Redwood County All Hazard Mitigation Plan

Update 28 March

2012

This multi-jurisdictional hazard mitigation plan update includes Redwood County and the cities of Belview, Clements, Delhi, Lamberton, Lucan, Milroy, Morgan, Redwood Falls, Revere, Sanborn, Seaforth, Vesta, Wabasso, Walnut Grove, and Wanda, Minnesota.

This project was supported by Grant Award Number FEMA-DR-1717-MN awarded by the Federal Emergency Management Agency (FEMA). Points of View or opinions in this document are those of the author and do not represent endorsement by FEMA or reflect FEMA's views.

Prepared by Southwest Regional Development Commission and Redwood County Emergency Management

Redwood County All Hazard Mitigation Plan

Update – 2012

ADDENDUMS

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Redwood County
All-Hazard Mitigation Plan

Update — 2012

Executive Summary

All-hazard mitigation is a process to eliminate or reduce long-term risks to people and property from natural and man-made hazards. This hazard mitigation plan documents the multi-jurisdictional, multi-hazard mitigation planning update process in Redwood County, Minnesota, which is intended to meet the requirements of the federal Disaster Mitigation Act of 2000.

The Redwood County All-Hazard Mitigation Plan is intended to identify effective mitigation efforts through education and proper planning.

In 2003-05, Redwood County and Southwest Regional Development Commission (SRDC) completed the county's first All Hazard Mitigation Plan. In 2009-11, a project was undertaken to update that plan, so that all local units of government in the county that wished to participate could become eligible to adopt the updated plan. During this time, four Presidential Disasters were declared that included Redwood County. All incorporated municipalities continued to participate in the County's hazard mitigation planning process: Belview, Clements, Delhi, Lamberton, Lucan, Milroy, Morgan, Redwood Falls, Revere, Sanborn, Seaforth, Vesta, Wabasso, Walnut Grove, and Wanda, Minnesota.

Redwood County and the cities of Redwood Falls, Sanborn and Seaforth participate in the National Flood Insurance Program (NFIP). The cities of Delhi, Revere, Vesta, and Walnut Grove have declined to participate in the NFIP, since although they contain identified Flood Hazard Areas homes are not at risk. The City of Wanda is applying to join NFIP in 2012.

The Redwood County All-Hazard Mitigation Planning Team identified the following natural and man-made hazards as current High Rank Hazards for Redwood County:

- Agricultural Disease (Animal & Crop)
- Tornado / Straight-line Winds
- Winter Storms
- Hazardous Materials

The Planning Team considered back-up power supplies, addressing hazardous materials, public education for severe weather, and hardening utilities to be priority mitigation actions for this update.

This plan is formatted to follow current FEMA guidance. Chapter One introduces the concept of multi-hazard mitigation planning, in one section. Section I describes all-hazard mitigation programs in Minnesota and provides a profile of the county.

Chapter Two covers prerequisites for eligibility to adopt this multi-hazard mitigation plan in multiple jurisdictions, in two sections. Section II describes the plan adoption process. Section III describes multi-jurisdictional participation in the planning process.

Chapter Three documents the process used in developing this plan. Section IV describes the planning process, the All Hazard Mitigation Planning Team, public involvement, and existing plans, studies, reports and technical information used in the planning process.

Chapter Four is the risk assessment of hazards facing the county, in multiple sections. Section V describes identified natural and technological hazards. Section VI provides a profile of identified hazards. Section VII provides an overview of vulnerability to identified hazards. Section VIII addresses Repetitive Loss Properties. Section IX addresses risks to structures. Section X addresses estimates of potential losses. Section XI provides an analysis of development trends. Section XII addresses multi-jurisdictional risk analysis for participating jurisdictions.

Chapter Five documents goals, objectives and mitigation strategies that the All-Hazard Mitigation Planning Team developed through the all-hazard mitigation planning process. Section XIII describes mitigation goals and objectives. Section XIV describes the comprehensive range of specific mitigation actions identified. Section XV addresses NFIP compliance. Section XVI describes implementation of mitigation actions. Section XVII addresses the multi-jurisdictional nature of mitigation actions.

Chapter Six documents procedures for long-term plan maintenance. Section XVIII describes monitoring, evaluating and updating the plan. Section XIX addresses incorporation of this plan into existing planning mechanisms. Section XX addresses the need for continued public involvement.

This planning process has been conducted by SRDC and Redwood County Emergency Management in accordance with current guidance provided by US Federal Emergency Management Agency (FEMA) and Minnesota Homeland Security and Emergency Management (HSEM). FEMA has announced that new guidance will be issued in FY2012, which should be reviewed at that time by users of this plan to align implementation measures with requirements of future plan updates.

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CHAPTER 1: INTRODUCTION

This Chapter introduces the concept of multi-hazard mitigation planning. Section I describes all-hazard mitigation programs in Minnesota and provides a profile of Redwood County.

I. Mitigation Planning

Natural and manmade hazards present risks throughout Minnesota. Rain and snow bring threats of flooding and utility failure. At any time, we may need to respond to the impacts of fire or tornado, riot or radiation. Our local units of government, first responders and emergency managers know how to effectively respond to hazards as they occur. We can also protect our communities by planning for hazard mitigation before disaster strikes.

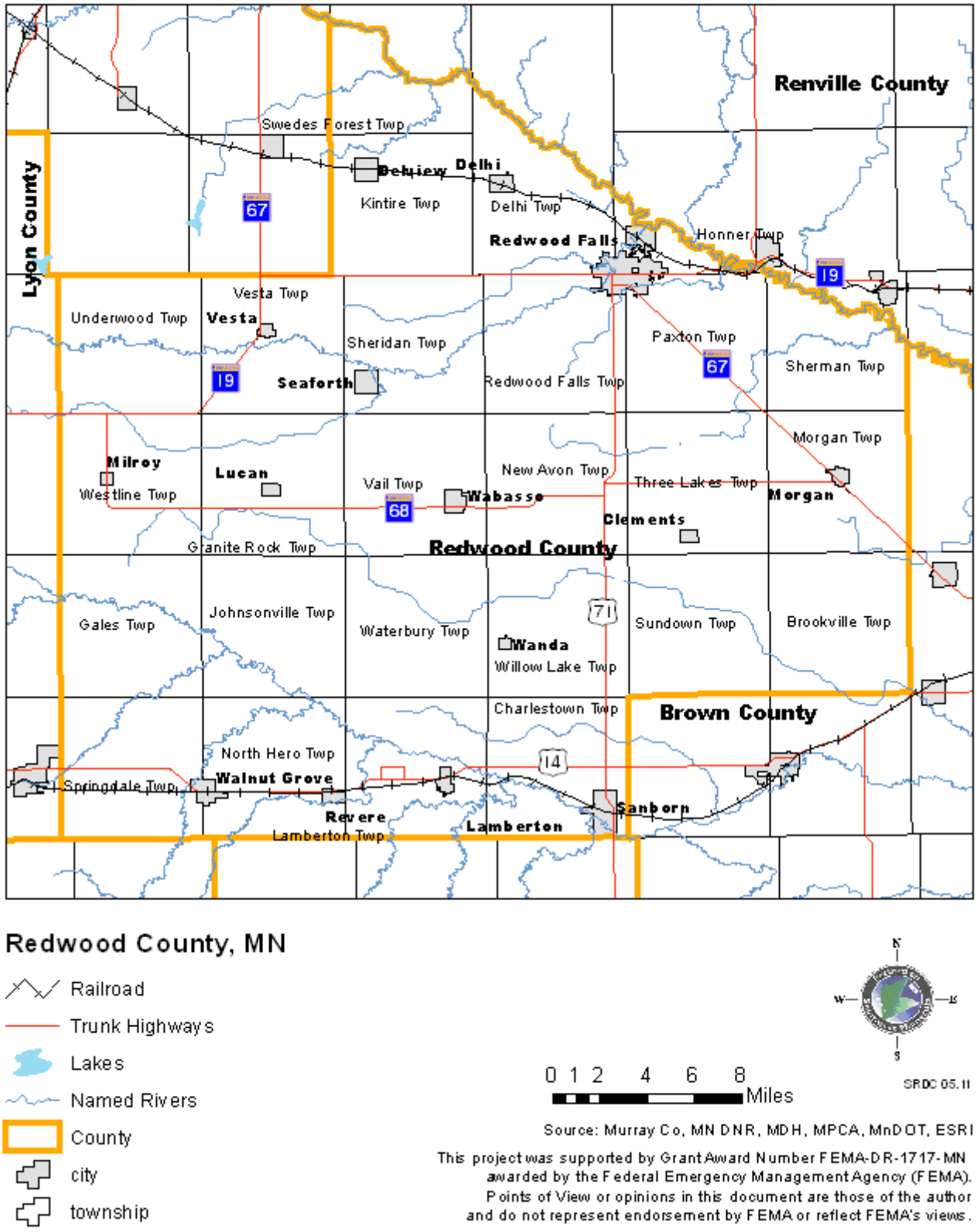
What is Hazard Mitigation Planning? The 2011 *Minnesota All-Hazard Mitigation Plan* (MAHMP) offers this definition: "Hazard mitigation is any sustained action taken to reduce or eliminate long-term risk to people and property from natural or human caused hazards and their effects." According to the U.S. Federal Emergency Management Agency (FEMA) State and Local Mitigation Planning Fact Sheet:

> *Hazard mitigation planning is the process State, local, and tribal governments use to identify risks and vulnerabilities associated with natural disasters, and to develop long-term strategies for protecting people and property in future hazard events. The process results in a mitigation plan that offers a strategy for breaking the cycle of disaster damage, reconstruction, and repeated damage, and a framework for developing feasible and cost-effective mitigation projects. Under the Disaster Mitigation Act of 2000 (Public Law 106-390), State, local and tribal governments are required to develop a hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance.*

The American Planning Association guide *Hazard Mitigation: Integrating Best Practices into Planning* offers that "Mitigation, a cornerstone of emergency management, is defined as taking sustained actions to reduce or eliminate the long-term risks to people and property from hazards." Author James Schwab, AICP, is even more direct in *Planning Magazine*: "Hazard mitigation essentially is the art and science of reducing risks of future losses."

Emergency management involves a cycle through which communities prepare, respond and recover from emergencies and disasters. Hazard mitigation is also part of this cycle and serves two primary purposes—to protect people and property, and to limit the costs of disaster response and recovery.

Figure 1-1 Local Units of Government



Redwood County, MN

- Railroad
- Trunk Highways
- Lakes
- Named Rivers
- County
- city
- township

0 1 2 4 6 8 Miles

SRDC 05.11

Source: Murray Co, MN DNR, MDH, MPCA, MnDOT, ESRI

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A. Purpose and Authority

The rising costs of natural and human-caused disasters have led many leaders to consider how to better protect people and their communities. Congress passed the Disaster Mitigation Act of 2000 (DMA2K) (PL 106-390) to establish a unified national hazard mitigation program. DMA2K amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act), which in turn had amended the Disaster Relief Act of 1974. DMA2K placed new emphasis on hazard mitigation planning in state and local units of government, requiring adoption of mitigation plans as a prerequisite for certain assistance programs.

A multi-hazard or "All-Hazards" approach to mitigation planning encompasses both natural and manmade hazards. Following the 2001 attacks on New York City and Washington, DC, and the subsequent reorganization of FEMA and the nation's homeland security structure, many mitigation planning efforts explicitly incorporated technological hazards arising from human activities, both accidental and intended. While local hazard mitigation plans are only required to address natural hazards, the All-Hazards approach considers a comprehensive array of both risks and potential mitigation actions.

FEMA has implemented hazard mitigation planning requirements through federal regulations (44 CFR 201). In Minnesota, the Homeland Security and Emergency Management (HSEM) division of the Department of Public Safety (DPS) works with FEMA to implement disaster mitigation efforts. The Minnesota Department of Natural Resources (DNR) is also involved with mitigation as the agency responsible for implementation of FEMA's National Flood Insurance Program (NFIP) and floodplain management in the state.

A.1 Federal Mitigation Funding Programs

FEMA administers several programs that provide hazard mitigation funding, for which HSEM applies for funding on behalf of local sub-applicants. Typically grants allow a cost-share of 75 to 90 percent federal funding for eligible projects. Section Two of the *Minnesota All-Hazard Mitigation Plan* describes five different FEMA hazard mitigation assistance programs. Any projects funded by these programs must demonstrate a positive cost-benefit ratio—the benefits of the mitigation action must demonstrably outweigh the costs. Programs described in the MAHMP include the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), Repetitive Flood Claims (RFC), and Severe Repetitive Loss (SRL).

Figure 1-2 Eligible Sub-applicants

	HMGP	PDM	FMA	RFC	SRL
State agencies	√	√	√	√	√
Tribal governments	√	√	√	√	√
Local governments/communities	√	√	√	√	√
Private non-profit organizations (PNPs)	√				

Source: FEMA HMA Guidance

A.1.a Hazard Mitigation Grant Program (HMGP)

HMGP provides funds in accordance with priorities identified in hazard mitigation plans to implement mitigation measures during disaster recovery. State and local governments, certain private non-profit organizations, and tribes are eligible sub-applicants through HSEM. Examples of eligible projects include:

- Acquiring and relocating structures from hazard-prone areas
- Retrofitting structures to protect them from floods, high winds, earthquakes, or other natural hazards
- Constructing certain types of minor and localized flood control projects
- Constructing safe rooms inside schools or other buildings in tornado-prone areas
- Hazard mitigation planning

A.1.b Pre-Disaster Mitigation (PDM)

PDM provides funds for hazard mitigation planning and implementation prior to a disaster event. State-level agencies, tribes, local government, and public colleges are eligible sub-applicants through HSEM. Examples of eligible projects include:

- Voluntary acquisition of real property for open space
- Elevation of existing public or private structures
- Retrofitting existing structures to meet building codes
- Construction of safe rooms for public or private structures that meet certain FEMA requirements
- Hydrologic and hydraulic studies/analyses, engineering and drainage studies for project design and feasibility
- Vegetation management
- Protective measures for utilities, water, sewer, roads and bridges
- Storm water management to reduce/eliminate long-term flood risk

A.1.c Flood Mitigation Assistance (FMA)

FMA implements cost-effective measures to reduce or eliminate long-term risk of flood damage to NFIP structures. State-level agencies, tribes, and local government are eligible sub-applicants through HSEM. Eligible projects include:

- Acquisition, structure demolition, or structure relocation with the property deed restricted for open space uses in perpetuity
- Elevation of structures
- Dry floodproofing of non-residential structures
- Minor structural flood control activities

A.1.d Repetitive Flood Claims (RFC)

RFC intends to reduce/eliminate long-term risk to structures with one or more NFIP claim. State-level agencies, tribes, and local government that cannot meet

FMA requirements for cost-share or management capacity are eligible sub-applicants through HSEM. Project grants are available for acquisition, structure demolition, or structure relocation of insured structures, with the property deed restricted for open space uses in perpetuity.

A.2.e Severe Repetitive Loss (SRL)

SRL Pilot Program is intended to reduce/eliminate risk to severe repetitive loss properties. There are currently no such properties in the county.

B. FEMA Guidance and Plan Review

FEMA provides a publication, *Local Multi-Hazard Mitigation Planning Guidance* (the "Blue Book") to provide guidance to local governments to meet the requirements of 44 CFR §201.6 *Local Mitigation Plans*. The Blue Book includes a Plan Review Crosswalk which outlines the process for review of local mitigation plans. FEMA announced late in the plan update process that new guidance will be released in FY2012, which should be taken into account during implementation and plan maintenance.

This All-Hazard Mitigation Plan is intended to document the process that Redwood County and participating jurisdictions undertook to meet the *Local Multi-Hazard Mitigation Planning Guidance* and Crosswalk requirements as stated in the July 1, 2008, publication. The remainder of this document (chapters 2-6) is structured according to the outline of the Crosswalk to permit easy and accurate Federal and State review of the local process and the results thereof.

B.1 Plan Submittal and Review Procedures

Federal rules require that this plan be submitted to HSEM for initial review and coordination, with the State then forwarding the plans to FEMA's Regional Office in Chicago for formal review and approval. HSEM provided advice throughout the mitigation planning process.

After FEMA review, the agency may require changes to meet requirements. Once FEMA judges the all-hazards mitigation plan "approvable pending adoption," the plan will then be forwarded to participating jurisdictions for adoption. (See section II below.) The plan must be updated within 5 years of initial approval, and any changes once again reviewed and approved by FEMA, in order to continue funding eligibility (Section XVIII).

B.2 Planning Resources

In addition to the Blue Book, FEMA provides a number of other planning tools that were consulted prior to and during the local all-hazard mitigation planning process. These included:

U.S. Federal Emergency Management Agency (FEMA) *Hazard Mitigation Grant Program Fact Sheet* (June 2007)

U.S. Federal Emergency Management Agency (FEMA) *Local Multi-Hazard Mitigation Planning Guidance* (July 2008)
U.S. Federal Emergency Management Agency (FEMA) "Mitigation Ideas: Possible Mitigation Measures by Hazard Type" Region V (September 2002)
U.S. Federal Emergency Management Agency (FEMA) *Pre-Disaster Mitigation Grant Program Fact Sheet* (June 2007)
U.S. Federal Emergency Management Agency (FEMA) *State and Local Mitigation Planning Fact Sheet* (March 2007)
U.S. Federal Emergency Management Agency (FEMA) *State and Local Mitigation Planning How-To Guide* (September 2002)
U.S. Federal Emergency Management Agency (FEMA) *Tribal Multi-Hazard Planning Guidance* (March 2010)
U.S. Federal Emergency Management Agency (FEMA) *Using HAZUS-MH for Risk Assessment How-To Guide* (August 2004)

The HAZUS-MH (Hazards US-Multi-Hazard) GIS risk assessment software program available from FEMA was partially utilized in this plan. Improving data for HAZUS should be considered in preparing for the next plan update.

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B.3 Flood Mitigation Planning

In 2007, FEMA amended 44 CFR 201 to incorporate mitigation planning requirements for the FMA program (I.A.1.c above). The changes combined the local mitigation plan requirement for all hazard mitigation assistance programs include FMA as well as HMGP, PDM and SRL programs; required that jurisdictions with NFIP repetitive loss properties (I.A.1.d) address such properties in their assessment and mitigation strategies, and required that jurisdictions in NFIP include a strategy for continued compliance with the NFIP in the mitigation plan.

B.4 Multi-Jurisdictional & Other Local Organizations

For the purpose of hazard mitigation, FEMA considers a Local Government having jurisdiction as "any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments…, regional or interstate government entity, or agency or instrumentality of a local government." (44CFR§201.2) Special considerations are given by FEMA for school districts, private nonprofit organizations, and multi-jurisdictional private nonprofit utilities (such as Rural Electric Cooperatives).

FEMA requires that ALL participating jurisdictions meet the requirements for mitigation planning in 44CFR§201.6. The Blue Book specifically requires that each participating jurisdiction address:

- Risks, where they differ from the county
- Mitigation actions (actions must be identified for each jurisdiction)
- Participation in the planning process (attending meetings, contributing research, data, or other information, commenting on drafts of the plan); and
- Adoption (each jurisdiction must formally adopt the plan).

It is intended that this plan will document how each and every one of these requirements was intended to be met by all participating jurisdictions.

C. Profile of Redwood County

Redwood County is located in the Minnesota River Valley of southwestern Minnesota, adjacent to Brown, Cottonwood, Murray, Lyon, Renville, and Yellow Medicine counties.

Redwood County's population in the 2010 U.S. Census was 16,059. There are 15 incorporated municipalities, and 26 townships in Redwood County. The Lower Sioux Indian Community is also included within the boundaries of Redwood County, but is not separately incorporated and is generally addressed to Morton, Minnesota, post office. The City of Redwood Falls is the county seat.

US Highway 71 runs north-south through Redwood Falls, connecting Willmar at TH 23 and Jackson at I-90. US 14 and MN Trunk Highways (TH) 19, 67 and 68 run east-west across the county.

Table 1-1
Civil Divisions in Redwood County

Cities	Townships
Belview	Brookville
Clements	Charlestown
Delhi	Delhi
Lamberton	Gales
Lucan	Granite Rock
Milroy	Honner
Morgan	Johnsonville
Redwood Falls	Kintire
Revere	Lamberton
Sanborn	Morgan
Seaforth	New Avon
Vesta	North Hero
Wabasso	Paxton
Walnut Grove	Redwood Falls
Wanda	Sheridan
	Sherman
	Springdale
	Sundown
	Swedes Forest
	Three Lakes
	Underwood
	Vail
	Vesta
	Waterbury
	Westline
	Willow Lake

C.1 Demographics

Redwood County shares many of the opportunities and challenges common in rural Minnesota and the Midwest. Population in Southwest Minnesota has been generally contracting for several decades. The Census 2010 count was slightly under the population projections (completed by the Minnesota Demographic Center) in the latest *Redwood County Comprehensive Plan*.

Redwood County's ethnic makeup is fairly homogonous at 89% White. Five percent of Census respondents classified themselves as American Indian. The Census counted 419 individuals in 134 households with the Lower Sioux Indian Community.

Table 1-2
Population in Southwest Minnesota

County	1970	1980	1990	2000	2010
Cottonwood	14,887	14,854	12,694	12,167	11,687
Jackson	14,352	13,690	11,677	11,268	10,266
Lincoln	8,143	8,207	6,890	6,429	5,896
Lyon	24,273	25,207	24,789	25,425	25,857
Murray	12,508	11,507	9,660	9,165	8,725
Nobles	23,208	21,840	20,098	20,832	21,378
Pipestone	12,791	11,690	10,491	9,895	9,596
Redwood	**20,024**	**19,341**	**17,254**	**16,815**	**16,059**
Rock	11,346	10,703	9,806	9,721	9,687
Region 8	141,532	137,039	123,359	121,717	119,151

Source: US Census

Two-thirds of all households are Family Households, similar to the state overall, but fewer are families with children (27% vs. 30% in MN). Female Householders with children at home have a similar share of households locally as statewide.

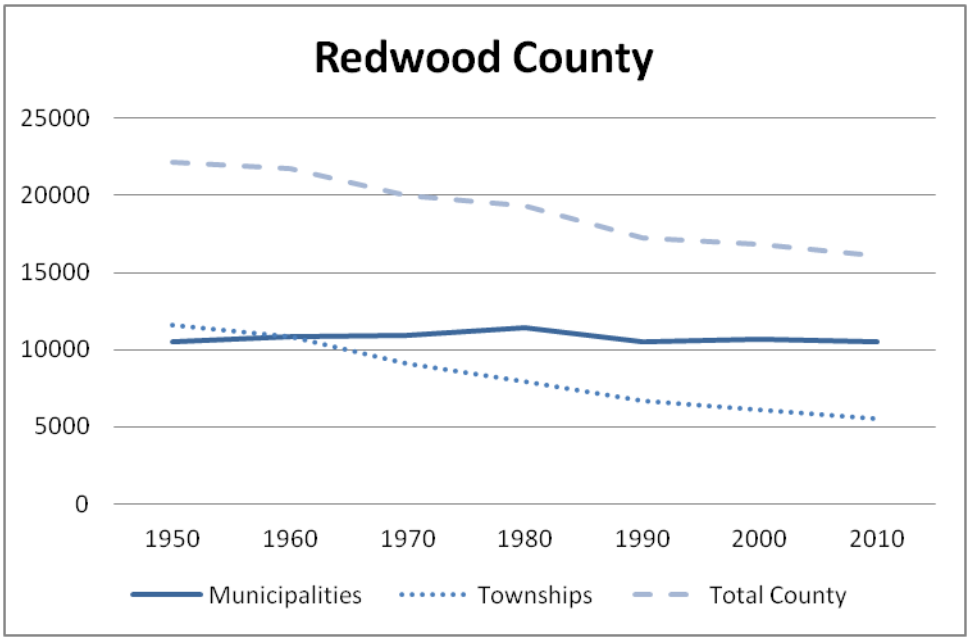
Southwest Minnesota is leading the state and nation with the megatrend of aging populations as the baby boomers reach retirement age. In Minnesota, the median age is 37.4 years. In Redwood County the median age is 42.6, although the median age of the Lower Sioux Community is 27.6. The share of population below age 18 is about the same in the county and state. However, the share of retirement-age population is about 20% in Redwood County compared to 13% in Minnesota overall.

Table 1-3
Population in Redwood County

Minor Civil Division	2010 Population
Belview city	384
Brookville township	224
Charlestown township	208
Clements city	153
Delhi city	70
Delhi township	293
Gales township	137
Granite Rock township	225
Honner township	79
Johnsonville township	152
Kintire township	182
Lamberton city	824
Lamberton township	193
Lucan city	191
Milroy city	252
Morgan city	896
Morgan township	257
New Avon township	191
North Hero township	161
Paxton township	555
Redwood Falls city	5,254
Redwood Falls township	181
Revere city	95
Sanborn city	339
Seaforth city	86
Sheridan township	197
Sherman township	370
Springdale township	217
Sundown township	185
Swedes Forest township	121
Three Lakes township	194
Underwood township	206
Vail township	229
Vesta city	319
Vesta township	192
Wabasso city	696
Walnut Grove city	871
Wanda city	84
Waterbury township	196
Westline township	178
Willow Lake township	222
Redwood County	16,059

Source: MN Demographic Center

Figure 1-3 City-Township Population Distribution, 1950-2010



C.2 Employment

Redwood County is part of a strong agricultural region in Southwest Minnesota. The city of Redwood Falls offers a variety of retail services in addition to a strong manufacturing sector. Marshall to the west and New Ulm to the east are regional trade centers drawing commuters to jobs in manufacturing, trade, medical care and higher education.

Table 1-4
Redwood County Employment By Industry

	Number of Employees		
Industry	2000	2005	2010
Total All Industries	7,184	6,652	6,463
Natural Resources	n/a	n/a	53
Construction	n/a	n/a	315
Manufacturing	1,186	804	796
Trade, Transportation and Utilities	1,547	1,397	1,340
Information	88	74	53
Financial Activities	243	216	256
Professional and Business Services	310	n/a	337
Education and Health Services	1,541	1,615	1,613
Leisure and Hospitality	1,299	n/a	1,112
Other Services	161	155	110
Public Administration	381	n/a	477

n/a-not available, categories do not sum due to non-disclosure

Source: QCEW

Table 1-5
Redwood County Major Employers 2011

Employer		Products/Services	Number of Employees
Jackpot Junction Casio	Rural Morton	Entertainment	620
Daktronics	Redwood Falls	Electronics Manufacturing	200
Schult Homes	Redwood Falls	Manufactured Homes	210
Redwood County	Redwood Falls	Local Government	180
Redwood Area Schools	Redwood Falls	Education	180
Redwood Area Hospital	Redwood Falls	Medical Care	175
Jonti-Craft, Inc.	Wabasso	Furniture Manufacturing	150
Central Bi-Products/FUILLC	Redwood Falls	Animal Processing	140
Walmart	Redwood Falls	Retail	120

Source: RADC/SRDC

Local employment has remained strong in the recent recession, and the local unemployment rate has paced or kept below the statewide and national averages. The 2009 Annual Average Unemployment Rate for Redwood County peaked at 7%, compared to 8% in Minnesota and 9.3% for the U.S. nationwide (not seasonally adjusted).

There were 1,215 farms in Redwood County in 2007, about the same as counted by the US Census of Agriculture in 2002. Two-thirds of farmers list farming as their primary occupation. The average size of a farm was 456 acres, and the average farm reported sales of $300,000. Most acres were planted to corn or soybeans. Redwood County is the 3rd largest producer of crops in Minnesota and among the top 100 counties in the United States. Redwood County is also among the fifteen largest cattle, hog and turkey producers in Minnesota, and among the top 100 hog counties in the United States.

C.3 Natural Environment

Southwest Minnesota has a typical humid, mid-continental climate, with cold, dry continental polar air dominating in the winter and hot, dry tropical air masses from the Southwest meeting warm, moist maritime air masses from the Gulf of Mexico in the summer. Weather patterns circulate counter-clockwise and generally enter the area from the west to southwest and sometimes the south. Average daily temperature is 45.6 degrees Fahrenheit.[1] Average annual rainfall is 25-26 inches (Minnesota's state-wide median since 1890 is about 26 inches). Annual precipitation can vary widely—while 25 inches was measured in 2008 and 2009, less than 21 inches of precipitation was observed in 2003, and over 38 inches fell during 2010.[2] Typically 80% of precipitation falls April to September. Thunderstorms occur about 45 days each year,

[1] US Dept. of Commerce National Climatic Data Center (NCDC)
[2] State Climatology Office – DNR Division of Ecological and Water Resources

mostly in the summer. In the winter the average temperature is 16 degrees F, and average seasonal snowfall is about 38 inches.[3]

The University of Minnesota Remote Sensing and Geospatial Analysis Laboratory analysis indicates that 86% of land in Redwood County was in agricultural use in the year 2000. This accounts for over 482,000 of the 564,000 acres in the county. About 5% of land is in grass/shrub/wetland, while 5% is classified "urban". The same analysis found that less than 1% (4,600 acres) of the county is considered "impervious" or developed such that water will run off rather than soak into the ground.

Redwood County is located in the Minnesota River's drainage into the Mississippi River basin. The Coteau des Prairies, or Buffalo Ridge, rises up south of the Cottonwood River, which flow east out of the county into the Minnesota River. The glacial till lowland plain, north of the Cottonwood River, is mostly level and drained by the Redwood River which flows into the Minnesota River at Redwood Falls. The Minnesota River Valley varies from ½ to about 2 miles in wide and cuts a gorge about 150 feet lower than surrounding prairie.

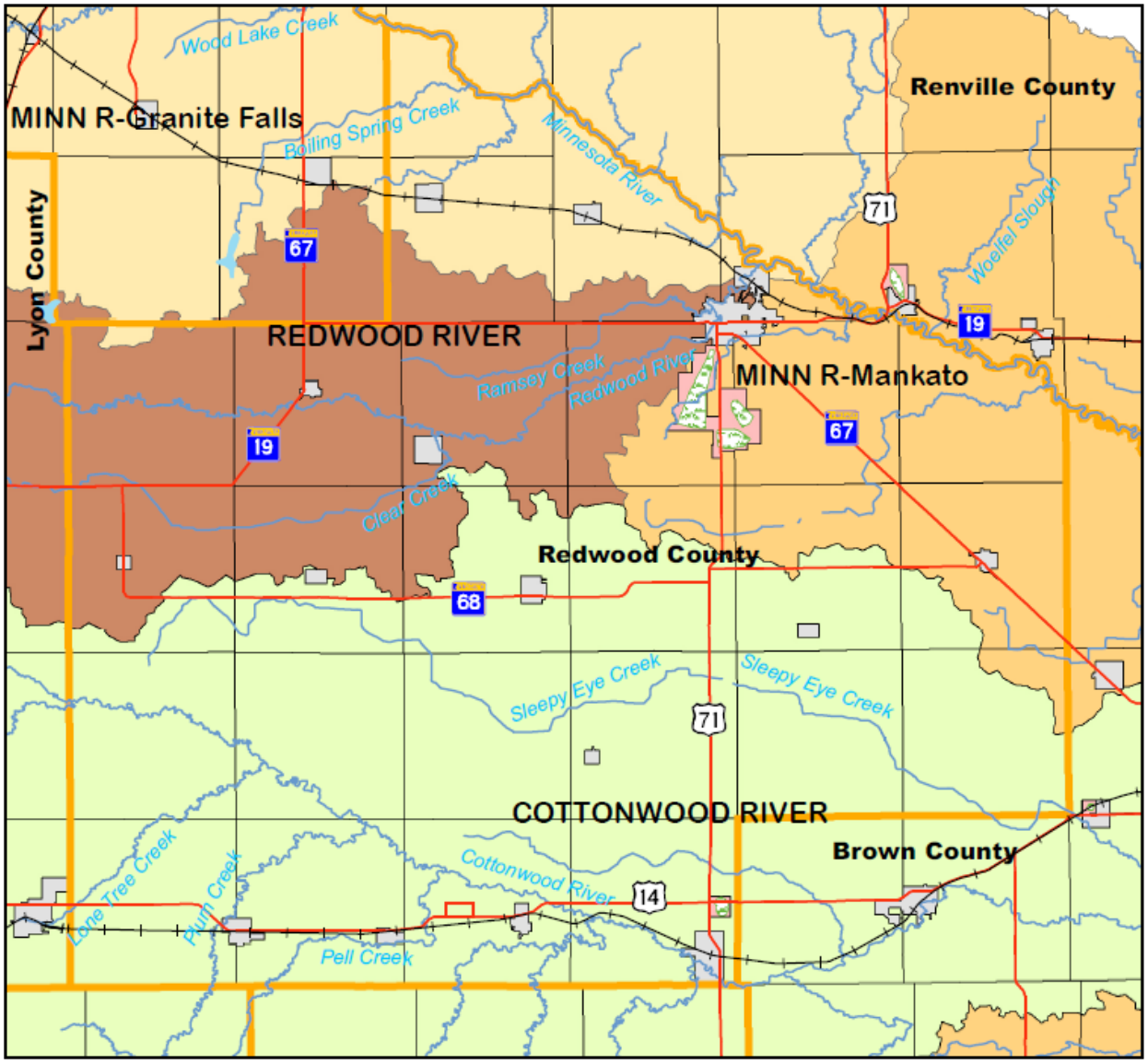
The USDA *Soil Survey of Redwood County Minnesota* (1981) delineates eight general soil units in the county. The USDA NRCS *U.S. General Soil Map* (STATSGO2), the Soil Survey Geographic (SSURGO) Database and the NRCS Web Soil Survey describe much more detailed soil properties and interpretations. The most current soils data is available through the NRCS website at http://soils.usda.gov .

There are also many wetlands scattered across the region. According to MN DNR, "a wetland has mostly wet soil, is saturated with water either above or just below the surface and is covered with plants that have adapted to wet conditions." Wetlands provide many benefits to humans including the reduction of flooding by means of storage during high flows, filtration of pollutants and sediment, groundwater and aquifer recharge, wildlife habitat and aesthetic appeal. Much of the drainage of wetlands within the region occurred prior to the 1980s, when policies were enacted to prevent future wetland loss.

Hazards posed by flooding and potential dam failure are profiled in Section VI below.

[3] USDA *Soil Survey of Redwood County Minnesota* (1981)

Figure 1-4 Watersheds Map



Redwood County, MN

- Railroad
- Trunk Highways
- Lakes
- Named Rivers
- County

Local Jurisdictions

- city
- township

- COTTONWOOD RIVER
- MINN R-Granite Falls
- MINN R-Mankato
- REDWOOD RIVER
- WHPA
- DWSMA

N W E S

0 1 2 4 6 8 Miles

SRDC 06.11

Source: Redwood Co, MN DNR, MDH, MnDOT, ESRI

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C.4 Infrastructure

Infrastructure is the basic physical and organizational structure needed for the operation of a city or region—the skeleton and nervous system of a community. These facilities may be public, like the road system, or private, like telecommunications systems. No matter the ownership, infrastructure is characterized by long-term, capital-intensive investments that are interdependent and vulnerable to both natural and technological hazards.

C.4.a Transportation Networks

Redwood County's transportation network is designed to serve the needs of local traffic. The Minnesota Department of Transportation (MnDOT) works with the County Engineer and municipal authorities to construct, maintain and regulate a comprehensive system of roads, rail and airports for public and private use.

Functional Classification is used by the FHWA to determine eligibility for Federal emergency relief funds should roads be damaged by flooding or other natural disaster. I-90, about 40 miles south of the county, is the highest classification as an Interstate Highway. US Hwy 14, US Hwy 71 and Trunk Highway (TH) 19 are classified as Principal Arterial highways. TH 67 and TH 68 are classified as Minor Arterial highways.

Two railroads serve Redwood County. The Dakota, Minnesota and Eastern (DM&E) Railroad crosses the county east to west parallel to US 14. The Class II DM&E, recently acquired by the Canadian Pacific Railway, has been proposed as a major coal-hauling route from the Powder River Basin of Wyoming which would significantly increase train traffic. The Minnesota Valley Regional Railroad Authority's Minnesota Prairie Line (MPL) enters the Minnesota River just east of US Hwy 71, passing through Redwood Falls, Delhi and Belview. The MPL short line is operated by the Twin Cities & Western Railroad Co.

Redwood Falls Municipal Airport is a general aviation facility located north of US Hwy 71/TH 19, on the east side of the county seat. There is one 4000' northwest-southeast paved runway, and a 2,081' unpaved crosswind runway (closed winter months).

C.4.b Utilities

Electrical service is provided in Redwood County by investor-owned utilities and rural electric cooperatives. Northwest Natural Gas provides natural gas service in Belview and Redwood Falls, while Minnesota Energy Resources serves communities along US Hwy 14. There are several different incumbent wired-line telephone providers across the county. Redwood Area Development Corp

Table 1-6
Utility Systems

	Belview	Clements	Delhi	Lamberton	Lucan	Milroy	Morgan	Redwood Falls	Revere	Sanborn	Seaforth	Vesta	Wabasso	Walnut Grove	Wanda	Rural County
Electricity																
Alliant Energy				X				X	X	x	X	x	X	X		
Redwood Electric/REA					X											X
Municipal Utility							X									
Otter Tail Power						x										
Xcel/NSP	X	x	x				X									
Natural Gas																
Great Plains Natural Gas	X						X									
Minnesota Energy				X				X	X				X			
Municipal Utility						X										
Telecommuications																
CenturyTel				X				X						X	X	
Clements Tel Co		X													X	
Minnesota Valley Tel Co					X	X									X	
Qwest Corp							X								X	
Redwood Co Tel Co	X		X				X			X	X	X	X		X	
Sleepy Eye Tel Co															X	
Western Tel Co									X						X	

Source: DEED MNProspector, MDOC

is currently sponsoring a feasibility study to evaluate options to expand broadband deployment in the area.

NOAA Weather Radio All Hazards (NWR) is a nationwide network of radio stations broadcasting continuous weather information directly from the nearest National Weather Service office. NWR broadcasts official Weather Service warnings, watches, forecasts and other hazard information 24 hours a day, 7 days a week. Working with the Federal Communication Commission's (FCC) Emergency Alert System, NWR is an "All Hazards" radio network, making it the single source for comprehensive weather and emergency information. Redwood County is covered by Sioux Falls Weather Service by KXI50 Russell at 162.500 (1000 watts) and KXI31 Jeffers at 162.45 MHz (1000 watts), and by Twin Cities Chanhassen by KX139 New Ulm at 162.525 (1000 watts) and WNG711 Olivia at 162.400 (300 watts). Redwood County's Specific Alert Message Encoding (SAME) code is 027127.

FEMA is working to develop the Integrated Public Alert and Warning System (IPAWS) as the next-generation alert and warning network. IPAWS will expand on the Emergency Alert System (EAS) by adding new technologies to traditional audio-only radio and television alerts, including cell phone, residential phone,

Internet and the capability to broadcast one message over more media to more people before, during and after a disaster.

One Drinking Water Supply Management Area (DWSMA) with three Wellhead Protection Areas (WPA) has been designated by the Minnesota Department of Health (MDH) at Redwood Falls and one DWSMA and WPA has been designated at Sanborn (Figure 1-3 above). Red Rock Rural Water System (RRRWS) serves parts of Redwood County also. These projects offer additional options for redundant water supplies by interconnections within the system and between other suppliers.

C.4.c Public Services

A critical and essential role of local government is to provide public services. There are also private non-profit organizations that help in this area.

The Redwood County Sheriff's Office provides law enforcement throughout the county. The cities of Lamberton, Morgan, Redwood Falls and Walnut Grove maintain their own police forces, as does the Lower Sioux Indian Community.

Fifteen different fire districts provide volunteer fire protection in Redwood County, and there are nine different ambulance service providers. Redwood Area Hospital in Redwood Falls is a Level IV trauma center. The nearest Level III trauma center is located in Marshall; the nearest Level I hospitals are in Minneapolis-St. Paul.

Table 1-7
Public Services

	Belview	Clements	Delhi	Lamberton	Lucan	Milroy	Morgan	Redwood Falls	Revere	Sanborn	Seaforth	Vesta	Wabasso	Walnut Grove	Wanda	Rural County
Law Enforcement																
County Sheriff												X				X
Police				X			X	X					X			(Lower Sioux)
Fire Stations	X	X		X	X	X	X	X		X	X	X	X	X	X	
Health Care																
Ambulance				X			X	X				X	X			
Hospital								X								
Clinic				X				X					X			
School Buildings																
	X			6-12		K-4*	6-12	K-4 5-8 9-12					K-12	K-6		
*Charter																
**Private							K-6**	K-8**					K-6**			

Nine public school districts serve Redwood County, five of which have facilities inside the county—Cedar Mountain (Morgan), Redwood Area, Red Rock Central (Lamberton), Westbrook-Walnut Grove, and Wabasso. There is a public charter school at Milroy, and private elementary/middle schools at Morgan, Redwood Falls and Wabasso. The South West / West Central Service Cooperative hosts special education services for students K-12 at the Belview Learning Center.

The South Central Minnesota Regional Chapter of the Red Cross, based in Mankato, serves 19 counties including Redwood County.

Figure 1-5 Ramsey Falls

Alexander Ramsey Park, Redwood Falls, Source: JC Shepard ©

CHAPTER 2: PREREQUISITES

This Chapter covers prerequisites for eligibility to adopt this multi-hazard mitigation plan in multiple jurisdictions. Section II describes the plan adoption process. Section III describes multi-jurisdictional participation in the planning process.

II. Multi-Jurisdictional Plan Adoption

Requirement §201.6(c)(5): For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

Following passage of the Disaster Mitigation Act of 2000 (DMA2K), counties in southwestern Minnesota worked cooperatively with the Southwest Regional Development Commission (SRDC) to inform local units of government, agencies, businesses, education, nonprofit organizations and other local citizens about the importance of hazard mitigation. This updated plan is the result of that ongoing effort.

A. Jurisdictions Represented in this Plan

It was the intent of this planning process that all local units of government in the county should continue to be covered by the multi-jurisdictional County plan.

In 2003, the Redwood County Board of Commissioners initiated development of an All Hazard Mitigation Plan. That plan was adopted by resolution 1 March 2005.

On 18 August 2009, the Chairman of the Redwood County Board of Commissioners approved a Statement of Interest to formally participate in this hazard mitigation update effort. (At that time, HSEM did not require this step until *after* the project was initiated.) *All* cities in the county passed similar statements of interest to participate in the process.

- Belview
- Clements
- Delhi
- Lamberton
- Lucan
- Milroy
- Morgan
- Redwood Falls
- Revere
- Sanborn
- Seaforth
- Vesta
- Wabasso
- Walnut Grove
- Wanda

Statements of Interest are included as Addendum A, since they were not secured until after the project was initiated by SRDC and Redwood County.

In the initial planning process, HSEM had encouraged townships to also be formally involved. No townships in the County have full-time staff. Most townships do not exercise statutory land use control either. Townships in the county were advised of the multi-jurisdictional update and encouraged to participate.

A.1 Lower Sioux Indian Community

During the update planning process, FEMA updated *Tribal Multi-Hazard Mitigation Planning Guidance* (March 2010). The Lower Sioux Indian Community is a federally recognized Native American tribe located in Redwood County. HSEM staff advised the Planning Team that the Tribal Community is eligible to participate in the County multi-jurisdictional plan, but would be limited in applying for FEMA funding through the State of Minnesota. This plan provides analysis, assessment and strategies for all of Redwood County, including the unincorporated area covered by the Lower Sioux Community; however, it is not the intent of this plan to usurp the Community's sovereign status relationship with the State of Minnesota or FEMA.

B. Adoption Procedure

Each jurisdiction participating in the plan must formally adopt the updated plan after FEMA provisionally approves the document (Section 1.B.1). Typically local jurisdictions adopt the plan by resolution.

As stated in Section I, the County will consider formal adoption of the All-Hazard Mitigation Plan once FEMA deems this plan "approvable pending adoption." After County approval, staff will work with each participating local unit of government to facilitate the local adoption of the plan. HSEM requires that participating jurisdictions adopt the plan within six months or less of provisional FEMA approval.

C. Supporting Documentation

Resolutions of Adoption from each participating jurisdiction that chooses to adopt this updated plan will be appended in Appendix A, after FEMA approval.

III. Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process … Statewide plans will not be accepted as multi-jurisdictional plans.

Redwood County undertook the all-hazard mitigation planning process with the stated intention that all communities in the county should be eligible to participate and be covered by this plan. Only the largest cities in Redwood County have full-time staff and they all rely on County Emergency Management as a clearinghouse for intergovernmental cooperation. Redwood County Emergency Management maintains regular communication with all local units of government in the county.

A. How Each Jurisdiction Participated in this Plan

Table 2-1 summarizes participation by each jurisdiction participating in this plan. As stated above in Section II.A, all incorporated cities in the county approved formal Statements of Interest demonstrating their commitment to undertake this process.

The majority of cities had staff and/or elected officials representing them on the Redwood County All Hazards Mitigation Planning Team (see next section). All but one city submitted the Capabilities Worksheet required by HSEM (Section IV.E). Finally, each of the cities has at least one mitigation strategy identified for a natural hazard (Chapter 5, Section XIV).

Table 2-1
Multi-Jurisdictional Participation in Redwood County AHMP Update
2009-2011

Local Unit of Government	Statement of Interest	Representative on Planning Team	Capabilities Worksheet	Mitigation Strategy
Redwood County	Yes	Yes	Yes	Yes
Belview	Yes		Yes	Yes
Clements	Yes	Yes	Yes	Yes
Delhi	Yes		Yes	Yes
Lamberton	Yes	Yes	Yes	Yes
Lucan	Yes	Yes	Yes	Yes
Milroy	Yes		Yes	Yes
Morgan	Yes	Yes	Yes	Yes
Redwood Falls	Yes	Yes	Yes	Yes
Revere	Yes		Yes	Yes
Sanborn	Yes		Yes	Yes
Seaforth	Yes	Yes	Yes	Yes
Vesta	Yes	Yes	Yes	Yes
Wabasso	Yes	Yes		Yes
Walnut Grove	Yes		Yes	Yes
Wanda	Yes		Yes	Yes

Cities not present at team meetings were consulted on strategies by telephone, email or personal visit. City staff and/or elected officials were given the opportunity to separately rank hazards where they varied from the risks facing the entire planning area (Section XII.A). After the final team meetings, Redwood County Emergency Management followed-up with each city to confirm mitigation strategies selected.

A.1 Participation Provisions Post-Approval

FEMA guidance explains a process that potential partners can follow to become part of the planning process, or "join" the mitigation plan, after FEMA approval (pp. 21-23 of the FEMA "Blue Book" referenced in Section I.B above). The plan may be required to be revised in full or by a new annex documenting additional planning work for that specific area.

Any jurisdiction wishing to modify (or join) the plan at a later date should contact Redwood County Emergency Management.

B. Jurisdictional Participation Changes in Plan Update

All cities and the County participated in the initial All-Hazards Mitigation Plan approved by FEMA in 2005. All cities and the County continued to participate in the update process.

CHAPTER 3: PLANNING PROCESS

The planning process is as important as the plan itself. This Chapter documents the process used in developing this plan. Section IV describes the planning process, the All Hazard Mitigation Planning Team, public involvement, and existing plans, studies, reports and technical information used in the planning process.

IV. Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;

(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and

(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

A. Description of the Planning Process

The initial *Redwood County All-Hazard Mitigation Plan* was developed by Redwood County and the Southwest Regional Development Commission (SRDC) in 2003 and 2004. Working with samples and guidelines provided by the former Minnesota Planning agency, SRDC developed a work plan and facilitated work of the All Hazard Planning Task Force. Additional input and consultation was received from federal, state and local agencies, non-profit organizations, municipalities and citizens. A plan was drafted with five sections—Executive Summary; County Profile; Risk Assessment; Goals, Policies, and Implementation Strategies; and Planning Process. This plan was adopted and approved by FEMA in 2005.

A.1 The Plan Update

HSEM staff met with regional county emergency managers and SRDC in the summer of 2008 to review the AHMP update process. SRDC initiated an application to HSEM for sub-grantee funding to work with the County to update the multi-jurisdictional hazard

mitigation plan. An executed Sub-Grantee Agreement under the Hazard Mitigation Grant Program (FEMA-DR-1717-MN) was received by SRDC dated 14 April 2009, at which time formal work on the project began. As noted above, the Redwood County Board of Commissioners Chair approved a Statement of Interest to participate in the all-hazard mitigation process in August 2009.

Development Planner John C. Shepard, AICP, has served as primary staff planner on hazard mitigation plans for SRDC since 2005. Redwood County's Emergency Manager, Jim Sandgren, coordinated local logistics, including soliciting statements of interest, public communications (Addendum D), recruiting and working with the Planning Team (next section) and providing data for analysis. Redwood County Emergency Management arranged all meetings and SRDC staff facilitated the meetings.

In addition to staff-level consultation, there were three public meetings during this update project:

1. The All-Hazard Mitigation Planning Team organized and reviewed the existing AHMP at the first meeting on 16 September 2009.
2. The Planning Team conducted a unified county-wide risk assessment at a meeting on 4 May 2011, with one-on-one city follow-up afterwards.
3. The Planning Team discussed a comprehensive range of specific mitigation items for each participating jurisdiction at a meeting on 9 November 2011.

Project completion was delayed by four Federal Disaster Declarations (see Section V.A below). The Minnesota Dept of Natural Resources (DNR), FEMA and engineering consultants were also developing Digital Flood Insurance Rate Maps (dFIRMS) for Redwood County at the same time as the plan was being updated. After FEMA review of a regional county's second generation AHMP update, SRDC staff drafted this updated plan document based on input from the Planning Team, local units of government and community stakeholders, as well as review and guidance from HSEM.

B. The All Hazard Mitigation Planning Team

The initial All Hazards Mitigation Plan was composed by a partnership of staff and an All Hazards Mitigation Planning Task Force. That small group included the County Emergency Management Director, Highway Engineer, Environmental Services Administrator, Zoning Administrator, Sheriff, and a representative from the County Seat.

Prior to beginning the update process, Redwood County Emergency Management identified potential volunteers to serve on an All-Hazard Mitigation Planning Team. These included city council members and city staff; township board members; county commissioners, elected officials, and county staff; first responders, law enforcement, and essential services providers; private sector employers and a representative of the Lower Sioux tribal community. Redwood

County is a rural community and few local units of government have paid full-time staff. Members of the Planning Team were recruited in an open and inclusive process to represent knowledge and views of those people who will make the plan a reality. The County Emergency Manager called meetings of the Planning Team, and will keep this group informed of progress on the plan and future updates. Individuals listed in Table 3-1 participated in the Planning Team over the course of the planning process. Meeting notes for Planning Team meetings are included in Addendum E.

Table 3-1

Redwood County All Hazard Planning Team

James Sandgren	Redwood County & City of Redwood Falls	Emergency Management City Council
Jon Mitchell	Redwood County	Environmental Services
Jean Price	Redwood County	Auditor/Treasurer
Lon Walling	Redwood County	Commissioner
Ernie Fiala	Redwood County	Highway Dept. (-2010)
Barb Billmeier	Redwood Public Health	Emergency Preparedness
Betty Wilhelmi	City of Clements & Redwood Electric Co-Op	
Steven Flaig	City of Lamberton	City Clerk
Thomas Neperman	City of Lamberton	Fire-EMT
Wade Wellner	City of Lamberton	Emergency Management
Dustin Tietz	City of Lucan	Mayor
Jerry Jenniges	City of Lucan	City Council
Robert Platz	City of Lucan	Council/Civil Defense
Barb Fischer	City of Morgan	City Council
Keith Muetzel	City of Redwood Falls	City Administrator
Pam Sheehan	City of Seaforth	City Clerk
Gordon Alexander	City of Vesta	Emergency Management
Dan Dahl	City of Wabasso & Highwater Ethanol	
Jason Lieffring	Lower Sioux Indian Community	
Marilyn Davis	New Avon Twp	Clerk
Steve Prokosch	New Avon Twp	Supervisor
Merna Malmberg	Springdale Twp	Clerk
Barbera Schmidt	Vesta Township	Clerk
Bill Zimmerli	Central Bi-Products	
Don McCallum	Central Bi-Products	
Dan Hildebrandt	Farmers Union Industries	
Dennis Crotti	Jackpot Junction	Casino-Hotel
Pat Dingels	Redwood Area Development Corp.	
Diane Radel	Renville/Redwood Red Cross	
John Shepard	Southwest Regional Development Commission	

The Planning Team reaffirmed the mission statement from the original plan to reflect their intent for this update project:

The Redwood County All-Hazard Mitigation Plan is intended to identify effective mitigation efforts through education and proper planning.

C. Public Involvement

In rural communities, the public cannot help but become involved in local government. Intergovernmental coordination was essential if this plan was to be more than a document gathering dust on a shelf. SRDC and Redwood County Emergency Management provided information to all local units of government in the county about the all hazards mitigation planning process and opportunities for participation. Formal participation was solicited multiple times in 2009 and 2010. All incorporated municipalities approved statements of intent to participate (Section II.A).

Public Notice of all Planning Team meetings was posted at the Courthouse according to local practice. As there are no local television stations, most residents, businesses and organizations receive local news through the community newspaper. Sample copies of Public Communication are provided in Addendum D.

D. Other Opportunities for Involvement

Hazard mitigation has been a regional effort in Southwest Minnesota, with many opportunities for involvement provided for neighboring communities, agencies involved in hazard mitigation, and businesses, academia, and other relevant private and non-profit interests. SRDC has worked (or was working during plan development) with the following regional Minnesota counties on their hazard mitigation plans:

- Cottonwood County (2011)
- Jackson County (2008)
- Lincoln County (2010)
- Lyon County (2010)
- Murray County (2005; update in progress)
- Nobles County (2005; update 2011)
- Pipestone County (2010)
- Rock County (2007)

Prior to adoption of the plan, it is intended that a presentation will be made to the Redwood County Planning Commission to provide an opportunity for public input and encourage incorporation of findings into other local planning documents and processes. SRDC will post the draft plan on their website and the County will make copies available to the public, local

governments, and county departments. The adoption process for this plan is explained in Section II above.

E. Existing Plans, Studies, Reports and Technical Information

Many sources of local, state, federal and private information were used during the hazard mitigation process. The coordinated use and consideration of these diverse data sources form a sound basis for this plan and implementation activities.

The following references were specifically consulted during the planning process.

Biko Associates, Redwood County, Minnesota, Comprehensive Plan (2007)

Clarion Associates, Airport Land Use Compatibility Manual, Minnesota Department of Transportation Office of Aeronautics (September 2006)

Fransen, Tanja and Olga Wilhelmi, "Increasing Societal Resilience to Winter Weather", American Meteorological Society 16th Conference on Applied Climatology (January 2007)

Josiah, Scott and Mike Majeski, "Living Snow Fences", University of Minnesota Extension #FO-07277-GO (2002)

Minnesota Department of Public Safety, Fire in Minnesota, State Fire Marshall (2010)

Minnesota Department of Public Safety, Minnesota Motor Vehicle Crash Facts 2008, Office of Traffic Safety (2009)

Minnesota Department of Transportation, Living Snow Fences website: http://www.dot.state.mn.us/environment/livingsnowfence/ Accessed most recently on 11 October 2011.

Minnesota Department of Transportation, Minnesota Comprehensive Highway Safety Plan (December 2004)

Minnesota Homeland Security and Emergency Management (HSEM), Minnesota All-Hazard Mitigation Plan (April 2011)

RAND Drug Policy Research Center, The Economic Cost of Methamphetamine Use in the United States, 2005 (2009)

Redwood County All Hazard Mitigation Task Force and Southwest Regional Development Commission, Redwood County All Hazard Mitigation Plan (2005)

Schwab, James. Hazard Mitigation: Integrating Best Practices into Planning PAS 560. American Planning Association (2010)

Schwab, Jim with K.C. Topping, C.D. Eadie, R.E. Deyle, R.A. Smith, Planning for Post-Disaster Recovery and Reconstruction PAS 483/484. American Planning Association (1998)

US Department of Agriculture, Soil Conservation Service, Soil Survey of Redwood County, Minnesota (1981)

US Department of Homeland Security, Quadrennial Homeland Security Review Report: A Strategic Framework for a Secure Homeland, (February 2010)

US Environmental Protection Agency, Planning for an Emergency Drinking Water Supply (June 2011)

U.S. Federal Emergency Management Agency (FEMA) Taking Shelter From the Storm: Building a Safe Room for Your Home or Small Business (FEMA 320, August 2008)

Wind Science Engineering Center (WSEC), Texas Tech University, A Recommendation for an Enhanced Fujita Scale (EF-Scale), National Weather Service (June 2004).

E.1 Capabilities Worksheets

As discussed in Section III.A above, Redwood County and municipalities completed a Capabilities Worksheet required by HSEM, identifying planning capabilities, policies/ordinances, programs, studies and reports, staff, and community partners relevant to hazard mitigation. The Worksheet is attached as Addendum B.

Several documents were referenced extensively in the planning process, including the county comprehensive (land use) plan and development ordinance, transportation plans, and water management plans. Other policies and ordinances were referenced more generally in the planning process. Specific items, such as capital improvement plans, watershed plans and other local resources, helped the Planning Team choose potential mitigation measures. County and city staff were consulted by the Planning Team throughout the planning process.

E.2 Description of the Jurisdiction

The FEMA Blue Book gives a special consideration, that "The planning team should consider including a current description of the jurisdiction… to provide a context for understanding the mitigation actions that will be implemented to reduce the jurisdiction's vulnerability".[4] See Chapter I, Section I.C, for a brief profile of the county.

F. Planning Team Review and Revision of Previous Plan

SRDC staff and the County Emergency Manager reviewed each section of the plan with the Planning Team, and analyzed how the existing document should be changed to meet current FEMA requirements. Each section was revised and re-formatted in whole as part of the update process.

[4] FEMA *Local Multi-Hazard Mitigation Planning Guidance,* p. 27

CHAPTER 4: RISK ASSESSMENT

This Chapter profiles hazards facing the county. Section V describes identified natural and technological hazards. Section VI provides a profile of identified hazards. Section VII provides an overview of vulnerability to identified hazards. Section VIII addresses Repetitive Loss Properties. Section IX addresses risks to structures. Section X addresses estimates of potential losses. Section XI provides an analysis of development trends. Section XII addresses multi-jurisdictional risk analysis for participating jurisdictions.

V. Identifying Hazards

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type … of all natural hazards that can affect the jurisdiction.

The *Minnesota State All-Hazard Mitigation Plan* (MAHMP) includes a detailed hazard analysis, the result of a risk and vulnerability assessment conducted state-wide. Those hazards were themselves selected by Minnesota Homeland Security and Emergency Management (HSEM) from a comprehensive list of natural hazards identified by the Federal Emergency Management Agency (FEMA) in 1997, as well as relevant human-caused hazards. The state-wide risk assessment is intended to satisfy the requirements of the federal Disaster Mitigation Act of 2000 (DMA2K).

A. Description of All Hazards

There are many natural and man-made hazards that put Minnesota at risk. A "major disaster" is an event which the President of the United States determines warrants federal aid to supplement state and local recovery efforts. According to the MAHMP, the state of Minnesota was included in Presidential Disaster Declarations 43 times between 1965 and 2010, of which 36 involved flooding.

There were four Presidential Disaster Declarations during this AHMP update. Disaster **DR-4009** was declared for 15 counties and one tribe in Minnesota, including Redwood County, for **severe storms, flooding and tornadoes** from 1-11 July, 2011. Federal funding was available on a cost-sharing basis for emergency work and the repair or replacement of facilities. Presidential Disaster Declaration **#1982** was declared in May 2011 for 34 counties across central and western Minnesota, including Redwood County, for **severe storms and flooding** beginning 16 March through 25 May 2011. Redwood County was eligible for public assistance including "not less than" 75 percent of eligible costs of repairing damaged public facilities, removing debris from public areas, and approved hazard mitigation projects. The Secretary of Agriculture also included Redwood County in **Ag Disaster S3188** for the 2011 growing season for "Combined effects of excessive rain, excessive heat, high winds, tornadoes, and an early fall frost." These disasters were open into 2012.

In 2010, Presidential Disaster Declaration **#1941** was declared for 29 counties in southern Minnesota, including Redwood County, for **severe storms and flooding** from 22 September through 14 October. Earlier the same year, **Disaster #1900/EM-3310** was declared for 26 counties and two Indian Reservations, including Redwood County, for **flooding** 1 March – 26 April 2010.

The following Presidential Disaster Declarations were detailed in the 2005 edition of the MAHMP:

Key: **PA** = Public Assistance Program (formerly Infrastructure Support Program)
IA = Individual Assistance
HM = Hazard Mitigation Grant Program

#1370 in 66 Counties and 4 Tribal
5/16/2001 Severe Winter Storms, Flooding & Tornadoes
PA, IA, HM

#1175 in 58 Counties
4/4/1997 Severe Flooding, High Winds, Severe Storms
PA, IA, HM

#1158 in 40 Counties
1/16/1997 Severe Winter Storms & Blizzards, Snow Emergency Declaration
PA

#993 in 57 Counties:
6/11/1993 Severe Storms, Tornadoes & Flooding
PA, IA, HM

#946 in 10 Counties:
6/26/1992 Severe Storms, Tornadoes & Flooding
PA, IA, HM

#255 in 70 Counties:
4/18/1969 Flooding
PA, IA

#188 in 65 Counties:
4/11/1965 Flooding
PA, IA

A.1 Methodology

During the original project, the Redwood County All Hazard Mitigation Task Force began the process of creating an *All Hazard Mitigation Plan* by first identifying all of the potential hazards that they felt posed a threat to the county. This was done by first examining a variety of hazards and then brainstorming a list specific to Redwood

County. By the end of that process, the committee had identified the following hazards (not in priority order):

- Flood
- Landslide/Debris Flow (Erosion)
- Drought
- Summer Storm
- Tornado
- Severe Wind
- Extreme Temperatures
- Winter Storms
- Snow Load
- Wildfire
- Structure Fires
- Hazardous Materials
- Transportation Accidents
- Utility Failure
- Natural Gas Lines
- Radiological Emergencies
- Sabotage/Terrorism
- Civil Disturbance

When the update project started in the late summer/early autumn of 2009, the newly constituted Redwood County All-Hazard Mitigation Planning Team compared hazards considered in the existing plan with hazards detailed in the then-current edition of the state-wide MAHMP.

As detailed in Section IV above, each hazard was evaluated against data on disaster incidents in the county and local knowledge of hazards experienced. Comments from FEMA and HSEM also led to consolidation of certain hazard categories in the original plan; for example, utility failure and transportation accidents are now discussed within the underlying natural and technological hazards. Thoroughly discussing each state-wide hazard, the Planning Team combined some hazards for ease of assessment and development of mitigation actions. The Team also included local concerns for hazards posed by Agricultural Disease. Certain state-wide hazards in the MAHMP that the team considered of no local risk were eliminated from discussion. These included:

- Coastal Erosion—there are no coasts in Southwest Minnesota.
- Nuclear Generating Plants—none are located in or near Southwest Minnesota.
- Karst Sinkholes—maps provided by the State of Minnesota show these as issues in other parts of Minnesota.

The Planning Team evaluated reports of incidents and local knowledge to evaluate location, extent, occurrences and probability of future events. Hazard events were categorized on potential frequency, potential severity, risk level and hazard rank. The details of the hazard profiles are presented in the Section VI. Results of the Team's Hazard ranking are presented in the Section VII.

Natural Hazards affecting the jurisdiction include:

- Agricultural Disease (animal and crop)
- Blizzards & Winter Storms
- Drought
- Earthquake
- Extreme Heat
- Fire—Wildfire
- Flooding
- Hail
- Land Subsidence (landslide)
- Lightning
- Tornado and Straight-line Winds

Technological Hazards affecting the jurisdiction include:

- Civil Unrest
- Dam Failure (combined with flooding for analysis)
- Fire—Structure & Vehicle Fires (combined with wildfire for analysis)
- Hazardous Materials
- Public Health and Infectious Disease
- Terrorism (combined with civil unrest for analysis)
- Water Supply Contamination (combined with hazardous materials for analysis)

A.2 Locations Affected by Hazards

The natural landscape and development pattern of Redwood County is fairly homogeneous across the 26 townships and 15 cities in the county. Most areas of the county are equally at risk from each of the natural and technological hazards considered in this plan, with the exception of flooding and subsidence which are highly dependent on topography.

However, different types of infrastructure and critical facilities will be affected differently by each hazard. These are addressed for each hazard in the following section.

VI. Profiling Hazards

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the … 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.

In this section, Natural hazards present in the county are described in alphabetical order for ease of reference, followed by Technological Hazards.

A. Natural Hazards

This section describes natural hazards which are considered a risk in Redwood County. These natural hazards include those caused by climatological, geological, hydrological or other events of the physical rather than man-made world. As the 2011 edition of the *Minnesota All-Hazard Mitigation Plan* (MAHMP) points out on page 51:

> *Natural hazards are natural events that threaten lives, property, and other assets. Often, natural hazards can be predicted. They tend to occur repeatedly in the same geographical locations because they are related to weather patterns or physical characteristics of an area. Natural hazards such as flood, fire, tornado, and windstorms affect thousands of people each year.*

Natural hazards considered in this plan include agricultural diseases, blizzards and winter storms (including ice and extreme cold), drought, fire, flooding (including dam failure), severe summer storms (including hail, lightning and extreme heat), and tornado and straight-line winds.

Much of the data in this section is referenced from the National Climatic Data Center (NCDC) Storm Events database. According to the National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service website[5] :

> *NCDC receives Storm Data from the National Weather Service. The National Weather service receives their information from a variety of sources, which include but are not limited to: county, state and federal emergency management officials, local law enforcement officials, skywarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public.*

A.1 Agricultural Disease (animal or crop)

Agriculture is the economic foundation of Redwood County and Southwest Minnesota. Animal and crop-related diseases have the potential to inflict both large economic losses and logistical hazards on the community.

The initial county All Hazard Mitigation Plan did not address this hazard; however, the 2005 edition of the *Minnesota State All-Hazard Mitigation Plan* addressed "Infectious Disease / Environmental Outbreak" in Annex A12. The current state hazard plan

[5] http://www.ncdc.noaa.gov

addresses both animal and human diseases under Infectious Disease Outbreak (pp173-177). This plan addresses human diseases along with other Technological Hazards in the next section of this chapter.

A.1.a Locations Affected by the Hazard

Major incidents of agricultural disease are likely to be localized, rather than affecting large areas. Based on experience within the county, the prevalence of crop agriculture and the relative ease with which crop diseases spread, the All-Hazard Mitigation Planning Team concluded that any outbreak will likely affect or have the potential to affect trees, crop and animal agriculture in any part of the county.

Animal Transmitted Diseases pose the greatest threat to farms and pastures. Insects, pests and disease pose a risk to both agriculture and tree-cover. A majority of land in the county is used for agriculture and is at risk for agricultural diseases.

A.1.b Extent of the Hazard

Animal Transmitted Diseases

Animal Transmitted Diseases, such as Hoof and Mouth Disease and Bovine Spongiform Encephalopathy (BSE-Mad Cow Disease), threaten animal agriculture. The United States has been free of Hoof and Mouth Disease since 1929 due to effective prevention programs initiated by the Federal Government. Essential efforts to prevent animal transmitted disease include coordination with the federal & state governments and local veterinarians. Public education and risk communication are essential strategies to assist in the response.

When an infection of foot and mouth disease or BSE is confirmed, the only effective way to control the disease is isolation and culling of an entire herd. With foot and mouth disease isolation and culling of the neighboring herds would likely be necessary. These cattle would have to be properly disposed of depending on the numbers involved. While this is not a direct threat to human health, the mental health of the families affected by the loss of their livelihood could be a significant problem, for law enforcement and the community as a whole.

The threat of bovine tuberculosis (TB) has impacted agriculture in Minnesota recently. In April 2008, the US Department of Agriculture (USDA) downgraded Minnesota's status, requiring Minnesota cattle producers to do additional testing when shipping animals out of state. According to the Board of Animal Health website, bovine TB can be difficult to diagnose, "as cattle can be infected

for a long period of time before showing any outward signs of TB." In October 2010, the majority of Minnesota was upgraded to Bovine TB Accredited–Free, and the Minnesota Board of Animal Health announced that USDA approved Minnesota's statewide bovine Tuberculosis (TB) Free status, effective October 2011.

Minnesota's Dept. of Agriculture (MDA), Board of Animal Health, Dept. of Health, and Homeland Security and Emergency Management (HSEM) are working with local agencies to effectively mitigate any and all effects of hazards on animal agriculture.

Plant Pests and Diseases

Plant diseases cause a loss of yields or damage to the infected plant. Certain tree diseases may weaken their structure and create a hazardous situation where property damage or serious bodily injury may result from falling limbs or the entire tree toppling. It is imperative that arborists, landscapers, and ground maintenance personnel recognize the signs that a particular tree may present an imminent hazard.

Some of the more notable pests infest cornfields. Corn rootworm and European corn borer are two major pests that pose serious potential loss of income to farmers. In the last decade or so, seed companies have been able to genetically enhance corn varieties to provide some level of protection. Soybean fields are often attacked by soybean cyst nematode and soybean aphids. Recently, seed companies have begun developing hybrids that have resistance to certain types of cyst nematode, but not all. Soybean aphids became a wide-spread problem in the last decade, and must be addressed with commercial spray.

The largest current threat to both the rural and urban forest is to Ash trees, which became a preferred quick-growing street tree and shade tree across the USA after elm trees succumbed to Dutch Elm Disease. MDA and University of Minnesota Extension Service provide information on a variety of insects and pests. According to the MDA, the Emerald Ash Borer is an insect that attacks and kills ash trees. The adults are small, iridescent green beetles that live outside of trees during the summer months. The larvae are grub or worm-like and live underneath the bark of ash trees. Trees are killed by the tunneling of the larvae under the tree's bark. According to a story in *Planning Magazine* ("Diversifying the Urban Forest, February 2010), Minnesota could lose all of its ash trees within 10 years.

A.1.c Previous Occurrences of the Hazard

There have not been recent large-scale occurrences of animal transmitted disease in the area. Some occurrence of crop pests and diseases happens each

year. In 2009, Emerald Ash Borer was found in St. Paul, and will likely become an increasing concern throughout Greater Minnesota.

A.1.d Probability of Future Events of this Hazard

Agricultural Disease is likely to occur in the area. The Redwood County All-Hazard Mitigation Planning Team considered some form of disease to occur in any given year (see Hazard Identification Worksheet in Section VII below).

A.2 Blizzards and Winter Storms

Minnesota experiences winter weather from mid-Autumn through the winter season into early spring. Heavy snowfall and extreme cold can immobilize large regions at the same time. All types of winter storms can be accompanied by extreme cold—both absolute temperatures and wind chill. The MAHMP covers Severe Winter Storms, Blizzards, and Ice and Ice Storms in Section Four: Hazard Analysis.

A.2.a Locations Affected by the Hazard

Winter storms typically affect large areas at the same time. Rural homes and farms face the threat of isolation and utility failure during winter storms. Roads closed due to hazardous winter weather also may make it difficult for emergency responders to access individuals located in remote rural areas. Given the rural nature of the county, the distance between cities and the role of the cities of Redwood Falls as a regional center, residents of smaller communities often face similar conditions.

A.2.b Extent of the Hazard

There are several types of winter storm events typical for this area. Heavy snow events in Minnesota are considered to be 6 or more inches of snow in a 12-hour period, or 8 or more inches in a 24-hour period. Snow is considered heavy when visibilities drop below one-quarter mile regardless of wind speed. Heavy snows can lead to building collapse as well as dangers to residents and travelers.

Ice storms include freezing rain, freezing drizzle and sleet (see section on Severe Storms below for information on hail storms, which more typically occur in the spring and summer seasons). Sleet forms from rain that turns to ice pellets while still in the air. Freezing rain freezes when it hits the ground, creating a coating of ice on roads, trees and power lines. Ice storms often lead to utility outages.

Ice storms combined with high winds often threaten the electrical power grid. Typical power outages are due to localized storm events and utility crews can respond and restore power within hours. A complete power outage, however, has the potential to be a catastrophic event, due to the extensive systems that rely on remote power generation. Water and sewer service rely on electrical

pumping stations. Individual home furnaces may be able to run on natural gas or propane, but usually need electricity to circulate warm air or hot water throughout a building.

Blizzards are the most violent type of winter storm. A blizzard occurs with sustained or frequent gusts to 35 miles per hour or greater and considerable amounts of falling and/or blowing snow (reducing visibility to less than a quarter mile) for three hours or longer. Temperature is not taken into consideration when the National Weather Service issues a Blizzard Warning; however, the nature of these storms typically leads to extreme cold.

Blizzards and winter storms create hazardous driving conditions for considerable amounts of time. In addition to slippery ice, drifting can close roads and block sight lines at intersections. According to MnDOT, "Drift-free roads are achievable through two mitigation strategies, proper road design and/or the use of snow fences. A suitably designed roadway will promote snow deposition in ditches rather than on the roadway and blowing snow that does reach the road will move across without drifting. Snow fences can also help maintain clear roadways by capturing blowing snow upwind of a problem area and storing that snow over the winter season." The University of Minnesota Extension Service states that "reduced snow removal costs alone in an average snowfall year (32 inches) would generate benefit/cost ratios ranging from 9:1 to 46:1."[6]

Extreme cold temperatures lead to direct dangers to people and animals. As NOAA points out in public education ("Dangers of Winter Weather" flyer, undated):

> *Infants and the elderly are most susceptible to prolonged exposure to the cold, which can cause potentially life-threatening conditions such as hypothermia and frostbite. Below freezing temperatures can damage vegetation and cause pipes to freeze and burst inside homes.*

Studies by NOAA researchers[7] show that more deaths across the nation are attributed to winter storms than to cold weather events. However, different populations are more at risk to different events. Men 40-49 years old were most vulnerable to both types of events. Over half of winter-weather deaths occurred in a vehicle, and 30% occurred outdoors.

Relationship to Other Hazards—Cascading Effects

Heavy snows and rapid snow melt contribute to seasonal spring flooding.

[6] Josiah & Majeski 2002
[7] Fransen & Wilhelmi 2007

A.2.c Previous Occurrences of the Hazard

Southwest Minnesota has a long history of severe winter weather. According to the Minnesota Climatology Working Group, the term "blizzard" originated in the region, just across the state line in Iowa:

> *Mar 14-16, 1870 blizzard struck northern Iowa and SW Minnesota with up to 16 inches of snowfall. First use of the term "blizzard" (from boxing, meaning volley of punches) by the Esterville, IA Vindacator newspaper. The term blizzard was not used by the U.S. Signal Corps Weather Service until 1876.*

Winter storms (snow & ice events) covering all or part of Redwood County—often a much larger area—have been documented 52 times in the National Climatic Data Center (NCDC) Storm Events database since 1993 (29 times in the last ten years, Table 4-1 below). Only 1 death and no injuries have been directly attributed to these storms, and few have attributed property damage.

On 23-24 December 1996, 4-10 inches of snow fell across a large area of Central Minnesota. NCDC describes the event:

> *Strong winds of 20 to 30 mph in the wake of the storm on 12/24 resulted in restricted visibilities in blowing snow. Highway 19 west of Redwood Falls, Highways 7 and 40 at Madison, and Highways 67 and 23 were closed out of Granite Falls. The 6 to 7 inches in Willmar in addition to previous heavy snowfall caused a portion of the historical society's roof to collapse on 12/30. After getting stuck in the snow about one half mile from home, a woman left her vehicle and become disorientated in the winter storm conditions. She was last seen leaving work on 12/23. Her car was found Christmas Eve. Her body was found in a snow covered field by a snowmobiler on 12/26.*

In December 2009, several storm systems moved through the area impacting holiday travel. On 23 December, light snow and freezing drizzle developed into heavy snow, totaling 12-15 inches through 25 December. The *Redwood Gazette* reported local weather observations of 20 inches of snow from 22-27 December, with at least a trace of snow for 11 days in a row. In Redwood Falls, crews were putting in 10-13 hour days clearing snow from city streets. On 25 January 2010, high winds closed area highways closing schools and filling local motels. One hundred students spent the night at the Westbrook-Walnut Grove high school.

The most recent winter storm event listed in the NCDC database occurred on 23 March 2011, when sleet and snow mixed with thunderstorms turned to heavy snowfall in Redwood and Sibley counties. Several winter storm and blizzard

warnings were issued in the fall and winter of 2010-2011, causing roads, schools and businesses to close repeatedly.

Table 4-1
NCDC Snow & Ice Events in Redwood County
Since 2002

Counties	Date	Time	Type
Redwood, Renville, Brown, 13 more	2/9/2002	7:00 AM	Winter Storm
Redwood, Renville, Brown, Yellow Medicine, 38 more	3/8/2002	6:00 PM	Winter Storm
Redwood, Renville, Brown, Yellow Medicine, 34 more	3/14/2002	8:00 AM	Winter Storm
Redwood, Renville, Yellow Medicine, 19 more	2/2/2003	6:00 PM	Winter Storm
Redwood, Renville, Brown, Yellow Medicine, 28 more	11/22/2003	6:00 PM	Winter Storm
Redwood, Renville, Brown, 20 more	12/9/2003	3:00 AM	Winter Storm
Redwood, Renville, Brown, Yellow Medicine, 9 more	12/15/2003	6:00 PM	Winter Storm
Redwood, Renville, Brown, Yellow Medicine, 37 more	1/24/2004	9:00 PM	Winter Storm
Redwood, Renville, Brown, 25 more	2/1/2004	2:00 AM	Winter Storm
Redwood, Renville, Brown, Yellow Medicine, 34 more	1/1/2005	10:00 AM	Winter Storm
Redwood, Renville, Brown, 19 more	3/18/2005	12:00 AM	Winter Storm
Redwood, Brown, 22 more	12/29/2005	7:00 PM	Heavy Snow
Redwood, Renville, Brown, Yellow Medicine, 28 more	3/12/2006	12:00 PM	Winter Storm
Redwood, Sibley	2/24/2007	4:00 AM	Winter Storm
Redwood, Renville, Brown, Yellow Medicine, 26 more	3/1/2007	12:00 AM	Winter Storm
Redwood, 3 more	12/1/2007	7:30 AM	Winter Storm
Redwood	1/12/2009	14:00 PM	Winter Storm
Redwood, Brown, Yellow Medicine, 1 more	2/26/2009	8:00 AM	Winter Storm
Redwood, Renville, Brown, 26 more	10/12/2009	3:00 AM	Winter Weather
Redwood, Renville, Yellow Medicine, 6 more	12/23/2009	18:00 PM	Winter Storm
Redwood, 2 more	1/6/2010	9:00 AM	Winter Storm
Redwood, Renville, Brown, 12 more	1/25/2010	9:00 AM	Winter Storm
Redwood, Renville, 7 more	2/7/2010	6:00 AM	Winter Storm
Redwood, Renville	11/28/2010	20:00 PM	Winter Storm
Redwood, Renville, Brown, 1 more	12/3/2010	8:00 AM	Winter Storm
Redwood, Brown	12/20/2010	8:00 AM	Winter Storm
Redwood, Renville, 1 more	1/30/2011	19:00 PM	Winter Storm
Redwood, 4 more	2/20/2011	7:30 AM	Winter Storm
Redwood, 1 more	3/23/2011	12:00 AM	Winter Storm

Source: National Climatic Data Center

A.2.d Probability of Future Events of this Hazard

Winter storms are highly likely in the area; they occur every year.

A.3 Drought

Drought is defined as a prolonged period of dry weather with very little or no precipitation. There are four types of drought: meteorological drought (departure from average), hydrological drought (shortfall of stream flows or groundwater), agricultural drought (soil moisture deficiencies), and socioeconomic or water management drought.

Typically, a droughty weather pattern lasts long enough to cause a serious depletion of surface and ground waters. The effects of a drought are difficult to precisely measure. They can easily be seen in rural areas as many of the crops will display drought stress. Effect on the public water supply is not as easily observed.

A.3.a Locations Affected by the Hazard

Drought patterns are typically regional, affecting large areas at the same time. Areas with well-drained soils may be more likely to experience adverse impacts to crops. Areas that rely on individual wells for drinking water supplies may also be more likely to experience shortages than areas with access to redundant municipal and rural water suppliers.

A.3.b Extent of the Hazard

Redwood County relies heavily on agriculture, leading to ongoing concern for protecting water. Corn and soybeans can be hurt by drought conditions. Livestock operations are affected by loss of feedstocks, pasture and general forage, as well as drinking water. Reduced yield due to a drought event has an economic impact on individual farmers, secondary suppliers who buy and sell crops and livestock, tertiary retailers and local governments that rely on sales taxes. Industrial users also rely heavily on water for processes.

The Minnesota Department of Health has worked with water suppliers to develop Wellhead Protection Plans (WHP) to help protect long-term quality and quantity of drinking water. Wellhead Protection Areas (WHPAs) and Drinking Water Supply Management Areas (DWSMAs) are mapped on Figure 1-3 in Chapter 1.

The Minnesota Department of Natural Resources (DNR) also has an important role in integrated planning for water conservation. The MAHMP explains the statutory process DNR undertakes to define water use priorities when water supplies are limited.

Relationship to Other Hazards—Cascading Effects

Drought will increase the risk of fires. Drought can also make animals and plants more susceptible to agricultural diseases and pests.

A.3.c Previous Occurrences of the Hazard

The U.S. Drought Monitor provides an online snapshot of drought conditions across the state and nation.[8]

The NCDC database does not document periods of drought events for Redwood County. Dry weather beginning in August 1999 through spring 2000 affected eight of the nine counties in the Southwest Regional Development Commission service area. The initial *Redwood County AHMP* documented extremely dry conditions during the 2001 growing season. The area experienced one of the driest fall (September through November) periods on record. Unusually warm weather during the month contributed to the drying. One noticeable manifestation of the dry conditions was a number of grass fires. While damage was mainly limited to the grasslands, considerable manpower and expense was needed to fight the fires. Burning had to be restricted, causing some economic impact. Although most of the fires did not start naturally, the extremely dry conditions and in some cases strong winds exacerbated the fires. Similar conditions re-occurred in the Fall of 2011.

A.3.d Probability of Future Events of this Hazard

The Redwood County All-Hazard Mitigation Planning Team considered that droughts would be likely to occur in the region (10%-100% chance in next year).

A.4 Fire (wildfire)

Each year, reports FEMA, more than 4,000 Americans die and more than 25,000 are injured in fires, many of which could have been prevented. Direct property loss due to fires is estimated at $8.6 billion annually. According to the Minnesota State Fire Marshall's report *Fire in Minnesota*, a fire was reported on average in Minnesota every 35 minutes. Structure fires are specifically addressed as a technological hazard in Section VI.B.4 below.

A.4.a Locations Affected by the Hazard

The risk of fire affects all locations. **The City of Redwood Falls is considered by DNR to be at a higher risk for fires due to the topography and concentrations of conservation land along the Minnesota River valley.**

While wildfires typically occur in forests and grasslands, crops (cornfields for example) can also burn. Isolated rural locations can be at higher risk due to long response times and limited water supplies.

[8] http://drought.unl.edu/dm

A.4.b Extent of the Hazard

Wildfire occurs when an uncontrolled fire spreads through vegetated fuel, posing danger and threatening destruction of property. They often begin unnoticed, spread quickly, and can be highly unpredictable. While more typical in rugged Northern or Western forested areas these days, prairie fires were a natural part of the environment across the Great Plains prior to settlement. The MAHMP categorizes wildfires into four types:

- Wildland fires in grasslands, brush and forests;
- Firestorms, occurring during extreme weather;
- Interface fires where natural landscapes meet urbanized areas
- Prescribed burns, intentionally set or natural fires that are allowed to burn for beneficial purposes

Factors such as topography, fuel and weather affect wildfire behavior. Fire intensity tends to increase during daytime heating. Large parcels of land left fallow in conservation and natural areas may be susceptible to grass fire even when properly managed. Gusty winds and low relative humidity create conditions for wildfire to spread rapidly in dry grasses and crops. Farm fields with row crops, ditches and rights-of-way along railroad tracks are vulnerable, in particular, to the errant spark or carelessly discarded cigarette. Prolonged periods of high temperatures and/or high winds increase the risk of wildfires.

Relationship to Other Hazards—Cascading Effects

Wildfire risk is closely related to incidents of drought. Wildfire destroys vegetation, which can cause erosion and worsen flooding. There is also the potential for fires to ignite hazardous materials. For example, many farms have anhydrous ammonia and other agricultural chemicals, which can cause serious difficulties for emergency response.

A.4.c Previous Occurrences of the Hazard

Fires occur periodically throughout the county, in both cities and townships. The State of Minnesota gathers information on fire response through the National Fire Incident Reporting System of the US Fire Administration. A new web-based reporting system was put into use in 2009.

The National Weather Service issues Grassland Fire Danger statements from April 1st to November 15th each year. The DNR is the lead state agency for wildfire response and prevention across the state, and offers training and other resources for local fire departments. The State hazard plan has reported on one fairly recent wildfire incident indicative of risk in the region—a 300 acre grassfire in 2003 that burned some small sheds near Windom, in Cottonwood County. The local *Sentinel Tribune* weekly described seven field and combine

fires reported to the Redwood County Sheriff's Office during warm, windy weather the first week of October 2011, as well as fires in adjacent Cottonwood and Murray counties.

A.4.d Probability of Future Events of this Hazard

Wildfires tend to be limited and only occasionally require fire department response. The All-Hazard Mitigation Planning Team considered wildfire a risk of 1% to 10% in any year.

A.5 Flooding / Dam Failure and Landslide

Floods are one of the most common hazards across the United States. Flooding can occur anytime, anywhere. Seemingly benign streams can overflow their banks from a sudden rainstorm, quick snowmelt or blockage of the channel. Lakes or reservoirs can slowly retain water or quietly creep up the shore. City sewers can back up and pour into private basements and onto public streets. Land subsides and stream banks slide away during high water and due to groundwater depletion. Dams can break.

Minnesota DNR administers most state water law, including regulating work in public waters, control of appropriation and use of water, and ensuring the safety of dams. DNR classifies dam structures in three categories:

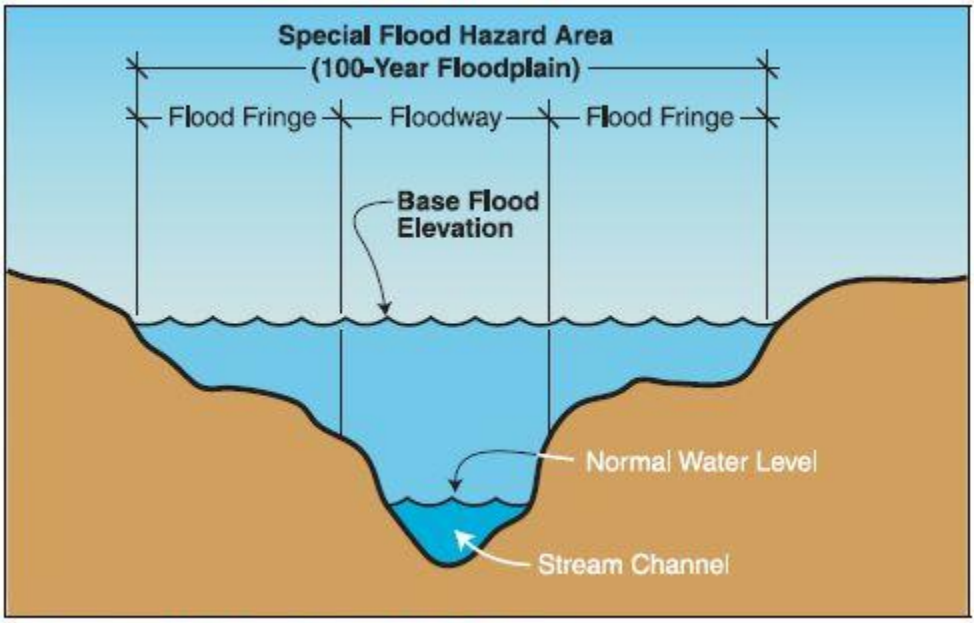
- High Hazard: any loss of life or serious hazard to public;
- Significant: possible health hazard or probable loss of high-value property;
- Low: property loss restricted to rural outbuildings and local roads.

A.5.a Locations Affected by the Hazard

The Federal Emergency Management Agency (FEMA) maps the probability of flood waters inundating floodplains. Specifically, FEMA works with local communities to map the Special Flood Hazard Area (SFHA), commonly known as the 100-year floodplain, where they calculate a 1% chance of a flood event any given year. Within the SFHA lie the floodway, in which water can be expected at any time, and the flood fringe which is vulnerable to flood events. In some areas, a 0.2% annual probability area (500-year floodplain) is also mapped.

FEMA has developed Flood Insurance Rate Maps (FIRMs) for many communities across the United States. FEMA now posts these online, along with "FIRMettes"—a "a full-scale portion of a FEMA Flood Insurance Rate Map (FIRM) that you create yourself online by selecting the desired area from an image of a Flood Insurance Rate Map.

Figure 4-1 The 100-Year Floodplain

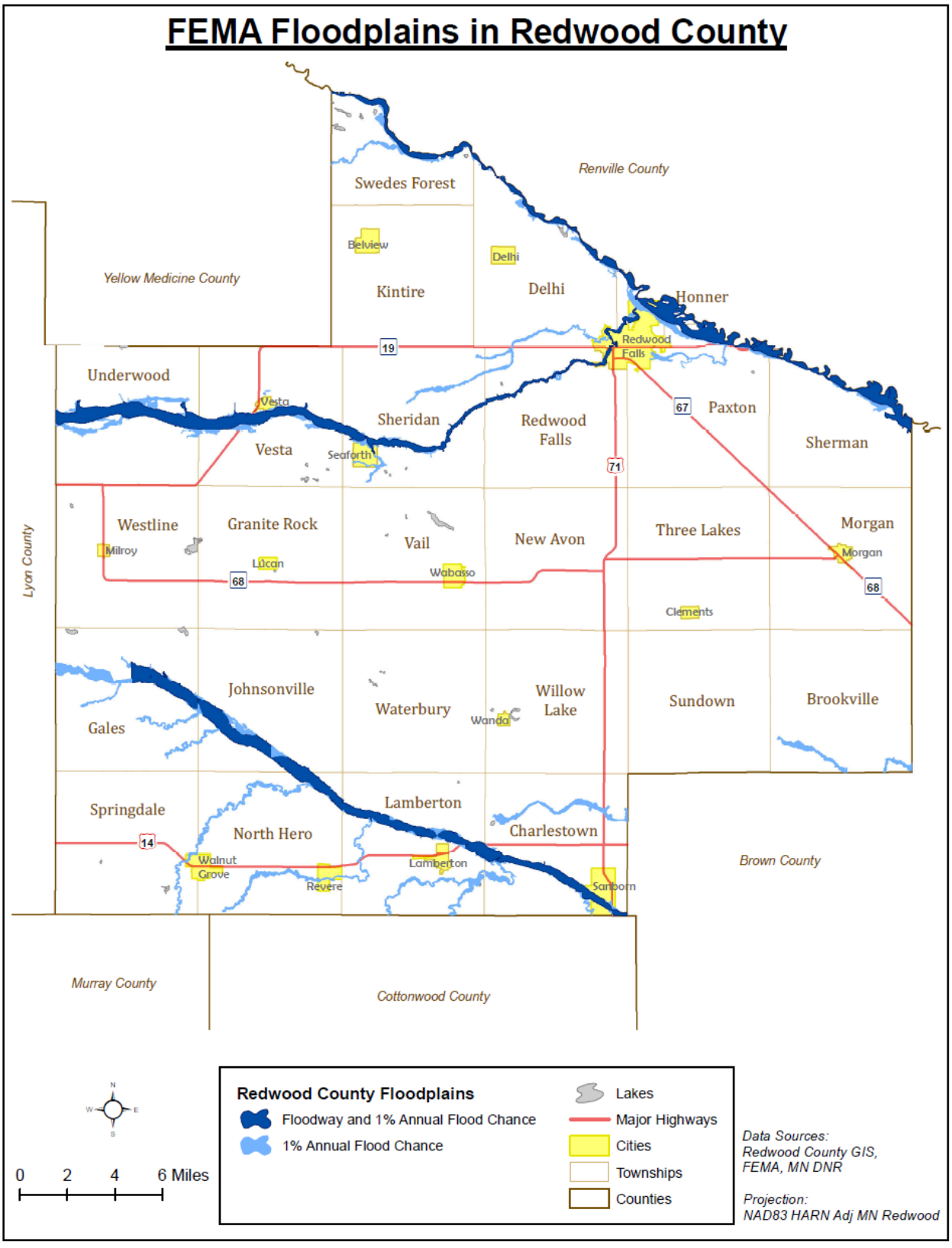


Source: FEMA, August 2001.

Obsolete FIRMs, many not updated since their initial production in the 1970s, make flood management decision-making difficult. Redwood County has been working with DNR and FEMA to engineer, review and adopt digital floodplain maps, or dFIRMs, which identify SFHAs in Zone A (1%, no BSE Base Flood Elevation) and Zone AE (1% with BFE). Environmental Office staff identified parcels in each area where the maps differed and notified owners early in the process to be sure the public was informed of changes. Draft dFIRM maps were used in this plan to estimate flood hazard areas.

About two-thirds of local townships include mapped floodplains. Many of these areas are narrow, following streams and creeks. The Minnesota River, however, has a broad floodplain along the boundary between Renville and Redwood counties that includes Swedes Forest, Delhi, Honner, Paxton, and Sherman Twp, as well as old North Redwood Falls. The Redwood River enters from Lyon County and crosses four townships—Underwood, Vesta, Sheridan, and Redwood Falls Twp—and corners of the city of Seaforth on its way to the county seat and the Minnesota River. The Cottonwood River also enters from Lyon County in Gales Twp and crosses Johnsonville, North Hero, Lamberton and Charleston townships, before touching its namesake county and exiting into Brown County. About two dozen building sites are affected across the county.

Figure 4-2 Floodplain Map



City of Delhi

While floodplain was mapped for the City of Delhi in 1974, the small flood hazard area along Rice Creek is in a farmed area outside the developed part of the town site. One farm site is close to the floodplain. This area was not mapped in the draft dFIRM. The City of Delhi does not participate in NFIP.

City of Redwood Falls

The Minnesota River Valley is deep and wide, but is largely undeveloped except at the old city of North Redwood, which merged with Redwood Falls in the 1990s. The Redwood River's course through the city is largely confined to Lake Redwood and Alexander Ramsey Park, the largest municipal park in Minnesota. Ramsey Park is also home to the 183' long historic stone Swayback Bridge, built in 1938 by the federal Works Progress Administration (WPA). The initial AHMP estimated the floodplain area in the city encompassed about 0.6 square miles or 12% of the community.

City of Revere

A flood hazard area was mapped along Pell Creek in the undeveloped portion of the City of Revere; however, the incorporated area is smaller today than when mapped in 1979. The City of Revere does not participate in NFIP; no structures are at risk.

City of Sanborn

The Cottonwood River's floodplain is about ¼ -mile wide as it leaves the county outside Sanborn. This is one area in which the dFIRM maps have identified a more extensive floodplain than the existing maps; a wider floodway designated will affect development of the City Park.

City of Seaforth

Small creeks run through the southern and eastern portions of Seaforth, tributary to the Redwood River which flows across the northern city limits. The dFIRM maps one non-residential building near the floodplain along the Redwood River. The City of Seaforth joined the NFIP in 2011.

City of Vesta

The Redwood River flows south of the City of Vesta, outside the current city limits. The current Flood Hazard Boundary Map show more extensive corporate limits than today, so the city is listed as sanctioned in the Community Status Book. The dFIRM floodplain is more extensive in this area, including a wide floodway, and a small portion of dFIRM floodplain appears to cross the current city limits on the southeast corner of the city. The City of Vesta does not participate in NFIP; no structures appear to be at risk, although a lagoon may be located in the dFIRM floodplain.

City of Walnut Grove

A flood hazard area follows Plum Creek in the undeveloped northeast portion of the City of Walnut Grove. The City of Walnut Grove does not participate in NFIP; no structures are at risk.

Although all of these cities have mapped floodplains—many without structures—the Planning Team noted the county-wide risk from County ditches and drain tiles. Any of these could break at any time, with the potential to cause water damage throughout the county. Some cities also have lakes, wetlands and other sources of high groundwater that can be a hazard to public and private property. The City of Wanda is working with DNR to join NFIP in 2012, even though the city does not include mapped floodplains.

Dams

An Emergency Action Plan (EAP) is required for all High Hazard dams, implemented in the County Emergency Operations Plan (EOP). Currently the City of Redwood Falls' Redwood Falls Dam, originally used for hydroelectric generation, has a High Hazard rating. Redwood County's Walnut Grove dam on Plum Creek is rated at Significant Hazard. There are an additional 13 low-rated dams monitored by MN DNR.

Land Subsidence

Unstable stream banks and steep bluffs can be prone to landslides and subsidence, especially during heavy precipitation or a flood event. This has been a problem along the Minnesota River valley, for example, along road cuts—in April 2011, 7,000 cubic yards of soil slid onto TH 19/71 blocking the highway between Redwood Falls and Morton for several days. The County Highway Engineer has also expressed concern with sloughing at the County Shop site and near bridges on county roads crossing the Minnesota River outside Franklin (Renville County) and Delhi.

The Redwood County Soil Survey notes severe limitations due to caving in several soil types.[9] Geologic maps show Redwood County to be located outside areas prone to subsidence due to Karst soil sinkholes.

A.5.b Extent of the Hazard

Flooding occurs with the accumulation of water outside a normal water body, typically into a floodplain. FEMA defines a flood as:

> *"A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from:*
>
> - *Overflow of inland or tidal waters;*

[9] USDA (1981)

- *Unusual and rapid accumulation or runoff of surface waters from any source;*
- *Mudflow; or*
- *Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above."*

Further, a "flash flood" is considered to occur with "6 inches or more rainfall within a 24 hour period… The rationale for using these criteria is that a rainfall of six inches in a 24-hour period is near the 100-year return period in Minnesota" (Minnesota Climatology Working Group).

The National Flood Insurance Program (NFIP) was created by Congress to help property owners to protect themselves financially. NFIP offers flood insurance in communities that agree to adopt and enforce ordinances to reduce the risk of flooding. In Minnesota, the DNR administers floodplain management programs. Homeland Security and Emergency Management (HSEM) administers FEMA's flood response, recovery and mitigation programs. According to NFIP's website:

> *"Floodplain management" refers to an overall community program of corrective and preventive measures for reducing future flood damage. These measures generally include zoning, subdivision, or building requirements, and special-purpose floodplain ordinances.*
> *FEMA works closely with state and local officials to identify flood hazard areas and flood risks. Floodplain management requirements within high-risk areas, known as Special Flood Hazard Areas (SFHAs), are designed to prevent new development from increasing the flood threat and to protect new and existing buildings from anticipated flood events. Communities participating in the NFIP must require permits for all development in the SFHA. Permit files must contain documentation to substantiate how buildings are actually constructed. The community must also ensure that construction materials and methods used will minimize future flood damage. In return, the federal government makes flood insurance available for almost every building and its contents within the community.*[10]

Measures to mitigate flood risk include acquisition of property in the floodplain, flood proofing, relocation, and flood warning systems.

A city may choose to go beyond minimum NFIP requirements to promote flood mitigation and restrict activities within the floodplain. The NFIP's Community Rating System (CRS), a voluntary incentive program, recognizes and encourages community floodplain management activities that exceed the minimum NFIP

[10] http://www.floodsmart.gov

requirements. CRS communities receive discounted flood insurance premium rates in recognition of reduced flood risks. No communities in Southwest Minnesota currently participate in the CRS.

Threats to transportation systems are addressed in more detail in the next section. Special issues occur with infrastructure in a flood event. Communities can mitigate the effects of flooding by asking certain questions before areas are inundated, such as:

- Are telephone switching stations vulnerable? Local phone/cable distribution lines?
- Electrical switching stations? Local power distribution?
- Are natural gas systems and meters flood-proofed?
- Are all underground fuel storage tanks inventoried and flood-proofed?
- How can homeowners be contacted to shut off and secure propane tanks, home fuel oil tanks, etc?
- To what level are public wells, water treatment, and sewage treatment plants protected from flood events?
- Is there a plan to move police, fire, public works, and city equipment, to high ground if needed?
- How will debris be managed and collected post-flood?

Relationship to Other Hazards—Cascading Effects

Flooding can interfere with emergency response to fires, as seen in Grand Forks, North Dakota, during the Red River Flood of 1997. Flooding or increased moisture/humidity levels can allow for increased insect pest infestations. Flooding can also create Public Health emergencies and contaminate water supplies.

A.5.c Previous Occurrences of the Hazard

Flood events are an almost annual occurrence in Redwood County, but damage has tended to be limited to roads and bridges. There is a stream gauge on the Redwood River above the City of Redwood Falls, and on the Minnesota River at the US 71 / TH19 highway bridge near Morton. Moderate flood stage at the Redwood gauge is 15', which has been exceeded four times, most recently on 23 March 2001. The NCDC database (Table 4-2) records twenty-two flood events in and around the county between 1993 and 2011—several of which are classified as flash flood events.

As in much of Minnesota, seasonal spring flooding from snowmelt is a common occurrence in late winter and early spring. The NCDC database has general event information, but the record of local property damage as a result of most of these events is spotty. For example:

Heavy snowfall during winter remained on the ground through the end of March [2001] and then rapidly melted, resulting in river stages close to record levels. Water began to gush through drainage ditches, streams and into the mainstem rivers during midday April 1. Heavy rain April 7-8 over much of central Minnesota (see corresponding flood entry) prolonged the high water and also added one or two feet to many crests during mid April. Another period of heavy rain April 22-23 (see corresponding flood entry) caused rivers to crest again in late April and early May; in some cases the crest was higher than the first. Many rivers remained well above flood stage into mid-May (see May 2001 Storm Data).

Table 4-2
NCDC Flood Events in Redwood County

Location	Date	Time	Type
Redwood County	5/7/1993	20:00 PM	Flash Flood
Redwood River	8/9/1994	8:00 AM	Flash Flood
Minnesota River Valley	3/15/1997	6:00 AM	Flood
Cottonwood River	3/23/1997	6:00 AM	Flood
Redwood River	3/27/1997	6:00 AM	Flood
Minnesota River Valley	4/1/1997	12:00 AM	Flood
Redwood River	4/1/1997	12:00 AM	Flood
Cottonwood River	4/1/1997	12:00 AM	Flood
Minnesota River Valley	5/1/1997	12:00 AM	Flood
Morgan	7/25/1997	1:00 AM	Flash Flood
Minnesota River Valley	4/1/2001	12:00 PM	Flood
Redwood County	4/22/2001	7:00 PM	Flood
Minnesota River Valley	5/1/2001	12:00 AM	Flood
Redwood & Renville counties	5/29/2004	11:00 PM	Flash Flood
Redwood & Renville counties	5/30/2004	3:30 AM	Flood
Redwood Falls, Morgan	9/12/2005	8:30 PM	Flash Flood
Redwood Falls	3/13/2007	10:00 AM	Flood
Redwood Falls, Morgan	8/19/2007	1:00 AM	Flash Flood
Redwood Falls	10/5/2007	1:25 AM	Flash Flood
Redwood County	3/19/2010	12:00 PM	Flood
Southern Minnesota	9/22/2010	19:00 PM	Flash Flood
Minnesota River Valley	3/25/2011	18:00 PM	Flood

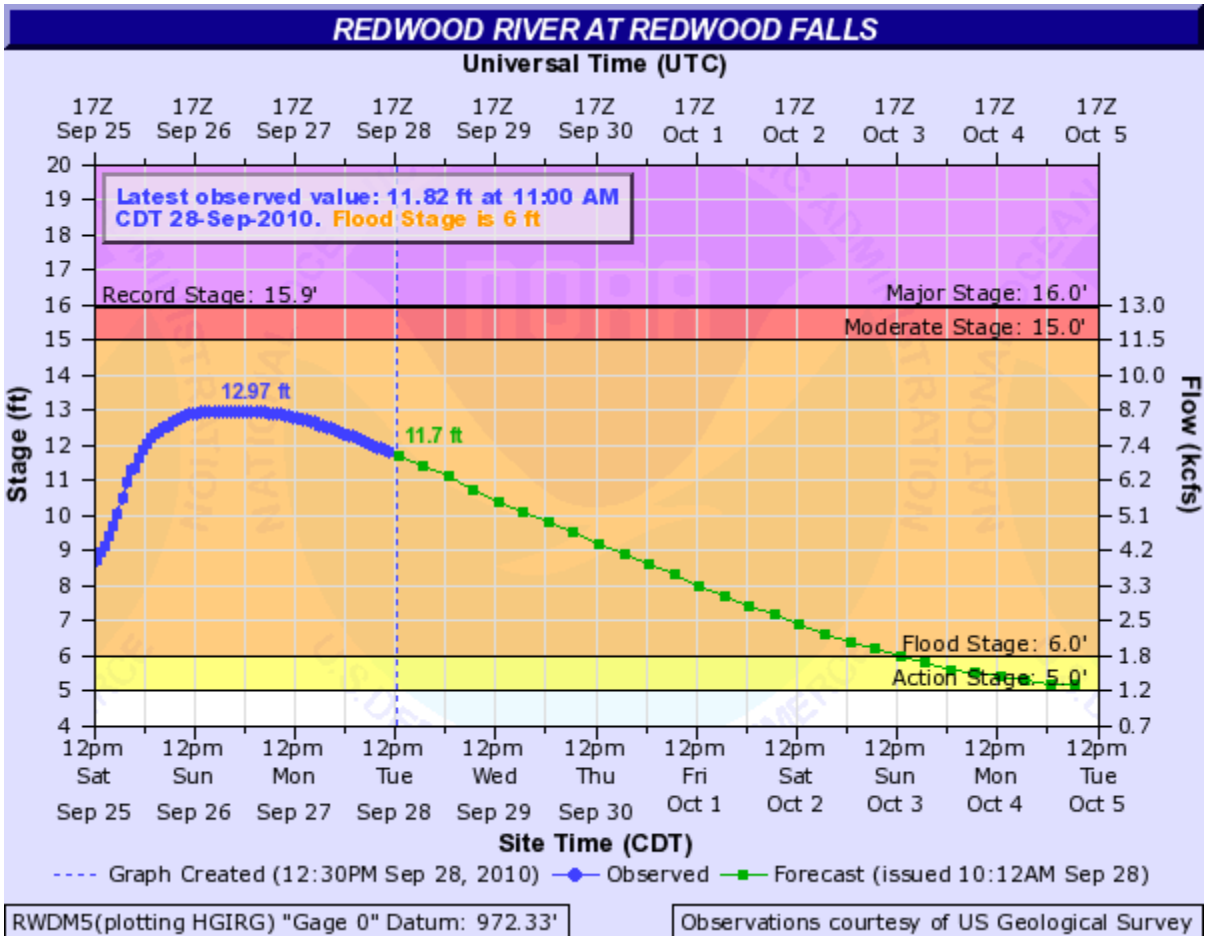
The most wide-spread impact of flooding tends to be closed roads and bridges. For example, in March 2010, flooding closed CSAH 8 from CSAH 46 to TH 19, CSAH 17 at the Goldmine Bridge over the Minnesota River, and CSAH 31 through Ramsey Park, Redwood Falls. Spring flooding in 2010 and 2011 prompted Presidential and Secretary of Ag Disaster Declarations for counties across the region.

"Flash flood" events are often caused by heavy rains in late spring and summer. These events are often highly localized, affecting roads more than structures. In

the autumn of 2010, as this plan revision was in process, continuous rains saturated soils in the region. Beginning on 22 September, widespread heavy rains caused flash flooding across Southern Minnesota, leading the Governor of Minnesota to declare a State of Emergency, including Redwood County. Much of the damage reported was to township roads and bridges.

There have been no recent incidents of dam failure in the county.

Figure 4-3 Hydrograph at Flood Stage



Source: National Weather Service water.weather.gov

A.5.d Probability of Future Events of this Hazard

Flooding is likely to occur each year. The Redwood County All-Hazard Mitigation Planning Team considered dam failure a 1%-10% chance in a year.

A.6 Severe Summer Storms: Extreme Heat, Hail, Lightning

During the spring, summer and autumn, severe thunderstorms, lightning and hail can be commonplace. The *Minnesota All-Hazard Mitigation Plan* covers lightning, hail, windstorms, and extreme heat temperatures. (Windstorms and Tornado events are addressed below.)

A.6.a Locations Affected by the Hazard

Summer storms typically affect large areas at the same time. Hail can be extremely damaging to crops in rural areas, as well as vehicles and building roofs.

A.6.b Extent of the Hazard

Thunderstorms, which occur most frequently from mid-May through mid-July, are the most common type of severe summer storm. Thunderstorms are usually localized, produced by cumulonimbus clouds, accompanied by lightning, and have strong wind gusts, heavy rains, and sometimes hail or tornados.

Lightning occurs to balance the difference between positive and negative discharges within a cloud, between two clouds, and between the cloud and ground. For example, a negative charge at the base of the cloud is attracted to a positive charge on the ground. A lightning bolt happens when the difference between the charges is great enough. The charge is usually strongest on tall buildings, trees, and other objects protruding from the surface. Consequently, these objects are more likely to be struck than lower objects.

While cloud-to-ground lightning poses the greatest threat to people and objects on the ground, it accounts for only 20 percent of all lightning strikes. The remaining lightning occurs within the cloud, from cloud to cloud, or from the ground to the cloud. The most common type of lightning is lightning occurring within a cloud.

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

The Tornado and Storm Research Organisation (TORRO) in the UK has developed a scale to measure increments of intensity or damage potential

related to hail size and characteristics. The TORRO Hailstorm Intensity Scale ranges from H0 (hard hail causing no damage) to H10 (super hailstorms with hail >100mm diameter causing extensive structural damage and the risk of severe or fatal injuries to people caught in the open).[11]

Figure 4-4 TORRO Hail Scale

Hail size and diameter in relation to TORRO Hailstorm Intensity Scale.

Size code	Maxmimum Diameter mm	Description
0	5-9	Pea
1	10-15	Mothball
2	16-20	Marble, grape
3	21-30	Walnut
4	31-40	Pigeon's egg > squash ball
5	41-50	Golf ball > Pullet's egg
6	51-60	Hen's egg
7	61-75	Tennis ball > cricket ball
8	76-90	Large orange > Soft ball
9	91-100	Grapefruit
10	>100	Melon

Source: TORRO

In Minnesota, most hail ranges in size from pea-size (1/4 of an inch) to golf-ball size (1 ¾ of an inch). Larger hailstones occur less frequently. Strong updrafts are necessary within the cloud to form hail, and are usually associated with severe thunderstorms. Coverage areas for individual hailstorms are highly variable and spotty due to the changing nature of the cumulonimbus cloud. While almost all areas of southern Minnesota can expect some hail during the summer months, most hail is not large enough to cause significant crop damage or property damage.

Extreme heat temperatures often accompany severe summer storms. The combination of high temperatures and exceptionally humid conditions can prove deadly. Heat stress can lead to heat cramps, heat exhaustion and heatstroke, and death. According to the US Centers for Disease Control (CDC), more than 300 Americans die annually from excessive heat exposure—during 1979-2003, more people in the US died from extreme heat than from hurricanes, lightning, tornadoes, floods and earthquakes combined.

[11] See http://www.torro.org.uk for more detailed information on the scale.

Relationship to Other Hazards—Cascading Effects

Heavy rain can cause flash flood events, and may threaten transportation infrastructure. Lightning often starts structure and wildfires. Extreme heat can lead to public health emergencies.

Table 4-3
NCDC Hail Events in Redwood County
Sorted by Magnitude, Golf Ball Size +

Mag: Magnitude
PrD: Property Damage
CrD: Crop Damage

Location or County	Date	Time	Mag	PrD	CrD
31 REDWOOD	5/28/1991	1940	4.50 in.	0	0
43 Lamberton	7/13/1997	4:30 PM	4.00 in.	200K	1.2M
44 Morgan	7/13/1997	5:02 PM	3.00 in.	0	0
21 REDWOOD	7/2/1982	2130	2.75 in.	0	0
32 REDWOOD	5/28/1991	2020	2.75 in.	0	0
56 Belview	8/17/2001	6:15 PM	2.75 in.	25K	0
20 REDWOOD	7/2/1982	2045	2.50 in.	0	0
79 Milroy	8/3/2005	7:50 PM	2.00 in.	0	0
99 Rowena	8/2/2009	20:53 PM	2.00 in.	0K	0K
2 REDWOOD	8/4/1958	1925	1.75 in.	0	0
3 REDWOOD	8/10/1959	1600	1.75 in.	0	0
6 REDWOOD	6/9/1965	1500	1.75 in.	0	0
8 REDWOOD	6/15/1973	2130	1.75 in.	0	0
9 REDWOOD	6/16/1973	1900	1.75 in.	0	0
14 REDWOOD	7/26/1979	1430	1.75 in.	0	0
17 REDWOOD	6/23/1981	1545	1.75 in.	0	0
19 REDWOOD	4/2/1982	1654	1.75 in.	0	0
23 REDWOOD	4/20/1985	2115	1.75 in.	0	0
27 REDWOOD	5/29/1986	1500	1.75 in.	0	0
29 REDWOOD	5/28/1991	1903	1.75 in.	0	0
30 REDWOOD	5/28/1991	1929	1.75 in.	0	0
34 Wanda	4/25/1994	1805	1.75 in.	0	0
39 Walnut Grove	7/19/1995	1545	1.75 in.	0	0
47 Milroy	7/20/1998	9:30 AM	1.75 in.	0	0
57 Vesta	5/5/2002	5:20 PM	1.75 in.	0	0
58 Redwood Falls	5/5/2002	5:25 PM	1.75 in.	0	0
66 Redwood Falls	8/16/2002	10:30 PM	1.75 in.	0	0
			TOTALS:	225K	1.200M

Source: National Climatic Data Center

A.6.c Previous Occurrences of the Hazard

The NCDC database lists 106 hail events in Redwood County from 1958 to 2011, with $1,425,000 property and crop damage accounted for in two storms. These events ranged from reported melon-sized hail in 1991 and 1997 to many incidents of penny-sized hail, which is considered to be severe (Table 4-3 above). A storm in 1997 with grapefruit-sized hail resulted in $1.4 million in

reported damage to property and crops in the Lamberton and Morgan areas. However, dollar-cost damage is not consistently reported in the database.

The *MAHMP* documented July and August 2001 extreme heat events which included Redwood County in a large affected area with dew points in the middle and upper 70s, resulting in six fatalities in the Twin Cities. Excessive heat and humidity in July 2011 lead to three consecutive days with 80 degree dew points at MSP airport. Problems for livestock owners in Southwest Minnesota brought out firefighters to hose down cattle suffering heat stroke.

A new concern in Southwest Minnesota is the impact of lightning strikes on wind turbines. The growth of wind energy conversion systems in the region has provided opportunities for economic development, but also new demands for emergency service providers. In 2010, a manager for GE Power & Water told the *Pipestone Star* that lightning is the most common problem for turbine failure.

A.6.d Probability of Future Events of this Hazard

Severe Summer Storms take place every year. In the Planning Team's local experience, extremely high temperatures and hail are likely while lightning is highly likely any given year. Individuals can and should mitigate their individual exposure to these hazards.

A.7 Tornado and Straight-line Winds

Tornados are the most violent of all storm types experienced in Minnesota. A tornado is a rapidly rotating column of air that is spawned from a cumulonimbus cloud. When it drops to the ground, it can create significant property damage and loss of life. While not as damaging as a tornado, windstorms can and do produce substantial damage over wider areas at one time.

A.7.a Locations Affected by the Hazard

A tornado or straight-line wind can hit anyplace, anytime. An extreme wind event can cause potential damage in a populated area ranging anywhere from minor inconvenience to total devastation. FEMA places Southern Minnesota in Wind Zone IV, subject to winds of up to 250 mph (consistent with ASCE 7-05 criteria).

A.7.b Extent of the Hazard

The most severe windstorms usually occur (and do the most damage) during severe thunderstorms in the spring and summer months. These include tornados, downbursts, or straight line winds. Straight-line winds have similar effects to tornadoes without the rotational damage pattern. Downburts are created by a column of sinking air, capable of producing straight-line winds in

excess of 150 mph. Winds of greater than 60 mph are also associated with intense spring and fall low-pressure systems. These winds can inflict damage to buildings and overturn high profile vehicles.

Tornados are most likely to occur during warm humid spells during May, June, July, and August but have occurred as early as March and as late as November in Minnesota. They are sometimes referred to as cold air funnels after the passage of a cold front when the air is much less humid, but the air aloft is very cold creating enough instability to make funnel clouds. Tornados occur during the warmest part of the day (late afternoon or early evening) and over 80 percent of tornados occur between noon and midnight.

The severity of tornadic damage is measured by the Fujita Tornado Scale, with a sliding scale from F0 to F5 depending on wind speed. An F5, the most damaging type of tornado, has winds of over 261 miles per hour and can disintegrate strong frame buildings. Beginning in 2007, the 'Enhanced F Scale' is now being used to estimate the scale of a tornado. The EF Scale relies on 28 damage indicators to typical structures from small outbuildings and schools, to trees and towers (Figure 4-5).

Figure 4-5 Enhanced F-Scale for Tornado Damage

An update to the the original F-scale by a team of meteorologists and wind engineers, to be implemented in the U.S. on 1 February 2007.

FUJITA SCALE			DERIVED EF SCALE		OPERATIONAL EF SCALE	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	**EF Number**	**3 Second Gust (mph)**
0	40-72	45-78	0	65-85	**0**	**65-85**
1	73-112	79-117	1	86-109	**1**	**86-110**
2	113-157	118-161	2	110-137	**2**	**111-135**
3	158-207	162-209	3	138-167	**3**	**136-165**
4	208-260	210-261	4	168-199	**4**	**166-200**
5	261-318	262-317	5	200-234	**5**	**Over 200**

*** **IMPORTANT NOTE ABOUT ENHANCED F-SCALE WINDS:** *The Enhanced F-scale still is a set of wind estimates (not measurements) based on damage.* Its uses three-second gusts estimated at the point of damage based on a judgment of 8 levels of damage to the 28 indicators listed below. These estimates vary with height and exposure. **Important**: The 3 second gust is not the same wind as in standard surface observations. Standard measurements are taken by weather stations in open exposures, using a directly measured, "one minute mile" speed.

Source: NOAA

A tornado's path typically ranges from 250 feet to a quarter of a mile in width. The speed a tornado travels varies but commonly is between 20 mph and 30 mph. Most tornados stay on the ground for less than five minutes. Tornados frequently move from the southwest to the northeast but this also varies and cannot be counted on in all instances.

Relationship to Other Hazards—Cascading Effects

Severe winds, as noted, typically accompany thunderstorms and hail events. Hail may also accompany a tornado or severe wind event. A tornado event, and many straight-line wind storms, can lead to total destruction of buildings and wide-scale casualties. There are often fires and potential public health emergencies. Catastrophic events such as these may also create the potential for civil unrest.

A.7.c Previous Occurrences of the Hazard

The NCDC database lists 120 general thunderstorm and high wind events reported for Redwood County from 1950 to 2011. In June 2010, thunderstorms uprooted trees between Wabasso and Wanda and blew down a large grain bin in Wabasso causing approximately $50,000 damage. In August 2010, several waves of thunderstorms caused $15-$25,000 in property damage in Redwood County with trees and power lines blown down.

There are 27 tornado events listed for Redwood County in the NCDC database from 1958 through 2011, from F0 to F5 (Table 4-4). There was one death and three injuries recorded. There were three tornado events recorded from the 1950s, two in the 1960s, one in the 1970s, six in two incidents in the 1980s, and nine on two days in the 1990s.

In the last decade, there have been tornados reported in the NCDC database on three different dates. In April 2004, an F0 tornado was recorded on video by law enforcement as it crossed US 14 east of Revere about 5pm, with a path 50 yards wide and 1.5 miles long, traveling north. At 5:30 the same day, an F1 left a path 50 yards wide for 7 miles north of Lamberton. While no damage is recorded in the database, a farm shop was destroyed four miles north of Sanborn. In June 2010, an F1 tornado left a 200 yard wide path 3 miles long to the southeast in open country east of Revere, with reports of large hail in Lyon and Redwood counties.

Most recently, on 1 July 2011, a hot and humid storm front traveled through Southwest and East Central Minnesota, spawning several tornadoes in its path. In Redwood County, tornado, wind and hail damage occurred primarily along TH 19, near Milroy, Vesta, and Redwood Falls. Sustained winds of 83 mph and 100

mph gusts buffeted the city of Redwood Falls. An EF-1 tornado touched down near the Lyon County line and traveled on a 300 yard wide path for 3 miles north of Milroy. Another F1 touched down six miles west of Vesta, leaving a 300 yard wide path for 5 miles north to Yellow Medicine County. A third F1 tornado with a 300 yard wide path traveled for 8 miles from southwest of Belview to northwest of Delhi, crossing the Minnesota River into Renville County.

Table 4-4
NCDC Tornado Events in Redwood County
Sorted by Magnitude

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage

Location or County	Date	Time	Mag	Dth	Inj	PrD
5 REDWOOD	6/13/1968	1810	F5	0	0	2.5M
13 REDWOOD	6/16/1992	1725	F3	0	0	0K
15 REDWOOD	6/16/1992	1810	F3	0	0	0K
7 REDWOOD	6/21/1981	1604	F2	0	0	250K
9 REDWOOD	6/21/1981	1654	F2	0	0	250K
10 REDWOOD	6/23/1981	1356	F2	0	0	2.5M
16 REDWOOD	6/16/1992	1825	F2	0	0	0K
17 REDWOOD	6/16/1992	1825	F2	0	0	0K
19 REDWOOD	6/16/1992	1840	F2	0	0	0K
2 REDWOOD	8/4/1958	1930	F1	1	2	0K
6 REDWOOD	6/28/1979	1530	F1	0	1	25K
11 REDWOOD	4/21/1985	1900	F1	0	0	250K
12 REDWOOD	4/21/1985	1915	F1	0	0	250K
14 REDWOOD	6/16/1992	1755	F1	0	0	0K
18 REDWOOD	6/16/1992	1830	F1	0	0	0K
20 Clements	6/18/1998	2:55 PM	F1	0	0	0
23 Lamberton	4/18/2004	5:29 PM	F1	0	0	0
24 REDWOOD	6/25/2010	17:55 PM	F1	0	0	0K
25 Vesta	7/1/2011	15:31 PM	F1	0	0	250K
26 Vesta	7/1/2011	15:31 PM	F1	0	0	500K
27 Belview	7/1/2011	15:41 PM	F1	0	0	200K
1 REDWOOD	6/19/1958	1600	F0	0	0	0K
3 REDWOOD	5/4/1959	1800	F0	0	0	0K
4 REDWOOD	6/7/1967	1500	F0	0	0	0K
8 REDWOOD	6/21/1981	1647	F0	0	0	0K
21 Redwood Falls	6/18/1998	3:07 PM	F0	0	0	0
22 Revere	4/18/2004	5:03 PM	F0	0	0	0
			TOTALS:	1	3	6.976M

Source: National Climatic Data Center

A.7.d Probability of Future Events of this Hazard

Tornado and straight-line wind events are likely to take place in any year. The 2008 *Minnesota All-Hazard Mitigation Plan* calculated a 40% annual probability of a tornado event in Redwood County.

A.8 Other Natural Hazards

Based on maps showing seismic activity in the United States, the Planning Team considered the potential for an earthquake of any significant magnitude to be unlikely over 50 years.

B. Technological Hazards

This section provides information on the nature of technological hazards—those caused by humans rather than nature—which are a risk in Redwood County. These hazards are primarily caused directly by people or spread person to person, rather than by natural events. The nature of this hazard covers acts both intentional and accidental. As FEMA explained in their 2003 planning guide, *Integrating Manmade Hazards Into Mitigation Planning*:

> *The term "technological hazards" refers to the origins of incidents that can arise from human activities such as the manufacture, transportation, storage, and use of hazardous materials.*

The Disaster Mitigation Act of 2000 (DMA2K) encourages local jurisdictions to address all likely hazards facing the community. Although FEMA does not typically fund mitigation efforts to address man-made threats, it is essential to consider all hazards to assure public health, safety and welfare. Man-made hazards considered in this plan include public violence (domestic civil unrest and international-based terrorism), hazardous materials, public health and infectious disease, and structure fires. Dam failure is addressed above in Section A with Flooding.

B.1 Civil Unrest and Terrorism

Several large-scale man-made disasters have highlighted the need to address technological hazards along with natural hazards. The 1995 destruction of the federal building in Oklahoma City and the 2001 World Trade Center and Pentagon attacks demonstrate the need to protect our citizens, in large cities and small.

FEMA's *Integrating Manmade Hazards Into Mitigation Planning* guide explains:

> *The term **"terrorism"** refers to intentional, criminal, malicious acts. There is no single, universally accepted definition of terrorism, and it can be interpreted in many ways. Officially, 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." (28 CFR, Section 0.85). The Federal Bureau of Investigation (FBI) further characterizes terrorism as*

either domestic or international, depending on the origin, base, and objectives of the terrorist organization; however, the origin of the terrorist or person causing the hazard is far less relevant to mitigation planning than the hazard itself and its consequences.
For the purposes of this guide, "terrorism" refers to the use of Weapons of Mass Destruction (WMD), including biological, chemical, nuclear, and radiological weapons; arson, incendiary explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases; and "cyberterrorism." Within these general categories, however, there are many variations. Particularly in the area of biological and chemical weapons, there are a wide variety of agents and ways for them to be disseminated.

Violence in public places can erupt anyplace, anytime. Specific hazards in this category may include:

- Conventional bomb/explosive devise
- Biological, chemical or radiological agent (see also Hazardous Materials hazard below)
- Arson/incendiary attack (see also Fire hazard above)
- Armed attack
- Cyber-terrorism
- Agri-terrorism

B.1.a Locations Affected by the Hazard

Public buildings and facilities, such as the Courthouse, schools and utilities, are potential targets for domestic or international terrorists. Agricultural chemical depots may also be targets. Isolated rural farmsteads may also be inviting staging grounds for terroristic groups or individuals, away from the watchful eye of law enforcement.

B.1.b Extent of the Hazard

Domestic Concerns

The MAHMP defines domestic terrorism as involving groups or individuals whose unlawful activities are directed at elements of our government or population without foreign direction. Domestic Preparedness focuses on mitigating these activities without foreign direction.

The US Department of Homeland Security (DHS) and the FBI classify domestic threats in four broad categories—special interest, rightwing, leftwing, and lone wolf. While current monitoring is typically classified at the Law Enforcement Sensitive (LES) level, the 2008 MAHMP noted that there are specific areas of concern within Minnesota. Two examples specifically cited in that plan (p.168):

- Both lone gunmen and small organized cells have planned and carried out attacks in public places, such as the school shootings at Red Lake (2005).
- Minnesota's growing migrant worker populations, including East African, South East Asian, and other ethnic groups, have numerous documented affiliations with criminal/gang-related activity. As well, the American Nazi Party has been active within the state.

The initial edition of the *Redwood County AHMP* considered the possibility of civil disturbance from sabotage and other incidences of domestic or international terrorism.

International Concerns

Threats from abroad are typically addressed at the federal level. The state Mitigation Plan defines international terrorism as involving groups or individuals whose terrorist activities are foreign-based and/or directed by countries or groups outside of the United States or whose activities transcend national boundaries. The state plan notes:

> *The local FBI Joint Terrorism Task Force (JTTF) is among the most active in the nation, addressing the issue of overseas financial transfers and groups such as Al Qaeda, Hizballah, Hamas, Al-Ittihad al-Islami and Islamic Jihad. These cases provide examples that the threat of terrorism warrants attention and consideration.*

Relationship to Other Hazards—Cascading Effects

The nature of domestic or international terrorism is inherently unpredictable. Cascading effects depend on the specifics of the event. Release of anthrax or other biological agents could lead to animal and crop disaster. Destruction of a dam could lead to flooding. Destruction of an industrial or farm chemical site could lead to a hazardous material crisis. Destruction of any structure would also likely lead to fires.

B.1.c Previous Occurrences of the Hazard

Redwood County has been fortunate not to have experienced many incidents that could be classified as civil unrest or terrorism. The All-Hazard Mitigation Planning Team identified no recent events within the county.

B.1.d Probability of Future Events of this Hazard

Given the uncertain nature of events of this type, the Redwood County All-Hazard Mitigation Planning Team judged the hazard from civil unrest as a likely future risk (10-100%), but terrorism as only an occasional risk to occur locally (1%-10% chance).

B.2 Hazardous Materials and Water Supply

Hazardous materials are found everywhere, from farm to home. A hazardous material is any item which has the potential to cause harm to humans, animals, or the environment, by itself or through interaction with other factors. Spilled material can be costly to clean up and may render the area of the spill unusable for an extended period of time. Water supplies become contaminated by the introduction of point and non-point source pollutants into public ground water and/or surface water supplies.

B.2.a Locations Affected by the Hazard

Hazardous materials may be present and passing along the county's highways at any time. As seen in table 1-4, the largest manufacturers in Redwood County are located in Redwood Falls and Wabasso. With two state highways and a railroad, the City of Redwood Falls expressed particular concern regarding hazardous materials in transit. While factories may be clustered in certain cities, but agricultural chemicals are distributed from the cities and used on farms. Methamphetamine has also been a particular concern in rural communities.

B.2.b Extent of the Hazard

Federal law defines certain hazardous chemicals, and requirements for emergency planning for facilities at which hazardous substances are present. According to the 2011 MAHMP, about 6,000 facilities across the state report under the Federal Emergency Planning and Community Right-To-Know Act to the Minnesota Department of Public Safety (DPS) and US Environmental Protection Agency (EPA).[12] As of 2010, Central Bi-Products, Daktronics and Schult Homes in Redwood Falls, Highwater Ethanol at Lamberton, and Jonti-Craft in Wabasso—all among the County's largest employers—reported chemical use to the EPA Toxic Release Inventory.

Chemicals

Chemicals used in manufacturing and agriculture (e.g. anhydrous ammonia) are a local concern, whether in fixed site storage or in transit by rail, truck or tractor. There are also hazards associated with the use of radiological materials and equipment at the hospitals, although the Planning Team does not consider these greater than typical.

Land use activities and farming practices can have significant impacts on vulnerable aquifers. The 2008 State hazard plan notes the threat:

> *The hazards come in the form of contamination [from] current industry and EPA Superfund projects, runoff with oil and other chemicals from paved surfaces, traces of pharmaceuticals found in waterways, topsoil*

[12] http://www.epcra.state.mn.us/

washed from farm fields and construction sites, and wastewater that was not thoroughly treated.[13]

Aquifers in the region are often shallow and have a high potential of contamination from nitrate leaching. Deeper aquifers may not be suitable for water supplies due to naturally occurring contaminants, such as sulfur, or because of slow well recharge. Nitrates have found to be a specific problem in the region.

Pipelines

The State Fire Marshall's Pipeline Safety Team (SFMPST) oversees pipeline operations in Minnesota. The National Pipeline Mapping System identifies two Northern Natural Gas Co pipeline that run through Redwood County. One enters from Yellow Medicine County near Belview and ends at Redwood Falls. The other enters from Brown County and tracks the DM&E west to Tracy in Lyon County.

Meth

Methamphetamine laboratories have posed problems to rural communities. Methamphetamine (commonly referred to as "meth") is a powerful stimulant drug that is similar to a family of drugs called amphetamines. According to the Rand Drug Policy Research Center, amphetamines are the most widely used illicit drug worldwide, after marijuana, and "regional data systems, law-enforcement agencies, and county hospitals indicate that meth is the most significant problem facing the populations they serve."

Meth is a synthetic or man-made drug. The drug is often manufactured in clandestine labs in locations including houses, apartments, motels, vehicles, or wooded areas. Recipes for meth are available on the internet. Meth production starts with over-the-counter medications that include pseudoephedrine or ephedrine in their contents and is often made using anhydrous ammonia. The hazardous chemicals used in meth production usually leave the manufacturing site uninhabitable with very expensive cleanup required by property owners or the public.

Response

Local response agencies maintain equipment for immediate action, and rely on state resources for HAZMAT assessment and cleanup. According to the HSEM website:

The Hazardous Materials Regional Response Team Program consists of ten Chemical Assessment Teams and four Emergency Response Teams

[13] Page 198.

under contract with the Department of Public Safety. The teams are strategically located throughout the state to provide an immediate response to hazardous materials emergencies threatening public safety. Chemical Assessment Teams assist local authorities by providing technical assistance, air monitoring and decontamination. Emergency Response Teams provide local authorities with spill mitigation assistance.
Local authorities may request a team response by contacting the Minnesota Duty Officer.

A Chemical Assessment Team is located in Marshall.

Relationship to Other Hazards—Cascading Effects

Hazardous materials incidents may occur in conjunction with or cause fires. Contamination of aquifers would make it more difficult to respond to drought. Hazardous materials facilities may also become a target for vandalism or terrorist activity.

B.2.c Previous Occurrences of the Hazard

Hazardous material incidents can occur in different locations:

- Fixed site facilities
- Highway and rail transportation
- Air transportation
- Pipeline transportation

Recent hazardous material events have been mostly limited to minor incidents. Two railroads cross the county, and hazardous materials may be traveling on roads through the area at any time. Local airports are limited to general aviation, but do host crop dusting and other hazardous materials. Marine transportation is not a concern in Southwest Minnesota. Recent changes in state law regulating the sale of ingredients used in the manufacture of methamphetamine has reduced incidents; however, meth labs are still a concern in the region.

Almost all water for public consumption in Southwest Minnesota is sourced from underground aquifers, rather than surface waters. Wellhead Protection Plans are in place to address threats to some public water supplies. As discussed above regarding the hazard from drought, MDH has worked with cities and rural water suppliers to develop these plans to protect vulnerable aquifers. Wellhead Protection activities prevent well contamination by managing potential contaminant sources in the land area that contributes water to the well.

There is often a direct flow relationship between surface waters and aquifers, especially shallow aquifers. The federal Clean Water Act requires states to adopt water-quality standards to protect these impaired waters from pollution.

B.2.d Probability of Future Events of this Hazard

The Redwood County All-Hazard Mitigation Planning Team identified hazardous materials events as likely risks in the county (10-100% chance in any year). Many aquifers are already polluted and further pollution is likely to occur if not carefully protected.

B.3 Public Health and Infectious Disease

Local government has been increasingly concerned with public health since the 19th century. Cities first installed public sewers to safely dispose of waste that threatened public health. Laws regulated building types and quality to assure light and fresh air, toilets and running water. Public health services today face new challenges to counter ever-evolving infectious disease.

The Minnesota Department of Health (MDH) works with DPS, the federal Centers for Disease Control (CDC) and other agencies to prepare for large-scale emergencies of many types. Infectious diseases can present wide threats to many people, or very narrow threats to highly susceptible populations. An "epidemic" is a disease that occurs suddenly in numbers clearly in excess of normally expected rates. A "pandemic" is an epidemic that spreads across a large region. The state mitigation plan notes:

> *If an epidemic event were to occur, deaths could be in the many hundreds of thousands across the nation. If the health of the general public is perceived to be threatened on a large scale, riots or states of lawlessness are a possibility.*

B.3.a Locations Affected by the Hazard

People throughout the county are potentially affected by this hazard.

B.3.b Extent of the Hazard

Many infectious diseases are preventable and controllable. Standard procedures involve collection of accurate assessment data, outbreak detection and investigation, and development of appropriate control strategies based on specific epidemiological data. These activities require close collaboration between health care providers, clinical laboratories, state and local health departments, and federal agencies.

Certain infectious diseases are considered more likely to present a public health emergency hazard in rural Minnesota.

Flu is an infection of the nose, throat and lungs caused by the Influenza virus, which comes in three distinct types (A, B and C). Influenza A typically occurs over the winter, and affects humans and many animal species. Influenza B occurs though out the year. Influenza C is less common. The flu is different from a cold—although they share some symptoms. Persons over the age of 65 years, people of any age with chronic medical conditions, and very young children are most likely to have complications from influenza infection.

Severe acute respiratory syndrome (SARS) is a viral respiratory illness that was recognized as a global threat in 2003. The illness usually begins with a high fever (greater than 100.4 degrees F). Other symptoms may include headache, an overall feeling of discomfort, body aches, and diarrhea. After 2-7 days, SARS patients may develop a dry, nonproductive cough and a majority of the patients develop pneumonia. SARS is caused by a previously unrecognized coronavirus, spread by close person-to-person contact, and is thought to be spread by respiratory droplets produced when an infected person coughs or sneezes. People are contagious when they have symptoms and most contagious when they develop a fever and cough.

While Bovine Tuberculosis (TB) is a concern for animals in any rural community (see agricultural disease above), human Tuberculosis also occurs periodically. According to the CDC, TB is a disease caused by a bacterium called *Mycobacterium tuberculosis*, which is spread through the air. The bacteria usually attack the lungs, but can attack any part of the body. TB can be fatal if not treated properly.

In 2002, West Nile Virus (an arboviral encephalitis) was identified in Minnesota for the first time. Mosquitoes transmit both Western Equine Encephalitis and West Nile viruses. Both diseases can cause debilitating encephalitis in people and horses.

Hepatitis is caused by a group of viruses (or certain toxins, infections and diseases) resulting in an inflammation of the liver. The disease may be acute or long-term, and may have serious symptoms (e.g. abdominal pain, fatigue, jaundice) or none at all. There are vaccines available.

Many vaccine-preventable diseases such as Measles, Rubella, Polio and Smallpox are no longer commonplace in the United States. Due to the threat of terrorism, there has been public concern and fear regarding Smallpox. Smallpox is a serious, contagious, and sometimes fatal infectious disease. The only prevention for Smallpox is vaccination. Variola major is the most severe and most common form of Smallpox, with an extensive rash and high fever.

Relationship to Other Hazards—Cascading Effects

A public health emergency will affect the ability to respond and recover from any other natural or technological hazard incident. Plans need to be in place to control the potential for civil disturbance in a severe public health event.

B.3.c Previous Occurrences of the Hazard

Aside from the 2009 H1N1 influenza outbreak, there have been no other major public health emergencies in Redwood County in recent years.

Influenza is a common seasonal occurrence. Influenza type A virus has caused three pandemics in the past century worldwide with significant loss of life. Pandemics occur because the type A influenza virus is very unstable, and new subtypes can appear through genetic drifts or shifting. Outbreaks of influenza in avian populations have increased with bird to human transmission occurring frequently. Currently, the only effective method of controlling avian influenza is the culling of affected animals.

In 2009, the US Centers for Disease Control and Prevention (CDC) tracked "H1N1 (sometimes called "swine flu")… a new influenza virus causing illness in people. This new virus was first detected in people in the United States in April 2009. This virus is spreading from person-to-person worldwide, probably in much the same way that regular seasonal influenza viruses spread." The MDH tracked early widespread influenza-like activity in Minnesota for 10 weeks starting in September 2009. Locally, Public Health provided public information and H1N1 vaccines.

A public health emergency has the potential to tax human infrastructure responsible for critical community services. Local government, businesses and organizations must plan for redundancy and succession of responsibility in response to any of the hazards in this plan, from a potential pandemic to a long blizzard that can keep people from their normal duties for an extended period of time.

B.3.d Probability of Future Events of this Hazard

People contract seasonal influenza every year. The Redwood County All-Hazard Mitigation Planning Team identified the risk for Public Health and Infectious Disease events as highly likely, as incidents such as the flu occur every year.

B.4 Structure Fires

The State Hazard Plan addresses "fires to property not considered wildfire" separately as Other Hazards, including structure fires (residential, public and mercantile, industrial) and vehicle fires. Wildfires are addressed in Section VI.A.4 above.

B.4.a Locations Affected by the Hazard

Structure and vehicle fires can occur in any community and pose a threat year-round. Fire protection is provided by volunteer firefighters in all area communities.

B.4.b Extent of the Hazard

Structure and vehicle fires are treated as technological (man-made) hazards by the State hazard plan. These types of non-wildfire incidents are classified by the State hazard plan into four broad types:

- Residential Structures
- Public and Mercantile Structures
- Industrial Structures
- Vehicles

Statewide, 75% of structure fires in Minnesota are residential fires. Almost half of structure fires are caused by cooking accidents (mostly from unattended cooking equipment), with heating accounting for 12% (mostly fireplace/ chimney), arson for 10% and open flames for 10% of structure fires. Careless smoking is the leading cause of fires in which people died. Smoke alarms were absent or non-operating in 1 of 4 fatal residential fires in the state.

The State Fire Marshall participates in Fire Prevention Week each October, and encourages local fire department participation.

B.4.c Previous Occurrences of the Hazard

As described in Section VI.A.4.c above, local fire departments report incidents to the Minnesota State Fire Marshall. All fire departments in Redwood County reported to the State Fire Marshall in 2010. There were no arsons (Incendiary Incidents), six burn injuries and 53 fire runs reported in the county with a total loss of $261,000. There have been five fire deaths in Redwood County over the past 25 years.

B.4.d Probability of Future Events of this Hazard

There are structure fires every year.

VII. Assessing Vulnerability: Overview

Requirement §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.

Hazards are a fact of life. They are going to occur. The All-Hazards Mitigation approach seeks to reduce the chances of hazards occurring, and when they do occur to minimize their effects on people and property. While we are all at some risk from hazards, through this process we can reduce our vulnerability to the effects of hazards.

This plan update separates the Vulnerability Assessment from the Hazard Inventory in this and following sections of this chapter, to better follow the outline of the FEMA guidance.

A. Summary of Vulnerability

The 2008 Minnesota All-Hazard Mitigation Plan (MAHMP) offers an explanation of the concept of vulnerability in the context of hazard mitigation:

> *Vulnerability is the extent to which something is damaged by a hazard. Value is how much something is worth. Although the concept may generate disagreement, it is possible to assign a value to many community "assets" including physical components such as buildings and infrastructure, functional ones such as government or business operations, and even injuries and casualties.*

The MAHMP includes a detailed risk assessment of the most likely hazards which also have the greatest potential for mitigation. The four such hazards in the 2011 edition of the MAHMP (p.197-202) included:

- Flood
- Tornado
- Windstorms (thunderstorms & straight-line winds)
- Wildfire

Figures from state-level analysis give a broad idea of local vulnerability to these hazards (see impacts below). Over $260,000 in fire-related losses were reported for the county in 2010, up from $141,000 the year before. The 2008 MAHMP calculated about $105,000 annual estimated loss from tornadoes, $141,000 from other windstorms, and over $127,000 from flooding each year. The 2011 MAHMP also noted over $650,000 total crop indemnity claims in Redwood County from 2000-2009.

A.1 Hazard Ranking Worksheets

As detailed in Section IV.A and B, as well as Section V.A above, the Redwood County All Hazard Mitigation Planning Team met to assess and update hazards using worksheets developed by the former Minnesota Planning agency. The Team reviewed hazards identified in the initial *Redwood County AHMP* and ranking of hazards by the original Task Force. That plan listed six High Rank hazards, 12 Moderate Rank hazards, and three Low Rank hazards.

For each updated hazard the Planning Team evaluated potential frequency, spatial extent, potential severity, risk level, and hazard rank, based on current events and federal guidance.

The Team considered locations throughout the entire county (except local flood hazard areas) at equal risk for each hazard; however, potential *impacts* of each hazard vary by the type of hazard as described in the individual hazard profile sections.

Results of the Planning Team's ranking are presented in Figure 4-6. Hazards were ranked for the entire county—one place is as likely to be struck by a blizzard, tornado, or public health emergency as any other. The one unique risk is flooding and dam failure which was considered for mapped floodplains and known dam locations.

As shown in the worksheet, frequency criteria included: Unlikely=<1% chance in the next 100 years, Occasional= 1% and 10% in the next year, Likely=between 10% and 100% in the next year, Highly Likely 100% chance. Extent: Minor=<10% area affected, Limited=10% to 25% area affected, Major=25% to 50% area affected, Substantial=>50% area affected.

The Planning Team considered the County's subjective Risk Level, based on data compiled, as typically minimal, limited, high, and very high. The overall Hazard Ranks were then set as Low, Moderate, and High based on the Team's evaluation of this plan's data, mitigation measures available and public input.

Agricultural Disease, Blizzards and Winter Storms, and Tornado and Straight-line Winds, as well as technological threats from Hazardous Materials were considered the highest rank hazards for Redwood County at this time.

Figure 4-6 Redwood County Hazard Identification Worksheet

Hazard	Potential Frequency	Spatial Extent	Potential Severity	Risk Level	Hazard Rank
NATURAL HAZARDS					
Agricultural Disease (Animal & Crop)	Highly Likely	Countywide	Major	High	**High**
Blizzards & Winter Storms	Highly Likely	Countywide	Major	Very High	**High**
Tornado / Straight-line Winds	Likely	Local	Substantial	Very High	**High**
Drought	Likely	Countywide	Substantial	High	Moderate
Flooding	Likely	Countywide	Major	High	Moderate
Land Subsidence	Occasional	Local	Major	Average	Moderate
Wildfire	Occasional	Local	Limited	Average	Moderate
Earthquake	Unlikely	Countywide	Limited	Limited	Low
Extreme Heat	Likely	Countywide	Limited	Average	Low
Hail	Likely	Local	Substantial	Average	Low
Lightning	Highly Likely	Local	Major	Average	Low
TECHNOLOGICAL HAZARDS					
Hazardous Materials	Highly Likely	Local	Major	High	**High**
Civil Unrest	Likely	Local	Minor	Average	Moderate
Fires (Structures)	Highly Likely	Local	Minor	Average	Moderate
Public Health / Infectious Disease	Highly Likely	Countywide	Major	Average	Moderate
Water Supply Contamination	Highly Likely	Countywide	Major	High	Moderate
Dam Failure	Occasional	Local	Major	Average	Low
Terrorism	Occasional	Local	Major	Average	Low
Hazard	**Potential Frequency**	**Spatial Extent**	**Potential Severity**	**Risk Level**	**Hazard Rank**

For Potential Frequency, *Unlikely* if <1% chance in the next 100 years, *Occasional* = 1% and 10% in next year, *Likely*=between 10% and 100% in next year, *Highly Likely*=100% in next year.
For Potential Severity, *Limited*=<10% area affected destroyed, *Minor*=10% to 25% area affected, *Major*=25% to 50% area affected, *Substantial*=>50% area affected.
Risk Level is subjective ranking by Task Force members based on previous categories.
SRDC, adapted from Minnesota Planning

B. Impacts of Hazards on the Community

The Redwood County All-Hazard Mitigation Planning Team considered the county and each participating jurisdiction at equal risk for all hazards, aside from the risk of flooding/dam failure. However, certain hazards are likely to cause greater lasting impacts to the community. Ag Disease and Drought, for example, have the potential to greatly impact the local economy, but neither typically poses a threat to buildings, infrastructure nor critical public facilities.

B.1 Natural Hazards

Because the unpredictable nature of natural hazards to which the jurisdictions are vulnerable (other than floods) make one area as vulnerable as any other area, all buildings and facilities are considered to have equal vulnerability to potential loss.

B.1.a Blizzards and Winter Storms

Severe winter weather is common in Minnesota and this is considered a High Rank hazard by the Planning Team. Winter storms have immediate impacts on local communities, including the potential for injuries, the need to clear snow and ice from public streets, to recover from utility failure, and to possibly provide emergency shelters for travelers and dislocated residents. Winter storms can also cause lost productivity and disruptions in the local workforce, with public and private employees unable to work regular hours.

The accumulated effects of winter storms and blizzard conditions also pose a risk to structures from snow load on roofs. Only the City of Redwood Falls has adopted the Building Code, so there are limited local provisions to enforce construction standards. Vulnerable structures can easily collapse under the weight of heavy snow and/or high winds.

Analysis of specific infrastructure and structure dollar-cost vulnerability is not possible since winter storms can (and do) impact any portion of the study area. Based on currently available data, modeling future losses would only be possible for total losses with excessive margins of error. Future storm events could be tracked specifically as they occur and used to model local vulnerability to winter storms in future updates.

Rural Electric Cooperative

Electric distribution infrastructure is highly vulnerable in the best of times in rural areas. Redwood Electric Cooperative (REC) provided information for this plan on their electrical distribution infrastructure. REC is a member owned rural electric distribution cooperative providing service to rural Redwood County, as well as portions of Brown and Lyon counties, with headquarters in Clements, MN. REC provides electric service to approximately 2,500 members of which over 90% reside in Redwood County.

Redwood Electric Cooperative was first organized in 1937. Much of REC's electrical distribution system was built in the 1930's and 1940's. Today REC has 958 miles of overhead electric distribution lines and 258 miles of underground. Approximately 94 percent of RECs overhead and underground distribution lines are in Redwood County.

The early Redwood system was constructed overhead using very long pole span lengths. The conductor used was primarily 6A or 8A copperweld. Some steel conductors along with some 3 #12 conductors were also installed during this period. Copperweld has steel that rusts and becomes brittle over time. Because of these conditions, these lines can break easily in storms. This results in a far greater likelihood of outages caused by downed power lines. REC has been replacing the older distribution system as part of its normal work plans. As of today approximately 294 miles of older overhead single lines remain in Redwood County. The cost of replacing this conductor is estimated to cost approximately $10.9 million.

Many of REC's wooden distribution poles will be reaching their end of life. REC has an annual pole testing program. Since the conductors are also reaching their end of life and are failing, most lines must be rebuilt. A majority of the lines will be replaced underground. REC's pole testing program is on a 10 year rotation; therefore approximately 1,500 poles are tested each year. Based on the results of the program over the past 5 years, an average of approximately 5% of poles tested are due for replacement. The cost to replace one pole on a single phase overhead distribution line is estimated to be $900 per pole. This does not include the cost of the wire and other hardware.

Plans and Programs

- Real-time weather monitoring stations can provide current temperatures, dew point, wind speed, wind direction, and barometric pressure.
- Wind chill warnings and advisories are issued by the National Weather Service according to local criteria.
- Soil & Water Conservation Districts (SWCD) and MnDOT have promoted natural snow fences to protect highways against drifting snow.
- The County Engineer and local cities work closely with MnDOT to improve the safety of transportation in all weather.
- Electric utility providers identify and clean up areas of the county and communities that are most likely to experience damage to power lines from falling tree limbs.

Gaps and Deficiencies

- The effective range of warning systems is limited. Weather radios could be more widely used.
- Local radio stations provide warnings, but many feature non-local satellite programming.
- Many local residents are resistant to zoning and building codes that could assure higher standards for new construction.
- Many people commute long distances to work, increasing exposure to winter weather hazards, especially ice and ice storms.
- There is limited federal/state funding for back-up power generators, which could provide redundant electrical supply.
- Individual homeowners should be encouraged to plan ahead for inevitable seasonal outages.

Existing Mitigation Efforts

Much work has already been completed by rural electric and municipal power utilities to harden electric utilities against winter storms. Redundancies in utility systems can further reduce outages resulting from storms.

Redwood Electric Cooperative received federal funding of $648,244 for disaster DR-1419.17 in 2004 for powerline conversion. Redwood SWCD received $9,101 in disaster DR-1175.36 in 1999 for living snow fences. One land owner, for example, planted 30 8-10' red cedar trees mixed with 200 smaller trees on a 30-year easement for a living snow fence along US 71, an arterial highway.

B.1.b Fires

The State Fire Marshall reports that there were $261,000 in fire-related losses reported in Redwood County in 2010, for $7,250 average dollar loss per fire. There were 6 burn injuries reported by hospitals, costing $6,348.

Plans and Programs

- Redwood County is served by local volunteer departments.
- Redwood County and some of the cities regulate the development of new building through zoning. The state electrical inspectors inspect commercial structures for potential fire hazards.
- Firefighters participate in mandatory fire fighting training classes offered by the State.
- Firefighters are offered the opportunity to participate in wildfire training classes offered by the Minnesota Department of Natural Resources-Forestry Department.
- The National Fire Protection Association (NFPA) Firewise program encourages local solutions for wildfire safety.

- Prescribed (or controlled) burns in the right locations (and in the right weather conditions) reduce fuel load, while also benefiting native prairie restoration.
- The County and cities can enact burning bans to decrease the potential for structure fires and wildfires.

Gaps and Deficiencies

- An increasing number of properties are used for recreation or conservation. Management plans providing maintenance of these properties (including cutting tall grass, thinning trees, prescribed burning, and removal of low-hanging branches around structures) can mitigate the risk of wildfire.

Existing Mitigation Measures

In a discussion on the future perspectives for fire mitigation, the 2008 MAHMP noted on page 174:

> *Funding for fire suppression and education for non-wildfire programs… do not normally come through FEMA. However, there may be a situation in the future where a water system needs protected or a special education program will be needed.*

B.1.c Flooding

As we saw in Section VI.A.5 above, flooding is mostly limited the broad Minnesota River, and limited areas along the Cottonwood and Redwood rivers. Even with three flooding-related disasters in two years, there has been little recent flood damage to inhabited structures.

The initial *Redwood County AHMP* assessed the risk of flooding in Redwood County. County staff used black and white GIS aerial imagery to identify general locations of about 43 structures in the regulated floodplain across the entire county. For this update, Redwood County Environmental Office staff queried their GIS for parcels intersecting the proposed dFIRM map, and found the digital floodplain touching at least part of 964 rural parcels. (Parcels have not been digitized within cities of Redwood County at this time.) Staff then queried building footprints (from LiDAR data produced by the State of Minnesota), and found that **only 25 rural parcels in the floodplain have structures, with a combined building value of approximately $1,489,800**. Staff notes that this is an overestimate of the value of those structures at risk, since it applies to all structures on those parcels, whether or not those buildings are in the regulated floodplain. Countywide, 83 structures and 24,218 acres appear to be located in the dFIRM floodplain (Table 4-5).

Table 4-5
Structures in Flood Hazard Area

Location	Number of Structures	Acres in SFHA
Rural Redwood County	65	23230
Redwood Falls	16	549
Sanborn	2	271
Other Cities	0	168
	83	24,218

Source: Redwood County, SRDC

Area II Minnesota River Basin Projects, Inc. is a local grant-in-aid organization which provides financial and technical assistance to member counties for the planning, design, and installation of floodwater retarding/retention projects. According to the BWSR website "Nine reservoirs have been constructed since 1978, with several providing multi-purpose functions as county park and recreation areas. Besides the larger structures, Area II has assisted with the installation of many road retention structures which serve as temporary reservoirs that 'meter' out the floodwaters at controllable velocities and volumes."

According to the *MAHMP*, Redwood County received $27,000 in federal and state flooding-related public assistance for federal Disaster #946, $870,000 for Disaster #993, $770,000 for Disaster #1175, and $412,000 for Disaster #1370.[14] The *MAHMP* also reported that the county experienced $5.9 million in agricultural losses from water-related insurance claims over 1994-2006.[15] This is slightly more than Murray County to the southwest and half as much as Renville County to the northeast. Overall, the *MAHMP* calculated Redwood County to have an Annual Estimated Public Assistance Loss from flooding of $127,693.[16]

Plans and Programs

- The county and identified cities have official FIRM maps identifying flood hazard areas. Local zoning ordinances can control permitted land uses in these areas, what can be built, and how. Land use permits in those cities should contain a check-box for property owners to indicate if a parcel is located in a mapped floodplain.
- FEMA's National Flood Insurance Program (NFIP) provides an option for local property owners to protect their structures in communities that participate.

[14] Minnesota All Hazard Mitigation Plan (2011) Appendix I
[15] *Minnesota All Hazard Mitigation Plan* (2008) Table 37
[16] *Minnesota All Hazard Mitigation Plan* (2008) Public Assistance Damage, Table 49

- On-site stormwater detention can slow runoff, slowing potential flash flood events and improving the quality of runoff.

Gaps and Deficiencies

- Many local residents are resistant to leaving stream-side property, even if it is located in a designated floodplain.
- Existing land use plans do not necessarily address flood plain protection.
- Local match for mitigation projects (such as acquisition of property) will likely become even more difficult to fund as local government assistance is further cut back.

Existing Mitigation Measures

In 2010, in response to DR-1900, FEMA's Environmental Planning and Historic Preservation program worked with the Redwood County Highway Engineer and Minnesota Historical Society to stabilize the historic Ramsey Park Swayback Bridge (Section VI.A.5.a). FEMA and the historical society posted a locally-produced video of the project on YouTube.[17] While funds were committed for rehabilitation, unfortunately two more flood-related disasters (DR-1941, DR-1982) caused further damage and delays in restoration of the structure. The County and the City of Redwood Falls have been working with the State Historic Preservation Officer (SHPO) and developing an application for Minnesota Legacy funding.

The City of Redwood Falls is also working with FEMA and DNR in response to these disasters to purchase a flood-prone building in Old North Redwood from a willing seller. The project cost is estimated at approximately $54,000 and will make room for future flood-preparation efforts.

B.1.d Tornado and Straight-line Winds / Severe Summer Storms

Severe wind events cause impacts from the minor debris to structural failure and full-scale devastation. Residents and travelers must be warned of impending danger immediately before and during a Tornado or severe Straight-line Wind event. Local units of government in many places provide safe rooms in emergency shelters for travelers and dislocated residents.

Severe summer storms also put great stress on utilities and structures. Lightning can cause fires and personal injury, even death. While hail can certainly damage buildings the greater impact is felt locally from damage to agricultural crops. In addition to direct damage, the community is vulnerable to cascading effects such as fires, storm-related flash floods, hazardous materials

[17] http://www.youtube.com/watch?v=tqD557QiLec accessed most recently 20 October 2011

incidents, and infrastructure failure (particularly utility failure). Clean-up from a severe wind event will impact community resources including solid waste disposal.

The 1 July 2011 severe storms and tornadoes illustrated this point. As described in Section VI.A.7.c above, sustained winds in excess of 80 mph caused wide-spread impacts to buildings and trees in addition to tornado damage. The City of Redwood Falls alone incurred over $230,000 in FEMA-reimbursable costs (including municipal utilities). The true cost to the City is much higher given staff's regular work time dedicated to response, recovery and evaluation of mitigation projects.

The 2008 *MAHMP* calculated a 0.4035 annual probability of a Tornado in Redwood County, with an average of more than $262,000 damage per event.[18] The State plan calculated a 1.5 annual probability of a Windstorm event, with $93,000 damage per event.[19]

Plans and Programs

- The severe storm spotters network, sponsored by the National Weather Services (NWS), enlists the help of trained volunteers to spot severe storm conditions and report this information to the NWS. No tornado warnings are given unless the storm has been spotted by someone or is confirmed by NWS radar reports.
- Most of the county's cities have emergency sirens that can be activated to warn residents in the event of a tornado. NOAA's Public Alert weather radios provide warnings indoors.
- Heat advisories are issued by the National Weather Service when the heat index exceeds 95 degrees and the relative humidity is at least 50 percent.
- Wastewater treatment plants are required to test discharges after major rains events to determine whether or not discharges meet PCA guidelines for acceptable levels of waste.

Gaps and Deficiencies

- The effective range of warning systems is limited. Weather radios should be more widely used. Local radio stations provide warnings, but increasingly feature non-local satellite programming.
- Many local emergency siren systems must be replaced soon as they wear out and technology standards improve.
- Local match for construction projects (such as safe rooms) will likely be even more difficult to fund as local government assistance is further cut back.

[18] *Minnesota All Hazard Mitigation Plan* (2008) Table 40
[19] *Minnesota All Hazard Mitigation Plan* (2008) Table 43

- Many local residents are resistant to zoning and building codes that could assure higher standards for new construction.
- The City of Redwood Falls estimates it would cost approximately $384,000 for the municipal utility to bury electric distribution lines in neighborhoods hardest hit by the July 2011 storms.

Existing Mitigation Measures

Redwood Electric Cooperative's electrical overhead distribution is very vulnerable to the weather. In the past 15 years very few extreme storms have impacted Redwood County, until this summer. The severe storm on 1 July 2011 damaged over a third of REC's electric lines. The estimated cost to repair the electrical distribution system to pre storm conditions is estimated at $500,000.

Approximately 10 years ago, REC applied for and received funding from FEMA for mitigation (B1a above). The FEMA mitigation project included converting the City of Lucan to underground lines and was completed in 2005. The City of Lucan was impacted by the July 1st 2011 storm. It is estimated the mitigation project may have saved between $150 to $200 thousand dollars in the City of Lucan in this storm alone.

B.2 Technological Hazards

Human-caused hazards under consideration here tend to pose a risk to individuals and groups of people. Public Health Emergencies, by their very nature, are focused on people. Perpetrators of domestic or international terrorism incidents may target any public or private structure in the county. Hazardous Materials (including methamphetamine) pose a danger to any buildings and transportation routes used in their manufacture, use or transportation.

More detailed analysis of vulnerability to man-made disasters should be undertaken if technological hazards are included in future updates to this plan.

B.2.a Plans and Programs

- The County Emergency Operations Plan is the go-to source for responding to both natural and man-made hazards. The County and each city should constantly monitor updates for the EOP.
- County Emergency Management works closely with Public Health to mitigate and effectively respond to potential public health emergencies.
- The City of Seaforth has worked with USDA-RD and University of Minnesota Extension to develop options to replace failing individual subsurface sewage treatment systems (SSTS).

B.2.b Gaps and Deficiencies

- The County is currently in the process of updating radio equipment and networks to be compliant with federal regulations.
- An aging population puts the county at greater risk of Public Health Emergencies. As more citizens dependent on life-support are living in their own homes rather than care facilities, they may be vulnerable to utility outages.
- Emergency responders are in need of specialized equipment to deal with hazardous materials. This equipment is often expensive, single use items.
- Hazardous materials and other pollution in watersheds can directly influence water quality of well recharge areas.

VIII. Assessing Vulnerability: Addressing Repetitive Loss Properties

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.

Repetitive loss properties are defined by FEMA as having two or more losses of at least $1,000 each paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978. A Severe Repetitive Loss (SRL) property is defined by FEMA as a residential property covered under NFIP that has at least four NFIP claim payments over $5,000 each and the cumulative amount of such claims exceeds $20,000. An SRL property may also be one for which at least two separate NFIP payments have been made with the cumulative amount of the building portion of these claims exceeding the market value of the building.

As of June 2011, there were no **repetitive loss properties** identified in the county.

IX. Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): 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 … .

The initial edition of the *All-Hazard Mitigation Plan* focused on getting the hazard mitigation approach off the ground in the participating jurisdictions. This update has focused on aligning the risk assessment in this chapter with current FEMA guidance. Future updates should perform additional data collection and analysis to identify vulnerable structures in greater detail. An analysis should also be done on future planned buildings, infrastructure and critical facilities.

A. Existing Critical Facilities

No particular critical facilities in Redwood County are uniquely at risk from identified hazards. The specific number of bridges in the county located in a designated flood plain is unknown. (Table 4-6). Section I.C.4 above includes brief profiles of local utility and public service providers. There are no current plans for new or expanded critical facilities.

Special consideration may be necessary in time of disasters for historic and locally significant structures and places, such as the Swayback Bridge (Section VI.A.5.c, VII.B.1.c). Several locations in the county are listed on the National Register of Historic Places (Table 4-7).

Table 4-6
Asessing Critical Facilities in Redwood County
HSEM Required Data

Name or Description of Asset	Critical Facilities	In Flood Plain
Court House	1	0
County Offices	6	0
City Offices	15	0
Police Stations	4	0
Fire Stations	13	0
Hospitals	1	0
Long-term Care Facilites	9	0
Schools	11	0
Colleges	0	n/a
Community Centers	8	0
Emergency Operations Centers	0	0
Bridges	291	unknown
Transportation Dept. Facilites	1	0
Public Works Facilities	16	0
Emergency Shelter	0	n/a

Source: Redwood County, SRDC

Table 4-7
National Register of Historic Places

Location		Building Date	Style	Architect/Builder
Belview	Land and Loan Office	1892	Vernacular	A.O. Gimmestad
Belview	Minneapolis and St. Louis Depot	1892	Railroad	MSL RR
Belview	Odeon Theater	1901	Queen Anne	A. Pottratz
Clements	Clements State Bank	1902	Commercial Queen Anne	
Delhi	Delhi Coronet Band Hall	1896	Vernacular	
Lamberton	City Blacksmith Shop	1898	Commercial Vernacular	
Lamberton	J.A. Anderson House	1900	Queen Anne	Andrew Anderson
Lower Sioux	Saint Cornelia's Episcopal Church	1890	Gothic Revival	
Lower Sioux	Birch Coulee School	1891	Vernacular	R.B. Henton
Lucan	Chicago Northwestern Depot	1902	Railroad	CNW RR
Milroy	Milroy State Bank	1902	Commercial Queen Anne	
New Avon Twp	District No. 8 School	1908	Vernacular	
Paxton Twp	Gilfillan	1882	Vernacular	
Redwood Falls	Honner-Hosken House	1872	Vernacular	
Redwood Falls	Henry D. Chollar House	1878	Italianate	
Redwood Falls	Bank of Redwood Falls	1885	Richardsonian Romanesque	
Redwood Falls	Redwood Falls Carnegie Library	1904	Classical Revival	Rockey, Church & Pass
Redwood Falls	Scenic City Cooperative Oil Co.	1925	Vernacular	Artstone Co.
Redwood Falls	Ramsey Park Swayback Bridge	1938	Stone	Works Progress Admin
Revere	Revere Fire Hall	1900	Vernacular	
Sherman Twp	Lower Sioux Agency	1861	Stone	
Wabasso	Commercial Hotel	1901	Vernacular	Thomas Walton
Walnut Grove	Walnut Grove Cooperative Creamery	1930	Vernacular	Edward Albert Schutt

Source: MN Historical Society

X. Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate … .

In Section VII above this plan discussed vulnerability of the county to hazards in general terms. It can be useful to describe vulnerability in terms of dollar losses, to provide a common framework for local, State and Federal agencies to measure the risk of hazards to structures.

A. Structures Vulnerable to Natural Hazards

To better understand local risks, the All Hazard Mitigation Planning Team took a closer look at two natural hazards, tornadoes and flooding. The results of this analysis are presented below. Future updates of this plan should carefully consider the need to collect additional data to enable a full range of monetary estimates of potential losses from hazard events. This would include structure, contents and function losses to present a full picture of the potential total loss for each asset.

A.1 Tornado Hazard Analysis

The wind blows in Southwest Minnesota, making this area prime territory for development of wind energy conversion systems. The region is also, as we saw in Section VI.A.7 of this chapter, vulnerable to tornado and straight-line wind events.

Large tornadoes have left paths of destruction ¼-mile wide or wider, which on the right course would destroy most if not all of any one of the cities in this county. The National Weather Service has suggested that vulnerability of small towns in rural Minnesota to an EF4 or EF5 scale tornado might be estimated by looking at the recent experience of Greensburg, Kansas (population 1,500). Approximately 95% of that city was destroyed in 2007.

The County Assessor supplied the estimated market value for improved parcels by type of occupancy in each city in the county, based on available information. If we assume a 90% destruction rate from an EF4 or EF5 tornado event, we see in Table 4-8 (below) the potential for extreme amounts of damage in each city.

Figure 4-7 Severe Storm Damage, July 2011

St. John Lutheran Church, Vesta, Source: Troy Krause © Redwood Falls Gazette used with permission

Table 4-8

Potential Structure Vulnerability to F4/F5 Tornado Events

Estimated Market Value 2011

	No. Parcels w/ Structures	Value of Structures	At-Risk Structures	Value
City of Belview				
Agricultural	1	$ 1,800	1	$ 1,620
Commercial	19	$ 450,400	17	$ 405,360
Exempt/Non-Profit	15	$ 3,823,400	14	$ 3,441,060
Industrial	1	$ 6,700	1	$ 6,030
Residential	154	$ 5,400,200	139	$ 4,860,180
Vulnerable Structures	**190**	**$ 9,682,500**	**171**	**$ 8,714,250**
City of Clements				
Agricultural	4	$ 98,000	4	$ 88,200
Commercial	20	$ 513,200	18	$ 461,880
Exempt/Non-Profit	11	$ 350,400	10	$ 315,360
Industrial	5	$ 246,600	5	$ 221,940
Residential	89	$ 3,500,500	80	$ 3,150,450
Vulnerable Structures	**129**	**$ 4,708,700**	**116**	**$ 4,237,830**
City of Delhi				
Agricultural	1	$ 82,600	1	$ 74,340
Commercial	4	$ 28,500	4	$ 25,650
Exempt/Non-Profit	5	$ 63,000	5	$ 56,700
Industrial	1	$ 1,369,300	1	$ 1,232,370
Residential	42	$ 1,096,800	38	$ 987,120
Vulnerable Structures	**53**	**$ 2,640,200**	**48**	**$ 2,376,180**
City of Lamberton				
Agricultural	1	$ 1,600	1	$ 1,440
Commercial	61	$ 2,253,500	55	$ 2,028,150
Exempt/Non-Profit	20	$ 9,766,900	18	$ 8,790,210
Industrial	3	$ 4,163,600	3	$ 3,747,240
Residential	378	$ 18,416,700	340	$ 16,575,030
Vulnerable Structures	**463**	**$ 34,602,300**	**417**	**$ 31,142,070**
City of Lucan				
Agricultural	3	$ 95,300	3	$ 85,770
Commercial	12	$ 369,000	11	$ 332,100
Exempt/Non-Profit	12	$ 1,521,900	11	$ 1,369,710
Industrial	3	$ 119,300	3	$ 107,370
Residential	103	$ 4,093,600	93	$ 3,684,240
Vulnerable Structures	**133**	**$ 6,199,100**	**120**	**$ 5,579,190**
City of Milroy				
Agricultural	0		0	$ -
Commercial	19	$ 393,800	17	$ 354,420
Exempt/Non-Profit	18	$ 3,164,200	16	$ 2,847,780
Industrial	5	$ 989,300	5	$ 890,370
Residential	117	$ 6,672,800	105	$ 6,005,520
Vulnerable Structures	**159**	**$ 11,220,100**	**143**	**$ 10,098,090**
City of Morgan				
Agricultural	0	$ -	0	$ -
Commercial	53	$ 1,961,300	48	$ 1,765,170
Exempt/Non-Profit	20	$ 12,661,100	18	$ 11,394,990
Industrial	5	$ 1,417,700	5	$ 1,275,930
Residential	380	$ 20,299,000	342	$ 18,269,100
Vulnerable Structures	**458**	**$ 36,339,100**	**412**	**$ 32,705,190**
City of Redwood Falls				
Agricultural	9	$ 1,028,600	8	$ 925,740
Commercial	252	$ 28,462,700	227	$ 25,616,430
Exempt/Non-Profit	113	$ 96,782,300	102	$ 87,104,070
Industrial	9	$ 3,057,200	8	$ 2,751,480
Residential	1998	$ 164,924,100	1798	$ 148,431,690
Vulnerable Structures	**2381**	**$ 294,254,900**	**2143**	**$ 264,829,410**

	No. Parcels w/ Structures	Value of Structures	At-Risk Structures	Value
City of Revere				
Agricultural	4	$ 176,400	4	$ 158,760
Commercial	10	$ 118,300	9	$ 106,470
Exempt/Non-Profit	3	$ 202,200	3	$ 181,980
Industrial	1	$ 141,600	1	$ 127,440
Residential	48	$ 824,000	43	$ 741,600
Vulnerable Structures	**66**	**$ 1,462,500**	**59**	**$ 1,316,250**
City of Sanborn				
Agricultural	5	$ 40,100	5	$ 36,090
Commercial	42	$ 695,900	38	$ 626,310
Exempt/Non-Profit	13	$ 574,900	12	$ 517,410
Industrial	6	$ 1,741,400	5	$ 1,567,260
Residential	194	$ 7,046,300	175	$ 6,341,670
Vulnerable Structures	**260**	**$ 10,098,600**	**234**	**$ 9,088,740**
City of Seaforth				
Agricultural	8	$ 143,500	7	$ 129,150
Commercial	5	$ 30,500	5	$ 27,450
Exempt/Non-Profit	4	$ 424,600	4	$ 382,140
Industrial	0	$ -	0	$ -
Residential	52	$ 1,065,500	47	$ 958,950
Vulnerable Structures	**69**	**$ 1,664,100**	**62**	**$ 1,497,690**
City of Vesta				
Agricultural	1	$ 72,000	1	$ 64,800
Commercial	24	$ 472,900	22	$ 425,610
Exempt/Non-Profit	13	$ 486,400	12	$ 437,760
Industrial	3	$ 1,128,400	3	$ 1,015,560
Residential	143	$ 5,686,000	129	$ 5,117,400
Vulnerable Structures	**184**	**$ 7,845,700**	**166**	**$ 7,061,130**
City of Wabasso				
Agricultural	2	$ 149,200	2	$ 134,280
Commercial	51	$ 3,671,300	46	$ 3,304,170
Exempt/Non-Profit	19	$ 6,752,100	17	$ 6,076,890
Industrial	5	$ 1,675,500	5	$ 1,507,950
Residential	270	$ 17,293,600	243	$ 15,564,240
Vulnerable Structures	**347**	**$ 29,541,700**	**312**	**$ 26,587,530**
City of Walnut Grove				
Agricultural	6	$ 89,600	5	$ 80,640
Commercial	46	$ 994,000	41	$ 894,600
Exempt/Non-Profit	25	$ 4,202,200	23	$ 3,781,980
Industrial	3	$ 5,406,100	3	$ 4,865,490
Residential	312	$ 11,563,400	281	$ 10,407,060
Vulnerable Structures	**392**	**$ 22,255,300**	**353**	**$ 20,029,770**
City of Wanda				
Agricultural	1	$ 500	1	$ 450
Commercial	16	$ 360,300	14	$ 324,270
Exempt/Non-Profit	6	$ 662,400	5	$ 596,160
Industrial	0	$ -	0	$ -
Residential	45	$ 1,150,400	41	$ 1,035,360
Vulnerable Structures	**68**	**$ 2,173,600**	**61**	**$ 1,956,240**

* Assuming a 90% destruction rate per National Weather Service

Source: Redwood County Assessor

A.2 Flood Hazard Analysis

Through FEMA funding of Murray County's AHMP update (at the same time as this update), SRDC acquired FEMA's HAZUS-MH extension for ArcGIS. HAZUS is a regional multi-hazard loss estimation model developed by FEMA and the National Institute of Building Sciences (NIBS). While analysis is conducted at the Census Tract and Census Block level, according to the documentation the primary purpose of HAZUS is to develop multi-hazard losses at a regional scale.

SRDC applied a **Level 1 Flood Hazard analysis** to the county—an "out-of-the-box" approach with data supplied by FEMA and the US Geological Survey (USGS, see Addendum F for the complete report). A stream network was developed for basins greater than 10 square miles, and a Countywide Scenario generated for a typical 100-year return flood event (1% chance flood). HAZUS found potential building exposure of over 11,800 buildings in the county with a replacement value of $1.2 billion. Two thirds of the building value is residential occupancy.

At this scale, the model estimated that 15 residential buildings in the county would be at least moderately damaged. The model estimated that 1,767 tons of debris would be generated, requiring 71 truckloads to remove. About 157 households would be displaced, with 123 people seeking temporary shelter in public shelters. The total economic loss was estimated at $17.4 million, with building-related losses of $16.7 million (Table 4-9).

Table 4-9
HAZUS Countywide Building-Related Economic Loss Estimates
Scenerio: 100-year Return Period Flood Event, Redwood County

	(Millions of dollars)				
Category	Residential	Commercial	Industrial	Others	Total
Building Loss					
Building	4.95	0.75	0.10	1.06	6.85
Content	3.20	1.94	0.14	4.33	9.61
Inventory	0.00	0.03	0.03	0.21	0.26
Subtotal	**8.15**	**2.72**	**0.27**	**5.59**	**16.73**
Business Interuption					
Income	0.00	0.01	0.00	0.02	0.03
Relocation	0.00	0.00	0.00	0.00	0.01
Rental Income	0.00	0.00	0.00	0.00	0.00
Wage	0.00	0.02	0.00	0.16	0.17
Subtotal	**0.01**	**0.03**	**0.00**	**0.18**	**0.21**
ALL Total	**8.16**	**2.74**	**0.27**	**5.77**	**16.94**

Source: HAZUS-MH Flood Event Summary Report, 10 sqmi Basins Run 29May2010

The Polis Center at Indiana University and the University of Minnesota-Duluth also performed HAZUS Flood Hazard analysis for Minnesota HSEM updating database information for general building stock and building valuations.[20] The Polis model estimated only 9 buildings damaged in a 100-year flood event with $11 million in total economic losses, including building-related losses of $5.7 million.

The Level 1 HAZUS-generated 100-year return period polygon was compared visually with the Q3 and dFIRM floodplain maps in ArcMap GIS. HAZUS identifies certain areas at risk that are not covered by the FIRMs. Other areas covered by the FIRMs are not identified by HAZUS. HAZUS uses Census Blocks as the basis for analysis, which may indicate more property at risk in rural areas since Census Blocks are often much larger outside a city grid. Although not a major issue in Redwood County, the Polis analysis points out that HAZUS is based on riverine flooding rather than lake-based floodplains, a major shortcoming in the Land of 10,000 Lakes. As well, at the Level 1 analysis, the model relies on pre-development landscapes which may have been substantially altered over time.

Inconsistencies in results may also be due to limitations of the elevation dataset. Where HAZUS (at a Level 1 analysis) utilizes national-scale elevation data from USGS, new LiDAR-based elevation data recently developed in Minnesota could improve results. There are some other concerns with using the national-scale data provided with HAZUS. As with any model, HAZUS produces an approximation of the "real world". The software is intended to be a tool for regional analysis, and needs additional time and effort to be used at a city or township-scale. Even so, local jurisdictions should more closely consider flood hazard risks in areas identified by HAZUS to better understand vulnerability and potential losses. Future updates should provide for local data collection to support further refinement, preferably a Level 2 HAZUS analysis.

[20] *MAHMP* Addendum F.

XI. Assessing Vulnerability: Analyzing Development Trends

Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] 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.

A. Land Uses and Development Trends

Redwood County is located in Southwest Minnesota. The region has a strong agricultural economy, with a vital manufacturing component. The County's current population of 16,059 is 4.5% lower than the 2000 population. As we say in Section I.C, while the County's overall population has contracted, population inside municipalities has remained relatively stable since 1950. The population in unincorporated townships has declined generally due to farm consolidation, smaller family sizes and an aging demographic.

The *Redwood County Comprehensive Plan* (2007) assumed Redwood County's population would grow by about 4% from 2000-2030. The Comprehensive Plan projected the greatest growth in the cities of Clements, Redwood Falls, Vesta, Wabasso and Walnut Grove, as well as Paxton and Sherman Townships between Redwood Falls and Morton. Key themes identified in that plan include:

- A consensus that traditional agriculture is and, for the foreseeable future, will be the main economic (and social) driver in the county.
- Recognition that, high capital cost requirements mean "newcomers" will not be able to afford to become traditional farmers; opportunities should be developed for non-traditional agriculture.
- Tourism-based enterprises are needed to diversify the economy; this requires protecting the natural environment, in particular along the Minnesota River Valley and CSAH 24 between Redwood Falls and Lower Sioux Community.

Redwood County and the cities of Redwood Falls and Walnut Grove have comprehensive plans to guide future development. Redwood County and the cities of Lamberton, Milroy, Morgan, Redwood Falls and Walnut Grove have at least a basic zoning ordinance, which can protect property from future development in hazard areas. Redwood Falls is the only jurisdiction in Redwood County to have adopted the State Building Code.

The growing number of wind energy conversion systems (WECS) or "wind farms" poses special challenges for public safety, in particular for emergency medical services and fire fighting in tall wind turbines. According to local wind turbine technicians, the most common problem for turbine failure is lightening. However, ice storms can cause ice accumulation on turbine blades. Potential hazards from this "ice throw" can be mitigated by allowing sufficient setbacks from roads and structures.

XII. Multi-Jurisdictional Risk Analysis

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

A. Risk Assessment for Participating Jurisdictions

The Redwood County All-Hazard Mitigation Planning Team's consensus was that risks of identified hazards do not vary significantly across the planning area, with the exception of flooding. However, some hazards are more likely to affect the entire county at one time, and others are more likely to have localized affects.

Section V of this chapter identifies hazards that pose a risk to jurisdictions in Redwood County. Locations at risk are identified in Section VI. Section VII above assesses vulnerability of local jurisdictions to these hazards.

For Redwood County overall, the highest rank natural hazards were: Agricultural Disease, Blizzards and Winter Storms, and Tornado and Straight-line Winds. The highest rank technological hazards county-wide was the risk from Hazardous Materials. The City of Redwood Falls noted a specific concern with potential vehicle spills of hazardous materials.

Representatives of cities were also asked to rank priority hazards where their cities varied from the county-wide consensus (Figure below). At the conclusion of the plan process, the County Emergency Management Director re-confirmed these rankings with staff and/or elected officials of each and every city in the county.

Figure 4-8 City Hazard Ranking

	City of Belview	City of Clements	City of Delhi	City of Lamberton	City of Lucan
1	Tornado/Straight-line Wind	Ag Disease	Blizzards/Winter Storms	Ag Disease	Ag Disease
2	Blizzards/Winter Storms	Blizzards/Winter Storms	Tornado/Straight-line Wind	Blizzards/Winter Storms	Blizzards/Winter Storms
3	Hazardous Materials	Tornado/Straight-line Wind	Hazardous Materials	Tornado/Straight-line Wind	Tornado/Straight-line Wind
4	Water Supply	Hazardous Materials	Public Health	Hazardous Materials	Hazardous Materials
5			Structure Fires		

	City of Milroy	City of Morgan	City of Redwood Falls	City of Revere	City of Sanborn
1	Ag Disease	Ag Disease	Blizzards/Winter Storms	Ag Disease	Ag Disease
2	Blizzards/Winter Storms	Blizzards/Winter Storms	Tornado/Straight-line Wind	Blizzards/Winter Storms	Blizzards/Winter Storms
3	Tornado/Straight-line Wind	Tornado/Straight-line Wind	Flooding	Tornado/Straight-line Wind	Tornado/Straight-line Wind
4	Hazardous Materials	Hazardous Materials	Hazardous Materials	Hazardous Materials	Hazardous Materials
5			Structure Fires		
6			Water Supply		
7			Dam Failure		

	City of Seaforth	City of Vesta	City of Wabasso	City of Walnut Grove	City of Wanda
1	Blizzards/Winter Storms	Ag Disease	Ag Disease	Blizzards/Winter Storms	Tornado/Straight-line Wind
2	Tornado/Straight-line Wind	Blizzards/Winter Storms	Blizzards/Winter Storms	Tornado/Straight-line Wind	Blizzards/Winter Storms
3	Public Health	Tornado/Straight-line Wind	Tornado/Straight-line Wind	Hazardous Materials	Water Supply
4	Water Supply	Hazardous Materials	Hazardous Materials	Public Health	Hazardous Materials
5	Wildfire			Water Supply	Public Health

CHAPTER 5: MITIGATION STRATEGY

This Chapter documents goals, objectives and mitigation strategies that the All-Hazard Mitigation Planning Team developed through the all-hazard mitigation planning process. Section XIII describes mitigation goals and objectives. Section XIV describes the comprehensive range of specific mitigation actions identified. Section XV addresses NFIP compliance. Section XVI describes implementation of mitigation actions. Section XVII addresses the multi-jurisdictional nature of mitigation actions.

XIII. Local Hazard Mitigation Goals

Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

A. Description of Mitigation Goals and Objectives

Hazard mitigation is intended to protect our communities by reducing or eliminating long-term risk to people and property before a disaster strikes. Emergency management involves a cycle through which communities prepare, respond and recover from emergencies and disasters.

In selecting local mitigation goals, the Redwood County All-Hazard Mitigation Planning Team considered the overall goal of this planning process (Chapter 3, Section IV.B): *… to identify effective mitigation efforts through education and proper planning.*

Goals are general guidelines that explain what local jurisdictions in the county want to achieve. Objectives define strategies or implementation steps for each participating jurisdiction to achieve those goals.

The original Redwood County All Hazard Planning Task Force developed goals, objectives and mitigation strategies for Redwood County and all local participants in the initial *Redwood County AHMP*. Each community and township was asked to identify areas, goals and strategies that they had in common, or to identify their own goals, objectives and mitigation projects.

For the plan update, all local units of government in Redwood County were invited to review and comment on mitigation goals, objectives and strategies in the existing AHMP. Communities not represented in person were provided information individually. Goals and objectives were revised and developed to address the hazards and guidance now current.

Proposed strategies are listed in the next section, each classified by type, with local partners likely to be involved in implementation.

It should be noted that not every hazard identified within the risk assessment has a goal outlined below. Goals were combined for certain hazards with similar mitigation measures. For example, severe summer storms and tornados both require similar awareness, prevention and structural measures. The main benefit of the actions listed is the improved health, safety and

welfare of the community and residents. The highest ranking hazards are listed first, followed by moderate rank hazards and finally low rank hazards.

As the communities in the county achieve the outlined objectives, new objectives and implementation strategies will be identified in future All Hazard Planning updates.

A.1 High Rank Hazards

A.1.a Hazard: Agricultural Disease (Animal & Crop)

Goal: Reduce risks to agriculture / amenities from disease and pests.

Objectives:

- Public is informed on animal/crop diseases and pests/insects prevalent in the region.

A.1.b Hazard: Severe Storms, including: Blizzards/Winter Storms, Tornado/Straight-line Winds, Extreme Heat, Hail, Lightning & Earthquakes

Goal: People and county facilities are safe from the impacts of severe weather and other natural hazards.

Objectives:

- Educated county residents who understand the importance of and need for an adequate supply of safety shelters.
- Staff at schools and care facilities is trained for severe weather emergency response.
- County citizens are better notified of current weather conditions.
- Adequately protected critical facilities, with hardened utilities and backup power in case of utility failure.

A.1.c Hazard: Hazardous Materials / Water Supply

Goal: Effectively prepare for and respond to hazardous material spills and contamination.

Objectives:

- Ability to map potential disaster area within the county.
- Identify types of hazardous materials traveling through the County and obtain more information on these substances.
- Proper disposal of hazardous waste within the County.
- An emergency supply of drinking water is available in case of emergencies.

A.2 Moderate Rank Natural Hazards

A.2.a Hazard: Drought

Goal: Minimize the negative impacts of drought conditions.

Objectives:

- Communities develop and maintain wellhead protection plans.
- Conserve water.
- Ground water supplies are sufficient to meet demands.

A.2.b Hazard: Flooding, including Dam Failure & Land Subsidence

Goal: Minimize negative impacts resulting from flood events.

Objectives:

- Future development is located outside of identified 100-year flood plains.
- Property is protected from flooding and land subsidence.

A.2.c Hazard: Wildfire

Goal: Minimize threats of wildfire.

Objectives:

- Land managers and fire departments are fully trained on wildfire.
- Reduced potential fuel sources.
- Partnerships in place between landowners to establish fire breaks.

A.3 Moderate Rank Technological Hazards

A.3.a Hazard: Civil Unrest/Terrorism

Goal: Prevent civil disturbance and protect critical infrastructure from attack.

Objectives:

- Communities are prepared for “most likely” events.
- New facility construction is responsive to potential terrorist activity, where appropriate.

A.3.b Hazard: Structure Fires

Goal: Eliminate or lessen negative impacts from structure or vehicle fire.

Objectives:

- Safer commercial and industrial structures with easy access for fighting fires.
- Increase fire prevention and safety for residential units throughout the County.

A.3.c Hazard: Public Health Infectious Disease

Goal: Reduce the threat of infectious diseases through education and awareness.

Objectives:

- Better coordination with local media in the case of medical emergencies.
- Increased abilities to distribute medications and medical supplies in the case of an emergency.
- An effective quarantine plan that limits the spread of highly contagious diseases.

A.4 Other Goals and Objectives

A.4.a Mitigation Plan Maintenance

Goal: Maintain the all-hazard mitigation plan in accordance with federal and state statute, rules and regulations.

Objectives:

- Update the plan as necessary and required.

XIV. Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

A. Mitigation Actions and Projects

The All-Hazard Mitigation Planning Team discussed a wide range of potential mitigation measures based on their knowledge of the planning area and assessment of risks to the county.

The Planning Team began by reviewing progress in local mitigation efforts and changes in priorities, reconsidering the range of specific actions listed. The Team reviewed changes in federal guidance, and discussed strategies in place in other counties in the region. Information provided by HSEM such as the FEMA Region V handout "Mitigation Ideas: Possible Mitigation Measures by Hazard Type" were also used to suggest possible action items.

Mitigation measures described in the State Hazard Mitigation Plan are classified by type:

- Prevention
- Property & Natural Resources Protection
- Public Education & Awareness
- Structural Projects
- Emergency Services

These categories provide a framework to develop local mitigation strategies. Particular mitigation action items were chosen by consensus of the Planning Team. The Team also considered certain other Emergency Services measures supporting preparedness, response and recover actions. While these actions may not be eligible for FEMA mitigation funding, they help understand the overall context of reducing and eliminating natural and technological hazards affecting the jurisdictions.

The Planning Team considered High Rank Hazards as top priorities for action. Prioritization of individual actions and projects will depend on local funding and personnel availability. Mitigation actions listed in this plan should be considered a priority for implementation by each participating jurisdiction. While an official cost benefit review was not conducted for any of the strategies, the estimated costs were discussed (See Section XVI below). Overall benefits to each jurisdiction were considered when selecting strategies to be included in the plan. A formal cost-benefit review would have to be completed prior to implementation of mitigation projects.

Table 5-1
Local Partners with Interest in All Hazards Mitigation
Redwood County, Minnesota

Local Units of Government		Other Parties	
RCEM	Redwood County Emergency Management	EMS	Ambulance\First Responder volunteers
RCEO	Redwood County Environmental Office & Floodplain Administrator	Fire	Firefighting volunteers
		Hosp	Hospitals and Clinics
RHWY	Redwood County Highway Dept.	LE	Local Law Enforcement
RCSO	Redwood County Sheriff's Office	Sch	Local School districts
SWCD	Redwood County SWCD	RCRCA	Redwood-Cottonwood Rivers Control Area
RPH	Redwood Public Health	RWS	Rural Water Systems
CiB	City of Belview	BWSR	Minnesota Board of Water & Soil Resources
CiC	City of Clements	MDA	Minnesota Dept. of Agriculture
CiD	City of Delhi	MDH	Minnesota Dept. of Health
CiLa	City of Lamberton	DNR	Minnesota Dept. of Natural Resources
CiLu	City of Lucan	MnDOT	Minnesota Dept. of Transportation
CiMy	City of Milroy	MPCA	Minnesota Pollution Control Agency
CiMo	City of Morgan	HSEM	MN Division of Homeland Security & Emergency Management
CiRF	City of Redwood Falls		
CiRv	City of Revere	Ext	University of Minnesota Extension Service
CiSa	City of Sanborn	FSA	USDA Farm Service Agency
CiSe	City of Seaforth	FEMA	US Federal Emergency Management Administration
CiV	City of Vesta		
CiWb	City of Wabasso	**ALL**	**All Parties Listed**
CiWG	City of Walnut Grove		
CiWd	City of Wanda		
Twp	All Townships in Redwood County		

Benefit:

General:	Mitigates hazards in general
Property:	Mitigates hazards to property
Lives:	Mitigates hazards to lives

Cost Estimates:

Low:	In-kind services/projects with existing staff, typically part of ongoing workplan
Medium:	Special projects, contracted services and/or cost-share involved
High:	Major capital costs involved

Table 5-2
Natural Hazard Mitgation Strategies

		Mitigation Strategy	Who	Type	Cost	Benefit	Timeframe	Status	Original Timeframe
Ag Disease									
A1a	1	Provide information on ag disease and prevention to producers & residents	RCEO, SWCD, Ext, FSA	Awareness	Low	General	Ongoing	New	
A1a	2	Monitor invasive insect species, such as emerald ash borer	RCEM, SWCD, MDA, DNR, Ext	Prevention	Low	General	Ongoing	New	
Severe Storms									
A1b	1	Conduct a study to determine what places in the county and each city are deficient in safe rooms; Construct at least one new safe room or improve warning system in one community each year.	RCEM, CiB, CiC, CiD, CiLa, CiLu, CiMy, CiMo, CiRF, CiRv, CiSa, CiSe, CiV, CiWb, CiWG, CiWd	Structural	High	Lives	2012-2016	Revised	2005
A1b	2	Educate local schools, nursing homes, assisted living, hospitals, etc on importance of doing a "Severe Weather Awareness Week" workshop for their staff, including identifying evacuation routes and safe rooms.	RCEM, Hosp, Sch	Awareness	Low	General	Ongoing	In Progress	April annually
A1b	3	Make nursing home staff aware of the need/importance of providing shelter locations and evacuation routes for residents in case of severe weather	RCEM	Awareness	Low	General	Ongoing	Revised	
A1b	4	Ensure manufactured home parks have updated emergency management plan; work w/park managers to improve communication during severe storms; ensure residents are familiar w/emergency plans, evacuation routes, safe rooms	RCEM, CiRF	Prevention	Medium	Lives	2012-2013	Revised	2005-2006
A1b	5	Encourage all residents & public buildings have NOAA Public Alert radios with SAME technology, especially in rural areas away from community sirens.	RCEM, CiB, CiC, CiD, CiLa, CiLu, CiMy, CiMo, CiRF, CiRv, CiSa, CiSe, CiV, CiWb, CiWG, CiWd	Prevention	Low	General, Lives	Ongoing	Revised	Ongoing
A1b	6	Ensure that critical facilities have access to back up power generators. Examine needs and costs for providing back up power generation where none currently exists.	RCEM, CiLa, CiLu, CiRF, CiSe, CiWb, Hosp	Protection	Medium	Property	2013-2016	Revised	Ongoing
A1b	7	Harden utilities, replace overhead w/underground power lines.	RCEM, RCEO, CiLu, CiRF, Utilities	Protection	High	Property	Ongoing	Revised	
A1b	8	Use road design & living snow fences to control snow.	RHWY, SWCD, MnDOT	Protection	Medium	General	Ongoing	New	
A1b	9	Implement county-wide public alert telephone-text notification system.	RCEM, RCSO	Emerg Svc	Medium	General	2012-2014	New	
A1b	10	Scope at least one infrastructure retrofit project in one community each year.	RCEM, CiB, CiC, CiD, CiLa, CiLu, CiMy, CiMo, CiRF, CiRv, CiSa, CiSe, CiV, CiWb, CiWG, CiWd	Protection	Medium	Property	2013-2016	New	
	x	Encourage radio stations to get weather reports from West	RCEM	Prevention	Low	General, Lives		Deleted	Ongoing

Table 5-2
Natural Hazard Mitgation Strategies

		Mitigation Strategy	Who	Type	Cost	Benefit	Timeframe	Status	Original Timeframe
Drought									
A2a	1	Work with the Minnesota Department of Health to develop & implement Wellhead Protection Plans	RCEO, SWCD, CiRF, CiSa, MDH	Prevention	Medium	General	Ongoing	In Progress	Ongoing
A2a	2	Encourage development of ordinances that contain conservation provisions and use restrictions in times of severe drought	RCEO, RCEM, BWSR	Prevention	Medium	General	Ongoing	Deferred	Ongoing
A2a	3	Educate the public of the importance of wellhead protection and water conservation	RCEO, SWCD, MDH, Ext, RWS	Prevention	Low	General	Ongoing	In Progress	Ongoing
	x	Perform necessary studies to determine capacities and recharge rates of aquifers	RCEO, MDH, BWSR, DNR	Protection	Unknown	General		Deleted	
Wildfire									
A2c	1	Conduct wildfire risk assessments periodically	RCEO, RCSO, CiLa, CiRF, Fire, DNR	Prevention	Low	General, Property	2013-2014	Revised	Spring-Fall Annually
A2c	2	Participate in the "Firewise" education program	RCEM, Fire	Awareness	Low	General	Ongoing	Revised	Annual
A2c	3	Develop management plans that outline the scheduled maintenance of Conservation properties	FSA, DNR, SWCD	Prevention	Medium	Property	2014-2015	Deferred	Annual
A2c	4	Encourage development of evacuation plans, which clearly delineate routes residents should take in the event of a large-scale wildfire	RCEM, RCEO, RCSO, RHWY, Twp, DNR	Emerg Svc	Medium	Lives	2015-2016	Deferred	Spring 2005
A2c	5	Encourage township road authorities to cut back road ditches and bale where appropriate, which will limit potential for the spreading of wildfire	RHWY, Twp	Protection	Low	Property	Ongoing	In Progress	Ongoing
A2c	6	Develop a program to educate property owners on need for firebreaks before they enroll land in CRP or CREP	RCEM, SWCD, DNR, FSA, Ext	Awareness	Low	General	2016-2017	Deferred	Ongoing

Table 5-3
Technological Hazard Mitgation Strategies

		Mitigation Strategy	Who	Type	Cost	Benefit		Status	Original Timeframe
Hazardous Materials									
A1c	1	Continue awareness of the county household hazardous waste facility, its importance, & how to utilize services	RCEO	Awareness	Low	General	Ongoing	In Progress	Ongoing
A1c	2	Develop Geographic Information Systems capability to map locations of fixed facilities using hazardous materials and associated transportation corridors	RCEM, RCEO, CiRF, MDA, MDH, MPCA	Prevention	Medium	General	Ongoing	Deferred	Ongoing
A1c	3	Review the County water plan for potential groundwater contaminants within the County	RCEO, SWCD	Prevention	Medium	General	2015	Deferred	2005
A1c	4	Update the Emergency Response Plan to identify alternate sources of drinking water, including the location of adequate amounts of bottled water	RCEM, RWS	Prevention	Low	General	2013-2014	Deferred	June 2005
A1c	5	County, townships and cities with airports/flightpath review airport improvement plans and zoning.	RCEO, CiRF, Twp, MnDOT	Prevention	Medium	Property	2016-2017	New	
Civil Unrest/Terrorism									
A3a	1	Complete and maintain thorough community risk and threat assessments.	RCSO, LE, RCEM	Emerg Svc	Low	Property	2012-2013	Revised	Ongoing
A3a	2	Consider zoning code changes and updates that reflect building measures to withstand terrorist attack	RCEO, CiRF, Sch	Prevention	Low	General	Ongoing	Deferred	Ongoing
A3a	3	Increase security at critical facilities, add fencing, alarm systems and surveillance cameras as appropriate	RCSO, LE, RCEM	Prevention	High	Property	Ongoing	In Progress	Ongoing
A3a	4	Limit public access in high profile critical facilities in times of increased potential for terrorist activity. These times could follow the Federal Government (Department of Homeland Security) warning system	RCEM, RCSO, LE	Prevention	Medium	General	Ongoing	Revised	Ongoing
	x	Increase information and education about terrorism to all people in Redwood County	RCEM	Protection	Low	Property		Deleted	Ongoing

Table 5-3
Technological Hazard Mitgation Strategies

		Mitigation Strategy	Who	Type	Cost	Benefit		Status	Original Timeframe
Structure Fires									
A3b	1	Ensure that snow removal ordinances are followed and encourage building construction to include fire/smoke alarms and sprinkler systems	RCEM, RCEO, RCSO, Fire	Prevention	Low	General, Property, Lives	Ongoing	In Progress	Ongoing
A3b	2	Ensure each property has road or alley access of sufficient size for modern fire fighting vehicles	RCEO, Fire	Prevention	Medium	Property	Ongoing	In Progress	Ongoing
A3b	3	Work with community fire chiefs to educate and encourage residents on the need for having fire alarms and chimney inspections.	RCEM, Fire	Awareness	Low	Property	Ongoing	New	
Public Health									
A3c	1	Improve coordination and communication with local media	RCEM, RPH	Awareness	Low	General	Ongoing	In Progress	June 2005
A3c	2	Work with Public Health Service and MDH on the mass distribution of needed medicines and supplies for public health emergencies	RCEM, RPH	Emerg Svc	Low	Lives	Ongoing	In Progress	2005
A3c	3	Maintain a quarantine plan in coordination with local doctors and other health professionals	RCEM, RCSO, LE, RPH, Hosp	Emerg Svc	Low	Lives	Ongoing	Revised	2005
A3c	4	Update Redwood County Emergency Operations Plan Public Health annex	RCEM	Emerg Svc	Low	General	2012	In Progress	June 2005
A3c	5	Ensure that hospitals have access to back up power generators.	RCEM, RPH, CiRF, Hosp	Protection	Medium	Lives	2013	In Progress	Ongoing
Plan Maintenance									
A4a	1	Budget to perform additional data collection and analysis to identify vulnerable structures in specific detail in next plan update.	RCEM, HSEM	Prevention	Medium	General	2012-2013	New	
A4a	2	Budget to perform estimates of potential monetary loses to structures, contents and functions in specific detail in next plan update.	RCEM, HSEM	Prevention	Medium	General	2013-2014	New	

B. Reducing the Effects of Hazards on New Buildings & Infrastructure

Redwood County is a rural community with limited resources. For the first generation All Hazard Mitigation Plan, the Task Force's focus was on efforts to minimizing injuries and loss of life, and reducing or eliminating damages due to natural hazards that poses the greatest degree of risk. For this update, the Planning Team reviewed efforts in place and evaluated lessons learned, choosing to concentrate on life-safety issues.

Several strategies address mitigating effects of hazards on new buildings and infrastructure, although most apply to both new and existing structures. For example, the strategy to construct safe rooms (A.1.b.1) may be more likely to address new construction than retrofitting existing structures. While cities can require developers to install new utilities underground, the strategy for Severe Storms (A.1.b.7) to "harden utilities" is often implemented by replacing existing overhead power lines with underground lines. Specific locations are identified by utilities in the course of their regular capital improvement planning. Providing back-up power supply (A.1.b.6 and A.3.c.5) would also benefit existing facilities, but is often prompted in conjunction with new building projects which provide additional space and electric load.

The flooding-related strategy in the next section, to discourage development in the floodplain addresses new buildings and expansion of existing buildings. "Indicate on zoning forms if property is in flood hazard area" (B.1.a.6) raises awareness of the floodplain on any new building project. Implementing new digital floodplain maps will also mitigate effects of flooding or dam failure on any new buildings and infrastructure as well as existing structures.

C. Reducing the Effects of Hazards on Existing Buildings and Infrastructure

In addition to the strategies noted above, Wellhead Protection Plans (A.2.a.1 Drought) protect existing aquifers and mitigate the need for new infrastructure. The strategy for Severe Storms (A.1.b.8) to "Use road design and living snow fences to help control snow on roadways" has been used to improve safety on existing transportation infrastructure.

XV. Identification and Analysis of Mitigation Actions: National Flood Insurance Program (NFIP) Compliance

Requirement: §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate

A. Participation in the NFIP

FEMA's National Flood Insurance Program (NFIP) is intended to provide flood insurance, assist with floodplain management and complete flood hazard mapping (See Chapter 4, Section VI.A.5 above). According to FEMA, nearly 20,000 communities across the United States participate in the voluntary program.

Eight of the 16 participating jurisdictions in the county are listed in FEMA's *Community Status Book.*[21]. Redwood County and the cities of Redwood Falls, Sanborn and Seaforth currently participate in the NFIP (See Table 5-4). The City of Wanda is working with DNR to enter the program in 2012. There are only 16 policies listed in Redwood County.

Table 5-4
Participation in National Flood Insurance Program
Redwood County, Minnesota

Jurisdiction	NFIP Status	Initial FHBM	Initial FIRM	Current Effective Map Date	Joined Program (or *Sanctioned*)	Policies In Force#	Total Losses	Total Payments
Redwood County	Participating	1977	1985	1985**	1985	8	2	$54,453
City of Delhi	Not Participating	1974		1974	*1975*	*n/a*		
City of Redwood Falls	Participating	1974		NSFHA*	1984	8	0	$0
City of Revere	Not Participating	1975		1979	*1976*	*n/a*		
City of Sanborn	Participating	1974	1985	1985	1985	0	0	$0
City of Seaforth	Participating	1974		1974	2011	0	0	$0
City of Vesta	Not Participating	1975		1975	*1976*	*n/a*		
City of Walnut Grove	Not Participating	1975		1975	*1976*	*n/a*		

* NSFHA-No Special Flood Hazard Area
** Draft Digital Flood Insurance Rate Map not yet approved by FEMA as of October 2011
# Policies In Force, Total Losses, and Total Payments as of 30 August 2011

Source: FEMA Community Status Book 10.11, NFIP Insurance Statistics

FEMA's *Local Multi-Hazard Mitigation Planning Guidance* (the Blue Book) states that **"Jurisdictions that are currently not participating in the NFIP may meet this requirement by describing the reasons why the community does not participate…"** (p.61). As described above, no structures were found in the mapped floodplain in non-participating cities.

[21] http://www.fema.gov/fema/csb.shtm

Table 5-5
NFIP Mitigation Strategies

			Who	Type	Cost	Benefit	Timeframe	Status	Original Timeframe
Flooding/Dam Failure									
B1a	1	Work with communities to develop their own EOP.	RCEM, RHWY, SWCD, CiRF	Emerg Svc	Medium	General	Ongoing	Deferred	2005-
	2	Discourage future development within floodplains; consider minor localized flood reduction projects, especially to reduce overland flooding.	RCEO, RHWY, SWCD, CiD, CiRF, CiRv, CiSa, CiSe, CiV, CiWG	Prevention	Low	Property	Ongoing	In Progress	Ongoing
	3	Encourage sound construction practices and agricultural Best Management Practices (BMPs) in flood fringe areas.	RCEO, SWCD, BWSR, CiD, CiRF, CiRv, CiSa, CiSe, CiV, CiWG, CiWd	Protection	Low	Property	Ongoing	In Progress	Ongoing
	4	Implement dFIRM floodplain maps.	RCEO, CiRF, CiSa, CiSe, DNR, FEMA	Prevention	Medium	Property	2012-2013	Revised	2005-
	5	Jurisdictions not currently participating in the National Flood Insurance Program (NFIP) will review their flood hazard areas and consider participation.	DNR, CiD, CiRv, CiV, CiWG, CiWd	Prevention	Medium	Property	2012-2013	New	
	6	Indicate on zoning forms if property is in flood hazard area.	RCEO, CIRF	Prevention	Low	Property	Ongoing	New	
	7	Encourage all property owners in flood hazard areas to purchase flood insurance.	RCEO, CiRF, CiSa, CiSe, CiWd	Awareness	Low	Property	Ongoing	New	
	8	Develop a program to voluntarily acquire, relocate or elevate at-risk structures in floodplains.	RCEM, RCEO, CiRF, CiSa, DNR, HSEM	Protection	High	Property	2014-2016	New	
	9	Retrofit infrasturucture to reduce impacts of flooding; stabalize/replace at-risk bridges and slopes prone to sloughing.	RHWY, CiRF, CiSa, CiSe	Protection	High	Property	Ongoing	New	

B. Identification, Analysis and Prioritization of Actions Related to Continued Compliance in NFIP

The following strategies were identified based on the analysis of the Flooding and Dam Failure hazards in Chapter 4, SectionVI.A.5, to meet the goals and objectives in Chapter 5, Section XIII.A.2 (Moderate Rank Hazards) above.

B.1 Hazard: Flooding and Dam Failure

Individual strategies in Table 5-5 (above) were selected by consensus and do not appear in rank order. Several new action items were selected which were not included in the current AHMP, including encouraging property owners to purchase flood insurance and considering a program to acquire, relocate or elevate structures, although neither rated highly with the Planning Team (Table 5-6 below). Prioritization of individual actions and projects will depend on local funding and personnel availability. A formal cost-benefit review would have to be completed prior to implementation of mitigation projects.

XVI. Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

In the initial all-hazard mitigation plan, the All-Hazard Mitigation Planning Task Force concentrated on understanding the hazards present in the community and the wide range of potential mitigation strategies to address these hazards. During this plan update, the current Planning Team concentrated on assessing elements of that initial plan and understanding current guidance. Implementation of individual actions and projects will depend on local funding and personnel availability.

A. Action Prioritization

The initial plan approved by FEMA did not rank mitigation strategies. In the 2005 plan, the Task Force identified priority hazards and priority goals for achieving mitigation measures for those hazards. Throughout both the initial and the update process, staff and the Planning Task Force/Team strove to achieve consensus. For the update, now, the Planning Team reviewed every mitigation strategy identified in the existing plan and evaluated progress (or lack of progress) to date.

The highest rank natural hazards identified by the Planning Team—Ag Disease, Blizzards/Winter Storms, Tornado/Windstorm—received the majority of the Team's attention. It is intended that strategies to mitigate the highest rank hazards receive the top priority for implementation, followed by moderate rank hazards.

As stated in Section XIV above, Planning Team members considered a wide range of potential mitigation measures, including actions in place in other counties in the region, estimated costs and benefits of projects, and funding available. Individual strategies were selected by consensus of the Team.

A.1 Priority Action Items

All-Hazard Mitigation Planning Team members were asked to prioritize individual mitigation action items in an online survey, considering benefits that would result from actions versus the cost of those actions. A scale of 1-5 was used, from low to high priority. The top results for strategies are listed in the table below.

Table 5-6
Priority Action Items for Redwood County

Mitigation Strategy	Survey Score
A.1.b.6 Critical facility back-up power	4.5
A.3.c.5 Hospital back-up power	4.4
A.1.c.3 County Water Plan hazardous materials	3.9
A.1.b.2 Severe Weather Awareness Week	3.8
A.1.b.3 Nursing home shelter/evacuation outreach	3.7
A.1.b.7 Harden utilities	3.7

Source: All-Hazard Mitigation Planning Team

B. Action Implementation and Administration

Redwood County Emergency Management is the primary agency responsible for implementation and administration of this plan. The County will implement mitigation strategies within the next five years, and will seek appropriate funding to do so.

Local jurisdictions with comprehensive plans and land use controls will be strongly encouraged to incorporate applicable goals, objectives, and policies into their local plans upon their next update. Transmittal of the final plan will include a letter from the County Emergency Manager requesting that each participating jurisdiction 1) adopt this Hazard Mitigation Plan as a primary policy document, and 2) review and incorporate all applicable policies of this document into the community's existing plans by inclusion or by reference.

Upon adoption of this plan, the County and participating cities should also at the same time evaluate development and management controls, such as zoning and floodplain ordinances, to maintain consistency with this plan.

C. Cost-Benefit Review

As explained in Section XIV above, formal cost benefit review is beyond the scope of this plan and was not conducted for strategies during this mitigation planning process. Page 63 of the *Local Multi-Hazard Mitigation Planning Guidance* ("Blue Book", July 1, 2008) states:

> "Note that the mitigation planning regulation **does not** require plans to include a benefit cost analysis for projects. However, an economic evaluation is essential for selecting one or more actions from among many competing ones." [emphasis in original]

The overall cost and funding available to implement strategies played a significant role in selection of proposed mitigation action items. A formal cost-benefit review would have to be completed prior to implementation of specific mitigation projects.

C.1 Sources of Funding

Certain mitigation actions lend themselves to specific funding sources. The following FEMA mitigation programs summarized in Chapter 1, Section I.A.1 should be considered for identified mitigation projects.

- HMGP: A.1.b.1, A.1.b.8, A.1.b.10, A.4.a.1, A.4.a.2, B.1.a.8, B.1.a.9
- PDM: A.1.b.1, A.1.b.7, A.1.b.8, A.1.b.10, A.4.a.1, A.4.a.2, B.1.a.8, B.1.a.9
- FMA: B.1.a.2, B.1.a.8

Funds may be available from other sources to mitigate weather-related hazards. The Minnesota Department of Natural Resources (DNR) assistance may be available for back-up power supply. MnDOT/Federal Highway Administration (FHWA), County State Aid, and other County/Township/City-funded projects. MnDOT may pay $500-$700 per acre, per year for living snow fence projects in priority locations, which is often supplemented by the Conservation Reserve Program (CRP) through USDA Farm Service Agency and SWCD.

Minnesota Pollution Control Agency (MPCA) and US Environmental Protection Agency (EPA) are typical sources for funding for hazardous materials mitigation and response, such as the Project Priority List (PPL) for water and sewer projects, Brownfields Voluntary Investigation and Cleanup (VIC) and Tank Compliance and Assistance Program. Public Health agencies typically take the lead in mitigation actions for Public Health Emergencies, with funding through the Minnesota Department of Health and other sources.

Mitigation action items for Drought may find funding from DNR, the Minnesota Board of Water and Soil Resources (BWSR), MPCA, EPA and US Department of Agriculture (USDA). Mitigation actions for flooding/dam failure beyond property acquisition,

relocation and elevation may be fundable through DNR, BWSR, and local Soil & Water Conservation District sources. Communities in the region have accessed HUD funds for rehabilitation of homes damaged by flooding in the region through Minnesota Department of Employment and Economic Development (DEED) Small Cities Development Program (SCDP).

Mitigation actions for Fires (both structure/vehicle fires and wildfires) may be fundable by local fire departments through FEMA's Assistance to Firefighters Grants (AFG), Staffing for Adequate Fire and Emergency Response Grants (SAFER), Fire Prevention and Safety Grants (FP&S), Assistance to Firefights Fire Station Construction Grants (SCG) programs. For example, counties and fire districts in the region have accessed AFG funding for ARMER radio and other communications equipment. The DNR also works with local fire departments to conduct wildfire training programs.

USDA-Rural Development also offers grants and low-interest loans to public agencies and certain other organizations for public purposes. USDA-RD has recently funded requests such as fire halls and equipment, water and sewer systems, and tornado sirens in the region.

Other actions would have to be funded from general tax levies, ongoing program budgets, and by private citizens.

D. Completed, Deleted or Deferred Mitigation Actions

Tables 5-2, 5-3 and 5-5 above identify mitigation strategies and original timeframes. For each item the tables show which actions are in progress from the original AHMP, revised from the original plan, completed or deleted from the original plan, deferred due to budgetary constraints, or are new to this edition of the plan. Items indicated as "In Progress" are typically unchanged because they are on-going actions or are included in existing agency work plans.

XVII. Multi-Jurisdictional Mitigation Actions

Requirement §201.6(c)(3)(iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

As explained in Chapter 2, Section III, Redwood County is a rural community with few full-time paid public staff. Jurisdictions in the county rely on Redwood County Emergency Management as a clearinghouse for intergovernmental cooperation. Redwood County Emergency Management maintains regular communication with all local units of government in the county.

A. Action Items for Each Participating Jurisdiction

Action items are identified for each participating jurisdiction. These items were selected by the All Hazard Mitigation Planning Team with advice and consent by each participating jurisdiction—cities not in attendance at the Team meeting were consulted by telephone by the Emergency Management Director. See Table 5-7 below for a summary by city.

Each participating jurisdiction is responsible for selecting their mitigation action items, as well as funding and staffing implementation. The following contact information is current as of January 2011:

Belview City Clerk, PO Box 159, Belview, MN 56124
Clements City Clerk, PO Box 17, Clements, MN 56224
Delhi City Clerk, 233 – 3rd St, Delhi, MN 56283
Lamberton City Administrator, PO Box 356, Lamberton, MN 56152
Lucan City Clerk, PO Box 7, Lucan, MN 56255
Milroy City Clerk, PO Box 9, Milroy, MN 56263
Morgan City Clerk, PO Box 27, Morgan, MN 56266
Redwood Falls City Administrator, PO Box 526, Redwood Falls, MN 56283
Revere City Clerk, PO Box 66, Revere, MN 56166
Sanborn City Clerk, PO Box 278 Sanborn, MN 56083
Vesta City Clerk, PO Box 214, Vesta, MN 56292
Seaforth City Clerk, 23395 – 295th St, Wabasso, MN 56293
Wabasso City Clerk, PO Box 60, Wabasso, MN 56293
Walnut Grove City Clerk, PO Box 335, Walnut Grove, MN 56180
Wanda City Clerk, PO Box 293, Wanda, MN 56294
Redwood County Emergency Management, PO Box 130, Redwood Falls, MN 56283

Chapter 2, Section II.A.1 describes how a jurisdiction may modify this plan after FEMA approval.

Table 5-7
Mitigation Actions by City

Mitigation Strategy	Belview	Clements	Delhi	Lamberton	Lucan	Milroy	Morgan	Redwood Falls	Revere	Sanborn	Seaforth	Vesta	Wabasso	Walnut Grove	Wanda
A.1.b Hazard: Severe Storms															
A.1.b.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
A.1.b.4								X							
A.1.b.5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
A.1.b.6				X	X			X			X		X		
A.1.b.7					X			X							
A.1.b.10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
A.1.c Hazard: Hazardous Materials															
A.1.c.2								X							
A.1.c.5								X							
A.2.a Hazard: Drought															
A.2.a.1								X		X					
A.2.c Hazard: Wildfire															
A.2.c.1				X				X							
A.3.a Hazard: Civil Unrest/Terrorism															
A.3.a.2								X							
B.1 Hazard: Flooding/Dam Failure															
B.1.a.1								X							
B.1.a.2			X					X	X	X	X	X		X	
B.1.a.3			X					X	X	X	X	X		X	X
B.1.a.4								X		X	X				
B.1.a.5			X						X			X		X	X
B.1.a.6								X							
B.1.a.7								X		X	X				X
B.1.a.8								X		X					
B.1.a.9								X		X	X				

B. Completed, Deleted or Deferred Mitigation Actions

As discussed in Section XVI.D above, Tables 5-2, 5-3 and 5-5 above identify mitigation strategies, costs, benefits, status and timeframe of each.

Figure 5-1 Minnesota River Valley Scenic Byway

Goldmine Bridge, CSAH 17 / Renville County 21, Source: JC Shepard

CHAPTER 6: PLAN MAINTENANCE

This Chapter documents procedures for long-term plan maintenance. Section XVIII describes monitoring, evaluating and updating the plan. Section XIX addresses incorporation of this plan into existing planning mechanisms. Section XX addresses the need for continued public involvement.

XVIII. Monitoring, Evaluating, and Updating the Plan

Requirement §201.6(c)(4)(i): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

A. Method and Schedule for Monitoring this Plan

As explained in Section I.B, this plan documents the multi-hazard mitigation process conducted to meet the guidance currently issued by FEMA (the "Blue Book"). In October 2011, FEMA issued a *Local Mitigation Plan Review Guide* which will phase in significant changes from current guidance. FEMA also announced that new guidance will be released for local plan developers in FY12. That guidance should be reviewed by County Emergency Management to make sure implementation, monitoring, and evaluation for future plans is accurate and up-to-date.

This *All Hazard Mitigation Plan* will be monitored continuously by the County Emergency Management Director as part of their annual work plan, and after each disaster event. This monitoring is intended to determine:

- if applications for Hazard Mitigation Assistance should be initiated
- the effectiveness of mitigation actions
- if any new actions are appropriate

Redwood County Emergency Management maintains regular contact with all jurisdictions in the county, and will monitor the status and effectiveness of mitigation in the county within their time available.

B. Method and Schedule for Evaluating this Plan

FEMA requires that plans be reviewed, updated and re-approved within five years of initial adoption. Given the length of the planning cycle, the County Emergency Management Director should review and formally evaluate the plan within two and a half (2.5) years of adoption, as well as after every disaster event, to adequately prepare for the plan update.

Aspects of the mitigation plan to be formally evaluated would include:

- Do goals and objectives address current and expected conditions?
- Have the nature, magnitude, and types of risk changed?
- Are current resources appropriate for implementing the plan
- Are there implementation problems such as technical, political, legal, or coordination issues with other agencies?
- Have outcomes occurred as expected (a demonstration of progress)?
- Have agencies and other partners participated as originally proposed?

C. Method and Schedule for Updating the Plan

Within three (3) years of adoption, the Emergency Management Director will formulate a work plan and seek input from All-Hazard Mitigation Planning Team members, local units of government and local residents and property owners to update plan content, goals and strategies. At that time, hazard-related items from local plans and projects will be incorporated into this plan. Emergency Management will also extend an invitation to any non-participating jurisdictions to join the planning process for the update.

Any revisions to this plan will be forwarded to Minnesota HSEM and FEMA as required in the original adoption process.

XIX. Incorporation into Existing Planning Mechanisms

Requirement §201.6(c)(4)(ii): *[The plan **shall** include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*

A. Local Planning Mechanisms Available for Incorporating Mitigation Requirements

During the course of this hazard mitigation planning process, the following relevant planning mechanisms were identified:

Comprehensive Plan	Redwood County, Redwood Falls, Walnut Grove
County Emergency Plan:	Redwood County
County Mitigation Plan:	Redwood County and all participating cities
Regional Development Plans:	Southwest Regional Development Commission, including representatives from the County, all townships and cities
Zoning Ordinance:	Redwood County, Lamberton, Milroy, Morgan, Redwood Falls, Walnut Grove
Building Code:	Redwood Falls

Floodplain Ordinance:	Redwood County, Redwood Falls, Seaforth
Subdivision Ordinance:	Redwood County, Lamberton, Redwood Falls

B. Incorporating Mitigation Strategies and Hazard Information in Other Plans and Ordinances

The Redwood County Environmental Services office has been involved throughout this plan update. Results will be presented to the Redwood County Planning Commission to inform their deliberations, plans and processes.

As discussed in Chapter 5, Section XVI.B above, upon adoption each participating jurisdiction should evaluate their existing plans and ordinances to incorporate goals, objectives and strategies of the All-Hazard Mitigation Plan. For Redwood County, the Emergency Management Director will work with elected officials and other departments in this process.

C. How the Plan Has Been Used

The primary local planning documents updated in the five years since the initial AHMP was approved and adopted, the *Redwood County Comprehensive Plan,* utilized data analysis completed for the initial AHMP. The *Comprehensive Plan* also incorporated risk assessment and mitigation strategies for flood hazards into that process.

Redwood County has experienced four Presidential Disaster Declarations in the past two years. FEMA staff have worked with local officials to identify potential mitigation projects during post-disaster recovery efforts.

XX. Continued Public Involvement

Requirement §201.6(c)(4)(iii): *[The plan maintenance process **shall** include a] discussion on how the community will continue public participation in the plan maintenance process.*

Continued public participation in hazard mitigation will be solicited through the ongoing work of Redwood County Emergency Management. Comments from the public on the AHMP will be received by County Emergency Management and forwarded to the All Hazard Mitigation Planning Team for discussion. Once adopted, a copy of the plan will be made available to public libraries in the county, and posted to the SRDC website.

APPENDIX

A. Resolutions of Adoption

To be appended following FEMA approval and adoption by each participating jurisdiction.

REDWOOD COUNTY BOARD OF COMMISSIONERS

P.O. Box 130 • Redwood Falls, Minnesota 56283
Phone: 507.637.4016 • Fax: 507.637.4017
Website: www.co.redwood.mn.us

RESOLUTION OF REDWOOD COUNTY BOARD OF COMMISSIONERS

ADOPTION OF THE REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, Redwood County has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that Redwood County supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan Update.

This Resolution was declared duly passed and adopted and was signed by the Chairman and attested to by the Administrator this seventh day of February, 2012.

Lon Walling, Chairman Redwood County

Attest:

Vicki Knobloch, Redwood County Administrator

1st District	2nd District	3rd District	4th District	5th District
LON WALLING	JOHN SCHUELLER	AL KOKESCH	PRISCILLA KLABUNDE	SHARON HOLLATZ
27784 Co. Hwy 5	29157 250th Street	33650 Co. Hwy 2	400 Teakwood Dr.	393 Laser Trail
Milroy, MN 56263	Wabasso MN 56293	Morton MN 56270	Redwood Falls, MN 56283	Redwood Falls, MN 56283
507-747-2175	507-342-5621	507-697-6477	507-637-3817	507-641-2999
lon_w@co.redwood.mn.us	john_s@co.redwood.mn.us	al_k@co.redwood.mn.us	priscilla_k@co.redwood.mn.us	sharon_h@co.redwood.mn.us

RESOLUTION OF THE CITY OF BELVIEW

ADOPTION OF THE
REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Belview has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that the City of Belview supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

This Resolution was declared duly passed and adopted and was signed by the Mayor and attested to by the City Clerk/Treasurer this 13 day of March, 2012.

Marlo Sander, Mayor

Attest:

Lori Ryer, City Clerk/Treas.

Resolution #4 of 2012

RESOLUTION OF THE CITY OF Clements

ADOPTION OF THE
REDWIID COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Clements has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that the City of Clements supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

This Resolution was declared duly passed and adopted and was signed by the Mayor and attested to by the clerk this 13 day of May, 2012.

Thomas Groebner
Mayor

Attest: Karen Groebner
Karen Groebner
City Clerk

RESOLUTION OF THE CITY OF _____Delhi_____ #12-3

ADOPTION OF THE
REDWIID COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of _____Delhi_____ has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that the City of _____Delhi_____ supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

This Resolution was declared duly passed and adopted and was signed by the __Mayor_____ and attested to by the _Clerk_____ this _____12th__ day of __April_____, 2012.

Cindy Bell, Mayor

Attest:

Jessica Nasby, Clerk

RESOLUTION OF THE CITY OF LAMBERTON

ADOPTION OF THE
REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Lamberton has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that the City of Lamberton supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

This Resolution was declared duly passed and adopted and was signed by the Mayor and attested to by the City Clerk this 9th day of April, 2012.

Bill Sp Jan

Attest:

STEVEN FLAIG
Clerk, City of Lamberton, Redwood Co., Minnesota
Notarial Officer (ex-officio notary public)
My term is indeterminate

RESOLUTION NO. 2012-06
CITY OF LUCAN

ADOPTION OF THE
REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Lucan has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WIIEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that the City of Lucan supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

This Resolution was declared duly passed and adopted and was signed by the Mayor and attested to by the City Clerk this 2nd day of April, 2012.

Attest:

Elaine Moore

CITY OF MILROY

410 Euclid Ave
P.O. Box 9
Milroy MN 56263

Phone: 507-336-2495
Fax: 507-336-2465
E-mail: milroy@means.net

RESOLUTION 6-2012

A RESOLUTION ADOPTING THE REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Milroy has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that the City of Milroy supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

Passed by the City of Milroy this 26th day of March, 2012.

By: Jeff Van De Wiele Attest: _____
Mayor *City Clerk/Treasurer*

RESOLUTION NO. 06 OF 2012 OF THE CITY OF MORGAN

ADOPTION OF THE REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Morgan has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW, THEREFORE BE IT RESOLVED, that the City of Morgan, Minnesota supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

This Resolution was declared duly passed and adopted and was signed by the Mayor and attested to by the City Clerk this 4th day of April, 2012.

Robert H. Fischer, Mayor

Attest:

John L. Kleinschmidt, City Clerk - Treasurer

RESOLUTION NO. 12 OF 2012

RESOLUTION ADOPTING THE REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Redwood Falls has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000; and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW, THEREFORE, BE IT RESOLVED that the City of Redwood Falls supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

PASSED AND ADOPTED by the City Council of the City of Redwood Falls, Minnesota this 20th day of March, 2012.

ATTEST:

Keith Muetzel
City Administrator

Gary Revier
Mayor

(City Seal)

RESOLUTION OF THE CITY OF REVERE

ADOPTION OF THE
REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Revere has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that the City of Revere supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

This Resolution was declared duly passed and adopted and was signed by the Mayor and attested to by the clerk this 9th day of April, 2012.

Dean W. Baker

Attest:
Kristi Butler

RESOLUTION OF THE CITY OF SANBORN

ADOPTION OF THE REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Sanborn has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that the City of Sanborn supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

This Resolution was declared duly passed and adopted and was signed by the Mayor and attested to by the City Clerk this 3rd day of April, 2012.

Rae Trapp - Mayor

Attest:

Tara Havemeier

Tara Havemeier – City Clerk

RESOLUTION OF THE CITY OF SEAFORTH

ADOPTION OF THE
REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Seaforth has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that the City of Seaforth supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

This Resolution was declared duly passed and adopted and was signed by the Mayor and attested to by the Clerk-Treasurer this 2nd day of April, 2012.

Charles Rohlik, Mayor

Attest:

Pam Sheeran

Pam Sheeran, Clerk-Treasurer

RESOLUTION OF THE CITY OF ____VESTA_____

ADOPTION OF THE
REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of __Vesta____ has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that the City of _____Vesta_____ supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

This Resolution was declared duly passed and adopted and was signed by the ___Mayor_____ and attested to by the ___Clerk___ this __13th__ day of ___March__, 2012.

Eleanor Bauna

Attest:
Jean Kladitsch

RESOLUTION 3-2012 OF THE CITY OF WABASSO

ADOPTION OF THE
REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Wabasso has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that the City of Wabasso supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

This Resolution was declared duly passed and adopted and was signed by the Mayor and attested to by the City Clerk this 12th day of March, 2012.

Attest:

RESOLUTION OF THE CITY OF Walnut Grove

ADOPTION OF THE
REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Walnut Grove has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that the City of Walnut Grove supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

This Resolution was declared duly passed and adopted and was signed by the Mayor and attested to by the Clerk this 16th day of April, 2012.

Greg Hansen

Attest:
Paula McGarvey

RESOLUTION OF THE CITY OF WANDA

ADOPTION OF THE
REDWOOD COUNTY ALL-HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Wanda has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a multi-jurisdictional County Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Redwood County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Redwood County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Redwood County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Redwood County will maintain public participation and coordination; and

WHEREAS, the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Redwood County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this is a multi-jurisdictional Plan and cities that participated in the planning process may choose to also adopt the County Plan.

NOW THEREFORE BE IT RESOLVED that the City of Wanda supports the hazard mitigation planning effort and wishes to adopt the Redwood County All-Hazard Mitigation Plan.

This Resolution was declared duly passed and adopted and was signed by the City of Wanda Mayor and attested to by the City of Wanda Council this 17th day of April, 2012.

Mayor Karen L. Weber

Attest:

Janet M. Brown Clerk City of Wanda

Addendums

Addendums to the Redwood County All Hazard Mitigation Plan are available separately.

A. Statements of Interest by Jurisdiction

All cities in Redwood County participated in the original plan and this update.

Redwood County
City of Belview
City of Clements
City of Delhi
City of Lamberton
City of Lucan
City of Milroy
City of Morgan
City of Redwood Falls
City of Revere
City of Sanborn
City of Seaforth
City of Vesta
City of Wabasso
City of Walnut Grove
City of Wanda

B. Capabilities Assessment

C. All Hazards Mitigation List of Acronyms

D. Sample of Public Communication

E. Meeting Notes

F. HAZUS-MH Flood Scenario Reports