would determine the impact on both emergency services and residents of Carver County

Land Use and Development Trends

Carver County currently has no land use or development trends related to energy/fuel shortage.

Multijurisdictional Concerns

All of Carver County is vulnerable to an energy/fuel shortage.

Hazard Summary

Energy/fuel shortages are an uncommon occurrence in Carver County. However, the potential for an energy/fuel shortage in the county poses an interesting challenge in the development of adequate mitigation measures.

4.4.5 Aircraft Accidents

Hazard Identification

Carver County is located approximately 20 miles southwest of Minneapolis-St. Paul, Minnesota. Carver County is located in the flight pathway of the Minneapolis-St. Paul International Airport, making it vulnerable to the effects of aircraft accidents. Additionally, Flying Cloud Airport is in the neighboring City of Eden Prairie and causes small plane air traffic over Carver County.

Hazard Profile

There has only been one aircraft accident in Carver County in recent history. There was a small airplane emergency crash landing north of the City of Waconia on September 27, 2001 but fortunately, there were no fatalities. However, the potential exists due to the high volume of air traffic that goes in and out of the Minneapolis-St. Paul International Airport.

The probability of an aircraft accident is minimal. The low probability of an incident suggests that the potential for impact is minimal. Based on historical records from the past 10 years, the probability of an aircraft accident occurring in Carver County and the planning area is considered low.

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** It was determined that all critical facilities have the possibility of being affected by an aircraft accident.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in Carver County, it was determined that risk/vulnerability includes the entire population of the County since there is no way to determine the impact/magnitude of an aircraft accident incident and no way to predict where and when an aircraft accident incident will occur. People are vulnerable to aircraft accident events due to the location of the county to the Minneapolis-St. Paul International Airport.

- **Environment Risk/Vulnerability.** Risks to the environment are low should an aircraft accident occur. Environmental concerns would be impact of the aircraft in or near a natural gas line and secondary events such as fires and hazardous materials accidents (gas pipelines rupturing, rupture of hazardous materials containers at facilities, etc.).

Vulnerability

Aircraft Accidents

Frequency of Occurrence	Occasionally
Warning Time	None
Geographic Extent	Localized
Potential Impact	Minor to Moderate

Damage Assessment

An aircraft accident in the County could have a detrimental effect. The magnitude of the accident and the long-term effects of the incident would determine the impact on both emergency services and residents of Carver County.

Land Use and Development Trends

Carver County currently has no land use or development trends related to aircraft accidents.

Multijurisdictional Concerns

All of Carver County is vulnerable to an aircraft accident.

Hazard Summary

Aircraft accidents are an uncommon occurrence in Carver County. However, the potential for an aircraft accident in the county poses a challenge in the development of adequate mitigation measures.

4.4.6 Critical Facilities and Infrastructure Loss

Requirement 44 CFR 201.6(c) (2) (ii)(A)(B)
The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area. (B) An estimate of the potential dollar losses to vulnerable structures identified in … this section and a description of the methodology used to prepare the estimate.

Hazard Identification

According to FEMA, critical facilities and infrastructure are those systems "whose incapacity or destruction would have a debilitating impact on the defense or economic security of that community." These systems include the following seven general categories: fire and emergency services, telecommunications infrastructure, hospitals, law enforcement, educational buildings, government services, and public utilities.

Hazard Profile

Carver County Emergency Management maintains a database for critical facilities and infrastructure. Participating organizations provided the critical facilities and/or assets within their communities. Carver County Emergency Management identifies the structure value of all critical assets and structures.

All facilities and infrastructure within Carver County are susceptible to natural and terrorist events. Lightning and wind within the county can cause damage to facilities. The possibility of a fire within the facilities could cause damage, as could flooding and hazardous materials incidents.

Table 4-10
Carver County Critical Facility Summary

Critical Infrastructure	Number of Critical Facilities
Fire Stations	13
Care Facilities	6
Law Enforcement Facilities	2
Educational Buildings	78
Totals	**99**

Assets Exposed to Hazard

All assets within the County are susceptible to being affected by natural or terrorist incident. Plans have been developed to prevent terrorist events from impacting facilities and infrastructure. Natural events may have some impact on facilities and infrastructure, but building codes have been developed to reduce the damage to facilities. The table below details the critical facilities in the county, where they are located, and the assessed loss should they be damaged or destroyed.

Critical Facilities	City	Address	Estimated Loss
Fire Stations			
Carver Fire Station	Carver	801 Jonathon Carver Parkway	$2.1 Million
Chanhassen Fire Station #1	Chanhassen	7610 Laredo Drive	$2.3 Million
Chanhassen Fire Station #2	Chanhassen	6400 Minnewashta Parkway	$290,000
Chaska Fire Station	Chaska	285 Engler Boulevard	$2.9 Million
Cologne Fire Station	Cologne	110 Louis Street West	$800,000
Hamburg Fire Station	Hamburg	181 Broadway Avenue	$820,000
Mayer Fire Station	Mayer	400 Ash Avenue North	$315,000
New Germany Fire Station	New Germany	300 Broadway Street East	$287,000
Victoria Fire Station	Victoria	1500 80th Street	$2.3 Million
Waconia Fire Station	Waconia	26 South Maple Street	$820,000
Watertown Fire Station	Watertown	401 Carter Street Northeast	$1.6 Million
Hospitals			
Ridgeview Medical Center	Waconia	500 Maple Street	$35.0 Million
Ridgeview 212 Facility	Chaska	111 Hundertmark Road	$23.1 Million

Critical Facilities	City	Address	Estimated Loss
Law Enforcement			
Carver County Sheriff's Office	Chaska	606 East Forth Street	$45.0 Million
Chaska Police Department	Chaska	1 City Hall Plaza	$4.7 Million
Other			
National Weather Service	Chanhassen	1733 Lake Drive West	$2.1 Million

The table below lists all city hall and township offices within the county that are potentially vulnerable to a hazard.

Hall	Address
Townships	
Hollywood	15855 County Road 122, Hollywood
Watertown	3580 County Road 10, Watertown
Camden	315 State Avenue South, New Germany
Waconia	12777 102nd Street, Waconia
Laketown	9530 Laketown Road, Chaska
Dahlgren	15180 County Road 40, Carver
Benton	13235 County Road 51, Norwood Young America
Young America	181 Broadway Avenue, Hamburg
Hancock	16610 Otis Avenue, Norwood Young America
San Francisco	17380 Homestead Road, Carver
Cities	
Carver	316 Broadway Avenue, Carver
Chanhassen	7700 Market Boulevard, Chanhassen
Chaska	One City Hall Plaza, Chaska
Cologne	1211 Village Parkway, Cologne
Hamburg	181 Broadway Avenue, Hamburg
Mayer	413 Bluejay Avenue, Mayer
New Germany	300 Broadway Street, New Germany

Hall	Address
Norwood Young America	310 Elm Street, Norwood Young America
Victoria	7951 Rose, Victoria
Waconia	201 Vine Street South, Waconia
County	
Carver County Government Center	600 East 4th Street, Chaska

Vulnerability

Critical Facilities and Infrastructure

Frequency of Occurrence	Occasionally
Warning Time	None–More than 12 hours
Geographic Extent	Localized to Countywide
Potential Impact	Negligible to Major

Damage Assessment

Carver County has recorded instances of critical facilities and/or other property being damaged as a result of natural events such as wind and rain. There are no recorded instances of damage to critical facilities or infrastructure from terrorist events.

Land Use and Development Trends

Future development throughout the County will take into consideration possible natural and terrorist events.

Multijurisdictional Concerns

All of the County is subject to events and therefore should be included in any prospective mitigation projects. Critical facilities are mapped on a jurisdictional basis in appendix D.

Hazard Summary

Critical facilities in Carver County are susceptible to many hazards, including flood, wildfires, severe weather (including tornadoes), terrorism, and energy shortages. The destruction of critical facilities or outage of infrastructure can affect the entire community for a vast amount of time. Mitigating against their loss is of the utmost importance to maintain county operations.