Cottonwood County All Hazard Mitigation Plan

August 2019

This multi-jurisdictional hazard mitigation plan includes Cottonwood County and the Cities of Bingham Lake, Comfrey, Jeffers, Mountain Lake, Storden, Westbrook, and Windom. This project was supported by Grant Award awarded by the Federal Emergency Management Agency (FEMA).

Prepared by Southwest Regional Development Commission and Cottonwood County Emergency Management

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COTTONWOOD COUNTY
ALL HAZARD MITIGATION PLAN

August 2019

Executive Summary

The purpose of the Cottonwood County All Hazard Mitigation Plan (AHMP) is to determine how to reduce property damage and loss of life resulting from natural and manmade hazards. The Cottonwood County AHMP includes resources and information to assist county residents, public and private sector organizations, and others interested in participating in planning for both natural and manmade hazards. This mitigation plan identifies hazards that pose a threat to Cottonwood County, as well as what is currently being done to mitigate their impacts. The plan also provides a list of actions and programs that may enable Cottonwood County to further reduce negative impacts caused by disasters. The implementation strategies address both natural and manmade hazards that include but are not limited to flooding, drought, severe summer and winter storms, fires, and tornadoes.

FEMA's recent Natural Hazard Mitigation Saves: 2017 Interim Report shows that mitigation can save on average $6 in future disaster cost.[1]

The Cottonwood County AHMP Planning Team identified the following natural and manmade hazard as the highest rank hazards for Cottonwood County:

- Tornado
- Winter Storm
- Windstorm
- Lightning
- Hail

This planning process has been conducted by the Southwest Regional Development Commission (SRDC) and Cottonwood County Emergency Management in accordance with current guidance provided by the State of Minnesota Department of Homeland Security and Emergency Management (HSEM) and the US Federal Emergency Management Agency (FEMA). This hazard mitigation plan documents the multi-jurisdictional, multi-hazard mitigation planning process in Cottonwood County, Minnesota, which is intended to meet the requirements of the Federal Emergency Management Agency (FEMA) Regulation 44 CFR 201.6 Local Mitigation Plans.

[1] Natural Hazard Mitigation Saves: 2017 Interim Report which shows that mitigation can save on average $6 in future disaster cost. https://www.fema.gov/natural-hazard-mitigation-saves-2017-interim-report

All participating jurisdictions in Cottonwood County have agreed to a joint administration and operation of the AHMP to help mitigate the effects of natural and manmade hazards. The project was undertaken so that all local units of government in Cottonwood County, that wished to participate, could participate and remain eligible for FEMA funding.

The previous Cottonwood County AHMP was adopted in 2011. The current update reviewed and updated the original plan. The update utilized a great deal of data from many different sources and also relied on input and expertise from the Cottonwood County AHMP Planning Team. The plan resides with the Office of Emergency Management in Cottonwood County, who is responsible for maintenance and updates.

Cottonwood County's All Hazard Mitigation Mission:

The Cottonwood County All-Hazard Mitigation Plan is intended to protect public health, safety and welfare by coordinating mitigation of natural and man-made hazards, and to meet FEMA requirements.

Cottonwood County Mission: "The Cottonwood County All-Hazard Mitigation Plan is intended to protect public health, safety, and welfare by coordinating mitigation of natural and man-made hazard, and to meet FEMA requirements."

Participation in Plan Development

The Cottonwood County All Hazard Mitigation Plan is a multiparty effort among Cottonwood County, Cottonwood County Emergency Management, Cottonwood County citizens, local public agencies, people in the private sector, and many people in regional and state organizations. Public participation plays a key role in the planning process. We also rely on the experience of elected and appointed volunteers. The Cottonwood County AHMP Planning Team (here after referred to as planning team) members comprised a broad representation of the county and their feedback was immensely useful in the development of the plan update.

Cottonwood County AHMP Planning Team:

- Paul Johnson – Cottonwood County: Emergency Management Director
- Donna Gravley – Cottonwood County: Commissioner
- Nick Anderson – Cottonwood County : County Attorney
- Ryan Sokolofsky – Bingham Lake City Council
- Denise Nichols – City of Bingham Lake
- Scott Peterson – Windom Police
- Allen Wahl – Westbrook Police Department
- Kelly Brown – Westbrook City Council
- Curtis Madson – Westbrook Fire EM
- Steve Nasby – Windom City Administrator
- Donna Stresemann – Cottonwood County Solid Waste: Assistant Administrator
- Tim Hacker – Windom Ambulance
- Dan Ortmann – Windom Fire Department
- Nick Klisch – Cottonwood County Public Works: County Engineer
- Dave Watkins – Mountain Lake Ambulance & Fire Department
- Andrew Spielman – City of Windom

- Jason Purrington – Cottonwood County Sheriff
- Jim Jorgensen – Cottonwood County Sheriff's Office
- Karla Nelson – City of Storden
- Valerie Halter – Germantown Township
- Jed Rhubee – City of Jeffers City Council
- Tim Conels – Mountain Lake Fire/Ambulance
- Kevin Heggesen – Springfield Township
- Laurie Bartsch – Carson Township
- Roy Schmidt – Carson Township
- Mark Redman – City of Bingham Lake
- Michael Schulte – Mountain Lake City Administrator
- David VanLoh – Westbrook Township
- Tim Janzen – Mountain Lake Fire/Ambulance

Southwest Regional Development Commission:

- Max Kaufman, AHMP Planner

- **For more information regarding hazard mitigation, contact:**

Cottonwood County Emergency Management
902 5th Avenue
Windom, MN 56101
Phone: 507-832-8255
www.co.cottonwood.mn.us/county-departments/emergency-management/

Southwest Regional Development Commission
2401 Broadway Ave, Suite 1
Slayton, MN 56172
Phone: 507.836.8547
Fax: 507.836.8866
www.swrdc.org

Minnesota Division of Homeland Security and Emergency Management

Federal Emergency Management Agency

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Section 1 – Introduction

1.1 Mitigation Planning

Natural and manmade hazards present risks throughout Minnesota. Cottonwood County has to be ready at all times to respond to a number of natural and manmade disasters. Local units of government, first responders, and emergency managers have worked together to create the Cottonwood County All Hazard Mitigation Plan (AHMP). This plan helps Cottonwood County protect its population and infrastructure by planning for natural and manmade hazards before the disaster strikes.

What is Hazard Mitigation Planning? 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 develop long-term strategies for protecting people, resources, and property in future hazard events. This planning process involves Tribal members and other affected stakeholders, and results in a mitigation plan with a strategy for breaking the cycle of disaster damage, reconstruction, and repeated damage. The mitigation plan also identifies mitigation actions and projects to implement the mitigation strategy. 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 and FEMA grants to implement mitigation projects.*

A simpler description comes from James Schwab:

> "Hazard mitigation essentially is the art and science of reducing risks of future losses."[2]

1.2 Purpose

Save lives, reduce injuries, sustain public health

Identify properties that are in obvious need of protection and establish policies and practical actions that fortify these properties from the effects of natural and human caused hazards.

Reduce both economic and physical losses from repetitive damages caused from constant hazard events. Encourage county communities to participate in the National Flood Insurance Program (NFIP).

Improve hazard assessment information to make recommendations for discouraging new development and encouraging preventative measures for existing development in areas vulnerable to natural hazards.

[2]Planning Magazine. James Schwab. Accessed: 5/29/13. Available: http://allhazards.wordpress.com/2010/03/02/mitigation-planning/

Minimize social dislocation and stress

Where appropriate, develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards and the potential danger for human caused hazards.

Provide assistance in locating tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.

Minimize agricultural losses

Balance land use planning and natural resource management with hazard mitigation in order to protect life, property, and natural environment.

Preserve, rehabilitate, and enhance the county's natural infrastructure systems to serve hazard mitigation functions.

Protect critical infrastructure from damage

Establish policy through the planning process to ensure mitigation projects for critical facilities and services.

Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, businesses, and industries.

Coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

1.3 Justification & Legal Authority

The rising costs of natural and human-caused disasters at the end of the 20th century 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" approaches 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 in the hazard mitigation plans. 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 201.6). 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.

Minnesota Governor's Executive Order 07 – 14 assigns responsibility for the creation and maintenance of the Minnesota Emergency Operation Plan, the State All Hazard Mitigation Plan and such other duties as may be requested by the HSEM.[3] The order also directs other state agencies to assist with the planning process.

Under 44 CFR 201.6, local governments must have a FEMA-approved Local Hazard Mitigation Plan to be eligible for and receive project grants under the following hazard mitigation assistance programs: Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), and Severe Repetitive Loss (SRL).

1.4 Mitigation Funding Programs

FEMA administers several different programs that provide hazard mitigation funding. Typically grants allow a cost-share of 75 to 90 percent federal funding for eligible projects. FEMA offers four hazard mitigation assistance programs which are described in detail at www.fema.gov/hazard-mitigation-assistance. Any projects funded by these programs must demonstrate a positive benefit-cost ratio. The four hazard mitigation assistance programs include: the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), and Repetitive Flood Claims (RFC).

1.4.1 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

1.4.2 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

[3] State of Minnesota Executive Order 07-14. Accessed 5/29/13. Available: http://www.leg.mn/archive/execorders/07-14.pdf

- Vegetation management
- Protective measures for utilities, water, sewer, roads and bridges
- Storm water management to reduce/eliminate long-term flood risk

1.4.3 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 flood proofing of non-residential structures
- Minor structural flood control activities

1.4.4 Other Federal Disaster-related Funding Programs

FEMA is probably more well-known for providing response and recovery assistance. Other programs such as FEMA's Public Assistance (PA) Grant Program provide assistance to State, Tribal and local governments, and certain Private-Nonprofit organizations, so that communities can quickly respond to and recover from major disasters or emergencies. Through the PA Program, FEMA provides supplemental Federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain Private Non-Profit (PNP) organizations. The PA Program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process.

1.5 FEMA Guidance

FEMA has created the *Local Mitigation Planning Guidance* (the "Blue Book") to provide guidance to local governments to meet the requirements of 44 CFR §201.6 *Local Mitigation Plans*. There are three main objectives of the Blue Book. First, the Blue Book is intended to help local jurisdictions develop new mitigation plans or update existing plans in accordance with the requirements of the regulations. Second, the Blue Book is designed to help Federal and State Reviewers evaluate mitigation plans from local jurisdictions in a fair and consistent manner. Third, the Blue Book is designed to help jurisdictions conduct comprehensive reviews and prepare updates to their plans to meet the requirements of 44 CFR Part 201.6.

The Cottonwood County All Hazard Mitigation Plan is going to follow the planning process outlined in the Blue Book. The Cottonwood County plan will also use the Local Mitigation Plan Review Tool to specify where in the plan and how the specific regulation requirements were met.

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).

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Section 2 – Public Planning Process

2.1 Description of the Planning Process

2.1.1 Preplanning

Since the previous Cottonwood County AHMP was approved and adopted in 2011, the Cottonwood County Emergency Manager and the Southwest Regional Development Commission (SRDC) have collected information on hazards that occurred in Cottonwood County. This information gathering helped in updating the risk assessment section of the plan. It also helped to initiate conversations during the planning process regarding strategies to mitigate the effects caused from hazards over the five year update cycle.

In the summer of 2017, the planning process began for the update of the Cottonwood County AHMP. Every five years the Cottonwood County AHMP has a planned update. "A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five years in order to continue to be eligible for mitigation project grant funding."[4] The Cottonwood County Emergency Manager initiated the planning process by applying for a planning grant from FEMA and contacting the Southwest Regional Development Commission (SRDC) to assist with the grant and update to the plan.

The Cottonwood County AHMP Planning Team was reformed to assist with the update. The planning team consisted of a number of elected officials, county staff, city staff, and emergency personnel. Refer to the Executive Summary for a list of planning team members.

The SRDC contacted all of the cities within Cottonwood County that the update to the Cottonwood County AHMP was taking place. This original outreach also asked the cities to participate in the planning process to update the plan. Outreach was also done to the townships in Cottonwood County and multiple planning team members also represent townships in Cottonwood County.

2.1.2 Planning Meeting

The first All Hazard Mitigation Plan Meeting was held on February 1, 2018. This meeting was an introduction to the Cottonwood County AHMP Planning Team. The SRDC presented on the AHMP planning process, the purpose of the plan, the benefits of having a plan, and the participation in the development of the plan. Agendas for the meetings immediately follow this section, and copies of all of the meeting sign-in sheets are located after the copies of the resolutions of participation.

The planning process started with a review of the timeline and the information that needed to be gathered as part of the update and included in the plan. There were a total of two in-person planning meetings, including the first meeting, to gather information, analyze the natural and manmade hazards that pose a risk in Cottonwood County, and outline mitigation strategies to mitigate the risk of the hazards that where identified.

[4] FEMA. 44 CFR 201.6 - Local Mitigation Plans. Accessed: 9/25/15. Available: http://www.law.cornell.edu/cfr/text/44/201.6

Mitigation strategy and plan review subcommittees convened virtually, reviewing and sending comments via online survey. These subcommittee meetings were used to help gather additional information, analyze potential hazards, and finalize mitigation measures.

The CPRI (Calculated Priority Risk Index) was also discussed during the presentation regarding the planning process. The CPRI worksheet was distributed to the planning team via email so they could complete it prior to meeting in order to expedite the process and gain input from others in their jurisdiction. The CPRI is an important part of the planning process and helps the planning team rank and quantify the natural and other hazards in Cottonwood County. Vulnerability is the critical component to the planning meetings. The planning team and city involvement is needed to help identify hazards and provide feedback in regard to potential frequency, spatial extent, potential severity, warning time, risk level, and hazard rank.

The CPRI outlined the natural and other hazards that were included in the original Cottonwood County AHMP. SRDC staff presented other hazards that are typical to Minnesota and were included in the Minnesota AHMP and other county AHMPs. After thoroughly discussing each statewide hazard, the planning team updated the list of hazards that will be included in the plan. The planning team identified the following hazards (not in a specific order):

Natural Hazards affecting the jurisdiction include:

- Agricultural Disease (animal or crop)
- Blizzards, Winter Storms, and Extreme Cold Events
- Drought
- Flooding
- Fire—Wildfire
- Severe Summer Storms, Lightning and Hail, and Extreme Warm Events
- Tornadoes and Straight-line Winds

Manmade hazards affecting the jurisdiction include:

- Civil Disturbance and Terrorism
- Dam Failure
- Fire—Structure (combined with wildfire for analysis)
- Hazardous Materials
- Public Health Emergencies
- Transportation Infrastructure
- Utility Failure
- Water Supply Contamination

Certain statewide hazards were eliminated from the discussion since the planning team thought the risk of the hazard was minimal or non-existent in Cottonwood County. These hazards included:

- Coastal Erosion—Cottonwood County's lakes and lakeshore are typically stable, so FEMA has not identified any significant 100-year floodplain areas around any of the county's major lakes.

- Sinkholes and Land Subsidence—Maps provided by the State of Minnesota show this is not an issue in Cottonwood County. This is an issue in counties in eastern Minnesota.
- Nuclear Generating Plants—none are located in or near Cottonwood County.

Public participation is a critical component in the development of the Cottonwood County AHMP. The planning team is critical in helping to engage the public and to garner feedback in regards to the plan. The planning team recognizes the importance of public involvement during the planning process. Participation in the development of the Cottonwood County AHMP came from county staff, township and city representatives, and the general public. Efforts were made to actively include these groups in the update of the Cottonwood County AHMP, including posting notices as well as draft copies of the plan on the Cottonwood County Emergency Management website.

Planning Meeting / Risk Assessment Meeting #1

The second All Hazard Mitigation Plan Meeting was held on October 29, 2018. The second meeting were centered on updating the list of mitigation strategies and discussing new strategy needs.

This helped to outline existing plans and programs, gaps and deficiencies, and existing mitigation measures. The profile also included: locations affected by the hazard, extent of the hazard, previous occurrences of the hazard, and the probability of future events of this hazard. This also allowed the planning team members to draw on personal expertise and the hazard profile that was discussed during the risk assessment meetings.

The risk assessment meeting helped to educate the planning team, local government representatives, and other meeting attendees. Profiling the hazards also helped to facilitate conversation regarding the hazards. The conversations helped to fill in gaps in the research related to the hazards. There was also a chance for meeting attendees to discuss gaps that they identified.

Mitigation Strategies & STAPLEE Process – Online Review

The team finalized and prioritized the goals, objectives, and strategies through the STAPLEE Process. STAPLEE stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. The STAPLEE Process takes all seven criteria into consideration when finalizing and prioritizing the mitigation goals, objectives, and strategies.

A qualitative approach was used by the team in prioritizing the mitigation goals. The qualitative approach judged and prioritized the mitigation goals, objectives, and strategies based on perceived costs and benefits. All of the goals, objectives, and strategies were discussed during this subcommittee meeting. Upon completion, the Subcommittee reviewed the draft of the goals and strategies electronically.

Plan Review Meeting

The finished plan was sent to the County Emergency Management Director for review at the beginning of March 2019.

The Draft Plan was disseminated to all of the Team Members for review in April 2019. The Cottonwood County AHMP Planning Team reviewed the entirety of the Cottonwood County AHMP. Modifications were made via email and phone to the SRDC.

The Public Review Meeting was held on May 21, 2019. The event was intended as an opportunity for local residents as well as neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process. Entities had the opportunity to ask questions and discuss specific goals with Planning Team members and SRDC staff. The Cottonwood County AHMP was available online on Cottonwood County's website for three weeks prior to the Public Review Meeting.

Interested entities could prepare feedback and recommendations before the public review meeting. Attendees were also able to come and go at their convenience, review the material sections of the plan, provide feedback, and make recommendations. A Public Notice for the Public Review Meeting was posted in the official Cottonwood County newspaper. A flyer was also provided to local units of government and a press release was distributed to other local media in the region. The open comment period provided a great opportunity for gathering feedback in regards to the Cottonwood County AHMP.

2.2 Public Involvement

Intergovernmental coordination was essential in the development of the Cottonwood County AHMP. The SRDC and Cottonwood County Emergency Manager provided information to all local units of government in the county regarding the Cottonwood County AHMP planning process and opportunities for participation. Meeting participation was solicited, but smaller local units of government opted for participating via phone, email, and mail. Public Notice of all planning team meetings was posted at various government offices in Cottonwood County. Email notices were also sent to local units of government, local organizations, and other entities involved in hazard mitigation. Subcommittee Meetings were not publicized.

All local units of government in Cottonwood County were invited to review and comment on mitigation goals, objectives and strategies. Public and private entities were sent the mitigation strategies that their representing entity was listed in. Feedback and recommendations were requested regarding the mitigation goals, objectives, and strategies. Refer to the Figure #1 for more information regarding participating jurisdictions (including emergency response departments, schools, and organizations) that reviewed and approved the goals section of the Cottonwood County AHMP.

2.3 Other Opportunity 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 with the following Minnesota counties on their hazard mitigation plans:

- Cottonwood County (2011, update 2019)
- Jackson County (2008; update 2016)
- Lincoln County (2010, update 2019)
- Lyon County (2010, update 2017)
- Murray County (2005; update 2012, update 2019)
- Nobles County (2005; update 2011, update 2019)
- Pipestone County (2010, update in progress)
- Redwood County (2005; update 2012, update 2019)

- Rock County (2007; update 2014)

2.4 Existing Plans, Studies, Reports, and Technical Information

Many sources of local, state, federal, and private information were used during the AHMP update. Various plans, programs, and policies were reviewed by SRDC staff. The literature review was a critical step in updating the Cottonwood County AHMP. The coordinated use and consideration of these diverse data sources provided a sound basis for this plan and implementation activities. The following references were specifically consulted during the planning process.

- Cottonwood County Emergency Operations Plan
- Cottonwood County Comprehensive Plan
- The Cottonwood County Water Management Plan
- Cottonwood County Land Use Map
- Cottonwood County Zoning Ordinances
- Local Water Plans
- Minnesota Department of Health (MDH) regulations regarding water systems and routine inspection of public water systems
- The Minnesota Pollution Control Agency (MPCA) regulations regarding wastewater systems
- Clean Water, Land and Legacy Amendment of 2008
- Minnesota Well Code
- NOAA Weather Radio All Hazards (NWR) weather broadcasts system
- The National Flood Insurance Program
- FIRM maps identifying flood hazard areas
- Fire District and Ambulance District Maps
- Mutual Aid Agreements between police forces, fire districts and ambulance districts
- Response Plans: HAZMAT
- MNDOT's Towards Zero Deaths (TZD) Program
- Traffic safety publications: the National Cooperative Highway Research Program (NCHRP), MnDOT Road Design Manual, ADA Tool Kit, MnDOT Bikeways Facility Design Manual, Minnesota Manual on Uniform Traffic Control Devices, and multiple Safe Routes to School Resources.
- The Minnesota DNR dam safety program
- The Minnesota DNR drafts Emergency Action Plan
- City of Windom Comprehensive Plan
- FEMA Planning Aids and Tools
- County All Hazard Mitigation Plans

All of the above documents are incorporated into this planning document by reference. The maps selected and included in this plan have been created by Cottonwood County and the SRDC utilizing data from Cottonwood County GIS and the State of Minnesota's Land Management Information Center (LMIC).

The University of Minnesota Duluth Geospatial Analysis Center (GAC) performed a hazard risk assessment for 100-year floods using the Hazus-MH GIS tool. In recognition of the importance of planning in mitigation

activities, FEMA created **Haz**ards **US**A **M**ulti-**H**azard (Hazus-MH), a powerful geographic information system (GIS)-based disaster risk assessment tool. This tool enables communities of all sizes to predict estimated losses from floods, hurricanes, earthquakes, and other related phenomena and to measure the impact of various mitigation practices that might help reduce those losses. The Minnesota Homeland Security and Emergency Management office has determined that Hazus-MH should play a critical role in Minnesota's risk assessments, and therefore the 100-year flood event hazard analysis is introduced in this plan.

The list of final mitigation actions was divided into jurisdiction-specific mitigation action charts so that each could see and address those actions that applied specifically to their cities (see *Appendix G: Mitigation Actions by Jurisdiction*).

Public input was sought through meetings and direct conversations (see *Appendix E: Public Meeting Notices and Meeting Notes*).

The SRDC has assisted the counties in its region with Hazard Mitigation Planning since the early 2000's and has assisted each of the counties with their five year updates. Since the latest round of updates included six counties, HSEM suggested that the SRDC do a regional plan and that all six counties participate, unfortunately FEMA was unable to approve a regional planning process. In 2016 PDM funded the update of six county hazard mitigation plans. The EMDs from the six counties attended a meeting or were briefed on a meeting held on June 13, 2017. The six counties included in the funding were Cottonwood, Murray, Nobles, Lincoln, Pipestone, and Redwood. The main discussion was about the planning process and common mitigation actions. The Mitigation Ideas publication was reviewed. A list of funded projects in the SRDC planning region was reviewed. Potential projects were discussed with questions asked that were later clarified. James McClosky from HSEM followed up the meeting with the meeting notes and some clarifications on June 14, 2017. All six counties undergoing the update process had the opportunity to ask questions, compare notes and provide input into the process for the upcoming projects. Please see Appendix D for more information.

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SECTION 3: 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 participation provisions post-approval of the hazard mitigation plan by HSEM and FEMA.

3.1 Jurisdictions Represented in this Plan

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).

Cottonwood County has the land use authority over the townships, so Cottonwood County will represent the townships in the All Hazard Mitigation Plan (AHMP). The Cottonwood County AHMP will cover all the townships in the county. Land use authority within city limits is controlled by the local jurisdiction. Representatives from the townships were asked to participate in the planning process. Cottonwood County and all of its cities previously passed resolutions of intent to participate in the hazard mitigation process and to be covered by the Cottonwood County All Hazard Mitigation plan. The Resolutions will be added after FEMA approval from the townships and the cities which can be found in Appendix C at the end of this plan.

Cottonwood County is a rural county. A number of resources and responsibilities are shared throughout the county. The Cottonwood County Sheriff's Office provides law enforcement throughout the county. The Cities of Mountain Lake, Westbrook, and Windom also have separate police departments. Additional resources and responsibilities are shared regionally. Cottonwood County is part of the Des Moines Valley Health and Human Services (DVHHS) service area, which includes the following counties: Cottonwood and Jackson. Representatives from the Cottonwood County Sheriff's office was a member of the planning team. A representative from Des Moines Valley Health and Human Services also contributed to the data gathering process. This ensured a regional prospective was taken when analyzing natural and manmade hazards.

Invitations were sent via email to representatives of all of the local jurisdictions to participate in the development of the plan either through filling out the worksheets, attendance at the meetings or participating in the plan review process. As in most rural areas, many of the participants wore multiple hats during the development process as they are employed in one area, live in another community, and sometimes volunteer in professional capacities for their communities.

The table below shows the jurisdictions that participated in the risk assessment and mitigation action reviews.

Figure #1
Participating Jurisdictions

Local Units of Government
Cottonwood County (including all townships)
City of Bingham Lake
City of Comfrey
City of Jeffers
City of Mountain Lake
City of Storden
City of Westbrook
City of Windom
Unincorporated Community of Delft (included under County)
Other Participating Organizations
Cottonwood County Sheriff's Office
Cottonwood County Solid Waste
Cottonwood County Public Works/Highway Department

3.2 Adoption Procedure

Each jurisdiction participating in the plan must formally adopt the plan after FEMA provisionally approves the document (Section 1.B.1). This plan must be adopted within one year of provisional FEMA approval, or else be updated and re-submitted to FEMA again. Minnesota Statutes §375.51 Subd.1 requires that a "public hearing shall be held before the enactment of any ordinance adopting or amending a comprehensive plan or official control..."

Once the planning team finalized the draft All Hazard Mitigation Plan (AHMP), copies were made available to the public, local governments, and county departments for comment. The feedback period for the plan was 31 days. The planning team reviewed comments, modifications were made, and the draft was sent to Cottonwood County Board of Commission for their review.

As part of the planning team's review, a public hearing was held to obtain any additional comments that the public or others wished to make. This final public review was conducted on May 21, 2019, 15 members of the public attended. When satisfied with the plan, the planning team recommended the Cottonwood County Board of Commissioners forward the plan the State of Minnesota Division of Homeland Security & Emergency Management (HSEM) for review. Federal rules require that this plan be submitted to HSEM for initial review and coordination, with the State then forwarding the plan to FEMA's Regional Office in Chicago for formal review and approval. Upon approval by FEMA, the Cottonwood County Board of Commissioners will consider a Resolution of Adoption. After County approval, staff will work with each participating local unit of government to facilitate the local adoption of the plan.

Local jurisdictions with Comprehensive Plans and Land Use Plans are encouraged to incorporate applicable strategies, goals, and policies from the Cottonwood County AHMP into their local plans upon next adoption. Local jurisdictions should utilize applicable zoning, subdivision control, and other ordinances to enforce the policies described in this plan. The Cottonwood County Emergency Management Department will work with local jurisdiction to help incorporate the applicable strategies, goals, and policies from the Cottonwood County AHMP into their local plans. The SRDC sent all entities the goals, objectives, and strategies that their entity was named in. These entities had the opportunity to provide feedback and acknowledged the goals, objectives, and strategies that they were named in. Documentation of responses from those that responded can be found at the end of this plan.

3.3 Participation Provisions Post-Approval

FEMA guidance explains a process that jurisdictions can follow to become part of the planning process, or "join" the mitigation plan, after FEMA approval. Any jurisdiction wishing to join the plan at a later date should contact Cottonwood County Emergency Management.

3.4 Planning Committee Worksheets

All planning meeting agendas, notes, and attendance (sign in sheets) can be found in Appendix E for the meetings stated in Figure #2 below.

Figure #2
Planning Team and Public Meetings

Meeting Type	Date	Location
1st Planning Team Meeting	Feb. 1, 2018	Windom, Minnesota
2nd Planning Team Meeting	Oct. 29, 2018	Windom, Minnesota
Plan & Mitigation Strategies Review	May-June 2019	Online
Public Hearing #1		Windom, Minnesota

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Section 4 – Cottonwood County Profile

This section offers a general overview of Cottonwood County to provide a basic understanding of the characteristics of the community, such as the physical environment, population, and the location and distribution of services.

4.1 Location and Area

Cottonwood County is located in southwest Minnesota and has a land area of 649 square miles. The county is located on the Buffalo Ridge of southwestern Minnesota. The county is bordered on the north by Brown County and Redwood County, on the south by Jackson County, on the east by Brown County and Watonwan County, and on the west by Murray County.

There are 16 incorporated municipalities wholly within the county, 1 municipality that crosses the county line (Comfrey), and 18 townships in Cottonwood County. Cities within Cottonwood County include Bingham Lake, Jeffers, Mountain Lake, Storden, Westbrook, and Windom. Townships include Amboy, Ann, Carson, Dale, Germantown, Great Bend, Lakeside, Midway, Mountain Lake, Rosehill, Southbrook, Storden, and Westbrook Townships.

The City of Windom is the largest city in Cottonwood County and serves as the Cottonwood County seat. US Highway 71 runs north-south through the city of Windom, with access to I-90 at Jackson. MN Trunk Highway (TH) 30 runs west to east through the county connecting US Hwy 59 and MN 4. MN Trunk Highway (TH) 60 runs on a diagonal through the cities of Mountain Lake, Bingham Lake and Windom, providing a major link between the Twin Cities and Sioux City, Iowa, with access to I-90 at Worthington. The Union Pacific Railroad runs parallel to Highway 60.

Figure #3
Minnesota Counties & Region 8 Development Commission

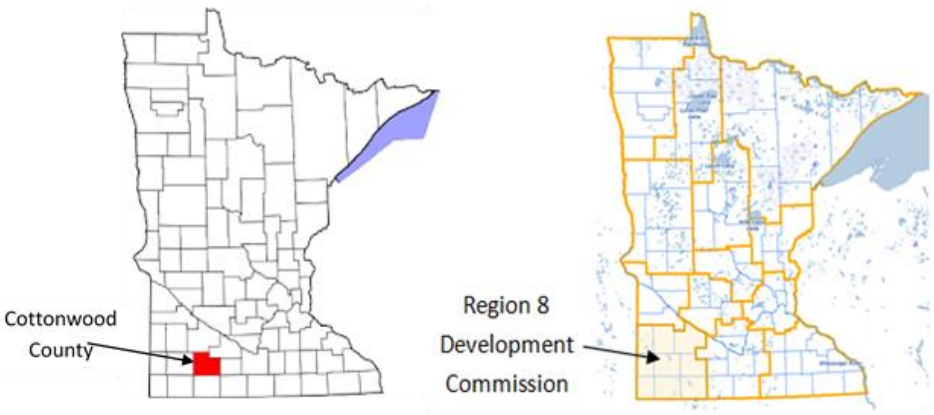
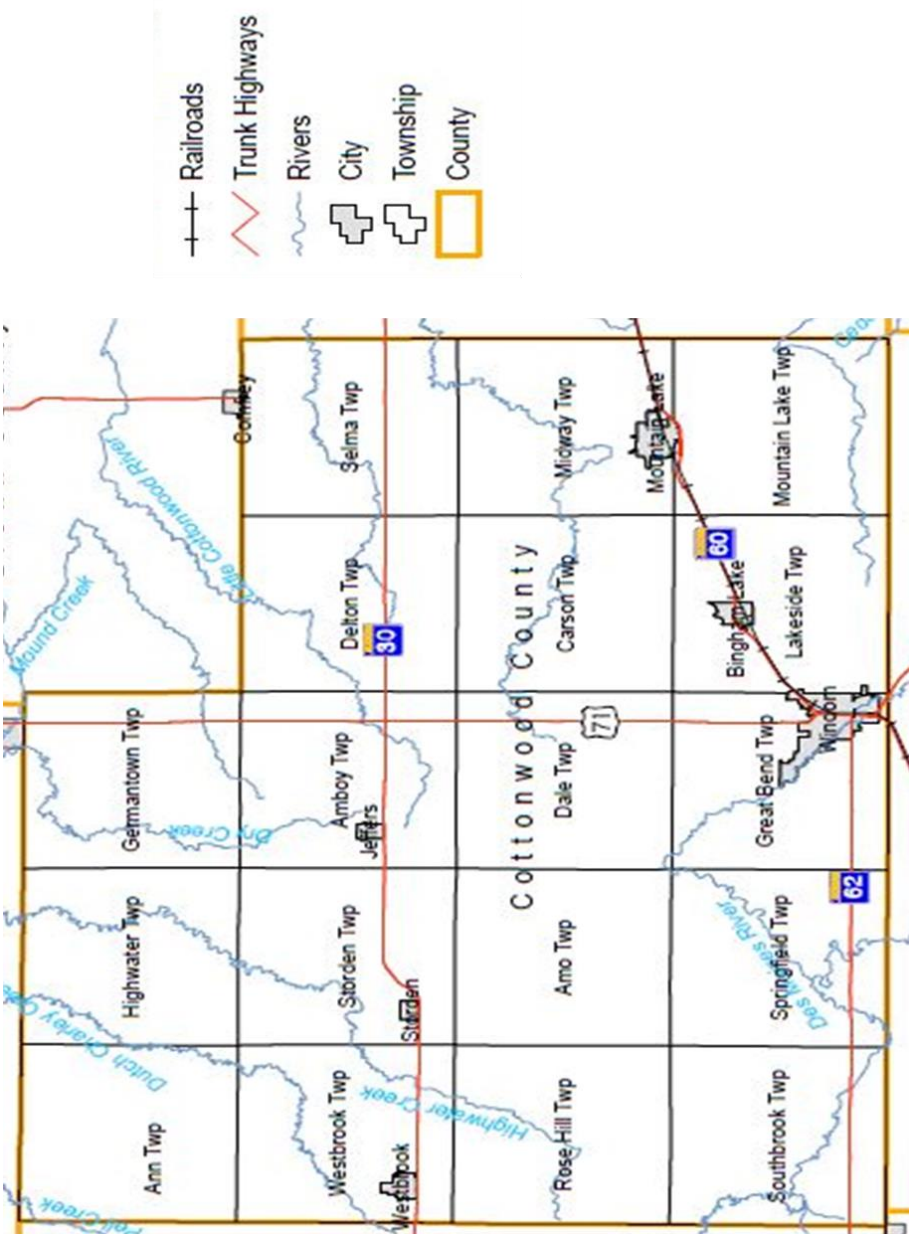


Figure #4
Minor Civil Divisions – Cottonwood County



4.2 History

Cottonwood County was established in 1857, and was formally organized in 1870. It was named for the Cottonwood River, which touches the northeast corner of Germantown Township in Cottonwood County. Originally the County included twenty townships, but by an act of the state legislature in 1864, two of the northeastern townships were made part of Brown County. The 1860 census listed Cottonwood County as having a total population of twelve—six men and six women. The settlement of Cottonwood County was rapid and was spurred on by the advent of the railroad in the 1870s. The population in 1870 was 534, and it became 5,533 in 1880 and 12,069 in 1900. The population continued increasing until the 1940s. Since the 1960s, the rural population has decreased and by 2010, there was 11,687 residents living in Cottonwood County.

The first railroad in the county—the St. Paul & Sioux City, later to become the Chicago, St. Paul, Minneapolis & Omaha Railway; Chicago & North Western; and today the Union Pacific—was constructed en-route to Sioux City, Iowa. In July of 1871, the first locomotive entered the villages of Mountain Lake and Windom. Three towns in Cottonwood County are on this rail line. Mountain Lake was platted and named in 1870. Windom was platted on June 20, 1871 (incorporated in 1875), and named in honor of U.S. Senator William Windom. Anticipating the growth and need for water, the first community well was dug in Windom in 1871. Also in 1871, the first schoolhouse was built and the county's first physician arrived. Windom was designated the county seat by a vote of the people within the county in 1872.

Bingham Lake was platted in 1875 and named in honor of the surveyor's friend, and was incorporated in 1900. Currie branch of the Omaha railroad was built through Cottonwood County in 1900, and resulted in the development of Delft, Jeffers, Storden and Westbrook. The village of Delft was a direct result of the building of the railroad, and remains an unincorporated village. The Village of Storden was incorporated in 1920. The Village of Westbrook was platted in June of 1900. This railroad line has since discontinued and the property is now farmland.

4.3 Physical Features

The southwestern region of Minnesota has a conspicuous feature called the Coteau des Prairies, meaning "highland of the prairies" or "hill of grasses," which bisects Cottonwood County. This is a ridge that extends northwest to southeast across South Dakota to Minnesota and on into Iowa, consisting of quartzite bedrock that is overlain by glacial sediment. The rolling topography of the county consists of glacial till on top of Sioux Quartzite and Cretaceous sandstone bedrock. Depth to bedrock is variable, deepest in the western part of the county, with outcrops of Quartzite in the northeast.

Pre-settlement vegetation consisted of grasslands and hardwood forests in river-bottom lands. The county can be delineated as having two classifications of original vegetation: grasslands and hardwood forests. Grasslands were the predominant form of native vegetation, while hardwood forests are primarily river-bottom stands.

The total area in Cottonwood County is 648 square miles or 414,720 acres, according to the Minnesota State Planning agency, although according to an 1896 Cottonwood County Plat Book, the county consisted of 650.39 square miles or 416,250 acres, with 8,000 acres covered by water. Certain areas in Cottonwood County are underlain by sand and gravel deposits which may be commercially-viable for aggregate mining. Likewise, certain hard-rock deposits lie close to the surface and are in demand as raw material to be crushed for aggregate. These deposits typically lie in protected floodplains and state-designated shoreland areas. [5]

University of Minnesota Remote Sensing and Geospatial Analysis Laboratory analysis indicates that 82% of land in Cottonwood County was in agricultural use in the year 2000. This accounts for over 341,000 of the 415,000 acres in the county. About 7% of land is in grass/shrub/wetland, while 6.3% is classified "urban." The same analysis found that less than 1.5% (5,280 acres) of the county is considered "impervious" or developed such that water will run off rather than soak into the ground. The future land use in Cottonwood County will likely remain predominately in agriculture production.

[5] Cottonwood County Comprehensive Plan. 2005. Accessed: 2/4/16. Available: https://www.co.cottonwood.mn.us/county-departments/planning-and-zoning/comprehensive-plan/

4.3.1 Open Water Sources

There are approximately 5,824 acres of open water in Cottonwood County. There are about 30 bodies of still water average about 170 acres each in size. Surface waters are typically undeveloped and most of the runoff and drainage water is not retained. The open water is characterized in three categories: lakes, marshes/wetlands, and rivers and streams.

Lakes

Cottonwood County has several lakes that provide recreational and natural resources. The lakes include: Arnolds, Augusta, Bartsh, Bat, Bean, Bingham, Carey, Clear, Cottonwood, Double, Duck, Eagle, Fish, Harder, Hurricane, Long, Maiden, Mountain, North Oaks, Oak Outlet, Parso, Rat, Round, Sheldorf Slough, Shoper-Bush Reservoir, South Clear, String, Summit, Swan, Talcot, Three, Warren, Warren Pond, Wolf Lake, and 13 unnamed lakes.

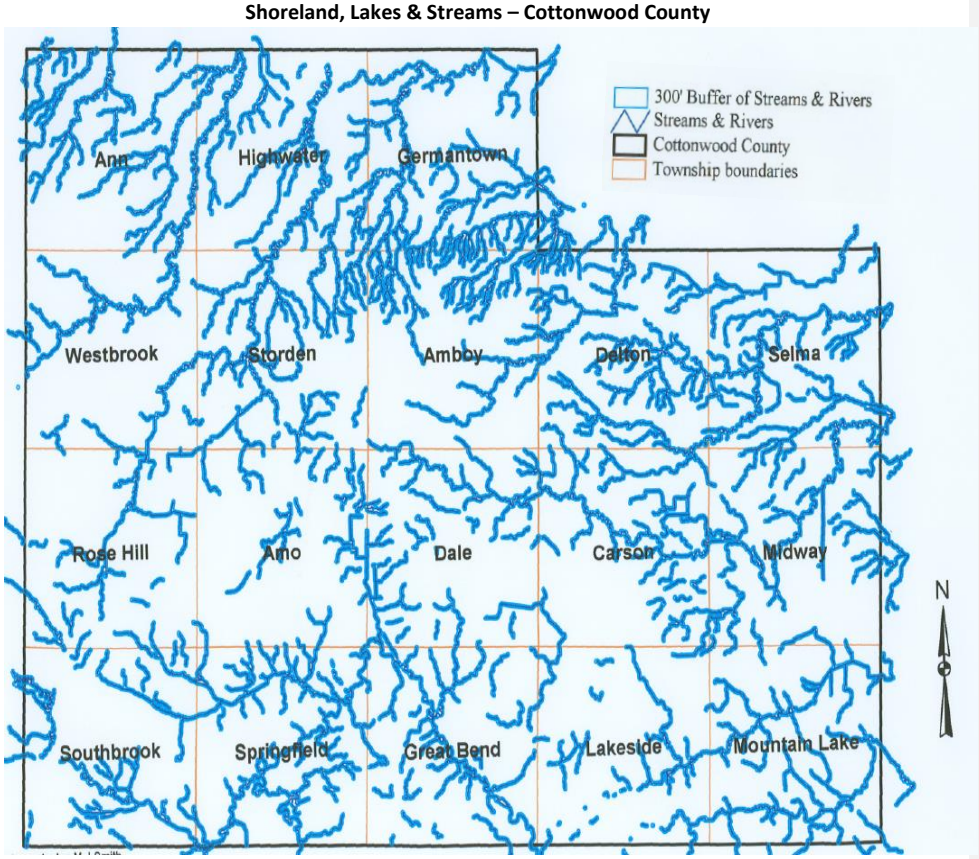
Talcot is the largest lake (678 acres) and is located in the southwest corner of Cottonwood County. Bingham Lake is the second largest lake (259 acres), located north of the city of Bingham lake. Mountain Lake, located in the east central part of the county, is the third largest (241 acres), while Cottonwood Lake, in Windom, is the fourth largest lake (140 acres) in the county. Most of the lakes provide the opportunity to catch game fish and are generally shallow. Cottonwood Lake is the deepest lake with a maximum depth of 9.9 feet. [6]

Rivers

Cottonwood County has five major rivers, the Des Moines River, Little Cottonwood River, North Fork Watonwan River, South Fork Watonwan River, and Watonwan River. The Des Moines River enters from Jackson County to the southwest and drains the central portion of Cottonwood County through Windom and back into Jackson County. The Little Cottonwood River and North Fork Watonwan River enters from the northeast from Brown County. The Watonwan River enters from Watonwan County in the east central area of the county. The South Fork Watonwan River enters the county from the southeast area out of Watonwan County. (See Figure #4)

[6] Department of Natural Resources. Accessed 10/29/15. Available: http://www.dnr.state.mn.us/lakefind/index.html

Figure #5
Shoreland, Lakes & Streams – Cottonwood County



Watersheds

Five major watersheds cross the county borders (see Figure #6). The three larger watersheds include the Cottonwood River Watershed which encompasses the north-central and western portion of the county covering about 245 square miles or 38% of the county land area; the Watonwan River Watershed which covers the eastern portion of the county and contains 198 square miles or 31% of the county land area; and the West Fork Des Moines River Watershed located in the southwestern and central portions of the county covering 165 square miles or 25% of the county land area. The two smaller watersheds include the Middle Minnesota Watershed (also called the Little Cottonwood River Watershed) which starts close to the center of the County and continues to the very northeastern edge of Cottonwood County covering 39 square miles or 6% of the land area; and the smallest one, the Blue Earth Watershed which covers only 1.3 square miles in the southeastern corner of the county. Watersheds of the Cottonwood, Watonwan, and to a lesser extent the Little Cottonwood and Blue Earth, drain in a northeasterly direction into the

Minnesota River, which meets the Mississippi River at St. Paul. The West Fork Des Moines River watershed drains south into Iowa and eventually into the Mississippi River. All but the Des Moines drain into the Minnesota River.

The following rivers and creeks drain within these watersheds:

- Cottonwood River Watershed: Dry Creek, Dutch Charley Creek, Highwater Creek, Mound Creek, Pell Creek
- Watonwan River Watershed: Watonwan River, North Fork of the Watonwan River, South Fork of the Watonwan River, Unnamed Branch
- West Fork Des Moines Watershed: Des Moines River, Heron Lake Outlet
- Middle Minnesota River Watershed: Little Cottonwood River
- Blue Earth River Watershed: no named streams

Wetlands

In and around these watersheds are wetlands. Wetlands refer to the low depressions in the landscape that is saturated with water either permanently or seasonally. The wetlands in Cottonwood County are classified under the Riverine and Palustrine systems. The wetlands are soils that are occasionally or frequently flooded and have a high water table. The wetlands are mostly stream segments, old oxbows, and low lying areas that make up the drainage system in Cottonwood County. Much of the drainage of wetlands within the county occurred prior to the 1980s, when policies were enacted to prevent future wetland loss.

Wetlands in Cottonwood County not only serve as a water drainage system, they also provide immediate benefits to ecosystems that surround them. The Wetlands Ecological Units (WEUs) for Cottonwood County is classified as Southwest Prairie under Ecological Classification System and National Wetland Inventory. Wetlands act like a sponge and are described as "nature's hazard insurance."[7] Wetlands store runoff and allow for a natural filtration of the water before it enters the ground water. The benefits of a healthy wetland vary from improved water quality to economic development generated from increased hunting, fishing, and recreation spending.

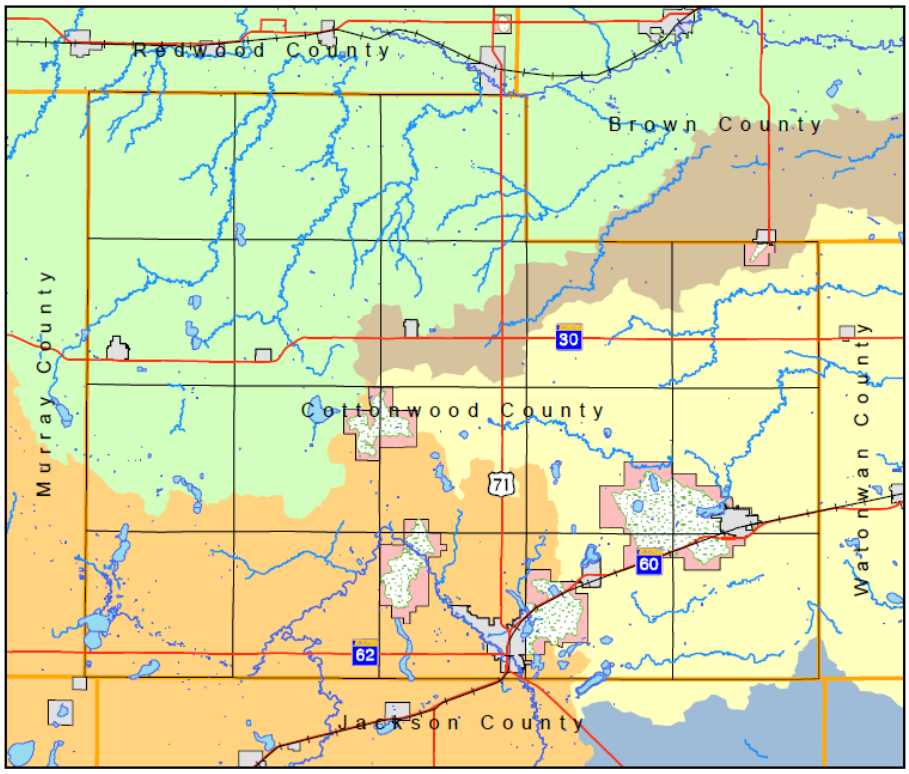
Overall, wetlands provide many benefits to humans including the reduction of flooding by means of storage during high flows, filtration of pollutants and sediment, groundwater and aquifer recharge, wildlife habitat and aesthetic appeal.

In addition, the wetlands in Cottonwood County provide the following benefits: In addition, the wetlands in Cottonwood County provide the following benefits:

- Floodwater Storage and Detention
- Nutrient Assimilation
- Sediment Entrapment
- Groundwater Recharge and Discharge
- Low-Flow Augmentation
- Aesthetics and Recreation
- Shoreland Anchoring and Erosion Control
- Wildlife Habitat
- Fisheries Habitat

[7] Wisconsin Wetland Association. Accessed 10/29/15. Available: http://www.wisconsinwetlands.org/HowWetlandsBenefitYourCommunity.pdf

Figure #6
Watersheds Map – Cottonwood County



Watersheds

- Railroads
- Trunk Highways
- Rivers & Streams
- Lakes
- City
- Township
- County
- WHPA
- DWSMA

Major Watersheds

- Blue Earth
- Cottonwood
- Minnesota River
- W. Fork Des Moines
- Watonwan

SRDC 10.10
Source: ESRI, DNR, MDH, MnDOT

0 1.5 3 6 9 12 Miles

This project was supported by Grant Award number EMC-2007-PC-0007 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 views.

As the landscape in Cottonwood County has changed over the years due to increased agricultural activities, the wetlands have also changed. Changes in the wetlands are due in part to tiling, changes in vegetation, and impervious surfaces. The exact amount of wetlands drained in Cottonwood County since increased agricultural activities is unknown. The majority of the remaining wetlands in Cottonwood County have been identified in the National Wetlands Inventory. The inventory classifies all wetlands into eight different wetland types based on the depth of water and type of vegetation. Identifying and classifying wetlands along with regulations protecting wetlands help to preserve our wetlands into the future.

Land use and management practices that have occurred in Cottonwood County have caused water quality degradation in the lakes. Due to the increase of nutrients, the county's lakes have seen an increase in algae blooms and other suspended sediments. With this decrease in water clarity, sunlight is not able to reach all areas of the lakes and this restricts many different kinds of plant growth. This not only eliminates a food supply for many game fish, but it also favors the growth of less desirable species like carp and black bullhead. Those fish then cause greater destruction to the lakes by uprooting other vegetation types and sending more debris into the water column.

4.3.2 Surficial Geology

Most of Cottonwood County is on the Coteau des Prairies. This is a ridge that extends northwest-southeast across Minnesota from South Dakota to Iowa. The ridge consists of a bedrock core that is overlain by glacial sediment.[8] The Sioux Quartzite, shale, and sandstone bedrock are overlain by thick deposits of glacial sediment except in river bottom lands.

Different types of parent materials and topography characterize each region. Loamy glacial till, sandy and gravelly to clayey glacial outwash, and lacustrine sediment cover most of the county. The glacial till is calcareous and of Wisconsin age. It is a gently sloping to nearly level ground moraine in most of the county. Undulating to steep, lateral moraines formed along main axis of glacial ice flow. Pre-glacial river channels formed along the lateral moraines. These channels entered the county on the west-central side and ran in a southeast direction. Glacial action was not sufficient to entirely cover these channels, and the glacial meltwaters reopened some of them. Most of the lakes in the county formed in these channels.[9]

Glacial meltwaters sorted material from the glacial till. Silty and clayey sediments were deposited in the glacial lakes in the southwestern and south-central parts of the county. Glacial outwash of sand and gravel was deposited in glacial river terraces in the south-central and north-central parts of the county.

4.3.3 Bedrock Geology

The oldest bedrock noted in Cottonwood County is Sioux Quartzite. It is of Pre-cambrian age and underlies most of the county. The depth of the bedrock is variable. It is deepest in the in the western part of the county where it underlies sandstone and shale of Cretaceous age. It is at a shallow depth in the central

[8] Soil Survey of Cottonwood County, Minnesota. USDA. 1979
[9] Soil Survey of Cottonwood County, Minnesota. USDA. 1979

part and outcrops in the northeastern part of the county. A small are also outcrops in the southwest corner. There is little to no exposed bedrock in the county.[10]

4.3.4 Soils

The soils of Cottonwood County formed in glacial till, in material sorted out of the till by water, and in organic material. The soils are dark colored because they formed under an original vegetation of tall and medium prairie. There are eleven soil associations within Cottonwood County according to the Soil Survey of Cottonwood County. The Clarion-Swanlake, Wilmonton-Letri, Swanlake-Storden, Webster-Canisteo, Webster-Nicollet, and Everly-Letri soil associations make up about 77 percent of the county.

Figure #7
General Soil Types – Cottonwood County

	Association	Approximate Percentage	Description
1	Germantown	2%	Nearly level to gently sloping, well drained soils
2	Everly-Letri	10%	Gently sloping, well drained soils and nearly level, poorly drained soils
3	Wilmonton-Letri	13%	Nearly level, moderately well drained to poorly drained soils
4	Glencoe-Jeffers	5%	Nearly level, very poorly drained and poorly drained, calcareous soils
5	Webster-Nicollet	10%	Nearly level, poorly drained soils and very gently sloping moderately well drained and somewhat poorly drained soils
6	Webster-Canisteo	10%	Nearly level, poorly drained soils and nearly level, poorly drained calcareous soils
7	Clarion-Swanlake	22%	Undulating and rolling, well drained soils
8	Swanlake-Storden	12%	Undulating to very steep, well drained soils
9	Estherville-Dickman	8%	Nearly level to steep, well drained soils
10	Rushmore-Ransom	3%	Nearly level to very gently sloping, poorly drained, somewhat poorly drained, and moderately well drained soils
11	Ves-Canisteo	6%	Undulating, well-drained soils and nearly level, poorly drained soils

Source: Soil Survey of Cottonwood County, Minnesota. USDA. 1979

[10] Soil Survey of Cottonwood County, Minnesota. USDA. 1979

4.4 Climate

Southwest Minnesota has a humid, mid-continental climate. Winters are characterized by cold, dry continental polar air. Summers are characterized by hot, dry tropical air masses from the Southwest meeting warm, moist maritime air masses from the Gulf of Mexico in the summer.

The weather is extremely variable during the year. During the winter months, precipitation is in the form of snowstorms, some which may be severe. During the summer months, precipitation is in the form of showers (occasionally heavy) when warm moist air leaves the Gulf region and meets cooler air over Cottonwood County. Weather patterns circulate counter-clockwise and generally enter Cottonwood County from the west to southwest and sometimes from the south.

4.4.1 Precipitation

Cottonwood County has an average annual precipitation of 23-30 inches (Minnesota's state-wide average is 27.01 inches). Average precipitation in Cottonwood County from 1981 to 2016 was 29.97 inches. Average precipitation can vary from less than 17 inches (1955) to over 41 inches (1993). In 2016, the average precipitation total was approximately 40.31 inches within Cottonwood County.[11]

From 1981 to 2010, the average seasonal snow fall in the City of Windom, which is the county seat of Cottonwood County, was 43.0 inches. 2011-2017 the average seasonal snow fall for City of Windom was 37.5 inches. Over that same time period, the average seasonal precipitation near the City of Storden, which is in the northcentral area on the western edge of Cottonwood County, was 28.52 inches; and the average seasonal precipitation near the City of Mountain Lake, which is in the northcentral area on the eastern edge of Cottonwood County, was 29.07 inches.

Figure #8

Precipitation: Averages since 1981

	1981-2016	Average Precipitation - 1981 - 2010			
Month	**Precipitation in Inches – Nobles County**	**Precipitation in Inches – Windom**	**Snowfall in Inches – Windom**	**Precipitation in Inches – Storden**	**Precipitation in Inches – Mountain lake**
January	0.87	0.90	8.4	.69	0.80
February	0.76	0.71	7.0	.64	0.66
March	1.75	1.97	8.6	1.82	1.93
April	3.12	3.24	3.4	2.99	3.10
May	3.94	3.55	0.0	3.43	3.36
June	4.61	4.56	0.0	4.29	4.26
July	3.85	4.05	0.0	3.62	3.69
August	3.46	3.52	0.0	3.48	3.64
September	3.05	3.29	0.0	3.21	3.05
October	2.07	2.18	0.7	2.13	2.13
November	1.48	1.67	6.0	1.42	1.52
December	1.01	0.98	8.9	0.80	0.93
Annual Average	**29.97**	**30.62**	**43.0**	**28.52**	**29.07**

[11] State Climatology Office DNR Waters at http://climate.umn.edu/

Source: National Climatic Data Center (http://ggweather.com/normals/)

4.4.2 Temperature

Average temperature in Cottonwood County from 1981 to 2016 was 45.2 degrees Fahrenheit. The hottest month on average in Cottonwood County is July with an annual average temperature of 72.7°F. The coolest month on average is January with an annual average temperature of 17.7°F. Temperatures were taken in the City of Windom.

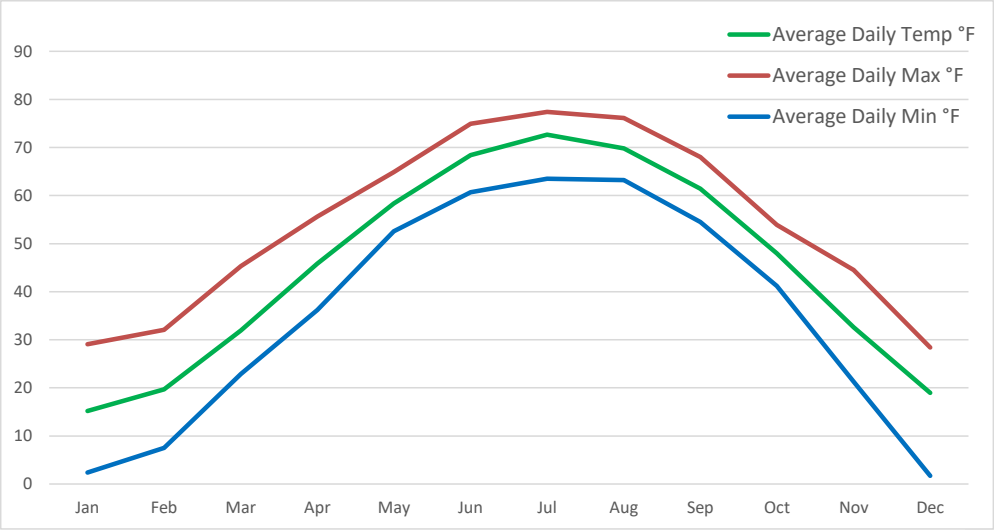
Figure #9

Average Temperature: 1981 – 2016 – Windom

Month	Average Daily Temp. °F	Average Daily Max °F	Average Daily Min °F
January	15.2	29.1	2.4
February	19.7	32.1	7.5
March	32.0	45.3	22.9
April	45.8	55.6	36.2
May	58.3	64.9	52.6
June	68.4	74.9	60.7
July	72.7	77.4	63.5
August	69.8	76.1	63.2
September	61.4	68.0	54.5
October	48.0	53.9	41.2
November	32.6	44.5	21.3
December	19.0	28.4	1.7
Annual Average	**45.2**	**48.9**	**40.9**

Source: http://www.dnr.state.mn.us/climate/historical/

Table #10
Average Temperature: 1981 – 2016 – Windom



4.5 Population

Cottonwood County is the 63rd most populous county in the State of Minnesota (out of 87).[12] Cottonwood County's population in the 2010 U.S. Census was 11,687, for a density of 18 persons per square mile. Population growth trends have an effect on the needs and demands of services such as transportation, law enforcement, and emergency response personnel.

It is important to analyze past population trends to attempt to make valid projections. However, it should be recognized that population projections are dependent upon a number of factors, a number of which are beyond county control.

4.5.1 Population Trends

The 2010 Census shows that Cottonwood County has a population of 12,167 and the MN State Demographer's Office estimated its population to be 11,465 in 2016. The largest community Windom with a population of 4,646 in 2010 and the MN State Demographer's Office estimated its population to be 4,597 in 2016. From 2000 to 2010, Windom's population increased by 3.4 percent but estimated population for 2016 indicates a 2.7 percent decrease to a population of 4,519. Cottonwood County shares many of the opportunities and challenges common in rural Minnesota and the Midwest overall. While population in Southwest Minnesota has been generally declining for several decades, Cottonwood County's population has maintained relatively consistent decline.

Figure #11
Population Trends – Region 8

County	1970	1980	1990	2000	2010	2016 Estimates*
Cottonwood	14,887	14,854	12,694	12,167	11,687	11,465
Jackson	14,352	13,690	11,677	11,268	10,266	9,978
Lincoln	8,143	8,207	6,890	6,429	5,896	5,766
Lyon	24,273	25,207	24,789	25,425	25,857	25,684
Murray	12,508	11,507	9,660	9,165	8,725	8,332
Nobles	23,208	21,840	20,098	20,832	21,378	21,825
Pipestone	12,791	11,690	10,491	9,895	9,596	9,211
Redwood	20,024	19,341	17,254	16,815	16,059	15,275
Rock	11,346	10,703	9,806	9,721	9,687	9,484
Region 8	**141,532**	**137,039**	**123,359**	**121,717**	**119,151**	**117,020**

Source: U.S. Census 1970, 1980, 1990, 2000, 2010, MN State Demographers Office 2016*

[12] Department of Employment and Economic Development. Accessed: 7/7/2017. Available: https://apps.deed.state.mn.us/lmi/rws/Results.aspx

Figure #12
Distribution of Population – Cottonwood County

	1980	1990	2000	2010	2016 Estimates*
Cities	8,921	7,923	8,164	8,219	8,160
Townships	5,933	4,771	4,003	3,468	3,305
Cottonwood County	14,854	12,694	12,167	11,687	11,465

Source: MN Demographers Office, U.S. Census 2000, 2010, MN State Demographers Office 2016*

Approximately 70% of county residents live in cities and the rest in the rural townships, including the unincorporated community of Delft (Carson Twp). The Minnesota Demographic Center 2015 estimates are an average 1.87 persons per households in the cities and 2.51 persons per household in the townships.

The loss in population numbers from the rural areas and increasing urban population is not unique to Cottonwood County, which is seen in the decline of the number of farmers. Populations in rural farming communities, like Cottonwood County, are interconnected to the agricultural economy.

The agricultural economy is a competitive industry and is often used in economics as an example of a perfectly competitive market. Competition in the agriculture industry has lead agricultural businesses to specialize and exploit economies of scale to stay competitive in the market place. Innovation, specialization, and economies of scale have resulted in an agriculture industry that has been able to supply agriculture demand with fewer workers. In addition, the migration of young people from the rural areas to more urban areas, and the elderly persons moving to warming states have contributed to the decline of the rural population and the growth of urban centers.

Population by County Subdivision

The overwhelming majority of county subdivision saw a decline in population from 2000 to 2010. The three county subdivisions that did not see a population decline from 2000 to 2010 was part of the city of Comfrey (60 percent), the City of Windom (3.5 percent), and the City of Mountain Lake (1.1 percent). The three largest population declines were in Southbrook Township with a (-29.5) percent decrease, Westbrook Township with a (-28.5) percent decrease, and Midway Township with a (-26.3) percent decrease.

Figure #13
Distribution of Population by County Subdivision – Cottonwood County

County Subdivision	2000	2010	Percent Change 2000 - 2010	2016
Amboy township	164	172	-4.7%	152
Amo township	132	140	-5.7%	129
Ann township	179	191	-6.3%	160
Bingham Lake city	126	167	-24.6%	128
Carson township	280	311	-10.0%	261
Comfrey city (part)	16	10	60.0%	14
Dale township	151	154	-1.9%	136
Delton township	123	146	-15.8%	123
Germantown township	207	224	-7.6%	191
Great Bend township	287	326	-12.0%	280
Highwater township	166	169	-1.8%	159
Jeffers city	369	396	-6.8%	354
Lakeside township	237	255	-7.1%	224
Midway township	219	297	-26.3%	201
Mountain Lake city	2,104	2,082	1.1%	2,134
Mountain Lake township	384	442	-13.1%	378
Rose Hill township	166	189	-12.2%	167
Selma township	193	204	-5.4%	178
Southbrook township	79	112	-29.5%	83
Springfield township	120	161	-25.5%	120
Storden city	219	274	-20.1%	209
Storden township	165	198	-16.7%	160
Westbrook city	739	755	-2.1%	724
Westbrook township	216	302	-28.5%	203
Windom city	4,490	4,646	3.5%	4,597
Total	**12,167**	**11,687**	**-3.9%**	**11,465**

Source: MN Demographers Office, U.S. Census 2000, 2010, MN State Demographers Office 2016

Population by Age Cohort

Population by age cohort can help planners identify trends and make predictions based on these trends. Changes in age cohorts can also help government plan for changes in demand for services. If the childbearing cohorts decline, government can make predictions that student enrollments may decline in the near future. The largest gain in population by age cohort was the age group 55 to 64 with 31.0 percent. The largest loss in population by age cohort was 35 to 44 with (–23.3) percent.

Figure #14
Population by Age Cohort – Cottonwood County

Age Group	2000	Percent of Total	2010	Percent of Total	Percent Change 2000 - 2010
0-9	1,520	12.5%	1,504	12.9%	-1.1%
10-19	1,817	14.9%	1,552	13.3%	-14.6%
20-24	498	4.1%	515	4.4%	3.4%
25-34	1,172	9.6%	1,130	9.7%	-3.6%
35-44	1,653	13.6%	1,268	10.9%	-23.3%
45-54	1,624	13.3%	1,672	14.3%	3.0%
55-64	1,194	9.8%	1,564	11.4%	31.0%
65-74	1,168	9.6%	1,089	9.3%	-6.8%
75-84	992	8.2%	891	7.6%	-10.2%
85+	529	4.3%	502	4.3%	-5.1%

Source: U.S. Census 2000, 2010

Median Age

Cities in Cottonwood County had a small change in median age from 2000 to 2010, which was a 5.1 percent increase. The largest increase in the median age were in the City of Bingham Lake with 35.7 percent. The largest decrease in the median age was in the City of Mountain Lake (-3.0) percent. The City of Windom had a small change in median age, which was a 1.9 percent increase.

Figure #15
Median Age by City – Cottonwood County

City	2000	2010	Percent Change 2000- 2010
Bingham Lake	33.9	46.0	35.7%
Comfrey (part)	43.6	44.4	1.8%
Jeffers	45.0	46.4	3.1%
Mountain Lake	40.5	39.3	-3.0%
Storden	45.5	44.8	-1.5%
Westbrook	51.9	54.0	4.0%
Windom	41.8	42.6	1.9%

Source: U.S. Census 2000, 2010

In townships in Cottonwood County the median age increased by 10.4 percent from 2000 to 2010. The largest increase in the median age was in Southbrook Township, and the increase was 26.6 percent. The two decreases in the median age were in Midway Township, with (-125.7) percent, and in Carson Township, with (-3.6) percent decrease.

Figure #16
Median Age by Township – Cottonwood County

Township	2000	2010	Percent Change 2000 - 2010
Amboy	46.0	52.0	13.0%
Amo	39.8	48.0	20.6%
Ann	46.4	52.8	13.8%
Carson	41.3	39.8	-3.6%
Dale	44.0	50.1	13.9%
Delton	37.7	40.9	8.5%
Germantown	35.7	40.9	14.6%
Great Bend	43.0	49.3	14.7%
Highwater	44.5	47.5	6.7%
Lakeside	42.1	48.9	16.2%
Midway	50.9	37.8	-25.7%
Mountain Lake	22.3	26.7	19.7%
Rose Hill	38.4	47.0	22.4%
Selma	45.7	47.5	3.9%
Southbrook	41.0	51.9	26.6%
Springfield	40.3	49.0	21.6%
Storden	41.0	46.6	13.7%
Westbrook	49.7	50.8	2.2%

Source: U.S. Census 2000, 2010

In Cottonwood County the median age had a very small increase from 41.7 to 44.2 from 2000 to 2010. The median age in Cottonwood County is 3.7 years higher than Region 8 and is 6.8 years higher than the State of Minnesota, while Region 8 has a median age that is 3.1 years higher than the State of Minnesota.

Figure #17
Median Age by County/Region/State

	2000	2010	Percent Change 2000 - 2010
Cottonwood County	41.7	44.2	6.0%
Region 8	38.7	40.5	4.6%
Minnesota	35.4	37.4	5.6%

Source: U.S. Census 2000, 2010

Population by Race

From 1990's, the Caucasian population of Cottonwood County continued to decline while each minority group increased by significant percentages. From 2000 to 2010, white had a (-7.0) percent decrease in population numbers. The population number for each non-white race in 2010 had nearly doubled from the numbers in 2000, and this growth slowed the population decline to a (-3.9) percentage for the total population. Cottonwood County has 720 residents who identify as Hispanic/Latino (7.2% of the population). In 2000 the Hispanic/Latino population in the county was 267 or 2.2%; this increase is consistent with population trends which indicate the Hispanic/Latino population in the county will continue to increase over the next few decades.

Figure #18

Population by Race – Cottonwood County

	2000 Number	Percent	2010 Number	Percent	Percent Change 2000 - 2010
White	11,587	95.2	10,773	92.2	-7.0 %
Black or African American	41	0.3	87	0.7	112.2%
American Indian and Alaska Native	28	0.2	27	0.2	-3.6%
Asian	198	1.6	317	2.7	60.1%
Native Hawaiian and other Pacific Islander	10	0.1	17	0.1	70.0%
Some Other Race	164	1.3	318	2.7	93.9%
Two or More Races	139	1.1	148	1.3	6.5%
Total Population	**12,167**	**99.8**	**11,687**	**99.9**	**-3.9%**

Source: U.S. Census 2000, 2010

Diversity in Cottonwood County influences the number of spoken languages. Roughly 90 percent of residents in Cottonwood County only speak English. There are a number of other languages that are spoken in Cottonwood County, that include: Spanish, other Indo-European, Russian, Somali, Asian and Pacific Island languages. This is indicating a steady shift towards a more diverse population in the county.

Figure #19

Language Spoken At Home – Cottonwood County

Subject	Percent	Margin of Error
Speak only English	92.2	+/-1.3
Speak a language other than English	7.1	+/-1.3
Spanish	3.4	+/-1.0
Other Indo-European	1.2	+/-0.5
Asian and Pacific Island Languages	2.3	+/-0.5
Other Language	0.1	+/-0.2

Source: 2015 American Community Survey 5-Year Estimates

4.5.2 Population Projections

Population projections from the MN Department of Administration show that the population in Cottonwood County is projected to decrease by (-5.7) percent from 2015 to 2050. The projections show a dramatic decrease in the age cohorts 55 to 69 and an increase in the age cohorts 20 to 29 from 2015 to 2050. The population for the age cohorts 70 – 79 are projected to decrease by percentages ranging from (-3.2) % to (-18.8) % and 80 - 84 and 85+ are also projected to increase by percentages ranging from 7.6% to 8.6%. Some of the other population cohorts are expected to have small increases while some have decreases during the same time period.

Cottonwood County communities will undoubtedly be impacted by the changing age structure of their communities. The county must ensure that services and needs are met as the population gradually becomes older and the demands for public services change. In the next three decades of years, local governments throughout the State will find themselves dealing with an aging population and attempting to improve the safety and welfare of an older and a more diverse community.

Figure #20

Population Projections – Cottonwood County

Age Group	2015		2020		2025		2030		2035	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0 to 4	389	353	339	307	358	324	392	355	413	374
5 to 9	372	361	368	358	318	309	336	326	370	358
10 to 14	401	376	370	347	365	341	314	295	333	311
15 to 19	391	347	420	373	387	343	379	337	331	293
20 to 24	334	314	403	377	427	400	393	368	387	363
25 to 29	309	240	328	255	398	309	424	329	391	304
30 to 34	271	307	248	281	262	296	318	360	341	385
35 to 39	306	290	290	274	263	249	277	263	338	321
40 to 44	279	304	274	300	258	282	234	255	247	271
45 to 49	343	328	291	278	284	272	267	255	243	232
50 to 54	379	354	326	305	274	256	267	250	251	235
55 to 59	428	407	366	347	313	298	262	249	257	244
60 to 64	383	400	398	414	338	352	288	301	242	253
65 to 69	341	367	365	393	376	405	319	343	274	294
70 to 74	278	298	329	353	350	376	360	386	307	328
75 to 79	210	259	246	303	289	357	307	379	318	391
80 to 84	171	250	161	237	188	276	221	323	236	345
85+	156	316	138	278	126	255	134	270	153	308
Gender totals	5,741	5,871	5,660	5,780	5,574	5,700	5,492	5,644	5,432	5,610
Total Population										

	2040		2045		2050		Percent Change 2015- 2050		
Age Group	Male	Female	Male	Female	Male	Female	Male	Female	Total
0 to 4	412	374	398	360	390	353	0.3%	0.0%	0.1%
5 to 9	391	380	393	382	383	371	3.0%	2.8%	2.9%
10 to 14	369	346	394	369	397	372	-1.0%	-1.1%	-1.0%
15 to 19	351	312	391	346	418	370	6.9%	6.6%	6.8%
20 to 24	343	321	365	343	404	378	21.0%	20.4%	20.7%
25 to 29	389	301	344	267	369	287	19.4%	19.6%	19.5%
30 to 34	316	358	317	358	281	318	3.7%	3.6%	3.6%
35 to 39	365	346	342	324	343	326	12.1%	12.4%	12.2%
40 to 44	305	333	332	363	311	341	11.5%	12.2%	11.8%
45 to 49	259	248	322	308	352	336	2.6%	2.4%	2.5%
50 to 54	229	215	247	232	312	291	-17.7%	-17.8%	-17.7%
55 to 59	244	231	224	213	243	230	-43.2%	-43.5%	-43.4%
60 to 64	239	250	229	238	212	221	-44.6%	-44.8%	-44.8%
65 to 69	232	249	231	248	221	237	-35.2%	-35.4%	-35.3%
70 to 74	265	284	226	242	226	242	-18.7%	-18.8%	-18.8%
75 to 79	272	336	238	292	203	251	-3.3%	-3.1%	-3.2%
80 to 84	245	360	212	311	185	272	8.2%	8.8%	8.6%
85+	168	339	180	362	168	340	7.7%	7.6%	7.6%
Gender totals	5,394	5,583	5,385	5,558	5,418	5,536	-5.6%	-5.7%	
Total Population							-5.7%		

Source: Minnesota369 Department of Administration

4.6 Housing

Household characteristics have a direct impact on land use, demand for housing, government services, and public education. Changes in demographics are part of the driving forces that contribute to changes in housing characteristics and demand for housing. Planning and consideration needs to take place at the local levels to ensure the supply of housing is adequate to meet the demand.

The age cohorts that include 60 through 85+ are projected to decrease by an average of (-1.1) percent from 2015 to 2050. This aging population change requires different housing needs than younger cohorts. Assisted living facilities and nursing homes are two types of facilities that will help to accommodate this population change. The 60 plus age cohorts also have to be considered in emergency planning, since a number of persons in this cohort may have trouble evacuating a building and performing other safety protocol. This cohort and youth cohorts have to have special considerations when it comes to emergency planning.

There are a number of other considerations that have to be made when it comes to emergency planning. The age of a structure is one variable that impacts how well a structure will withstand a disaster. The age of a structure is also one variable that impacts the ability to repair a structure after a disaster. The building materials used to construct the structure and the maintenance of the structure are two other variables in whether a structure can withstand a disaster. There are a number of other variables that impact the ability of a structure to withstand the stresses of a disaster.

4.6.1 Housing Units

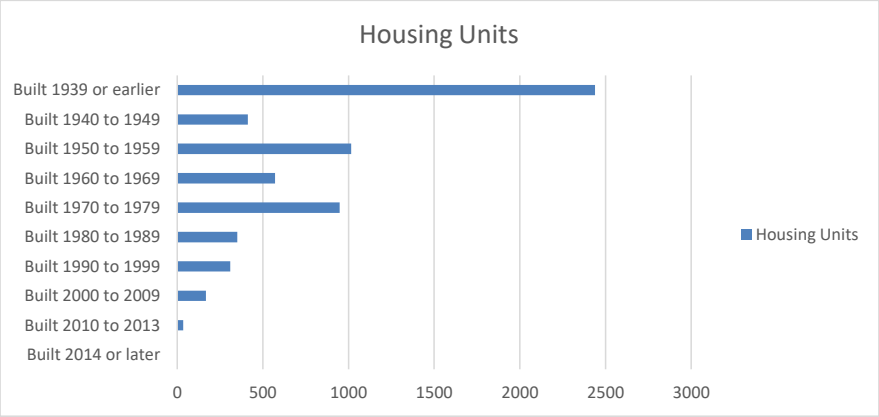
In Cottonwood County 23.9 percent of housing units were built in 1939 or earlier. Almost half of the housing units in Cottonwood County were built in 1950 to 1979 or earlier, while 16 percent of housing units were built after 1980. Cottonwood County still has an older housing stock which impacts the county's ability to with stand a disaster.

Figure #21
Build Year of Housing Units – Cottonwood County

Year Built	Housing Units	Percent
Built 2014 to 2015	0	0.0%
Built 2010 to 2013	34	0.6%
Built 2000 to 2009	168	3.1%
Built 1990 to 1999	310	5.8%
Built 1980 to 1989	350	6.5%
Built 1970 to 1979	948	17.6%
Built 1960 to 1969	571	10.6%
Built 1950 to 1959	1,016	18.9%
Built 1940 to 1949	413	7.7%
Built 1939 or earlier	1,576	29.3%
Total Housing Units	5,386	100.0%

Source: U.S. Census Bureau, 2015 5-year ACS

Figure #22
Building Year of Housing Units – Cottonwood County



There were a total of 4,762 housing units in Region 8 in 1970. Region 8 experienced a 12.98 percent increase in housing units from 1970 to 1980. From 1970 to 2000, there was a 12.13 percent increase in

housing units for Region 8. From 2000 to 2010, there was a 1.73 percent increasing in housing units for Region 8. In total, there was a 14.9 percent increase in housing units from 1970 through 2010.

For Cottonwood County, the total number of housing units increased from 1970, with a 11.6 percent (674 actual units) increase from 1970 to 1980, a (-5.6) percent (309 actual units) decrease from 1980 to 1990, a (-2.2) percent (19 actual units) decrease from 1990 to 2000, and a 0.8 percent (43 actual units) increase from 2000 to 2010. Cottonwood County saw nominal housing units' growth among Region 8 counties, with a 5.6 percent (289 actual units) increase from 1970 to 2010 overall.

Figure #23
Housing Unit Trends – Region 8

County	1970	1980	1990	2000	2010	Percent Change 1970 - 2010
Cottonwood	5,130	5,804	5,495	5,376	5,419	5.6%
Jackson	4,918	5,525	5,121	5,092	4,990	1.5%
Lincoln	2,882	3,298	3,050	3,043	3,108	7.8%
Lyon	7,526	9,196	9,675	10,298	11,098	47.5%
Murray	4,236	4,679	4,611	4,357	4,556	7.6%
Nobles	7,386	8,212	8,094	8,465	8,535	15.6%
Pipestone	4,286	4,636	4,387	4,434	4,483	4.6%
Redwood	6,718	7,388	7,144	7,230	7,272	8.2%
Rock	3,680	4,095	3,963	4,137	4,262	15.8%
Region 8	**46,762**	**52,833**	**51,540**	**52,432**	**53,723**	**14.9%**

Source: U.S. Census 1970, 1980, 1990, 2000, 2010

Population by Household

The U.S. Census defines households as the total number of occupied housing units, and household units as the total number of livable dwellings that are available. Cottonwood County's households remained steady but did decline, with a decrease of (-4.0) percent from 1990 to 2010. The MN State Demographer's Office estimated the population by household to be 4,833 in 2016. This population trend of households was not the trend of the number of households, which saw a decline in the 2000 census but increased in the 2010 Census showing a small decrease of (-1.5) percent from 1990 to 2010.

As the result of the increasing households, the persons per household decreased from 2.51 in 1990 to 2.36 in 2010. The decrease over that time period was (-6.0) percent. This is partially due to the number of elderly living alone, which poses a number of concerns in regards to emergency preparedness.

The Housing Summary Table shows the number of householders living alone and the number of householders 65 years and over living alone. There are 1,559 householders living alone and 764 householders 65 years and over living alone.

Figure #24

Population by Household – Cottonwood County

	1990	2000	2010	Percent Change 1990 - 2010	*2016 Estimate**
Households	5,060	4,917	4,857	-4.0%	*4,833*
Housing Units	5,495	5,376	5,412	-1.5%	*NA*
Average household Size	2.51	2.39	2.36	-6.0%	*2.32*

Source: U.S. Census 1990, 2000, 2010, MN State Demographers Office 2016*

In Cottonwood County 79.6 percent of occupied housing units are owner-occupied. In Region 8, 74.9 percent of occupied housing units are owner-occupied. Cottonwood County has minor fluctuation in the number of owner-occupied housing units over the past four decades. From 1970 to 2010, Cottonwood County has seen a (-0.1) percent decrease in owner-occupied housing units, which has been the smallest decrease in Region 8. During that same time period, Region 8 saw a 4.6 percent decrease in owner-occupied housing units.

Figure #25
Housing Occupancy – Region 8

	Total Occupied	Owner -Occupied
County	2010	2010 (%)
Cottonwood	4,912	79.6%
Jackson	4,429	78.3%
Lincoln	2,574	80.2%
Lyon	10,227	66.5%
Murray	3,717	82.6%
Nobles	7,946	72.8%
Pipestone	4,054	74.9%
Redwood	6,580	78.0%
Rock	3,918	77.4%
Region 8	**48,357**	**74.9%**

Source: U.S. Census 2010

Figure #26
Owner- Occupied Housing Occupancy – Region 8

County	1970	1980	1990	2000	2010	Percent Change 1970 – 2010
Cottonwood	3,760	4,243	3,925	3,955	3,757	-0.1%
Jackson	3,356	3,781	3,477	3,601	3,466	3.3%
Lincoln	2,131	2,323	2,161	2,130	2,063	-3.2%
Lyon	5,107	6,203	6,207	6,643	6,799	33.1%
Murray	2,821	3,181	2,982	3,135	3,070	8.8%
Nobles	5,161	5,928	5,791	5,955	5,783	12.1%
Pipestone	3,066	3,358	3,129	3,173	3,035	-1.0%
Redwood	4,587	5,252	5,055	5,328	5,135	11.9%
Rock	2,519	2,868	2,826	2,994	3,031	20.3%
Region 8	**32,508**	**37,137**	**35,553**	**36,914**	**31,009**	**-4.6%**

Source: U.S. Census 1970, 1980, 1990, 2000, 2010

The trend of renter-occupied units in Cottonwood County which saw a continued decrease from 1980 t0 2000. However, in 2010, the number of renter-occupied housing units increased by 41 actual units. The demand for renter-occupied housing units may increase as the population ages and moves from owner-occupied housing units to assisted living facilities and other rental facilities, and the changing household demographics in Cottonwood County.

Figure #27

Renter – Occupied Housing Occupancy – Region 8

County	1970	1980	1990	2000	2010	Percent Change 1970 - 2010
Cottonwood	1,053	1,233	1,134	962	1,003	-4.7%
Jackson	1,193	1,207	1,083	955	963	-19.3%
Lincoln	448	605	543	523	511	14.1%
Lyon	1,930	2,476	2,866	3,072	3,428	77.6%
Murray	897	855	776	587	647	-27.9%
Nobles	1,864	1,886	1,892	1,984	2,163	16.0%
Pipestone	996	999	949	896	1,019	2.3%
Redwood	1,579	1,600	1,499	1,346	1,445	-8.5%
Rock	975	987	928	849	887	-9.0%
Region 8	**10,935**	**11,848**	**11,670**	**11,174**	**10,622**	**-2.9%**

Source: U.S. Census 1970, 1980, 1990, 2000, 2010

4.6.2 Vacant Housing Units

The 1970 U.S. Census reported that Cottonwood County had 317 vacant housing units. This number increased by 1, to 318 units from 1970 to 1980. The number of vacant housing units increased again from 1980 to 1990 by 117 units to 435. The number of vacant housing units continued to increase between 1990 and 2000 459 units. Between 2000 and 2010, the number rose again by 48 units to 507 vacant units.

In 1990, the Census Bureau began to separate owner and renter vacant housing units. The combined percentages of the new data are higher than the actual vacant units year round. The numbers include unoccupied units for sale and housing used for seasonal, recreational, or occasional use. The rise of vacant housing units from 1970 to 1990 is mainly contributed to the decrease in rural population in Cottonwood County and other rural counties.

Figure #28
Vacant Housing – Region 8

County	1970	1980	1990	2000	2010	Percent Change 1970 - 2010
Cottonwood	317	318	435	459	507	59.9%
Jackson	322	379	561	536	561	74.2%
Lincoln	280	324	346	390	534	90.7%
Lyon	484	512	602	583	871	80.0%
Murray	463	445	853	635	839	81.2%
Nobles	350	383	411	526	589	68.3%
Pipestone	224	278	309	365	429	91.5%
Redwood	520	523	590	556	692	33.1%
Rock	182	239	209	294	344	89.0%
Region 8	**3,142**	**3,401**	**4,316**	**4,344**	**5,366**	**70.8%**

Source: U.S. Census 1970, 1980, 1990, 2000, 2010

In 2010, 9.4 percent of the housing units in Cottonwood County were vacant, which was below the 9.7 percent In Region 8. The percentage of a county's housing units being vacant adversely affects preparing for and cleaning up after a disaster.

Figure #29
Percent Vacant – Region 8

County	1970	1980	1990	2000	2010
Cottonwood	6.6%	5.8%	8.6%	8.5%	9.4%
Jackson	7.1%	7.6%	12.3%	10.5%	11.2%
Lincoln	10.9%	11.1%	12.8%	12.8%	17.2%
Lyon	6.9%	5.9%	6.6%	5.7%	7.8%
Murray	12.5%	11.0%	22.7%	14.6%	18.4%
Nobles	5.0%	4.9%	5.3%	6.2%	6.9%
Pipestone	5.5%	6.4%	7.6%	8.2%	9.6%
Redwood	8.4%	7.6%	9.0%	7.7%	9.5%

Rock	5.2%	6.2%	5.6%	7.1%	8.1%
Region 8	**7.1%**	**6.8%**	**8.9%**	**8.1%**	**9.7%**

Source: U.S. Census 1970, 1980, 1990, 2000, 2010

Housing Unit Value

Cottonwood County has the second lowest median housing unit value in Region 8 and lowest median rent than the Region 8 average. The median rent is 84 dollars lower than the Region 8 average. The cost of a disaster is potentially lower in Cottonwood County when compared to Region 8 averages.

Figure #30
Median Housing Unit Value – Region 8

County	Median Housing Unit Value	Median Rent
Cottonwood	$81,800	$454
Jackson	$100,300	$543
Lincoln	$76,300	$477
Lyon	$136,300	$543
Murray	$90,000	$521
Nobles	$97,200	$554
Pipestone	$85,100	$576
Redwood	$88,300	$557
Rock	$99,200	$567
Region 8	**$100,904**	**$538**

Source: U.S. Census 2010

Figure #31

Housing Summary: 2010 US Census – Cottonwood County

Subject	Number	Percent
Total Population		
In Households	4,857	100%
In Group Quarters	244	2.1%
Total Households		
Family Households	3,130	64.4
Non Family Households	1,727	35.6
Householder Living Alone	1,559	32.1
Households 65 years and over living Alone	764	15.7
Households with Individuals under 18	1,332	27.4
Households with Individuals 65 and over	1,659	34.2
Average Household Size	2.96	(X)
Units in Structure		
1 unit, detached	4,062	85.0%
1 unit, attached	86	1.8%
2 units	62	1.3%
3 or 4 units	167	3.5%
5 to 9 units	67	1.4%
10 or more units	292	6.1%
Mobile Home or other type of housing	0.01	0.9%
Vehicles Available		
None	311	6.5%
1 Vehicle	1,448	30.3%
2 Vehicles	1,787	37.4%
3 or more	1,233	25.8%
House Heating Fuel		
Utility Gas	2,590	54.2%
Bottled, tank, or LP gas	999	20.9%
Electricity	712	14.9%
Fuel oil, kerosene, etc.	287	6%
Coal or coke	5	0.1%
All other fuels	134	2.8%
No fuel used	48	1.0%
Selected Characteristics		
Lacking complete plumbing facilities	18	0.2%
Lacking complete kitchen facilities	107	0.9%
No telephone service	72	1.5%

Source: U.S. Census 2010 and 2015 ACS

4.7 Employment

Cottonwood County had an estimated employment of 4,444 persons in 2016, including 3,504 employments by private ownership and 940employments by government ownership. The two largest employers by industry were the Education and Health Services Industry and Trade, Transportation and Utilities Industry, followed by the Manufacturing Industry. The industry cohort Natural Resources and Mining including Agricultural, Forestry, Fishing, Hunting and Mining, is estimated to be higher, but self-employed farms workers are not reported in Department of Employment and Economic Development figures.

Figure #32
Employment by Industry – Cottonwood County

Industry	2000	2010	2016
Natural Resources and Mining	106	218	266
Construction	253	262	307
Manufacturing	772	1,541	828
Trade, Transportation and Utilities	1,121	926	852
Information	72	57	41
Financial Activities	160	121	100
Professional and Business Services	271	76	126
Education and Health Services	1,297	1,272	1,254
Leisure and Hospitality	243	301	301
Other Services	134	126	99
Public Administration	317	291	268
All Industries	**4,741**	**5,194**	**4,444**

Source: MN Department of Employment and Economic Development

Agriculture is a significant driving force in Cottonwood County. The USDA 2012 Census of Agriculture showed that there were 813 farms in Cottonwood County in 2012, which is (-0.94)% decrease from 2007. In 2012, the average farm size was 459 acres, and the average farm reported sales of $460,000. There were 372,767 acres of farm land in production in Cottonwood County.[13] In 2012, the market value of agricultural products sold in Cottonwood County was $374,090,000. Since 2012, the prices for agricultural products have been favorable, and it is expected that the upcoming USDA Census of Agriculture will show a marked increase in the market value of agricultural products sold in Cottonwood County as compared to 2012.

[13] USDA Census 2012. Accessed: 7/11/17. Available: https://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Minnesota/st27_2_001_001.pdf

4.7.1 Unemployment Trends

The unemployment rate in Cottonwood County was 7.3 percent in 2016, while the State of Minnesota had an unemployment rate of 3.9 percent. From 2012 through 2016, the average unemployment rate was 5.9 percent for Cottonwood County, 4.2 percent for Region 8, 4.5 percent for Minnesota, and 6.4 percent for the United States. The average unemployment rate for Cottonwood County was higher than Region 8, remained close to the State rates, and mostly remained lower than the national rates.

During the economic recession (2008-2012), the average unemployment rate was 6.1 percent for Cottonwood County, 5.3 percent for Region 8, 6.5 percent for the State of Minnesota, and 8.3 percent for the United States. Cottonwood County fared significantly better during the economic recession than the State of Minnesota, and the United States.

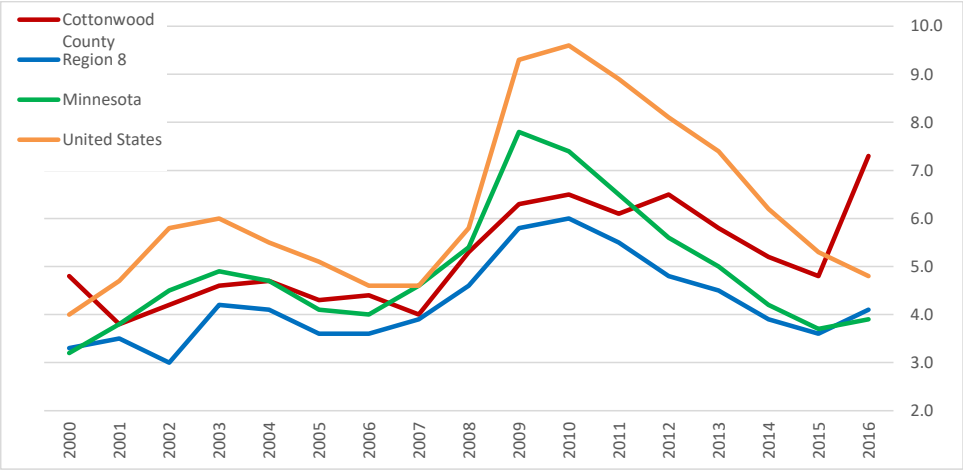
One explanation for Cottonwood County seeing significantly lower unemployment rates was the agriculture industry. Cottonwood County is part of a strong agricultural region in Southwest Minnesota. 66.8 percent of farmers list farming as their primary occupation. County has a significant amount of livestock, including chickens, turkeys, hogs and pigs, cattle, and sheep. Moreover, there is a large employer in the county, the Toro Company, a global lawn and garden equipment manufacturing and sales company headquartered in the city of Windom, and other considerable scale employers such as the Prime Pork, Hy-Vee Foods, Fortune Transportation, Sogge Memorial Good Samaritan, Sanford Regional Medical Center, Preferred Residential services, Windom Public Schools, Cottonwood County, and others.

Figure #33
Unemployment Trends

Year	Cottonwood County	Region 8	Minnesota	United States
2016	7.3	4.1	3.9	4.8
2015	4.8	3.6	3.7	5.3
2014	5.2	3.9	4.2	6.2
2013	5.8	4.5	5.0	7.4
2012	6.5	4.8	5.6	8.1
2011	6.1	5.5	6.5	8.9
2010	6.5	6.0	7.4	9.6
2009	6.3	5.8	7.8	9.3
2008	5.3	4.6	5.4	5.8
2007	4.0	3.9	4.6	4.6
2006	4.4	3.6	4.0	4.6
2005	4.3	3.6	4.1	5.1
2004	4.7	4.1	4.7	5.5
2003	4.6	4.2	4.9	6.0
2002	4.2	3.0	4.5	5.8
2001	3.8	3.5	3.8	4.7
2000	4.8	3.3	3.2	4.0

MN Department of Employment and Economic Development & Bureau of Labor Statistics

Figure #34
Unemployment Trends



4.7.2 Household Income Levels

Changes in income are an indicator of the county's economic condition. Per Capita income is the mean income computed for every person in a specified geographic area. For household income, the median is based on the distribution of the total number of housing units, including those occupants with no income. According to the 2010 Census information, the median household income for Cottonwood County was $40,292, while the Region 8 average was $44,361. Per capita income in Cottonwood County was $23,162, while Region 8 was $23,192. The median family income was $51,705, while Region 8 was $57,072. In all three income examples, Cottonwood County ranked lower than the Region 8 average.

Figure #35
Comparative County Income Levels – Region 8

County	2000 Median Household Income	2010 Median Household Income	2000 Per Capita Income	2010 Per Capita Income	2000 Median Family Income	2010 Median Family Income
Cottonwood	31,943	40,292	16,647	23,162	40,237	51,705
Jackson	36,746	46,869	17,499	25,144	43,426	59,238
Lincoln	31,607	44,672	16,009	24,922	38,605	58,953
Lyon	38,996	46,872	18,013	23,755	48,512	63,793
Murray	34,966	45,657	17,936	24,045	40,893	54,647
Nobles	35,684	43,040	16,987	20,953	43,076	52,356
Pipestone	31,909	40,589	16,450	22,289	40,133	55,609
Redwood	37,352	44,181	18,903	23,548	46,250	55,829
Rock	38,102	45,411	17,411	23,079	44,296	58,147
Region 8	**35,998**	**44,361**	**17,493**	**23,192**	**43,923**	**57,072**

Source: U.S. Census 2000, 2010

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4.8 EMERGENCY RESPONSE PROFILE

4.8.1 Introduction

A county's ability to respond to an emergency situation is based on service areas, facilities, equipment, and staff. An understanding of response times and abilities is critical for providing protection to Cottonwood County residents. The existing facilities, equipment, and staff in Cottonwood County are here to respond to local hazard events and provide regional support. These investments are critical in mitigating the effects of natural and manmade hazards and protecting lives, property, and other assets. Cottonwood County is considered a mutual aid county because they provide and receive support from neighboring counties. The following summary and description serves as an inventory of the response facilities for Cottonwood County. This Chapter profiles the emergency response capabilities of Cottonwood County. Facilities included in the profile include:

- Law Enforcement
- Ambulance Service
- Fire Department
- Medical Facilities
- Red Cross Shelter
- Sirens and other Emergency Notification Devices

Maps of Critical Facilities in participating jurisdictions are included in Appendix A.

4.8.2 Cottonwood County Emergency Management

The Cottonwood County Emergency Management Director administers the county-wide emergency management program Cottonwood County. The Director coordinates the emergency management functions of county and city governmental units assigned to varies emergency management responsibilities. The Director's duties also include the following:

- Coordinates response to actual disasters/emergencies, the logistics of federal field and survey teams, mitigation request and disaster assistance centers
- Coordinates meetings of the Cottonwood County Emergency Management Planning Advisory Commission (EMPAC)
- Works with the EMPAC to develop and maintain the Cottonwood County Emergency Operation Plan (EOP) and test this plan through exercises
- Maintains an inventory and utilization record of county equipment secured through emergency management sources
- Maintains liaison with county and state regional offices
- Prepares informational materials for dissemination to the public and meets with interested groups to explain emergency management programs
- Meets with interested groups to explain the emergency management program and to enlist their support and cooperation

4.9 Profiling Emergency Response Capabilities

The Cottonwood County Emergency Management Office and the Emergency Operations Center (EOC) are located in the Sherriff's Office at the Law Enforcement Center in Windom.

4.9.1 Law Enforcement

In Cottonwood County, the Cities of Comfrey, Windom, Mountain Lake, and Westbrook have independent police departments. The rest of the county is served by the Cottonwood County Sheriff's Office. The Sheriff's deputies patrol approximately 642 square miles, and contract police services to the cities of Bingham Lake, Jeffers, and Storden. Cottonwood County Sheriff Deputies are affiliated with the Jackson, Murray, Watonwan, and Redwood Drug Task Force as Emergency Response Unit and Liaison members.

The Cottonwood County Sheriff's Office houses the Correctional Detention Facility, Emergency Management, and is responsible for courthouse safety and security. The Cottonwood County Sheriff's Office currently has a staff of 21 includes the Sheriff, Deputies, Dispatchers, Jailers, Secretaries, and Custodians. The patrol deputies provide law enforcement and other sheriff's services to the citizens of Cottonwood County.

Cottonwood County Sheriff's Office also operates a county jail system. The Cottonwood County jail is located in Windom, and is connected to the Cottonwood County Law Enforcement Center and directly adjacent to the Cottonwood County Courthouse. The jail operates 24 hours a day and 7 days a week. The jail has 21 beds and house male and female inmates. 10 beds are for inmates with work release privileges and 11 are for those who must serve a sentence with no work release. Cottonwood County will house prisoners from other counties as room allows.

The Cottonwood County 911 Emergency Dispatch and Communications Center works 7 days a week, 24 hours a day, on a variety of shifts and are responsible for the dispatching of Law Enforcement, Fire, and EMS countywide. The Cottonwood County jail provides for the safe, secure, and humane detention of offenders in Cottonwood County.

Windom Police Department

The Windom Police Department's Mission is to provide quality police service to our community by promoting meaningful police/citizen interaction and community partnerships. The Windom Police Department consists of 9 sworn officers consisting of a Chief of Police, Assistant Chief of Police, six Patrol Officers, a School Resource Officer and a Records Clerk. One officer is assigned to the High-risk Entry and Arrest Team (HEAT Team). The HEAT Team currently has 23 operators assigned to the Team, consisting of police officers from both Minnesota and Iowa agencies. We are a part of the regional drug taskforce and the regional Emergency Response Unit.

Mountain Lake Police Department

The Mountain Lake Police Department is a professional law enforcement organization dedicated to serving the citizens of the City of Mountain Lake. The department operates 24 hours per day, seven days per week. The department employs a Police Chief, 3 Full-time Officers, and multiple Part-time Officers. The Mountain Lake Police Department works diligently to provide a safe environment for our citizens to

live, work, and raise their children. The Mountain Lake Police Department is assisted by the Cottonwood County Sheriff's Office.

Comfrey Police Department

The mission of the Comfrey Police Department is to provide the most professional and skilled services possible in the protection of life and property. The Comfrey Police Department is comprised of one full-time officer. The Comfrey Police Department is assisted by the Cottonwood County Sheriff's Office as needed.

Westbrook Police Department

The mission of the Westbrook Police Department is to provide the most professional and skilled services possible in the protection of life and property. The Westbrook Police Department is comprised of one full-time officer. The Westbrook Police Department is assisted by the Cottonwood County Sheriff's Office as needed.

Law enforcement agencies in Cottonwood County are also supported by state and federal law enforcement agencies. Law enforcement can contact the MN Bureau of Criminal Apprehension (BCA) for felony crimes that have occurred in the county or for internal investigations. There are a number of other specialized law enforcement agencies that can provide assistance to Cottonwood County.

4.9.2 Public Health

Cottonwood County is part of the Des Moines Valley Health and Human Services (DVHHS) group. DVHHS provides services across Cottonwood and Jackson Counties. Des Moines Valley Health and Human Services is dedicated to promote, protect and preserve the health and well-being of individuals, families and communities throughout Cottonwood and Jackson Counties in Southwest Minnesota. DVHHS staff focus on helping clients attain the vision of Healthy Practices, Healthy People and Healthy Places. DVHHS provides a number of services in regards to public health and welfare that include: social services, child support, financial assistance, and public health services.

- Social Services include: special needs adoption, adult and children's mental health, adult and child protection, chemical health, developmental disabilities, foster care, child care assistance, individuals with disabilities/chronic illness, licensing of foster and child care providers, family services, and senior services.
- Child support assisting in establishing parentage, establishing court orders for child support, enforcing those orders, providing medical, dental and child care support, collecting and processing payments.
- Financial assistance services that determine eligibility for services ranging from cash assistance, food support, health care and emergency assistance.
- Public Health Services that assure a strong public health system, promote healthy families and communities, prevent the spread of infectious disease, make environments safe and healthy, prepare for disasters and emergencies, and help all people get quality health services.

4.9.3 Medical Facilities

Medical facilities inventoried in Cottonwood County consist of two hospitals, five medical clinics, three nursing homes, five assisted living facilities, and 4 chiropractic clinics.

Hospitals

The hospitals in Cottonwood County are Windom Area Health and Sanford Westbrook Medical Center. Windom Area Health and Westbrook Medical Center are both Level IV trauma centers managed by Sioux Falls-based Sanford Health. Sanford Worthington Medical Center is the closest Level III trauma center. Level II trauma centers are located in Sioux Falls, SD. Windom Area Health an 18-bed full service hospital, an emergency care center, specialty physician clinics, imaging center, and an outpatient services center.

Patients in Cottonwood County are also transferred to hospitals in the region. Other hospitals in the region include: Sanford Worthington Medical Center, Murray County Medical Center, Avera McKennan Hospital, and Sanford USD Medical Center. The Murray County Medical Center is located in Slayton and is a Level IV Trauma Center and is affiliated with the Sanford Health Network. Sanford Worthington Medical Center is located in Worthington and is a Level IV Trauma Center and is owned by Sanford Health. The Avera McKennan Hospital and Sanford USD Medical Center are located in Sioux Falls. Both of these hospitals are Level II Trauma Centers.

Clinics

There are five health clinics within Cottonwood County. The health clinics in Cottonwood County include: Sanford Westbrook Medical Center in Westbrook, Avera United Medical Clinic in Windom, Sanford Health Mountain Lake Clinic, Windom Family Medical Center, and Sanford Health Windom Clinic. In Cottonwood County all of these clinics are classified as Medicare Certified Rural Health Clinics.

Nursing Homes

There are three nursing homes in Cottonwood County. The nursing homes in Cottonwood County include: Good Samaritan Society - Westbrook, Good Samaritan Society - Windom, and Good Samaritan Society – Mountain Lake.

- *Good Samaritan Society – Sogge Memorial (Windom*) is a 78 bed dual Medicare/Medicaid non-profit skilled health care facility that provides 24-hour nursing care 7 days per week. Services include Rehab/skilled care, outpatient therapy, special care unit, and post-acute rehabilitation services.
- *Good Samaritan Society – Mountain Lake* is a 55 bed dual Medicare/Medicaid skilled health care facility. Services include Rehab/skilled care, hospice, outpatient therapy, special care unit, and adult day services.
- *Good Samaritan Society - Westbrook* is a 34 bed dual Medicare/Medicaid non-profit skilled health care facility that provides 24-hour nursing care 7 days per week. Services include Rehab/skilled care, hospice, outpatient therapy, memory care, and adult day services.

Assisted Living Facilities

There are five assisted living facilities in Cottonwood County. The assisted living facilities in Cottonwood County include: Good Samaritan Society – Remick Ridge Estates and Mikkelsen Manor (Windom), Pineview Assisted Living in Windom, Good Samaritan Society (Windom and Mountain Lake) which plays roles in both nursing homes and assisted living facility, Peterson estates – Westbrook, and Brickstone Manor Senior Living in Comfrey.

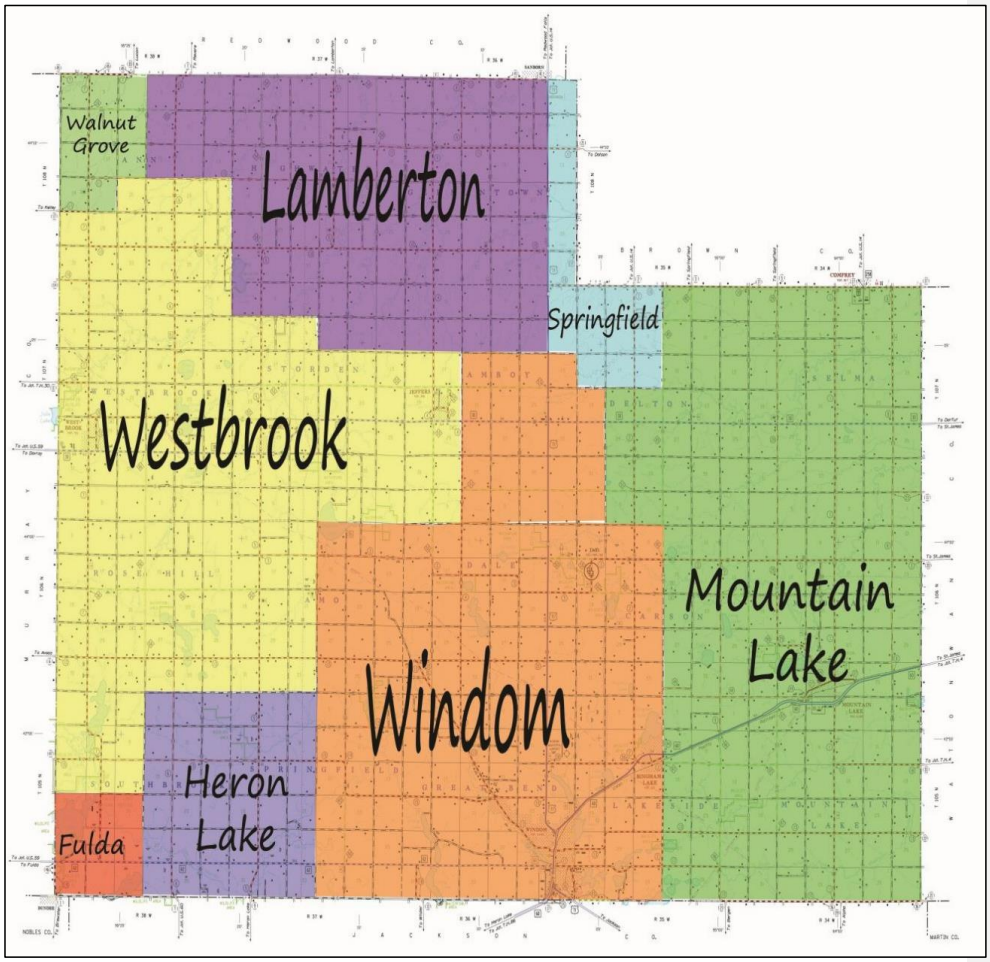
Chiropractic Clinics

There are 4 chiropractic clinics in Cottonwood County. The chiropractic clinics in Cottonwood County include: Evers Chiropractic - Westbrook, Progressive Chiropractic – Mountain Lake, Hedman Chiropractic – Windom, and ChiroCare - Windom and Wellness. There may be other Chiropractic Clinics, but they were not searchable online.

4.9.4 Ambulance Service

There are three primary Ambulance Districts in Cottonwood County. The primary Ambulance Districts include: Windom Ambulance District, Mountain Lake Ambulance District, and Westbrook Ambulance District. Additional ambulances can be called from neighboring counties. Secondary Ambulance Districts include: Heron Lake Ambulance District, Fulda Ambulance District, Walnut Grove Ambulance District, and Murray County Ambulance District.

Figure #36
Ambulance Districts – Cottonwood County



Windom Ambulance Service (Windom EMS)

The Windom Ambulance Service covers the cities of Windom, Bingham Lake, and unincorporated Delft. They serve all of Great Bend Township and parts of Amboy, Amo, Carson, Dale, Lakeside, and Springfield Townships in Cottonwood County. The Windom Ambulance Service is composed of 25 volunteer staff members on call 24 hours a day and 7 days a week. Windom Has 2 type III ambulances and 1 type I four wheel drive ambulance and went on 963 calls in 2018.

Windom Ambulance service has Mutual Aid agreements with Mountain Lake, Westbrook, Saint James, Jackson, Heron Lake, Lakefield, and Worthington.

Mountain Lake Ambulance Service (Mountain Lake EMS)

The Mountain Lake Ambulance Service covers the City of Mountain Lake and a portion of Comfrey. They serve all of Midway, Mountain Lake, and Selma townships. They service parts of Carson, Delton, and Lakeside Townships in Cottonwood County.

Mountain Lake Ambulance Service is composed of 21 volunteer staff members on call 24 hours a day and 7 days a week. Mountain Lake has 2 type III ambulances. Mountain Lake Ambulance Service went on approximately 209 calls in 2016.

Mountain Lake Ambulance service has mutual aid agreements with Windom, Westbrook, St. James, Jackson, and Gold Cross.

Westbrook Ambulance District (Westbrook EMS)

The Westbrook Ambulance Service covers the cities of Westbrook, Storden, and Jeffers. They serve all of Rose Hill and Westbrook Townships and parts of Amboy, Amo, Ann, Dale, Southbrook, and Storden Townships in Cottonwood County. The Westbrook Ambulance Service is composed of 14 volunteer staff members on call 24 hours a day and 7 days a week. The Westbrook has 1 type III ambulance and 1 type I four wheel drive ambulance and went on approximately 150 calls in 2016.

Westbrook Ambulance service has Mutual Aid agreements with Windom, Mountain Lake, Walnut Grove, Tracy, and Murray County.

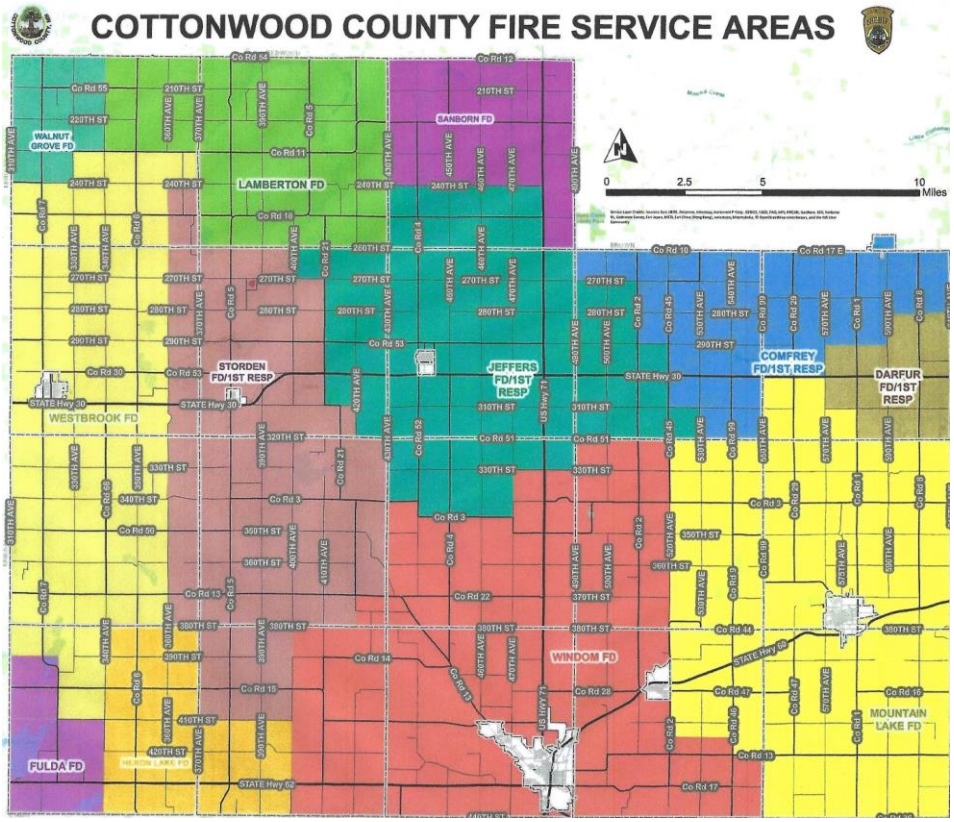
Jeffers Ambulance Service (Jeffers EMS)

The Jeffers Ambulance Service disbanded in 2014 and now has only First Responders. The City of Jeffers is now part of the Westbrook Ambulance service area, and the rest of their territory was split between Westbrook, Lamberton, Windom, Mountain Lake, and Springfield Ambulance services. The Emergency Medical Services Regulatory Board (EMSRB) approved the new territories.

4.9.5 Fire/ Emergency Services

There are no full time fire departments within Cottonwood County. All fire departments are volunteer based with responsibilities being divided between the fire districts. The five districts allow for response times to be reduced, but since Cottonwood County is a rural county some areas are better served than other. There are five fire districts in Cottonwood County, which include: Jeffers Fire District, Mountain Lake Fire District, Storden Fire District, Westbrook Fire District, and Windom Fire District.

Figure #37
Fire District Map – Cottonwood County



4.9.6 Fire Districts

Jeffers Fire Department (Jeffers Fire District)

The Jeffers Fire Department covers the City of Jeffers as well as the township of Amboy. They also cover portions of Dale, Delton, Germantown, and Storden Townships.

The Jeffers Fire Department consists of 21 volunteer fire fighters. The Jeffers Fire Department went on 24 calls in 2016 and 2017. The Jeffers Fire Department does have mutual aid agreements with all the fire departments in Cottonwood County as well as Sanborn, Lamberton, and the Southwest Regional Fire Department Association.

The Jeffers Fire Department needs:

- The Jeffers Fire Department needs to update some SCBA equipment and a tanker truck.
- The Jeffers Fire Department responded to 15 **Structure fires** between the years of 2013 and 2016. The records from 2005 to 2012 were lost when a computer failed.
- There is not an emergency generator at the fire hall. There are 3 generators in the city, 2 owned by Jeffers and 1 owned by the county.

Mountain Lake Fire Department (Mountain Lake Fire District)

The Mountain Lake Fire Department covers the City of Mountain Lake as well as the townships of Midway and Mountain Lake. They also cover portions of Carson, Delton, Lakeside, and Selma Townships.

The Mountain Lake Fire Department consists of 25 volunteer fire fighters. The Mountain Lake Fire Department went on 57 calls in 2016 and 2017. The Mountain Lake Fire Department does have mutual aid agreements with all the fire departments in Cottonwood County as well as The West Central and Southwest Fire Department Associations.

The Mountain Lake Fire Department needs:

- The Mountain lake Fire Department is upgrading its pumper truck; however the need for updated airpacks and turnout gear remains. Some of the turnout gear is outdated, but every year they try to get some updated.
- The Mountain Lake Fire Department responded to 42 **Structure fires** between the years of 2005 and 2018.
- The fire hall does not have a backup generator.

Storden Fire Department (Storden Fire District)

The Storden Fire Department covers the City of Storden. They also cover portions of Amo, Ann, Rose Hill, Springfield, Storden, and Westbrook Townships.

The Storden Fire Department consists of 21 volunteer fire fighters. The Storden Fire Department went on 23 calls in 2016 and 2017. The Storden Fire Department does have mutual aid agreements with all

the fire departments in Cottonwood County and the Southwest Regional Fire Department Association. The Storden Fire Department responded to 9 Structure fires between the years of 2014 and 2018.

The Storden Fire Department needs:

- Like many small rural fire departments, the Storden Fire Department needs some updated SCBA equipment, helmets, and turnout gear. A new fire hall to accommodate today's equipment is also a need. The current fire hall does not have a generator either, and one would be considered a need.
- Generators – Besides the fire hall, Storden needs a generator at the Storden Community Center. This was identified by public officials because in the event of a long duration power outage, a warming shelter could be opened in the community center if a generator was available. It could also operate as an EOC for the city in the event one is needed.

Westbrook Fire Department (Westbrook Fire District)

The Westbrook Fire Department covers the City of Westbrook. They also cover portions of Ann, Rose Hill, Southbrook, and Westbrook Townships.

The Westbrook Fire Department consists of 27 volunteer fire fighters. The Westbrook Fire Department went on 33 calls in 2016-2017. The Westbrook Fire Department does have mutual aid agreements with all the fire departments in Cottonwood and Redwood Counties as well as Dovray, Fulda, Walnut Grove, Heron Lake, and the Southwest Regional Fire Department Association

The Westbrook Fire Department needs:

- Current needs for the fire department are a new rescue truck and new air packs. The rescue truck is becoming unreliable and unsafe. A new rescue truck would more reliable and would be safer in the time of need. The air packs are becoming too expensive and we need to increase our safety and reliability.
- The Westbrook Fire Department responded to 52 **Structure fires** between the years of 2005 and 2017.
- The fire hall does not have an emergency generator. The city has a generator at the light plant building.

Windom Fire Department (Windom Fire District)

The Windom Fire Department covers the Cities of Windom and Bingham Lake as well as the township of Great Bend. They also cover portions of Amo, Dale, Carson, Lakeside, and Springfield Townships.

The Windom Fire Department consists of 30 volunteer fire fighters. The Windom Fire Department went on 62 calls in 2018. The Windom Fire Department does have mutual aid agreements with all the fire departments in Cottonwood County as well as Jackson, Heron Lake, Lakefield, Worthington, and St. James

The Windom Fire Department needs: The Windom Fire Department has several pieces of equipment that needs to be updated or replaced.

1. 1993 International Engine/Pumper – Truck is aging and in need of repairs and the Foam system in no longer working
2. 1998 Freightliner Engine Pumper – This truck is our city engine and is showing its age
3. 1985 Rescue Boat – very small in size to be conducting water rescues in, motor needs to be updated
4. Pagers – Department is currently using the Motorola 5 pagers, looking at up grading to the 6 model
5. Portable Radios – Communication is very important to our operations and need to start a schedule for replacing radios to stay up to date

The Windom Fire Department responded to 177 **Structure fires** between the years of 2005 and 2016.

The Windom Fire Department has a generator at the emergency services building. They received a 60,000 KW generator from the Minnesota DNR, it is a diesel powered generator that will power the entire Emergency Services Facility in the event that the city would lose power. The generator has 240 hours of operation on the meter, and before the generator was installed the engine was closely inspected.

The Windom Fire Department is operating out of a brand new emergency services building that features 10 stalls for the Fire Apparatus and 3 stalls for Ambulances. The building also has a base radio that they use if the building was to be used as a shelter or an operations center. They have multiple restrooms and living quarters built into the facility. They also have a full kitchen area and a meeting/Training room is large enough to hold 50 to 70 people.

4.10 Red Cross Shelters

American Red Cross Southwest Minnesota Chapter serves communities across Yellow Medicine, Lincoln, Lyon, Redwood, Renville, McLeod, Sibley, Nicollet, Blue Earth, Watonwan, Brown, Cottonwood, Murray, Pipestone, Rock, Nobles, Martin and Faribault counties, coving the nine counties in Southwest Minnesota. There are three shelter trailers; one is in Marshall, one is in Worthington and one is in Pipestone. The American Red Cross Southwest Minnesota Chapter is an Emergency Support Function (ESF) #6 and #15.

ESF #6 is responsible for Mass Care, Emergency Assistance, Housing, and Human Services. ESF #6 coordinates the delivery of federal mass care, emergency assistance, housing, and human services when local, tribal, and state response and recovery needs exceed their capabilities.[14]

- *Mass Care* - Includes sheltering, feeding operations, emergency first aid, bulk distribution of emergency items, and collecting and providing information on victims to family members.
- *Emergency Assistance*: Assistance required by individuals, families, and their communities to ensure that immediate needs beyond the scope of the traditional "mass care" services provided at the local level are addressed. These services include: support to evacuations (including registration and tracking of evacuees); reunification of families; provision of aid and services to special needs populations; evacuation, sheltering, and other emergency services for household pets and service animals; support to specialized shelters; support to medical shelters; nonconventional shelter management; coordination of donated goods and services; and coordination of voluntary agency assistance.
- *Housing* - Includes housing options such as rental assistance, repair, loan assistance, replacement, factory-built housing, semi-permanent and permanent construction, referrals, identification and provision of accessible housing, and access to other sources of housing assistance. This assistance is guided by the National Disaster Housing Strategy.
- *Human Services* - Includes the implementation of disaster assistance programs to help disaster victims recover their non-housing losses, including programs to replace destroyed personal property, and help to obtain disaster loans, food stamps, crisis counseling, disaster unemployment, disaster legal services, support and services for special needs populations, and other Federal and State benefits.

Emergency Support Function (ESF) #15 ensures that sufficient federal assets are deployed to the field during incidents requiring a coordinated federal response to provide accurate, coordinated, timely, and accessible information to affected audiences, including governments, media, the private sector, and the local populace, including the special needs population. ESF #15 provides the resource support and mechanisms to implement the National Response Framework (NRF) Incident Communications Emergency Policy and Procedures (ICEPP) described in the Public Affairs Support Annex.[15]

[14] FEMA. Accessed: 8/17/17. Available: http://www.fema.gov/pdf/emergency/nrf/nrf-esf-06.pdf
[15] FEMA. Accessed: 8/17/17. Available: https://www.hsdl.org/?view&did=483049

4.11 Sirens and other Emergency Notification Devices

Outdoor warning sirens provide coverage in cities and other more densely populated areas within Cottonwood County. The emergency sirens can be activated by the Cottonwood County Dispatchers or city officials to warn residents in the event of severe weather. Cottonwood County is a rural county, so large portions of the county are outside the range of severe weather warning sirens. Refer to Figure #83 for outdoor warning siren coverage and needs in Cottonwood County.

Since Cottonwood County is a rural county, additional measures are in place to expand the notification system. Emergency warnings over the radio are still an effective medium to reach wide audiences. NOAA Weather Radio is used for broadcasting serve weather warnings. NOAA Weather Transmitter is the Rowena Tower.

Cottonwood County selected CivicReady Community Notification System as their emergency response system. CivicReady has the capability to alert citizens who are in the direct path of the emergency, and gives you the tools to quickly send notifications via mobile (text/voice) phone, landline phone, email, social media, and many other channels.

Windom Public School District uses Skyward (Skylert), an automated alert system. Mountain Lake Public Schools use JMC Messaging Center as their alert system. Westbrook-Walnut Grove schools use JMC Messaging Center as well. All Cottonwood County schools conduct fire and lockdown drills in accordance with the Minnesota Department of Education's regulations. Bus drills are conducted at the beginning of the year. Tornado drills are held in schools statewide in April.

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Section 5 – Risk Assessment

The goal of mitigation is to reduce the future impacts of a hazard including loss of life, property damage, disruption to local and regional economies, and the expenditure of public and private funds for recovery. Sound mitigation practices must be based on sound risk assessment. A risk assessment involves quantifying the potential loss resulting from a disaster by assessing the vulnerability of buildings, infrastructure, and people.

Basing risk assessments on the best information available is important in developing effective mitigation actions that benefit communities. Geographic Information System (GIS) tools are not only helpful in producing maps, but they also show structures at risk and may determine damage estimates for potential hazard scenarios. MN Homeland Security and Emergency Management (HSEM) mitigation staff encourages the use of GIS tools in risk assessments because they produce good information to be used in the risk assessment process. In recognition of the importance of planning in mitigation activities, FEMA created **Haz**ards **US**A **All**-**H**azard (Hazus-MH), a powerful GIS-based disaster risk assessment tool. This tool enables communities to predict estimated losses from floods, hurricanes and other related phenomena and to measure the impact of various mitigation practices that might help reduce those losses. Hazus-MH was used by University of Minnesota Duluth Geospatial Analysis Center staff in the flood hazard risk assessment.

This assessment identifies the characteristics and potential consequences of a disaster, how much of the community could be affected by a disaster, and the impact on community assets. A risk assessment consists of 3 components — hazard identification, risk profile, and vulnerability profile. The last step is the risk ranking for each jurisdiction.

5.1 Hazard Identification/Profile

5.1.1 Hazard Identification

The cornerstone of the risk assessment is identification of the hazards that affect jurisdictions. To facilitate the planning process, several sources were employed to ensure that the natural hazards are identified prior to assessment.

The County maintenance of the plan includes continual updates of the hazards identified in the initial plan. The mitigation planning team decided to compare the hazards in the initial plan to the current publications to determine if new hazards should be considered or if some should be deleted.

Natural hazards are identified in the FEMA publication "Multi-Hazard Identification and Risk Assessment – A Cornerstone of the National Mitigation Strategy" also known as MHIRA. FEMA Region V developed a list based on state mitigation plans in the region. The list was divided into natural (Figure #38) and other hazards (Figure #39) as was done in the 2014 Minnesota State Hazard Mitigation Plan.

Figure #38
FEMA MHIRA Natural Hazards in the 2014 Minnesota State Hazard Mitigation Plan

Flooding	Hail	Drought
Dam/Levee Failure	Lightning	Extreme Heat
Wildfire*	Winter Storms	Extreme Cold
Windstorms	Erosion	Earthquakes
Tornadoes	Land Subsidence (Sinkholes & Karst)	

**Addressed in the State Mitigation Plan because Minnesota is a heavily forested state compared to other states in Region V.*

For the purpose of this plan, FEMA defines other hazards or "man-made hazards" as technological hazards and terrorism. These are distinct from natural hazards primarily in that they originate from human activity. In contrast, while the risks presented by natural hazards may be increased or decreased as a result of human activity, they are not inherently human-induced. The term "technological hazards" refers to the origins of incidents that can arise from human activities such as the manufacture, transportation, storage, and use of hazardous materials. For the sake of simplicity, this guide assumes that technological emergencies are accidental and that their consequences are unintended. The term "terrorism" refers to intentional, criminal, and malicious acts. There is no single, universally accepted definition of terrorism, and it can be interpreted in many ways. For the purposes of this plan, FEMA refers to "terrorism" as 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 "cyber terrorism."

Figure #39
FEMA MHIRA Other Hazards in the 2014 Minnesota State Hazard Mitigation Plan

Terrorism	Nuclear Generating Plant Incidents	Ground and Surface Water Supply Contamination*
Infectious Disease Outbreak	Hazardous Materials Incidents	
Fires (Structures and Vehicles)	Transportation Incidents	

**Addressed in the State Hazard Mitigation Plan because Minnesota has made a high investment in its prized resource, water.*

5.1.2 Vulnerability Assessment by Jurisdiction

The planning team met multiple times to review and update the hazards faced by residents of Cottonwood County, update the existing mitigation actions published in the 2011 All Hazard Mitigation Plan, and propose new mitigation actions.

To engage in this process the planning team drew on a number of data sources. First, the planning team examined the hazards identified in the 2011 Cottonwood County All Hazard Mitigation Plan (Figure #40). The existing mitigation actions were discussed and adjusted to reflect the definitions of natural hazards used in the State of Minnesota 2014 Multi-Hazard Identification and Risk Assessment list of natural hazards. This was done in order to assure that the risks faced by Cottonwood County were categorized the same way as the priority hazards established by the State of Minnesota.

Figure #40
Hazards Identified in the 2011 Cottonwood County All Hazard Mitigation Plan

Natural Hazards	Technological Hazards
Severe Summer Storms & Lightning	Structure Fires
Floods	Hazardous Materials
Drought	Civil Disturbances/Terrorism
Wildfires	Tornado and Straight-Line Winds
Public Health & Infectious Diseases	Dam Failure
Agricultural Disease	Blizzards and Severe Winter Storms
Extreme Temperatures	Hail

While the AHMP mainly deals with natural hazards, this planning took place with the understanding that many non-natural hazards could occur as a result of natural disasters (i.e. disruption in electrical service due to freezing rain causing problems for both utility corporations and vulnerable populations dependent on electricity for heat).

This plan draws on a variety of data sources including the State of Minnesota and Homeland Security Emergency Management Critical Infrastructure Strategy for the State of Minnesota (2010), FEMA's Local Mitigation Planning How-to Guide Integrating Manmade Hazards into Mitigation Planning (2003), and the State of Minnesota All Hazards Identification Risk Assessment.

Based on the planning team's comparison of these two sets of hazards, the planning team developed a list of hazards faced by Cottonwood County to address in the 2019 plan update (Figure #41).

Figure #41
Hazards Included in the 2019 Cottonwood County All Hazard Mitigation Plan Update

Natural Hazards		
Flooding (& Dam Failure)	Severe Summer Storms (Tornadoes, Thunderstorms, Windstorms, Lightning, Hail)	Severe Winter Storms
Erosion	Extreme Temperatures	Extreme Cold
Drought	Wildfire	
Other Hazards		
Water Supply Contamination	Hazardous Materials	Public Health/Infectious Diseases
Civil Disturbance	Agricultural Disease	Utility Failure
Structure Fire		

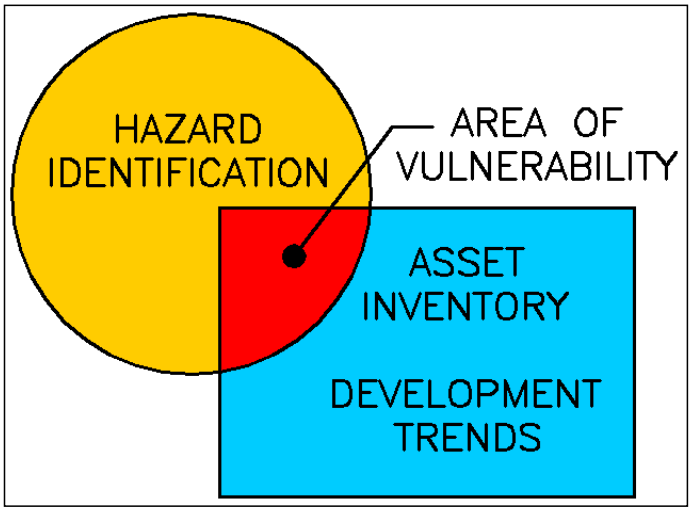
The committee drew on the 2018 Cottonwood County Calculated Priority Risk Index (CPRI) rankings to prioritize each hazard for inclusion in the plan. The methodology of the CPRI is outlined below.

Commented [RB1]: Should the spelling out of this acronym be where it is first introduced (pg 12)?

5.1.3 Calculated Priority Risk Index

The vulnerability assessment builds upon the previously developed hazard information by identifying the community assets and development trends and intersecting them with the hazard profiles to assess the potential amount of damage that could be caused by each hazard event. This concept is generally illustrated in Figure #42. A summary of Calculated Priority Risk Index (CPRI) Categories and Risk Levels is shown in Figure #43.

Figure #42
Conceptual Depiction of a Vulnerability Analysis



Definitions of CPRI Categories in Figure #43

Probability – a guide to predict how often a random event will occur. Annual probabilities are expressed between 0.001 or less (low) up to 1 (high). An annual probability of 1 predicts that a natural hazard will occur at least once per year.

Magnitude/Severity – indicates the impact to a community through potential fatalities, injuries, property losses, and/or losses of services. The vulnerability assessment gives information that is helpful in making this determination for each community.

Warning Time – plays a factor in the ability to prepare for a potential disaster and to warn the public. The assumption is that more warning time allows for more emergency preparations and public information.

Duration – relates to the span of time local, state, and/or federal assistance will be necessary to prepare, respond, and recover from a potential disaster event.

Figure #43: Summary of Calculated Priority Risk Index (CPRI) Categories and Risk Levels

CPRI Category	DEGREE OF RISK			Assigned Weighting Factor
	Level ID	Description	Index Value	
Probability	Unlikely	Extremely rare with no documented history of occurrences or events. Annual probability of <0.001	1	45%
	Possible	Rare occurrences with at least one documented or anecdotal historic event. Annual probability that is between 0.01 and 0.001.	2	
	Likely	Occasional occurrences with at least two or more documented historic events. Annual probability that is between 0.1 and 0.01.	3	
	Highly Likely	Frequent events with a well-documented history of occurrence. Annual probability that is greater than 0.1.	4	
Magnitude/ Severity	Negligible	Negligible property damages (less than 5% of critical and non-critical facilities and infrastructure). Injuries or illnesses are treatable with first aid and there are no deaths. Negligible quality of life lost. Shutdown of critical facilities for less than 24 hours.	1	30%
	Limited	Slight property damages (greater than 5% and less than 25% of critical and non-critical facilities and infrastructure). Injuries or illnesses do not result in permanent disability and there are no deaths. Moderate quality of life lost. Shut down of critical facilities for more than 1 day and less than 1 week.	2	
	Critical	Moderate property damages (greater than 25% and less than 50% of critical and non-critical facilities and infrastructure). Injuries or illnesses result in permanent disability and at least one death. Shut down of critical facilities for more than 1 week and less than 1 month.	3	
	Catastrophic	Severe property damages (greater than 50% of critical and non-critical facilities and infrastructure). Injuries or illnesses result in permanent disability and multiple deaths. Shut down of critical facilities for more than 1 month.	4	
Warning Time	Less than 6 hours	Self-explanatory.	4	15%
	6 to 12 hours	Self-explanatory.	3	
	12 to 24 hours	Self-explanatory.	2	
	More than 24 hours	Self-explanatory.	1	
Duration	Less than 6 hours	Self-explanatory.	1	10%
	Less than 24 hours	Self-explanatory.	2	
	Less than one week	Self-explanatory.	3	
	More than one week	Self-explanatory	4	

The prioritized list of hazards is presented in Figure #44 and is based on the ranking of hazards in the 2018 Cottonwood County CPRI.

Figure #44
Priorities of Risks Faced by Cottonwood County

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Risk Index	*Risk Severity*
Tornado	2.55	3.45	3.51	2.78	2.99	Medium
Winter Storm	3.60	2.10	2.36	2.66	2.87	Medium
Windstorm	3.25	2.16	3.06	2.22	2.79	Medium
Lightning	3.10	1.85	3.50	2.00	2.68	Medium
Hail	3.20	1.75	3.45	1.86	2.67	Medium
Extreme Cold	3.05	1.70	1.75	2.95	2.44	Medium
Extreme Heat	2.85	1.70	1.80	2.75	2.34	Medium
Flash Flood	2.25	2.10	2.56	2.25	2.25	Medium
Wildfire	1.65	1.80	3.35	2.05	1.99	Low
Drought	2.10	1.55	1.51	3.51	1.99	Low
Flood (Riverine)	1.55	1.65	1.60	2.60	1.69	Low
Earthquake	1.05	1.95	2.89	1.79	1.67	Low
Dam Failure	1.11	1.78	2.17	1.89	1.55	Low
Erosion	1.53	1.18	1.47	2.12	1.47	Low
Subsidence	1.06	1.35	2.59	1.76	1.45	Low
Landslide/Mudslide	1.06	1.22	2.44	1.61	1.37	Low

Hazard Profiling Concept of Planning

The risk assessments identify the characteristics and potential consequences of a disaster, how much of the community could be affected by a disaster, and the impact on community assets. A risk assessment consists of 3 components—hazard identification, risk profile, and vulnerability profile. The last step is the risk ranking for each jurisdiction.

5.1.4 GIS and Hazus-MH

The risk analysis step in this assessment quantifies the risk to the population, infrastructure, and economy of the community. Hazards that can be geographically identified (wildland fires, windstorms, tornadoes, hail, floods) were mapped.

Hazus-MH was used to estimate the damages incurred for a 100-year flood event and for general asset assessment. Hazus-MH also generates a combination of site-specific and aggregated loss estimates for the entire county due to a 100-year flood event. Aggregate inventory loss estimates, which include building stock analyses, are based upon the assumption that building stock is evenly distributed across each census block. Therefore, it is possible that overestimates of damage will occur in some parts of areas while underestimates will occur in other areas. With this in mind, total loss estimates tend to be more reliable over larger geographic areas (groups of many blocks) than for individual census blocks. It is important to note that Hazus-MH is not intended to be a substitute for detailed engineering studies. Rather, it is intended to serve as a planning aid for communities interested in assessing their risk to flood-, earthquake-, and hurricane-related hazards. This documentation does not provide full details on the processes and procedures completed in the development of this project. It is only intended to highlight the major steps that were followed during the project.

Site-specific analysis is based upon loss estimations for individual structures. For flooding, analysis of site-specific structures takes into account the depth of water in relation to the structure. Hazus-MH also takes into account the actual dollar exposure to the structure for the costs of building reconstruction, content, and inventory. However, damages are based upon the assumption that each structure will fall into a structural class, and structures in each class will respond in a similar fashion to a specific depth of flooding. Site-specific analysis is also based upon a point location rather than a polygon, therefore the model does not account for the percentage of a building that is inundated. These assumptions suggest that the loss estimates for site-specific structures as well as for aggregate structural losses need to be viewed as approximations of losses that are subject to considerable variability rather than as exact engineering estimates of losses to individual structures.

5.1.5 National Climatic Data Center (NCDC) Records

Historical storm event data was compiled from the National Climatic Data Center (NCDC). NCDC records are estimates of damage reported to the National Weather Service (NWS) from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to given weather events.

The NCDC data included 219 reported events in Cottonwood County between 1955 and November of 2014. However, some weather event categories only had available data going back as recent as 1996. No records before 1955 were available. A summary table of events related to each hazard type is included in the hazard profile sections that follow. A full table listing all events, including additional details, is included in Appendix B. NCDC hazard categories used in this plan are listed in Figure #45.

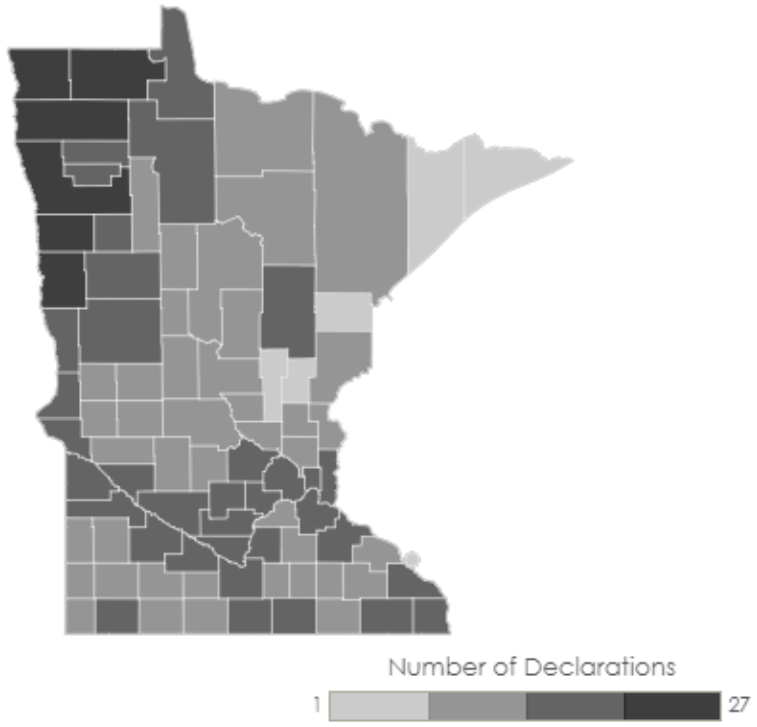
Figure #45
National Climatic Data Center Historical Hazards

Hazards	
Tornado	Hail Storm
Thunderstorm Wind	Flood/Flash Flood
Severe Snow Events	Ice Storms
Extreme Cold/Wind Chill	Excessive Heat

5.1.6 FEMA Declared Disasters

Another historical perspective is derived from FEMA-declared disasters. Eleven federal disaster declarations in Cottonwood County have been made between 1953 and 2016, of which 3 involved flooding (Figure #46).[16]

Figure #46
FEMA-Declared Disasters in Minnesota



In Cottonwood County, eleven FEMA disaster declarations have been made between 1965 and 2014. Figure #47 and Figure #48 show the details of the disasters including payments for Public Assistance (PA) and Individual Assistance (IA), listed under the flooding and severe storms profiles. No declarations were made for the other storms listed in the NCDC database. Reviewing the federal payments for damages from the declared disasters is a way of correlating the impact from the NCDC report.

[16] FEMA Data Visualization: Disaster Declarations for States and Counties. Accessed 7/27/17. Available: https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties

Figure #47
FEMA-Declared Major Disasters in Cottonwood County (1965-2016)

Incident	Declaration Date and Disaster Number	Incident Period	Total PA Obligated by FEMA for Disaster in Minnesota	Total PA Obligated by FEMA for Disaster in Cottonwood County	Individual Assistance in Minnesota	Individual Assistance in Cottonwood County
Severe Storms, Straight-Line Winds, Flooding, Landslides, And Mudslides	DR-7/21/2014	6/11/2014-7/11/2014	$41,013,710	$519,946	No	No
Severe winter Storm	DR-4113	4/9/2013 – 4/11/2013	$11,090,674	$494,457	No	No
Severe Storms, Flooding	DR-1982 5/10/2011	3/16/2011-5/25/2011	$20,790,850	$293,907	No	No
Severe Storms And Flooding	DR-1941 10/13/2010	9/22/2010–10/14/2010	$25,963,422	$505,995	No	No
Flooding	DR-1900 4/19/2010	3/1/2010-4/26/2010	$12,721,045	$36,450	No	No
Tornadoes and Severe Storm	DR-1212 4/1/1998	3/29/1998	Unknown	Yes $ Unknown	Unknown	Yes $ Unknown
Severe Winter Storms	DR-1158 1/16/1997	1/3/1997 – 2/3/1997	Unknown	Yes $ Unknown	No	No
Severe Ice Storm	DR-1151 1/7/1997	11/14/1996 – 11/30/1996	Unknown	Yes $ Unknown	No	No
Severe Storms, Tornadoes & Flooding	DR-993 6/11/1993	5/6/1933 – 8/25/1993	Unknown	Yes $ Unknown	Yes $ Unknown	Unknown
Flooding	DR-255 4/18/1969	4/18/1969	Unknown	Yes $ Unknown	Unknown	Yes $ Unknown
Flooding	DR-188 4/11/1965	4/11/1965	Unknown	Yes $ Unknown	Unknown	Yes $ Unknown

Data provided by FEMA: https://www.fema.gov/media-library/assets/documents/28318 accessed on July 26, 2017. Values are estimates collected at the time of the disaster.

Figure #48
FEMA-Declared Emergencies in Cottonwood County (1976-2016)

Incident	Declaration Date and Disaster Number	Incident Period	Individual Assistance in Minnesota	Public Assistance (all affected areas)
Hurricane Katrina Evacuation	09/13/2005 EM-3242	08/29/2005 to 10/1/2005	No	$2,391,613
Drought	06/17/1976 EM-3013	06/17/1976	No	Yes $ Unknown

**Note the Public Assistance totals are estimates collected at the time of the disaster. Data provided by FEMA:* https://www.fema.gov/media-library/assets/documents/28318 and https://www.fema.gov/media-library/assets/documents/28344 *Accessed on July 26, 2017.*

There have been no historical projects in Cottonwood County resulting from hazard mitigation funding.[17]

[17] FEMA Hazard Mitigation Program Summary - Open Government Dataset 4/10/2017. Accessed 7/27/17. Available: https://www.fema.gov/media-library/assets/documents/28323

5.2 Vulnerability Assessment

5.2.1 Asset Inventory

The Hazus-MH defaults, critical facilities, and essential facilities have been updated based on the most recent available data sources. The essential facility updates (schools, medical care facilities, fire stations, and police stations) were integrated into the Hazus-MH input database. Other critical facilities identified by the county were geocoded and overlaid with the Hazus-MH flood model output.

FEMA's Hazus 4.2 in ArcGIS 10.5.1 was used to estimate the potential losses incurred for a 100-year flood event in Cottonwood County using a Digital Flood Insurance Rate Map (DFIRM). A 10-meter DEM (digital elevation model) to create a flood depth grid. The resulting HAZUS-MH 100-yr floodplain output is shown in Figure 1.

5.2.2 Facility Replacement Costs

According to the Cottonwood County general building stock (derived from the county's parcel data and imported to the Hazus model), the Hazus model estimates there are 5,785 parcels with buildings in the region with a total replacement value (excluding contents) of $603 million (2010 dollars). Approximately 71% of the buildings (and 52% of the building value) are associated with residential housing. The Hazus model estimated 66 parcels' buildings will be at least moderately damaged (>10% damage). 5 buildings are estimated to be completely destroyed.

Facility replacement costs and total building exposure are identified in Figure #49, which also includes the estimated number of buildings within each occupancy class as calculated by Hazus general building stock.

Figure #49
Cottonwood County Total Economic Loss from a 100-Year Flood

General Occupancy	Estimated Total Buildings	Total Damaged Buildings	Total Building Exposure	Total Economic Loss	Building Loss
Agricultural	1,142	0	$170,982,000	$16,242,000	$522,000
Commercial	417	12	$55,424,000	$23,276,000	$1,306,000
Education	0	0	$0	$0	$0
Government	0	0	$0	$0	$0
Industrial	92	0	$62,966,000	$586,000	$94,000
Religious /Non-Profit	0	0	$0	$0	$0
Residential	4,134	87	$314,081,000	$11,639,000	$3,685,000
Total	**5,785**	**99**	**$603,453,000**	**$51,743.000**	**$5,607,000**

Source: Flood Hazard Analysis for Cottonwood County, June 2018, Geospatial Analysis Center, Swenson College of Science and Engineering

Census blocks of concern should be reviewed in more detail to determine the actual location and proximity of facilities with respect to the flood hazard areas. The aggregate losses reported in this study may be overstated due to the fact that values are distributed evenly across a census block. The 3 census blocks with the greatest estimated loss values (calculated by adding the total value of the buildings + the value of the buildings' contents located within a census block), which contain parcels with buildings located in the floodplain, are shown in Table 2. These potentially high loss census blocks, used for the loss estimation, and the Hazus-MH output floodplain are shown in Figure 6, Figure 7, and Figure 8. In some cases, the assets of value may not fall in the floodplain in the same proportion that the floodplain covers the entire census block. For this reason, some potential losses may be overstated.

Figure #50
Cottonwood County Census Blocks with the Greatest Estimated Losses in the 100-Year Floodplain

Census Block Number	Total Estimated Loss	Location
270332704002024	$1,243,000	Windom
270332704003060	$920,000	Windom
270332703004012	$778,000	Windom

An additional analysis was performed to identify the 10 parcels with the highest values (building + contents) that contain buildings which intersect the 100-year floodplain. Some of the parcels are located in one of the 3 census blocks with the greatest estimated loss; these parcels are labeled accordingly. The results of this analysis (and total building values) are shown in Table 3.

Figure #51
Cottonwood County Properties with Highest Building/Contents Value Intersecting 100-Year Floodplain

Parcel ID	Parcel Building + Contents Total Value	Class Description	Building Area (ft^2)
120250500	$ 6,145,250	Industrial - Light	138,393
251030010	$ 3,064,200	Commercial – Retail Trade	45,757
256220010	$ 2,615,400	Commercial – Retail Trade	28,086
251640021	$ 2,429,600	Commercial – Retail Trade	12,101
256220030	$ 1,913,600	Commercial – Retail Trade	35,059
258200530	$ 1,630,000	Commercial – Retail Trade	8,257
251640060	$ 1,340,600	Commercial – Retail Trade	38,679
253540020	$ 976,600	Commercial – Retail Trade	4,209
160140300	$ 917,000	Agriculture	20,434
251640011	$ 913,200	Commercial – Retail Trade	11,893
Total	***$ 21,945,450***		

5.3 Future Development

Because Cottonwood County is vulnerable to a variety of natural and other hazards, the county government—in partnership with state government—must make a commitment to prepare for the management of these types of events. Cottonwood County is committed to ensuring that county elected and appointed officials become informed leaders regarding community hazards so that they are better prepared to set and direct policies for emergency management and county response.

All development has abides by the rules and regulations of the zoning committee.

The Cottonwood County Emergency Management Director will work to keep the jurisdictions covered by the AHMP engaged and informed during the plan's 5-year planning cycle. By keeping jurisdictional leaders actively involved in the monitoring, evaluation and update of the AHMP, they will keep their local governments aware of the hazards that face their communities and how to mitigate those hazards through planning and project implementation. Each jurisdiction has identified mitigation strategies that they will seek to implement in their communities (see *Appendix G: Mitigation Actions by Jurisdiction*). Jurisdictions will include considerations for hazard mitigation in relation to future development when updating local comprehensive plans or other plans that may influence such development.

5.4 Hazard Profiles

Hazards were ranked by the planning team as stated in Section 5.1.3 Calculated Priority Risk Index and are listed in this section from high to low priority (Figure #52).

Figure #52: Ranking of Hazards in Cottonwood County 2019 AHMP Update

Hazard	*Risk Severity*
Tornado	Medium
Winter Storm	Medium
Windstorm	Medium
Lightning	Medium
Hail	Medium
Extreme Cold	Medium
Extreme Heat	Medium
Flash Flood	Medium
Wildfire	Low
Drought	Low
Flood (Riverine)	Low
Earthquake	Low
Dam Failure	Low
Erosion	Low
Subsidence	Low
Landslide/Mudslide	Low

Natural Hazards
Drought
Erosion
Extreme Temperatures
Flood (& Dam Failure)
Hail
Lightning
Severe Wind
Severe Winter Weather
Tornado
Wildfire

Other Hazards
Agricultural Disease
Hazardous Materials
Public Health/Infectious Disease
Structure Fire
Utility Failure
Water Supply Contamination

5.4.1 Severe Winter Storms – Blizzards, Ice Storms

Minnesota experiences winter weather from mid-autumn through the winter season into spring. Heavy snowfall can immobilize large regions at the same time. All types of winter storms can also be accompanied by extreme cold—both absolute temperatures and wind chill.

Between the years of 1975 and 1991, there were 49 deaths associated with blizzards statewide, or an average of 3 deaths per year. Deaths attributable to blizzards have dropped in recent years (seven since 1992), primarily due to increased weather awareness and warning capabilities across the state. The economic costs of winter storms since 1992 has resulted in property damage of over $26,000,000.

Ice storms are described as occasions when damaging accumulations of ice occur due to freezing rain. The terms freezing rain and freezing drizzle warn the public that a coating of ice is expected on the ground and on other exposed surfaces. Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers.

All locations in Cottonwood County are equally likely to be exposed to this hazard. Rural areas are more likely to be severely impacted by the hazard. Rural homes and farms face the threat of isolation and utility failure during winter storms. Roads throughout the county are at risk from ice or blowing and drifting snow. Roads closed due to hazardous winter weather also make it difficult for emergency responders to access individuals located in remote rural areas. Given the rural nature of Cottonwood County, residents of smaller communities may face similar isolation issues as rural residents. City residents are also at risk. Attempting to travel between communities would expose city dwellers to higher levels of risk corresponding with their rural counterparts.

There are several types of winter storm events that are typical for this area including: heavy snow events, ice storms, and blizzards. 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 creating a hazard to residents and travelers.

Ice storms include freezing rain, freezing drizzle and sleet (see Section 5.4.4 Severe Summer Storms below for information on hail storms, which more typically occur in the spring and summer seasons). Freezing rain, probably the most serious of the ice storms, occurs during a precipitation event when warm air aloft exceeds 32 degrees Fahrenheit while the surface remains below the freezing point. When precipitation originating as rain or drizzle contacts physical structures on the surface, ice forms on all surfaces creating problems for traffic, utility lines, and tree limbs.

Sleet forms when precipitation originating as rain falls through a rather large layer of the atmosphere with below freezing temperatures allowing the raindrops to freeze before reaching the ground. Sleet is also referred to as ice pellets. Freezing rain freezes when it hits the ground, creating a coating of ice on roads, trees and power lines. Sleet storms are usually of shorter duration than freezing rain and generally create fewer problems.

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. While blizzards in Cottonwood County can occur from October through April, they are most likely from November through the end of March. 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.

Relationship to Other Hazards—Cascading Effects

- *Flooding.* Heavy snows and rapid snow melt are primary contributors to seasonal spring flooding. Areas along rivers and stream in Cottonwood County can be impacted by spring flooding.
- *Transportation Crashes.* Winter storms often lead to hazardous conditions for transportation infrastructure. Icy roads can make travel difficult and poorly designed roads can result in large drifts that make travel impossible. Poor driving conditions and poorly designed transportation infrastructure can contribute to motor vehicle crashes.
- *Utility Failure*. Winter storms can impact the power grid. Utility interruption can be severe in Cottonwood County due to the rural nature of the county. A winter storm can isolate rural residents and can leave them without power for extended periods of time. These residents are at risk of hypothermia or even death.
- *Wildland or Structural Fire* - Heavy storms that result in large amounts of downed timber can result in an increase of dead or dying trees left standing, thus providing an increased fuel load for a wildfire. There is an additional risk of increased frequency of structural fires during heavy snow events, primarily due to utility disruptions and the use of alternative heating methods by residents.
- *Public Safety* - Drivers stranded in snowstorms may make uninformed decisions that can put them at risk; residents who are unprepared or vulnerable may not be able to obtain goods or reach their destinations. EMS providers may be slowed by road conditions while responding to emergencies. Ice storms may result in power outages due to downed power lines, putting people at risk for cold temperature exposure and reducing the ability to spread emergency messages to the public via television, radio or computer.

From History of Severe Winter Storms in Cottonwood County

January 2000 through May 2017, there have been 30 documented winter storms events in Cottonwood County. These winter storms are often not confined to Cottonwood County but affect all of southwest Minnesota. In the table below are winter storm occurrences that occurred from January 2011 through May 2017.

Figure #53
Winter Storms Events – Cottonwood County

Date	Location	Event Narrative
1/31/2011	Cottonwood, Lyon, Lincoln, Nobles, Rock, Jackson, Pipestone, and Murray	Snowfall of 5 to 9 inches included light accumulations which fell before and after the heavy snow during the daytime hours of January 31st. Winds gusting to over 30 mph caused areas of blowing and drifting snow. Travel was made difficult at times, and some schools and businesses closed.
2/20/2011	Cottonwood, Lyon, Lincoln, Murray, Nobles, Rock, and Pipestone	Freezing rain and sleet changed to snow. The freezing rain and sleet caused icy travel and walking surfaces. Light glazing was reported from the freezing rain, as well as light sleet accumulations. Snowfall varied from 2 inches in the southeast corner of the county up to 7 inches far northwest. Winds averaging 20 to 30 mph caused drifting and some areas of blowing snow in the northwest part of the county. Some roads in the far northwest corner were blocked by the drifting.
4/9/2013	Nobles, Jackson, Cottonwood, Rock, Murray, Pipestone, Lyon, and Lincoln	An extended period of precipitation began with freezing rain and freezing drizzle producing light ice accumulations, then changing to sleet and then snow, with sleet and snow accumulations reaching 14.5 inches near Marshall. The winter precipitation made travel very difficult, resulting in schools and businesses being forced to close.
4/18/2013	Cottonwood, Jackson, Murray, Nobles, Lincoln, Pipestone, and Lyon	Wet snow accumulated 5 to 8 inches, including 6 inches at Marshall. There were areas of blowing snow in wind gusts up to 40 mph while the snow was falling.
12/3/2013	Cottonwood, Lyon, Lincoln, Murray, Rock, and Pipestone	Snow accumulated 5 to 8 inches, with 7.5 inches falling at Marshall. The snow was accompanied by northwest winds gusting to over 30 mph which developed on the afternoon of December 4th, causing areas of blowing and drifting snow. Some schools and businesses closed early or for the day on December 4th.
1/5/2015	Cottonwood, Lyon, Lincoln, Rock, Pipestone, Nobles, Murray, and Jackson	Snow accumulated 3 to 6 inches. The snow was accompanied by southeast winds gusting to over 30 mph, reducing visibility to a quarter mile or less in a few areas. The storm forced some schools to close early for the day.
11/30/2015	Cottonwood, Jackson, Murray, Nobles, Lincoln, Pipestone, Rock, and Lyon	Freezing drizzle was quickly followed by snow. The snow accumulated 4 to 7 inches over a 24 hour period, including 5.1 inches at Windom. The storm resulted in cancellations or cutbacks of school classes.
12/01/2015	Cottonwood, Jackson, Murray, Nobles, Lincoln, Pipestone, Rock, and Lyon	Freezing drizzle was quickly followed by snow. The snow accumulated 4 to 7 inches over a 24 hour period that began on November 30th, including 5.1 inches at Windom. The storm resulted in cancellations or cutbacks of school classes.

Date	Location	Event Narrative
12/25/2015	Cottonwood, Jackson, Murray, Nobles, Lincoln, Pipestone, Rock, and Lyon	Snow accumulated 5 to 8 inches, including 8.0 inches at Westbrook. North to northwest winds gusted to around 30 mph on December 26th, causing areas of blowing snow with visibilities below a half mile in places. The storm affected mainly Christmas weekend travel.
3/23/2016	Cottonwood, Jackson, Murray, Nobles, Lincoln, Pipestone, Rock, and Lyon	Snowfall ranging from 2 to 5 inches, including 5 inches northwest of Storden, was accompanied by north to northeast winds gusting to over 40 mph. Despite the wet nature of the snow, the winds caused blowing snow while the snow was falling. The snow made travel difficult at times.
12/16/2016	Cottonwood, Jackson, Murray, Nobles, Lincoln, Pipestone, Rock, and Lyon	Snow accumulated 4 to 6 inches, including 5 inches at Windom. Northerly winds increased to around 20 mph sustained with gusts around 30 mph, causing drifting snow and areas of blowing snow. The winds and falling temperatures caused wind chills to drop to 20 to 25 below zero during the storm. Some schools were dismissed early on December 16th.
1/24/2017	Cottonwood, Jackson, Murray, Nobles, Lincoln, Pipestone, Rock, and Lyon	Snow accumulated 3 to 6 inches, including 5 inches near Windom. Winds of 20 to 30 mph caused significant blowing and drifting snow, closing several roads and causing school and business closings. The blowing and drifting continued to cause problems after snow accumulations had ended.

National Climatic 8/18/2017 Data Center (NCDC / NOAA) Storm Events database

From January 2000 through May 2017, there have been 16 documented Blizzards in Cottonwood County. In the table below are blizzard occurrences that occurred from December 2013 through May 2017.

Figure #54
Blizzards – Cottonwood County

Date	Location	Event Narrative
1/16/2014	Cottonwood, Pipestone, Lyon, Rock, Nobles, Lincoln, Murray, and Jackson	Northwest winds gusting to over 50 mph combined with existing snow cover and new snowfall of up to 2 inches to cause widespread frequent visibilities below a quarter mile in blowing snow. Schools and some businesses closed as travel temporarily became difficult to impossible.
1/3/2015	Cottonwood, Nobles, and Jackson	Snowfall of 1 to 3 inches while winds were gusting to over 40 mph caused widespread near zero visibilities over the southeastern part of Cottonwood County during much of the evening of January 3rd. Travel in open areas was temporarily brought to a halt.

Date	Location	Event Narrative
1/8/2015	Cottonwood, Lyon, Lincoln, Murray, Nobles, Jackson, and Pipestone	Northwest winds gusting up to 50 mph combined with existing snow cover to cause blowing snow, reducing visibilities to a quarter mile or less over much of the area. Some schools ended classes early.
2/2/2016	Cottonwood, Jackson, Murray, Nobles, Lincoln, Pipestone, Rock, and Nobles	Heavy snow combined with north to northwest winds 20 to 35 mph, with gusts over 40 mph, to produce near zero visibilities in falling and blowing snow. Accumulations ranged from 6 to 9 inches with 7 inches at Windom. Travel was brought to a halt and numerous vehicles slid off roads due to the combination of snowy roads and low visibility. Schools and numerous businesses were closed.
2/7/2016	Cottonwood, Lyon, Lincoln, Murray, Nobles, Jackson, Rock, and Pipestone	Northerly winds gusting to over 50 mph combined with existing heavy snow cover and around one inch of new snowfall to produce widespread blizzard conditions, with visibilities lowering to below a quarter mile in blowing snow. Some vehicles became stuck or drove off roads in zero visibilities. Some schools and businesses closed on Monday February 8th. A peak gust of 55 mph was recorded at Windom Airport.
2/23/2017	Cottonwood, Murray, Nobles, Jackson, Rock, and Pipestone	Snowfall of 2 to 5 inches combined with strong winds of 40 to 45 mph created blizzard conditions with widespread visibilities below a half mile. The worst of the conditions existed in southern portion of the county.

National Climatic Data Center (NCDC/NOAA) Storm Events database

Severe Winter Storms and Climate Change

Historically, winter storms have had a large impact on public safety in Minnesota. This will continue, with a possible increase in snowstorm frequency and annual total snowfall. Winter weather is often a cause of power outages. Pressures on energy use, reduced reliability of services, potential outages and potential rise in household costs for energy are major climate change risks to public health.

The number of heavy snowfall years for the Midwest has fluctuated throughout the 1900-2006 time period. The periods of 1900-1920 and 1960-1985 had numerous years with snowfall totals over the 90th percentile. In the recent 3 decades, the number of heavy seasonal snowfall totals has been much lower. Despite these generally lower seasonal snowfall totals, some areas of the Midwest have still experienced significant snow totals in the most recent decade. The 100-year linear trends based on decadal values show that the upper Midwest had statistically significant (1% level) upward linear trends in snowstorm frequency from 1901 to 2000.[18]

Vulnerability

Winter storms are highly likely in the area, and they occur annually and have major impacts on local communities. The risk level assigned to blizzards and winter storms events by the planning team is high. The effects of a winter storm can include: closures, need to clear snow and ice from public streets, recover

[18] Kunkel, et al., Regional Climate Trends and Scenarios for the U.S. National Climate Assessment., 2013

from utility failure, possibly provide emergency shelters for travelers and dislocated residents, and potential injuries and death. Winter storms can also cause lost productivity and disruptions in the local workforce, with public and private employees unable to work regular hours.

A number of facilities in Cottonwood County do have emergency generators that help keep emergency services available during a winter storm.

The accumulated effects of winter storms and blizzard conditions also pose a risk to structures from snow load on roofs. Vulnerable structures can easily collapse under the weight of heavy snow and/or high winds. The Minnesota building code has requirements for snow loads.

Analysis of specific infrastructure and structure dollar-cost vulnerability is not possible since winter storms can (and do) impact large portions of the study area. Based on current 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 could be used to model local vulnerability to winter storms in future updates.

Plans and Programs

- Real-time weather monitoring – The City of Windom has a real-time weather monitoring station at the Windom Municipal Airport that provides current temperatures, dew point, wind speed, wind direction, and barometric pressure.
- Travel Assistance – "511 is a public service of the Minnesota Department of Transportation (MnDOT) to help traveler's access information about road conditions, traffic incidents, commercial vehicle restrictions, and weather information via the phone or the Web, 24 hours a day, seven days a week."[19]
- Regional Forecasts – Cottonwood County is in the Sioux Falls designated market area (DMA). Weather forecasts from the media in the Sioux Falls region tend to be a good predictor of weather in Cottonwood County. Cottonwood County uses this information in regards to school closures and other weather related announcements.
- School closings – Cottonwood County's school districts have a policy of closing schools when wind chills exceed certain thresholds, low visibilities create unsafe driving conditions, or when heavy snow has fallen making travel difficult. Local radio stations partner with the school districts to make sure the announcements are out by 6:00 am or earlier if possible. Schools also use their own email lists, text lists, or calling software to alert parents of school delays and closures.
- Snow Fences – Cottonwood County has in the past promoted natural and manmade snow fences to protect highways against drifting snow.
- Road closures – Cottonwood County Public Works and local cities are working closely with MnDOT to improve transportation safety in all weather conditions. Road closures are enacted when conditions become too hazardous. MnDOT uses the 511MN.org, or 511 for mobile phones. This system does not send out alerts, but posts weather related road information online for public access.
- Emergency generators – Emergency generators help keep emergency services available during winter storms.

[19] MnDOT. 511. Accessed: 12-2-14. Available: http://hb.511mn.org/About.html

- City Policies – Cities have snow removal and winter parking policies in place to ensure access throughout the city.
- Rental Ordinance – The Cities of Mountain Lake and Windom have a rental ordinance to help identify and correct deficient rental housing units within the city.
- Minnesota Building Code – The Cities of Windom and Mountain Lake have adopted the Minnesota Building Code. The Minnesota Building Code helps to ensure buildings are built with minimum snow load requirements and other requirements to ensure the building is safe and will be safe for years to come. Cities that have not adopted a building code include: Bingham Lake, Storden, Jeffers, Comfrey, and Westbrook. Cottonwood County has not adopted the Minnesota Building Code.
- Backup generators – Some critical public facilities have emergency electrical generation on-site. A number of private residents also have backup generators.
- Hardening of the electrical grid – Much work has already been completed to harden electric utilities against winter storms. Redundancies in utility systems can further reduce outages resulting from storms.
- Hardening of the electrical grid - As of today approximately 427 miles of older overhead single lines remain in Cottonwood County. The cost of replacing this conductor is estimated to cost over $12 million. (from 2011 Plan) South Central Electric Association (SCEA) suffers from storm damage and interruptions mainly from ice, wind, and severe weather on its overhead lines. In order to lower the effects from extreme weather on overhead lines, SCEA builds and maintains its distribution system to specifications that try to limit damage during extreme weather conditions. SCEA works with its engineering company to determine areas where overhead facilities should be replaced with underground facilities, to locate tie lines and to loop feeds to pick up member electrical load if one substation fails. If/when available, SCEA would use FEMA mitigation dollars for site specific projects to harden its distribution system and would pursue additional non-site specific projects if additional FEMA dollars become available.
    - For the City of Windom, 70 to 75% of the electric grid is underground.
    - Mountain Lake Electrical Power Plant has 8mw of generation which is plenty to support the community's load.
    - Mountain Lake spends $40,000 to $50,000 annually to improve and upgrade our electric infrastructure to prevent and reduce outages.
    - Mountain Lake spends approximately $5,000 annually on tree trimming and removal to help prevent outages during storms.
    - Much of the Mountain Lake system can be back fed which improves redundancy.

Gaps and Deficiencies

- Automated weather stations at schools – Automated weather stations at schools throughout Cottonwood County would provide more current information and quicker response to dangerous and changing weather conditions.
- 511 System – The 511 system does not incorporate local knowledge as well as it could. County staff has little involvement in providing updates to the 511 system. Including snowplow drivers and other

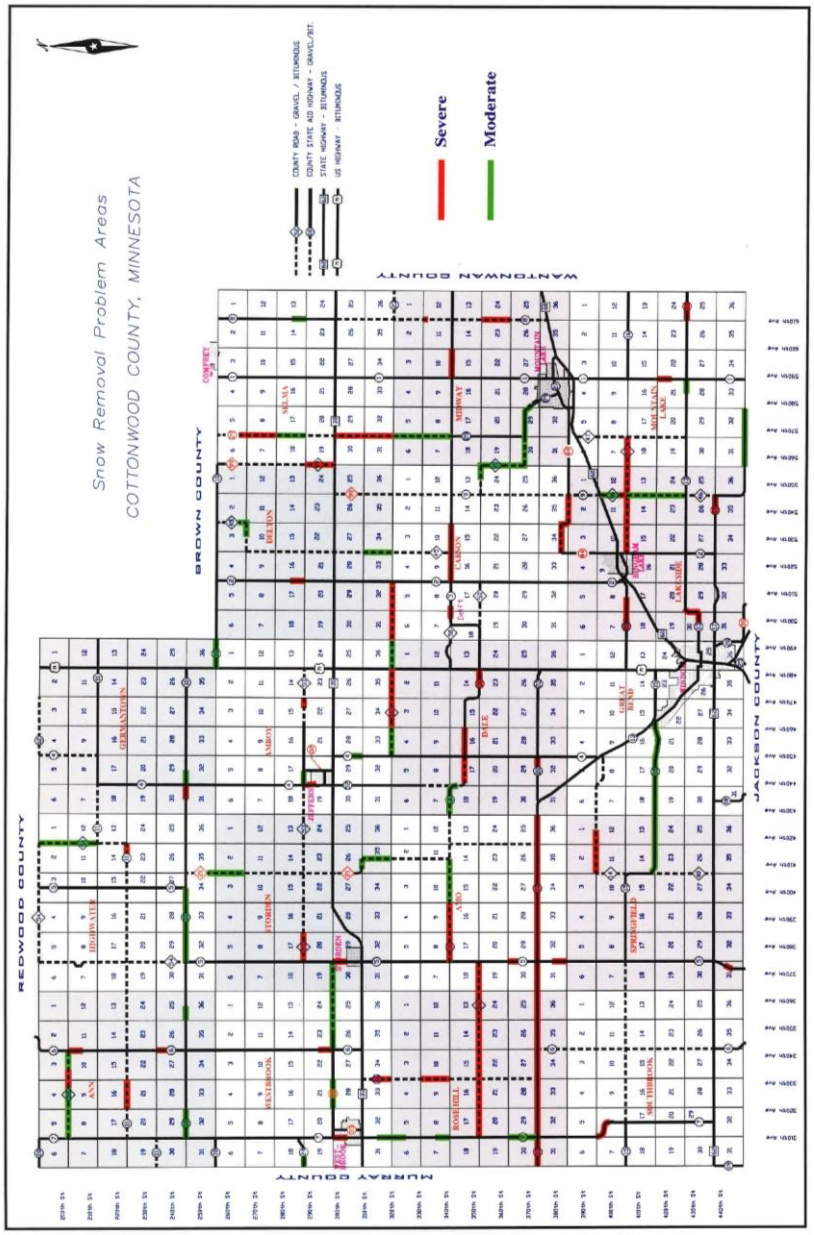
county staff could help to improve the accuracy of the system. County staff has local knowledge regarding the road network and can provide accurate information into the system.

  - MN511 doesn't cover county roads. We don't close county roads for bad winter storms, but we may pull the plows off if it gets too bad

- Road Closures Coordination – MnDOT closes state highways and does not talk to local emergency managers. There needs to be a direct line of communications between MnDOT and local emergency managers. This is an issue for emergency response and mass sheltering.
- Snow removal ordinance – Snow removal along sidewalks and at intersections can be an issue in Cottonwood County. Most cities in Cottonwood County have an ordinance regarding snow removal. Snow should be removed from sidewalks within 24 hours of a snow event, but this policy is often not enforced. City ordinances and enforcement should be used to prohibit snow piles from interfering with pedestrian traffic and visibility, especially around schools. Mountain Lake, Westbrook, and Windom have snow removal ordinances
- Warning systems – The effective range of warning systems is limited. Travelers may be unaware of an upcoming storm. Local radio stations issue severe weather warnings, but satellite radio and streaming services like Pandora and Spotify are becoming more widely used. Severe weather warnings issued on the radio may not be as effective as in the past. Weather radios should be promoted and more widely used, so residents and travelers can plan accordingly.
- Snow loads and building codes – Some residents are resistant to building codes that could help assure higher standards for new construction. The accumulated effects of winter storms and blizzard conditions also pose a risk to structures from snow load on roofs. Vulnerable structures can easily collapse under the weight of heavy snow and/or high winds. The Cities of Windom, and Mountain Lake have adopted the Minnesota State Building Codes, which includes snow load requirements. The Cities of Bingham Lake, Comfrey, Jeffers, Storden, and Westbrook do not have any building code requirements in regards to snow loads.
- Building Codes – Certified inspectors increase the cost of building. This increase in costs could result in less development. Cities outside of Windom and Mountain Lake in Cottonwood County have thought it is the responsibility of the property owner to ensure the building meets standards outlined in the Minnesota Building Code.
- Commuting time – Commuting times have increased. In Cottonwood County a number of residents commute long distances to work, which increases their exposure to winter weather hazards. Population in Windom doubles during the work day. A recent study has shown only 35% of employees at Windom's major employers (Toro, Fast, and Prime Pork) have a 56101 (Windom's postal zip code) address.
- Backup generators – It is expensive to install back-up generators. Due to limited funding sources, redundant electrical supply back-up may not be available in all essential locations in Cottonwood County. The table below identifies essential locations that should have back-up generators.
- Lack of rental ordinances – Windom and Mountain Lake have rental ordinances to help identify and correct deficient rental housing units within the city. Other cities in Cottonwood County do not have a similar ordinance.
- Lack of snow fences – As prices for farm land and crops have went up, a number of trees and wind breaks have been taken out.

- Coordination with rural electric cooperatives – When power outages occur, it can be difficult for rural electric trucks to get into areas with drifting snow. Increased coordination is needed with county and township staff to open routes to the source of a power outage.
- Language barriers – Language barriers can be an issue regarding severe weather warnings. There are a number of nationalities and languages spoken in Cottonwood County. This makes it difficult to send out emergency broadcast. Having to translate emergency broadcasts into multiple languages takes time and money.
- Generator connectivity – The Cottonwood County Law Enforcement center has a generator; however the building is not equipped with a quick connect system for a transportable generator if the current generator fails. All critical government infrastructure should be built with a quick connect generator system.
- Looping/tying substation feeds together so if one substation fails, the load can be picked up by other substations.
- Putting ties between substations underground.
- Replacing overhead lines with underground lines for key member loads. These loads would include rural water pumping stations and other emergency loads that rely on electricity to maintain service.
- Tree Maintenance – Cities help to increase the reliability of the utility grid by cutting down and maintaining trees that are close to power lines and in the public right-of-way.
- Road design – Transportation engineers use road design to substantially reduce hazards from blowing and drifting snow. Living snow fences have been used to mitigate the effects of blowing and drifting snow, which affect road conditions. Living snow fences are designed plantings of trees and/or shrubs and native grasses located along roads or around buildings, which create a vegetative trap to control blowing and drifting snow.

Figure #55
Snow Removal Problem Areas – Cottonwood County



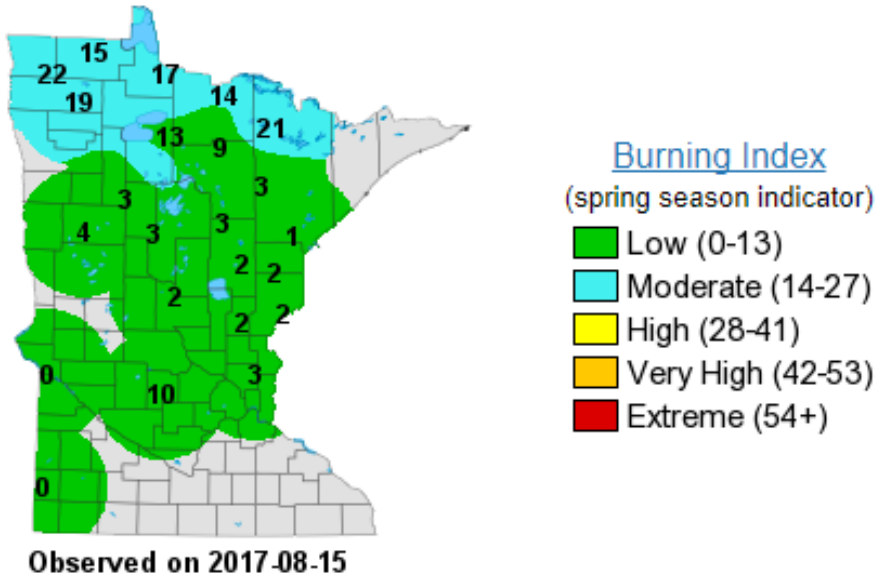
5.4.2 Fire (Wildfires and Structure Fires)

According to FEMA, each year in the United States more than 2,500 people die and 12,600 are injured in home fires, many of which could have been prevented.[20] A home fire is reported every 85 seconds in the United States.[21] Fires can occur in any community and pose a year-round threat. All locations in Cottonwood County are at risk to be exposed to this hazard.

Wildfire

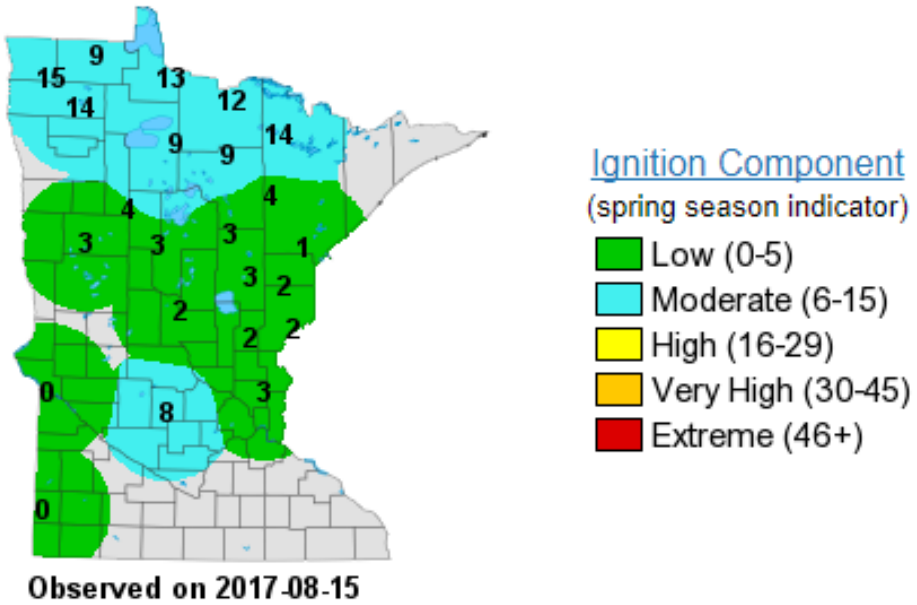
Incidents of wildfire tend to be localized in southwest Minnesota due to the low burning index in this area. "Burning Index relates the potential amount of effort needed to contain a single fire in a particular fuel type."[22] Wildfires can start in grasslands or in crops if the conditions are dry.

Figure #56
Burning Index Map – Minnesota



[20] FEMA. Accessed: 6/2/14. Available: http://www.ready.gov/fires
[21] Karter Michael Jr. Fire Loss in the United States During 2011. Accessed: 6/20/14. Available: http://www.nfpa.org/assets/files/pdf/os.fireloss.pdf
[22] MN Department of Natural Resources. Accessed: 5/20/13. Available: http://www.dnr.state.mn.us/forestry/fire/maps/fdi_grass.html

Figure #57
Ignition Component Map – Minnesota



Wildfire occurs when an uncontrolled fire spreads through vegetation, posing danger and destruction of property. Wildfires often begin unnoticed, spread quickly, and can be highly unpredictable. Prairie fires are less common than forest fires in the rugged Northern or Western forested area, but prairie fires can pose a serious threat. The State hazard plan categorizes wildfires into three types:

- Wild land fires in grasslands, brush and forests;
- Interface fires where natural landscapes meet urbanized areas; and
- 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 also 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.

Approximately 1,300 wildfires occur in Minnesota each year.[23] However, according to data from the National Centers for Environmental Information, Minnesota experienced fourteen reportable wildfires between 2003 and 2017. Wildfires occur throughout the spring, summer and fall; however, most wildfires in Minnesota take place in March, April, and May. During this period, much of the existing vegetation has been killed due to winter temperatures and is dead, brown and combustible. Also, there is little green vegetation to serve as a barrier for a moving wildfire.

Wildfires in western Minnesota most often occur in grasslands. Grasslands typically include lands in conservation programs such as Reinvest In Minnesota (RIM), Conservation Reserve Program (CRP), Wetland Reserve Program (WRP) and Conservation Reserve Enhancement Program (CREP); "rough ground" that has been hayed, pastured or left wild; and public lands (such as wildlife management areas (WMAs), state parks, waterfowl production areas (WPAs), etc.). Fire danger grows when cedar trees encroach into grasslands. These trees can add a considerable amount of fuel load.

While much of the agricultural land is currently in production, there is both private and public land within the county in many reserve programs. This land is mostly marginal farm land which has been taken out of production due to poor drainage or steep slopes leading to a highly erodible land designation. The land in these programs are planted with grass and native prairie flowers, and the landowners must maintain the land through controlled burns and mowing or spraying for weeds.

Approximately 7,118 acres within the county are enrolled in conservation programs like Reinvest In Minnesota, and the Conservation Reserve Enhancement Program.

According to the Cottonwood County Farm Service Agency office, there are roughly 12,500 acres of land scattered across Cottonwood County enrolled in the conservation reserve program (CRP).

There are federal lands that lie within Cottonwood County. The United States Fish and Wildlife Service (USFWS) manages fourteen different parcels of Waterfowl Production Area (WPA) totaling 3,448.6 acres. There is also 664 acres of private easement land where the private landowners work with the USFWS through programs to maintain grasslands and wetlands.

The Minnesota Department of Natural Resources has many Wildlife Management Areas in Cottonwood County. The largest is Talcot Lake Wildlife Management Area. Talcot Lake WMA is 5,237.92 acres of grassland and wetland located in Murray, Jackson, and Cottonwood County. Most of this area lies within the southwest corner of Cottonwood County. Other partial WMAs in Cottonwood County are Voit WMA (47.28 acres), Winkler WMA (78.33 acres), and Budolfson WMA (577.19 acres)

Other WMAs that lie completely within Cottonwood County include:

Arnold's Lake WMA is 123.31 acres of grassland and wetland in Dale TWP sections 9 and 10.

Banks WMA is 312.21 acres of grassland and wetland in Lakeside TWP sections 27 and 28.

[23] Minnesota DNR website. Accessed 7/31/17. Available: http://www.dnr.state.mn.us/forestry/anniversary/beginning-now.html

Carpenter WMA is 60.81 acres grassland and wetland Lakeside TWP section 9.

Delft WMA is 351.67 acres of grassland and wetland in Carson TWP sections 17 and 20.

Expandere WMA is 893.09 acres of grassland and wetland in Southbrook TWP sections 1,2, 12 and Springfield TWP section 7.

Farhagen WMA is 104.21 acres of grassland and wetland in Great Bend TWP section 11.

Grunflur WMA is 162.93 acres of grassland and wetland in Germantown TWP section 2.

Highwater WMA is 80.28 acres of grassland and wetland in Storden TWP section 33.

Hurricane Lake WMA is 360.38 of grassland and wetland in Highwater TWP section 31 and Storden TWP section 6.

Little Swan WMA is 411.8 acres of grassland and wetland in Carson TWP section 18 and Dale TWP section 13.

Mountain Lake WMA is 70.08 acres of grassland and wetland in Midway TWP sections 29 and 32.

Pat's Pasture WMA is 318.59 acres of grassland Springfield Township section 29.

Regehr WMA is 65.04 acres of grassland and wetland in Mountain Lake TWP section 1

Rock Ridge WMA is 158.14 acres of grassland in Delton TWP section 14

String lakes WMA is 298.75 acres of grassland around string lakes in Great Bend TWP section 29.

Typhoon WMA is 82.52 acres of grassland around Duck Lake in Highwater TWP section 16.

Wolf Lake WMA is 55.4 acres of grassland and wetland just east of Windom

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. DNR conducts controlled burns annually to help manage grasslands.

Structure fires

Incidents of structure fires tend to be contained to one or two buildings, rather than spreading widely. Isolated rural structures can be at risk due to long response times and limited water supplies. The

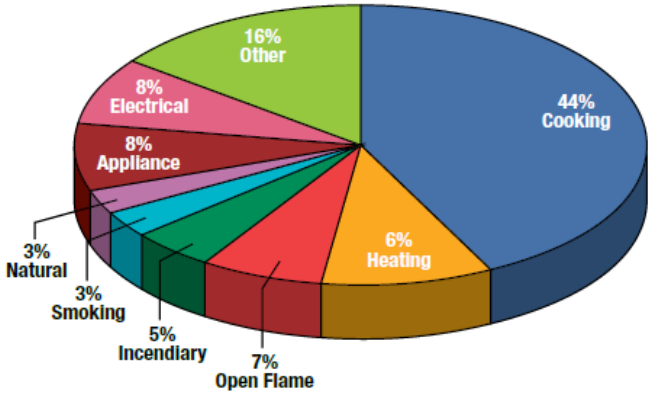
planning team identified the spatial extent of a structure fire as local. However, there are many risks in town, such as one structure fire spreading to adjacent properties.

Structure fires are classified into three categories:

- Residential Structures
- Public and Mercantile Structures
- Industrial Structures

In Minnesota, there was over 130 million dollars in losses due to residential structure fires in 2015. Forty four percent of structure fires are caused by cooking accidents (mostly from unattended cooking equipment), 16 percent by other causes, and 6 percent by heating sources.[24] Refer to Figure #58 for a breakdown of structure fire causes.

Figure #58
Structure Fire Causes – Minnesota (2015)



"While careless smoking accounts for only three percent of structure fires, it caused 35 percent of known fire fatalities and 27 percent of residential fire deaths."[25] The most deadly time for a fire is during the night when people are sleeping. There have been 8 civilian deaths related to fires in Redwood County, since 1990.[26]

[24] Minnesota Fire Marshall. 2015 Fire in Minnesota Report. Accessed: 7/31/17. Available: https://dps.mn.gov/divisions/sfm/mfirs/Documents/Fire%20in%20Minnesota/2015-Fire-in-Minnesota.pdf
[25] Minnesota Fire Marshall. 2015 Fire in Minnesota Report. Accessed: 7/31/17. Available: https://dps.mn.gov/divisions/sfm/mfirs/Documents/Fire%20in%20Minnesota/2015-Fire-in-Minnesota.pdf
[26] Minnesota Fire Marshall. 2015 Fire in Minnesota Report. Accessed: 7/31/17. Available: https://dps.mn.gov/divisions/sfm/mfirs/Documents/Fire%20in%20Minnesota/2015-Fire-in-Minnesota.pdf

The State Fire Marshall reports that there was $172,308 in fire related losses reported in Cottonwood County in 2015. From 2011 to 2015, there was an average of $165,583 in fire-related losses reported in Cottonwood County per year.

Relationship to Other Hazards—Cascading Effects

- Flooding and erosion. Major wildfires can completely destroy ground cover, which causes heavy erosion and vegetation loss. If heavy rains follow a major fire, flash floods, landslides, and mudflows might occur since vegetation is essential in deterring flooding during heavy rainfalls or spring runoff.
- Hazardous Material. The potential for hazardous materials to catch on fire is an added risk to wildfires. Any leaking or explosion of hazardous materials adds to the potential destruction caused by a wildfire.
- Service disruptions. Major fires can completely destroy structures, utility infrastructure, and essential public facilities that provide basic services to the community.
- Health risks. Destruction or damage to essential infrastructure like water or wastewater facilities might cause public health risk.
- Hazardous materials. If certain buildings or storage areas are ruptured or caused to explode because of fire, dangerous hazardous materials could be unleashed into surrounding areas. For example, many farms have anhydrous ammonia and other agricultural chemicals, which can cause serious difficulties for emergency response.
- Public Health - Air quality is adversely affected by wildfires

Wildfire and Structure Fire History in Cottonwood County

There was one wildfires in Cottonwood County from January 2000 through July 2014.[27] The wildfire occurred October 19, 2003 in Windom. The wildfire burned 300 acres of grassland and also burned some small sheds. The fire came close to five homesteads, burning to less than 20 yards from two of them. One home had smoke damage from the fire. Dry conditions and winds gusting to 40 mph allowed the fire to advance rapidly before it was brought under control. The wildfire resulted in $20,000 in property damages.

Structure Fires occur periodically throughout Cottonwood County. From 1990 through 2015, there were 3 civilian deaths related to fires in Cottonwood County.[28]

[27] NOAA. Storm Events Database. Accessed 7/31/17. Available: http://www.ncdc.noaa.gov/stormevents/
[28] Minnesota Fire Marshall. 2015 Fire in Minnesota Report. Accessed: 7/31/17. Available: https://dps.mn.gov/divisions/sfm/mfirs/Documents/Fire%20in%20Minnesota/2015-Fire-in-Minnesota.pdf

Figure #59
Structure & Vehicle Incendiary Fires – Minnesota

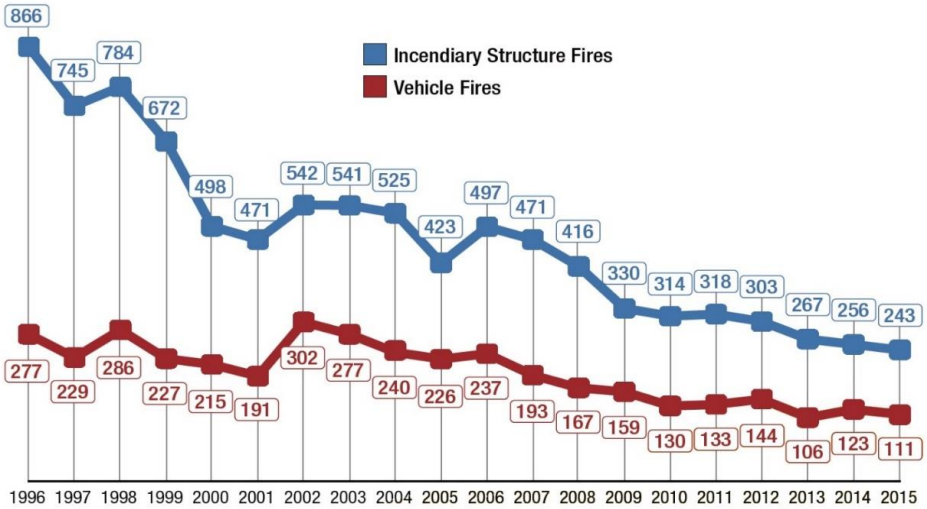
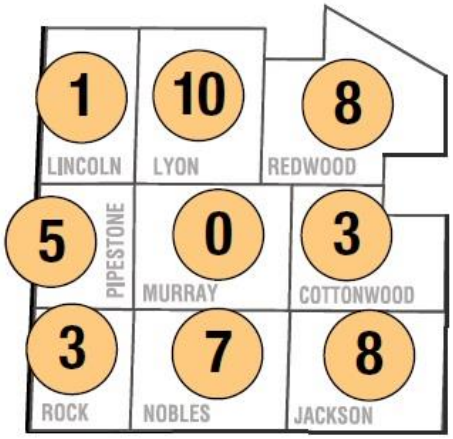


Figure #60
Civilian Fire Deaths by County: 1990 – 2014



Minnesota Department of Public Safety[29]

[29] Minnesota Fire Marshall. 2015 Fire in Minnesota Report. Accessed: 7/31/17. Available: https://dps.mn.gov/divisions/sfm/mfirs/Documents/Fire%20in%20Minnesota/2015-Fire-in-Minnesota.pdf

Figure #61
Runs & Dollar Losses by County – 2015

County	Fire Runs	Other Runs	Total County Dollar Loss	Fire Rate	Avg. Dollar Loss/Fire
Cottonwood	48	41	$172,308	332	$4,923
Jackson	31	79	$387,400	395	$14,900
Lincoln	26	17	$279,621	263	$12,710
Lyon	107	252	$1,199,350	396	$18,452
Murray	39	40	$142,078	292	$4,899
Nobles	59	218	$1,393,150	392	$25,330
Pipestone	39	92	$781,250	292	$24,414
Redwood	65	56	$570,770	324	$11,891
Rock	42	113	$195,620	319	$6,521

Minnesota Department of Public Safety[30]

Wildfire and Climate Change

Temperatures are predicted to rise in the state, which could lead to more extreme heat events and associated wildfire risks. As Minnesota's climate changes, weather fluctuations between drought and extreme rain events and increasing temperatures will result in changes to forest composition and/or distribution. These fluctuations can lead to dry conditions that may cause increased fire risk in both grassland and forest environments.

Vulnerability

Wildfires in Cottonwood County are rare, but they can occur under the right conditions. Fire is a serious risk that is not always understood. Fires can spread very quickly. It only takes 30 seconds for a small flame to get completely out of control.[31] There is often only enough time to get out of the house safety, before the entire house is engulfed with smoke and flames. The risk level assigned to structure fires and wildfires by the planning team is average.

Plans and Programs

- Local fire departments – Local fire departments within the districts extinguish structure fires. Each department is responsible for fires within their boundaries. However, they often work together on larger fires through mutual aid agreements.
- State training – Local firefighters participate in mandatory firefighting training classes offered by the state. Firefighters are also offered the opportunity to participate in wildfire training classes offered by the Minnesota Department of Natural Resources-Forestry Department.
- Zoning – The Cottonwood County Development Code controls development of new construction, including the enforcement of safety restrictions like setbacks, coverage, depth, and structure height requirements. The county Environmental Office issues permits for all new construction in the county outside incorporated municipalities.

[30] Minnesota Fire Marshall. 2015 Fire in Minnesota Report. Accessed: 7/31/17. Available: https://dps.mn.gov/divisions/sfm/mfirs/Documents/Fire%20in%20Minnesota/2015-Fire-in-Minnesota.pdf
[31] FEMA. Learn About Fire: The Nature of Fire. Accessed: 1/6/16. Available: http://www.usfa.fema.gov/citizens/about_fire.shtm

- The City of Mountain Lake has the same requirements in Chapter 9 of its city code.
- The City of Windom zoning code and comprehensive plan regulate land uses while the city uses the state building code to enforce laws related to buildings.

- Burning Bans – Currently, in times of extreme heat and drought, the county will enact burning bans. Residents are alerted through the media, Facebook, Twitter, Civic Ready (Cottonwood County's Public Alerting Software) and Nixle (Mt. Lake and Windom's software) when a burning ban is enacted. The Sheriff of Cottonwood County declares a burning ban, and all municipalities enforce a burning ban when the county has one.
- Burn Permits – Cottonwood County Sherriff's Office issues burn permits free of charge. Burning Permits are valid for 2 years. Permit holders are required to call the Cottonwood County Sheriff's Office before they start a controlled burn and call again when the fire is extinguished. If a deputy sees smoke, they check with dispatch to see if a permit holder has called in a controlled burn in the area before a fire department is paged.
  - A Burning Permit is not needed in Mountain Lake; however, code sets rules for burning in city limits.
  - The City of Windom Requires a burning permit and code sets rules on dates and items that can be burned.
- Burn barrels – "In Minnesota, open burning of household garbage is banned, with the exception of farms where regularly scheduled pick up of waste is not "reasonably available to the resident" (Minn. Stat. §§ 17.135 and 88.171). However, 33 of Minnesota's 87 counties have passed no-burn/bury resolutions to close this exemption."[32] Cottonwood County has not adopted a resolution closing the loophole.
- Property management – Many properties that are owned by Cottonwood County 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) are in place.
- Wind tower fires – Plans are in place for fires involving wind towers. Firefighters are instructed to contain the fire from a distance and let the turbine burn.
- Ethanol plant fire protection – Specific fire training is done in regards to ethanol plant fires. The Windom and Mountain Lake Fire Departments work with the ethanol plant to understand the layout of the plant and what materials are on the grounds. An annual tour of the facility is done by the Windom Fire Department and other neighboring departments are invited to participate in the training. The Windom Fire Department also attended two ethanol fire specific classes led by Minnesota West Community and Technical College. These classes were open to any fire department that wanted to attend.
- Electrical fires – The state electrical inspectors inspect commercial structures for potential fire hazards.
- Prescribed burns – The DNR conducts prescribed (or controlled) burns annually in Cottonwood County. Controlled burns help to reduce fuel load, while also benefiting native prairie restoration. Controlled burns have to be conducted in the right locations and in the right weather conditions. Coordination

[32] Minnesota Pollution Control Agency. Accessed: 7/31/17. Available: https://www.pca.state.mn.us/waste/laws-prohibiting-backyard-burning-garbage

between the DNR, local fire departments, and the Cottonwood County Sheriff's Office is done to ensure the controlled burns are contained.
    - Fire Departments in Cottonwood County often train by doing prescribed burns on private or public land upon state approval.
- Ditch maintenance – Road ditches are maintained to help decrease the chance of a wildfire spreading. MN Stat. 160.232 states: "To provide enhanced roadside habitat for nesting birds and other small wildlife, road authorities may not mow or till the right-of-way of a highway… Exception is from July 31 to August 31, where the entire right of way may be mowed. Statute also states "When feasible, road authorities are encouraged to utilize low maintenance, native vegetation that reduces the need to mow, provides wildlife habitat, and maintains public safety."
- Water source capacity – Water storage is also analyzed by fire departments in Cottonwood County to understand water source capacity to fight fires.
- Road closures – The Cottonwood County Highway Department, Municipality, Township, depending on who owns the road, notifies the Cottonwood County Sheriff's office of all road closures. Dispatch keeps track of the closures and tells the fire departments and ambulance services about them. When a department is paged, they are reminded of the closure and given an alternate route to the call.
- Development Policy – New developments in Cottonwood County are required to have streets and alleys wide enough to sufficiently handle the size of a modern fire truck.
    - The City of Windom also lists this requirement in its development code.
- Mutual Aid Agreements – Mutual Aid Agreements are in place between police forces, fire districts and ambulance districts to ensure adequate emergency services in Cottonwood County. Mutual Aid Agreements create agreement among emergency responders to lend assistance across jurisdictional boundaries. Recently the fire departments in Cottonwood County signed a regional mutual aid agreement, and currently county ambulance services are looking into a regional agreement as well. Mutual Aid Agreements are updated every five years in Cottonwood County, and they are currently in the process of updating them.
- Cottonwood County Emergency Services Association – Currently, Cottonwood County holds a quarterly meeting for all fire and ambulance services in the county. Some out of county services attend this meeting as well.
- Right-of-way maintenance – Road Authorities maintain the right-of-way of roadways in Cottonwood County. This helps to limit tree growth and farm fields from approaching onto public right-of-way of roadways.
- Fire education – Cottonwood County participates in the nationally coordinated "Firewise Program" to increase resident education.
- Ordinances – Snow removal ordinances are in place to keep fire hydrants accessible.
- Building codes – Public buildings are constructed to include fire/smoke alarms and sprinkler systems.

Gaps and Deficiencies

- Lack of fire breaks – Cottonwood County needs a program that places fire breaks in between the continuous CRP (Conservation Reserve Program) tracts of land or other state wildlife areas during times of severe drought.
- Wildfire risk assessment – Cottonwood County does not undertake a systematic assessment of wildfire risk and associated prevention measures.

- Fire department/EMS equipment – Regulations, compliance, and training issues are costing rural fire departments more and more. This is causing deficiencies in equipment availability. Not having proper equipment is a safety concern. Older equipment is better than no equipment.
- Specialized trainings – Homes with chimneys pose a larger threat for fires. Specialized training classes, like chimney cleaning, safe cooking in the kitchen, and holiday hazards could be offered to residents.
- Evacuation plans – All cities in Cottonwood County should have evacuation plans detailing the routes residents should take in the event of a large fire.
- Street capacity – Currently, some local streets and alleys are not adequate to handle fire trucks. Those roads should be identified and widened in the future to provide adequate protection.
- Property maintenance – An increasing number of properties are used for recreation or conservation. These properties may not be monitored frequently, which can result in overgrowth and an increased fire risk. Managing properties effectively can reduce the risk of structure and wildfires. Effective property maintenance can include cutting tall grass, thinning trees, prescribed burning, and removal of low-hanging branches around structures as needed.
    - In the City of Mountain Lake Code, Chapter 8 does regulate these issues.
- Zoning – Currently, Cottonwood County zoning lacks regulations regarding vegetation on property. One of the problems with past fires is the undergrowth and overhanging trees near residential structures. Although aesthetically appealing, vegetation around homes can add fuel to the fire.
- Emergency response staffing levels – Keeping local fire departments staffed is becoming an issue. Local fire departments are getting older, and there are less young residents volunteering for the departments. Availability is also a concern for the local fire departments. A number of Cottonwood County residents work outside the county or in a different community than which they reside, so availability is an issue.
- Burn barrel compliance – Compliance with burn barrel regulation is an issue. An educational campaign may be necessary to increase compliance. The Cottonwood County Solid Waste Administrator would like to see the County Commissioners adopt an ordinance closing the state loophole; however it has not happened as of 2018.
- Water availability – Cottonwood County is a rural county, so water availability during a rural fire can be an issue. Barn fires require between 5 and 15 tankers of water, each 2,000 gallons. This requires firefighters to pull water from multiple locations depending on the location of the fire. Pulling water from multiple sources affects response times and the ability to contain the fire.
- Dry hydrants – There are numerous dry hydrants in and near Cottonwood County. There is one at Fish Lake (on the south shore in Jackson County), String Lakes (west of Windom), Harder Lake (Near Delft), Mountain Lake (on the northeast shore off co rd. 29), Long Lake (Carson TWP Section 24, 25 on the west shore off CO RD 9 near 360th St), and Bingham Lake (on the east shore off CO RD 44 near 390th St). More dry hydrants spread throughout Cottonwood County would help to ensure timely refill capabilities of tanker trucks. Maintenance is an issue regarding dry hydrants. The dry hydrant has to be blown out once a year.
- Transformer and meter fires – corn dryers and other heavy equipment can overload and overheat a transformer or meter. This is a concern in the fall during harvest.

- Household electrical fires – Electrical improvements in homes in greater Minnesota are often not inspected, unless there is a state enforced building code or rental housing ordinance. The homeowner has an incentive to ensure the work is done properly, but some people may not be able to ensure proper electrical work.
- Rural fire hydrants – There are no fire hydrants located by water storage towers in rural Cottonwood County.

5.4.3 Flooding

Flooding is one of the most common hazards across the United States and "floods are among the most frequent and costly natural disasters."[33] Flooding can occur anytime, anywhere. Seemingly benign streams can overflow their banks from a sudden rainstorm, quick snowmelt, or blockage of a channel. Lakes or reservoirs can retain water and quietly creep up the shorelines. City sewers can back up and pour into private basements and onto public streets. Dams can break causing flooding down river.

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.[34]

There are 2 flood insurance policies (FIP) in Cottonwood County and 62 FIPs in the city of Windom.[35] Each policy covers a single building, but all single family home policies include detached garages. The table below outlines that number of policies in each city and the county.

Figure #62
Flood Insurance Policies – Cottonwood County (as of 4/30/2017)

County / City	Number of NFIP Policies in Force	Insurance in Force – Whole Dollars
City of Windom	62	$8,128,300
Cottonwood County (unincorporated areas of county only)	2	$425,000
State of MN	9,541	$2,230,873,300

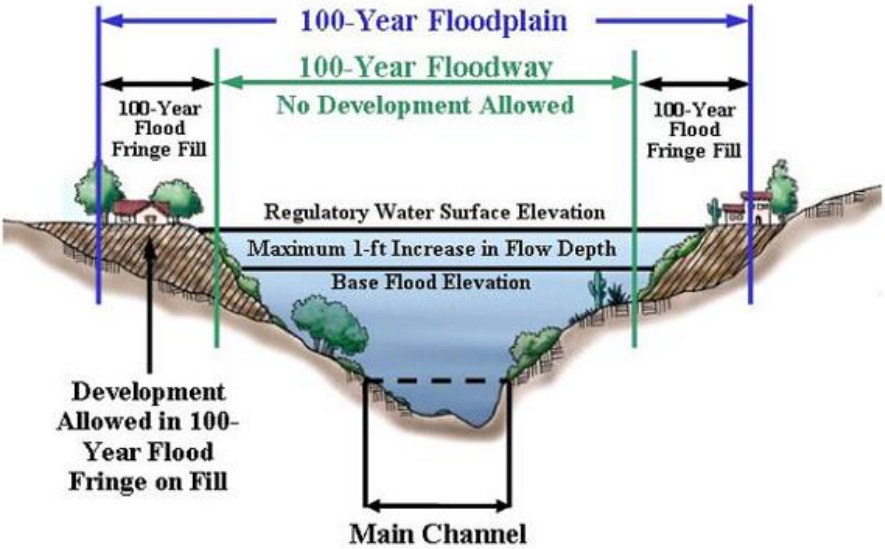
FEMA Region V NFIP Policy Information by State. Accessed: 8/7/2017. Available: https://bsa.nfipstat.fema.gov/reports/1011.html

The Federal Emergency Management Agency (FEMA) has mapped the probability of flood waters inundating floodplains. FEMA works with local communities to map the Special Flood Hazard Area (SFHA), commonly known as the 100-year floodplain (one percent floodplain), where they calculate a one percent 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.

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."

[33] American Red Cross. Accessed: 8/8/17. Available: http://www.redcross.org/prepare/disaster/flood
[34] Flood Smart. Accessed 8/7/17. Available: http://www.floodsmart.gov/floodsmart/pages/about/nfip_overview.jsp
[35] FEMA Region V NFIP Policy Information by State. Accessed: 8/7/2017. Available: https://bsa.nfipstat.fema.gov/reports/1011.htm

Figure #63
100-Year Floodplain (1 percent Floodplain)



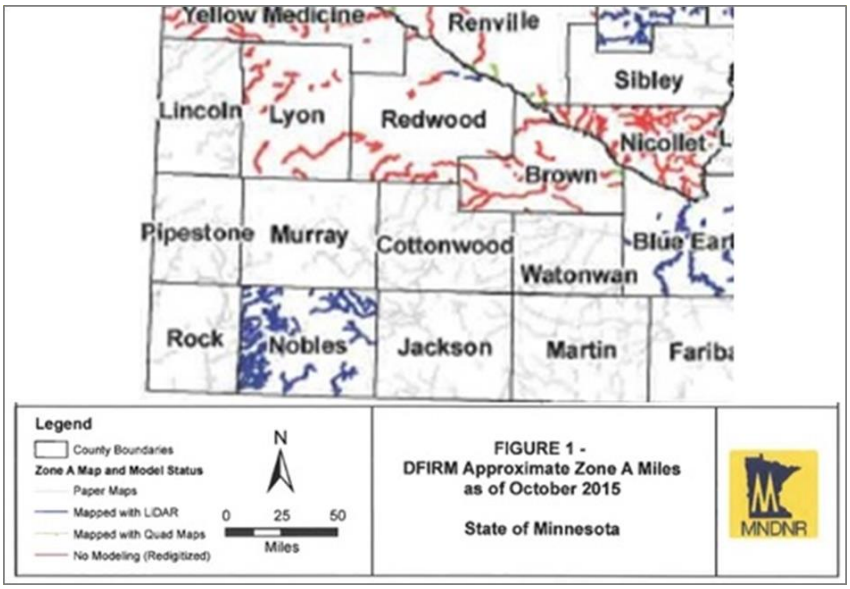
Obsolete FIRMs, many not updated since their initial production in the 1970s, make flood management decision-making difficult. Cottonwood County has been working with DNR and FEMA to engineer, review and adopt digital floodplain maps, or dFIRMs.

Flooding can occur anytime, anywhere. The majority of Cottonwood County is classified as Zone C, which is defined as an area of minimal flooding. The areas of minimal flooding include most of the intermittent streams throughout the county. These streams contain surface water runoff at various times throughout the year and high water levels may extend beyond the established drainage channel and onto adjacent lands. Flash flooding events tend to be localized, not countywide, but the risk is countywide. Flash flooding can occur rapidly and cause substantial damage. Flash flooding can cause a rapid rise in the water level of a stream or creek above a predetermined flood level.

One percent floodplain areas do exist in Cottonwood County. These flood plain areas are along the Des Moines River, Watonwan River, Cottonwood River, and multiple streams and creeks. Additionally, parcels within the cities of Windom and Mountain Lake are estimated to sustain extensive losses in the event of a 100-year flood. See Figure #67 for a map of Cottonwood County's 100-year floodplain.

The Flood Insurance Rate Maps (FIRM) for these public entities can be found by contacting the Cottonwood County Emergency Manager.

Figure #64
DFIRM Approximate Zone A Miles – October 2015 (1 percent Floodplain)



There are mapped floodplains across the extent of Cottonwood County, but most areas are narrow, following streams and creeks. These include Dutch Charley, Highwater, and Dry creeks, a couple ditch systems, and the Cottonwood and Watonwan rivers. Other areas are broader, encompassing lake shores and historic wetland areas, especially around Talcot Lake on the Murray County line and all along the Des Moines River.

City of Comfrey

A one-square-block public park in the Brown County portion of Comfrey is mapped as floodplain. No part of Comfrey's floodplain is in Cottonwood County.

City of Mountain Lake

The mapped floodplain from the HAZUS analysis extends around the shores of Mountain Lake. The majority of the city is outside the hazard area, though a few parcels of land, including some residential areas do lie within the floodplain.

City of Windom

Mapped floodplains extend throughout the city of Windom (See Figure #66). The city is built on the West Fork of the Des Moines River, a braided stream with numerous meanders and islands. Zone AE extends outside the river banks in three locations:

- Mapped floodplain reaches up TH 60 along the UP railroad past 11st street, putting about many city blocks at risk;
- Floodplain crosses River Road (County Road 13) between 12th and 13th streets, reaching into the County Fairgrounds;
- The floodway and floodplain are mapped up Perkins Creek south of the high school across the north central part of Windom.

While the Flood Insurance Rate Maps for Cottonwood County and Windom were updated in the 1980s, they have not been digitized, making it difficult to analyze the extent of flood hazards.

The City of Windom has expressed interest in pursuing a flood mitigation project to help mitigate flooding along Perkins Creek (which meanders through the 102 acres of city-owned property east of the airport). This project would consist of the potential quarrying of 10 to 30 acres to create a water retention/detention pond in order to store water during flood events. It would help mitigate downstream flooding within the City of Windom. To do this, the city would need to:

1. Identify upstream water retention and detention pond areas.
2. Work with the US Army Corps of Engineers as a project partner.
3. Gain approval from FAA (regulator agency)

Figure #65
City of Windom, Potential Flood Retention Site

Figure #66
Floodplain map for the City of Windom

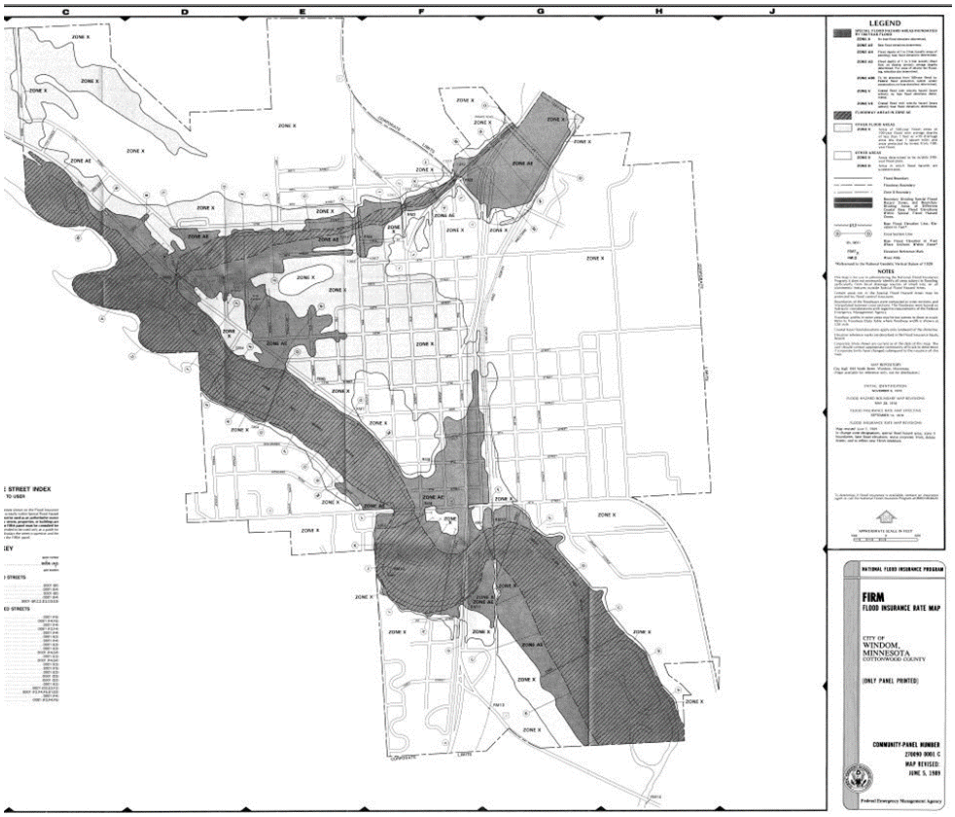
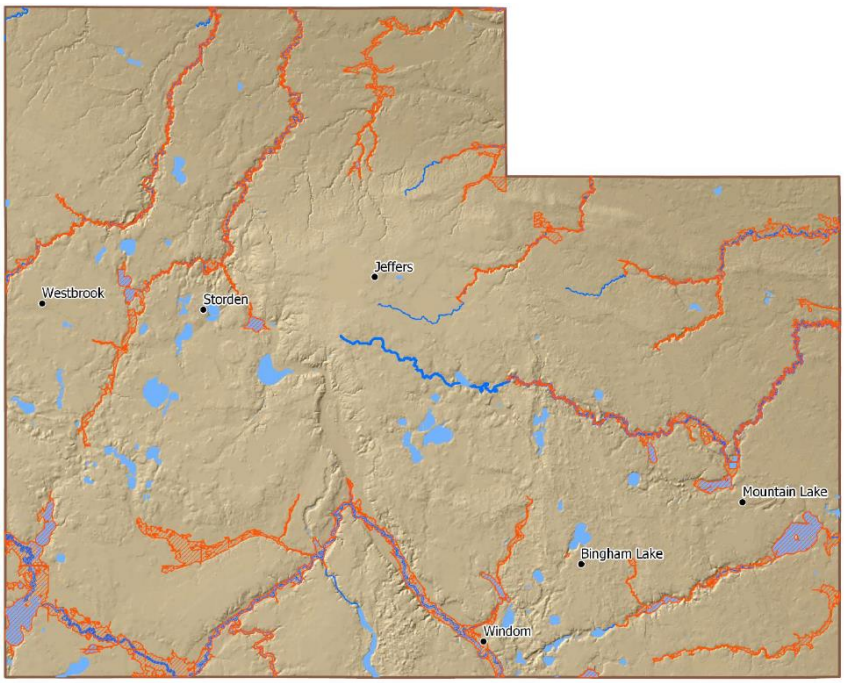


Figure #67
100-Year Flood Plain Map – Cottonwood County



100 Year Floodplain

Data Sources: FEMA DFIRM Flood Data, and Hazus-MH

Dams

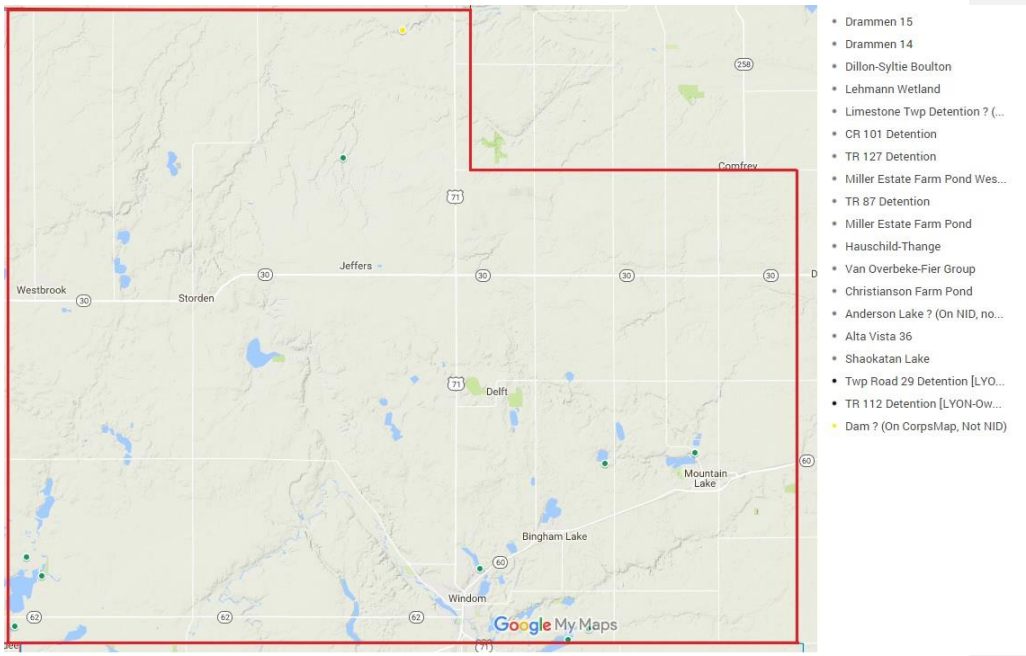
An Emergency Action Plan (EAP) is required for all High Hazard dams, implemented in the County Emergency Operations Plan (EOP). Currently there are no High Hazard rated dams in Cottonwood County. There are two Significant-rated dams: Mountain Lake (MN DNR), and Schoper-Bush (Cottonwood County) on Dry Creek north of Jeffers. The Windom Dam was breeched in 2007. There are also several low-risk dams owned by DNR and Cottonwood County along tributaries to the Blue Earth, Des Moines, and Watonwan rivers.

There have been two incidents of dam failure in the county, both noted in the AHMP although neither posed a risk to lives or structures. In the spring of 2007, a 17' section of gate on the south side of Talcot Lake Dam needed repair after steel trusses on the gate rusted out, allowing water to flow through the gate. According to the Tri-County News, DNR replaced the damaged gate with 24 steel stop logs. Also in 2007, stream bank erosion caused the failure of the Windom Dam abutment adjacent to Island Park, scouring a new channel around the dam.

In 2010, State bonding dollars became available for a project in Windom which would remove the dam and install three sets of rock riffles. The City of Windom in conjunction with the Minnesota Department of Natural Resources and US Fish and Wildlife Service developed the project. In 2011, environmental permits and studies were completed. In early 2012, the dam was removed and the rock riffles were installed. A double riffle was installed where the old dam was removed and a single riffle was installed a few hundred feet upstream.

The total project cost was between $350,000 and $375,000. The City of Windom paid $40,000 towards the project. The riffles are designed for fish passage and recreation, they were not designed for flood control; however residents who lived along the old dam reservoir reported after the dam was removed their sump pumps ran less frequently. City staff have also noticed different areas of Island Park (where the dam was located) flood. Flooding used to take place closer to the entrance of the park, it now occurs in the area where the softball and baseball complex sit.

Figure #68
Dams – Cottonwood County



Landslides and Subsidence

Unstable stream banks and steep bluffs can be prone to landslides and subsidence, especially during heavy precipitation or a flood event. As in much of Minnesota, seasonal spring flooding from snowmelt is a common occurrence in late winter and early spring.

Highly erodible soils can result in landslides and sinkholes. Both of these phenomena can occur in Cottonwood County but are rare as the county's soil loss rates are only 5 T/ac. [36] The Erodibility Index (EI) is a numerical expression of the potential of a soil to erode, considering climatic factors and the physical and chemical properties of the soil – the higher the index, the greater is the investment needed to maintain the sustainability of the soil resource base if intensively cropped. Highly Erodible Land (HEL) in Southwest Minnesota is defined to have an EI of at least 5.[37] The soil loss tolerance rate (T) is the maximum rate of annual soil loss that will permit crop productivity to be sustained economically and indefinitely on a given soil. Erosion is considered to be greater than T if either the water (sheet & rill) erosion or the wind erosion rate exceeds the soil loss tolerance rate.

One identified risk area is along the Des Moines River in Windom. The southwest bank of the river near Island Park is much higher than the northeast bank. There is potential for an entire portion of the bank to sluff into the river channel, possibly taking with it 6th avenue South and potentially seven homes depending on where the bank slides.

There are likely other areas along the river as well as throughout the county; however none of the other areas have the potential infrastructure and residential damage this area has.

[36] *National Resources Conservation Service, Worthington MN Office. Data Request 1/8/18. Received: 1/9/18.*
[37] *National Resources Conservation Service, Worthington MN Office. Data Request 1/8/18. Received: 1/9/18.*

Figure #69
Landslide Risk – Cottonwood County

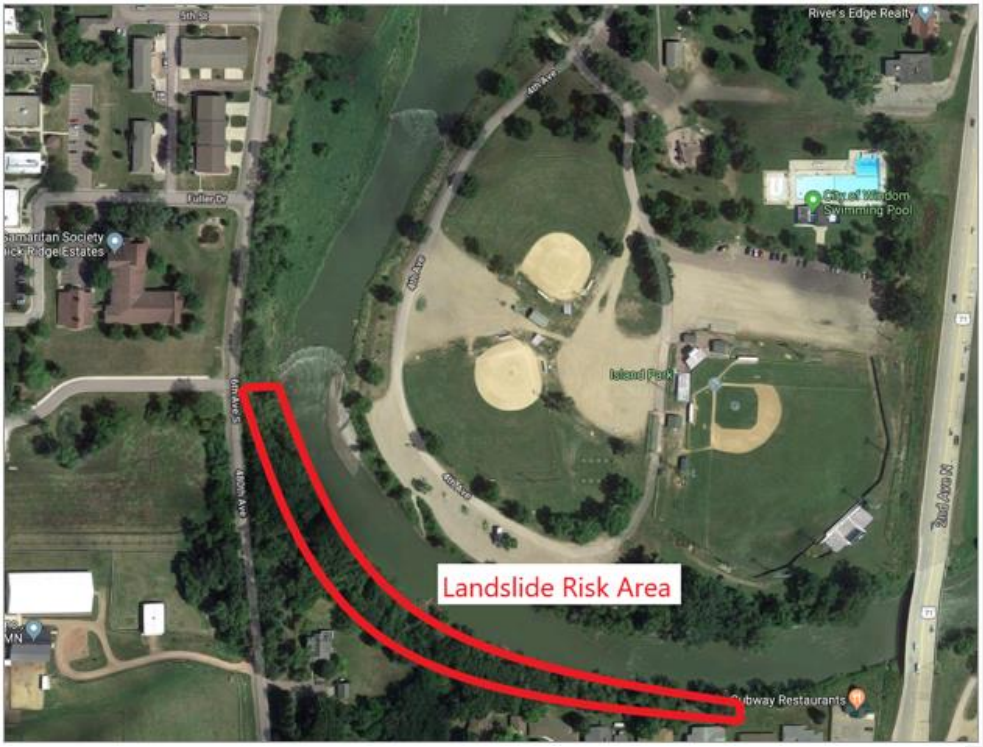
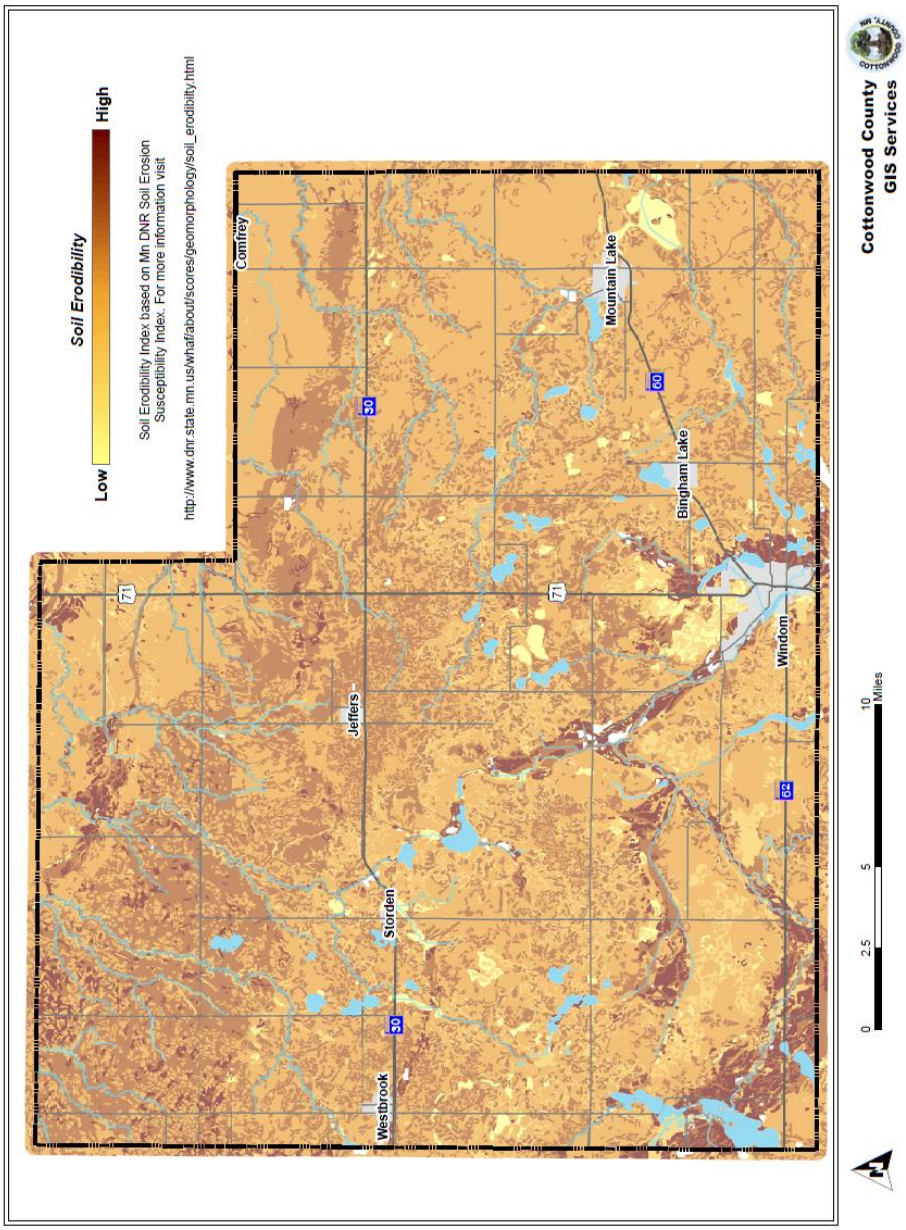


Figure #70
Soils Erosion Susceptibility Map – Cottonwood County



Essential Facilities

There are no essential facilities (care, fire, police, schools) in Cottonwood County that are within the one percent floodplain.

Effect on Housing

The majority of Cottonwood County's population lives safe from flooding, although some housing units have been identified within the one percent floodplain and flooding can occur anywhere. County staff has identified residential and commercial structures within the floodplain using GIS, FIRM Maps, and the State of Minnesota DOQ flyovers.

Development has occurred along and near waterways in Cottonwood County due to the aesthetics they create. The median housing unit value in Cottonwood County was $87,200 in 2015.[38] If we assign this median value for all the *residential* structures estimated to be damaged within the floodplain in Cottonwood County, there is a total value of $7,569,000. However, the HAZUS analysis estimates $3,685,000 for total residential building loss. Since flooding could occur in any of the communities within Cottonwood County and in the rural areas, the potential damage of a flood could be relatively high.

Commercial Structures

There are some commercial structures currently located within the one percent floodplain in Cottonwood County, but past damages that have occurred were minimal. Future construction of commercial buildings in the floodplain has been prohibited under Cottonwood County's zoning regulations (Cottonwood County Ordinance No. 28 Section 12: F-1 Floodplain District Subdivision 3. Permitted Uses).

Public Infrastructure

Within Cottonwood County there are some roads that are prone to flooding or washing out during a hazard event. Those most noted are roads in low-lying areas. River crossings along the Watonwan River and the Cottonwood River are the most vulnerable to intermittent flooding from spring thaws or large rain falls.

Along with flooding or washing out of roads, the County has had a problem with debris being left on roads as a result of water running over the roadway. Debris removal is often limited, but cleanup is a cost that is incurred.

There are 236 bridges on county, municipal, and township roadways within Cottonwood County.[39] Most are made of steel or steel reinforced concrete, which can withstand annual spring flooding. According to Cottonwood County Public Works, a couple of bridges were destroyed due to flooding in 1969. There are still two structures in Springfield Township that are crooked because of the 1969 flood. After high water events, there have also been some bridges that were closed by the county and replaced. These closed and replaced bridges were already in poor condition when these high water events happened.

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[38] Census 2010, 2015 ACS. Accessed: 8/8/17. Available: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

[39] MnDOT. MN Bridges Report 2016. Accessed: 8/18/17. Available: http://www.dot.state.mn.us/bridge/pdf/minnesota-bridges-2016-report.pdf

The majority of damages from flooding occur on township roads and county roads. Many other locations can experience damage from flooding depending on the location, amount, and duration of the rainfall event. A one percent flood event would result in a number of roadways sustaining damage and wider spread road closures.

Roads, bridges, and culverts are susceptible to damage from flooding. This may be the result of an undersized culvert, poor drainage, inadequate holding basin, or other issues. For more information regarding specific locations identified in the figure below, please contact the Cottonwood County Public Works Office.

There are no communities in Cottonwood County that have wastewater treatment plants close to the one percent floodplain. To date, extensive damage to wastewater treatment ponds within the county due to flooding has not occurred.

Relationship to Other Hazards—Cascading Effects

Numerous. Flooding can have a number of secondary effects that can create additional hazards related to fire, public health, utility failure, insect and pest infestation, and infrastructure damage. Flooding can interfere with emergency response to fires, as seen in Grand Forks, North Dakota, during the Red River Flood of 1997. The after effects of a flood can be a contaminated water supply and mold which affect public health. It can take up to a week or two to get the power back on after a flood. Not having reliable power makes day to day life more difficult. Insect and pest infestation can take place after the flood has receded. Damage to infrastructure can takes weeks to repair. This can cause increase emergency response times and put residents at risk.

Flood History in Cottonwood Hazard

From January 1993 through May 2017, there have been 14 documented floods and 9 documented flash floods in Cottonwood County. The tables below documents flooding occurrences since 2000. NOAA defines a flood as "an overflow of water onto normally dry land. The inundation of a normally dry area caused by rising water in an existing waterway, such as a river, stream, or drainage ditch. Ponding of water at or near the point where the rain fell. Flooding is a longer term event than flash flooding: it may last days or weeks."[40]

NOAA defines a flash flood as "a flood caused by heavy or excessive rainfall in a short period of time, generally less than 6 hours. Flash floods are usually characterized by raging torrents after heavy rains that rip through river beds, urban streets, or mountain canyons sweeping everything before them. They can occur within minutes or a few hours of excessive rainfall. They can also occur even if no rain has fallen, for instance after a levee or dam has failed, or after a sudden release of water by a debris or ice jam."[41]

In July 2018, severe flooding took place in Cottonwood County. This is not reflected in Figure #70 because the National Climatic Data Center data does not reflect such recent events.

[40] NOAA. Accessed: 11/24/14. Available: http://www.srh.noaa.gov/mrx/hydro/flooddef.php
[41] NOAA. Accessed: 11/24/14. Available: http://www.srh.noaa.gov/mrx/hydro/flooddef.php

Figure #71
Floods - Cottonwood County

Date	Location	Event Narrative
4/5/2001	Cottonwood County	Flooding along the Des Moines River affected mainly farmland and undeveloped lowlands near the river. The river crested several times, with the highest readings during the last week of April, after heavy rain fell over the area. Some parkland was flooded in Windom.
4/4/2006	Windom and Jackson	Heavy rain resulted in flooding along the Des Moines River. The river rose to one to two feet above flood stage. Flooding was confined mainly to lowlands near the river, including Island Park in Windom. No reports of damage to structures were received.
3/16/2010	Windom and Bergen	Rapid melting of a heavy winter snowpack caused flooding of the Des Moines River which persisted to the end of March. The flooding affected mainly farmland. The river crested at 2.5 feet above flood stage near Windom on March 21st.
4/1/2010	Windom and Bergen	Continued flooding of the Des Moines River abated and ended during the first few days in April, with the minor flooding affecting a few fields. The river began the month at 1.8 feet above flood stage near Windom, and fell below flood stage there on April 5th.
6/27/2010	Windom and Bergen	Heavy rain caused minor flooding along the Des Moines River, with only a few lowlands affected. The river crested at less than a foot above flood stage at Windom on June 27th.
9/23/2010	Windom and Bergen	Heavy rain caused flooding of the Des Moines River which reached the lower end of the major flooding category. Farmland, parkland, and several roads were flooded. The river crested at exactly 4 feet above flood stage at Windom on September 24th.
10/01/2010	Windom and Bergen	Minor to moderate flooding of the Des Moines River steadily abated and ended during the first two weeks of the month. Some roads and riverside lowlands including agricultural land were still flooded early in the month.
3/16/2011	Westbrook	Melting of a heavy winter snow cover caused flooding of the Des Moines River, as well as flooding of lowlands, lakes, and streams. The Des Moines River crested at 2.79 feet above flood stage at Windom on March 25th. There was considerable flooding of farmland. Numerous roads in the county were flooded. Some of the roads were closed, and some were washed out in spots. The flooding onset was rapid for a snow melt flood due to high water and groundwater levels from record precipitation in the year 2010.
4/1/2011	Westbrook	Flooding of lakes and lowlands, including some farmland, continued in the county through April. While flooding of small streams abated, lake and lowland flooding continued with very slow improvement. Several roads remained flooded. High water and groundwater levels resulting from record precipitation in the previous year was the main reason that the flooding either grew worse or improved so slowly.

Date	Location	Event Narrative
6/21/2011	Windom and Bergen	Heavy rain caused minor flooding of the Des Moines River, with some farmland and other lowlands affected. The river crested at about a foot above flood stage at Windom on June 28th.
6/16/2014	Westbrook	Persistent moderate to heavy rain caused flooding of fields and other lowlands, including several roads, homes, and businesses. This flooding lasted for two days, and was aggravated locally by additional storms during that time. Some roads were damaged or washed out.
6/20/2014	Windom Municipal Airport	Repeated heavy rains caused moderate flooding of the West Fork Des Moines River. Agricultural land and several roads were flooded, including the county roads being used for a previously established detour of U.S. Highway 71. The river crested at 2.57 feet above flood stage at Windom on June 22nd.

National Climatic Data Center (NCDC/NOAA) Storm Events database

Figure #72
Flash Floods – Cottonwood County

Date	Location	Event Narrative
7/11/2004	Cottonwood County - South Portion	Up to 6 inches of rain caused flooding of roads, fields, and other low areas, including a golf course in Windom. Flooding of basements was reported in Windom and Mountain Lake.
6/20/2005	Westbrook	Heavy rain caused flooding of streets and low areas.
7/25/2005	Storden	Heavy rain of up to 5 inches caused flooding of basements and some roads.
9/24/2005	Windom	Heavy rain caused flooding of streets, parking areas, parks, fields, basements, and garages. Up to three feet of water flooded some roads, including the main intersection of U.S. Highway 71 and State highway 60. One street was partially washed out under the curb. Numerous vehicles stalled on the flooded streets, and the basement flooding was widespread in the city. The heavy rain also caused Perkins Creek to overflow its banks. Reports of 6 inches of rain were received from Windom, and 7 inches of rain from south of Windom.
6/5/2008	Windom	Heavy rain caused flash flooding of streets in Windom.
6/26/2010	Mountain Lake	Heavy rain caused flash flooding of a rural road and adjoining low areas.
9/22/2010	Windom	Heavy rainfall of 5.75 inches caused widespread flash flooding of roads and basements, with sewer backups in Windom. One basement collapsed.
6/14/2011	Westbrook	Heavy rain on saturated ground caused flash flooding of several county roads.

Date	Location	Event Narrative
8/16/2015	Westbrook	Heavy rain of over 5 inches caused a path of water to run up to 3 feet deep over the area.

National Climatic Data Center (NCDC/NOAA) Storm Events database

Vulnerability

Flooding is highly likely to occur each year and forecasting technology and models can help predict yearly spring flooding. Even with weather forecasting technology floods can occur rapidly and poses a risk throughout the county. Flooding can occur anytime anywhere, so the potential damage of a flood could be higher than the total value of residential structures within the floodplain. The value of residential structures does not take into consideration outbuildings, machine sheds, and agricultural production. The potential damage of a flood could be relatively high. Flash flooding could result in sewer systems being overloaded and flooding to occur in basements. Basement flooding could be isolated to low lying areas, or could be citywide in an event of an extreme rain event.

Plans and Programs

Improvements have been made along the flood plain. Pumps have been purchased by cities to assist with bypassing the sewer system during an extreme rain event. Additional plans and programs include:

- Zoning – The County and the City of Windom 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. The floodplain section of the Cottonwood County, City of Windom, and City of Mountain Lake Development Code addresses the placement of structures within the floodplain. These zoning regulations prohibit any further development within the floodplains. Existing structures may continue to exist as "grandfathered" structures, but the county anticipates the number of these structures will be reduced over time.
- The Cottonwood Soils and water Conservation District's (SWCD) 10-year strategic plan includes goals to reduce flooding and documenting the effectiveness of flood reduction measures, as well as working on water quality issues. The Redwood-Cottonwood Rivers Control Area, a non-regulatory, joint-powers organization that includes eight counties in the Redwood and Cottonwood river basins, focuses mostly on water quality but also works to keep water on the landscape longer, reducing potential flood impacts.
- Area II River Basin – The Area II River Basin works to alleviate recurrent flood problems in southwest Minnesota. Member counties include: Brown, Cottonwood, Lac qui Parle, Lincoln, Lyon, Murray, Pipestone, Redwood, and Yellow Medicine.
- Dams – Area II River Basin have worked with Cottonwood County to sponsor and complete dam projects in the county and surrounding counties.
- County flood area maps – Cottonwood County has FIRM maps identifying the 100-year. Windom and Comfrey in Cottonwood County have official FIRM maps identifying the 100-year flooding plain. All cities addressed flood risks in their planning and zoning documents.
- Cottonwood County Emergency Operations Plan – A response plan to a flood emergency has been developed and local resources and personnel have been committed to it:

- Response Plan – A response plan to a flood emergency has been developed and local resources and personnel have been committed to it. Part of the response plan is an evacuation plan that is in the EOP.
- National Flood Insurance Program (NFIP) – Cottonwood County and the following cities participate in the NFIP: Comfrey, Mountain Lake, and Windom.[42] The NFIP has three basic aspects that include: floodplain identification and mapping, floodplain management, and flood insurance. FEMA's National Flood Insurance Program (NFIP) provides an option for local property owners to protect their structures in communities that participate.
- Zoning restrictions – The City of Windom and Cottonwood County have zoning restrictions that limit new structures and land uses within the Floodway, Flood Fringe, and General Flood Plain District.
- Water level monitoring – Water levels in the Des Moines River are monitored, so the water levels downstream are predictable. The gauge is near the Windom Country Club and County Road 15 bridge.
- Local Water Management Plan – The water plan identifies priorities regarding drainage, which includes flooding.
- Emergency response planning – Road closures are taken into account in planning and training. Local fire departments, emergency medical services, and other emergency responders plan for having to use alternative routes in case of flooding.
- Road Closure – Cottonwood County Public Works will close any county roads or assist townships in closing township roads if they are unsafe due to flooding or washouts caused by flooding. Public Works will notify the Sheriff's Department of any road closures. MnDOT will close any state highways deemed unsafe due to flooding or washouts due to flooding. MnDOT will update MN511 with any road closures.
- On-site stormwater detention can slow runoff, slowing potential flash flood events and improving the quality of runoff.
- Ditch system / drainage – Cottonwood County continues to make improvements to the ditch system. With increased tiling, it is important to reevaluate the ditch system and drainage.
- Sediment ponds – The Cottonwood County Highway Departments works with the DNR and other organizations to increase the number of sedimentation ponds along roadways in Cottonwood County. Sedimentation ponds hold back water, which helps to control flooding. Cottonwood County Zoning references erosion control and drainage in our subdivision ordinance, but the county does not distinctly call out requirements for sedimentation ponds or their required size. Cottonwood County follows state recommendations on storm water management for bare land development and other applicable projects. The City of Windom has completed drainage and retention projects to minimize flooding in the city. For example, the 4th Avenue bridge on Perkins Creek was oversized when it was replaced and a water control device was constructed on 18th avenue in Windom. The City of Mountain Lake complies with the National Pollutant Discharge Elimination System and reviews building and development plans to assure that private entities are also complying with these federal and state requirements.

[42] MN DNR. National Flood Insurance Program Participation. Data Request. Accessed: 7/11/2017.

- Road mitigation projects – Road retention projects were pursued to reduce the impact of flooding along roadways. These projects included: analyzing runoff and the capacity of county ditches, the installation of smaller culverts, and adding water retention ponds. Downsizing culverts is a reversal in the trend of replacing culverts with larger sized culverts, which only transfer additional water downstream. Cottonwood County has been proactive in culvert replacement.
    - Cottonwood County is proactive in Bridge Replacement Projects as well (we replaced two county bridges and a township bridge last year and will replace 1 or 2 township bridges this year and possibly another county bridge. A Hydraulic Analysis is performed prior to each bridge or box culvert replacement greater than a 10' span to determine adequate and proper sizing.

Gaps and Deficiencies

- Wastewater treatment vulnerability to flooding – Wastewater treatment plants may be vulnerable to flooding. Additionally, pumps may not be capable to keep up with flood events. This would result in sewer water being combined with clean water and entering the various watersheds. Pond systems are the most vulnerable.
    - The City of Windom's wastewater treatment plant is a mechanical system.
- Grandfathered in structures in the floodplain – At-risk uses and structures remain in identified 100-year floodplains, because they are "grandfathered" in.
    - Windom's wastewater treatment plant is located outside the one percent floodplain.
- Severe flooding – Local resources are not adequate for a severe and prolonged flood. State and federal resources are required when responding to severe flooding. There may be a time delay to receive assistance.
- Development in the floodplain – Some residents are resistant to leaving their property, even if it is located in a designated floodplain. The area may be seen as scenic, so the resident may want to continue living in the floodplain.
- Local assistance – Local match for mitigation projects (such as acquisition of property) is often difficult to acquire, due to limited local budgets.
- Local resources – Local resources are not adequate for a severe or prolonged flood. Additional assistance would be needed.
- Limitations of models – Models are increasingly being used by engineers and scientists in flood management. Models are only as accurate as the data that is used in the analysis. Outdated maps and not including all the impacting variables can cause forecasting errors to occur. Ground saturation is one variable that is not included in the models for estimating yearly flood levels. Ground saturation affects the amount of moisture that can be soaked in during a precipitation event. Forecasters are working on ways to include ground saturation into their flood models.
- Critical facilities in the flood plain – Windom has two lift stations located in the one percent flood plain.
- Floodplain maps – The FIRM maps are being updated in 2018 for Cottonwood County. We do not know what they will look like, and Windom is not being updated, even though there have been 24 LOMAs completed in Windom. The City of Windom feels the FIRM maps are inaccurate, and are working toward getting them updated.
- Pumps – There are always a number of requests for pumps and generators when there are flood events. The MN Warn System helps to coordinate the supply of pumps, generators, and other

equipment to affected communities. Through the MN Warn System communities can share local and regional assets.

- Windom flooding – Windom has several undeveloped sites that encounter repetitive flooding. Island Park, the Environmental Center, Windom Country Club, and a city owned property near 17th avenue have caused Windom financial hardship over multiple flood events. Areas where flooding happens include Perkins Creek and properties adjacent to the Des Moines River. Removal of the dam in Windom has helped some of the flooding issues within the city.
- Aging drainage systems – Public drainage systems are aging and maintenance costs are increasing. Culverts are rusting out and replacement costs are substantial. Townships and local units of government need outside funding to help update public drainage systems. Not updating the system will lead to culvert failures, roads washing out, and erosion. The County and Townships are actively working to replace or repair aging roadway drainage structures as funding allows.
- Debris Management – The landfill would have a difficult time sorting piles of appliances, food, electronics, trees, and demolition debris. These items have to be separated and they are not allowed in the landfill.

5.4.4 Severe Summer Storms (Severe Thunderstorms, Lightning, and Hail)

During the spring, summer and autumn, severe thunderstorms, lightning, and hail can occur. (Windstorm and tornado events are addressed in the next section.) All locations in Cottonwood County are at risk to be affected by this hazard. Severe summer storm events will be more widespread. These weather events can generate lightning and hail that tend to be more isolated.

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 tornadoes. Thunderstorms are produced by air masses that become unstable and that overturn violently. Unstable air masses are usually the result of warm humid air at lower elevations and colder air at higher elevations.

Lighting is often associated with thunderstorms and can be deadly. 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.

Figure #73
Estimating Hail Size

Description	Diameter (inches)
Pea	0.25
Plain M&M	0.5
Penny	0.75
Nickel	0.88
Quarter	1
Half Dollar	1.25
Walnut or Ping Pong Ball	1.5
Golf ball	1.75
Hen's Egg or Lime	2
Tennis Ball	2.5
Baseball	2.75
Tea Cup	3
Grapefruit	4
Softball	4.5
CD-DVD	4.75 – 5

National Weather Service (NWS)

In Minnesota, most hail ranges in size from pea-size (1/4 inch) to golf-ball size (1-3/4 inch). Larger hailstones have been reported, but 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.

Given the rural agricultural nature of the county, the likelihood is greatest that crops would experience the most damage from a hail event; however, hail can also do a great amount of damage to vehicles and roofs of individual structures. The chance of significant building damage is likely to be higher within the cities as there are simply more buildings clustered in a small area to be potentially damaged.

Relationship to Other Hazards—Cascading Effects

- *Utility Failure.* Severe Summer Storms often occur during times of extreme heat that can place a heavy burden on the power grid, making it especially vulnerable to service interruptions caused by lightning.
- *Transportation Infrastructure.* Heavy rain can cause flash flood events, and may threaten transportation infrastructure.
- *Fire.* Lightning can cause both structure fires and wildfires.
- *Agricultural Disease.* Extreme Heat can have a major effect on the county's crops and livestock. During prolonged heat events, crops grow weak and are more susceptible to plant pests and diseases. In times of extreme heat, it is important that confinement buildings are properly ventilated and outside livestock are provided with places to get into the shade. Heat stroke can pose a serious threat to livestock.

Severe Summer Storms History in Cottonwood County

Thunderstorms are not documented by the NOAA as a separate event. There were four documented lightning events in Cottonwood County from January 2000 through May 2017.[43] There were most likely a number of other lighting events, but they went unreported. "Tall objects such as trees and skyscrapers are commonly struck by lightning. Lightning can strike the ground in an open field even if the tree line is close by."[44]

Figure #74
Lightning Events – Cottonwood County

Date	Location	Event Narrative
8/23/200	Storden	Lightning struck a garage, causing a fire which destroyed the garage, a pickup truck, lawn mower, tiller, and a restored bicycle. $50,000 in Property damage resulted.
6/2/2002	Westbrook	Lightning damaged electronic equipment at a grain elevator, and stripped a large part of the bark from a tree. $5,000 in Property damage resulted.
7/11/2004	Westbrook	Lightning struck and destroyed a large tree. The lightning also damaged a computer and a television set in the adjoining house. $3,000 in Property damage resulted.
8/16/2004	Windom	Multiple lightning strikes damaged electrical lines and equipment at an electrical substation, resulting in a city wide power outage. An air conditioner was also damaged. $10,000 in Property damage resulted.

National Climatic Data Center (NCDC/NOAA) Storm Events database

The lightning activity level (LAL) is a common parameter that is part of fire weather forecasts nationwide. LAL is a measure of the amount of lightning activity using values 1 to 6 where:

Figure #75
Lightning Activity Level

LAL	Cloud & Storm Development	Lightning Strikes / 15 min
1	No thunderstorms.	-
2	Cumulus clouds are common but only a few reach the towering cumulus stage. A single thunderstorm must be confirmed in the observation area. The clouds produce mainly virga, but light rain will occasionally reach the ground. Lightning is very infrequent.	1-8
3	Towering cumulus covers less than two-tenths of the sky. Thunderstorms are few, but two to three must occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent.	9-15
4	Towering cumulus covers two to three-tenths of the sky. Thunderstorms are scattered and more than three must occur within the observation area. Moderate rain is common and lightning is frequent.	16-25

[43] NOAA. Accessed: 8/7/17. Available: http://www.ncdc.noaa.gov/stormevents/
[44] NOAA. Accessed: 8/7/17. Available: http://www.nssl.noaa.gov/education/svrwx101/lightning/

5	Towering cumulus and thunderstorms are numerous. They cover more than three-tenths and occasionally obscure the sky. Rain is moderate to heavy and lightning is frequent and intense.	>25
6	Similar to LAL 3 except thunderstorms are dry.	

Figure #76
Lightning Detector Needs – Cottonwood County Schools

Location	Lightning Detectors	Need for Lightning Detectors
Windom Schools	*None*	*We would only need two since all of our fields are in the same complex.*
Westbrook-Walnut Grove Public Schools	*2 – generally kept with our athletic trainers at our outdoor events* *Weather station purchased in January 2018 (AcuRite Model #06014 with added lightning detector #06045) and placed near football field in Westbrook. School has not used it for emergency situations and has no plans to use it for outdoor activities.*	*Add 2 additional devices to our supply, since we often have multiple events at multiple sites taking place concurrently.*
Mountain Lake Public School		

Figure #77
Lightning Detector Needs – Cities (Public Facilities)

Location	Lightning Detectors	Need for Lightning Detectors
Windom	*1*	*Legion Park – softball and baseball fields*

Hail events are separate events recorded by NOAA. Hail is often part of a thunderstorm and is not always reported due to the varying size and the rural nature of Cottonwood County. From January 2000 through May 2017, there have been 82 documented hail events in Cottonwood County. Some of these hail events are only minutes apart, but a hail event is a separate event if the storm stops hailing and starts hailing a few minutes later.

Figure #78
Hail Events - Cottonwood County (January 2010 – May 2017)

Date	Location	Size	Event Narrative
6/25/2010	Jeffers	1.00”	Thunderstorms produced numerous reports of large hail, along with some damaging winds, a tornado, and flash flooding, in southwest Minnesota, during the late afternoon and evening of June 25th.
9/22/2010	Jeffers, Delft, Mountain Lake	1.00”	Persistent thunderstorms produced large hail, damaging winds, and numerous reports of flash flooding in much of southwest Minnesota during the late afternoon and evening of September 22nd. Large hail was accompanied by estimated 60 mph wind gusts.
5/21/2011	Windom (2 events), Mountain Lake	0.88” – 1.50”	Thunderstorms produced large hail and damaging winds at several locations across southwest Minnesota during the evening of May 21st.
5/18/2012	Storden	1.00”	A thunderstorm produced quarter size hail in Cottonwood County on the early evening of May 18th.
5/17/2013	Storden, Jeffers, Delft, Windom Muni ARP (4 events), Windom (12 events)	0.75” – 2.00”	Thunderstorms produced large hail at numerous locations in Cottonwood and Jackson Counties in southwest Minnesota on the late afternoon of May 17th. There were also two tornadoes reported, though no damage was reported with either. Large hail damaged vehicles, siding, roofs, and cracked windows. Minor crop damage was also suspected. The amount of damage was not known.
6/18/2013	Delft, Mountain Lake	1.00” - 1.25”	Thunderstorms produced large hail in Cottonwood County in southwest Minnesota during the predawn hours on June 18th. The hail covered the ground in places. Large hail covered the ground, and drifts persisted for several hours after the storm.
6/21/2013	Storden	1.00’	Thunderstorms produced damaging winds and large hail at numerous locations in southwest Minnesota during the late afternoon and evening of June 21st, with one brief tornado also reported. There was also flash flooding in Jackson County, which continued after midnight into the early morning hours of June 22nd.
8/5/2013	Westbrook	1.25”	Thunderstorms produced marginally large hail in Murray and Cottonwood Counties in southwest Minnesota near midnight on August 4th/5th, 2013.
8/31/2013	Jeffers	1.00”	Thunderstorms produced large hail at scattered locations in southwest Minnesota during the late afternoon and evening of August 31st. Large hail covered the ground.

Date	Location	Size	Event Narrative
5/8/2014	Westbrook	0.88”	Thunderstorms produced marginally large hail at a few places in southwest Minnesota on the afternoon of May 8th.
8/21/2014	Bingham Lake	0.88”	Thunderstorms produced heavy rain, nickel size hail and a brief tornado in Cottonwood County during the predawn hours of August 21st. Hail was heavy enough to strip leaves from trees and damage a corn crop. The hail was accompanied by heavy rain.
9/9/2015	Jeffers	0.75”	Thunderstorms produced large hail at one location, with penny size hail reported at two other places in southwest Minnesota during the late afternoon and early evening of September 9th.
7/13/2016	Mountain lake	1.00”	A thunderstorm produced quarter size hail a few miles from Mountain Lake in Cottonwood County on the morning of July 13th.
7/16/2016	Mountain Lake	0.75”	Thunderstorms produced damaging winds, heavy rain, flash flooding, and penny size hail at scattered locations in southwest Minnesota during the evening of July 16th. The heavy rain and flash flooding lingered to after midnight on July 17th.

National Climatic Data Center (NCDC/NOAA) Storm Events database

Hail and Climate Change

According to the Federal Advisory Committee Draft National Climate Assessment (NCA), winter storms have increased slightly in frequency and intensity, and their tracks have shifted northward over the U.S. Other trends in severe storms, including the numbers of hurricanes and the intensity and frequency of tornadoes, hail, and damaging thunderstorm winds are uncertain. Since the impact of more frequent or intense storms can be larger than the impact of average temperature, climate scientists are actively researching the connections between climate change and severe storms (National Climate Assessment Development Advisory Committee, 2013).

The occurrence of very heavy precipitation has increased in Minnesota in recent decades and future projections also indicate this will continue (International Climate Adaptation Team, 2013). While it is unknown if this precipitation will occur during severe storms that produce hail, the possibility has not been ruled out.

Vulnerability

Severe summer storms are highly likely to take place every year, including lighting, and hail. People do not always recognize their limitations. Summer storms can pose a serious risk to all populations, especially the young and elderly population. Informing the public about summer storms is important in preventing accidents.

Plans and Programs

- Emergency alert system – Cottonwood County has the CivicReady emergency notification system. CivicReady has the capability to alert citizens who are in the direct path of the emergency, and gives you the tools to quickly send notifications via mobile (text/voice) phone, landline phone, email, social media, and many other channels.
    - Windom also has a civil alert system called Nixle
- Lightning detectors – "Lightning hazards can be mitigated by advanced planning. One part of this safety program should include an early detection and warning alarm package. Lightning detectors can give notice to shut down dangerous operations before the arrival of lightning. (Note: there is no defense from a "first strike" situation.) Detectors also may signal 'all clear' conditions after the lightning threat has passed."[45] Lightning detectors would improve safety at outdoor sporting events. Refer to Figure #75 for an inventory and need for lightning detectors for schools in Cottonwood County.
- Storm Ready Community – StormReady is a community preparedness program that encourages government entities and commercial gathering sites to prepare for severe storms. Storm Ready Communities are about building resilient communities in the face of increasing vulnerabilities to extreme weather events. Cottonwood County is exploring the requirements to become a Storm Ready Community.
- Weather Ready Nation Ambassador – Cottonwood County is a Weather Ready Nation Ambassador. "The Weather-Ready Nation Ambassador™ initiative is the National Oceanic and Atmospheric Administration's (NOAA) effort to formally recognize NOAA partners who are improving the nation's readiness, responsiveness, and overall resilience against extreme weather, water, and climate events. As a WRN Ambassador, partners commit to working with NOAA and other Ambassadors to strengthen national resilience against extreme weather."[46]
- The severe storm spotters network in Cottonwood County consists of the area Fire Departments and local law enforcement. Due to the use of ARMER radios during spotting, these are the agencies that are used. There are also volunteers in an operations center that monitor the weather radar and coordinate the spotter response by monitoring radio traffic and directing the spotters.
- All 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.
- Severe Weather Awareness – Each spring, Cottonwood County Emergency Management participates in Severe Weather Awareness week through advertising on the radio as well as advertising in the local newspapers. These advertisements are intended to educate people about severe weather. Emergency management also posts on Facebook and Twitter tips about how to prepare for severe

[45] National Lightning Safety Institute. Overview of Lightning Detection Equipment. Accessed: 2/24/16. Available: http://lightningsafety.com/nlsi_lhm/detectors.html
[46] NOAA. Weather Ready Nation Ambassadors. Accessed: 3/24/16. Available: http://www.nws.noaa.gov/com/weatherreadynation/ambassadors.html

weather. The county also participates in the statewide tornado drill, usually held on the Thursday of that week at 1:45pm and 6:45 pm. Other entities that participate in the tornado drill include: Windom Public Schools, Mountain Lake Public Schools, Mountain Lake Christian School, Westbrook/Walnut Grove Public Schools, Windom Area Health and Sanford Westbrook Medical Center. There are also a number of businesses, assisted living and long term care facilities, and day cares that participate.

- Local media – Severe weather warnings are broadcasted via local media, social media, and Civic Ready. Public service announcements are one of the ways to warn the public of severe weather.
  - Mountain Lake and Windom use Nixle for alerts; however, there is not a weather component to their program.
- Severe weather spotter training – a biennial training is provided in Cottonwood County. The National Weather Service conducts the training. We coordinate with Jackson County so the training is offered somewhat locally for both counties every year.
- After the 1998 tornado, the Comfrey city building was reconstructed with reinforced concrete safe areas, and all residents received weather radios. The Cottonwood County EOC is located in the basement of the concrete Law Enforcement Center.

Gaps and Deficiencies

- Public education – The public may not be aware of the real risks associated with heat exhaustion, extreme heat events, and other severe summer storms.
- Lightning detectors – Lightning detectors detect lightning produced by thunderstorms. Lightning detectors would improve safety at outdoor sporting events by providing better information when delaying or cancelling a sporting event. Not all outdoor sporting events have a lightning detector. Currently, the National Federation of State High School Associations (NFHS) "30-30 Rule" is used. The 30-30 Rule states that when you see lightning, count the time until you hear thunder. If this time is 30 seconds or less, go immediately to a safer place. Some smart phones are able to download a lightning detector app. Refer to Figure #75 for an inventory and need for lightning detectors for schools in Cottonwood County.
- 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.
- There are areas where an outdoor warning siren should be constructed in the county. The unincorporated area of Delft has expressed interest in having an outdoor warning siren. Talcot Lake Campground has also been identified as a location an outdoor warning siren could be installed. As many as 300 campers are in the campground at times, and it is in a remote location, so getting information to the campers about approaching weather is difficult.
- Additional resources and training are necessary for the storm spotters network to function continuously.
- Local match for construction projects (such as safe rooms) will likely become even more difficult to fund as local government assistance declines.

- Many local residents are resistant to zoning and building codes that could assure higher standards for new construction.

5.4.5 Tornado & Straight-line Wind Events

Tornadoes are the most violent of all storm types experienced in Minnesota.[47] 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.

Straight-line winds are also damaging but not to the extent of more powerful tornadoes. Straight-line winds can and do produce substantial damage over wider areas at one time. NOAA documents straight-line wind events as thunderstorm wind events and defines them as winds equal to or greater than 40 mph (35 knots). All of Cottonwood County is at risk of a tornado. FEMA places Southern Minnesota in Wind Zone IV, subject to winds of up to 250 mph.[48]

Minnesota lies along the north edge of the region of maximum tornado occurrence in the United States, known as tornado alley. Tornado Alley encompasses part of the central United States that extends across parts of Texas, Oklahoma, Kansas, Missouri, East Nebraska, and West Iowa. Tornadoes have been reported in Minnesota in every month from March through November.[49]

Since 2007, tornado strength in the United States is ranked based on the Enhanced Fujita scale (EF scale), replacing the Fujita scale introduced in 1971. The EF scale uses similar principles to the Fujita scale, with six categories from 0-5, based on wind estimates and damage caused by the tornado. The EF Scale is used extensively by the NWS in investigating tornadoes (all tornadoes are now assigned an EF Scale number), and by engineers in correlating damage to buildings and techniques with different wind speeds caused by tornadoes. The Fujita Scale, the derived EF Scale and the operational EF Scale are included. Though the Enhanced Fujita scale itself ranges up to EF28 for the damage indicators, the strongest tornadoes max out in the EF5 range (262 to 317 mph). [50]

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 tornadoes stay on the ground for less than five minutes. Tornadoes frequently move from southwest to northeast but this also varies and cannot be counted on in all instances.

Tornado damage can vary from limited damage to trees and building to complete destruction of a community. Along with monetary damages, loss of life is a real concern. However, due to the rural nature of Cottonwood County, many funnel clouds have only caused damages to crops and unpopulated area.

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[47] MN State Hazard Mitigation Plan 2014. Accessed: 8/8/17. Available: https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/State%20Plan%20Final%202014.pdf
[48] FEMA. Accessed:8/8/17. Available: https://www.fema.gov/media-library-data/1418837471752-920f09bb8187ee15436712a3e82ce709/FEMA_P-320_2014_508.pdf
[49] MN State Hazard Mitigation Plan 2014. Accessed: 8/8/17. Available: https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/State%20Plan%20Final%202014.pdf
[50] MN State Hazard Mitigation Plan 2014. Accessed: 8/8/17. Available: https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/State%20Plan%20Final%202014.pdf

Figure #79
Enhanced F-Scale for Tornado Damage

Scale	Wind Estimate	Typical Damage
EF0	65-85 mph	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
EF1	86-109 mph	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
EF2	110-137 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	138-167 mph	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
EF4	168-199 mph	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
EF5	200-234 mph	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

National Climatic Data Center (NCDC/NOAA) Storm Events database

Figure #80
Straight-line Wind Damage Estimates

Wind Speed	Effects
25 – 31 mph	Large branches in motion, whistling in telephone wires
32 – 38 mph	Whole trees in motion
39 – 54 mph	Twigs break off of trees, wind impedes walking
55 – 72 mph	Damage to chimneys and TV antennas, pushes over shallow rooted trees
73 – 112 mph	Peels surface off roofs, windows broken, trailer houses overturned
113+ mph	Roofs torn off houses, weak buildings and trailer houses destroyed, large trees uprooted

The National Weather Service

The most severe windstorms usually occur (and do the most damage) during severe thunderstorms in the spring and summer months. These include tornadoes, downbursts, or straight line winds. Straight-line winds have similar effects to tornadoes without the rotational damage pattern.

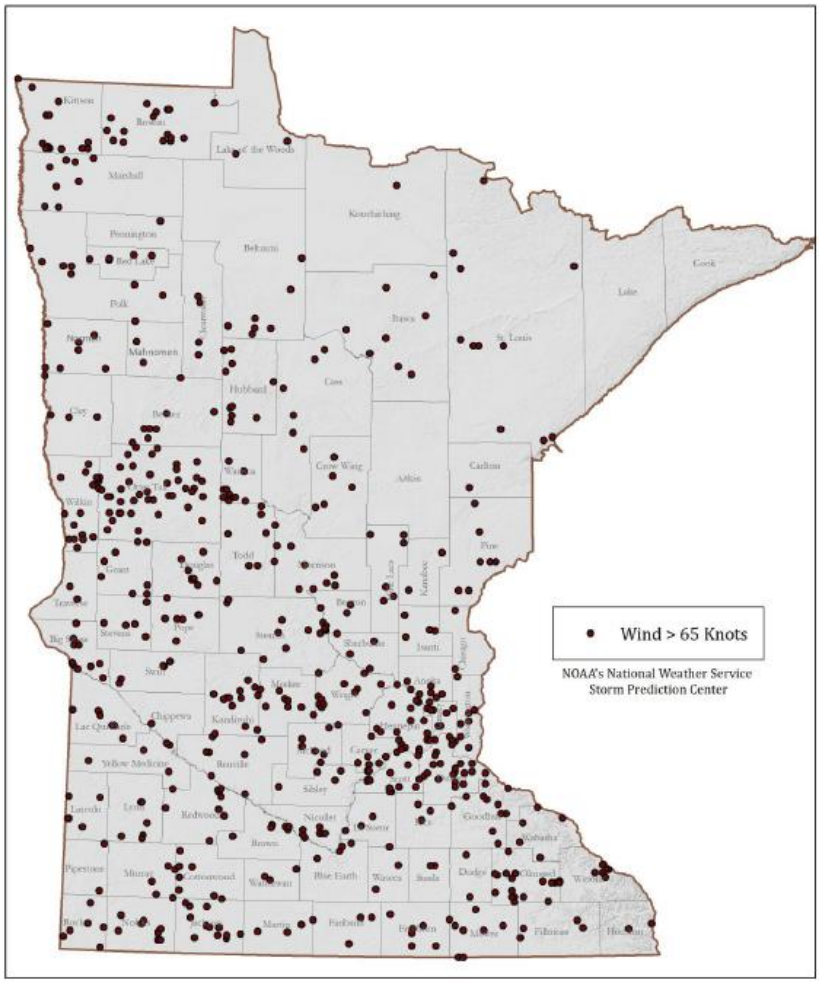
Downbursts are created by a column of sinking air, capable of producing straight-line winds in excess of 150 mph. Winds of greater than 60 mph are also associated with intense spring and fall low-pressure systems. These winds can inflict damage to buildings and overturn high profile vehicles.

The Minnesota AHMP calculated an annual probability of 1.42 of a windstorm event with 868,473,000 in building exposure. The Minnesota AHMP places Cottonwood County as a medium level risk (a moderate vulnerability based less than two wind events per year and compared to building exposure.). [51] According to the National Climatic Data Center, there have been 8,961 high wind events in Minnesota between 1/1/1955 to 8/31/2013. This number is misleading because the same storm data may have been reported at multiple locations. However, due to these events there were 10 deaths and approximately $881 million dollars in property damages.

The entirety of Cottonwood County is at risk for both tornados and straight line winds, with figures #81 and #82 demonstrating that these events can occur anywhere in the county.

[51] MN State Hazard Mitigation Plan 2014. Accessed: 8/8/17. Available: https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/State%20Plan%20Final%202014.pdf

Figure #81
Reported sustained winds or wind gusts 65+ knots, 1955-2012[52]



Relationship to Other Hazards—Cascading Effects

- *Numerous.* A tornado or straight-line wind storm, can lead to total destruction of buildings and wide-scale casualties. There can be fires, disruptions to transportation infrastructure and other infrastructure, and potential public health emergencies. Catastrophic events such as these may also create the potential for civil unrest.

[52] MN State Hazard Mitigation Plan 2014. Accessed: 8/8/17. Available: https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/State%20Plan%20Final%202014.pdf

- *Emergency Response.* Emergency response times can also be affected by infrastructure being damaged. Cell phone towers and telephone lines can be downed delaying calls for help.

Tornado & Straight-line Wind Events History in Cottonwood County

There were nine documented tornadoes in Cottonwood County from January 2000 through May 2017. There were 47 thunderstorm wind events documented during this same time period, 13 were in excess of 60 knots as shown in Figure #82. Straight-line winds are classified by NOAA as thunderstorm wind events. Straight-line winds can also cause property damage, but there is less risk of loss of life associated with straight-line winds. Tornadoes and straight-line winds can be most devastating to those living in mobile homes, boats, or RV's. The 2015 American Community Survey conducted by the US Census identified 54 mobile home units (1.0% of the 5,386 available housing units) in Cottonwood County.[53] The only known concentration is approximately 4 units located on 5th Street on the East side of Windom. Cottonwood County does not keep an inventory of individual mobile home units in the County.

Figure #82

Tornadoes – Cottonwood County

Date	Location	Scale	Event Narrative
8/7/2000	Jeffers	F-1	A tornado destroyed a barn and damaged other farm buildings. The tornado also caused crop damage, but the amount of crop damage was not determined.
7/14/2003	Storden	F-0	A brief tornado caused no reported damage.
6/29/2005	Windom	F-0	A tornado damaged corn crops and tore off a pumphouse roof.
8/1/2006	Mountain Lake	F-0	A brief tornado caused no reported damage.
76/11/2008	Jeffers	EF-0	Thunderstorms produced three tornadoes and a report of damaging winds in southwest Minnesota at the end of the afternoon on June 11th. A tornado damaged outbuildings and caused tree damage.
7/7/2009	Storden	EF-0	Thunderstorms produced damaging winds, hail, and one tornado in Murray and Cottonwood Counties in southwest Minnesota on the late afternoon of July 7th. The tornado caused no reported damage.
6/25/2010	Storden	EF-0	Thunderstorms produced numerous reports of large hail, along with some damaging winds, a tornado, and flash flooding, in southwest Minnesota, during the late afternoon and evening of June 25th. A brief tornado caused no reported damage.
5/17/2013	Windom	EF-0	Thunderstorms produced large hail at numerous locations in Cottonwood and Jackson Counties in southwest Minnesota on the late afternoon of May 17th. There were also two tornadoes reported, though no damage was reported with either.

[53] FactFinder. Accessed 8/8/17. Available: http://factfinder2.census.gov

Date	Location	Scale	Event Narrative
8/21/2014	Mountain Lake	EF-0	Thunderstorms produced heavy rain, nickel size hail and a brief tornado in Cottonwood County during the predawn hours of August 21st. A brief tornado caused no reported damage.

National Climatic Data Center (NCDC/NOAA) Storm Events database

Figure #83

Thunderstorm Wind Event (60+ knots) – Cottonwood County

Date	Location	Wind Speed	Event Narrative
8/7/2000	Bingham Lake, Westbrook	61 - 69 kts MG	In Westbrook a thunderstorm winds tore the roof off a garage and concession stand at a high school football field, and damaged the scoreboard, bleachers, and the baseball dugout at the school. In Bingham Lake a thunderstorm winds caused tree and power line damage, and flattened a corn crop. The amount of crop damage was not known.
6/13/2001	Windom	61 - 69 kts MG	Thunderstorm winds blew the roof and wall of a large lumber yard building onto a nearby bowling alley. Widespread tree damage included large trees blown down, about a dozen of which fell onto houses and caused further damage. The winds caused roof damage to other structures and blew down power lines.
4/16/2002	Storden	61 kts MG	Thunderstorm winds blew the roof off a vehicle repair shop. The roof knocked down power lines when it fell, causing a power outage.
6/27/2003	Mountain Lake	61 kts MG	Thunderstorm winds caused widespread tree damage, including numerous trees blown down. Falling trees damaged roofs of houses and destroyed the topper of a pickup truck, and severely damaged another pickup. Power lines were blown down, resulting in power outages. A large storage shed was destroyed. The roof of a house was blown off, and other roof damage to structures was reported.
4/18/2004	Storden, Westbrook, Windom	61 - 69 kts MG	In Storden, thunderstorm winds caused tree and power line damage. The amount of damage was not known. In Westbrook, thunderstorm winds blew the roof off a barn and destroyed a machine shed. Two cars, a combine, and a field sprayer in the machine shed were damaged. The winds destroyed a barn on another farm, damaging a tractor and a van inside. The winds blew over a sign anchored in cement, with two tractors being damaged when the sign fell on them. Widespread tree and power line damage was also reported.

Date	Location	Wind Speed	Event Narrative
5/16/2004	Westbrook	69 kts MG	Thunderstorm winds caused tree damage, including numerous trees blown down. One pine tree penetrated the roof of a house. The house suffered other wind damage, including to the porch. The garage was heavily damaged and farm equipment was damaged.
5/29/2004	Westbrook	61 kts MG	Thunderstorm winds caused tree damage, including several 6 inch diameter limbs blown down.
8/3/2005	Westbrook	69 kts MG	Thunderstorm winds blew off the roof of an apartment building, and damaged buildings at a lumber yard and at a school bus yard. The winds also caused widespread tree damage, including several trees uprooted.
6/11/2008	Westbrook	70 kts MG	Thunderstorms produced three tornadoes and a report of damaging winds in southwest Minnesota at the end of the afternoon on June 11th.
7/23/2010	Jeffers	61 kts MG	Thunderstorms produced damaging winds across several counties in southwest Minnesota during the late evening of July 23rd. Thunderstorm winds caused tree damage, including branches blown down.
7/15/2011	Mountain Lake	61 kts MG	A thunderstorm produced a damaging wind gust which was measured near Mountain Lake in Cottonwood County on the early afternoon of July 15th.
6/14/2016	Bingham, Mountain Lake	61 – 64 kts MG	In Bingham Lake, a thunderstorm winds cause tree damage in a shelter belt, including up to 3 inch diameter hardwood branches broken off. In Mountain Lake, a thunderstorm winds damaged several large trees and destroyed an outbuilding.
6/17/2016	Mountain Lake	61 kts MG	Thunderstorm winds caused tree damage, including a large tree blown across a road.

National Climatic Data Center (NCDC/NOAA) Storm Events database

Windstorms and Climate Change

Lack of high-quality long-term data sets make assessment of changes in wind speeds very difficult.[54] One analysis generally found no evidence of significant changes in wind speed distribution. Other trends in severe storms, including the numbers of hurricanes and the intensity and frequency of tornadoes, hail, and damaging thunderstorm winds are uncertain. Since the impact of more frequent or intense storms can be larger than the impact of average temperature, climate scientists are actively researching the connections between climate change and severe storms (National Climate Assessment Development Advisory Committee, 2013).

[54] Kunkel, et al., Regional Climate Trends and Scenarios for the U.S. National Climate Assessment, 2013

Tornadoes and Climate Change

Tornadoes and other severe thunderstorm phenomena frequently cause as much annual property damage in the U.S. as do hurricanes, and often cause more deaths. Although recent research has yielded insights into the connections between global warming and the factors that cause tornados and severe thunderstorms, such as atmospheric instability and increases in wind speed with altitude (Del Genio, Yao, & Jonas, 2007), these relationships remain mostly unexplored, largely because of the challenges in observing thunderstorms and tornadoes and simulating them with computer models (National Climate Assessment Development Advisory Committee, 2013).

According to Harold Brooks of NOAA's National Severe Weather Laboratory, there is increasing variability in the "start" of tornado season. The number of days with more than 30 EF1 or greater tornadoes is increasing, while the number of days with at least 1 EF1 or greater tornadoes is decreasing. Thus, tornadoes are occurring on fewer days, but *more* are occurring on outbreak days.

Tornadoes have not been recorded in Minnesota in the winter months of December, January and February (MN DNR, 2014). However, the state of Wisconsin has recorded 3 tornadoes in January and 6 in December during the period of 1844-2013 (National Weather Service Weather Forecast Office, 2014) including a recent January tornado in 2008.

Vulnerability

Tornado and Straight-line Wind events are likely to take place in any year. Tornadoes are less common than straight-line wind events, but communities need to be prepared since loss of life is a risk associated with these two hazards. Severe wind events can cause minor damage 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.

Plans and Programs

- Severe Weather Spotter Network – The severe storm spotter 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. Cottonwood County biennially trains its fire and law enforcement personnel on severe weather spotting through the National Weather Service.
- Severe Weather Shelters – The Minnesota State Zoning Ordinance regarding severe weather shelters has been adopted by Cottonwood County. This ordinance requires on-site shelter for mobile home park residents or provides information on evacuation routes to safe shelters elsewhere; however, there are no mobile home parks in Cottonwood County.
    - Mountain Lake has a storm shelter at their campground, and there is one at Heritage Estates on 6th Avenue near CO RD 1. There are no mobile home parks in Mountain Lake
- NOAA Weather Radio – NWR broadcasts official warnings, watches, forecasts, and other hazard information 24 hours a day, seven days a week. The nationwide network of radio stations broadcast continuous weather information from the nearest National Weather Service office. The NWR is your primary source of comprehensive weather and emergency information regarding all hazards.

- Outdoor warning sirens – Most of the county's cities have outdoor warning sirens that can be activated to warn residents in the event of a tornado. Outdoor warning sirens offer last minute warnings to take shelter. The primary purpose of the outdoor warning siren is to alert people who are outside to severe weather, chemical hazard, or other emergency. If you hear an outdoor warning siren you should seek shelter immediately. Most of the cities in Cottonwood County have good coverage by outdoor warning sirens that can be activated to warn residents in the event of a severe weather event or other emergency. All of the outdoor warning sirens in Cottonwood County are activated through a VHF paging system, and have been converted to narrow band frequency to comply with FCC regulations.
- County Emergency Management Plan – The county Emergency Management Plan designates where to go in case of an emergency, who the main contacts are, and who is in charge of response and clean up.
- Severe Weather Awareness – Each spring, Cottonwood County Emergency Management participates in Severe Weather Awareness week through advertising on the radio as well as advertising in the local newspapers. These advertisements are intended to educate people about severe weather. Emergency management also posts on Facebook and Twitter tips about how to prepare for severe weather. The county also participates in the statewide tornado drill, usually held on the Thursday of that week at 1:45pm and 6:45 pm. Other entities that participate in the tornado drill include: Windom Public Schools, Mountain Lake Public Schools, Mountain Lake Christian School, Westbrook/Walnut Grove Public Schools, Windom Area Health and Sanford Westbrook Medical Center. There are also a number of businesses, assisted living and long term care facilities, and day cares that participate.
- Local media – Severe weather warnings are broadcasted via local media, social media, and Civic Ready. Public service announcements are one of the ways to warn the public of severe weather.
    - Mountain Lake and Windom use Nixle for alerts; however, there is not a weather component to their program.
- Severe weather spotter training – a biennial training is provided in Cottonwood County. The National Weather Service conducts the training.
- After the 1998 tornado, the Comfrey city building was reconstructed with reinforced concrete safe areas, and all residents in received weather radios. The Cottonwood County EOC is located in the basement of the concrete Law Enforcement Center.
- Warning sirens – No outdoor warning sirens in Cottonwood County have voice capabilities.
- School Tornado drills – Windom Area Public Schools, Westbrook/Walnut Grove Public Schools, Mountain Lake Public Schools, and Mountain Lake Christian School participate in severe weather awareness week. The schools have a plan in place for tornadoes and other severe weather events. They participate in the statewide tornado drill held during severe weather awareness week usually on Thursday.

Figure #84
Outdoor Warning Sirens – Cottonwood County

Cities	Sirens Adequate	Have backup battery	Feedback
Bingham Lake	Yes		
Comfrey	Yes		
Jeffers	Yes		
Mountain Lake	Yes		
Storden	Yes		
Westbrook	Yes		
Windom	Yes		
County Parks & Unincorporated Areas	No		Sirens are needed at populated, but unincorporated areas such as Delft and the Talcot Lake campground.

Gaps and Deficiencies

- Emergency shelters in nursing homes and assisted living facilities – A number of nursing homes and assisted living facilities in Cottonwood County may not have basement shelters or other suitable shelters for the residents.
- Emergency shelters in mobile home parks – Cottonwood County does not have any mobile home parks.
- Warning siren range – The effective range of warning sirens is limited. Rural areas are outside the range of the severe weather warning system areas. Weather radios should be more widely used. Local radio stations provide warnings, but increasingly feature non-local satellite programming.
- Local radio and television warnings – Local radio and television stations do provide warnings, but they are effective only if tuned to the local channel. Satellite and internet based mediums are widely used, so local emergency broadcasts are limited. Language barriers can also be an issue regarding severe weather warnings.
- Tornado preparedness training – Training should be given to educate residents as to where to go in their own homes during a tornado.
- Countywide basement study – A small number of homes in the county lack basements that would provide shelter in the event of a tornado or damaging winds from a severe thunderstorm. The county needs to better assess how many actual homes do not have basements, and then develop a plan to provide shelter to those residents.
- Emergency shelter and safe rooms –There are no safe rooms or emergency shelters in Cottonwood County. Funding is an obstacle for the construction of safe rooms. A safe room would be very beneficial at Talcot Lake Campground (county owned and operated) and the Windom Recreation Area.
- Warning sirens in county parks – None of the county parks in Cottonwood County have a warning siren.
- Warning siren backup batteries – Not all sirens are equipped with a backup battery. If the power goes off as a result of the storm, the siren is useless if it does not have a backup generator. See Figure #83 for warning sirens in Cottonwood County that do and do not have backup batteries (backup power generation).

- Diversity and language barriers – There are a number of nationalities and languages spoken in Cottonwood County. This makes it difficult to send out emergency broadcast. Having to translate emergency broadcasts into multiple languages takes time and money.
- Debris Management – The landfill would have a difficult time sorting piles of appliances, food, electronics, trees, and demolition debris. These items have to be separated and they are not allowed in the landfill.

5.4.6 Extreme Cold

Minnesota experiences winter weather from mid-autumn through the winter season into spring. 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. All locations in Cottonwood County are equally likely to be exposed to this hazard. Rural areas are more likely to be severely impacted by the hazard. Rural homes and farms face the threat of isolation and utility failure during winter storms.

Given the rural nature of Cottonwood County, residents of smaller communities may face similar isolation issues as rural residents. City residents are also at risk. Attempting to travel between communities would expose city dwellers to higher levels of risk corresponding with their rural counterparts.

Extreme cold events are when temperatures lead to direct dangers to people and animals. Infants and the elderly are most susceptible to prolonged exposure to the cold. Wind and cold weather can combine to cause wind chill temperatures as low as 70 degrees below zero.[55] Prolonged exposure can cause frostbite or hypothermia and can be life-threatening.

Below freezing temperatures can also damage vegetation and cause pipes to freeze and burst inside homes. More deaths are attributed to winter storms than to extreme cold weather events, but some populations are at more risk than others. The best advice is to stay inside. Over half of winter-weather deaths occurred in a vehicle, and 30 percent occurred outdoors.

[55] National Oceanic and Atmospheric Administration. Accessed 8/9/17. Available: http://www.nws.noaa.gov/om/cold/wind_chill.shtml

Figure #85
Wind Chill Table

Wind Chill Chart

Wind (mph)	Temperature (°F)																	
Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph) *Effective 11/01/01*

Relationship to Other Hazards—Cascading Effects

- *Transportation Crashes.* Winter storms often lead to hazardous conditions for transportation infrastructure. Icy roads can make travel difficult. Poor driving conditions and poorly designed transportation infrastructure can contribute to motor vehicle crashes.
- *Wildfire.* Extreme cold directly impacts firefighting, making fire suppression more difficult and increasing the likelihood of equipment damage.
- *Public Health.* Frozen septic systems can lead to the release of increased levels of untreated wastewater into the environment.
- *Public Safety.* Anyone exposed to extremely cold temperatures can develop frostbite and hypothermia. The elderly, children and those who engage in outdoor work or recreation may be most susceptible to the danger of extremely cold temperatures.

Extreme Cold History in Cottonwood County

From January 2000 through May 2017, there have been ten documented extreme cold events in Cottonwood County. In the table below are extreme cold events that occurred in that timeframe.

Figure #86
Extreme Cold Events – Cottonwood County

Date	Location(s)	Event Narrative
1/14/2009	Cottonwood County	Moderate to strong northwest winds and very cold air combined to lower wind chills to 35 to 45 below zero at times. The coldest winds chills were during the morning of January 14th with strong winds, and the night of January 14th to daybreak of January 15th when temperatures were falling and winds were slowly decreasing. The actual temperature dropped to 24 below zero at Windom on the morning of January 15th after the wind had subsided.
1/7/2010	Cottonwood County	Persistent north to northwest winds combined with very cold air to produce wind chill values the frequently dropped to 35 below zero or a little colder. These extremely dangerous wind chills added to the hazards produced by the preceding winter storm. As winds slowly subsided during the night of January 7th, temperatures continued to drop to well below zero, keeping the wind chills at the very dangerous level through the morning of January 8th.
2/1/2011	Cottonwood County	North to northwest winds averaging 15 to 30 mph combined with temperatures dropping below zero to produce wind chills of 20 to 35 below zero on February 1st. On the night of February 1st and the early morning of February 2nd, wind chills reached the 35 to 40 below zero range at times despite slowly decreasing winds, as temperatures fell further below zero.
1/20/2013	Cottonwood County	Northwest winds 15 to 30 mph combined with temperatures well below zero to lower wind chills to 35 to 40 degrees below zero.
12/23/2013	Cottonwood County	Temperatures of 15 to 28 below zero and winds reaching 10 to 15 mph at times combined to produce wind chills of 35 to 45 below zero.
1/23/2014	Cottonwood County	Temperatures of 10 to 16 below zero and winds reaching 10 to 15 mph at times combined to produce wind chills of 35 to 40 below zero.
2/27/2014	Cottonwood County	Temperatures dropping to double digits below zero, combined with winds of 10 to 20 mph, produced wind chill readings around 35 below zero for several hours ending a little after sunrise on February 27th.
3/2/2014	Cottonwood County	Temperatures dropping to around 15 below zero, combined with northwest winds of 5 to 15 mph, produced wind chill readings around 35 below zero for several hours ending a little after sunrise on March 2nd.
1/16/2016	Cottonwood County	Wind chills dropped to the 35 to 45 below zero range for much of the night and morning hours on January 16-17. Northwest winds gusted to around 20 mph early in the event, but generally averaged 10 to 15 mph when the coldest wind chills were reached, during which time actual temperatures were 15 to 20 degrees below zero.

Date	Location(s)	Event Narrative
12/17/2016	Cottonwood County	Strong northwest winds on December 17th, decreasing to around 10 mph during the night of the 17th, combined with falling temperatures to lower wind chill readings to 40 to 55 below zero. Actual temperatures dropped to colder than 20 below zero.

National Climatic Data Center (NCDC/NOAA) Storm Events database

Extreme Cold and Climate Change

There is not yet any observable trend related to extreme cold events and climate change in Minnesota. Cold temperatures have always been a part of Minnesota's climate and extreme cold events will continue. However, an increase in extreme precipitation or storm events such as ice storms as the climate changes could lead to a higher risk of residents being exposed to cold temperatures during power outages or other storm-related hazards during extreme cold.

Vulnerability

Extreme cold temperatures affect the county nearly every year. The amount of snow and ice, number of blizzard conditions, and days of sub-zero temperatures each year are unpredictable.

Within Cottonwood County the risk of extreme cold does not vary geographically. Citizens living in climates such as these must always be prepared for situations that put their lives or property at risk. It is not always the depth of the cold, but an unprepared individual with a vehicle breakdown or unmaintained garage that are at risk. Rural citizens not connected to city gas lines are more vulnerable to issues with extreme cold. The vulnerability of each jurisdiction to extreme cold has not changed due to any development in the last five years.

Plans and Programs

- Real-time weather monitoring – The City of Windom has a real-time weather monitoring station at the Windom Municipal Airport that provides current temperatures, dew point, wind speed, wind direction, and barometric pressure.
- Travel Assistance – "511 is a public service of the Minnesota Department of Transportation (MnDOT) to help traveler's access information about road conditions, traffic incidents, commercial vehicle restrictions, and weather information via the phone or the Web, 24 hours a day, seven days a week."[56]
- Regional Forecasts – Cottonwood County is in the Sioux Falls designated market area (DMA). Weather forecasts from the media in the Sioux Falls region tend to be a good predictor of weather in Cottonwood County. Cottonwood County uses this information in regards to school closures and other weather related announcements.
- School closings – Cottonwood County's school districts have a policy of closing schools when wind chills exceed certain thresholds, low visibilities create unsafe driving conditions, or when heavy snow has fallen making travel difficult. Local radio stations partner with the school districts to make sure the announcements are out by 6:00 am or earlier if possible. Schools also use their own email lists, text lists, or calling software to alert parents of school delays and closures.

[56] MnDOT. 511. Accessed: 12-2-14. Available: http://hb.511mn.org/About.html

- Wind chill warnings – The local radio and television media partner with the National Weather Service to issue a wind chill warning when temperatures are -30 degrees Fahrenheit or lower. Severe wind chill warnings are provided when conditions warrant and when safety is a factor. Wind chills of -40 degrees Fahrenheit or lower frequently prompt the closing of schools to protect children, particularly in rural areas.
- Emergency generators – Emergency generators help keep emergency services available during winter storms.
- Rural electric and municipal power utilities have been working for several years to harden electric utilities against winter storms. Redundancies in utility systems can further reduce outages resulting from storms.
- Winter Hazard Awareness – Each November, Cottonwood County Emergency Management participates in Winter Hazard Awareness Week through advertising on the radio as well as advertising in the local newspapers. These advertisements are intended to educate people about winter hazards such as winter storms, outdoor winter safety, winter fire safety, indoor winter safety, and winter driving. Emergency management also posts on Facebook and Twitter tips about how to prepare for winter hazards.

Gaps and Deficiencies

- Automated weather stations at schools – Automated weather stations at schools throughout Cottonwood County would provide more current information and quicker response to dangerous and changing weather conditions.
- 511 System – The 511 system does not incorporate local knowledge as well as it could. County staff has little involvement in providing updates to the 511 system. Including snowplow drivers and other county staff could help to improve the accuracy of the system. County staff has local knowledge regarding the road network and can provide accurate information into the system.
- Road Closures Coordination – MnDOT closes state highways and does not talk to local emergency managers. There needs to be a direct line of communications between MnDOT and local emergency managers. This is an issue for emergency response and mass sheltering.
- Language barriers – Language barriers can be an issue regarding severe weather warnings. There are a number of nationalities and languages spoken in Cottonwood County. This makes it difficult to send out emergency broadcast. Having to translate emergency broadcasts into multiple languages takes time and money.

5.4.7 Extreme Heat

During the spring, summer and autumn excessive heat can occur. Extreme heat events were assigned a hazard rank of moderate by the planning team. Excessive heat temperatures and temperature change is one of the variables that impact summer storms. All locations in Cottonwood County are at risk to be affected by this hazard. Severe summer storms and extreme heat events will be more widespread.

Extreme heat helps to contribute to the magnitude of a thunderstorm and often accompanies severe summer storms. The combination of high temperatures and exceptionally humid conditions can lead to overheating, heat stress, and a severe strain on the system. Heat stress can lead to heat cramps, heat exhaustion, heatstroke, and even death. According to the Centers for Disease Control and Prevention (CDC), more than 300 Americans die annually from excessive heat exposure from 1979-2003. Extreme heat events, or heat waves, are a leading cause of extreme weather-related deaths in the United States. The number of heat-related deaths is rising.[57]

Relationship to other Hazards

- *Drought and Wildfire*. Dry, hot conditions can reduce the protective moisture of woodlands and increase the risk of wildfire.
- *Public Safety*. Anyone exposed to extreme heat can develop heat exhaustion and heat stroke. The elderly, children and those who engage in outdoor work or recreation may be most susceptible to the danger of extreme heat.

Extreme Heat History in Cottonwood County

Extreme heat events are documented as a separate event by NOAA. Excessive heat occurs from a combination of high temperatures and high humidity index. From 1979 to 2003, more people in the U.S. died from extreme heat than from hurricanes, lightning, tornadoes, floods, and earthquakes combined.[58]

Figure #87
NOAA Definitions

Excessive Heat Outlook	A combination of temperature and humidity over a certain number of days are designed to provide an indication of areas of the country where people and animals may need to take precautions against the heat during the months of May through November.
Excessive Heat Warning	Issued within 12 hours of the onset of the following criteria: heat index of at least 105°F for more than 3 hours per day for 2 consecutive days, or heat index more than 115°F for any period of time.

[57] Centers for Disease Control and Prevention (CDC). Accessed 8/10/17. Available: https://ephtracking.cdc.gov/showClimateChangeExtremeHeat.action
[58] Minnesota Department of Health. Assessed: 8/10/17. Available: http://www.health.state.mn.us/divs/climatechange/docs/toolkit_chapter1.pdf

Excessive Heat Watch	Issued by the National Weather Service when heat indices are in excess of 105°F (41°C) during the day combined with nighttime low temperatures of 80°F (27°C) or higher are forecast to occur for two consecutive days.

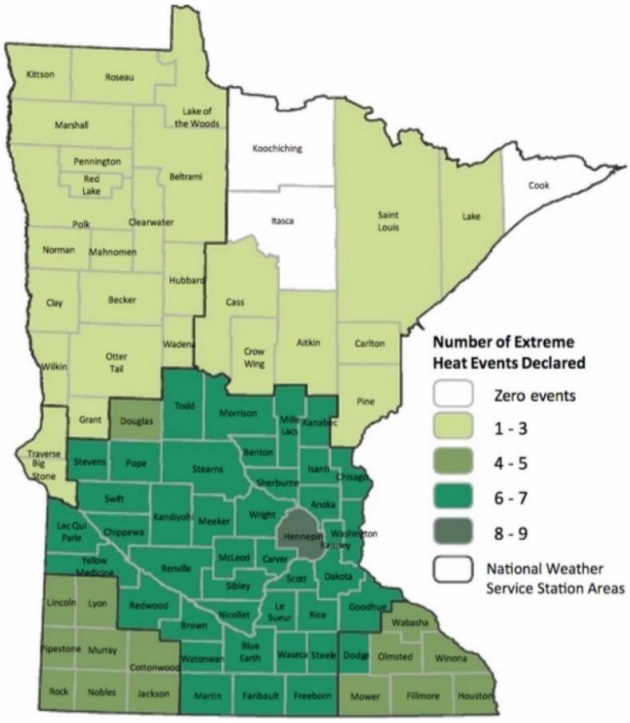
There were six documented extreme heat events in Cottonwood County from January 2000 through May 2017.

Figure #88
Excessive Heat – Cottonwood County

Date	Location	Event Narrative
7/15/2011	Cottonwood County	An extended period of excessive heat produced daytime temperatures reaching the 90s and dew points in the 70s to lower 80s, with heat indices often reaching or exceeding 115 degrees. Nighttime temperatures often in the mid-70s to lower 80s with continued high humidity provided little if any relief. The heat and humidity caused prolonged stress on people and livestock.
6/27/2012	Cottonwood County	Temperatures reaching the 90s and high humidity with dew points in the 70s caused excessive heat, with the heat index peaking between 100 and 105 degrees.
7/2/2012	Cottonwood County	Temperatures reaching the 90s to just above 100, and high humidity with dew points in the 70s, caused an extended period of excessive heat. The heat index peaked at 100 to 110 degrees each day, and did not fall enough at night to provide much relief to indoor locations that were not otherwise cooled.
7/16/2012	Cottonwood County	Temperatures reaching the 90s, and high humidity with dew points in the 70s, caused excessive heat. The heat index peaked at 100 to 105 degrees.
6/10/2016	Cottonwood County	Temperatures reaching daytime highs in the mid to upper 90s after a period of cool weather were accompanied by humid conditions, with the heat index rising to 100 degrees or a little hotter. An unknown number of people suffered from heat stress, heat exhaustion, or dehydration, as reported by hospital emergency rooms.
7/20/2016	Cottonwood County	Temperatures reaching daytime highs in the 90s were accompanied by very humid conditions, with the heat index rising to 100 to 110 degrees. An unknown number of people suffered from heat stress, heat exhaustion, or dehydration, as reported by hospital emergency rooms.

National Climatic Data Center (NCDC/NOAA) Storm Events database

Figure #89
Number of Extreme Heat Events by County 1995 - 2012



Source: https://statesummaries.ncics.org/mn

Extreme Heat and Climate Change

Minnesota's average temperature has increased more than 1.5°F since recordkeeping began in 1895, with increased warming happening in recent decades (International Climate Adaptation Team, 2013). Annual temperatures in the Midwest have generally been well above the 1901-1960 average since the late 1990s, with the decade of the 2000s being the warmest on record.[59] Seven of Minnesota's ten warmest years occurred in the last 15 years. Projected increases are 2°F to 6°F more by 2050 and 5°F to 10°F by 2100.[60] The Midwest has experienced major heat waves and their frequency has increased over the last 6 decades (Perera, et al., 2012). For the U.S., mortality increases 4% during heat waves compared with non-heat wave days (Anderson & Bell, 2011). During July 2011, 132 million people across the U.S. were under a heat alert – and on July 20 the majority of the Midwest experienced temperatures in excess of 100°F. Heat stress is projected to increase as a result of climbing summer temperatures and humidity (Schoof, 2012). On July 19, 2011, Moorhead Minnesota set a new state record for the hottest heat index ever, at 134°F.

[59] (Kunkel, et al., Regional Climate Trends and Scenarios for the U.S. National Climate Assessment, 2013
[60] MN Environmental Quality Board, 2014

That same day, Moorhead also recorded a new state record for the highest dew point at 88. It was the hottest, most humid spot on the planet that day (Douglas, 2011).

Increasing temperatures impacts Minnesota's agricultural industry. Agriculture is highly dependent on specific climate conditions. As a result of increasing temperature, crop production areas may shift to new regions of the state where the temperature range for growth and yield of those crops is optimal. According to the National Climate Assessment, the Midwest growing season has lengthened by almost 2 weeks since 1950 due in large part to earlier timing of the last spring freeze. This trend is expected to continue. While a longer growing season may increase total crop production, other climate changes, such as increased crop losses and soil erosion from more frequent and intense storms, and increases in pests and invasive species, could outweigh this benefit. There may also be higher livestock losses during periods of extreme heat and humidity. Losses of livestock from extreme heat lead to a challenge in disposal of animal carcasses. Currently there are only 2 rendering facilities in Minnesota available for livestock disposal. If a rendering facility is not available, lost livestock must be composted on an impervious surface. If losses are high, finding an impervious surface large enough is a challenge. In an attempt to adapt to increased temperatures, livestock areas in Minnesota may shift farther north. As a result of new livestock areas and the resulting manure production, farmers may transition to manure-based fertilizer applications in areas where traditionally only commercial fertilizers have been used, with accompanying environmental advantages and disadvantages.[61]

Vulnerability

Extreme heat is highly likely to take place every year and people do not always recognize their limitations. Summer heat can pose a serious risk to all populations, especially the young and elderly population. Informing the public about extreme heat events and other summer storms is important in preventing accidents.

Plans and Programs

- Heat advisories – The local radio and television media are in contact with the National Weather Service to issue a heat advisory when the combination of temperature and humidity create risks for people and animals. A heat index of 105 to 114 warrants a heat advisory. This occurs when air temperature reaches 95 degrees and the relative humidity is 50 percent. An excessive heat warning is issued when the heat index reaches 115. This occurs with an air temperature of 95 degrees and relative humidity of 60 percent. A heat index of 115 or higher puts both humans and animals at risk.
- Emergency alert system – Cottonwood County has the CivicReady emergency notification system. CivicReady has the capability to alert citizens who are in the direct path of the emergency, and gives you the tools to quickly send notifications via mobile (text/voice) phone, landline phone, email, social media, and many other channels.
    - Windom and Mountain Lake have similar capabilities with Nixle
- Weather Ready Nation Ambassador – Cottonwood County is a Weather Ready Nation Ambassador. "The Weather-Ready Nation Ambassador™ initiative is the National Oceanic and Atmospheric Administration's (NOAA) effort to formally recognize NOAA partners who are improving the nation's

[61] Adapting to Climate Change in Minnesota: 2013 Report of the Interagency Climate Adaptation Team, 2013

readiness, responsiveness, and overall resilience against extreme weather, water, and climate events. As a WRN Ambassador, partners commit to working with NOAA and other Ambassadors to strengthen national resilience against extreme weather."[62]

- Local media – Severe weather warnings are broadcasted via local media. Public service announcements are one of the ways to warn the public of severe weather.
- Severe weather spotter training – a biennial training is provided in Cottonwood County. The National Weather Service conducts the training.

Gaps and Deficiencies

- Public education – The public may not be aware of the real risks associated with heat exhaustion, extreme heat events, and other severe summer storms.

[62] NOAA. Weather Ready Nation Ambassadors. Accessed: 3/24/16. Available: http://www.nws.noaa.gov/com/weatherreadynation/ambassadors.html

5.4.8 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. Droughts can have lasting effects and can cause a serious depletion of surface and ground waters.

The entire county is equally at risk for drought; however, areas within the county may react differently to drought conditions. 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 are more likely to experience shortages than areas with access to municipal and rural water suppliers. Different areas in Cottonwood County may be impacted differently by a drought, but the small size of the county and interdependence of the residents will result in any drought event having a significant impact on the entire county.

The City of Windom has its own water system including treatment and 1.5 million gallons of storage that consists of multiple wells and provides water for the City of Bingham Lake. The City of Mt. Lake also has its own water system consisting of wells, a reverse osmosis treatment plant, a 250,000 gallon water tower and 140,000 gallons of ground storage. The City of Westbrook operates its own water facility through Westbrook Public Utilities. Westbrook has a filter plant and a 200,000 gallon water tower. They do not have a backup water supply. Red Rock Rural System (RRRWS) provides potable water service to 830 rural homes within 504 square miles of rural Cottonwood County and the Cities of Jeffers, Storden, and Delft. RRRWS has two well fields and two water treatment plants within the county along with 1.2 million gallons of storage. RRRWS provides an emergency backup to the City of Windom and Windom provides a back-up to RRRWS. POET bio-refinery and Prime Pork have their own water sources, but are backed up by the City of Windom and\or RRRWS.

Extent of the Hazard

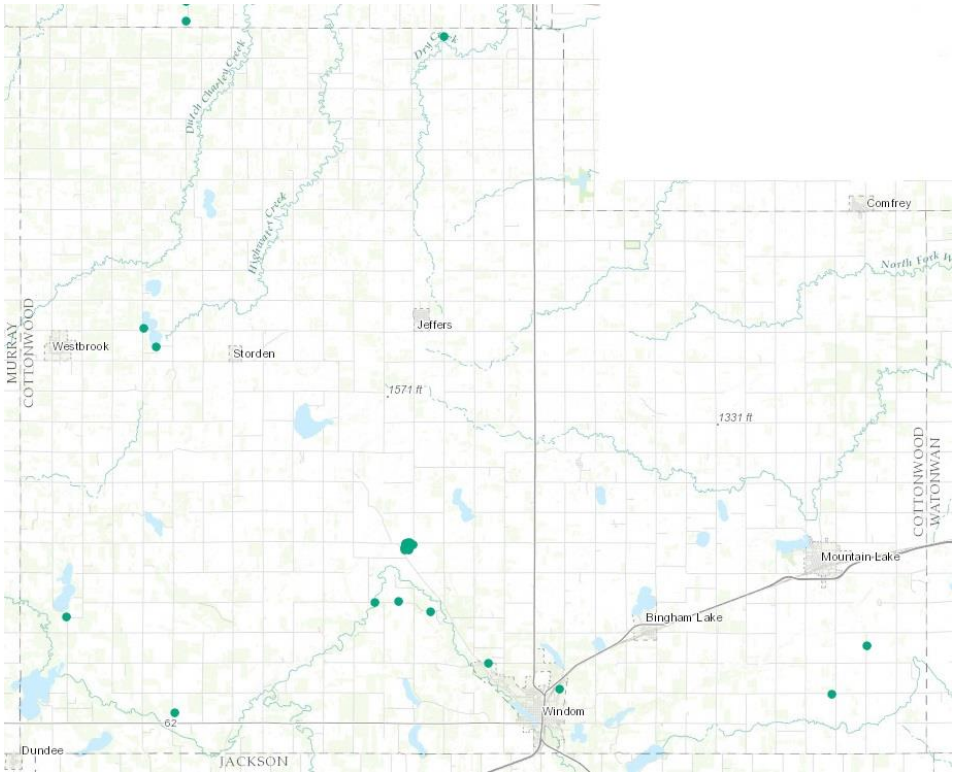
Cottonwood County's economy is based heavily on agriculture. A severe drought could cause economic hardship within the county.

Corn and soybeans yields can be dramatically decreased by drought conditions. Livestock operations are affected by loss of feedstock, pasture and general forage, as well as drinking water. Reduced yields due to a drought event will not only have an economic impact on individual farmers, but on secondary suppliers who buy and sell crops and livestock, agricultural retailers, and local governments that rely on sales taxes. Drought insurance for crops does help compensate for losses, but there can still be economic hardship as the result of a drought.

A drought will not only produce a hardship for the farmers growing the crops, but overall supply can decrease causing food prices to rise. The U.S. Department of Agriculture estimated that the drought during the summer of 2012 pushed retail food prices up by between 3% and 4% in 2013.[63]

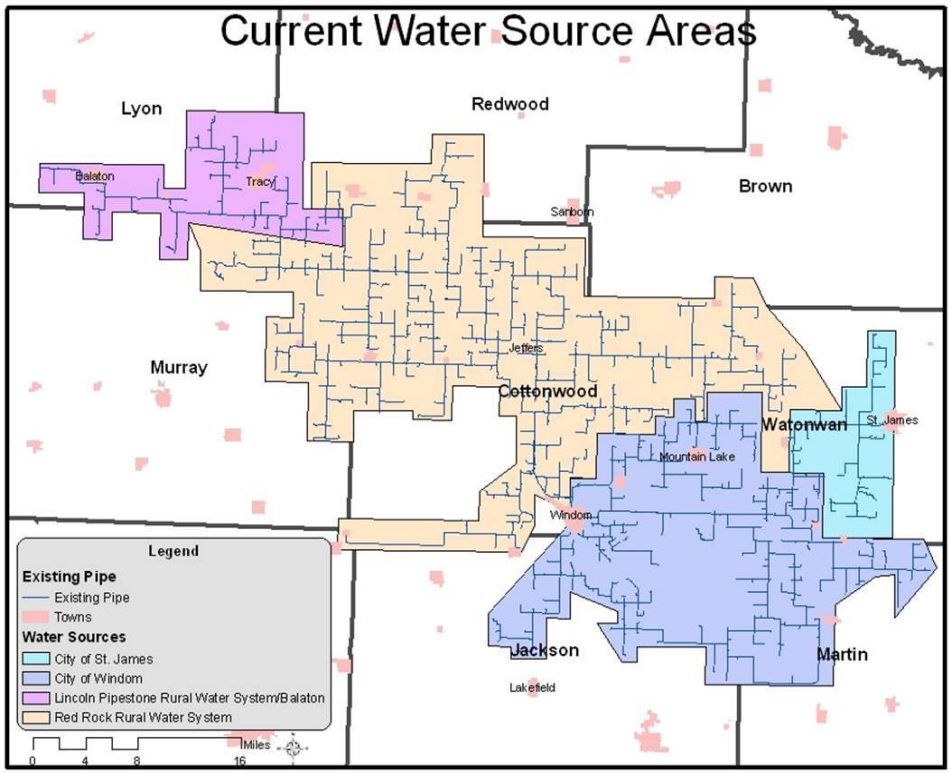
[63] Time. The Cost and Consequences of the U.S. Drought. Oct. 26 2012. Access: 6/20/14. Available: http://business.time.com/2012/10/26/the-cost-and-consequences-of-the-u-s-drought/#ixzz2Tgswe7kB

Figure #90
Cottonwood County MPCA Ground Water Map



Source: http://pca-gis02.pca.state.mn.us/eda_groundwater/index.html

Figure #91
Red Rock Rural Water Distribution Map



Relationship to Other Hazards—Cascading Effects

Drought can increase the risk of a number of natural and manmade hazards.

- *Wildfires.* Drought stressing woods, brush land, and non-cultivated fields significantly increases the risk of wildfires and lightning strikes onto dry fields have the potential to cause wildfires as well. In addition, moving equipment within Cottonwood County like trains or combines during fall harvest have the potential to cause wildfires.
- *Insect Infestation.* An increase in the amount of insects and other pests are often caused or impacted by severe drought conditions.
- *Tree Loss.* Due to the lack of moisture, tree loss or decline can be experienced resulting in several problems including: loss of shade for homes requires increased power consumption, and loss of windbreaks provided by trees allows for an increase in soil erosion.
- *Wells/Aquifers.* The absence of rain for a long period of time is insufficient to recharge aquifers and eventually, the loss of water in underground wells results.

- *Business interruption.* A drought can result in watering bans. Businesses that are heavier water users will be impacted. Golf courses, processing facilities, car washes, and a number other businesses will be impacted.
- *Utility/Infrastructure.* Cottonwood County's limited groundwater resources, provided by surficial aquifers, can be easily negatively impacted by drought.
- *Dust Storms.* As surface soils dry out and the winds blow, an increased amount of soil erosion occurs.
- *Civil Disturbance.* A long lasting drought can cripple the economic opportunity in greater Minnesota and other areas that have an agricultural based economy. This loss in economic opportunity can cause social unrest.

Drought History in Cottonwood County

From January 2000 through May 2017, there were 14 documented droughts in Cottonwood County. In the table below are documented droughts that occurred from January 2010 through May 2017.

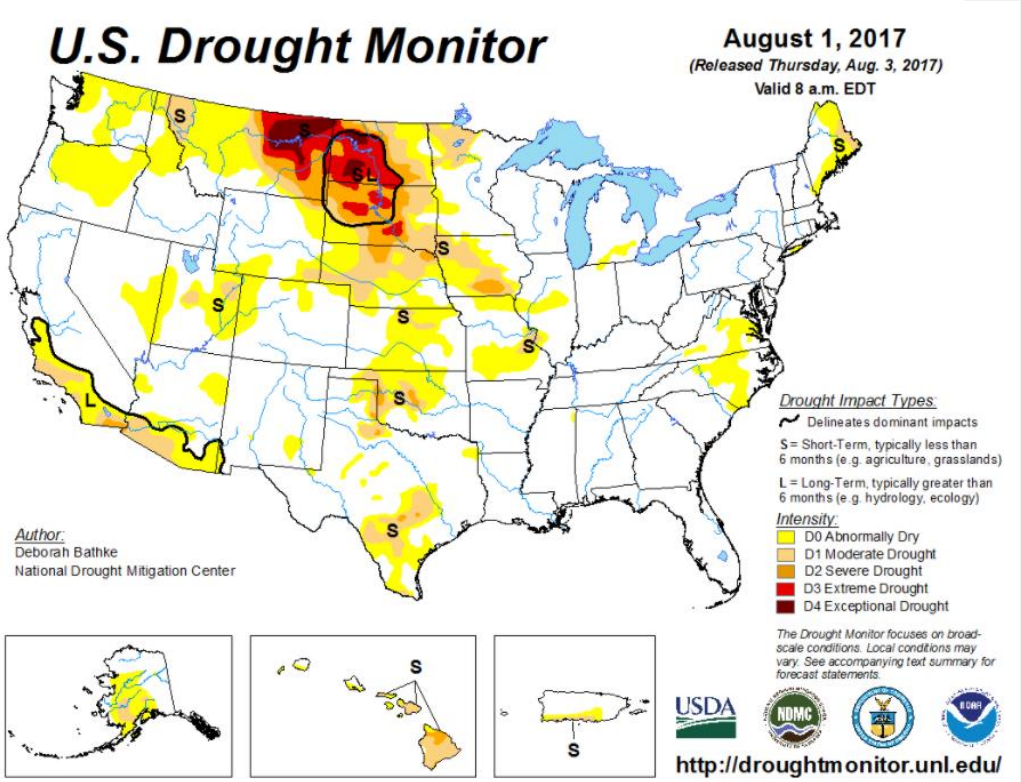
Figure #92
Droughts – Cottonwood County

Date	Location	Event Narrative
7/1/2012	Cottonwood County	Much below normal rainfall aggravated existing long term dry soil conditions, and also resulted in a lack of even short term relief. This produced stress on crops with the stress becoming increasingly visible. Damage in the form of reduced yields became certain, but the amount of yield reduction was still highly unknown because of the long time remaining before harvest, and the unknown future weather during that time. At the end of the month, corn crops were judged to be the most susceptible to the reduced yields, due to the lack of moisture during the tasseling period, while soybeans had more recovery potential if significant rain were to fall in the near future.
8/1/2012	Cottonwood County	Below normal rainfall continued to aggravate existing long term dry soil conditions, and stress on crops continued despite less hot weather than in July. Crop damage including certain reduced crop yields was very apparent, although the amount of yield reduction and other damage was still highly uncertain before harvest. Corn continued to be the crop suspected of enduring the most damage, with some recovery potential for soybeans in the less hot weather. The drought was also leading to local water use restrictions.
9/1/2012	Cottonwood County	Well below normal rainfall continued to aggravate existing long term dry soil conditions. Stress on crops which was observed during most of the summer became more evident with the beginning of harvest, although the amount of yield reduction and other damage was still uncertain. Corn, soybeans, and other crops were known to be severely affected, although corn continued to be the crop suspected of suffering the most damage. The drought continued to result in local water use restrictions.

Date	Location	Event Narrative
10/1/2012	Cottonwood County	Below normal rainfall continued to aggravate existing long term dry soil conditions. The fall harvest was generally completed with definitely reduced yields, but no estimation on how much the reduction in yields was. The dryness hampered the germination of winter wheat which was planted. The effect of local water use restrictions eased with the dropping off of water usage.
11/1/2012	Cottonwood County	Well below normal rainfall continued to aggravate existing long term dry soil conditions. The effect of the dryness on winter wheat germination was more strongly confirmed, and the future effect of the lack of soil moisture on next spring and summer's farming was feared if the dryness were to continue. Otherwise, few new effects of the drought were noted during the month due to the seasonal decrease in water usage and need.
12/1/2012	Cottonwood County	Long term dry soil conditions continued, despite normal to above normal precipitation, as the excess over the low winter normals was not enough to relieve the dry conditions. Aside from the effects on winter wheat and available winter livestock feed, hunting was hampered due to reduced pheasant population and disease in the deer population. The future effect of the lack of soil moisture on next spring and summer's farming was feared if the dryness were to continue. Otherwise, few new effects of the drought were noted during the month due to the seasonally low water usage and need.
1/1/2013	Cottonwood County	Long term dry soil conditions continued, with a range of below to much below normal precipitation during the month bringing no relief. Few new effects were noted, with the seasonally low water usage. The main problem, aside from winter livestock feed, was the poor outlook for the spring and summer, which were expected to be extremely sensitive to dry weather.
2/1/2013	Cottonwood County	Long term dry soil conditions continued, despite above normal precipitation, due to the excess being only a few tenths of an inch during the normally driest month. Few new effects were noted, with the seasonally low water usage. The main problem, aside from winter livestock feed, was the poor outlook for the spring and summer, which were expected to be extremely sensitive to dry weather.
3/1/2013	Cottonwood County	Long term dry soil conditions continued in March, with below normal precipitation and runoff over frozen ground leaving soil moisture conditions very dry. Few new effects were noted, though the dry conditions coming out of winter were expected to immediately affect the winter wheat crop, as they had affected germination in the fall. Seasonally low water usage resulted in few other new effects. The main problem, aside from winter livestock feed, was the poor outlook for the spring and summer, which were expected to be extremely sensitive to dry weather.
4/1/2013	Cottonwood County	Long term dry soil conditions at the start of April abated somewhat during the month, with extreme to exceptional drought becoming moderate to severe. The improvement was due to normal to above normal precipitation. No new effects were noted, but the area remained sensitive to possible worsening again of conditions, depending on precipitation during the planting and growing seasons.

National Climatic Data Center (NCDC/NOAA) Storm Events database

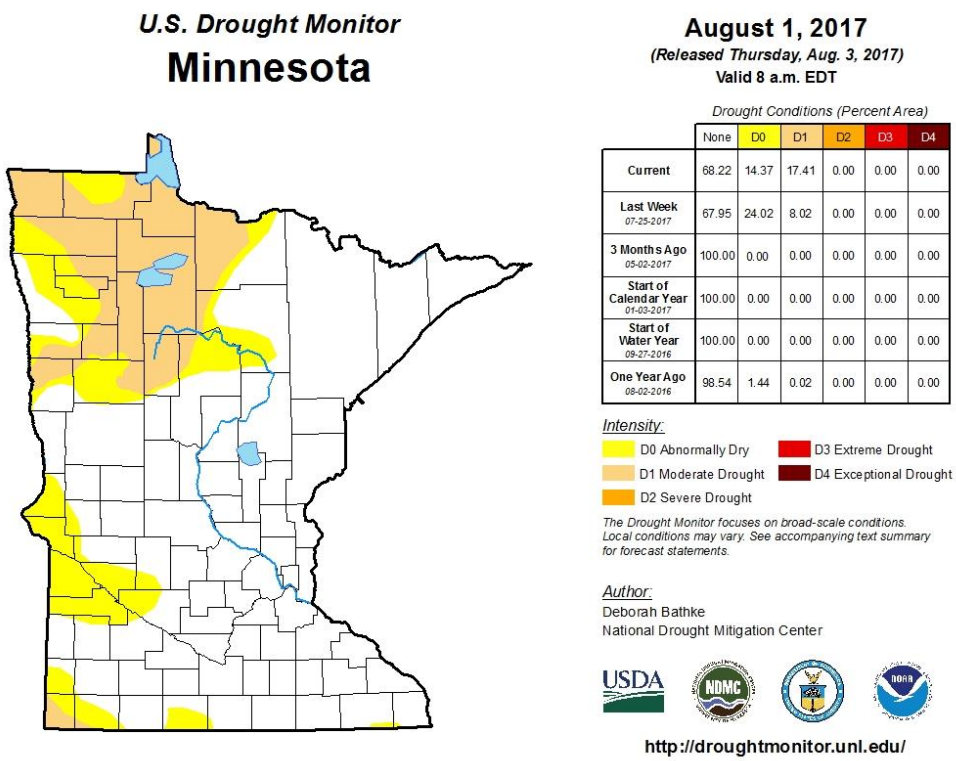
Figure #93
US Drought Monitor Map – August 2017



The USDM's drought intensity scale is composed of five different levels: D0, D1, D2, D3, and D4. The abnormally dry category, D0, corresponds to an area experiencing short-term dryness that is typical with the onset of drought. This type of dryness can slow crop growth and elevate fire risk to above average. This level also refers to areas coming out of drought, which have lingering water deficits and pastures or crops that have not fully recovered.

The moderate drought category, D1, corresponds to an area where damage to crops and pastures can be expected and where fire risk is high, while stream, reservoir, or well levels are low. The severe drought category, D2, corresponds to an area where crop or pasture losses are likely, fire risk is very high, water shortages are common, and water restrictions are typically voluntary or mandated. The extreme drought category, D3, corresponds to an area where major crop and pasture losses are common, fire risk is extreme, and widespread water shortages can be expected requiring restrictions. The highest category, exceptional drought, or D4, corresponds to an area experiencing exceptional and widespread crop and pasture losses, fire risk, and water shortages that result in water emergencies.

Figure #94
US Drought Monitor Map, Minnesota – August 2017



	None	D0	D1	D2	D3	D4
Current	68.22	14.37	17.41	0.00	0.00	0.00
Last Week 07-25-2017	67.95	24.02	8.02	0.00	0.00	0.00
3 Months Ago 05-02-2017	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-03-2017	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-27-2016	100.00	0.00	0.00	0.00	0.00	0.00
One Year Ago 08-02-2016	98.54	1.44	0.02	0.00	0.00	0.00

Drought and Climate Change

Droughts have been happening throughout Minnesota's history and it is not yet clear how climate change may impact this (International Climate Adaptation Team, 2013). While there was no apparent change in drought duration in the Midwest over the past century (Dai, 2011), the average number of days without precipitation is projected to increase in the future (National Climate Assessment Development Advisory Committee, 2013).

Even in areas where precipitation does not decrease, projected higher air temperatures will cause increased surface evaporation and plant water loss, leading to drier soils. As soil dries out, a larger proportion of the incoming heat from the sun goes into heating the soil and adjacent air rather than evaporating its moisture, resulting in hotter summers under drier climatic conditions (Mueller & Seneviratne, 2012). Temperature has risen in Minnesota about 2°F since the early 20th century. Under a higher emissions pathway, historically unprecedented warming is projected by the end of the 21st century. While warmer temperatures will reduce the heating energy demand and lengthen

the growing season, it will also increase the intensity of naturally occurring droughts.[64] In 2007, 24 Minnesota counties received drought designation, while 7 counties were declared flood disasters. In 2012, 55 Minnesota counties received federal drought designation at the same time 11 counties declared flood emergencies (MN Environmental Quality Board, 2014).

Vulnerability

Droughts do occur throughout Cottonwood County.

Plans and Programs

- Watering Ban Ordinance – Cottonwood County and the Cities of Windom, Mountain Lake, and Westbrook have developed ordinances on water usage within their communities and can place restrictions on this usage in times of drought. The watering bans decrease the demand for water. This is done to curve demand for nonessential watering. Residents are alerted through the media when a watering ban is enacted. Cities in Cottonwood County have not issued a watering ban since 2012/2013.
- Burning ban – Cottonwood County can issue a burning ban during a drought event.
- Cottonwood County Water Management Plan – The Cottonwood County Comprehensive Water Management Plan serves as the five year 'Work Plan' for the Cottonwood County Soil and Water Conservation District (SWCD). Yearly Plans are developed to achieve the goals and objectives of the Water Plan. The Water Plan identifies and maps the major and minor aquifers serving the county. The Cottonwood County Comprehensive Water Management Plan can be found on the Cottonwood County SWCD website.[65] The current Water Plan runs from 2017-2027.
- Recharge rates – The Cottonwood County Water Management Plan documents the number of gallons of water used per year by municipalities and large water users within the county. Regionally, recharge rates are tracked regional by Minnesota Board of Soil and Water Conservation.
- Shoreline zoning – Cottonwood County and the City of Windom has adopted the Department of Natural Resources (DNR) statutory shoreline zoning classifications and minimum standards. Zoning along the river is also regulated by the river conservancy district, which is overseen by the Minnesota Board of Soil and Water Conservation.
- Aquifer inventories – Recharge rates and capacities of the county's aquifers are recorded and inventoried by United States Geological Survey (USGS). These studies help to determine the capacities and recharge rates of the county's aquifers in order to better assess use restrictions and provisions during times of drought.
- Usage rates – The Department of Natural Resources (DNR) regulates withdrawal and usage rates. There has to be a draw down study before irrigation permits can be issued.
- Public outreach – Educational campaigns regarding water conservation by the Cottonwood County Soil and Water Conservation District and rural water systems. This helps to ensure Cottonwood County's ground water supplies are sufficient to meet demands.

[64] NCICS State Summaries. Accessed: 8/10/17. Available: https://statesummaries.ncics.org/mn
[65] Cottonwood County Soil and Water Conservation District. Accessed: 8/22/2017. Available: http://www.cottonwoodswcd.org/wp-content/uploads/2015/09/Cottonwood-Water-Plan-March-2007.pdf

Gaps and Deficiencies

- Water conservation outreach – Water conservation programs need to be established to educate residents on the need and ways to conserve water usage.
- Lack of watering ban ordinance - Cottonwood County and the Cities of Windom, Mountain Lake, and Westbrook have developed ordinances on water usage within their communities and can place restrictions on this usage in time of drought. The Cities of Bingham Lake, Comfrey, Jeffers, and Storden do not have watering ban ordinances. Cities with populations over 1,000 have a Water Supply Plan with the DNR, which has triggers for water reduction measures.
- Water supply – A number of communities are dependent on or rely on rural water as a backup. Water supply could be as issue in Cottonwood County.
- Lack of Fire Breaks – The County needs a program that places fire breaks in between the continuous CRP tracts of land or other state wildlife areas during times of severe drought.
- Red Rock Rural Water – Red Rock Rural Water has two wellfields in Cottonwood County. One in Great Bend Township and the other in Amo Township.
- Large water users – Food processors and bio-energy producers are large water users. The City of Windom is a large water user, since one of the city's main industries is swine processing. An adequate water supply is critical to the industries in Windom and Cottonwood County. Windom also provides backup water to POET, an ethanol plant, in Bingham Lake.
- Annual recharge rates – Cottonwood County does not have estimated annual recharge rates, but there is a robust mounting of heavy water users and wells. The City of Windom has seen a slight decline in well levels; however, it is still above static levels.

5.4.9 Erosion

According to FEMA, erosion is the wearing away of land, such as loss of riverbank, beach, shoreline, or dune material. It is measured as the rate of change in the position or displacement of a riverbank or shoreline over a period of time. Short-term erosion typically results from periodic natural events, such as flooding, hurricanes, storm surge, and windstorms, but may be intensified by human activities. Long-term erosion is a result of multi-year impacts such as repetitive flooding, wave action, sea level rise, sediment loss, subsidence, and climate change. Death and injury are not typically associated with erosion; however it can destroy buildings and infrastructure.

Relationship to Other Hazards

Erosion is related to flooding, which has become more common in Cottonwood County. Flood-relation erosion is the collapse or subsidence of land along the shore of a lake or other body of water as a result of undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as a flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding.[66]

History of Erosion in Cottonwood County

The South Bank of the Des Moines River in Windom is an area of concern. Previously, trees and riffles were put in to stop erosion in one area, but concerns still exist by the gravel pit. This has affected nearby sites, such as the snowmobile trail in that area which cannot be used due to the erosion concerns.

Perkins Creek, a small stream that runs through the City of Windom has had some erosion issues recently. Near 6th Avenue and 17th Street, bank erosion has been occurring near the 6th avenue Bridge. One large tree near a home has some of its roots exposed currently, and a CenturyLink telephone line that was buried along the bank has been exposed due to flooding in July of 2018.

Erosion and Climate Change

Because climate change has effects that change precipitation patterns, erosion is inevitably effected. Increases in available moisture ("effective precipitation") can promote both runoff and erosion as well as vegetation cover.

Vulnerability

As discussed by the planning team, river banks in Cottonwood County are vulnerable to erosion, specifically the Des Moines River. Small-scale erosion on river banks in Cottonwood County has taken place in the past and is possible to continue taking place.

Plans and Programs

- Previously trees and riffles were put in the Des Moines River to stop erosion.

Gaps & Deficiencies

- Actions so far have been response-based rather than prevention-based.

[66] FEMA: Flood-Related Erosion. Accessed: 2/8/2019. Available: https://www.fema.gov/flood-related-erosion

5.5 Manmade Hazards

5.5.1 Agricultural Disease (animal or crop)

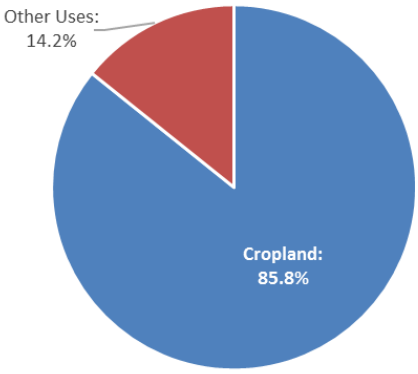
Agriculture is a major economic driver in Cottonwood County and Southwest Minnesota. Animal and crop related diseases have the potential to inflict both large economic losses and logistical hazards on the community. Agricultural disease is often difficult to contain. The majority of incidents related to agricultural disease are likely to occur countywide rather than in localized areas, given the small size and the difficulty to contain a disease.

Figure #95
Farm Summary – Cottonwood County

	1987	1992	1997	2002	2007	2012	Change 2007-2012
Land in Farms	377,506	374,920	368,346	374,717	381,249	372,767	-2.30%
Number of Farms	970	876	784	832	865	813	-6.00%
Average Size (acres)	389	428	470	192	441	459	3.90%
Harvested Crops	276,326	312,520	316,894	326,562	332,956	319,658	-3.99%
Corn	110,696	153,348	149,057	161,862	182,787	165,254	-9.59%
Soybean	146,418	148,913	160,915	152,532	137,155	145,230	5.89%

Source: Census of Agriculture 1987, 1992, 1997, 2002, 2007, 2012 (http://www.agcensus.usda.gov/Publications/Historical_Publications/)

Figure #96
Land in Farms – Cottonwood County 2012



Source: Census of Agriculture 1987, 1992, 1997, 2002, 2007, 2012

One of the most current threats is emerald ash borer, which is an exotic beetle from Asia that is devastating ash trees in a number of states. Emerald ash bore is a small green beetle that kills ash trees. It has been difficult to contain this threat, and there are a number of other similar examples of how it is difficult to contain an agricultural disease. The decision to relate agricultural disease to a countywide area instead of a localized area is also based on the planning teams experience within the county, the

prevalence of crop agriculture, and the relative ease with which plant diseases spread. It is likely that any outbreak will likely affect all trees, crops, and animal agriculture within the county.

The majority of the land in Cottonwood County is used for agriculture. An agricultural disease causing crop failure could cause millions of dollars in lost production. In 2013, Cottonwood County was ranked 18 in crop production and 25 in livestock production among counties in Minnesota with a total of $357,142,000 in 2011 total cash receipts.[67] Animal transmitted diseases pose the greatest threat to animal confinement buildings, feeding lots, and pastures. Insects and pests pose the largest risk to both agriculture crops and tree-cover.

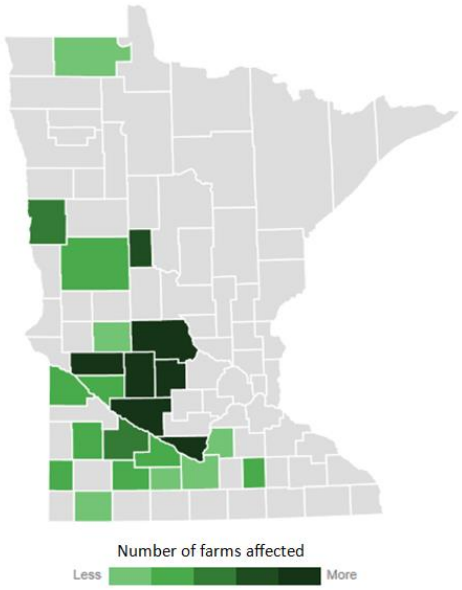
Animal Transmitted Diseases

Avian Influenza (HPAI) is a disease caused by infection with avian influenza and Type A viruses. These viruses occur naturally among wild aquatic birds worldwide and can infect domestic poultry and other bird and animal species. Avian Influenza viruses do not normally infect humans. However, sporadic human infections with Avian Influenza viruses have occurred.[68]

"Influenza in poultry falls into two groups: low pathogenic avian influenza (LPAI), or highly pathogenic avian influenza (HPAI). Similar to influenza symptoms in people, birds infected with LPAI usually experience only mild signs if any, including respiratory signs such as conjunctivitis and nasal discharge, ruffled feathers or a drop in egg production. Unlike LPAI, the first indication of HPAI in poultry is sudden death, often without signs of illness. In the last 40 years, there have been introductions of LPAI in Minnesota poultry all of which have been successfully eliminated."[69]

[67] 2013 Cottonwood County Agricultural Profile. Accessed 8/18/17. Available: http://www.mda.state.mn.us/food/business/agmktg-research/~/media/Files/food/business/countyprofiles/econrpt-cottonwood.ashx
[68] CDC. Information on Avian Influenza. Access: 11/24/15. Available: http://www.cdc.gov/flu/avianflu/
[69] Minnesota Board of Animal Health. Avian Influenza. Accessed: 11/24/15. Available: https://www.bah.state.mn.us/avian-influenza

Figure #97
Avian Influenza Outbreak Map – Minnesota June 2015



The threat of bovine tuberculosis (TB) has impacted agriculture in Minnesota recently. In April, 2008, 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, invested animals can be infected for a long period of time before showing any outward signs of TB.[70]

The United States has been free of Hoof and Mouth Disease Bovine Spongiform Encephalopathy (BSE-Mad Cow Disease) since 1929.[71] This was possible through effective collaborative prevention programs between private producers, veterinarians, researchers, and government organizations. Education and early symptom identification were critical in the success. 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.

Early detection can be difficult since symptoms can be the same for multiple diseases. Later detection can result in a large percentage of a herd having the disease. Having to dispose of a large percentage of a herd would result in substantial financial loss to the producer.

[70] Minnesota Board of Animal Health. Accessed 5-17-13. Available: http://mn.gov/bah/diseases/bovine-tb/tb-testing.html
[71] University of California Cooperative Extension. Accessed: 9/10/13. Available: http://cesanbernardino.ucanr.edu/Dairy511/FACT_SHEET_No-1_Foot_and_Mouth_Disease/

Animals are also susceptible to the flu and common colds. "Respiratory diseases are common and costly to livestock producers."[72] The common cold along with other animal diseases like avian Influenza (bird flu), Chronic Wasting Disease, and Lyme Disease, just to name a few, pose risks to producers and cost thousands of dollars to producers to treat annually.

Plant Pests and Diseases

Plant diseases can cause a loss of yield or damage to the infected plants. 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. Root decay and the loss of trees may also lead to erosion.

In many cases, fungi are involved in tree diseases that result in a tree becoming a hazard. A tree with slowed growth, branch dieback, smaller than normal leaves or needles, excessive cone or seed set, premature autumn leaf coloration, or severe winter twig kill may be exhibiting early symptoms of a disease. Nothing can be done for a tree once it is infected nor is it likely that fungus can be completely eliminated from the soil or general area around the tree once the tree is removed.

A tree with fungal fruiting structures on several limbs, trunk, butt, or roots should be removed promptly if it is in a location where property damage might occur or where falling limbs or tree could strike people or animals. If most of the tree appears healthy, any single branch with fungal fruiting structures should be removed promptly, regardless of the identity of the fungus present.

Some of the more notable pests infest corn fields. Corn rootworm and European corn borer are two major pests that pose serious potential loss of income to farmers. Goss's Bacterial Wilt and Leaf Blight are two other damaging diseases that have caused problems over the past few growing seasons in Minnesota. In 2010, Wilt and Leaf Blight developed in many fields across southern Minnesota. Wilt and Leaf Blight can be a significant disease problem, with yield losses reported as high as 70 to 80 bushels per acre in Minnesota.[73]

In the past few decades technological progress has been made, and seed companies have been able to genetically enhance corn varieties to provide a higher level of protection against pests and diseases. Advances in Soybean seed modifications have also been able to overcome a number of plant pests and diseases that include soybean cyst nematode and soybean aphids. These hybrids have resistance to certain types of cyst nematode, but not all. Soybean aphids can be addressed with commercial spray, but Mother Nature is often one step ahead. Other plant diseases include: Asian Soybean Rust, Sudden Death Syndrome (SDS), White mold, Phytophthora Root rot, Brown Stem Rot, Pod and stem blight, Rhizoctonia root and stem rot, Frogeye leaf spot, European Corn Borer, Bacterial leaf streak, Physoderma brown spot, and a number of insects.

Relationship to Other Hazards—Cascading Effects

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[72] The Cattle Site. Accessed: 9/11/13. Available: http://www.thecattlesite.com/diseaseinfo/#sthash.KWvGHoRq.dpuf

[73] University of Minnesota Extension. Accessed 5-17-13. Available: http://blog.lib.umn.edu/efans/cropnews/2011/08/watch-for-gosss-leaf-blight-an.html

Public Health. Agricultural disease can have a major impact on public health. A shortage of food can cause poor development among youth that will have lifelong consequences. Psychological first aid and mental health needs are another potential public health concern during an agricultural disease emergency.

Agricultural disease History in Cottonwood County

There were two farms south of Mountain Lake that had confirmed cases of HPAI by the Minnesota Board of Animal Health.[74] There were also a number of affected farms in Minnesota, but fortunately Cottonwood County did not have a large scale outbreak of Avian Flu.

Not having any large scale occurrences of agricultural disease is largely due to the economic incentives farmers have to stay ahead of new diseases and taking precautionary actions. Large operations have specialized staff to monitor livestock and enforce sterilization of equipment and employees before entering facilities. Ag businesses also work with Minnesota Department of Agriculture (MDA) and University of Minnesota Extension Service to stay ahead of and combat agricultural disease.

Minnesota Department of Agriculture (MDA) and University of Minnesota Extension Service provide information on a variety of insects and pests that help prevent occurrences of agricultural disease. Seed producers and other agricultural businesses use this information to modify crops to be resistant to more pests and diseases. The agricultural sector studies past seed modifications and make adjustments to combat the next year's hazards. It is important to study past plant pests and diseases, so we can prepare for future hazards. Understanding the past is an important variable in mitigating future hazard events.

During the spring and summer of 2015, Highly Pathogenic Avian Influenza hit turkey and chicken farmers in Minnesota and neighboring states. As of June 5, 2015, 9 million birds where affected and humanely put down in Minnesota.[75] Cottonwood County had no turkey farms affected. Losses in poultry production and related businesses due to avian influenza are estimated at $309.9 million in Greater Minnesota, according to University of Minnesota Extension. "Using economic modeling, analysts determined that for every million dollars in direct losses, the estimated ripple effect leads to $1.8 million in overall economic losses, including $450,000 in wages. Ripple effect losses stem from factors including reduced wage-earner and business-to-business spending."[76]

Vulnerability

Agricultural disease is difficult to contain and can spread quickly. Emerald Ash Bore is an example of how a plant disease can spread and how it is difficult to contain. The City of Minneapolis has removed 879 unhealthy ash trees in 2012.[77] It is recommended by the Minneapolis Tree Advisory Commission to

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[74] Minnesota Turkey accessed 4/1/2019 http://minnesotaturkey.com/wp-content/uploads/2015/03/14-APR15-AI-SUSP-CONF-DZ-ALERT_041015.pdf http://minnesotaturkey.com/wp-content/uploads/2015/03/18-APR15-AI-SUSP-CONF-DZ-ALERT_041815.pdf http://minnesotaturkey.com/wp-content/uploads/2015/03/Southern_MN_size34x44.pdf

[75] CDC. Information on Avian Influenza. Access: 7/23/15. Available: http://www.cdc.gov/flu/avianflu/

[76] University of Minnesota. Extension analysis: Economic impact of avian flu at nearly $310 million as of May 11. Accessed: 7/23/15. Available: http://discover.umn.edu/news/food-agriculture/extension-analysis-economic-impact-avian-flu-nearly-310-million-may-11

[77] City of Minneapolis. Accessed: 9/17/13. Available: http://www.minneapolismn.gov/sustainability/indicators/WCMS1P-081056

remove and replace another 5,000 ash trees in 2013 to help prevent the widespread infestation of the bug. Emerald Ash Borer (EAB) is one pest that has the potential for a large amount of damage in Cottonwood County. There are statewide efforts being made to slow the spread, but the outcome is unknown at this time. According to a story in *Planning Magazine* ("Diversifying the Urban Forest, February 2010), Minnesota could lose all of its ash trees within 10 years.

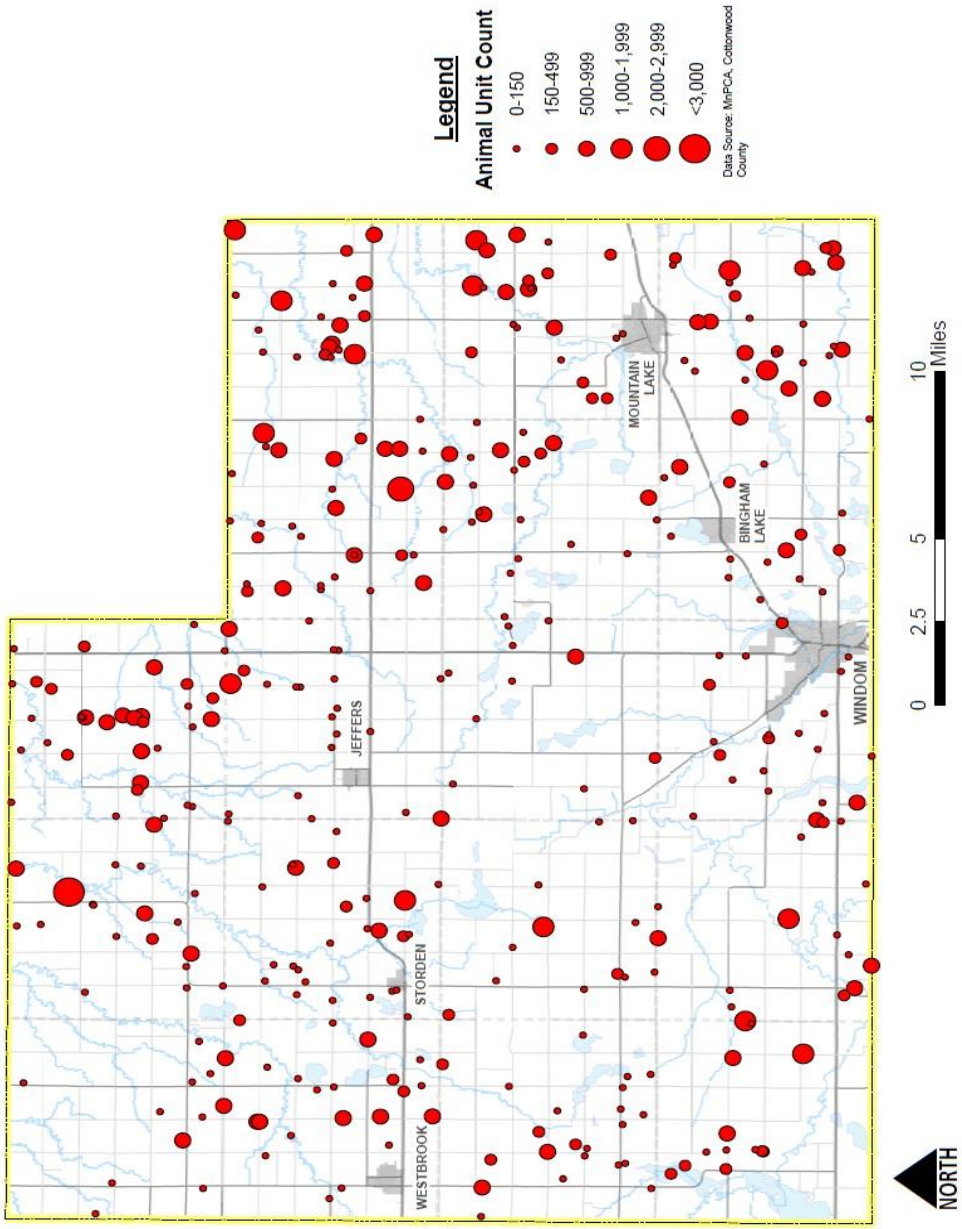
Ash trees became a preferred quick-growing street tree and shade tree across the USA after elm trees succumbed to Dutch Elm Disease. According to the MDA, the EBA is an insect that attacks and kills ash trees. The adults are small, iridescent green beetles that live outside of trees during the summer 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. "On May 14, 2009, emerald ash borer was confirmed as present in the South Saint Anthony Park neighborhood in St. Paul. EAB is a serious invasive tree pest. Quarantine has been placed on Ramsey, Hennepin, Houston, and Winona counties to help slow the spread of Emerald Ash Borer to other areas."[78]

Large scale animal outbreaks are rare. The Minnesota Board of Animal Health works with producers to educate, monitor, report, and respond to outbreaks. This coordinated effort has worked to reduce the frequency and scale of occurrences. The Minnesota Pollution Control Agency (MPCA) regulates collection, transportation, storage, processing and disposal of animal manure. At the end of 2014, there were 302 registered feedlots within Cottonwood County.[79] Management of feedlots and manure is a priority for Soil and Water Conservation Districts in southwest Minnesota.

Some occurrence of crop pests and diseases happens each year. The potential frequency of agricultural disease is occasional according to the planning team. Researchers try to stay ahead of the hazards by giving livestock vaccinations and supplements and by genetically modifying crops.

[78] Minnesota Department of Agriculture. Accessed 5-17-13. Available: http://www.mda.state.mn.us/plants/pestmanagement/eab.aspx
[79] MPCA, 2016 County Feedlot Program Report. Accessed: 8/18/17. Available: https://www.pca.state.mn.us/sites/default/files/lrwq-f-1sy16.pdf

Figure #98
Feedlots – Cottonwood County



Source: Cottonwood County GIS and Emergency Management

Plans and Programs

- Combined mitigation approach – Department of Agriculture, Minnesota Board of Animal Health, Minnesota Department of Health, University of Minnesota Extension Service, and Homeland Security and Emergency Management (HSEM) are working with local agencies and farmers to effectively mitigate any and all effects of hazards on animal agriculture and plant agriculture.
- Emergency Operations Plan – The Cottonwood County Emergency Operations Plan outlines procedures for county and local governments for contacting appropriate state and federal agencies and provides guidelines and strategies for dealing with animal and plant diseases and command structures with the Cottonwood County Emergency Manager.
- The Minnesota Board of Animal Health continues to work together with agricultural industries and other state and federal agencies to prepare for and respond to introductions of animal disease outbreaks. The state's voluntary cooperative control plan includes education, monitoring, reporting, and response. For the Avian Influenza outbreak, testing for influenza in poultry is conducted at the Minnesota Poultry Testing Laboratory in Willmar. Commercial and non-commercial poultry flocks are routinely monitored for influenza. Livestock and other agricultural operations are also monitored for animal disease outbreaks.
- Catastrophic animal loss – In the event of a catastrophic animal loss the Minnesota State Duty Officer, the Board of Animal Health (BAH), the Department of Agriculture, and your local feedlot officer should be contacted.[80] The primary responsibility for regulating carcass disposal in Minnesota lies with the BAH. The 7020 feedlot rule addresses site selection for composting animal carcasses.[81] MPCA is in charge of carcass disposal in Minnesota.
- Catastrophic animal loss preparation – the Board of Animal Health conducted a catastrophic animal loss training exercise that helped dramatically with the response to Avian Influenza. Foaming and composting was part of the training, which was used during the response to Avian Influenza.
- The private sector has done a good job of policing itself is regards to animal disease outbreaks and the spread of plant diseases. Private agricultural businesses have an economic interest in maintaining a healthy field and healthy animal stock. Research and development plays a big role in trying to stay ahead of the animal and plants diseases and pests.
- Private / public partnerships – Press releases from the Minnesota Board of Animal Health were a critical part of getting the word out regarding Avian Influenza. Cottonwood County has promoted private and public partnership to help educate the agricultural community regarding potential insects/pests and diseases. These partnerships utilize research provided by public entities like the University of Minnesota Extension, and by private entities like Cargill. Creating private and public partnerships is important in mitigating the effects of agricultural disease. A number of issues impact geographical areas, so combining resources and taking advantage of economies of scale can help to make the mitigation efforts more effective.

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[80] Minnesota Pollution Control. Accessed: 7/19/13. Available: http://www.pca.state.mn.us/index.php/view-document.html?gid=3579

[81] Minnesota Pollution Control. Accessed: 7/19/13. Available: http://www.pca.state.mn.us/index.php/view-document.html?gid=3579

Gaps and Deficiencies

- Livestock / Poultry Disposal – Disposal of dead livestock and poultry was an issue identified in many rural counties since the 2015 Avian Influenza Outbreak. This is in regards to catastrophic animal loss. The catastrophic animal loss issue pertains to on the farm animal loss and while the livestock or poultry is being transported. Refer to the section of Transportation accidents for more information related to catastrophic animal loss while livestock and poultry are being transported. There are mitigation efforts in place, but the planning team was unsure of how effective the plans would be in regards to a catastrophic animal loss. Cottonwood County Planning and Zoning has identified potential burial sites. Part of this planning was tested in 2015 with the Avian Influenza outbreak. There were not extensive poultry losses in Cottonwood County, but there were catastrophic poultry losses in Minnesota, and Iowa.
- Identifying backyard flocks – During the Avian Influenza outbreak there were identification of smaller flock issues. There was no list of backyard flocks. There is no backyard flock/poultry tagging, inventorying, and identifying program in Cottonwood County. Cottonwood County Emergency Management had to rely on information from 4-H Clubs and other informal means of identifying backyard flocks.
- Animal Disease Containment – Isolation and containment was and is a concern regarding Avian Influenza. It is difficult to quickly identify infected flocks. Once an infected flock is identified containment protocols can be established.
- Manure Plans and Disposal – During the Avian Influenza outbreak in 2015, manure from infested farms from Iowa was being transported to County. Feed was then taken back to Iowa. There is an economic incentive for truckers to have loads both ways, but this should have been caught earlier. Wash sites and decontamination for trucks need to be more accessible.
- Avian Influenza Cause – Unsure why Avian Influenza occurred and other questions related to how it was transmitted.
- Local Coordination – The relationship between Emergency Management, Des Moines Valley Health and Human Services (DVHHS), and local veterinarians needs to be strengthened in order to respond to the potential of actual animal disease that would pose a public health threat.
- Lag in Response – The response for Foreign Disease Outbreak is controlled at the State level. There may be a lag in response, since organizations have to be informed about the outbreak before a response is coordinated. Time is critical in responding to an outbreak, so additional local assets may be needed. Additional training between local assets and state level staff could also help to decrease response times.
- Coordination with State and Federal Agencies – Coordination with local emergency managers was not effective during the Avian Influenza outbreak. The Minnesota response to Avian Influenza on the Minnesota Board of Animal Health's website has a section titled Collaborative Effect. One key partner was overlooked and was not utilized to the full extent. The Avian Influenza Emergency Operations Center in the vicinity of Cottonwood County was in [Wilmar]. Communication did not go through the normal channels. Local emergency managers were not asked to be heavily involved. Local resources could have been better utilized if local emergency managers were more involved.

- Aquatic Invasive Species – It is a good thing to slow and prevent the spread of aquatic invasive species, but the Minnesota Department of Natural Resources (DNR) needs to take a more visible approach. The "DNR recommends that boaters either: spray boat with high-pressure water; rinse boat with hot water (120 degrees for two minutes, or 140 degrees for 10 seconds); or dry boat and equipment for at least five days."[82] There needs to be more decontamination units at boat launches, or part of aquatic invasive species regulations are simply a tool to fundraise. You can take your plugs out and let your boat sit all winter and there is still a little bit of water in the bottom. A very small number of boaters can comply with aquatic invasive species regulations.
- Disposal of contaminated materials – During the Avian Influenza there was a lack of coordination regarding the transportation and disposal of contaminated supplies and equipment. Wash in and wash out was used for larger equipment, but disposal of contaminated supplies and equipment needed additional coordination.
- Availability of PPE suits (Personal Protection Equipment – Contamination Suits) – Contamination suits were not always available for workers when entering a contaminated site during the Avian Influenza outbreak.

[82] Minnesota Department of Natural Resources. Accessed: 5/18/15. Available: http://www.dnr.state.mn.us/invasives/aquatic/index.html

5.5.2 Dam Failure

Dams and impoundments maintain lake levels and help control flooding and the destructive power of water. Dams and impoundments are a critical part in minimizing erosion. "There are more than 1,250 dams in Minnesota; 800 are public dams, and the state owns over 430 of the public dams. Most of the public dams are more than 50 years old and require ongoing emergency repairs and reconstruction to maintain their structural integrity."[83] Dam failure is defined as a collapse or failure of an impoundment resulting in downstream flooding.

Failure may occur for one or a combination of the following reasons:

- Prolonged periods of rainfall and flooding;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross section of the dam and abutments, or maintain gates, valves, and other operational components;
- Improper design, including the use of improper construction materials and construction practices;
- Improper operation, including the failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams on the same waterway that release water to a downstream dam;
- Earthquakes, which typically cause longitudinal cracks at the tops of the embankments that can weaken entire structures

The Department of Natural Resources (DNR) has a dam safety program that inspects the structural integrity of dams and impoundments. The DNR classifies dam structures in three categories:

- Class 1; High Hazard: any loss of life or serious hazard to public;
- Class 2; Significant Hazard: possible health hazard or probable loss of high-value property;
- Class 3; Low Hazard: property loss restricted to rural outbuildings and local roads.

There are fifteen dams in Cottonwood County. Two dams are Class 2 and thirteen dams are a Class 3, which are the lowest risk. There are no Class 1 dams. Below is a dam inventory table for Cottonwood County.

Cottonwood County Emergency Management does not currently have an Emergency Action Plan (EAP) for dam failures in neighboring counties, the downstream risk for Cottonwood County is very low.

[83] Minnesota Department of Natural Resources. Accessed: 8/10/17. Available: http://www.dnr.state.mn.us/waters/surfacewater_section/damsafety/index.html

Figure #99
Dam Inventory – Cottonwood County

Dam Name	ID	Next Inspection Year	Last Inspection Date	Dam Class	City	Distance
Ann Twp 6	MN01754	2019	-	3	Revere	4
Bennett WMA	MN01755	2019	-	3	Odin	18
Dundee Marsh Dam	MN00680	2020	3/29/2012	3	Windom	23
Eagle Lake	MN00163	2020	11/1/2012	3	Mountain Lake	4
Fish Lake Barrier	MN01151	2023	4/22/2008	3	Odin	21
Fish Lake Outlet	MN00164	2023	-	3	Odin	20
Germantown	MN01496	EXEMPT	11/01/2012	3	Sanborn	3
Germantown Twp 30	MN01793	2026	05/02/2018	3	Sanborn	8
Little Cottonwood River	MN01752	2019	-	3	Searles	47
Long Lake	MN01808	2026	11/15/2018	3	Windom	16
Mountain Lake	MN00165	2022	5/3/2018	2	Mountain Lake	0
Schoper-Bush	MN01008	2019	3/13/2015	2	Sanborn	9
Talcot Lake Wma	MN00161	2020	3/29/2012	3	Windom	32
Talcot Lake Wma-Frerichs	MN00233	2026	11/15/2018	3	Windom	23
Warren Lake	MN00162	2025	3/31/2017	3	Windom	0

DNR Dam Safety Engineer https://arcgis.dnr.state.mn.us/ewr/dam_finder/

Select areas along other streams and water ways in Cottonwood County where impoundments were constructed to hold back water are also susceptible to flooding from impoundments washing out or dam failure upriver.

Dam failure, although the risk is minimal, has the potential to be devastating to the areas within the floodplain and around the streams directly below impoundments and dams. Dam failure may result in flash flooding, extensive property damage, erosion, destruction of infrastructure including road and culvert, and loss of life. A failure of an impoundment or culvert has a potential of devastating downstream property damage, erosion, and destruction of infrastructure, including roads and other culverts.

Relationship to Other Hazards—Cascading Effects

- *Flash Flooding.* Dam failure has the potential to cause damage to the areas directly below the dam. Dam failure would cause immediate flash flooding, destruction of property, erosion of crops, infrastructure damage, and possibility of lives being lost. Damage to public infrastructure could also occur in areas of heavy water movement.

Dam Failure History in Cottonwood County

The original dam on the Des Moines River in Windom was constructed in 1878 for a flour mill and washed out numerous times in its history. It was rebuilt many times; the latest was 1963. However, in 2007 water went around the dam for the last time. (https://www.dglobe.com/news/1350011-windom-facing-decision-dam) In 2012 the dam was removed and rock riffles were installed in its place.

One set of culverts in particular were replaced with a box culvert bridge. 310th street, between 390th and 400th avenue, had three small culverts that washed out numerous times during heavy water flow. Cottonwood County Public Works used township bridge funds to construct a new box culvert bridge that would handle the heavy flow of water. Work on the new bridge was completed in the fall of 2018.

In the spring of 2007, a 17' section of gate on the south side of Talcot Lake Dam needed repair after steel trusses on the gate rusted out, allowing water to flow through the gate. According to the Tri-County News, DNR replaced the damaged gate with 24 steel stop logs. Also in 2007, stream bank erosion caused the failure of the Windom Dam abutment adjacent to Island Park, scouring a new channel around the dam. During the flood of 2018, numerous culverts on township roads were washed out and had to be replaced. FEMA reimbursed project costs as part of DR-4390.

Relationship to other Hazards

- *Flooding* **-** In the event of dam failure, flooding of communities and transportation corridors can occur.

Dam Failure and Climate Change

Dams are designed based on assumptions about a river's annual flow behavior that will determine the volume of water behind the dam and flowing through the dam at any one time. Changes in weather patterns due to climate change may alter the expected flow pattern. It is conceivable that bigger rainfalls at earlier times in the year could threaten a dam's designed margin of safety, causing dam operators to release greater volumes of water earlier in a storm cycle in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream.

While climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures. Minnesota had a dam failure due to a large storm event in June 2012. The Forebay canal had operated as designed for nearly 100 years. The intensity of the 2012 rain event caused a failure of the canal wall which caused significant damage.

Climate change is adding a new level of uncertainty that needs to be considered with respect to assumptions made during dam construction.

Vulnerability

Free flowing water has tremendous power. It can move boulders, carve out rock, and erode an impoundment or dam. It is important to slow the runoff of water, so groundwater supplies can be replenished and the volume of free flowing water in streams and rivers is reduced. Reducing the free flowing water in streams and rivers will help to preserve impoundments and dams, but over time impoundments and dams will require maintenance and replacement.

There are a fifteen dams in Cottonwood County. All of the dams are classified a Class 2 or Class 3, which are the lowest two risk classification. Erosion would be the biggest risk if a dam failed in Cottonwood County.

If an impoundment or culvert failed, Windom and Mountain Lake in Cottonwood County could be vulnerable.

Plans and Programs

- Minnesota Dam Safety Program – The Minnesota Department of Natural Resources (DNR) regulates nearly 900 dams in the State of Minnesota. The DNR and U.S. Army Corps of Engineers regularly inspect dam and reservoir capabilities for flooding and dam failure. The Minnesota DNR dam safety program inspects the structural integrity of dams and impoundments in Cottonwood County. The classification of the dam depends on how often the dam is inspected. A dam classified as High Hazard is inspected annually. A dam classified as Significant Hazard is inspected every three to four years. A dam classified as Low Hazard is inspected every eight years.
- Dam Emergency Action Plan – The Minnesota DNR drafts an Emergency Action Plan (EAP) for all High Hazard dams and strongly recommends that Significant Hazard dams be included as well. An EAP is a formal document that identifies potential emergency conditions at a dam and specifies preplanned actions to be followed in order to minimize property damage and loss of life in the event of a dam failure.
- Emergency Operations Plan – Explains the standard operating guidelines for countywide notification in the event of an emergency and the procedures of evacuation during an emergency.
- Impoundment dams and other water control systems.
- U.S. Army Corps of Engineers - The U.S. Army Corps of Engineers has plans in place for terroristic acts against the dams and flood control projects in the county.

Gaps and Deficiencies

- Registry of dams – Not all dams and impoundments are identified by the DNR. If the dam is not on the registry, the dam does not get inspected by the DNR. Non-identified dams could be at risk of failing, since they are not inspected.
- Infrequency of dam inspection – Dams in Cottonwood County that are all classified by the Minnesota DNR as Low Hazard dams and therefore only get inspected every eight years. The infrequency of inspection may result in maintenance being deferred for a number of years or structural deficiencies not being identified. Inadequate maintenance could result in dam failure.
- Talcot Dam may face issues if there are more frequent flood events.

5.5.3 Hazardous Materials

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 may become contaminated by the introduction of point and non-point source pollutants into public ground water and/or surface water supplies.

In Cottonwood County there are a number of manufacturers who use and or produce a number of hazardous chemicals. MN 30, 60, and US 71 runs through the county and this major transportation corridor has a high volume of semi-truck traffic. The loads coming to the county and through the county varies, but some of these loads could pose a serious chemical hazard if a crash would take place. Oil tankers are one example.

Many chemicals are also used daily in agriculture, putting farms and rural communities at risk. Anhydrous ammonia is one dangerous chemical used in agriculture that if not handled properly can be very dangerous. Methamphetamine (commonly referred to as "meth") manufacturers have targeted isolated rural homes and abandoned farm sites for illegal drug labs. However, these individuals also have been known to set up labs in their car or basement in town, so populations in town are equally at risk of a meth lab explosion and other hazards.

Federal law defines certain hazardous chemicals, and requirements for emergency planning for facilities at which hazardous substances are present. According to the Minnesota AHMP, approximately 6,000 facilities across the state report their storage of hazardous chemicals to the Minnesota Department of Public Safety's Emergency Planning and Community Right-To-Know Act (EPCRA) Program, US Environmental Protection Agency (EPA), and their local fire department. Within Cottonwood County there are two facilities that report hazardous material storage to state and local authorities.[84] These two facilities are known as 302 facilities after EPCRA Section 302(c) that require state and local authorities to develop chemical emergency preparedness and response capabilities through better coordination and planning with local businesses.

Chemicals

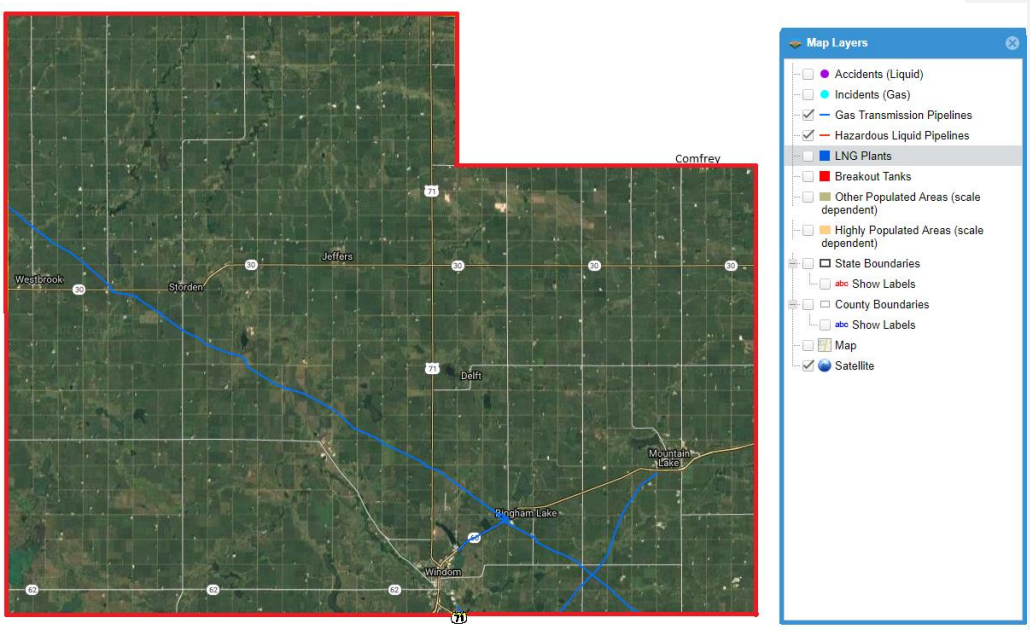
Land use activities and farming practices can have significant impacts on vulnerable aquifers. Aquifers in the region are often shallow and have a high potential of contamination from nitrate leaching. Deeper aquifers may not be suitable for water supplies due to naturally occurring contaminants, such as sulfur, or because of slow well recharge. Nitrates have been identified as a specific problem in the region.

[84] Toxic Release Inventory Program. 2016 Preliminary Dataset. Accessed 8/14/17. Available: https://www.epa.gov/toxics-release-inventory-tri-program/2016-preliminary-dataset-basic-data-files

Pipelines

The State Fire Marshall's Pipeline Safety Team (SFMPST) oversees pipeline operations in Minnesota. The National Pipeline Mapping System identifies two Gas Transmission Pipelines traversing Cottonwood County. One travels from the Northwest portion of the county north of Westbrook the southeast corner south of Bingham Lake. Then from Bingham lake along MN 60 to Windom. There is a second pipeline that is approximately 6 – 10 miles in length in the southeast corner to Mountain Lake. These two pipelines to converge south of Bingham Lake and west of Windom. The pipelines are in blue on the map below. Pipelines are pressurized and monitored, so pipelines can be quickly shut off in case of an accident. Pipelines are a safer way to transport hazardous liquids than by trucks or rail. "The evidence is clear: transporting oil and natural gas by pipeline is safe. Furthermore, pipeline transportation is safer than transportation by road, rail, or barge, as measured by incidents, injuries, and fatalities—even though more road and rail incidents go unreported."[85]

Figure #100
Hazardous Liquid Pipelines – Cottonwood County



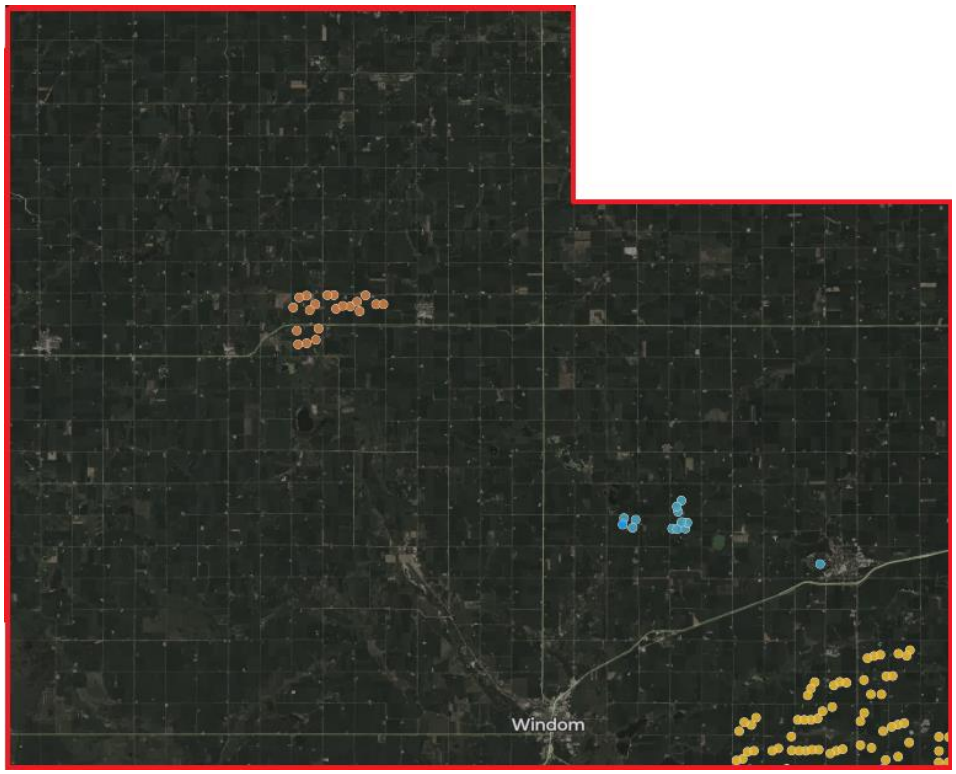
Source: National Pipeline Mapping System - https://www.npms.phmsa.dot.gov/PublicViewer/

[85] Manhattan Institute for Policy Research. Issue Brief – Pipelines are Safer for Transportation of Oil and Gas. Accessed: 7/23/15. Available: http://www.manhattan-institute.org/html/ib_23.htm#.VbFOi6_bK70

Decommissioning of Wind Towers

There are currently 86 wind towers in Cottonwood County and plans for two large wind farms to be constructed in the next five years. There is a concern of wind towers being abandoned and property owners left with removal and cleanup. There are removal and cleanup guarantees in the majority of the contracts with the wind farms, but if the wind farm files bankruptcy or closes all together, there may not be funding for removal and cleanup. There would be a substantial cost associated with decommissioning wind towers.

Figure #101
Wind Towers – Cottonwood County



Source: https://eerscmap.usgs.gov/uswtdb/viewer/#9.81/44.0456/-95.159

Meth

Meth is a powerful stimulant drug that is similar to a family of drugs called amphetamines. During the production process there are a number of dangerous chemicals that are mixed that can cause dangerous fires and explosions. According to the Rand Drug Policy Research Center, amphetamines are the most

widely used illicit drug worldwide, after marijuana.[86] Information in regional data systems and feedback from law-enforcement agencies and local medical centers indicate that meth is still a problem facing the populations they serve.

Meth labs are a concern in the region and an incident at a lab could result in a major hazard material incident. A number of hazardous chemicals are used in the production process. An explosion and fire could result in a number of chemicals being emitted into the air and the ground water. There is also chemical byproduct from cooking meth that is often discarded. This chemical byproduct could infiltrate the ground water and cause ground water contamination.

As traditional drugs, like cocaine, become more scarce and expensive due to the War on Drugs, it is likely demand for synthetic drugs, like meth, will increase. This increase in demand will entice more people to supply the drug. Meth can be produced locally and is relatively inexpensive to manufacture, so as the number of meth labs increase due to the increase in demand, the probability of a hazardous event involving a meth lab increases.

Relationship to Other Hazards—Cascading Effects

- *Fire.* Hazardous materials incidents may cause or occur in conjunction with a fire. This could result in the fire spreading at a fast rate and can make containing and fighting the fire more difficult. Specialized equipment may be required to combat the fire caused or in conjunction with a hazard material.
- *Water Supply Contamination.* An incident involving hazardous materials on the roads, rail, or in the air can lead to a water contamination issue. Wellhead Protection Plans discuss the infiltration of chemicals leaking into ground water aquifers. The issue of infiltration could be multiplied by a load of hazardous materials being transported on any of the main highways being in a crash and causing contamination to the ground water.
- *Terrorist activity.* Most hazardous materials in transit are marked, but there is an unknown volume of government materials being shipped that are not marked due to security reasons. Since MN HWY 30 and 60 and US HWY 71 passes through Cottonwood County, there is an increased risk of a semi-truck being stolen and used in a terrorist activity.
- *Public Health Emergency.* Hazardous materials being proceeded in or shipped through Cottonwood County could be involved in a crash. The exposure of radiological substances by unprotected humans might result in the negative effects caused by such an exposure. It can be life threatening depending upon how much exposure and the length of the exposure time.

Hazardous Materials History in Cottonwood County

Hazardous material incidents can occur in different locations:

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

[86] Rand. Accessed: 5/29/13. Available: http://www.rand.org/pubs/research_briefs/RB9438/index1.html

Since 2000, there have been six hazardous materials incidents in Cottonwood County.[87] Hazardous material incidents also include the discovery of underground storage tanks and other minor incidents. Removal of underground storage tanks is required procedure by EPA, but in the past barrels and other materials were buried and discarded. It is unknown how many hazardous materials are buried in Cottonwood County.

Figure #102
Hazardous Materials Incidents since 2000 – Cottonwood County

Date	Nearest City	Type	Cause	Description / Report
11/7/2014	Bingham Lake	Fixed	Equipment Failure	Caller stated there was a release of anhydrous ammonia due to a failed gasket on an oil filter.
8/4/2011	Cottonwood	Mobile	Other	Caller stated that there were two vehicles that were involved in an accident, the cause of the accident was a private vehicle swerved in front of a commercial truck, unknown fatalities, one injury was reported from the driver of the private vehicle, there was a fire in the engine compartment of the commercial truck. Several agencies have responded to the incident.
8/7/2008	County Roads 4 & 13	Fixed	Unknown	Caller is reporting a release of chlorine to the air from the chlorine room due to unknown causes.
8/26/2001	Bingham Lake	Fixed	Equipment Failure	250 pounds of anhydrous ammonia released into atmosphere caused by a gasket failure.
10/28/2001	Windom	Railroad	Unknown	Due to an unknown cause five empty rail cars derailed.
8/27/2000	Bingham Lakes	Storage Tank	Other	Storage tank was overfilled from a tank truck

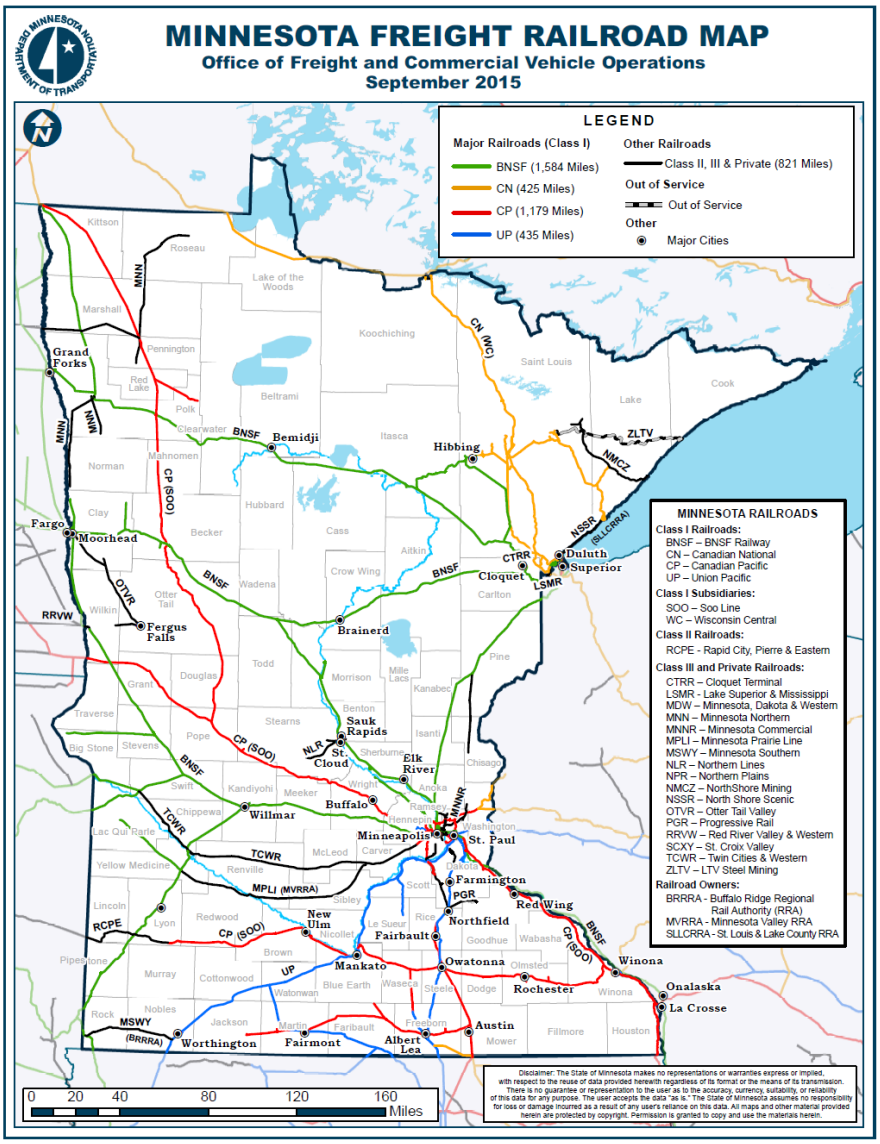
Vulnerability

With MN 30, 60 and US HWY 71 passing through the county and one Class I railroads (the Union Pacific) there is a high probability that there will be a crash involving hazardous materials. Refer to Figure #102 for the Minnesota Railroad Map.

[87] USCG National Response Center – EPA Hazardous Incidents Reports. Accessed 8/14/17. Available: http://nrc.uscg.mil/

With MN 60 and US HWY 71 and one Class I railroads crossing Cottonwood County, hazardous materials may be traveling through the area at any time. This volume of hazard materials traversing Cottonwood County could pose a serious risk of a hazardous material incident occurring. Precautionary measures are in place to prevent an incident from occurring, but a crash on MN HWY 60 or US HWY 71 involving a tanker of hazardous materials could result in a major hazardous material incident. A major incident could have large cascading effects since almost all water for public consumption in Southwest Minnesota is sourced from underground aquifers, rather than surface waters.

Figure #103
Railroads – Minnesota



- State agency cooperation – Cottonwood County works directly with the appropriate state agencies to address needs for responding to and mitigating the impacts of a hazardous materials event.
- Emergency Operations Plan – The EOP discusses Radiological/Hazardous Materials and outlines procedures for dealing with hazardous material accidents, spills, and releases. EOP identifies the 302/312 facilities within Cottonwood County that maintain a supply of hazardous chemicals.
- Environmental health regulations – Cottonwood County has worked to develop environmental health regulations and a County Safety Procedures and Policy Guide. These documents are cross-departmental plans that deal with hazardous material, infectious disease, and food-borne illnesses. They serve to provide guidelines to protect the citizens of the county.
- Training of emergency personnel – All emergency personnel are trained to at least the minimum Hazardous Materials Awareness level and all first responder groups conduct the required Occupational Health and Safety Administration training on a yearly basis.
    - Mountain Lake has an ordinance requiring that all houses display their house numbers. All properties were brought into compliance when the ordinance was adopted. The city should conduct a physical review to determine if all properties are in compliance.
- Ordinance – Cottonwood County has a meth lab ordinance describing the policies and procedures for cleaning up such a site. The cost of the cleanup is billed to the property owner.
- Cottonwood County Solid Waste Plan – In 2014, Cottonwood County updated its 10 year Solid Waste Plan. The plan identifies the policies and programs regarding Hazardous Waste Management for the county. The plan also identifies the large waste generators within the county.
- Hazardous chemicals collection – Cottonwood County's Emergency Manager works with the Department of Public Safety, Emergency Response Commission to assist in the statewide collection of hazardous chemicals existing at facilities throughout Cottonwood County so that local emergency officials can prepare for incidents.
- Household Hazardous Waste Facility – In 2012, Cottonwood County opened it's greater than 90 day Household Hazardous Waste Facility. The facility takes any hazardous waste that comes from a household such as paint, cleaners, fluorescent lights, etc.
    - Emergency Contingency Plan for the County Landfill and HHW is updated annually every November
- Regional hazardous waste facility. Cottonwood County works with the regional office in Marshall, MN, in providing a way for Very Small Quantity Generators (VSQG) to dispose of their hazardous waste.
- Hazardous Materials Response Team – Cottonwood County does not have a HAZMAT Team. Cottonwood County coordinates with the HAZMAT Team out of Mankato and Marshall. Sioux Falls could potentially be added as a HAZMAT Team, but state lines can make coordination more difficult.
- Monitoring program – A number of store owners currently report to the sheriff's office when products are sold that are used in making meth.
- MnDOT – MnDOT has several departments to address hazardous materials, freight, emergency management and disaster preparedness. The District State Aid Engineer is a good contact for access to those resources.

- Water plan – Cottonwood County's water plan recognizes that the county's ground water is impacted by both agricultural and residential fertilizer and pesticide applications. Windom and Red Rock Rural Water has a state approved wellhead protection plan.
- Regional and State assistance – Plans are in place specifying hazardous material cleanup and protocol for who should be contacted for regional and state assistance.

Gaps and Deficiencies

- Specialized equipment – Cottonwood County fire departments are in need of specialized equipment to deal with hazardous materials. This equipment is often a single use item and is a high cost item. Maintaining this equipment is expensive, so this equipment is often not purchased, available, or dies on the shelf.
- Public education regarding drug ingredients – Public outreach to business owners needs to occur more frequently regarding substances used in making meth and other controlled substances.
- Hazard material / Methamphetamine lab cleanup -The sheriff's office and local fire departments are trained to handle a number of hazardous materials, but for methamphetamine labs and other hazardous materials a HAZMAT certified cleanup team is required. The Cottonwood County sheriff's office nor any county fire departments have a HAZMAT Team. Methamphetamine lab clean up can be very costly. If a fire fighter goes into a fire and sees that it is a methamphetamine lab, the equipment the fire fighter is wearing has to be decommissioned. The chemicals in the fire contaminate the suit, so there are other costs that can be associated with a methamphetamine lab fire and clean up.
- Hazardous material training for first responders – First responders are trained to recognize hazardous materials and establish a perimeter. Hazardous material training only happens every three years for emergency responders. A refresher course would be helpful for emergency responders.
- 302 Facilities portable database – It may be time consuming to look up what hazardous materials a 302 facility is storing. A more usable database could assist with emergency response and increasing the safety of emergency responders.
- Proper hazardous waste disposal – Although the Cottonwood County Household Hazardous Waste Facility is open, there is still a need to educate the public and businesses on how to dispose of their waste properly.
- Drug Drop Box outreach and marketing – There is a prescription and over the counter medication disposal drop box in Windom at the Law Enforcement Center, Mountain Lake at Peterson Drug and Gifts, and Westbrook at City Hall. Additional outreach and marketing to the public is needed to increase use of the drug drop box.

5.5.4 Public Health Emergencies

As technology developed people started to demand sewer systems, running water, and waste disposal. This helped to prevent the spread of disease and helped to maintain a healthier public. As building technology also developed people started to demand safe and well-built buildings. This made it safer for people to live and work. Local government saw these demands and has tried to create uniformity through regulation. Through this government regulation the public health service evolved.

Public health services today face new challenges to counter ever-evolving disease. The Minnesota Department of Health (MDH) works with Department of Public Safety (DPS) 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.

People throughout Cottonwood County are equally affected by this hazard. "Infectious diseases have the potential to affect any form of life."[88] Some infectious diseases that were thought to have been eradicated have re-emerged and new strains present threats to the populations and require monitoring. Different strains of the influenza virus emerge seasonally and require modifications to antibiotics and vaccinations.

Infectious diseases in livestock also pose a significant risk. Food supplies could be affected and the livelihood of the owners of livestock will be impacted. Certain infectious diseases are considered more likely to present a public health emergency hazard in rural Minnesota.

Many infectious diseases are preventable and controllable. Measles, Rubella, Polio, and Pertussis are all vaccine preventable diseases. These diseases are no longer common, but a single case can cause a public health emergency. Doctors are often not looking for these diseases, so they may be overlooked which can cause the disease to spread. Also, more parents are electing not to vaccinate which puts the entire population at greater risk.

Arboviral Encephalitis commonly known as West Nile Virus is a mosquito transmitted disease that can cause encephalitis in people and horses. This virus was usually found in mosquitos and birds in Africa and Europe. However, West Nile encephalitis was reported in New York City in 1999.[89] In 2013, there were three deaths in Minnesota associated with West Nile Virus. There were no reported cases in Cottonwood County in 2013 or 2014.[90]

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[88] MN State Hazard Mitigation Plan 2014. Accessed: 8/14/17. Available: https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/State%20Plan%20Final%202014.pdf
[89] Minnesota Department of health. Accessed: 8/14/17. Available: http://www.health.state.mn.us/divs/idepc/diseases/westnile/
[90] Minnesota Department of health. Accessed: 8/17/17. Available: http://www.health.state.mn.us/divs/idepc/diseases/westnile/statistics.html

In 2009, the Centers for Disease Control and Prevention (CDC) started taking larger steps to combat H1N1 (sometimes called "swine flu"). H1N1 was first detected in people in the United States in April 2009. This virus has the potential to spread fast and can cause severe illness in people. The virus can spread person to person, much in the same way the seasonal influenza is spread.[91]

Smallpox has not been an issue in the United States for more than 50 years. Due to the threat of terrorism, this disease has been thrust to the forefront of public concern and fear. Smallpox is a serious, contagious, and sometimes fatal infectious disease. There is no specific treatment for smallpox. The only prevention for small pox is vaccination.

"Ebola is a rare and deadly disease caused by infection with a strain of Ebola virus. The 2014 Ebola epidemic is the largest in history, affecting multiple countries in West Africa. The risk of an Ebola outbreak affecting multiple people in the U.S. is very low."[92]

Relationship to Other Hazards—Cascading Effects

- *Emergency Response.* A public health emergency will affect the ability to respond and recover from any other natural or manmade hazard. If an epidemic event were to occur, deaths could be in the many hundreds of thousands across the nation.
- *Civil Disturbance.* If the health of the general public is perceived to be threatened on a large scale, riots or states of lawlessness are a possibility.

Public Health Emergencies History in Cottonwood County

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.

There has been one major public health emergency in Cottonwood County in recent years. Influenza is a common seasonal occurrence in Cottonwood County, but no major outbreak has occurred. Seasonal influenza is planned for every year. The annual seasonal influenza usually peaks in February.

There are stands of influenza that can be more devastating. Influenza Type A virus has caused three pandemics in the past century worldwide with significant loss of life. Pandemics are caused by the unstable nature of Influenza Type A, and new subtypes that appear through genetic drifts or shifting.

[91] Center for Disease Control and Prevention. Accessed: 8/14/17. Available: http://www.cdc.gov/h1n1flu/qa.htm
[92] Center for Disease Control and Prevention. Accessed 11/5/14. Available: http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/index.html

Figure #104
Cases of Selected Communicable Diseases Reported to the MN Department of Health by District of Residence, 2015

Disease	District (population per U.S. Census 2014 estimates)									
	Metropolitan (2,919,177)	Northwestern (157,393)	Northeastern (326,026)	Central (732,492)	West Central (235,563)	South Central (290,521)	Southeastern (498,011)	**Southwestern (212,847)**	Unknown Residence	Total (5,372,030)
Anaplasmosis	145	104	96	186	49	5	23	**5**	0	613
Arboviral disease										
La Crosse	0	0	0	0	0	1	0	0	0	1
West Nile	5	0	0	2	1	0	0	**1**	0	9
Babesiosis	9	14	3	12	5	1	1	0	0	45
Blastomycosis	16	3	5	7	1	0	2	0	0	34
Botulism (Infant)	0	0	0	0	0	0	1	0	0	1
Brucellosis	3	0	0	0	0	0	1	0	0	4
Campylobacteriosis	469	15	29	152	42	47	91	**79**	0	924
Cryptosporidiosis	72	7	8	58	44	30	60	**37**	0	316
Escherichia coli O157 infection	49	2	1	22	4	6	11	**20**	0	115
Hemolytic uremic syndrome	2	0	0	4	1	1	2	**1**	0	11
Giardiasis	316	15	42	105	23	25	49	**45**	0	620
Haemophilus influenzae disease	37	6	8	17	3	9	10	**14**	0	104
HIV (non-AIDS)	200	1	3	7	3	2	6	**2**	4	228
AIDS (diagnosed in 2015)	93	3	3	6	4	3	7	**2**	20	141
Legionellosis	31	0	5	6	1	2	6	0	0	51
Listeriosis	1	0	0	1	0	0	1	0	0	3
Lyme disease	555	44	120	288	49	18	92	**10**	0	1176
Measles (rubeola)	2	0	0	0	0	0	0	0	0	2
Meningococcal disease	2	0	1	2	0	0	2	0	0	7
Mumps	6	0	0	0	0	0	0	0	0	6
Pertussis	343	23	30	88	13	6	75	**14**	2	594
Q Fever (acute)	0	0	1	1	0	0	0	0	0	2
Salmonellosis	578	18	36	135	31	48	70	**59**	0	975
Sexually transmitted diseases										
Chlamydia trachomatis - genital infections	13534	461	992	1901	576	823	1470	**370**	1111	21238
Gonorrhea	3166	50	130	263	87	54	185	**23**	139	4097
Syphilis, total	569	3	13	29	1	10	19	**10**	0	654

Disease	District (population per U.S. Census 2014 estimates)									
	Metropolitan (2,919,177)	Northwestern (157,393)	Northeastern (326,026)	Central (732,492)	West Central (235,563)	South Central (290,521)	Southeastern (498,011)	**Southwestern (212,847)**	Unknown Residence	Total (5,372,030)
Primary/secondary	220	0	2	10	2	4	5	**4**	0	246
Early latent*	162	3	1	10	0	3	4	**2**	0	185
Late latent**	184	0	10	9	1	3	9	**4**	0	220
Congenital	3	0	0	0	0	0	0	0	0	3
Other***	0	0	0	0	0	0	0	0	0	0
Shigellosis	244	1	6	12	8	8	8	**5**	0	292
Streptococcal invasive disease - Group A	124	10	27	32	8	8	20	**7**	0	236
Streptococcal invasive disease - Group B	275	13	39	76	15	30	62	**17**	0	527
Streptococcus pneumoniae disease	238	16	50	81	32	44	51	**22**	0	534
Toxic shock syndrome (Staphylococcal)	10	0	0	1	0	0	0	0	0	11
Tuberculosis	111	1	0	9	3	4	18	**4**	0	150
Varicella	167	4	10	75	9	35	33	**28**	0	361
Viral hepatitis, type A	15	0	2	0	1	2	1	0	0	21
Viral hepatitis, type B (acute infections only, not perinatal)	15	0	0	2	0	0	2	0	0	19
Viral hepatitis, type C (acute infections only)	13	2	10	4	4	1	2	**1**	0	37

* Duration ≤1 year

** Duration >1 year

*** Includes unstaged neurosyphilis, latent syphilis of unknown duration, and latent syphilis with clinical manifestations

County Distribution within Districts

Metropolitan - Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, Washington

Northwestern - Beltrami, Clearwater, Hubbard, Kittson, Lake of the Woods, Marshall, Pennington, Polk, Red Lake, Roseau

Northeastern - Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, St. Louis

Central - Benton, Cass, Chisago, Crow Wing, Isanti, Kanabec, Mille Lacs, Morrison, Pine, Sherburne, Stearns, Todd, Wadena, Wright

West Central - Becker, Clay, Douglas, Grant, Mahnomen, Norman, Otter Tail, Pope, Stevens, Traverse, Wilkin

South Central - Blue Earth, Brown, Faribault, LeSueur, McLeod, Martin, Meeker, Nicollet, Sibley, Waseca, Watonwan

Southeastern - Dodge, Fillmore, Freeborn, Goodhue, Houston, Mower, Olmsted, Rice, Steele, Wabasha, Winona

Disease	District (population per U.S. Census 2014 estimates)									
	Metropolitan (2,919,177)	Northwestern (157,393)	Northeastern (326,026)	Central (732,492)	West Central (235,563)	South Central (290,521)	Southeastern (498,011)	**Southwestern (212,847)**	Unknown Residence	Total (5,372,030)

Southwestern - Big Stone, Chippewa, **Cottonwood,** Jackson, Kandiyohi, Lac Qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Redwood, Renville, Rock, Swift, Yellow Medicine

Source: http://www.health.state.mn.us/divs/idepc/newsletters/dcn/sum15/2015dcn.pdf

Vulnerability

People contract seasonal influenza every year and other diseases occur regularly. If an outbreak occurs that is contagious it is critical to quarantine the population affect by the disease. This is often difficult since the outbreak may go unnoticed for a period of time. Curtain mutations of a disease are also becoming more resistant to antibiotics. This is particularly true regarding Influenza Type A. Younger and older population cohorts are at a higher risk for acquiring a disease.

Plans and Programs

- Emergency Operations Plan – County Emergency Management is working closely with Public Health and local healthcare facilities to mitigate and effectively respond to potential Public Health Emergencies. The Cottonwood County Emergency Operations Plan outlines procedures for county and local governments for contacting appropriate state and federal agencies and provides guidelines and strategies for dealing with infectious diseases. A command structure between local public health and the Emergency Manager is also outlined in the Emergency Operations Plan.
- Des Moines Valley Health and Human Services (DVHHS) – DVHHS works with the Minnesota Department of Health (MDH) to address infectious diseases that are listed in MN Rule #4605.7040 (such as Encephalitis, Hepatitis, Influenza, Lyme's Disease, Tuberculosis, and Syphilis). If any of these or other listed diseases should appear in Cottonwood County, DVHHS works with MDH and local medical providers to limit the spread of the disease. DVHHS routinely receives information from MDH via Health Alert Network (HAN) for outbreaks occurring in Minnesota or outbreaks that could impact the state and issues appropriate information based on the most current alerts. DVHHS provides information to public and private employers, schools and hospitals about potential infectious disease threats and prevention measures.
- Area Strategic Stockpile Plan – DVHHS has a Strategic National Stockpile (SNS) plan in place. DVHHS and working with the Minnesota Department of Health and other regional and local partners for the mass distribution of needed medicines and supplies for a Public Health Emergency. DVHHS will continue to coordinate with regional partners for mass distribution of needed medical supplies for a public health emergency.
- Response capabilities (facilities) – DVHHS have designated buildings for the Strategic National Stockpile and Medical Countermeasure Dispensing Sites.
- Medical Countermeasure Dispensing Plan – DVHHS has a Medical Countermeasure Dispensing Plan in place. The plan covers mass dispensing of medicines and supplies/Medical Countermeasure Dispensing (MDS). In the event of a naturally occurring outbreak, bioterrorism incident or mass vaccination, dispensing of medication may be needed within a short period of time to prevent morbidity and mortality due to the incident. DVHHS has four designated medical countermeasure dispensing sites (MDS) which are utilized as an emergency, temporary, public health clinic to provide immunizations or medications to a large number of residents. DVHHS follows guidance from the Minnesota Department of Health (MDH) and works with other local, state, federal, and non-governmental agencies, as necessary.
- Isolation/Quarantine (I/Q) Plan – DVHHS has developed an Isolation & Quarantine plan to prevent the spread of diseases. The I/Q will be event specific. The plan will address measures to protect the public and prevent spread of disease. Isolation measures are directed towards people already ill, who are

usually within a health care facility or off site care. Quarantine is a tool used to hold & limit contact between persons who have been exposed to a disease in their own home. Both measures are effective tools in preventing spread of disease. DVHHS does not monitor individuals once they are place in I/Q. This monitoring will come down from MDH.

- Media outreach – County Emergency Management works with DVHHS and other local media throughout the county in the event of an infectious disease outbreak.
- Vaccination program – DVHHS conducts outreach programs to educate residents on the benefits of routine vaccinations. Part of this outreach is to assure that children and adults have access to recommended vaccines. Targeted groups include children, people with high deductibles, or people with no insurance. People in these groups can receive immunizations through the agency. Flu immunizations are also targeted to some adults within the county. Immunizations are designed to assist families of need in protecting their children and themselves from infectious diseases. DVHHS also participates in the South Central/Southwest Minnesota Immunization Information Connection (MIIC), which is a confidential, computerized network of shared immunizations records. It provides clinics, schools, and parents/adults with accurate, complete, and up-to-date immunization records. This system can assist in alerting participating families if there is any disease outbreak that may put them at risk in their area.
- Environmental health regulations and policies – DVHHS in cooperation with MDH has worked to develop environmental health regulations, a policy guide, and procedures to address infectious disease and food borne illness. Cottonwood County contracts with Brown Nicollet Environmental Health for inspections.
- Outbreaks – Windom Area Health (City Owned, Sanford Health managed) and Sanford Westbrook Medical Center has written plans for Investigation of Suspected Outbreaks, Significant Epidemiologic Occurrence or Sentinel Events, Pandemic Influenza, Flu Center, and Reporting of Communicable Diseases.
- Southwest Healthcare Preparedness Coalition – The coalition represents 23 hospitals, 43 primary care clinics, 50 Nursing Homes, 103 EMS groups and two tribal governments in our 16-county region in southwest Minnesota. Additional coalition members include: State and local representatives from Public Health, Homeland Security and Emergency Management, the Minnesota Department of Health, and the Emergency Medical Services Regulatory Board. The coalition is working together toward enhancing our response to local, regional, statewide, and national emergencies.[93]
- MDH FluSafe Program – Windom Area Health (Sanford Health) has performed staff vaccination and tracked percentage vaccinated each year participating in the MDH FluSafe Program with vaccination efforts of greater than 90% for several years.
- Public education – Des Moines Valley Health and Human Services (DVHHS), the agency responsible for the delivery of public health and social services in Cottonwood County, has various campaigns to educate the public on the importance of active living and healthy eating, vaccinations, tobacco, and other public health issues.

[93] Southwest Regional Emergency Preparedness Team. Accessed: 2/24/16. Available: http://www.mnswept.com/

- Senior LinkAge Line® – The Senior LinkAge Line® is the Minnesota Board on Aging's free statewide information and assistance service. This service helps to connect Minnesotans to local services.

Gaps and Deficiencies

- Strategic National Stockpile vulnerable to power outages – There have been no major public health emergencies in the county in recent years. Des Moines Valley Health and Human Services (DVHHS) and the Minnesota Department of Health maintain a Strategic National Stockpile (SNS) of needed medicines and supplies for Public Health Emergencies. The medication/vaccinations are vulnerable to power outages. A power outage could result in medicines and supplies not being kept cold and spoiling.
- Response capabilities (facilities) – DVHHS needs to work with Emergency Management, various units of government, and health care facilities to clarify and determine the use of buildings needed to respond to a public health emergency or respond to a hazard.
- Aging population – An aging population puts the county at greater risk of Public Health Emergencies. The population cohort 85 plus has increased by 22.4 percent from 2000 to 2010.[94] As more of the population is dependent on the younger population cohorts to help them, it puts a greater need on the rest of the population to stay healthy. The older population is dependent and requires services the rest of the population provides. If healthcare staff becomes sick that will put a strain on the care capacity of assisted living facilities, other elderly care facilities, and general care facilities.
- Cultural diversity & vaccination disparities – Due to the diversity of Cottonwood County, it is difficult to conduct public outreach in regards to immunizations. People from other countries do not have the same immunization plans as is custom in the United States. The overwhelming majority of school age children are vaccinated, but adults from other counties may not be vaccinated.
- Lack of Alzheimer's treatment – There is a lack of treatment facilities for Alzheimer's in southwest Minnesota.
- Lack of mental health treatment – There is a lack of treatment facilities for mental health issues in southwest Minnesota. Mental health issues go undiagnosed and too many people are not getting treatment. Jail space is being used to house people with mental health issues.

[94] U.S. Census 2000, 2010. Accessed: 8/14/17. Available: http://factfinder2.census.gov

5.5.5 Utility Failure

Utility failure consists of power outages, water treatment system failure, and waste water treatment system failure. Citizens have come to expect these services on a 24/7 basis. When these services fail there can be a social, economic, and public health impact. The majority of Cottonwood County residents is connected to and relies on one or more of these systems: power grid, water treatment system, and waste water treatment system. A small percentage of residents have personal backup generator, personal wells, and septic tanks. In the event of a major utility failure, the majority of Cottonwood County residents will be affected by the event.

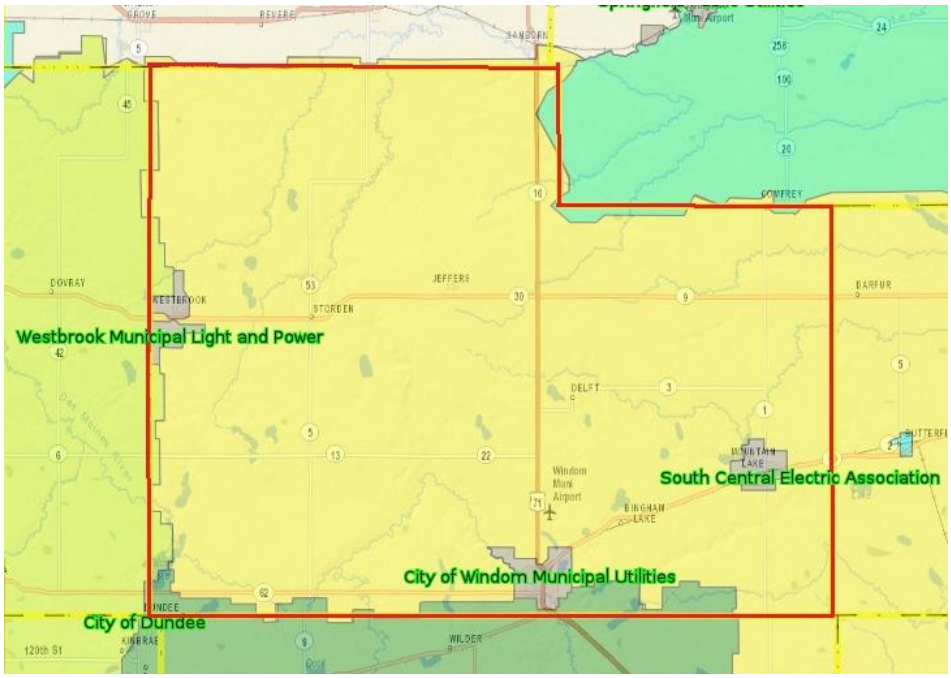
The electric utility industry is comprised of municipal utilities, cooperatives and investor-owned utilities. Municipal utilities are governed by the city council or appointed utility commission. Municipals are non-profit. Capital is raised through operating revenues or sale of tax-exempt bonds. There are 125 municipal electric utilities in the state. Cooperatives are governed by an elected board of directors. Those cooperative customers whose name appears on a bill are eligible to vote for these directors. Cooperatives are non-profit entities but make a 'margin' on sales. Cooperatives often access funds through the federal Rural Utilities Service, or the National Rural Utilities Cooperative Finance Corporation (CFC), a privately owned, non-governmental organization. Traditionally, cooperative boards set their own rates. Investor-owned utilities, also known as IOUs, are governed by a board of directors elected by stockholders. IOUs are a state-regulated monopoly. They exist to make a profit for their stockholders while serving the public. Capital is raised through stock sales, taxable bonds and through operating revenues. Five IOUs operate in Minnesota.

There are five main electric utilities in Cottonwood County. The main electric utilities include: South Central Electric Association, Mountain lake Public utilities, Westbrook Municipal Light and Power, City of Windom Municipal Utilities, Federated Rural Electric Association, and Brown County Rural Electric Association. Refer to Figure #104 for electric utility service area map.

South Central Electric Association provides electrical service to the majority of the county including the cities of Bingham Lake, Jeffers, Storden, and the unincorporated town of Delft. Brown County Rural Electric Association provides electrical service to a very small portion of the northeast area of the county and the city of Comfrey. Federated Rural Electric Association provides electrical service to a very small portion of the southern area of the county.

Mountain Lake Municipal Utilities provides electrical service to the City of Mountain Lake. Westbrook Municipal Light and Power provides electrical service to the city of Westbrook and a small portion south of MN 30. City of Windom Municipal Utilities provides electrical service to the city of Windom.

Figure #105
Electric Utilities – Cottonwood County



Utility failure can cause hardship and economic loss. The loss of power can have a cascading effect. A loss of power can result in water supply pumps not being able to replenish the water supply for a city or rural water system and water treatment facilities not being able to process waste water. Power interruption can also result in food spoiling, adequate drinking water supplies being diminished, and extreme cold and warm temperatures causing hardship and can be potentially life threatening for both people and livestock. The majority of all feedlots operating within the county rely on electricity for their livestock's water. In terms of animal production, a loss of power could result in large livestock losses. Routine daily activities can also become difficult and overwhelming at times.

Relationship to Other Hazards—Cascading Effects

- *Civil Disturbance.* Food and water are basic necessities and if power is out for multiple days, supplies could be diminished to critical levels. When the supply of a necessity becomes drastic low distress can take over and cause civil unrest. Scarce resources could cause the public to loot and cause civil disorder.
- *Public Health Emergency.* The failure of septic treatment facilities and systems can have immediate adverse impacts on human health due to communicable diseases and epidemics. A water treatment failure could also result in contamination of the water supply.

- *Fire.* Utility failures caused by downed power lines can cause wildfires and structure fires. Fighting a fire would be more challenging since electric pumps are not able to replenish the water supply and refueling may have to take place a number of miles from the fire. These variables will affect the response time, and will make it more difficult to stay ahead of the fire.

Utility Failure History in Cottonwood County

Cottonwood County has seldom experienced a countywide power loss. Typically, when the power is down it is confined to certain localities and crews can respond immediately and have power restored within hours. However, a severe daylong blizzard can keep crews from getting to the problem. The initial storm and piled up snow left behind can cause the power outage to last for multiple days.

Power outages caused by winter storms, high winds, and tornadoes can have significant economic impacts. These events may force the closure of businesses, schools and government offices. Homeowners may see food spoiled, move to a temporary shelter, experience flooding inside of their homes, or have their pipes burst all due to the lack of power. From 1999-2011 FEMA provided approximately $31 million dollars to private non-profits in Minnesota for disaster recovery efforts. Of the $31 million dollars, approximately $24 million was provided to electric cooperatives (15 cooperatives) to repair utility lines, clean-up debris or for protective measures.[95]

In the spring of 2013, an ice storm hit the region that caused hundreds of electric poles to snap in half. The ice storm caused miles of downed power lines that took weeks to fully repair. For close to a week some regional residents were without power.

Figure #106
Downed Powerlines

Associated Press

[95] MN State Hazard Mitigation Plan 2014. Rural Electric Cooperative Annex. Access: 8/15/17. Available: https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/Rural%20Electrical%20Cooperative%20Annex%202014.pdf

Vulnerability

Natural hazards will continue to cause power outages. Hardening of the utility grid will help to prevent large outages, but the costs of redundancy and hardening of the utility grid will limit the extent of the project. There are miles of power lines in Cottonwood County that are above ground on poles. This makes them vulnerable to winter storms, ice buildup, tornadoes and straight line winds, and other natural disasters. The risk level assigned to utility failure by the planning team is average.

Plans and Programs

- Tree maintenance – Electric utility providers identify and clean up areas of Cottonwood County that are most likely to experience damage to power lines from falling tree limbs. The utilities for Windom and Mountain Lake annually trim trees.
- Limiting electrical power – In times of extreme heat, the county will enact rolling power blackouts. Rolling blackouts decrease the demand for electricity and conserves energy during peak demand. A rolling blackout is having certain portions of the community scheduled to lose power. This is done to keep the system from overloading. Residents are alerted through the media when their portion of town will be without power.
- Utility grid upgrades – The utility grid is constantly being upgraded with new poles and technology to make the system more reliable.
- Water storage – There are planning recommendations to help mitigate the impact of utility failure. To help ensure adequate water storage capacity, cities consider two basic recommendations when analyzing water storage needs. First, Minimum storage should be at least 40 gallons/capita. Second, municipal water supply should have a minimum water storage capacity equal to the average daily water usage. During a power outage the water stored in water holding facilities can act as a reserve water supply until power can be regained.
- Emergency primary care facility – Windom Area Health is designated as an emergency primary care facility.
- Underground gas lines – Most gas mains within the county have been placed underground. This makes the lines less susceptible to damage to the system.
- Water availability –
- Mutual Aid Agreement – South Central Electric Association has mutual aid agreements with neighboring electric utilities to provide support in case of a large scale outage.
- South Central Electric Association – is working on a four year plan regarding redundancy. Part of this plan is also to bring their new territories into a plan for the future.
- MnWARN – "MnWARN is a formal emergency response program in Minnesota. MnWARN is a mutual aid agreement to provide a program whereby water, wastewater, and storm water utilities sustaining physical damage from natural or other disasters in the state of Minnesota can obtain emergency assistance, in the form of personnel, equipment, and materials and other associated services necessary to protect the health and welfare of the utilities' customers." The following cities are members of MnWARN: Windom, Mountain Lake, and Comfrey.
- Utility grid hardening – Local electrical cooperatives are hardening the electrical grid through various building techniques. Rural electrics suffer from storm damage and interruptions mainly from ice,

wind, and severe weather on its overhead lines, so additional mitigation funding could advance utility hardening projects at a faster rate.

- Prior to any utility work, road construction or maintenance requiring excavating or driving posts into the ground, a "Gopher One-Call" is performed and cleared to ensure that all underground utilities are located prior to the work being performed. This is per State Law.

Gaps and Deficiencies

- Above ground power lines – Many power lines in the county are above ground and subject to damage from ice storms, wind, and falling tree limbs.
- Backup generators – Not all communities have backup electrical generators to guarantee the operation of essential services in the event of a county wide utility failure. Water supplies could be diminished quickly, medical supplies that need to be cold may spoil, large amounts of food may spoil, and waste water could become an issue.
- Essential operating systems – Facilities that have backup generators learned, in the spring ice storm of 2013, that all essential operating systems were not hooked up to the generator. There are also key facilities that do not have backup generators.
- Cell phone coverage – Cell phone reception in rural areas in Cottonwood County is not reliable. In the case of an emergency, landline and satellite phones are needed to call for help.
- Public education – Public awareness should be increased for alerting the public of potential damage to gas mains and lines as these could be disrupted at many locations within the county.
- Natural gas lines and township road maintenance – there is a risk associated with snagging natural gas lines along township roads when work is being done. County roads require getting a permit. A permit should also be required along township roads.
- Hardening of the electrical grid – It is important to increase redundancy between the different electrical utilities in Cottonwood County. There is redundancy within individual systems, but there should also be redundancy between systems and suppliers. This would increase the reliability of the grid within Cottonwood County.
- Funding for hardening of the electrical grid – Local cooperatives will be able to harden the grid at a faster rate if rural electric funding could be supplemented with mitigation funding from FEMA and other sources.
- Generators – Besides the fire hall, Storden needs a generator at the Storden Community Center. This was identified by public officials because in the event of a long duration power outage, a warming shelter could be opened in the community center if a generator was available. It could also operate as an EOC for the city in the event one is needed.

5.5.6 Water Supply Contamination

Water supply contamination is the introduction of point and non-point source pollutants into public ground water and/or surface water supplies.[96] Water supply contamination can be the result of mismanaged landfills and dumps, negative externalities of industrial activity, and agricultural run-off.

Cottonwood County does not have an overabundance of high quality groundwater. Groundwater is generally drawn from multiple aquifers in Cottonwood County that include: Cretaceous sandstones and Precambrian Sioux Quartzite, these deposits typically are high in dissolved minerals (sulfate, iron, manganese). Even when these minerals are within US EPA standards, they may give water an objectionable taste and stain laundry and dishes. Quaternary sand and gravel deposits show higher yields and offer good potential for source water.

Some aquifers in surficial sand and gravel deposits associated with lakes and river channels show substantial yields, in particular along the Des Moines River where the City of Windom and Red Rock Rural Water System both have established well fields. These surficial aquifers yield "young water", with 10-12 year recharge cycles from precipitation. This makes them more susceptible to drought and contamination from both point and non-point sources. The highest quality water comes from these shallow aquifers. The deeper the aquifers the more iron and manganese there is in the water. The shallower aquifers are preferred since they have better quality water, but the shallower aquifers are more susceptible to contamination.

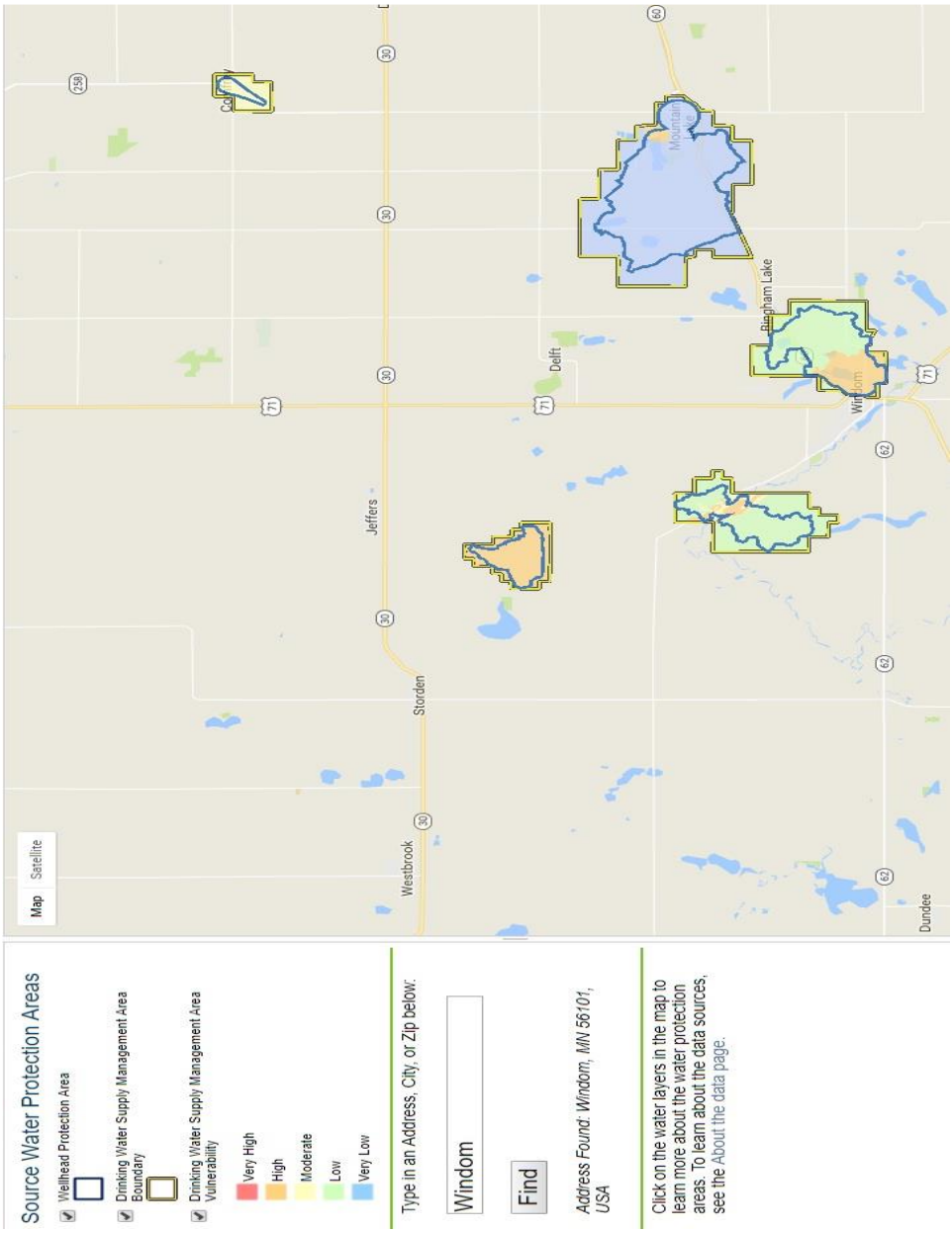
Microbiological and chemical contaminants can enter the ground water through leaking underground storage tanks, feedlots, and waste disposal sites. Human wastes and pesticides can also be carried to lakes and streams during heavy rains or snow melt. Areas in Cottonwood County have different risk factors in regards to certain contaminates, but there is equal risk throughout the county for water contamination.

[96] EPA. Accessed 6/3/13. Available: http://www.epa.gov/agriculture/tsur.html

Figure #107
Public Water Supplies - Cottonwood County

Public Water Supply Name	ID
Bingham Lake	117008
Windom	1170006
Delft	1170010
Mountain Lake	1170003
Neuhof Hutterian Brethren	1170011
Red Rock Rural Water System	1170009
Jeffers	1170002
Storden	1170004
Westbrook	1170005

Figure #108
Water Source Protection Areas – Cottonwood County



A major contamination could cause massive disruption to Cottonwood County's economy and surrounding communities. Removing contaminants from a water supply or relocating a well is an expensive process. Treating water for both human and animal consumption may result in people and farming operations relocating to new locations. This would leave areas of Cottonwood County unused until contaminates are removed from the water supply.

Relationship to Other Hazards—Cascading Effects

- *Public Health Emergency.* Shallower well systems are more susceptible to water supply contamination. Polluted water sources can cause illness and epidemics in both humans and animals.
- *Civil Disturbance.* A water supply shortage could also lead to public unrest and civil disturbances. When the supply of a necessity becomes drastically low distress can take over and cause civil unrest. Scarce resources could cause the public to loot and cause civil disorder.

Water Supply Contamination History in Cottonwood County

Cottonwood County has not had a major groundwater contamination problem.

Vulnerability

The City of Windom operated a municipal landfill from the 1930s to 1974. This site covers 11.4 acres and accepted municipal refuse including paint sludge. Concern about the site's proximity to the City's municipal well field prompted an MPCA evaluation of the landfill's impact to groundwater. Analysis consistently revealed volatile organic compounds downgradient of the landfill. Construction of a landfill cap began in 1989. To further protect the water supply, the filter units at the municipal water treatment plant were modified in September 1988 in order to enhance aeration of raw water to remove low levels of VOCs (chlorinated volatile compounds). The City also constructed a new water treatment plant in 1997. Monitoring of the landfill site and municipal well water testing continues to the present day and will likely continue indefinitely.

Water recharge in shallow wells can occur in a matter of hours, so wells that are drilled into the shallow aquifer are more vulnerable to pollutants infiltrating the water supply. There are also an unknown number of wells that continue to provide pathways for potential pollutants to reach the county's aquifers. A number of regulations and monitoring procedures are in place to help maintain a quality water supply.

Plans and Programs

- Cottonwood County Water Plan – The Cottonwood County Water Plan addresses management of water, effective environmental protection, and efficient resource management. The water management plan is intended to identify existing and potential water issues in the context of watershed units and groundwater systems. The Plan identifies and maps the major and minor aquifers serving the county. The Plan outlines Cottonwood County's enforcement of the state code for septic systems and floodplain ordinances. The county also does testing of some private wells through the guidelines set in the county's water plan.
- Wellhead Protection Program – Wellhead protection plans are complete / maintained for all public water suppliers, as promoted by the Minnesota Department of Health. Since 1974, all water wells

constructed in Minnesota must meet the location and construction requirements of the Minnesota Well Code.

- Abandoned Well Sealing Program – Cottonwood County has a cost share program for sealing abandoned wells. This program is part of the Local Water Management Plan.
- Feedlot pollution prevention – Cottonwood County actively works to protect water sources from feedlot runoff. County ordinances require that all feedlots within the county participate in the state's feedlot program. Also, county and county extension services promote best management practices to minimize runoff from feedlots into rivers. County zoning ordinances also limit feedlot locations. See Figure #97 Feedlot Map – Cottonwood County.
- Subsurface Sewage Treatment Systems (SSTS) – SSTS are commonly known as septic systems and are regulated by Minnesota Statutes 115.55 and 115.56. Minnesota Pollution Control Agency (MPCA) enforces the statutes and Cottonwood County continually works with MPCA towards updating failing septic systems.
- Septic System Code – Cottonwood County enforces the state code for septic systems and floodplain ordinances.
- Household Hazardous Waste Program (HHW) – The Cottonwood County's HHW program, helps residents with the disposal of toxic household products and provides an exchange program for usable leftover products.[97]
- Wastewater water monitoring – The MPCA requires routine inspection of all public wastewater systems. State staff, in the Water-Quality Point-Source Program, issue permits and monitors compliance through data review and inspections, and enforces permit conditions. Employees at the Cottonwood County wastewater facilities are certified operators under state requirements. These operators are required to take state training to maintain their certified operator status.
    - Windom has an MPCA permit which is undergoing review and renewal. There are new state standards on nitrates that will be enforced.
- Public water system monitoring – The MDH requires routine inspection of all public water systems. State staff issues permits and monitors compliance through data review and inspections, and enforces permit conditions. Employees at the Cottonwood County water facilities are certified operators under state requirements. These operators are required to take state training to maintain their certified operator status.
- Drinking water standards – The U.S. Environmental Protection Agency (EPA), as required by the Safe Drinking Water Act of 1974, sets uniform nationwide minimum standards for drinking water. State public health and environmental agencies have the primary responsibility for ensuring that each public water supplier meets the federal drinking water standards or more stringent ones established by the state. The EPA requires an ongoing water quality monitoring program to ensure public water systems are working properly. Local officials work together with the MDH and EPA to ensure that all public water supplies are safe. Also, the EPA requires all local suppliers to promptly inform the public should the supply become contaminated.

[97] Cottonwood County Local Household Hazardous Waste Facility. Accessed: 9/8/17. Available: http://www.co.cottonwood.mn.us/county-departments/solid-waste-and-recycling/landfill/

- Shoreline zoning – Cottonwood County has adopted the state's statutory shoreline riparian zoning classifications and minimum standards via ordinance.
- Floodplain Management Program – The Floodplain Management Program outlines how Cottonwood County tests general water quality following a heavy rain or flood event. The water quality test is looking for high levels of nitrates or phosphorus. The MDH assists Cottonwood County with the program.
- Clean Water, Land and Legacy Amendment – The Clean Water, Land and Legacy Amendment of 2008 increased the sales and use tax rate by three-eighths of one percent on taxable sales, starting July 1, 2009, continuing through 2034. Approximately 33 percent of this revenue is dedicated to the Clean Water Fund to protect, enhance, and restore water quality in lakes, rivers, streams, and groundwater.
- I & I – Cities in Cottonwood County work to reduce Infiltration and Inflow in their sanitary sewer systems.
    - When Windom has a street reconstruction project, they also reconstruct the sewer under the streets to help with I & I
    - Mountain Lake continues to work on I & I. The 2012-2014 utility and street project addressed the issue. Mountain Lake also has an ongoing inspection and replacement program that includes low interest loans to address the issue.
- Sediment ponds – The Cottonwood County Highway Department works with the DNR and other organizations to increase the number of sedimentation ponds along roadways in Cottonwood County. Sedimentation ponds hold back water, which allows for a more natural filtration process to occur and helps to increase water quality and aquifer recharge rates.
- County zoning – Several steps are being taken to protect ground water sources from feedlot runoff. County ordinances require that all feedlots within Cottonwood County participate in the State's feedlot programs. Also, county extension services promote best management practices to minimize runoff from feedlots into streams and rivers. County zoning ordinances also limit feedlot locations.
- Sedimentation pond –Sedimentation ponds are being integrated into highway projects to help slow the flow of water and allow for a more natural water filtration process.

Gaps and Deficiencies

- Backup drinking water sources – The Cottonwood County Emergency Management Plan should identify alternate sources of drinking water, including locations for acquiring adequate amounts of bottled water, in the event of well contamination.
- Septic system inspection – Cottonwood County does not have an ordinance requiring periodic inspections of individual septic systems. The initial installation has to meet MPCA requirements, and it has to be installed by a licensed contractor.
- Security around public water sources – Wells, water towers, groundwater storage tanks and water treatment plants should have additional security. This may include fencing around sites, alarm systems for break-ins and the addition of surveillance cameras. Rural water supplies may be more vulnerable, since security is less.
- Backup electrical generators – Not all communities have backup electrical generators to guarantee the operation of their water supply and/or wastewater treatment facilities.

- Annual recharge rates – Cottonwood County does not have estimated annual recharge rates, but there is a robust monitoring of heavy water users and wells.
- Sump pump public education – The general public may be unaware that sump pumps cannot drain into the city wastewater system. Windom and Mountain Lake do provide information to their residents about this issue.
- Nitrates – 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.
- Aging infrastructure – The water supply infrastructure in the majority of cities in southwest Minnesota is past its useful life. The water supply infrastructure is old, in need of repair, and is extremely costly to replace. Repairs and replacement is occurring, but this process could be accelerated with state and federal funding. Accelerated funding would help to decrease costs, so cities could make larger updates. There are economies of scale in larger projects and having work done in multiple adjacent cities.
- Rural water supply is near a landfill. Potential contaminants, thus, pose a threat to the water supply.

5.6 Hazard Identification Worksheet

5.6.1 Methodology

The Hazard Identification Worksheet below, (Figure 108) is a tool to help profile the identified hazards. In Section II above the results of Planning Team's Hazard Identification Worksheet were included in the profile of the identified natural and manmade hazards. The profile and the hazard identification worksheet helped the planning team assign priority to hazard mitigation strategies.

The Hazard Identification Worksheet was developed by the former Minnesota Planning Agency and expanding by the Southwest Regional Development Commission. It is used by assigning a Probability score, (from 1 to 4, with 1 being Unlikely, 2 Possible, 3 Likely and 4 Highly Likely) a Magnitude/Severity Score, (1 is Negligible, 2 is Moderate, 3 is Critical and 4 is Catastrophic) a Warning Time Score (1 is Optimal, 2 Limited, 3 Marginal and 4 Minimal), and a Duration score, (1 is Brief, 2 Intermediate, 3 Extended, 4 Prolonged.) The Probability score accounts for 45% of the total score, Magnitude/Severity accounts for 30% of the total, Warning Time for 15% of the total and Duration 10%. Each event is then scored and the end score is calculated to come up with the Risk Index listed in Figure 118. The Planning Team then looked at the totals and assigned a subjective ranking of Low, Medium or High.

The sorting criteria for categories in the Hazard Identification Worksheet are as follows:

Potential Frequency:	Unlikely if <1% chance in the next 100 years, Occasional = 1% and 10% chance in next year, Likely = between 10% and 100% chance in next year, Highly Likely = greater than 10% chance in next year.
Spatial Extent:	Countywide or Local
Potential Severity:	Limited =<10% area affected destroyed, Minor = 10% to 25% area affected, Major = 25% to 50% area affected, Substantial = >50% area affected.
Warning Time:	Minimal, 6 – 12 hours, 12– 24 hours, 24+ hours
Risk Level:	Subjective ranking by Planning Team based on previous categories
Hazard Rank:	Subjective ranking by Planning Team based on previous categories

Table 1: Modified Calculated Priority Risk Index

0.45 Probability	0.3 Magnitude / Severity	0.15 Warning Time	0.1 Duration
4 - Highly Likely ☐ Event is probable within the calendar year. ☐ Event has up to 1 in 1 year chance of occurring (1/1 = 100%) ☐ Chance of event is greater than 33% likely per year. ☐ Event is "highly likely" to occur	**4 – Catastrophic** ☐ Local jurisdiction is overwhelmed and unable to effectively respond to the hazard. Local resources are inadequate or non-existent. Complete loss of communications. Massive regional, state, EMAC and federal response is required. Federal disaster declaration. ☐ Local and regional medical services are unable to manage the volume of injuries and fatalities. Mass evacuation, sheltering, and care of displaced residents, medical patients, high risk and vulnerable populations are required. ☐ Loss of public utilities, government and essential services for more than 1 month. Widespread destruction of critical infrastructure, public and private property. More than 50% of critical and non-critical facilities and infrastructure damaged or destroyed. Extended emergency response operations lasting more than 1 month may be required.	**4 – Minimal** ☐ No-notice up to 6 Hours	**4 – Prolonged** ☐ More Than 1 Week
3 – Likely ☐ Event is probable within the next three years. ☐ Event has up to 1 in 3 years chance of occurring (1/3 = 33%) ☐ Chance of event is greater than 20% but less than or equal to 33% per year. ☐ Event is "likely" to occur.	**3 – Critical** ☐ Local jurisdiction is unable to effectively respond without District-level mutual aid support and significant state assistance. Local resources have been expended and local agencies have reached the limits of their capabilities. Communications seriously degraded with significant impact on operations. State disaster declaration. ☐ Local medical services are unable to manage number of injuries and fatalities. Patients require transportation to regional medical facilities outside of the affected areas. Local area evacuations, sheltering, and care of displaced residents, medical patients, high risk and vulnerable populations are required. ☐ Loss of public utilities, government and essential services for up to 1 month. Significant damage to critical infrastructure, public and private property over a large area. Up to 50% of critical and non-critical facilities and infrastructure damaged. Emergency response operations lasting up to 1 month may be required.	**3 – Marginal** ☐ 6 to 12 Hours	**3 – Extended** ☐ Up to 1 Week
2 – Possible ☐ Event is probable within the next five years. ☐ Event has up to 1 in 5 year chance of occurring (1/5 = 20%). ☐ Chance of event is greater than 10% but less than or equal to 20% per year. ☐ Event could "possibly" occur.	**2 – Moderate** ☐ Local jurisdiction is able to effectively respond with significant inter-local mutual aid support and limited state assistance. Local and mutual aid resources are adequate to support response. Communications systems operating near capacity. Local medical services are able to manage volume of injuries and fatalities but are near the limits of their capabilities. Only critically injured patients are diverted to facilities outside of the affected areas. Limited evacuations and sheltering required. ☐ Loss of public utilities, government and essential services for up to 1 week. Significant damage to critical infrastructure, public and private property over a localized area. Up to 25% of critical and non-critical facilities and infrastructure damaged. Response operations lasting up to 1 week may be required.	**2 – Limited** ☐ 12-24 Hours	**2 –Intermediate** ☐ Up to 1 Day
1 – Unlikely ☐ Event is probable within the next 10 years. ☐ Event has an up to 1 to 10 years chance of occurring (1/10 = 10%). ☐ Chance of event occurrence is less than or equal to 10% ☐ Event is "unlikely" to occur.	**1 – Negligible** ☐ Local jurisdiction is able to manage incident with standard mutual aid and little or no state assistance. Local resources are adequate to support response. Communications system operating normally. Local emergency. ☐ Local medical services are able to manage number of injuries and fatalities with on hand personnel and resources. ☐ Loss of public utilities, government and essential services for up to 24 hours. Damage contained to a single incident scene and immediate area. Up to 5% of critical and non-critical facilities and infrastructure damaged. ☐ Response operations lasting up to 72 hours may be required.	**1 – Optimal** ☐ 24+ Hours	**1 – Brief** ☐ Up to 6 Hours

Figure #109
CPRI Worksheet – Planning Team Rankings

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Risk Index	*Risk Severity*
Tornado	2.55	3.45	3.51	2.78	2.99	Medium
Winter Storm	3.60	2.10	2.36	2.66	2.87	Medium
Windstorm	3.25	2.16	3.06	2.22	2.79	Medium
Lightning	3.10	1.85	3.50	2.00	2.68	Medium
Hail	3.20	1.75	3.45	1.86	2.67	Medium
Extreme Cold	3.05	1.70	1.75	2.95	2.44	Medium
Extreme Heat	2.85	1.70	1.80	2.75	2.34	Medium
Flash Flood	2.25	2.10	2.56	2.25	2.25	Medium
Wildfire	1.65	1.80	3.35	2.05	1.99	Low
Drought	2.10	1.55	1.51	3.51	1.99	Low
Flood (Riverine)	1.55	1.65	1.60	2.60	1.69	Low
Earthquake	1.05	1.95	2.89	1.79	1.67	Low
Dam Failure	1.11	1.78	2.17	1.89	1.55	Low
Erosion	1.53	1.18	1.47	2.12	1.47	Low
Subsidence	1.06	1.35	2.59	1.76	1.45	Low
Landslide/Mudslide	1.06	1.22	2.44	1.61	1.37	Low

5.6.2 Repetitive Flood Claim Properties and Severe Repetitive Loss Properties

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.

Repetitive Loss Properties

FEMA has a nonpublic database of all of the repetitive loss structures within the State. These structures are those which have sustained damages on two separate occasions within a ten-year time span for which the cost of repairs at the time of the flood meets or exceeds 25 percent of the market value of the structure before the damage occurred.

Based on this database, Cottonwood County does not have any repetitive loss structures identified. From January 1, 1978, through November 30, 2017, zero total losses were reported in rural Cottonwood County.[98]

Figure #110
Loss Statistics Flooding – Cottonwood County, January 1, 1978 – June 30, 2017

Community Name	Total Losses	Closed Losses	Open Losses	Closed Without Payment Losses	Total Payments
City of Windom	11	6	0	5	$42,903.06
Cottonwood County	2	2	0	0	$11,659.84
Totals	13	8	0	5	$54,562.90

FEMA: Loss Statistics

Severe Repetitive Loss Properties

As of November 2017, there were no Severe Repetitive Loss properties in in Cottonwood County.[99]

5.6.3 Analyzing Development Trends

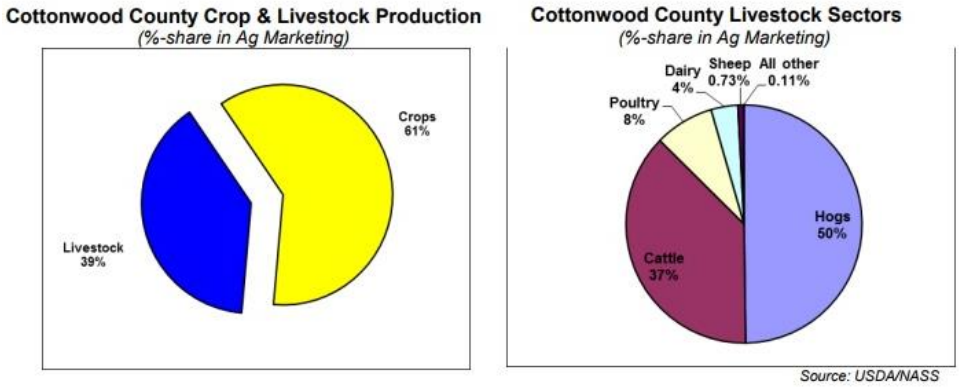
Land Use and Development Trends

Cottonwood County is a rural county with urban growth in the City of Windom. There are 372,767 acres in farm production in Cottonwood County.[100] Agriculture and food processing are two primary business categories in Cottonwood County.

A large percentage of tillable land in Cottonwood County is farmed. There are also lands in conservation programs, parks, and other more natural settings. Not having all of the tillable ground in production helps to maintain ground water quality, wetlands, and plants and wildlife.

[98] 2017 Flood Mitigation Assistance RL and SRL county lists. Accessed 12-7-2017.
[99] 2017 Flood Mitigation Assistance RL and SRL county lists. Accessed 12-7-2017.
[100] USDA Census 2012. Accessed: 9/8/17. Available: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Minnesota/st27_2_001_001.pdf

Figure #111
Cottonwood County Farm Land Use



Prohibiting development in floodplains also helps to mitigate the negative effects of flooding and runoff. Grasslands, shrubs, and other vegetation help to negate the negative effects that flooding and runoff can have. It is important to incorporate land conservation practices into local and county land use policy and development plans.

One percent floodplain areas do exist in Cottonwood County. These flood plain areas are along the Redwood River, Cottonwood River, and multiple streams and creeks. Compatible development has occurred along the Redwood River in the City of Windom. Refer to the subsection 5.4.3: Flooding more information regarding the one percent floodplain.

In southwest Minnesota there have also been a growing number of wind farms, solar farms, ethanol plants, and other biofuel plants. This development trend poses some unique challenges. In regards to roads and bridges, there is an increase of oversized loads, which can wear out the infrastructure faster and pose safety concerns to other motorists.

Firefighting also may be challenging. Specialized equipment is required to reach the top of the turbines, so firefighters have been instructed to sit back and let the wind turbine burn. Firefighters will monitor the fire to make sure the fire does not spread.

Ethanol plants and other biofuel plants have the potential to generate large and very hot fires. Plans are in place to address these new developments, but there is not extensive experience in mitigating hazards related to these development trends. Refer to 5.4.2: Fires for more information related to wind turbines ethanol plants, and biofuel fires.

A combination of conservation and planning has helped Cottonwood County maintain safe and efficient development. Cottonwood County is a rural county, so emergency response is impacted by distance and time and the availability of equipment and resources. Regional efforts help to mitigate the effects of natural and manmade hazards in Cottonwood County.

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Section 6 – Mitigation Strategy

The goal of mitigation is to protect lives and reduce the future impacts of hazards including property damage, disruption to local and regional economies, the amount of public and private funds spent to assist with recovery, and to build disaster-resistant communities. Mitigation actions and projects should be based on well-constructed risk assessments, provided in Section 5 of this plan. Mitigation should be an ongoing process adapting over time to accommodate a community's needs.

6.1 Community Capability Assessment

The capability assessment identifies current activities used to mitigate hazards. The capability assessment identifies the policies, regulations, procedures, programs, and projects that contribute to the lessening of disaster damages. The assessment also provides an evaluation of these capabilities to determine whether the activities can be improved in order to more effectively reduce the impact of future hazards. The following sections identify existing plans and mitigation capabilities within all of the communities.

6.1.1 National Flood Insurance Program (NFIP)

The NFIP is a federal program created by Congress to mitigate future flood losses nationwide through sound, community-enforced building and zoning ordinances and to provide access to affordable, federally-backed flood insurance protection for property owners. The NFIP is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods. Participation in the NFIP is based on an agreement between local communities and the federal government that states that if a community will adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas (SFHAs), the federal government will make flood insurance available within the community as a financial protection against flood losses.

There are 64 flood insurance policies in Cottonwood County.[101] Each policy covers a single building, but all single family home policies include detached garages. Refer to Figure #111 for an outline of policies in each city.

There are no repetitive loss properties in Cottonwood County.

Table 70 below shows which jurisdictions in Cottonwood County participate in the National Flood Insurance Program (NFIP).

[101] FEMA Region V NFIP Policy Information by State. Accessed: 8/7/2017.
Available: https://www.fema.gov/policy-claim-statistics-flood-insurance

Figure #112
NFIP Participation in Cottonwood County

Jurisdiction Name	NFIP	Mapped High-Risk Areas
Cottonwood County	Yes	1/2/1981 Update in progress
Mountain Lake	Yes	1/2/1981
Comfrey	Yes	09/25/09(M)
Windom	Yes	6/5/1989

(MN DNR, 2016) *Data current as of 12/1/2016*

6.1.2 Plans and Ordinances

Cottonwood County and its incorporated communities have a number of plans and ordinances in place to ensure the safety of residents and the effective operation of communities, including a Zoning Ordinance, Floodplain Ordinance, Wellhead Protection Plan, Local Water Plan, Transportation Plan, Economic Development Plan, and Emergency Operations Plan.

In Section 5.0 of this plan (*Hazard Profiles)* a review of the plans and programs in place was included as related to each of the hazards addressed in the plan.

For a full listing of plans and programs in place in Cottonwood County, see *Appendix H: Cottonwood County Plans & Programs in Place.*

In addition, the cities of Windom, Mountain Lake and Comfrey have land use ordinances and comply with the requirements of the program.

Paul Johnson, Cottonwood County Emergency Management Director states, "When they started this process of the update back in 2017, I went to every town in the county and asked if they would like to participate in the NFIP now. Mountain Lake was the only one who chose to go through the process of joining. All others decided they either didn't have mapped areas, and they don't have other building codes or code enforcement people, so adopting and enforcing the NFIP ordinances were cost prohibitive."

Ordinance No. 163

Floodplain Management Ordinance

General Floodplain District - One-Map Format
City of Comfrey

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CITY OF MOUNTAIN LAKE, MN

ORDINANCE #7-17

AN ORDINANCE OF THE CITY OF MOUNTAIN LAKE

ESTABLISHING SECTION 9.34

RESTRICTIVE FLOODPLAIN MANAGEMENT ORDINANCE

SUBDIVISION 1.0 STATUTORY AUTHORIZATION AND PURPOSE:

1.1 **Statutory Authorization:** The legislature of the State of Minnesota has, in Minnesota Statutes Chapter 103F and Chapter 462, delegated the responsibility to local government units to adopt regulations designed to minimize flood losses.

1.2 **Purpose:**

1.21 This ordinance regulates development in the flood hazard areas of the City of Mountain Lake. These flood hazard areas are subject to periodic inundation, which may result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base. It is the purpose of this ordinance to promote the public health, safety, and general welfare by minimizing these losses and disruptions.

1.22 National Flood Insurance Program Compliance. This ordinance is adopted to comply with the rules and regulations of the National Flood Insurance Program codified as 44 Code of Federal Regulations Parts 59 -78, as amended, so as to maintain the community's eligibility in the National Flood Insurance Program.

1.23 This ordinance is also intended to preserve the natural characteristics and functions of watercourses and floodplains in order to moderate flood and stormwater impacts, improve water quality, reduce soil erosion, protect aquatic and riparian habitat, provide recreational opportunities, provide aesthetic benefits and enhance community and economic development.

General Floodplain District (GF)

153.030 Permitted uses
153.031 Procedures for floodway and flood fringe determinations

Land Development Standards

153.035 Land development standards

Public Utilities, Railroads, Roads, and Bridges

153.040 Public utilities, railroads, roads, and bridges

Manufactured Homes and Manufactured Home Parks

153.045 Manufactured homes and manufactured home parks

Recreational Vehicles

153.046 Recreational vehicles

Administration

153.050 Administration
153.060 Variances
153.065 Conditional uses

Nonconformities

153.070 Nonconformities

Amendments

153.075 Amendments

Penalties and Enforcement

153.999 Penalties and enforcement

6.2 Mitigation Goals

In Section 5.0 of this plan, the risk assessment identified Cottonwood County as prone to a number of natural and technological hazards. Planning team members understand that although hazards cannot be eliminated altogether, Cottonwood County can work toward building disaster-resistant communities.

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. The planning team formulated goals, objectives, and strategies to mitigate the effects of natural and manmade hazards.

Goals are general guidelines that explain what Cottonwood County wants to achieve. Objectives narrow the general guidelines and define in more detail what Cottonwood County wants to achieve. Strategies are the actual steps to be taken to achieve the goals.

A qualitative approach was used by the planning team to judge and prioritize the mitigation strategies based on perceived costs and benefits. The process used to judge and prioritize the mitigation strategies was the STAPLEE Process.

Figure #113
STAPLE+E Planning Factors

S – Social	Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the community's social and cultural values.
T – Technical	Mitigation actions are technically most effective if they provide a long-term reduction of losses and have minimal secondary adverse impacts.
A – Administrative	Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
P – Political	Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support for the action.
L – Legal	It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
E – Economic	Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost benefit review, and possible to fund.
E – Environmental	Sustainable mitigation actions that do not have an adverse effect on the environment, comply with federal, state, and local environmental regulations, and are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound.

Refer to the Planning Process Chapter for more information relating to the STAPLEE Process and the planning process.

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 tornadoes 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. An acronym list of entities listed in the strategies below can be found in Section 6.3 Mitigation Strategies Acronym List.

6.2.1 Hazard Mitigation Actions

Cottonwood County and its included municipalities share a common All Hazard Mitigation plan and worked closely to develop it. These people work together with their city councils and the Cottonwood County Emergency Management Director to assure that the hazards and mitigation actions included in this plan are accurate and addressed in their jurisdictions. The jurisdictions responsible for each action are: Cottonwood County, Bingham Lake, Jeffers, Mountain Lake, Storden, Westbrook, Windom, and Comfrey. Figure #113 lists all mitigation actions for Cottonwood County and its jurisdictions. Appendix G contains separate mitigation action tables for each jurisdiction.

Each of these mitigation action charts detail the hazard, the mitigation action to address it, the priority ranking for implementation (1 = High Priority; 2 = Moderate Priority; 3 = Low Priority), its current stage of implementation, the timeframe for implementation going forward, the jurisdictions who have identified they will work to implement the action, the responsible parties to carry through with implementation, and comments on how the plan will be implemented through existing planning mechanisms and funding to make implementation happen.

In addition to ranking the hazard mitigation actions using STAPLE+E, the planning team also reports on the status of the mitigation action. Completed and deleted mitigation actions are denoted in Appendix F.

Status

Ongoing mitigation actions from the initial review were incorporated into annual reviews by the mitigation team. The status designations for the mitigation action chart are below. The status designations are broken into new and existing.

New Mitigation Strategy

- New – new action added to the AHMP

Existing Mitigation Strategy

- Ongoing – actions require continuing application
- In Progress – actions are currently being acted upon
- Complete – the action is complete
- Deferred – no progress has been made and the team has deferred working on it
- Carried Over – no progress has been made

Timeframe

The timeframe for implementing a mitigation strategy is divided into three categories:

- Short Term – 1 to 5 years

- Long Term – 5 + years
- Continuous

6.2.2 Strategy Implementation & Administration

Prioritization does not mean that all strategies with a priority ranking of five have to be accomplished before strategies with a four and so on can be implemented. The purpose of the prioritization is to show that the planning team talked about possible options and with unlimited resources, this is what they chose to accomplish first. Due to scarce resources, it may be necessary to start with a goal that has less upfront costs and is relatively easier to implement. The goals, objectives, and strategies being outlined in the Cottonwood County AHMP are recommendations from the planning team, so during implementation modifications can take place.

Cottonwood 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 strategies 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.

6.3 Mitigation Strategies Acronym List

Cities

CiB	City of Bingham Lake
CiJ	City of Jeffers
CiM	City of Mountain Lake
CiS	City of Storden
CiW	City of Westbrook
CiWi	City of Windom

Townships

Twp	All Townships

Local Organizations

CCA	Cottonwood County Administration
CCPW	Cottonwood County Public Works
CCEM	Cottonwood County Emergency Management
CCEO	Cottonwood County Environmental, Planning, Zoning Office
CCSO	Cottonwood County Sheriff's Office
HAZ	HAZMAT Team
DVHHS	Des Moines Valley Health and Human Services
SWCD	Soil and Water Conservation District

Other Entities and Organizations

EMS	Medical Response Personnel (EMS)
Fire	Fire Districts
Hosp	Hospitals & Clinics
LAW	Law Enforcement
Sch	Local School districts
PU	Public Utilities
RWS	Rural Water Systems
BWSR	Minnesota Board of Water and Soil Resources
MDAg	Minnesota Dept. of Agriculture
MDH	Minnesota Dept. of Health
MnDOT	Minnesota Dept. of Transportation
BAH	Minnesota Board of Animal Health
EXT	University of Minnesota Extension
MPCA	Minnesota Pollution Control Agency
DNR	Department of Natural Resources
DPS	Department of Public Safety
RC	American Red Cross
Rail	Local Railroads
Air	Local Airports (Windom)
FEMA	U.S. Federal Emergency Management Administration
USDA	U.S. Department of Agriculture

6.4 Mitigation Strategies

Figure #114. All Mitigation Actions for Cottonwood County

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
1	Tornado and Straight-line Winds – Structural	Improve the weather warning system in at least one community each year	Medium	In Progress	2019-2026	Cottonwood County, Bingham Lake, Comfrey, Jeffers, Mountain Lake, Storden, Westbrook, Windom	CCEM, CCEO, CCSO, Bingham Lake, Comfrey, Jeffers, Mountain Lake, Storden, Westbrook, Windom City Clerks	Sirens were updated in Windom and added to industrial park. Bingham Lake sirens updated and added 1. County uses Civic Ready text alerts.	$15,000-$25,000 depending on location and power source.
2	Tornado and Straight-line Winds – Awareness	Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, preferably with Specific Alert Message Encoding (SAME) capability.	Medium	Ongoing	2019-2024	Cottonwood County,	CCEM, Bingham Lake, Comfrey, Jeffers, Mountain Lake, Storden, Westbrook, Windom Fire Departments	Hy-Vee does promotional events there with Paul programming radios. Ongoing status.	Citizens can purchase them for $15-$100. CCEM will program for free
3	Tornado and Straight-line Winds – Awareness	Increase support for the local storm spotters' network.	Medium-High	In progress	2019-2024	Cottonwood County	CCEM, NOAA	Training in 2017. Just fire departments.	Free Through the NWS
4	Tornado and Straight-line Winds – Awareness	Review and update the EOP media plan to provide public information about all-hazard events.	Medium	Carried Over	2019-2024	Cottonwood County	CCEM, HSEM, FEMA	Facebook, Twitter are used by EMD. No media plan per se.	EM time is the only cost.

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
5	Tornado and Straight-line Winds – Protection	Work with critical facilities such as hospitals and rural water suppliers to assure access to back-up power generation.	High	In Progress	2019-2024	Cottonwood County, Westbrook	Utilities, CCEM, DVHHS, Hosp, RWS, MDH, Storden Fire Department, Westbrook Hospital administration	Westbrook lift, hospital, nursing home all have generators. Windom has generators at all lift stations, hospital, water, etc. All MnDOT towers have them. Highway Dept. needs one. Storden's fire hall and community center need generators.	Full Building Generators can cost up to $30,000.
6	Tornado and Straight-line Winds – Prevention	Encourage residents to use licensed contractors.	Medium-High	Ongoing	2019-2029	Bingham Lake, Comfrey, Mountain Lake, Storden, Westbrook, Windom	Bingham Lake, Comfrey, Mountain Lake, Storden, Westbrook, Windom Zoning Administrators		EM time to educate residents
7	Tornado and Straight-line Winds – Emerg Svcs	Plan for designated long-term shelter location(s) in case of disaster event.	Medium	Revised	2019-2024	Cottonwood County, Mountain Lake	CCEM, Mountain Lake City Administration	Bingham Lake community center. Westbrook Community center/school. Windom LEC & BARC.	Time for EM to partner with locations for shelter.
8	Tornado and Straight-line Winds – Awareness	Educate public about benefit of safe rooms and funding sources available.	Medium	Carried Over	2019-2029	Cottonwood County, Bingham Lake, Comfrey, Jeffers, Mountain Lake, Storden, Westbrook, Windom	CCEM, CCEO, CIBL, Bingham Lake, Comfrey, Jeffers, Mountain Lake, Storden, Westbrook, Windom Fire Departments		EM time to research and educate the public.
9	Tornado and Straight-line Winds – Structural	Encourage construction of safe rooms in public facilities and parks.	Medium-High	Carried Over	2019-2029	Cottonwood County, Comfrey, Mountain Lake, Westbrook, Windom	CCEM, CCEO, Sch, CCPW, Comfrey, Mountain Lake, Westbrook, Windom City Clerks	Talcot needs this because of camping. Windom Rec needs. Island Park in Windom needs. There are none in Mountain Lake.	Up to $100,000 according to research done.

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
10	Hazardous Materials – Prevention	Work with state and federal agencies to address hazardous materials and delivery systems that have the potential to impact the county and region.	Medium-High	Carried Over	2019-2029	Cottonwood County	CCEM, CCSO, CCEO, EMS, Fire, DPS, MPCA		Staff time to identify these.
11	Hazardous Materials – Prevention	Review and update the County Emergency Operations Plan (EOP) for hazardous material incident information.	Medium	In Progress	2019-2024	Cottonwood County	CCEM, HSEM		EM time to review the plan.
12	Hazardous Materials – Prevention	Work with MDH to complete and implement Wellhead Protection Plans.	Medium	Revised & In Progress	2019-2024	Cottonwood County	CCEO, SWCD, RWS, MDH	Windom complete. RRRW in process. Mountain Lake done.	RRWS Reports costs of $10,000 annually and $25,000 in a year an amendment is done. Likely the most expensive plan in county.
13	Hazardous Materials – Protection	Educate the public on ordinances that deal with responsibility for cleanup of contaminated property.	Medium	Carried Over	2019-2024	Cottonwood County	CCEM, CCEO, CCPW	Never enough – CCEM hasn't done this in some time.	Staff time to research and put together the materials.
14	Hazardous Materials – Protection	Develop Geographic Information Systems (GIS) capability to map locations of fixed facilities using hazardous materials and associated transportation corridors.	Medium	In Progress	2019-2029	Cottonwood County	CCEM, CCEO	Some was mapped with the wellhead protection plan.	Staff time to make the GIS maps.

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
15	Ag Disease – Awareness	Provide information on ag disease and prevention to producers & residents.	Medium	Carried Over	2019-2029	Cottonwood County	CCEO, SWCD, Ext, FSA		Staff time to research, compile, and distribute the information
16	Ag Disease – Emerg Svcs	Review the EOP for response and care of animals, including disposal, in an outbreak of disease or a major hazard event.	Medium	In Progress	2019-2024	Cottonwood County	CCEM, CCEO, MDA, MPCA, Ext, FSA	This section is being updated. Possible exercise upcoming.	Staff time for review and implementation.
17	Ag Disease – Prevention	Monitor invasive insect species, including emerald ash borer.	Medium	Ongoing	2019-2029	Cottonwood County, Mountain Lake, Windom	CCEO, Mountain Lake and Windom Tree Commissions, MDA, UMN Extension Educator	Always giving reports. UMN Extension is doing a training and parks might send one. Windom and Mountain Lake have tree commissions that plant trees and work to remove infested trees.	Staff time
18	Severe Winter Storms—Blizzards & Extreme Cold – Emerg Svcs	Work with communities to review and/or complete Continuity of Operations Planning, and encourage private businesses and families to prepare for all-hazard events.	Medium	Carried Over	2019-2024	Cottonwood County	CCEM		Staff time to meet with parties and develop the plans
19	Severe Winter Storms—Blizzards & Extreme Cold – Prevention	Work with MnDOT / local road authorities to identify and improve hazardous intersections and bridges.	Medium-High	Ongoing	2019-2024	Cottonwood County, Bingham Lake, Comfrey, Jeffers, Mountain Lake, Storden, Westbrook, Windom	CCHWY, Bingham Lake, Comfrey, Jeffers, Mountain Lake, Storden, Westbrook, Windom Public Works, Twp, RR	Highway 60 work is happening.	Staff time, plus potentially millions of dollars for road constr. To fix the issues

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
20	Severe Winter Storms—Blizzards & Extreme Cold – Prevention	Use road design and living snow fences to help control snow on roadways.	Medium-High	Carried Over	2019-2029	Cottonwood County	CCHWY, CCEO, SWCD, Twp, MnDOT		Time to plant and tend to living snow fences, compensation to farmers for taking land out of production. Cost of shrubs $5-$10 each.
21	Severe Winter Storms—Blizzards & Extreme Cold – Prevention	Encourage property owners to maintain landscaping distances to overhead power lines.	Medium	Revised & Ongoing	2019-2029	Cottonwood County, Mountain Lake, Westbrook, Windom	CCEO, Mountain Lake, Westbrook, Windom Public Works/Utilities	Windom walks the system once per year. Mountain Lake has a utility tree program – trees near power lines are removed & paid for by the Electric Department – replacement trees are small and will not ever reach the power line.	Staff time to walk and check the grid, trim where necessary, and costs of removal and replacement trees

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
22	Severe Winter Storms—Blizzards & Extreme Cold – Protection	Require utility providers to have power lines buried and/or hardened against hazards, where feasible.	Medium	Ongoing	2019-2034	Cottonwood County, Mountain Lake, Westbrook, Windom	CCEM, CCEO, Mountain Lake, Westbrook, Windom Public Utilities	Within wind farms the lines are underground then the transmission lines are above. REA doesn't want to bury anymore because of complications once they are there. The City of Windom is burying theirs and its 70% underground. Mt. Lake Electric continually works to move lines underground.	Underground boring companies charge $12-$18 per foot to bury lines per research. Windom purchased their own machine for $225,000 in 2016, but do need staff trained on operation.
23	Public Health and Infectious Disease – Emergency Services	Encourage the local Public Health agency to continue work with Minnesota Dept. of Health for the mass distribution of medicines and supplies for public health emergencies.	Medium	Ongoing	2019-2024	Cottonwood County	DVHHS Public Health staff, MDH, EMS, Fire, Hosp, CCEM	DVHHS is continuing to work with MDH on updating and revising mass dispensing plans, including supplies and distribution locations.	Staff time, some of which is grant funded.
24	Public Health and Infectious Disease – Awareness	Provide information to public and private employers, schools and hospitals about potential infectious disease threats and prevention measures.	High	Ongoing	2019-2029	Cottonwood County	DVHHS Public Health staff, MDH, Sch, Hospital Infection Control Nurse, CCEM	DVHHS distributes health alert network messages to local contacts in the event of an alert/advisory – this includes symptoms and preventative measures.	Staff time to maintain situational awareness
25	Drought / Extreme Heat – Prevention	Educate the public on the importance of wellhead protection and water conservation.	Medium	Ongoing	2019-2024	Cottonwood County, Windom	CCEO, SWCD, RWS, BWSR, Windom Water Department, DVHHS water quality staff	Windom, ongoing: Water bans, low flow aerators distributed. DVHHS assist with messaging & follow-up w/ affected families.	Staff time to educate the public.

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
26	Severe Summer Storms—Lightning & Hail / Earthquake – Awareness	Participate in "Severe Weather Awareness Week" each spring.	Medium-High	Ongoing	2019-2029	Cottonwood County, Bingham Lake, Comfrey, Mountain Lake, Storden, Westbrook, Windom	CCEM, Bingham Lake, Comfrey, Mountain Lake, Storden, Westbrook, Windom City Clerks/Administrators	EMD posts on social media for this. Participate in statewide tornado drill (all sirens sounded in the county).	Budget around $2,000 per year for Radio/ Newspaper Advertisements
27	Severe Summer Storms—Lightning & Hail / Earthquake – Prevention	Continue to enforce building code for new construction.	High	Ongoing	2019-2024	Mountain Lake, Windom	Mountain Lake and Windom building officials	State needs to update elevator size for ambulance structures. Ongoing. Mountain Lake has adopted building code.	Employing a building official could cost over $100,000 per year.
28	Severe Summer Storms—Lightning & Hail / Earthquake – Protection	Construct safe rooms at outdoor recreational facilities.	High	New	2019-2029	Cottonwood County	CCEM, CCPW		The last estimate received was for over $100,000 in construction costs.
29	Severe Summer Storms—Lightning & Hail / Earthquake – Protection	Place sirens in key unincorporated areas including Delft and Talcot Lake campground.	Medium-High	New	2019-2029	Cottonwood County	CCEM, Twp		Sirens are $15,000-$25,000 depending on location and if power needs to be dug into an area.
30	Fires—Structures and Wildfires – Awareness	Continue fire education, adding the nationally coordinated "Firewise" program.	Medium	Carried Over	2019-2024	Cottonwood County	Fire, Sch		Staff time to educate the public.

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
31	Fires—Structures and Wildfires – Awareness	Work with owners of conservation properties on the proper use of controlled burns and firebreaks.	Medium	Carried Over	2019-2024	Cottonwood County	Fire, CCSO, SWCD, Twp, DNR		Staff time to research and develop materials for the public.
32	Civil Disturbance – Prevention	Local governments complete and maintain thorough community risk and threat assessments.	Medium	Ongoing	2019-2024	Cottonwood County	CCEM, CCSO, LE	Rolled out ALICE training for public and private entities. Updated Mountain Lake's plan in late 2017.	Staff time to instruct and attend training.
33	Flooding and Dam Failure – Prevention	Work with FEMA to modernize floodplain maps.	Medium	In Progress	2019-2024	Cottonwood County, Comfrey, Windom	CCEO, Comfrey, Windom City Administration, DNR		Locally, staff time to review the maps, possibly hire an engineer to contest the proposed maps.
34	Flooding and Dam Failure – Prevention	Review and update floodplain protection in zoning ordinance.	Medium	In Progress	2019-2024	Cottonwood County, Bingham Lake, Comfrey, Windom	CCEO, Bingham Lake, Comfrey, Windom Zoning Administrators, DNR	Updated in 2015 comp plan. Mountain Lake in NFIP with flood plain ordinance. Storden in process. Bingham Lake is reviewing – no decision.	Staff time to update and review the ordinance, costs to enforce the ordinance could be $100,000 per year, depending on enforcement by building officials.

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
35	Flooding and Dam Failure – Prevention	Work closely with DNR on all development applications in identified flood hazard areas; have check box on building/zoning permit forms indicating flood hazard areas; discourage zoning variances in flood hazard areas.	Medium	Ongoing	2019-2024	Cottonwood County, Windom	CCEO, Windom Zoning Administrator	Does not necessarily discourage, but ordinance has extra steps that may discourage. Building in the flood plain goes to DNR for approval.	Staff time to work with DNR and ensure homes are not built in flood hazard areas.
36	Flooding and Dam Failure – Awareness	Educate and encourage property owners and insurance agents on purchasing flood insurance.	Medium	Ongoing	2019-2029	Cottonwood County, Comfrey, Windom	DNR, CCEO, Comfrey and Windom City Administration	Mountain Lake adopted flood plain ordinance in 2017.	Staff time to research and develop materials for the public.
37	Flooding and Dam Failure – Protection	Study programs to voluntarily acquire, relocate or elevate at-risk structures in floodplains.	Medium	Carried Over	2019-2024	Cottonwood County, Windom	CCEM, CCEO, Windom City Administration	Windom does not start filling sandbags until the forecast crest through Windom is 23 feet or higher. Very few homes are in danger of flooding, but there are a couple.	Buyouts of current flood threatened homes could cost $5,000-$100,000, depending on the home. Demolition and removal is estimated around $10,000

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
38	Flooding and Dam Failure – Prevention	Acquire/demolish property within the floodplain.	Medium	New	2019-2034	Cottonwood County	CCEM, Windom City Administration, CCEO	Owners of the homes would have to agree to the buyout. One owner has said they will not move from their location.	Buyouts of current flood threatened homes could cost $5,000-$100,000, depending on the home. Demolition and removal is estimated around $10,000
39	Flooding and Dam Failure – Protection	Place flood gauges at locations advantageous for forecasting flooding downstream to help with crest prediction and preparedness.	Medium	New	2019-2024	Cottonwood County	CCEM, CCEO	Avoca and Talcot are specific places to install these, which will help in Windom specifically.	Time to work with USACE and DNR to place new gauges. Cost of a new gauge is unknown.
40	Flooding and Dam Failure – Protection	Upgrade the gauge in Windom from USACE stage-only gauge to a full service stage-flow USGS gauge	High	New	2019-2024	Cottonwood County	CCEM, Windom Public Works, DNR, USGS, USACE	EM has been contacted about upgrading the gauge so it will forecast river levels.	Staff time for meetings, unknown what the upgrade would cost currently.
41	Flooding and Dam Failure – Prevention	Work with the DNR to address issues at Talcot Dam in anticipation of more frequent future flood events.	Medium	New	2019-2029	Cottonwood County	CCEM, CCEO, DNR	Specific need on the south side of the dam and control structure.	Dam renovations could be very expensive, thousands of dollars, unknown estimate at this time.

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
42	Flooding and Dam Failure – Prevention	Raise road levels in areas prone to washing out during flood events.	Medium	New	2019-2034	Cottonwood County	CCEM, CCEO, Twp	Specific need at 360th Street near Delft (between sections 20 & 29) to slow water like a levee.	Thousands of dollars to raise a road.
43	Flooding and Dam Failure -- Prevention	Mitigate downstream flooding in the City of Windom by quarrying 10 to 30 acres to create a water retention /detention pond. This includes: 1. Identify upstream water retention and detention pond areas. 2. Work with the US Army Corps of Engineers as a project partner. 3. Gain approval from FAA	High	New	2019-2034	Cottonwood County, Windom	CCEM, CCEO, DNR, Windom City Engineer, Twp		Staff time for permits and meetings. The city owns the land and would make money on the aggregate mined, but would not cover the thousands of dollars the project would cost.
44	Flooding and Dam Failure – Prevention	Additional tile for the City of Bingham Lake to mitigate street flooding that occurs with heavy rain. Currently, there is a 6" line, which is inadequate. It would empty into a county ditch, which would need to be improved. There is also research needed into water retention ponds if the ditch cannot handle the water	Medium	New	2019-2029	Cottonwood County, Bingham Lake	SWCD, CCEO, CCA, CCEM, Bingham Lake City Engineer		Rough estimate of $250,000 as of 2018 for the tile line. If retention is needed, land acquisition at $6,000-$9,000 an acre plus construction.

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
45	Erosion – Prevention	Work with DNR to address at-risk properties for erosion specifically.	Medium	New	2019-2029	Cottonwood County	CCEM, CCEO, SWCD		Time to identify the properties, plus thousands in construction for riprap or other erosion control measures.
46	Erosion – Structural	Work with the local Watershed District to extend/finish the Germantown Township berm that has already been started.	Medium	New	2019-2029	Cottonwood County	CCEM, CCEO, Watershed	The second phase of this project was never finished because of a lack of funding.	Thousands of dollars for construction of the berm.
47	Erosion – Prevention	Place riprap or use other techniques to stabilize banks along rivers in Cottonwood County.	High	New	2019-2029	Cottonwood County	CCEM, CCEO, SWCD, DNR	Specific need at Pat's Grove in Springfield Township along the Des Moines River.	Thousands of dollars for engineering studies and placement of riprap or other materials.
48	Utility Failure – Protection	Place generators at water systems, including lift stations and well systems.	Medium-High	New	2019-2024	Cottonwood County	CCEM, CCEO, SWCD	Well 10 is a specific concern.	Generators can cost up to $30,000 depending on electricity needs.

6.4.1 Mitigation Actions by Community

Action items for Participating Jurisdictions

Cottonwood County is a rural county with few full-time paid staff in the area of emergency management. Jurisdictions in Cottonwood County rely on Cottonwood County Emergency Management for services regarding emergency management and hazard mitigation. Cottonwood County Emergency Management maintains regular communication with all local units of government in the county to facilitate intergovernmental cooperation.

Combining strategies between jurisdictions is due to the rural nature of the county, and that a number of jurisdictions are similar in regards to the natural or manmade hazard the strategy is trying to mitigate. A number of strategies in the Cottonwood County AHMP have "All Cities" listed as who will be working to implement the strategy. Some strategies specifically outline a specific city or multiple specific cities to work together on implementing the strategy. The listed entities under each strategy have had the opportunity to provide input and recommendations in regards to the strategy and will work together to implement the strategy.

Implementation by Local Jurisdictions

Each local jurisdiction will implement and integrate the strategies identified in the hazard mitigation plan as they update their own comprehensive plans, zoning ordinances, and other plans that the community may from time to time need to update. When "All Cities" are identified within the strategies, it means that all jurisdictions mentioned in a strategy will take the strategy into consideration when updating planning processes and undergoing construction or development projects. In many of the smaller jurisdictions these strategies will be implemented as changes are made, but changes in the smaller jurisdictions do not occur as frequently as in the larger jurisdictions.

Mitigation actions by jurisdiction for the above cities are separated out in Appendix G.

Section 7 – Plan Maintenance

7.1 Monitoring, Evaluation, and Updating the Plan

The Cottonwood County All Hazard Mitigation Plan (AHMP) should be considered a living document. The plan should be reviewed at a minimum of every 5 years. The guidance in this section will function as the primary tool when reviewing progress on the implementation of the Cottonwood County AHMP.

Plan Monitoring

It is the intent of the plan to serve as a guide for mitigating current and future hazards. Cottonwood County Emergency Management Department maintains regular contact with all jurisdictions in Cottonwood County. This will allow the Cottonwood County Emergency Management Director and Department to monitor and implement strategies outlined in the AHMP. The Cottonwood County Emergency Management Director will evaluate the goals that have been implemented by Cottonwood County and jurisdictions within the county. The Cottonwood County Emergency Management Director will also evaluate the Cottonwood County AHMP on the number of strategies that have been implemented and the number of goals that were reached.

Public participation is critical in implementing strategies outlined in the plan. Local residents and representatives have a thorough understanding of local issues. Local residents and representatives can assist in gathering support and technical information to help ensure the project is successful. Maintaining regular contact with the jurisdictions in Cottonwood County will help to ensure that the Cottonwood County Emergency Management Director and Department are able to effectively implement the strategies outlined in the plan.

Evaluating the Plan

It is recommended that the County Emergency Management Director review and formally evaluate the plan within eighteen months of adoption, as well as after every disaster event, to adequately prepare for the plan update. When implementing strategies from the existing plan it is important to consider improvements that can be made to the planning process, implementation, and evaluation of the plan. AHMP are evolving documents that need to stay up to date. Information gathering and evaluation should be taking place throughout the five year cycle of updating the plan. This will help to insure existing risk assessments are accurate and that mitigation efforts are effective.

Updating the Plan

FEMA requires that plans be reviewed, updated and re-approved every five years or sooner. The planning process timeline for reviewing, updating, and approving an AHMP at Minnesota Homeland Security and Emergency Management (HSEM) and Federal Emergency Management Agency (FEMA) is around 15 months. Within three years of adoption, the Emergency Management Director will formulate a work plan and seek input from Cottonwood County AHMP Planning Team members, local units of government, and local residents to start the process to update the Cottonwood County AHMP. The Emergency

Management Director will also extend an invitation to non-participating jurisdictions to join the planning process for the update.

7.2 Implementation

Cottonwood County and its included municipalities share a common All Hazard Mitigation Plan and work together closely to develop, revise, and implement it. This AHMP provides a comprehensive chart of mitigation actions for Cottonwood County and its jurisdictions (*see Section 6.4, Mitigation Strategies*). Jurisdictions participated in the AHMP planning process and identified the specific mitigation strategies that they would seek to implement in their communities during the 5-year planning cycle. These mitigation actions are also provided in Appendix G: *Mitigation Actions by Jurisdiction*.

A number of implementation tools are available to address hazards. Many of these tools are below, however, in some cases additional discussion is needed in order to identify what strategies are most appropriate to use. This will be part of an ongoing discussion as Cottonwood County looks for opportunities for plan implementation. The following tools should be considered:

Education: In many cases education of residents has been identified as one of the most effective mitigation strategies.

Capital Investments: Capital investments such as fire and ambulance equipment, sprinkler systems and dry hydrants are tools that can limit risks and impacts of natural and other hazards.

Data Collection and Needs Assessments: Data collection and needs assessments can aid in gaining a better understanding of threats and allow planning for mitigation strategies accordingly. As resources are limited for this part of the planning process, additional data collection is likely to be an ongoing activity as resources become available.

Coordination: Responsibilities for mitigation strategies run across various county departments, local fire and ambulance departments, city and township governments, and a host of state and federal agencies. Ongoing coordination is an important tool to ensure resources are used efficiently. Coordination can also avoid duplication of efforts or prevent gaps that are created because of unclear roles and responsibilities. The mitigation plan review process can function as a tool to have an ongoing discussion of roles, responsibilities, and opportunities for coordination.

Regional Cooperation: Counties and public safety services providers throughout the Northeastern Region of Minnesota often share similar challenges and concerns. In some cases a regional approach may be warranted as a mitigation strategy in order to save resources. Mutual aid agreements are a tool already in use for a number of services. Needs assessments for fire and ambulance services and development of assistance for volunteer recruiting, training, and retention could benefit from a regional approach. Cooperation among counties could also help in lobbying for certain funding priorities that address concerns relating to challenges in service delivery in rural areas. Organizations such as FEMA Region V and the MN Department of HSEM through the Regional Program Coordinator can offer tools and resources to assist in these cooperative efforts.

Regulation: Regulation is an important mitigation tool for Cottonwood County. Regulation plays a particularly important role for land use, access to structures and the protection of water resources and public health.

7.3 Continued Public Involvement

Continued public involvement is critical to the successful implementation of the All Hazard Mitigation Plan (AHMP). The County and its participating jurisdictions should continue to engage new public stakeholders in planning discussions and project implementation during the 5-year cycle of this plan.

Cottonwood County maintains a website that includes a page for Emergency Management. The SRDC also maintains a website that includes a page for hazard mitigation. Both of these websites will be the main point of access for the public regarding information about the Cottonwood County AHMP. A PDF copy of the approved plan will be available on these pages along with other information related to the update and hazard mitigation. The public will have access to the plan and be able to provide input regarding progress on the mitigation strategies.

http://www.co.cottonwood.mn.us/

http://www.swrdc.org/planning/hazard-mitigation/

Other Opportunities for Involvement

Hazard mitigation has been a regional effort in Southwest Minnesota with services overlapping between counties. All Hazard Mitigation Plan (AHMP) development starts with reviewing the counties existing mitigation plan and comparing the plan with the neighboring counties. There are many opportunities during the development of a plan for involvement provided from neighboring communities, agencies involved in hazard mitigation, businesses, academia, and other relevant private and non-profit interests. SRDC has helped to develop mitigation plans for the following counties in southwest Minnesota:

- Cottonwood County
- Jackson County
- Lincoln County
- Lyon County
- Murray County
- Nobles County
- Pipestone County
- Redwood County
- Rock County

During the 5-year period before the plan is updated, planning team members will be responsible to keep their city councils, city departments, schools, and community members updated and engaged in the implementation of their respective mitigation action charts (see *Appendix G: Mitigation Actions by Jurisdiction*). Each respective jurisdiction will report their progress in this area to the Cottonwood County Emergency Management Director. Jurisdictions will use numerous means of public outreach to engage new public stakeholders in providing input on mitigation efforts or concerns on hazards by sharing information at city council meetings, sharing information at special events, working with local schools and partner organizations, and posting information on relevant local or social media that their communities use to inform and engage the public. As local mitigation projects are implemented, jurisdictions will work to keep the public updated and engaged in those local efforts.

Conclusion

Hazards can occur with little or no warning. The relatively unpredictable nature of some hazards makes mitigating the effects of an event more difficult, but history and probability says that natural and manmade hazards are going to occur. Since hazardous events are going to take place, hazard mitigation is here to minimize the damages to property and loss of life.

When planning mitigation projects and investing in the future, it is critical to consider all the costs, not just the construction costs. There are costs associated with the potential loss of life, public and private property damages, interruption to the economy, decreased connectivity, health outcomes, and loss of community. Decision makers need to consider health and include health related outcomes in the benefits and costs of a project.

Health benefits of a project could be related to increasing livability, connectivity, and creating an environment where people want to live. When people are there, people invest and create demand. Hazard mitigation can be the link between livability, economic vitality, and public safety.

Figure #113
Disaster Management Cycle

APPENDICES

COTTONWOOD COUNTY ALL HAZARD MITIGATION PLAN, 2019

Appendix A – Cottonwood County Maps & Hazus Analysis
Appendix B –Cottonwood County Hazard Events
Appendix C –Resolutions after FEMA Review
Appendix D – Planning Team Meetings
Appendix E – Public Meeting Notices and Comments
Appendix F – Completed and Deleted Actions from the 2011 Plan
Appendix G – Mitigation Actions by Jurisdiction
Appendix H – Works Cited

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Appendix A - Cottonwood County Maps & Hazus Analysis

Figure #A-1 **Public Facilities Map – Bingham Lake**

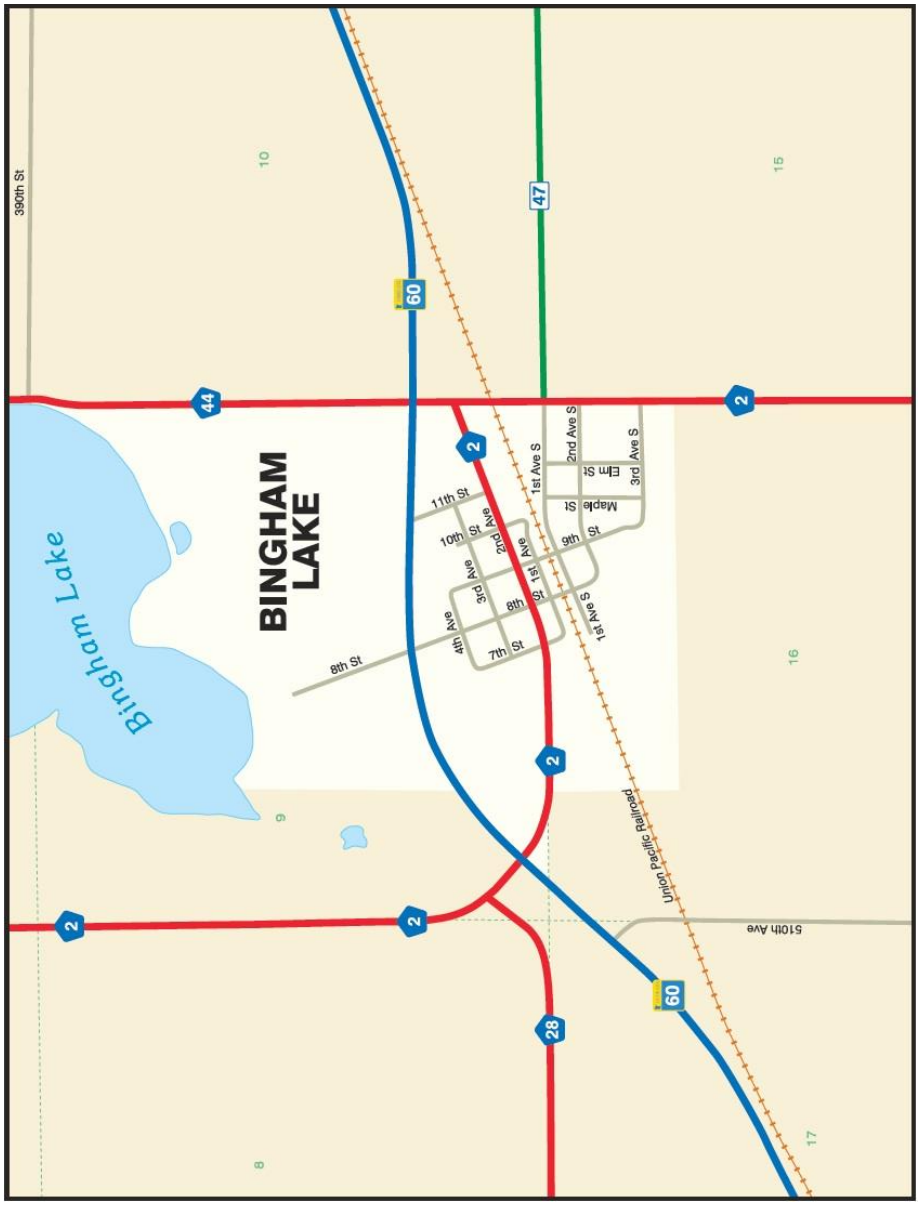


Figure #A-2 **Public Facilities Map –Jeffers**

Figure #A-3 **Public Facilities Map – Mountain Lake**

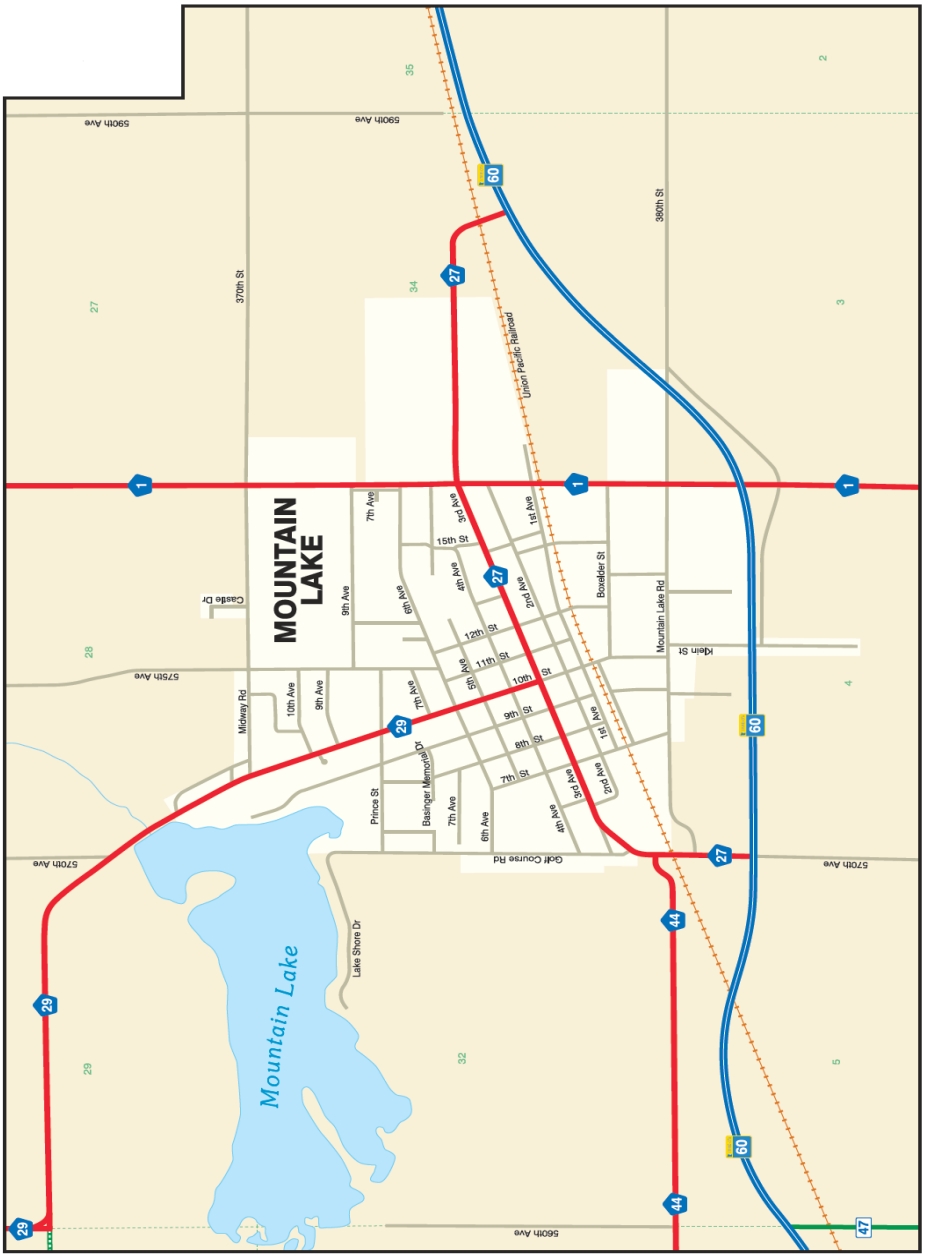


Figure #A-4 **Public Facilities Map –Storden**

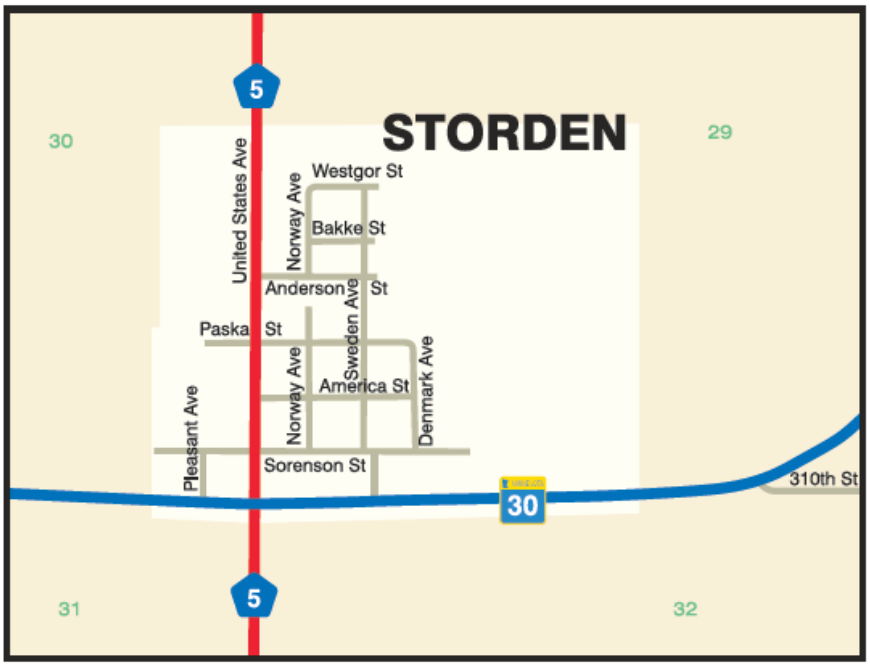


Figure #A-5 **Public Facilities Map – Westbrook**

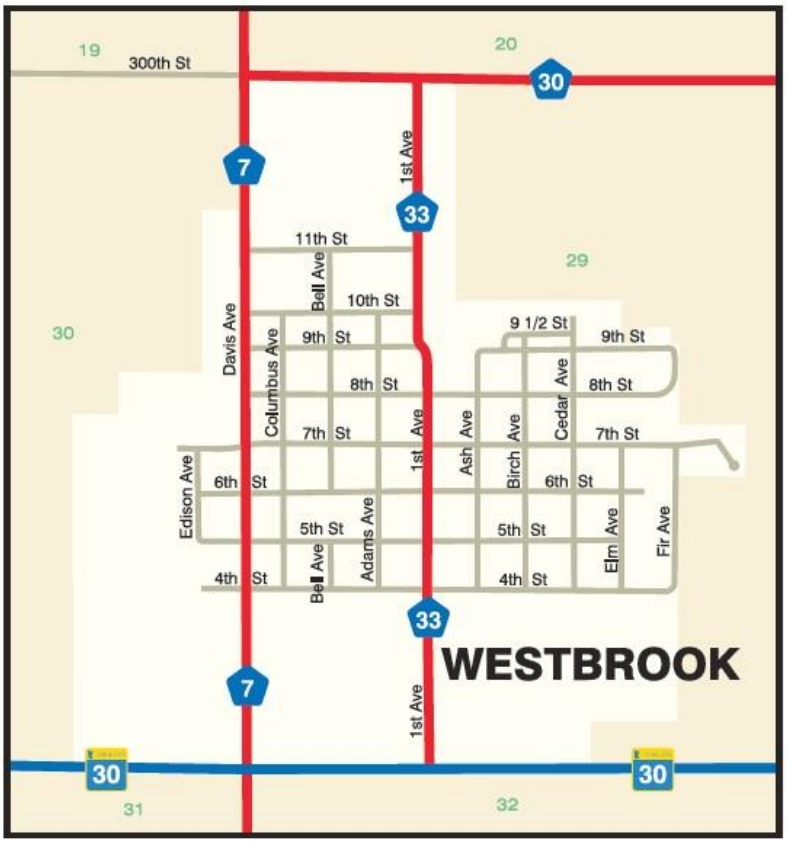


Figure #A-6 **Public Facilities Map – Windom**

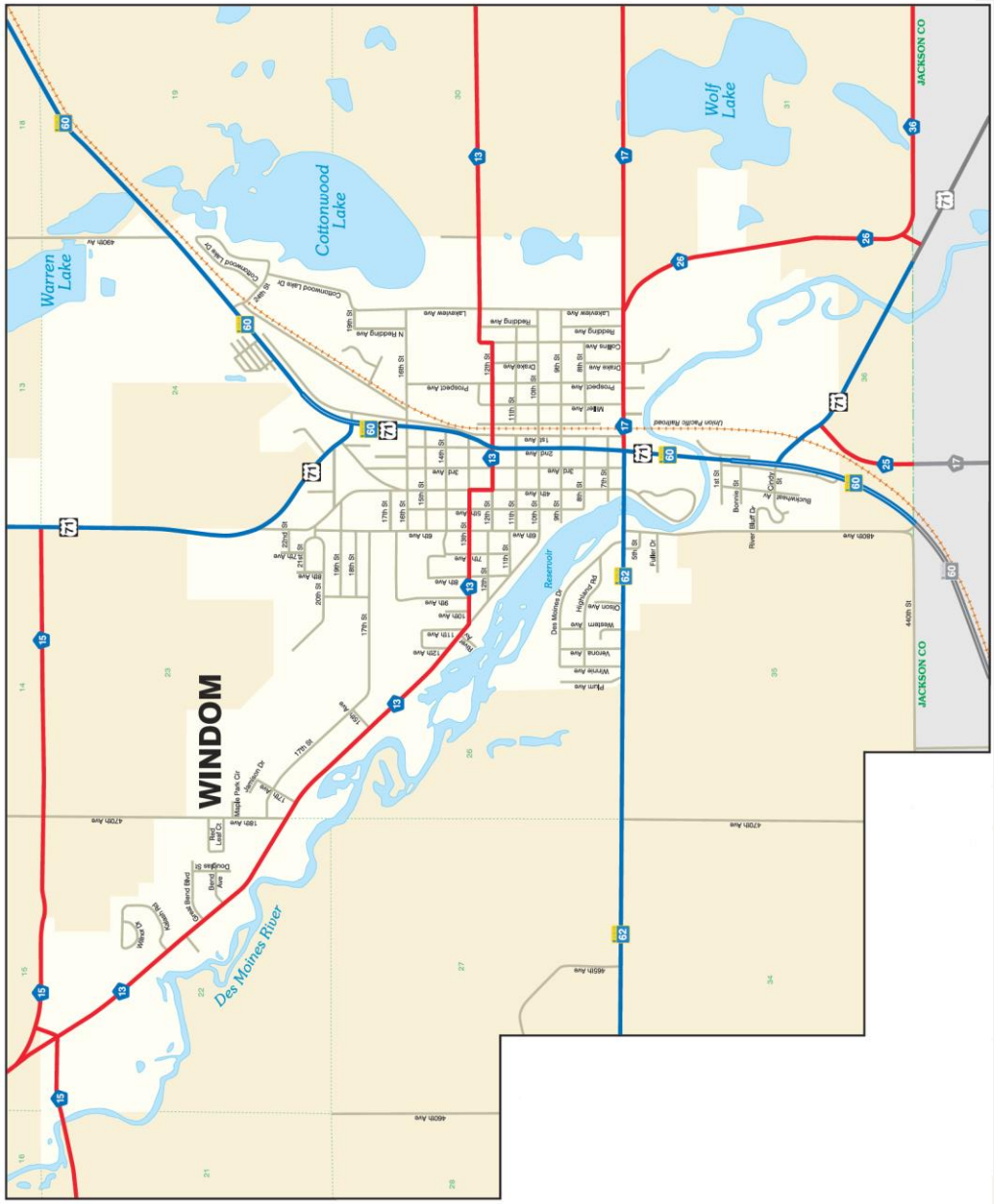


Figure #4
Minor Civil Divisions – Cottonwood County

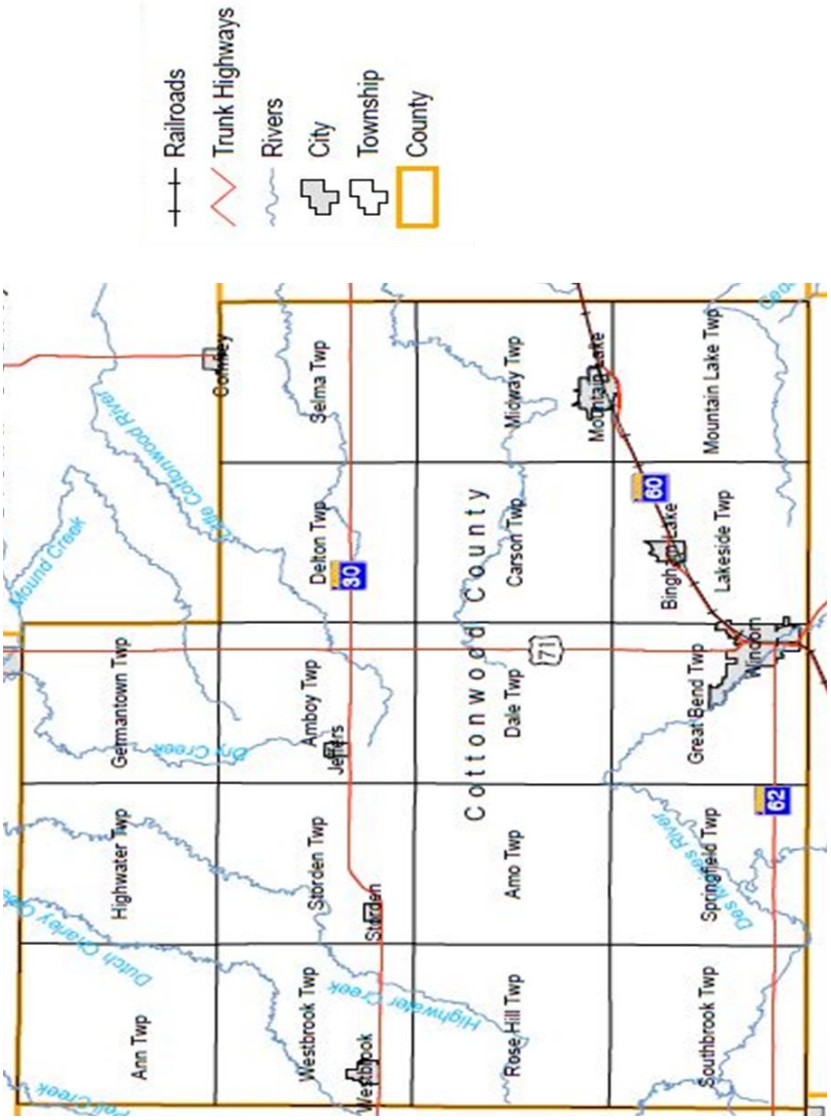


Figure #5

Shoreland, Lakes & Streams – Cottonwood County

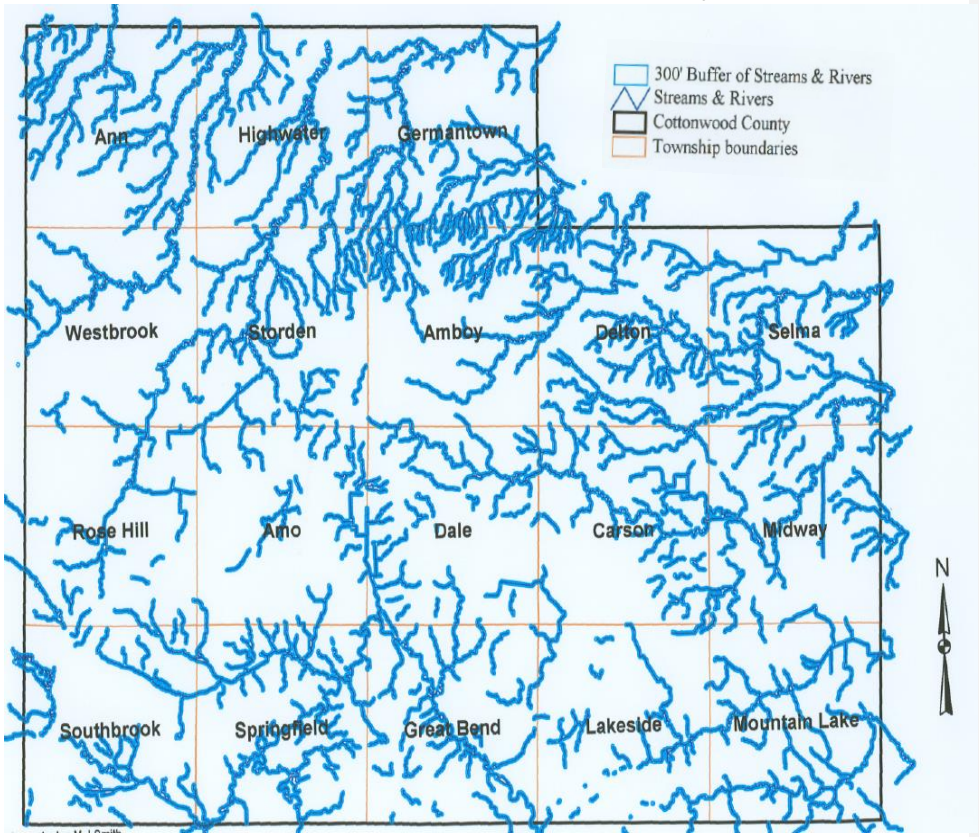


Figure #6
Watersheds Map – Cottonwood County

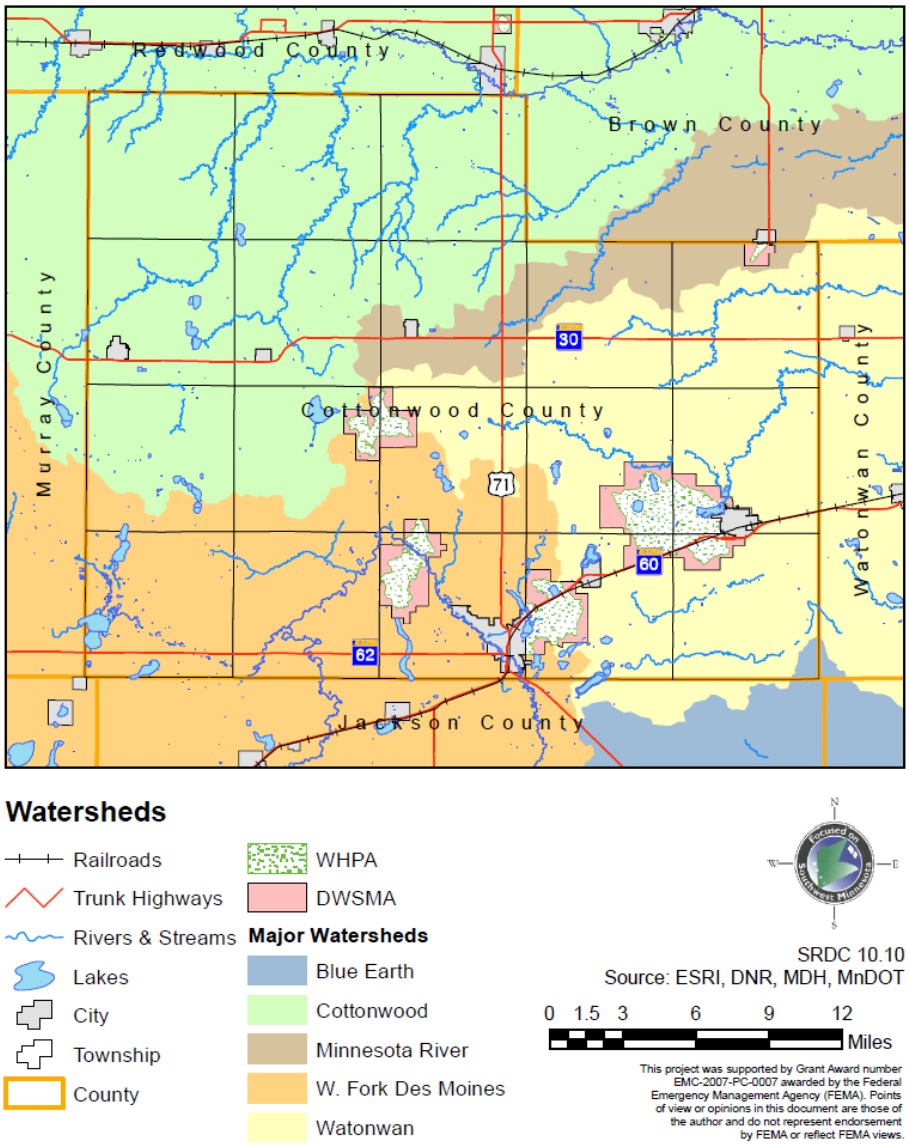


Figure #36
Ambulance Districts – Cottonwood County

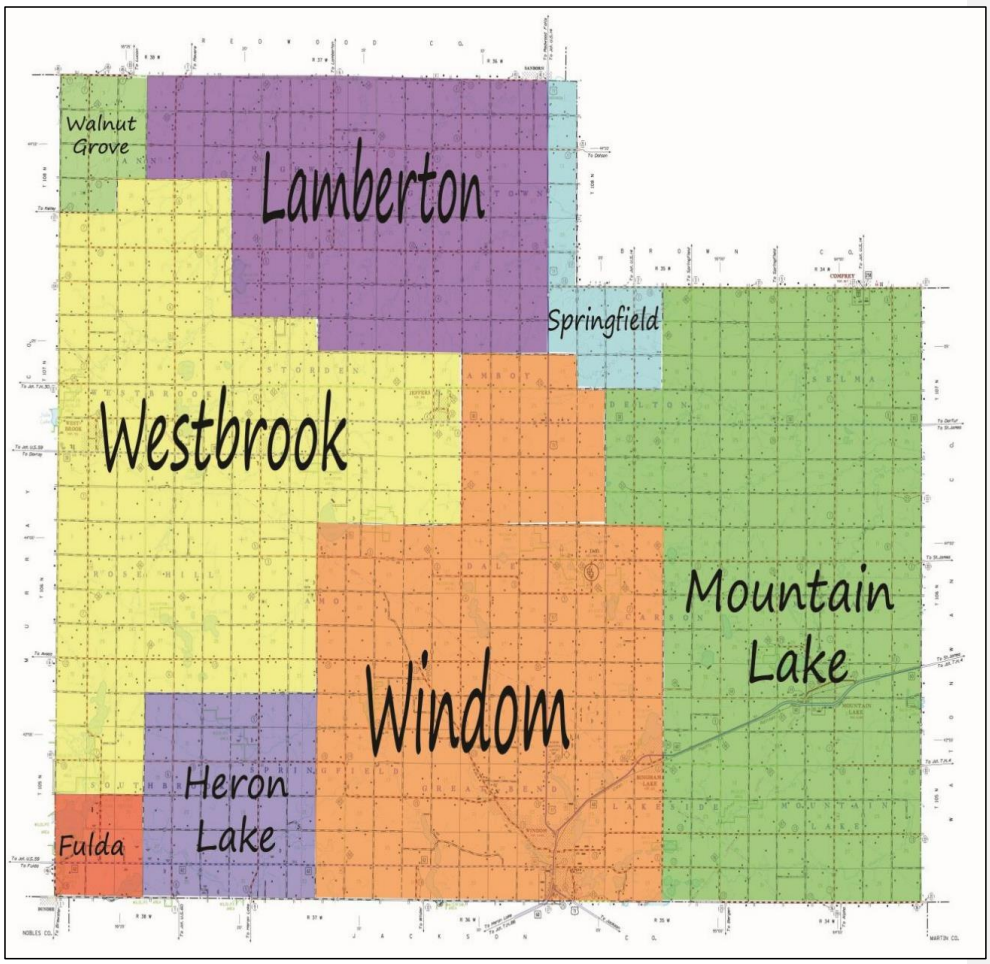


Figure #37
Fire District Map – Cottonwood County

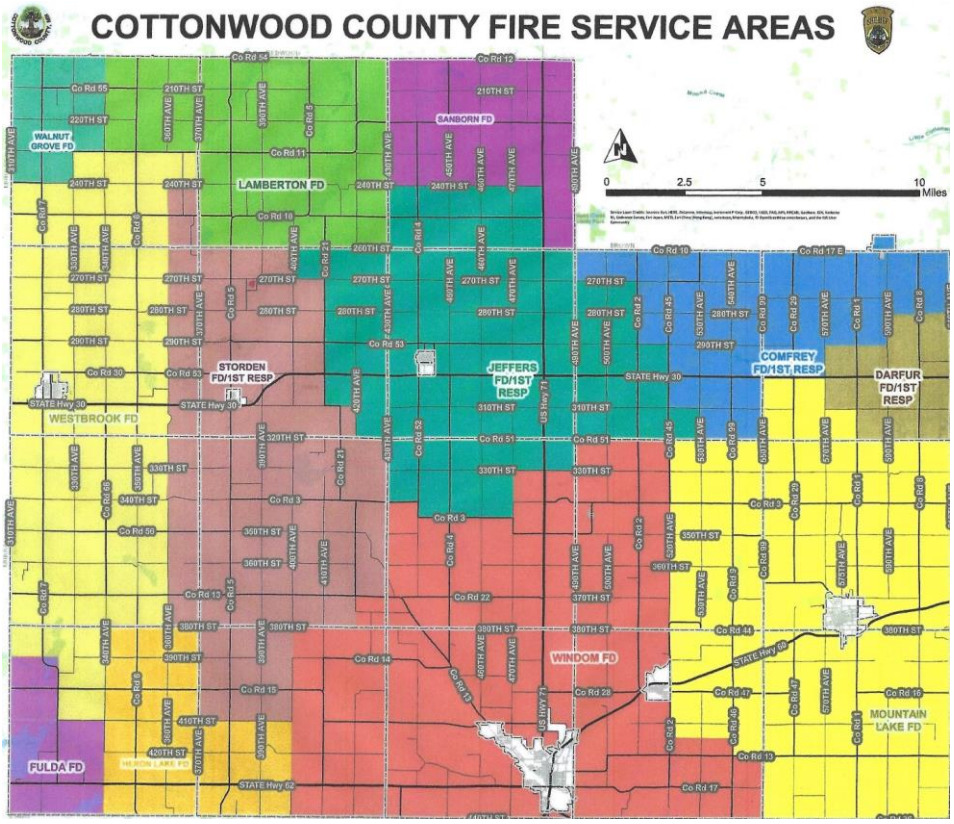


Figure #55
Snow Removal Problem Areas – Cottonwood County

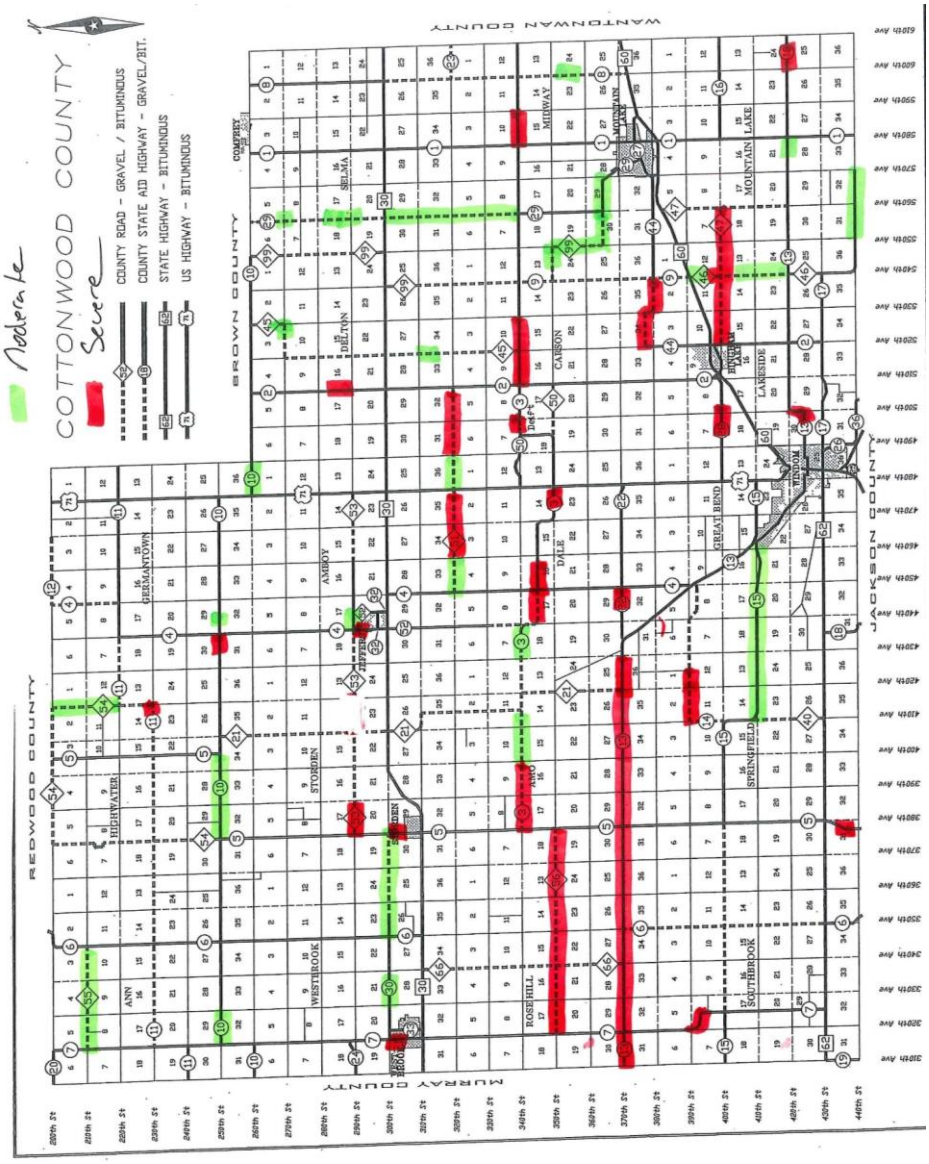


Figure #65
City of Windom, Potential Flood Retention Site

Figure #66
Floodplain map for the City of Windom

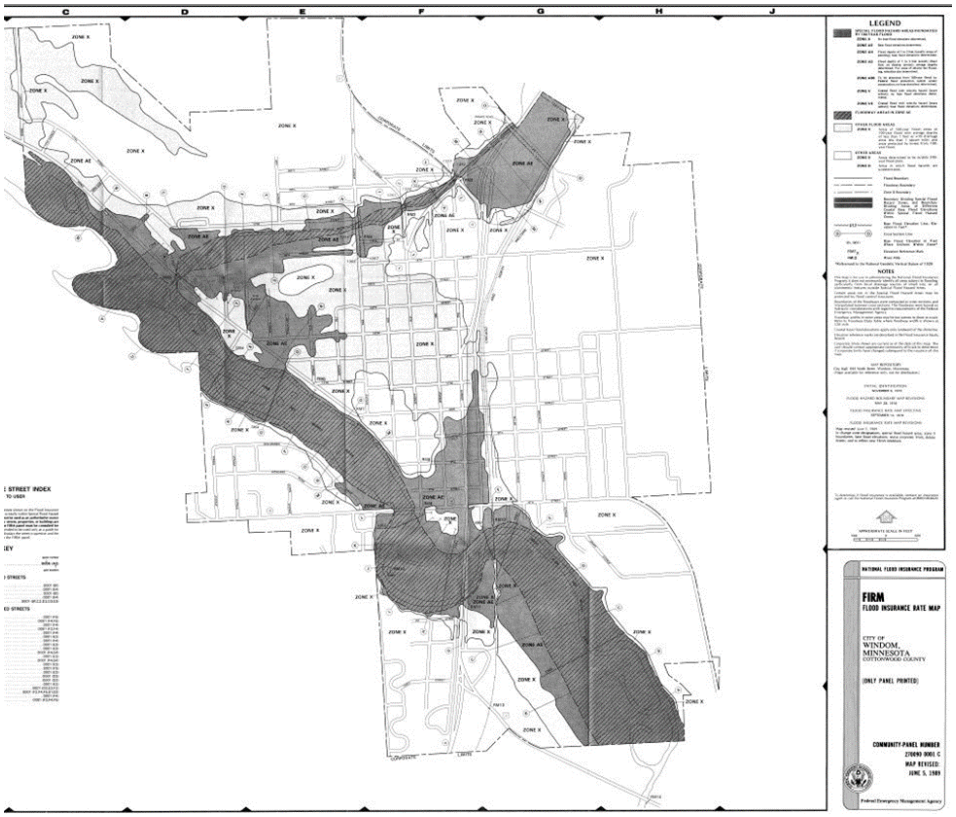
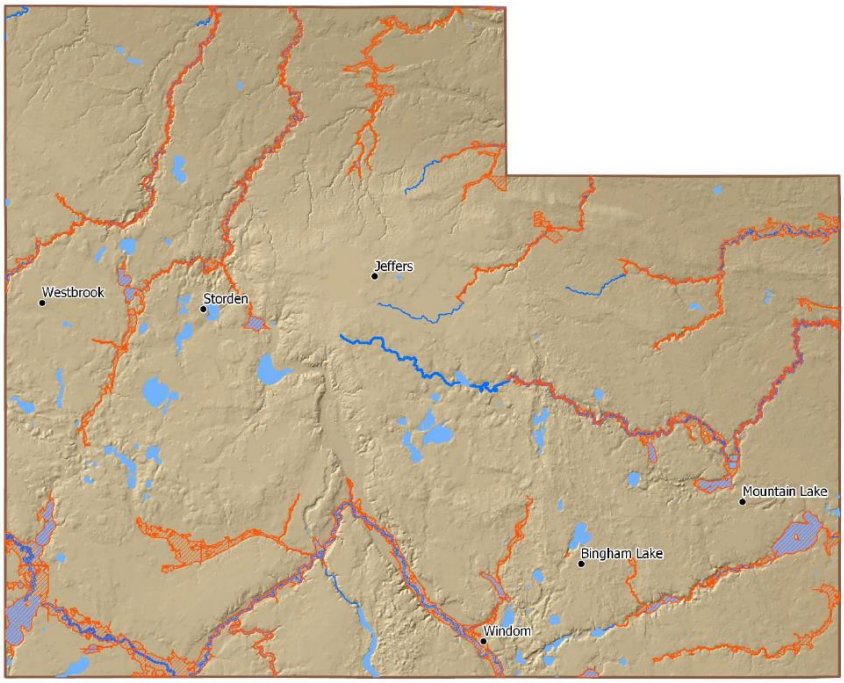


Figure #67
100-Year Flood Plain Map – Cottonwood County



100 Year Floodplain

Data Sources: FEMA DFIRM Flood Data, and Hazus-MH

Figure #68
Dams – Cottonwood County

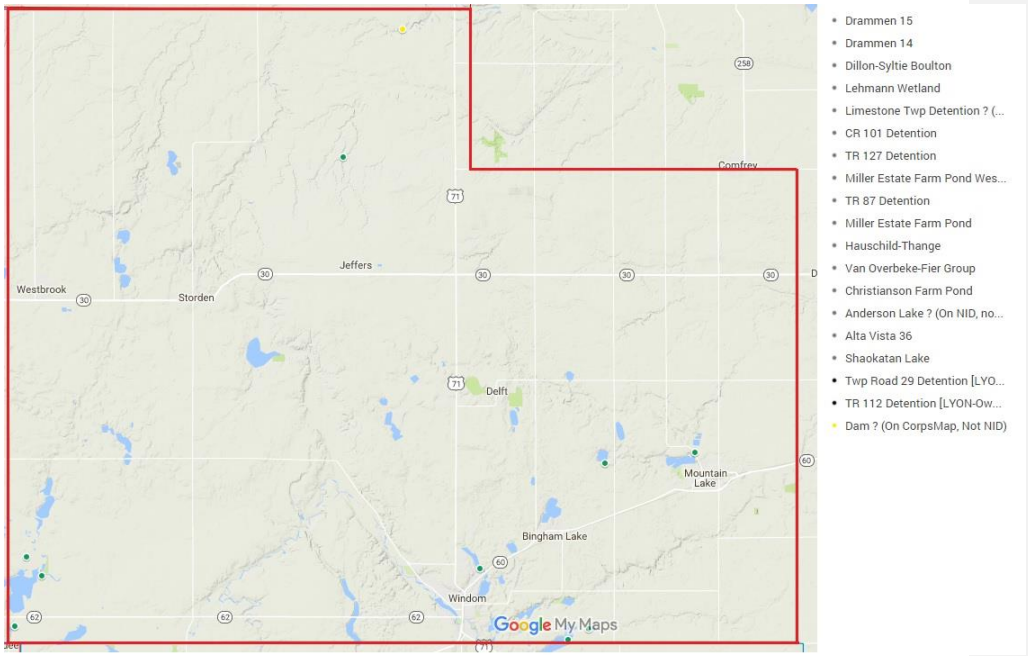


Figure #69
Landslide Risk – Cottonwood County

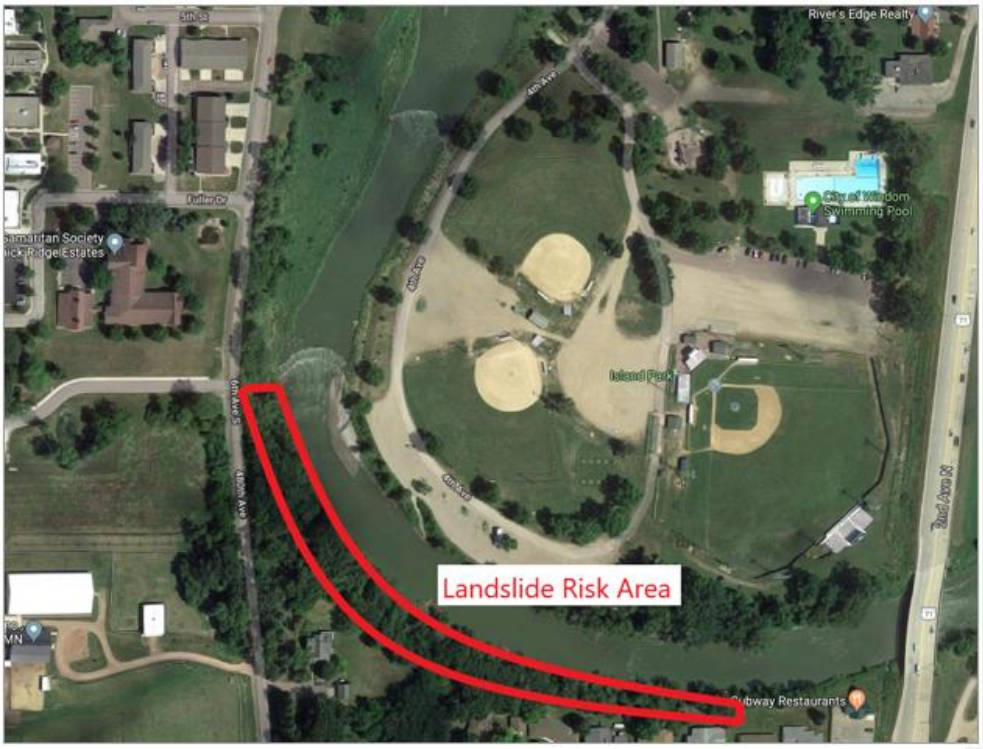


Figure #70
Soils Erosion Susceptibility Map – Cottonwood County

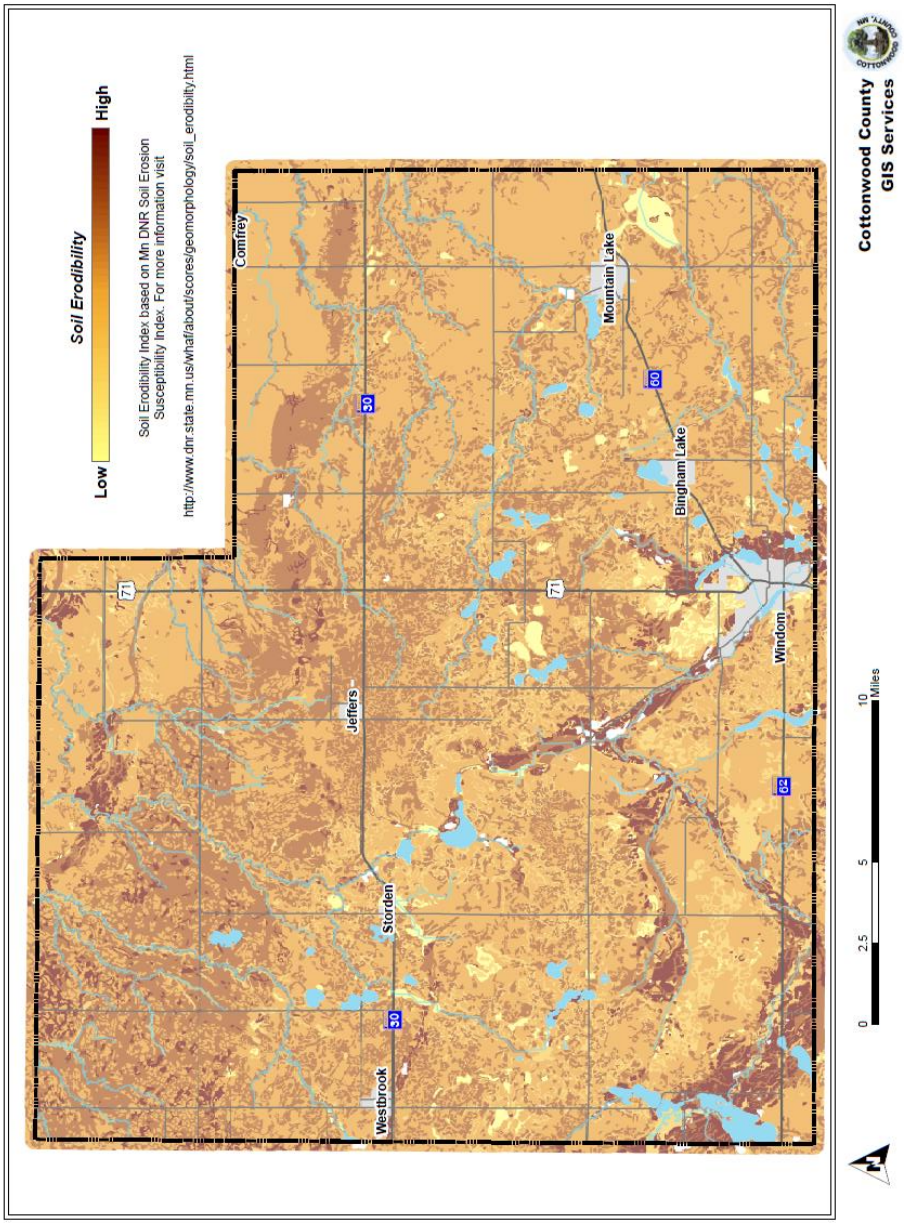


Figure #89
Cottonwood County MPCA Ground Water Map

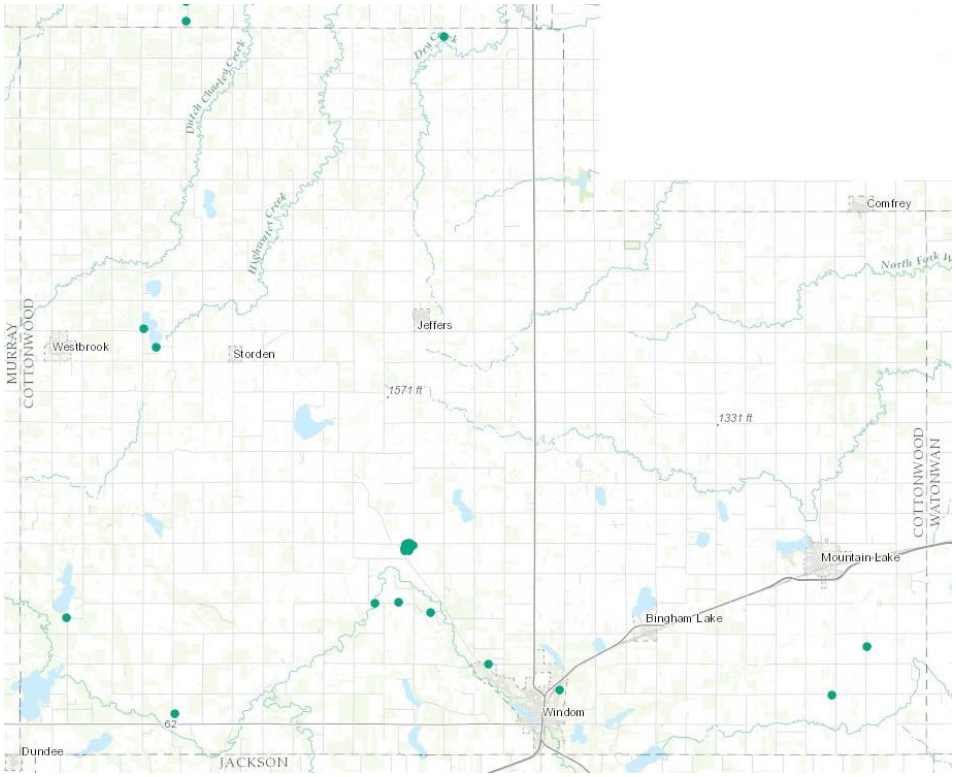


Figure #90
Red Rock Rural Water Distribution Map

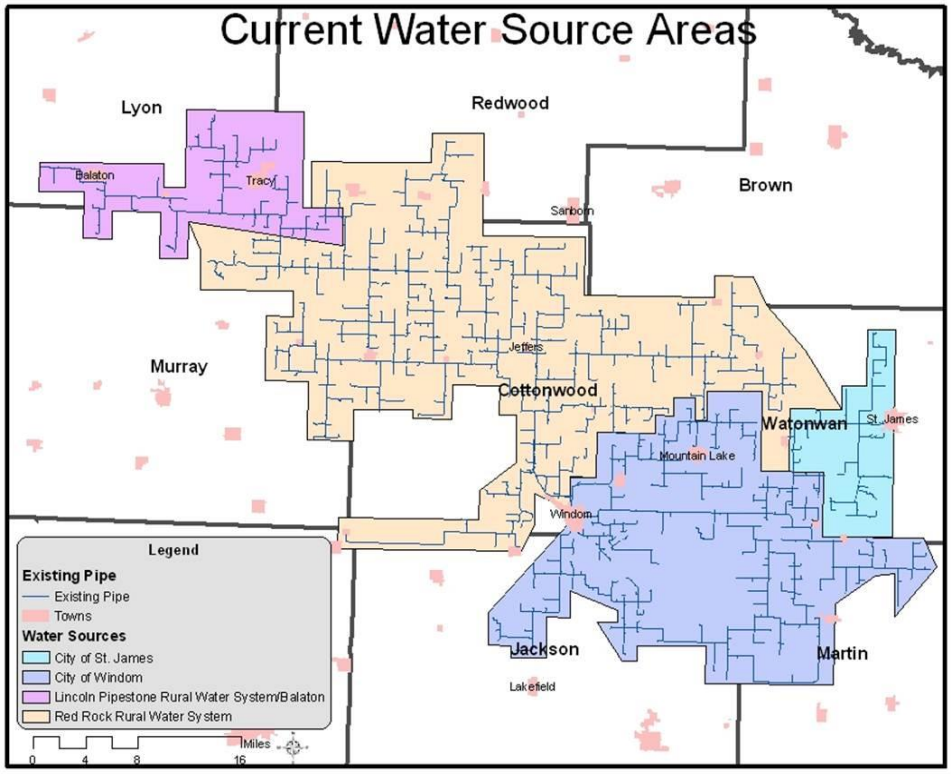


Figure #97
Feedlots – Cottonwood County

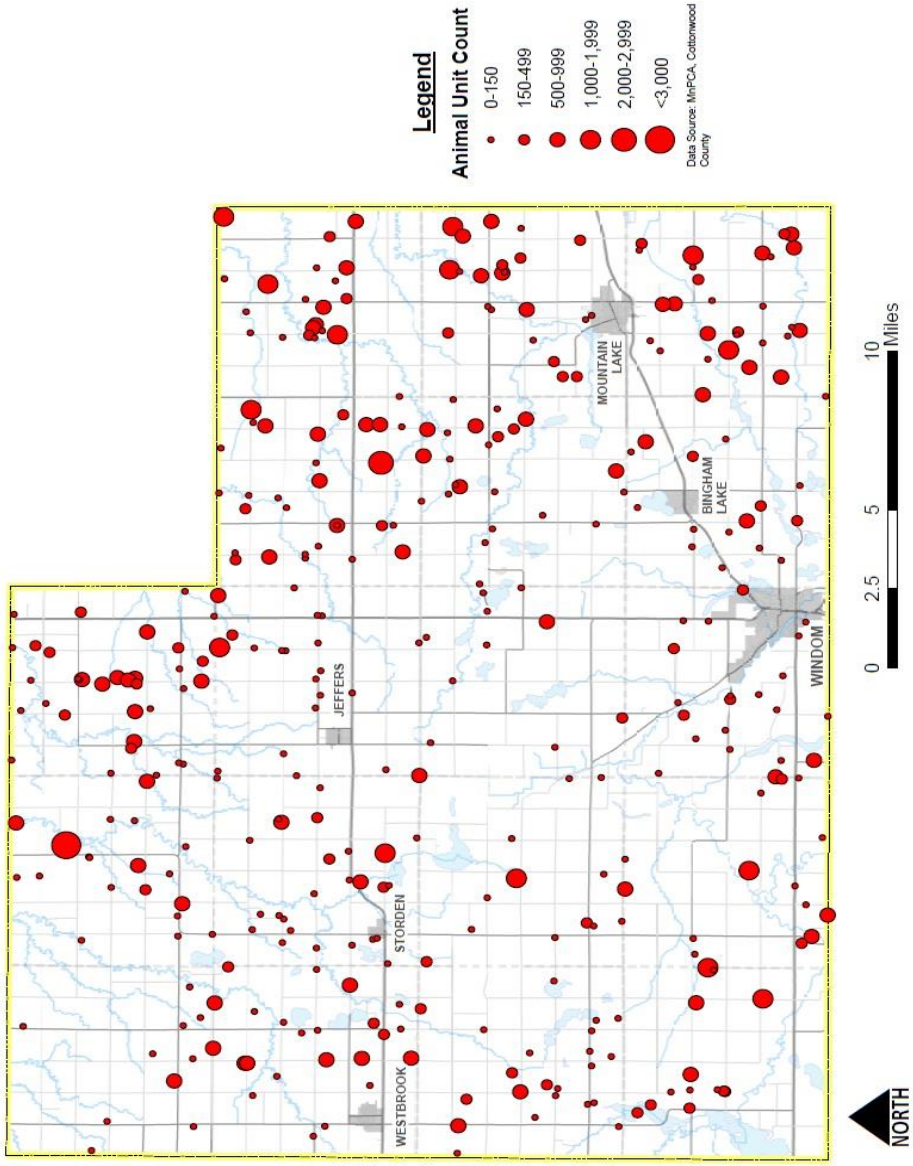


Figure #99
Hazardous Liquid Pipelines – Cottonwood County

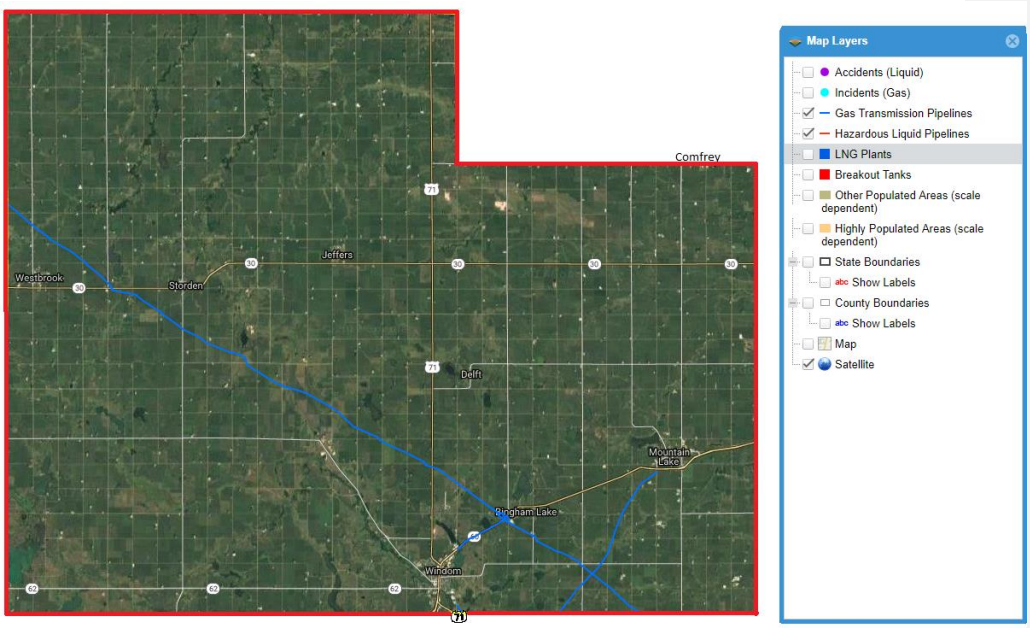


Figure #100
Wind Towers – Cottonwood County

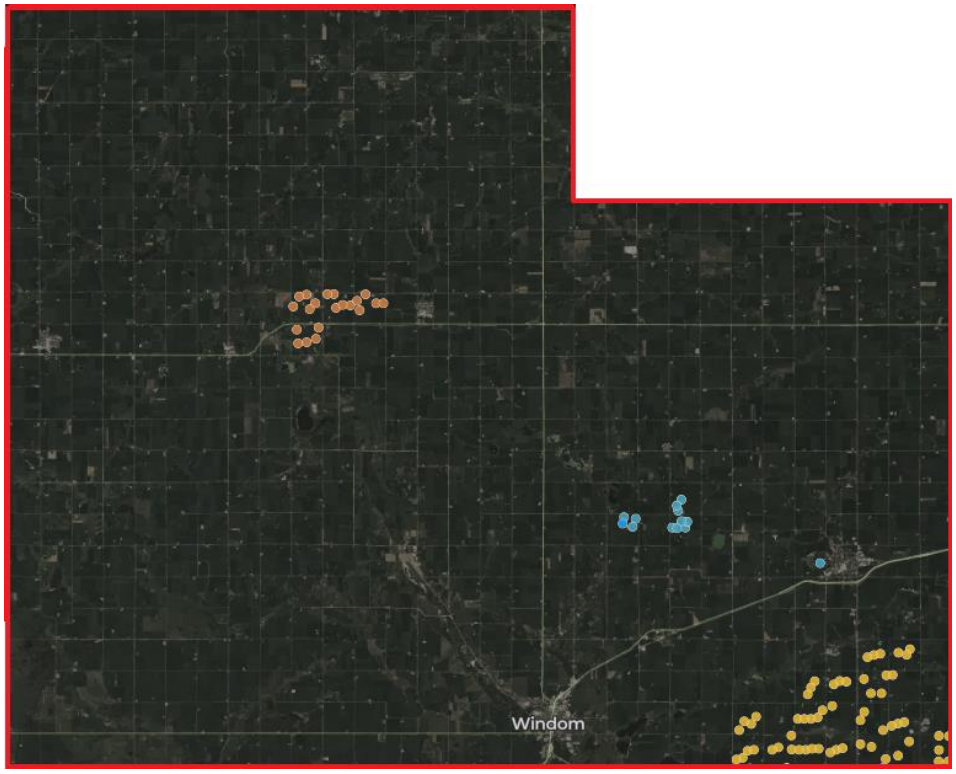


Figure #104
Electric Utilities – Cottonwood County

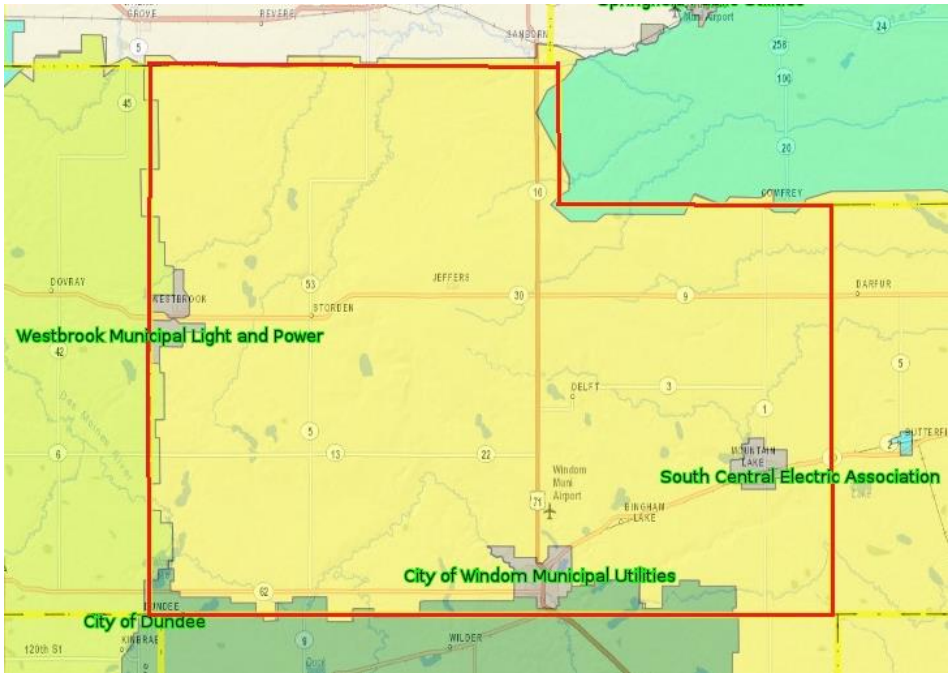


Figure #107
Water Source Protection Areas – Cottonwood County

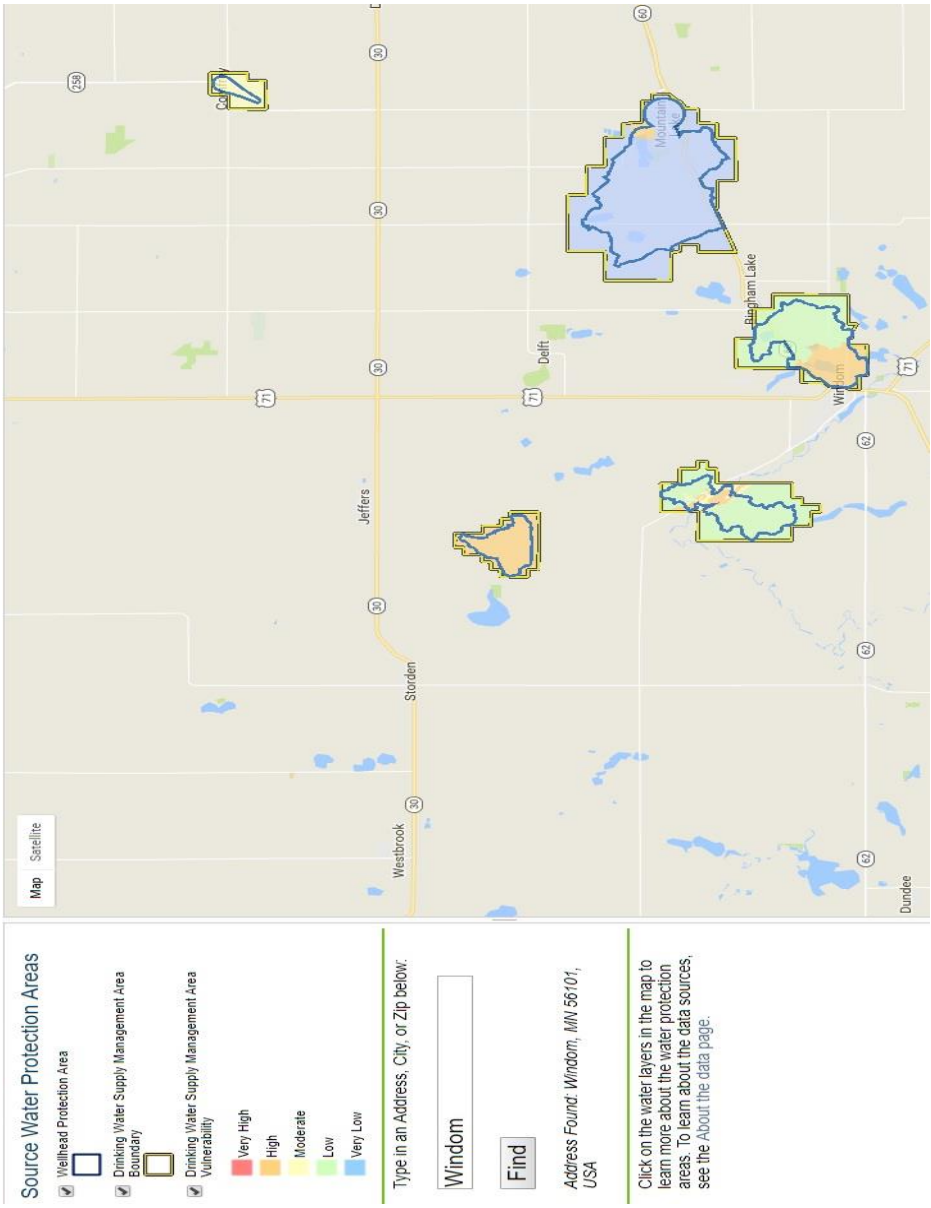


Figure #A-7
Cottonwood County Hazus Analysis

Flood Hazard Analysis for Cottonwood County

Prepared for Cottonwood County
Level II Flood Hazard Analysis performed using FEMA'S Hazus-MH

June, 2018

Contact Information:
Stacey L. Stark, MS, GISP
Geospatial Analysis Center
Swenson College of Science and Engineering
140 Engr
1303 Ordean Court
Duluth, MN 55812
Email: slstark@d.umn.edu
Tel: 218-726-7438

Cottonwood County Hazus-MH Hazard Analysis

The University of Minnesota Duluth Geospatial Analysis Center (GAC) performed the hazard risk assessment for 100-year floods using the Hazus-MH GIS tool. In recognition of the importance of planning in mitigation activities, FEMA created **Haz**ards **US**A **M**ulti-**H**azard (Hazus-MH), a powerful geographic information system (GIS)-based disaster risk assessment tool. This tool enables communities of all sizes to predict estimated losses from floods, hurricanes, earthquakes, and other related phenomena and to measure the impact of various mitigation practices that might help reduce those losses. The Minnesota Homeland Security and Emergency Management (HSEM) Office has determined that Hazus-MH should play a critical role in Minnesota's risk assessments.

FEMA's Hazus 4.2 in ArcGIS 10.5.1 was used to estimate the potential losses incurred for a 100-year flood event in Cottonwood County using a Digital Flood Insurance Rate Map (DFIRM). A 10-meter DEM (digital elevation model) to create a flood depth grid. The resulting HAZUS-MH 100-yr floodplain output is shown in Figure 1.

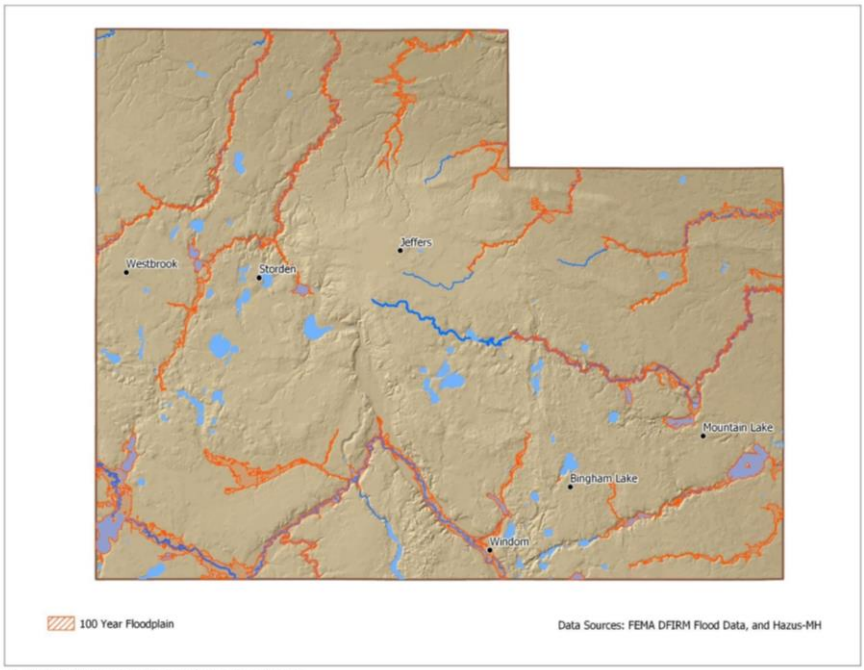


Figure 1. 100-Year Floodplain in Cottonwood County

Cottonwood County specific building data was sourced from the parcel tax and spatial databases to include building valuations, occupancy class, and number of stories. A shapefile named cocoparcels.shp was obtained from the county to locate buildings with additional location information derived from Lidar within the county. The resulting spatial dataset included 5,785 unique parcel numbers identified as having building values and were used in the analyses.

In cases where building value, year built, or number of stories were missing, values were assigned based on best practices from values in the other variables and from the region. Square footage was not available for any building records, so building polygons derived from LiDAR (Minnesota GeoCommons) were intersected with the parcel outlines to total building square footage and used average values/square foot by occupancy class from a neighboring county to estimate square footage. The data were then assigned to one parcel centroid or building location, which served as a surrogate for the each parcel's buildings to aggregate to the associated census block for use in the Hazus model.

According to the Cottonwood County general building stock (derived from the county's parcel data and imported to the Hazus model), the Hazus model estimates there are 5,785 parcels with buildings in the region with a total replacement value (excluding contents) of $603 million (2010 dollars). Approximately 71% of the buildings (and 52% of the building value) are associated with residential housing. The Hazus model estimated 66 parcels' buildings will be at least moderately damaged (>10% damage). 5 buildings are estimated to be completely destroyed.

The total economic loss estimated for the flood is $51.74 million dollars, which represents 25.5% of the total replacement value of the buildings exposed, because the census block in which they reside is in the 100-year floodplain. Building losses are broken into 2 categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood. The total building-related losses were $16.5 million dollars. 68% of the estimated losses were related to the business interruption of the region. Residential occupancies made up 22.5% of the total loss.

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

The total estimated number of damaged buildings (parcels as a surrogate), total building losses, and estimated total economic losses for the countywide 100-year flood are shown in Table 1. The distribution of economic losses for Cottonwood County is depicted in Figure 2.

General Occupancy	Estimated Total Buildings	Total Damaged Buildings	Total Building Exposure	Total Economic Loss	Building Loss
Agricultural	1,142	0	$170,982,000	$16,242,000	$522,000
Commercial	417	12	$55,424,000	$23,276,000	$1,306,000
Education	0	0	$0	$0	$0
Government	0	0	$0	$0	$0
Industrial	92	0	$62,966,000	$586,000	$94,000
Religious/Non-Profit	0	0	$0	$0	$0
Residential	4,134	87	$314,081,000	$11,639,000	$3,685,000
Total	**5,785**	**99**	**$603,453,000**	**$51,743,000**	**$5,607,000**

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

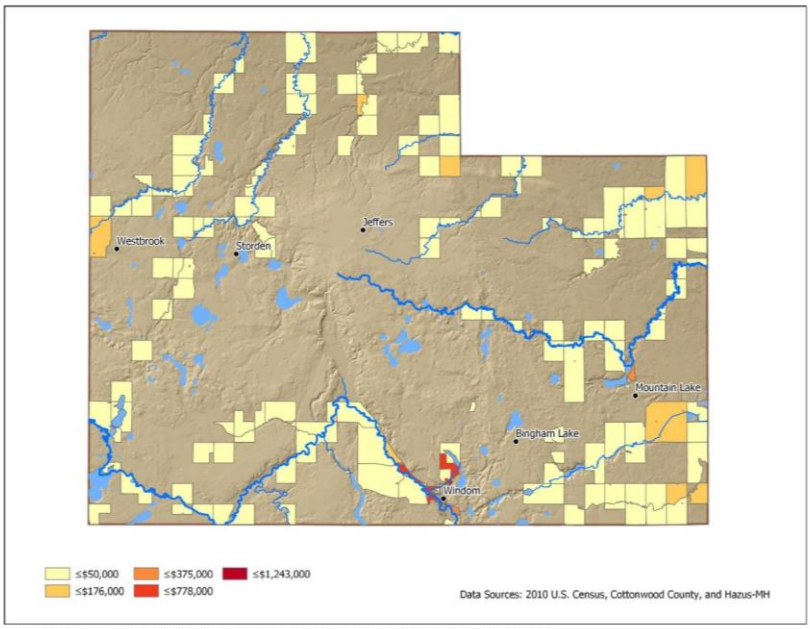


Figure 2. Estimated Economic Building-Related Loss by Census Block within the 100-Year Floodplain

The three most populated cities with a potential economic loss are displayed in Figure 3, Figure 4, and Figure 5.

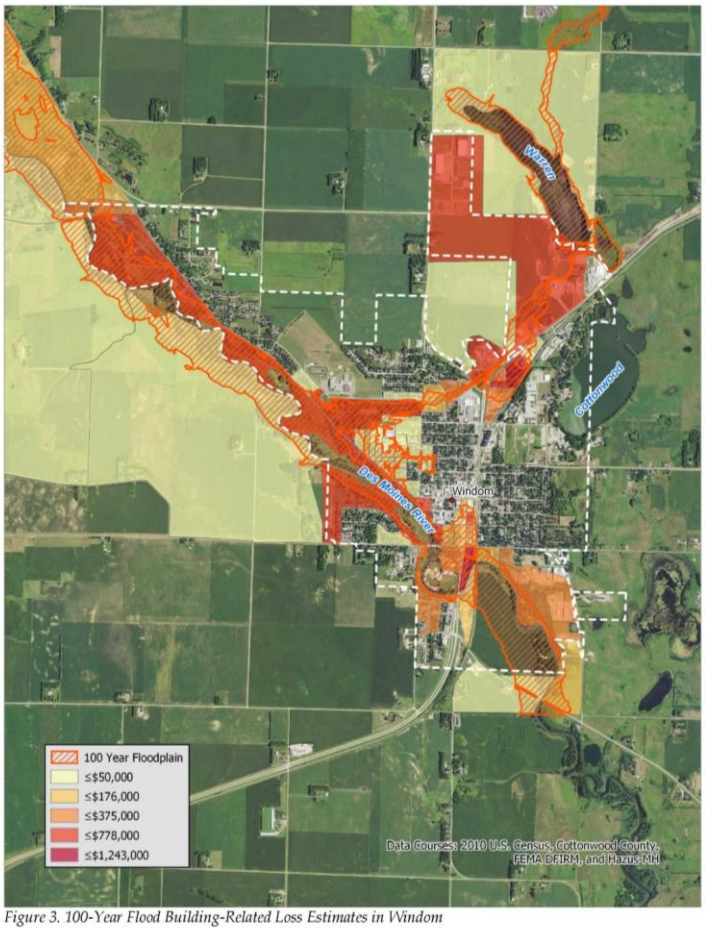


Figure 3. 100-Year Flood Building-Related Loss Estimates in Windom

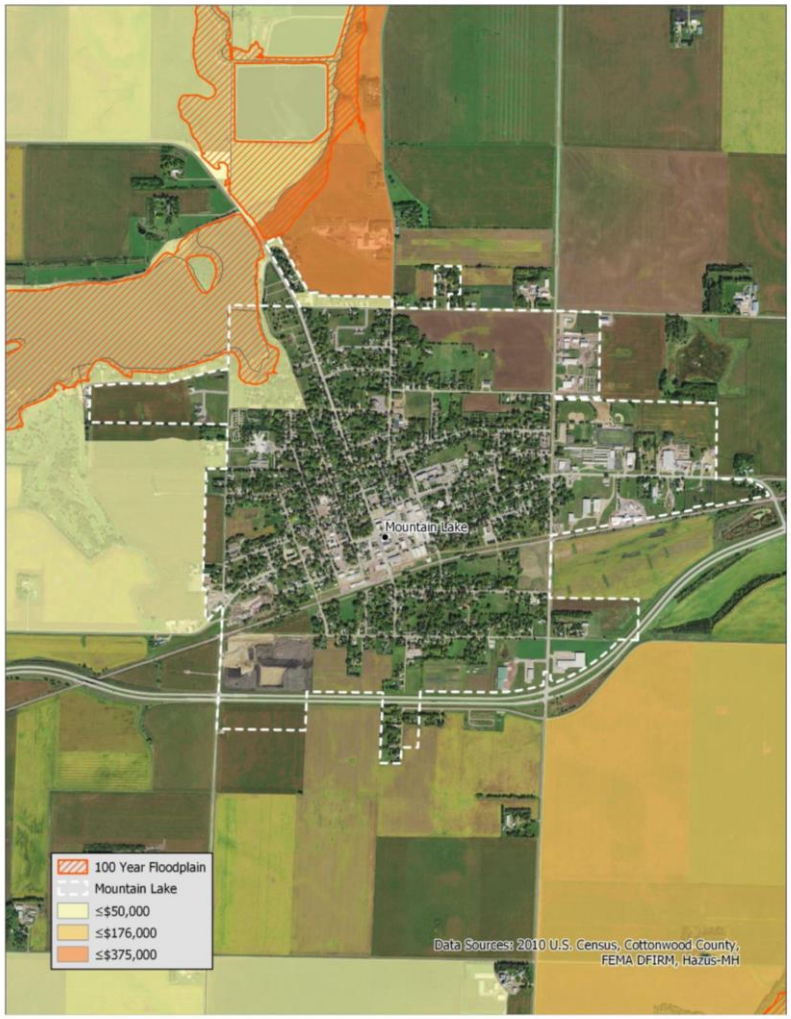


Figure 4. 100-Year Building-Related Flood Loss Estimates in Mountain Lake

Figure 5. 100-Year Building-Related Flood Loss Estimates in Westbrook

Census blocks of concern should be reviewed in more detail to determine the actual location and proximity of facilities with respect to the flood hazard areas. The aggregate losses reported in this study may be overstated due to the fact that values are distributed evenly across a census block. The 3 census blocks with the greatest estimated loss values (calculated by adding the total value of the buildings + the value of the buildings' contents located within a census block), which contain parcels with buildings located in the floodplain, are shown in Table 2. These potentially high loss census blocks, used for the loss estimation, and the Hazus-MH output floodplain are shown in Figure 6, Figure 7, and Figure 8. In some cases, the assets of value may not fall in the floodplain in the same proportion that the floodplain covers the entire census block. For this reason, some potential losses may be overstated.

Census Block Number	Total Estimated Loss (Building's Value & Contents)	Location
270332704002024	$1,243,000	Windom
270332704003060	$920,000	Windom
270332703004012	$778,000	Windom

Table 2. Census Blocks with the greatest estimated losses in the 100-Year Floodplain

An additional analysis was performed to identify the 10 parcels with the highest values (building + contents) that contain buildings which intersect the 100-year floodplain. Some of the parcels are located in one of the 3 census blocks with the greatest estimated loss; these parcels are labeled accordingly. The results of this analysis (and total building values) are shown in Table 3.

Parcel ID	Total Value of Building(s) + Building's Contents on Parcel	Class Description	Building Area (ft^2)
120250500	$6,145,250	Industrial - Light	138,393
251030010	$3,064,200	Commercial – Retail Trade	45,757
256220010	$2,615,400	Commercial – Retail Trade	28,086
251640021	$2,429,600	Commercial – Retail Trade	12,101
256220030	$1,913,600	Commercial – Retail Trade	35,059
258200530	$1,630,000	Commercial – Retail Trade	8,257
251640060	$1,340,600	Commercial – Retail Trade	38,679
253540020	$976,600	Commercial – Retail Trade	4,209
160140300	$917,000	Agriculture	20,434
251640011	$913,200	Commercial – Retail Trade	11,893
Total	**$21,945,450**		

Table 3. Cottonwood County Properties with Highest Building/Contents Value with Potential Building Flood Damage

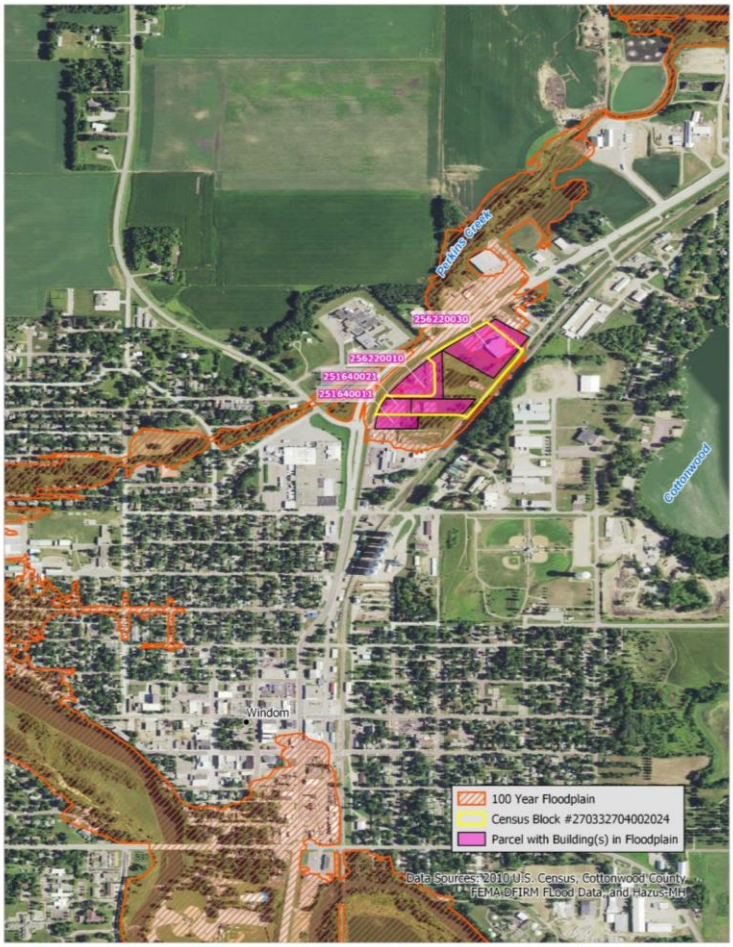


Figure 6. Census Block #270332704002024 and 100-Year Floodplain, Windom

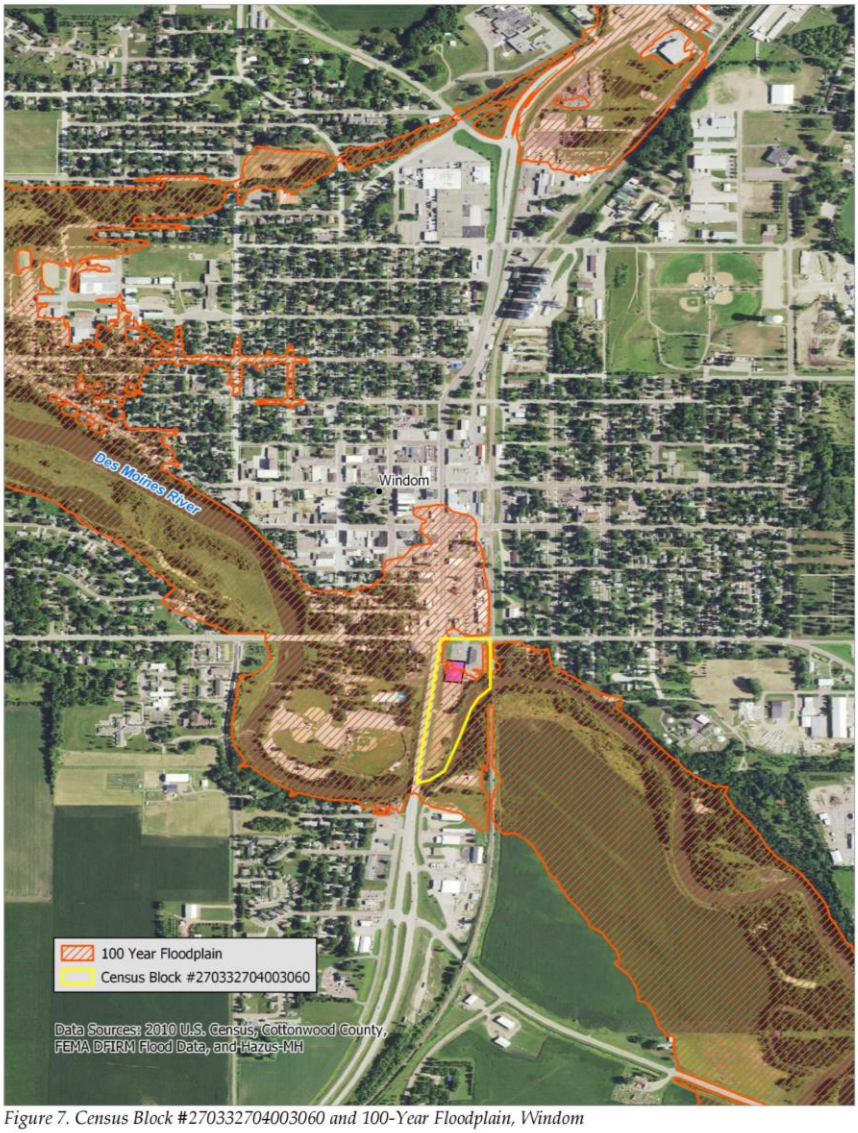


Figure 7. Census Block #270332704003060 and 100-Year Floodplain, Windom

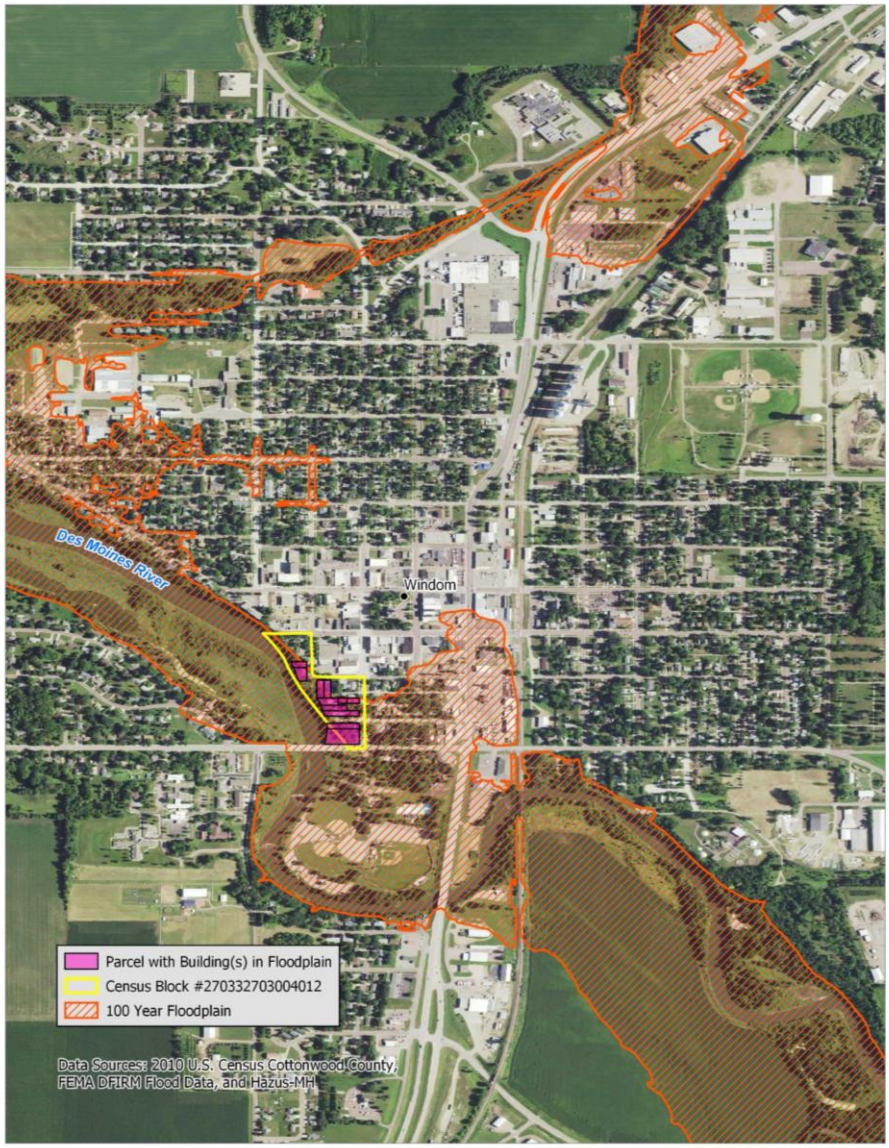


Figure 8. Census Block #270332703004012 and 100-Year Floodplain, Windom

Hazus-MH Essential Facility Loss Analysis

Essential facilities encounter the same impacts as other buildings within the flood boundary: structural failure, extensive water damage to the facility, and loss of facility functionality (i.e. a damaged police station will no longer be able to serve the community). However, none of Cottonwood County's essential facilities (care facilities, fire stations, police stations, and schools) included in the Hazus-MH analysis fall within the flood boundary.

Hazus-MH Shelter Requirement Analysis

Hazus-MH estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus-MH also estimates those displaced people that may require accommodations in temporary public shelters. The countywide 100-year flood model estimates 199 households may be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, the model estimates 24 people (out of 11,687) may seek temporary shelter in public shelters.

Hazus-MH Debris Generation Analysis

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

The model estimates that a total of 3,779 tons of debris may be generated. Of the total amount, Finishes comprises 55% of the total, Structure comprises 26% of the total, and Foundation comprises 18%. If the debris tonnage is converted into an estimated number of truckloads, it will require 152 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Appendix B – Cottonwood County Hazard Events

The National Climatic Data Center Database was queried for all notable events through May, 2017. However, some categories of events do not have records prior to 1996.

Table C - 1. All severe tornado events recorded by NCDC, 1950 through May 2017

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage
Cottonwood Co.	6/23/1952	Tornado	F2	0	0	2.500M
Cottonwood Co.	7/27/1971	Tornado	F1	0	0	25.00K
Cottonwood Co.	6/14/1976	Tornado	F2	0	3	250.00K
Cottonwood Co.	6/28/1979	Tornado	F1	0	0	2.500M
Cottonwood Co.	6/13/1981	Tornado	F1	0	0	0.25K
Cottonwood Co.	6/14/1985	Tornado	F0	0	0	0.00K
Cottonwood Co.	6/16/1992	Tornado	F2	0	0	0.00K
Westbrook	3/29/1998	Tornado	F3	0	3	30.000M
Jeffers	8/7/2000	Tornado	F1	0	0	100.00K
Storden	7/14/2003	Tornado	F0	0	0	0.00K
Windom	6/29/2005	Tornado	F0	0	0	0.00K
Mountain Lake	8/1/2006	Tornado	F0	0	0	0.00K
Jeffers	6/11/2008	Tornado	EF0	0	0	5.00K
Storden	7/7/2009	Tornado	EF0	0	0	0.00K
Storden	6/25/2010	Tornado	EF0	0	0	0.00K
Windom	5/17/2013	Tornado	EF0	0	0	0.00K
Mountain Lake	8/21/2014	Tornado	EF0	0	0	0.00K
Highest Value Property Damage:					**6**	**35.38M**

Table C – 2. All severe hail storm events recorded by NCDC, 1955 through May, 2017.

Location or County	Date	Type	Hail Size (inches)	Deaths	Injuries	Property Damage
Cottonwood Co.	6/21/1956	Hail	1.75 in.	0	0	0.00K
Cottonwood Co.	7/4/1961	Hail	3.00 in.	0	0	0.00K
Cottonwood Co.	7/6/1968	Hail	0.75 in.	0	0	0.00K
Cottonwood Co.	7/12/1979	Hail	2.00 in.	0	0	0.00K
Cottonwood Co.	7/20/1979	Hail	2.50 in.	0	0	0.00K
Cottonwood Co.	7/21/1979	Hail	2.75 in.	0	0	0.00K
Cottonwood Co.	5/26/1980	Hail	0.75 in.	0	0	0.00K
Cottonwood Co.	5/26/1980	Hail	0.75 in.	0	0	0.00K
Cottonwood Co.	5/29/1980	Hail	1.50 in.	0	0	0.00K
Cottonwood Co.	5/29/1980	Hail	2.75 in.	0	0	0.00K
Cottonwood Co.	7/21/1981	Hail	1.75 in.	0	0	0.00K
Cottonwood Co.	4/20/1985	Hail	1.75 in.	0	0	0.00K
Cottonwood Co.	4/20/1985	Hail	1.75 in.	0	0	0.00K
Cottonwood Co.	6/14/1985	Hail	1.75 in.	0	0	0.00K
Cottonwood Co.	7/3/1985	Hail	1.75 in.	0	0	0.00K
Cottonwood Co.	5/29/1986	Hail	1.75 in.	0	0	0.00K

Location or County	Date	Type	Hail Size (inches)	Deaths	Injuries	Property Damage
Cottonwood Co.	8/7/1994	Hail	0.75 in.	0	0	0.00K
Walnut Grove	7/19/1995	Hail	1.75 in.	0	0	0.00K
Windom	7/25/1995	Hail	0.75 in.	0	0	0.00K
Mountain Lake	10/16/1996	Hail	0.75 in.	0	0	1.00K
Westbrook	5/17/1997	Hail	0.88 in.	0	0	0.00K
Jeffers	6/28/1997	Hail	1.75 in.	0	0	0.00K
Delft	6/20/1998	Hail	0.75 in.	0	0	0.00K
Mountain Lake	6/20/1998	Hail	1.00 in.	0	0	0.00K
Mountain Lake	6/20/1998	Hail	0.75 in.	0	0	0.00K
Windom	4/19/2000	Hail	0.75 in.	0	0	0.00K
Jeffers	5/17/2000	Hail	0.75 in.	0	0	0.00K
Storden	7/2/2000	Hail	0.75 in.	0	0	0.00K
Jeffers	7/2/2000	Hail	1.00 in.	0	0	0.00K
Mountain Lake	7/2/2000	Hail	0.75 in.	0	0	0.00K
Westbrook	8/7/2000	Hail	1.50 in.	0	0	20.00K
Westbrook	4/24/2001	Hail	0.75 in.	0	0	0.00K
Windom	4/30/2001	Hail	1.00 in.	0	0	0.00K
Storden	6/7/2002	Hail	1.00 in.	0	0	0.00K
Delft	7/28/2002	Hail	0.88 in.	0	0	0.00K
Storden	7/28/2002	Hail	0.75 in.	0	0	0.00K
Jeffers	7/30/2002	Hail	0.88 in.	0	0	0.00K
Westbrook	6/23/2003	Hail	0.75 in.	0	0	0.00K
Jeffers	6/27/2003	Hail	1.00 in.	0	0	0.00K
Mountain Lake	6/27/2003	Hail	1.00 in.	0	0	200.00K
Jeffers	7/20/2003	Hail	0.75 in.	0	0	0.00K
Storden	8/18/2003	Hail	0.75 in.	0	0	0.00K
Westbrook	4/18/2004	Hail	0.75 in.	0	0	0.00K
Westbrook	4/18/2004	Hail	1.00 in.	0	0	0.00K
Storden	4/18/2004	Hail	1.00 in.	0	0	0.00K
Westbrook	4/18/2004	Hail	0.88 in.	0	0	0.00K
Windom	4/18/2004	Hail	0.75 in.	0	0	0.00K
Storden	5/9/2004	Hail	0.75 in.	0	0	0.00K
Delft	5/9/2004	Hail	0.75 in.	0	0	0.00K
Bingham Lake	5/28/2004	Hail	0.88 in.	0	0	0.00K
Mountain Lake	5/29/2004	Hail	0.75 in.	0	0	0.00K
Delft	5/29/2004	Hail	0.75 in.	0	0	0.00K
Windom	8/29/2004	Hail	0.88 in.	0	0	0.00K
Storden	4/17/2005	Hail	0.75 in.	0	0	0.00K
Westbrook	5/8/2005	Hail	0.88 in.	0	0	0.00K
Storden	6/7/2005	Hail	0.75 in.	0	0	0.00K
Windom	6/13/2005	Hail	0.75 in.	0	0	0.00K
Windom	6/13/2005	Hail	0.75 in.	0	0	0.00K
Jeffers	6/13/2005	Hail	0.75 in.	0	0	0.00K
Jeffers	6/13/2005	Hail	0.88 in.	0	0	0.00K

Location or County	Date	Type	Hail Size (inches)	Deaths	Injuries	Property Damage
Delft	6/29/2005	Hail	1.75 in.	0	0	0.00K
Mountain Lake	7/3/2005	Hail	0.75 in.	0	0	0.00K
Jeffers	7/19/2006	Hail	0.75 in.	0	0	0.00K
Bingham Lake	7/19/2006	Hail	1.00 in.	0	0	0.00K
Windom	7/19/2006	Hail	1.00 in.	0	0	0.00K
Storden	6/7/2007	Hail	1.75 in.	0	0	0.00K
Westbrook	6/5/2008	Hail	0.75 in.	0	0	0.00K
Westbrook	6/5/2008	Hail	0.75 in.	0	0	0.00K
Delft	8/13/2008	Hail	0.75 in.	0	0	0.00K
Windom	7/21/2009	Hail	1.75 in.	0	0	0.00K
Jeffers	6/25/2010	Hail	1.00 in.	0	0	0.00K
Jeffers	9/22/2010	Hail	1.00 in.	0	0	0.00K
Delft	9/22/2010	Hail	1.00 in.	0	0	0.00K
Mountain Lake	9/22/2010	Hail	1.00 in.	0	0	0.00K
Windom	5/21/2011	Hail	1.50 in.	0	0	0.00K
Windom	5/21/2011	Hail	1.00 in.	0	0	0.00K
Mountain Lake	5/21/2011	Hail	0.88 in.	0	0	0.00K
Storden	5/18/2012	Hail	1.00 in.	0	0	0.00K
Storden	5/17/2013	Hail	1.00 in.	0	0	0.00K
Jeffers	5/17/2013	Hail	0.75 in.	0	0	0.00K
Delft	5/17/2013	Hail	0.75 in.	0	0	0.00K
Windom Muni Arpt	5/17/2013	Hail	1.00 in.	0	0	0.00K
Windom Muni Arpt	5/17/2013	Hail	1.50 in.	0	0	0.00K
Windom	5/17/2013	Hail	1.75 in.	0	0	0.00K
Windom	5/17/2013	Hail	1.25 in.	0	0	0.00K
Windom Muni Arpt	5/17/2013	Hail	1.50 in.	0	0	0.00K
Windom Muni Arpt	5/17/2013	Hail	1.75 in.	0	0	0.00K
Windom	5/17/2013	Hail	1.50 in.	0	0	0.00K
Windom	5/17/2013	Hail	1.00 in.	0	0	0.00K
Windom	5/17/2013	Hail	1.00 in.	0	0	0.00K
Windom	5/17/2013	Hail	1.00 in.	0	0	0.00K
Windom	5/17/2013	Hail	1.25 in.	0	0	0.00K
Windom	5/17/2013	Hail	1.00 in.	0	0	0.00K
Windom	5/17/2013	Hail	1.00 in.	0	0	0.00K
Windom	5/17/2013	Hail	2.00 in.	0	0	0.00K
Windom	5/17/2013	Hail	1.75 in.	0	0	0.00K
Windom	5/17/2013	Hail	2.00 in.	0	0	0.00K
Delft	6/18/2013	Hail	1.25 in.	0	0	0.00K
Mountain Lake	6/18/2013	Hail	1.00 in.	0	0	0.00K
Storden	6/21/2013	Hail	1.00 in.	0	0	0.00K
Westbrook	8/5/2013	Hail	1.25 in.	0	0	0.00K
Jeffers	8/31/2013	Hail	1.00 in.	0	0	0.00K
Westbrook	5/8/2014	Hail	0.88 in.	0	0	0.00K
Bingham Lake	8/21/2014	Hail	0.88 in.	0	0	0.00K

Location or County	Date	Type	Hail Size (inches)	Deaths	Injuries	Property Damage
Jeffers	9/9/2015	Hail	0.75 in.	0	0	0.00K
Mountain Lake	7/13/2016	Hail	1.00 in.	0	0	0.00K
Mountain Lake	7/16/2016	Hail	0.75 in.	0	0	0.00K
Highest Value Property Damage:						**221.00K**

Table C - 3. All severe thunderstorm wind events recorded by NCDC, 1955 through May 2017

Location Or County	Date	Type	Wind Speed in Knots	Deaths	Injuries	Property Damage
Cottonwood Co.	6/18/1973	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	6/26/1973	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	7/3/1974	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	7/10/1974	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	6/27/1977	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	6/16/1978	Thunderstorm Wind	61 kts.	0	0	0.00K
Cottonwood Co.	7/6/1978	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	6/19/1979	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	8/4/1979	Thunderstorm Wind	52 kts.	0	0	0.00K
Cottonwood Co.	5/26/1980	Thunderstorm Wind	61 kts.	0	0	0.00K
Cottonwood Co.	10/16/1980	Thunderstorm Wind	52 kts.	0	0	0.00K
Cottonwood Co.	7/1/1983	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	4/27/1984	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	4/20/1985	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	4/20/1985	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	6/14/1985	Thunderstorm Wind	0 kts.	0	1	0.00K
Cottonwood Co.	6/14/1985	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	4/26/1986	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	5/29/1986	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	5/13/1987	Thunderstorm Wind	0 kts.	0	0	0.00K
Cottonwood Co.	5/16/1992	Thunderstorm Wind	56 kts.	0	0	0.00K
Cottonwood Co.	6/16/1992	Thunderstorm Wind	0 kts.	0	0	0.00K
Windom	6/17/1994	Thunderstorm Wind	0 kts.	0	0	0.00K
Windom	7/14/1995	Thunderstorm Wind	52 kts.	0	0	2.00K
Cottonwood Lake	7/25/1995	Thunderstorm Wind	0 kts.	0	0	5.00K
Mountain Lake	7/27/1995	Thunderstorm Wind	0 kts.	0	0	0.00K
Westbrook	6/22/1997	Thunderstorm Wind	52 kts.	0	0	20.00K
Storden	6/22/1997	Thunderstorm Wind	52 kts.	0	0	20.00K
Windom	6/22/1997	Thunderstorm Wind	67 kts.	0	0	50.00K
Bingham Lake	6/22/1997	Thunderstorm Wind	52 kts.	0	0	20.00K
Westbrook	6/22/1997	Thunderstorm Wind	67 kts.	0	0	100.00K
Windom	7/13/1997	Thunderstorm Wind	52 kts.	0	0	0.00K
Mountain Lake	7/14/1998	Thunderstorm Wind	61 kts.	0	0	150.00K

Location Or County	Date	Type	Wind Speed in Knots	Deaths	Injuries	Property Damage
Jeffers	7/18/1998	Thunderstorm Wind	61 kts.	0	0	50.00K
Storden	6/9/1999	Thunderstorm Wind	52 kts.	0	0	5.00K
Storden	7/2/2000	Thunderstorm Wind	52 kts. E	0	0	10.00K
Westbrook	8/7/2000	Thunderstorm Wind	61 kts. E	0	0	50.00K
Windom	8/7/2000	Thunderstorm Wind	52 kts. E	0	0	0.00K
Bingham Lake	8/7/2000	Thunderstorm Wind	69 kts. E	0	0	50.00K
Windom	6/10/2001	Thunderstorm Wind	52 kts. E	0	0	0.00K
Windom	6/13/2001	Thunderstorm Wind	61 kts. E	0	0	0.00K
Windom	6/13/2001	Thunderstorm Wind	69 kts. E	0	0	500.00K
Windom Muni Arpt	6/13/2001	Thunderstorm Wind	56 kts. M	0	0	0.00K
Windom	6/13/2001	Thunderstorm Wind	52 kts. E	0	0	0.00K
Jeffers	9/22/2001	Thunderstorm Wind	57 kts. E	0	0	0.00K
Storden	4/16/2002	Thunderstorm Wind	61 kts. E	0	0	50.00K
Westbrook	7/28/2002	Thunderstorm Wind	52 kts. E	0	0	0.00K
Westbrook	8/11/2002	Thunderstorm Wind	57 kts. E	0	0	10.00K
Jeffers	8/11/2002	Thunderstorm Wind	57 kts. M	0	0	0.00K
Mountain Lake	8/11/2002	Thunderstorm Wind	52 kts. E	0	0	0.00K
Mountain Lake	6/27/2003	Thunderstorm Wind	61 kts. EG	0	0	1.000M
Windom Muni Arpt	7/3/2003	Thunderstorm Wind	53 kts. MG	0	0	0.00K
Mountain Lake	8/18/2003	Thunderstorm Wind	57 kts. EG	0	0	0.00K
Westbrook	4/18/2004	Thunderstorm Wind	57 kts. EG	0	0	50.00K
Mountain Lake	4/18/2004	Thunderstorm Wind	57 kts. EG	0	0	5.00K
Westbrook	4/18/2004	Thunderstorm Wind	69 kts. EG	0	0	500.00K
Storden	4/18/2004	Thunderstorm Wind	65 kts. EG	0	0	0.00K
Windom	4/18/2004	Thunderstorm Wind	61 kts. EG	0	0	0.00K
Westbrook	5/16/2004	Thunderstorm Wind	69 kts. EG	0	0	30.00K
Westbrook	5/29/2004	Thunderstorm Wind	61 kts. EG	0	0	0.00K
Bingham Lake	7/21/2005	Thunderstorm Wind	52 kts. EG	0	0	0.00K
Windom	7/21/2005	Thunderstorm Wind	52 kts. EG	0	0	0.00K
Westbrook	8/3/2005	Thunderstorm Wind	69 kts. EG	0	0	100.00K
Westbrook	6/11/2008	Thunderstorm Wind	70 kts. EG	0	0	0.00K
Jeffers	6/23/2009	Thunderstorm Wind	50 kts. MG	0	0	0.00K
Bingham Lake	7/7/2009	Thunderstorm Wind	56 kts. EG	0	0	0.00K
Windom	5/25/2010	Thunderstorm Wind	58 kts. MG	0	0	0.00K
Jeffers	6/25/2010	Thunderstorm Wind	52 kts. EG	0	0	0.00K
Jeffers	7/23/2010	Thunderstorm Wind	52 kts. EG	0	0	0.00K
Jeffers	7/23/2010	Thunderstorm Wind	61 kts. EG	0	0	0.00K
Jeffers	9/22/2010	Thunderstorm Wind	52 kts. EG	0	0	0.00K
Mountain Lake	7/15/2011	Thunderstorm Wind	61 kts. MG	0	0	0.00K
Windom Muni Arpt	6/22/2015	Thunderstorm Wind	54 kts. MG	0	0	0.00K
Mountain Lake	6/22/2015	Thunderstorm Wind	52 kts. EG	0	0	0.00K
Westbrook	6/14/2016	Thunderstorm Wind	52 kts. EG	0	0	0.00K
Mountain Lake	6/14/2016	Thunderstorm Wind	52 kts. EG	0	0	0.00K
Delft	6/14/2016	Thunderstorm Wind	56 kts. EG	0	0	0.00K

Location Or County	Date	Type	Wind Speed in Knots	Deaths	Injuries	Property Damage
Mountain Lake	6/14/2016	Thunderstorm Wind	61 kts. EG	0	0	0.00K
Bingham Lake	6/14/2016	Thunderstorm Wind	64 kts. EG	0	0	0.00K
Mountain Lake	6/14/2016	Thunderstorm Wind	61 kts. EG	0	0	2.00K
Mountain Lake	6/17/2016	Thunderstorm Wind	61 kts. EG	0	0	0.00K
Windom Muni Arpt	9/5/2016	Thunderstorm Wind	54 kts. MG	0	0	0.00K
Highest Value Property Damage:					**1**	**2.779M**

Table C - 4. All extreme flood events recorded by NCDC, 1997 through May, 2017.

Location or County	Date	Type	Deaths	Injuries	Property Damage
Cottonwood (Zone)	3/25/1997	Flood		0	0
Cottonwood (Zone)	4/1/1997	Flood		0	0
Cottonwood (Zone)	4/5/2001	Flood		0	0
South Portion	7/11/2004	Flash Flood		0	0
Westbrook	6/20/2005	Flash Flood		0	0
Storden	7/25/2005	Flash Flood		0	0
Windom	9/24/2005	Flash Flood		0	0
Windom	4/4/2006	Flood		0	0
Windom	6/5/2008	Flash Flood		0	0
Windom	3/16/2010	Flood		0	0
Windom	4/1/2010	Flood		0	0
Mountain Lake	6/26/2010	Flash Flood		0	0
Windom	6/27/2010	Flood		0	0
Windom	9/22/2010	Flash Flood		0	0
Windom	9/23/2010	Flood		0	0
Windom	10/1/2010	Flood		0	0
Westbrook	3/16/2011	Flood		0	0
Westbrook	4/1/2011	Flood		0	0
Westbrook	6/14/2011	Flash Flood		0	0
Windom	6/21/2011	Flood		0	0
Westbrook	6/16/2014	Flood		0	0
Windom Muni Arpt	6/20/2014	Flood		0	0
Westbrook	8/16/2015	Flash Flood		0	0
Highest Value Property Damage:					**100.00K**

Table C - 5. All severe snow events recorded by NCDC, 1996 through May, 2017.

Location or County	Date	Type	Deaths	Injuries	Property Damage
Cottonwood (Zone)	1/18/1996	Blizzard	0	0	0.00K
Cottonwood (Zone)	3/24/1996	Blizzard	0	0	10.00K
Cottonwood (Zone)	12/14/1996	Heavy Snow	0	0	0.00K
Cottonwood (Zone)	12/16/1996	Blizzard	0	0	0.00K
Cottonwood (Zone)	1/4/1997	Blizzard	0	0	0.00K
Cottonwood (Zone)	1/9/1997	Blizzard	0	0	0.00K
Cottonwood (Zone)	11/10/1998	Blizzard	0	0	25.00K
Cottonwood (Zone)	1/1/1999	Winter Storm	0	0	0.00K
Cottonwood (Zone)	3/8/1999	Winter Storm	0	0	0.00K
Cottonwood (Zone)	10/1/1999	Heavy Snow	0	0	5.00K
Cottonwood (Zone)	1/19/2000	Winter Storm	0	0	0.00K
Cottonwood (Zone)	4/7/2000	Heavy Snow	0	0	0.00K
Cottonwood (Zone)	12/16/2000	Blizzard	0	0	0.00K
Cottonwood (Zone)	1/29/2001	Winter Storm	0	0	10.00K
Cottonwood (Zone)	2/24/2001	Winter Storm	0	0	20.00K
Cottonwood (Zone)	3/11/2001	Winter Storm	0	0	0.00K
Cottonwood (Zone)	11/26/2001	Heavy Snow	0	0	0.00K
Cottonwood (Zone)	2/9/2002	Winter Storm	0	0	0.00K
Cottonwood (Zone)	3/14/2002	Winter Storm	0	0	50.00K
Cottonwood (Zone)	4/20/2002	Heavy Snow	0	0	0.00K
Cottonwood (Zone)	4/6/2003	Heavy Snow	0	0	0.00K
Cottonwood (Zone)	11/23/2003	Winter Storm	0	0	0.00K
Cottonwood (Zone)	12/8/2003	Winter Storm	0	0	0.00K
Cottonwood (Zone)	12/15/2003	Winter Storm	0	0	0.00K
Cottonwood (Zone)	1/25/2004	Winter Storm	0	0	0.00K
Cottonwood (Zone)	1/21/2005	Winter Storm	0	0	0.00K
Cottonwood (Zone)	3/18/2005	Winter Storm	0	0	0.00K
Cottonwood (Zone)	3/12/2006	Winter Storm	0	0	0.00K
Cottonwood (Zone)	1/14/2007	Winter Storm	0	0	0.00K
Cottonwood (Zone)	2/24/2007	Winter Storm	0	0	0.00K
Cottonwood (Zone)	3/1/2007	Blizzard	0	0	0.00K
Cottonwood (Zone)	4/10/2007	Heavy Snow	0	0	0.00K
Cottonwood (Zone)	12/20/2008	Blizzard	0	0	0.00K
Cottonwood (Zone)	1/12/2009	Blizzard	0	0	0.00K
Cottonwood (Zone)	12/8/2009	Blizzard	0	0	0.00K
Cottonwood (Zone)	12/23/2009	Winter Storm	0	0	0.00K
Cottonwood (Zone)	1/6/2010	Winter Storm	0	0	0.00K
Cottonwood (Zone)	1/6/2010	Blizzard	0	0	0.00K
Cottonwood (Zone)	1/25/2010	Blizzard	0	0	0.00K
Cottonwood (Zone)	11/13/2010	Winter Storm	0	0	0.00K
Cottonwood (Zone)	12/11/2010	Blizzard	0	2	0.00K
Cottonwood (Zone)	1/31/2011	Winter Storm	0	0	0.00K
Cottonwood (Zone)	2/20/2011	Winter Storm	0	0	0.00K

Location or County	Date	Type	Deaths	Injuries	Property Damage
Cottonwood (Zone)	12/9/2012	Blizzard	0	0	0.00K
Cottonwood (Zone)	2/10/2013	Blizzard	0	0	0.00K
Cottonwood (Zone)	4/9/2013	Winter Storm	0	0	10.000M
Cottonwood (Zone)	4/18/2013	Winter Storm	0	0	0.00K
Cottonwood (Zone)	12/3/2013	Winter Storm	0	0	0.00K
Cottonwood (Zone)	1/16/2014	Blizzard	0	0	0.00K
Cottonwood (Zone)	4/3/2014	Heavy Snow	0	0	0.00K
Cottonwood (Zone)	1/3/2015	Blizzard	0	0	0.00K
Cottonwood (Zone)	1/5/2015	Winter Storm	0	0	0.00K
Cottonwood (Zone)	1/8/2015	Blizzard	0	0	0.00K
Cottonwood (Zone)	11/30/2015	Winter Storm	0	0	0.00K
Cottonwood (Zone)	12/1/2015	Winter Storm	0	0	0.00K
Cottonwood (Zone)	12/25/2015	Winter Storm	0	0	0.00K
Cottonwood (Zone)	12/28/2015	Heavy Snow	0	0	0.00K
Cottonwood (Zone)	2/2/2016	Blizzard	0	0	0.00K
Cottonwood (Zone)	2/7/2016	Blizzard	0	0	0.00K
Cottonwood (Zone)	3/23/2016	Winter Storm	0	0	0.00K
Cottonwood (Zone)	12/16/2016	Winter Storm	0	0	0.00K
Cottonwood (Zone)	1/24/2017	Winter Storm	0	0	0.00K
Cottonwood (Zone)	2/23/2017	Blizzard	0	0	0.00K
Cottonwood (Zone)	3/12/2017	Heavy Snow	0	0	0.00K
Highest Value Property Damage:				**2**	**10.120M**

Table C - 6. All severe ice storm events recorded by the NCDC, 1996 through May, 2017.

Location or County	Date	Type	Deaths	Injuries	Property Damage
Cottonwood (Zone)	1/17/1996	Ice Storm	0	0	100.00K
Cottonwood (Zone)	11/14/1996	Ice Storm	0	0	1.500M
Cottonwood (Zone)	1/3/1997	Ice Storm	0	0	0.00K
Cottonwood (Zone)	3/13/1997	Ice Storm	0	0	0.00K
Cottonwood (Zone)	4/16/2000	Ice Storm	0	0	2.86K
Highest Value Property Damage:					**1.603M**

Table C - 7. All extreme cold/wind chill events recorded by NCDC, 1996 through May, 2017.

Location or County	Date	Type	Deaths	Injuries	Property Damage
Cottonwood (Zone)	1/14/2009	Extreme Cold/wind Chill	0	0	0.00K
Cottonwood (Zone)	1/7/2010	Extreme Cold/wind Chill	0	0	0.00K
Cottonwood (Zone)	2/1/2011	Extreme Cold/wind Chill	0	0	0.00K
Cottonwood (Zone)	1/20/2013	Extreme Cold/wind Chill	0	0	0.00K
Cottonwood (Zone)	12/23/2013	Extreme Cold/wind Chill	0	0	0.00K
Cottonwood (Zone)	1/23/2014	Extreme Cold/wind Chill	0	0	0.00K
Cottonwood (Zone)	2/27/2014	Extreme Cold/wind Chill	0	0	0.00K
Cottonwood (Zone)	3/2/2014	Extreme Cold/wind Chill	0	0	0.00K
Cottonwood (Zone)	1/16/2016	Extreme Cold/wind Chill	0	0	0.00K
Cottonwood (Zone)	12/17/2016	Extreme Cold/wind Chill	0	0	0.00K
Highest Value Property Damage:					**0.00K**

Table C - 8. All extreme heat events recorded by NCDC, 1996 through May, 2017.

Location or County	Date	Type	Deaths	Injuries	Property Damage
Cottonwood (Zone)	7/15/2011	Excessive Heat	0	0	0.00K
Cottonwood (Zone)	6/27/2012	Excessive Heat	0	0	0.00K
Cottonwood (Zone)	7/2/2012	Excessive Heat	0	0	0.00K
Cottonwood (Zone)	7/16/2012	Excessive Heat	0	0	0.00K
Cottonwood (Zone)	6/10/2016	Excessive Heat	0	0	0.00K
Cottonwood (Zone)	7/20/2016	Excessive Heat	0	0	0.00K
Highest Value Property Damage:					**0.00K**

Appendix C – Resolutions after FEMA Review

Appendix D – Pre-Planning and Planning Team Meetings

McClosky, James (DPS)

From: McClosky, James (DPS)
Sent: Tuesday, May 30, 2017 12:47 PM
To: 'Steve Ewing'; Amber Scholten; 'Joyce Jacobs'; 'Paul Johnson'; 'hlandsman@co.murray.mn.us'; Jim Sandgren
Cc: Jayme Trusty; jennifer.e.nelson@state.mn.us; Marcy, Mark (DPS)
Subject: Invitation: Mitigation Plan Update Kickoff Meeting

Importance: High

Good Afternoon,

The Joint Powers Agreement was just approved. The mitigation plan update for your county may proceed.

You are invited to a plan update meeting:
Date: June 13, 2017
Time: 12:30 pm to 3 pm
Location: Southwest Regional Development Commission, 2401 Broadway Ave, Slayton, MN

Topics related to the plan update including:
→ Milestones and the Plan Update Process
→ Responsibilities and Expectations
→ Contents of Standardized Plans

The ideal is to have all six directors attend this meeting so that we're all on the same page.

Please let me know as soon as possible if you can or cannot attend this meeting.

Jim McClosky
Mitigation Planner
Minnesota Department of Public Safety
Homeland Security and Emergency Management
445 Minnesota Street, Suite 223
Saint Paul, Minnesota 55101
Phone: 651.201.7455

McClosky, James (DPS)

From:	McClosky, James (DPS)
Sent:	Wednesday, June 14, 2017 10:49 AM
To:	'Jim Sandgren'; 'Amber Scholten'; 'Paul Johnson'; 'Steve Ewing'; Jayme Trusty; 'maxk@swrdc.org'; 'judyp@swrdc.org'; Marcy, Mark (DPS)
Cc:	'hlandsman@co.murray.mn.us'; 'Joyce Jacobs'
Subject:	Six County Mitigaiton Plan Update Meeting Notes
Attachments:	Meeting Notes 6_13_17.docx; Eligible Activities.pdf

Greetings,
Thank you for your participation in the mitigation plan update meeting yesterday. This meeting is a good first step in updating your county's mitigation plan.

The attached meeting notes are some highlights of our discussion. A list of projects eligible for FEMA funding are attached. Please note that the generators that are listed must meet FEMAs Benefit Cost Analysis. The only generators that I know of that were funded were in huge metropolitan areas like New York City.

Discussion - Manufactured Safe Rooms
Manufactured safe room are a great idea since design and engineering do not have to be factored into the application. FEMA P-361 criteria needs to be met if Hazard Mitigation Assistance is being considered. ICC-500 is also part of the state building code. https://www.fema.gov/media-library-data/1467990808182-0272256cba8a35a4e8c35eeff53dd547/fema_p361_July2016_508.pdf

Regards,

Jim McClosky
Mitigation Planner
Minnesota Department of Public Safety
Homeland Security and Emergency Management
445 Minnesota Street, Suite 223
Saint Paul, Minnesota 55101
Phone: 651.201.7455

Six County Mitigation Plan Kickoff Meeting
June 13, 2017 12:30 pm to 3 pm

Participants

County EMDs: Jim Sandgren, Amber Scholten, Paul Johnson, Steve Ewing

SRDC: Jayme Trusty, Max Kaufman, Judy Elling Przybilla

HSEM: Mark Marcy, Jim McClosky

In summary, the slides provided should be a good reference while updating the mitigation plan. These meeting notes summarizes some of the discussions.

Milestones

The dates related to the action on the Milestones slide are used by HSEM to determine the progress of the plan update. The SRDC will report quarterly on progress.

Local Match

The first Personnel Activity Reports (PARS) need to be accompanies with the base and fringe salary breakdown. Subsequent PARS do not have to have this breakdown unless there is a change in salary. No federal funds may be supplanted for match.

The City and Public rate is $26.40/hour. Participation is documented on the Meeting Sign In Sheet. SRDC staff can track contact time for surveys and phone calls.

Standardized Plan

First, an updated multijurisdictional plan for each county will be produced. The items presented during the meeting are intended to have the plans meet requirement and to be useful.

Natural Hazard Focus

FEMA's Mitigation Ideas publication is a good foundation for identifying natural hazards and determining the appropriate mitigation strategies and actions for a community. An example of how this may be organized in the plan was reviewed.

"Other Hazards" are optional. The risk assessment and mitigation actions do not have to meet FEMA mitigation plan requirements.

Mitigation Actions

The Mitigation Ideas is a great reference. Not all project are funded by FEMA. Many may be local funded. Other projects, such as stormwater, may be funded through state agencies. Sometimes it may be a combination of Hazard Mitigation Assistance (HMA) and state funding. It was also suggested that homeowners may fund their own projects.

The State Mitigation Review document has a list of federal and state resources. In addition, a list of HMA eligible projects is being sent. The idea is not to have the exact funding stated but to have an idea where sources may be found.

Eligible Activities

The table below summarizes eligible activities that may be funded by HMA programs. Detailed descriptions of these activities can be found in the HMA Unified Guidance.

ELIGIBLE ACTIVITIES

Mitigation Activities	HMGP	PDM	FMA
Property Acquisition and Structure Demolition or Relocation	✔	✔	✔
Structure Elevation	✔	✔	✔
Mitigation Reconstruction			✔
Dry Floodproofing of Historic Residential Structures	✔	✔	✔
Dry Floodproofing of Non-Residential Structures	✔	✔	✔
Minor Localized Flood Reduction Projects	✔	✔	✔
Structural Retrofitting of Existing Buildings	✔	✔	
Non-Structural Retrofitting of Existing Buildings and Facilities	✔	✔	✔
Safe Room Construction	✔	✔	
Wind Retrofits	✔	✔	
Infrastructure Retrofit	✔	✔	
Soil Stabilization	✔	✔	
Wildfire Mitigation	✔	✔	
Post-Disaster Code Enforcement	✔		
Generators	✔	✔	
Advance Assistance	✔		
5% Initiatives	✔		
Hazard Mitigation Planning	✔	✔	✔
Management Costs	✔	✔	✔

✔ = Mitigation activity is eligible for program funding

Management Costs

For HMGP only: The Grantee may request up to 4.89 percent of the HMGP allocation for management costs. The Grantee is responsible for determining the amount, if any, of funds that will be passed through to the subgrantee(s) for their management costs.

Applicants for PDM and **FMA** may apply for a maximum of 10 percent of the total funds requested in their grant application budget (Federal and non-Federal shares) for management costs to support the project and planning subapplications included as part of their grant application.

Subapplicants for PDM and **FMA** may apply for a maximum of 5 percent of the total funds requested in a subapplication for management costs.

National Flood Insurance Program (NFIP) Participation

There are a number of ways that HMA eligibility is related to the NFIP:

NATIONAL FLOOD INSURANCE PROGRAM

SUBAPPLICANT ELIGIBILITY: All subapplicants for FMA must currently be participating in the NFIP, and not withdrawn or suspended, to be eligible to apply for grant funds. Certain non-participating political subdivisions (i.e., regional flood control districts or county governments) may apply and act as subgrantee on behalf of the NFIP-participating community in areas where the political subdivision provides zoning and building code enforcement or planning and community development professional services for that community.

PROJECT ELIGIBILITY: HMGP and PDM mitigation project subapplications for projects sited within a Special Flood Hazard Area (SFHA) are eligible only if the jurisdiction in which the project is located is participating in the NFIP. There is no NFIP participation requirement for HMGP and PDM project subapplications located outside of the SFHA.

PROPERTY ELIGIBILITY: Properties included in a project subapplication for FMA funding must be NFIP-insured at the time of the application submittal. Flood insurance must be maintained at least through completion of the mitigation activity.

Six County Mitigation Plan Update
Planning Meeting

June 13, 2017

Jim McClosky, Mitigation Planner

Agenda

- Overview
- Logistics and Reporting
- Standardized Plan
  - Hazards Identification
  - Risk Assessment
  - Mitigation Actions Update
  - Plan Maintenance

INTRODUCTIONS

1

Overview

The reasons for the changes discussed today:

- Input from EMDs
- Input from FEMA
- Support the State Mitigation Plan

No State Plan, No PA Categories C thru G

Major Points

- Individual multi-jurisdiction county plan
- Region-wide planning method
- Focus on HMA program hazards
- Jurisdiction Executive Summary
  - Mini Risk Assessment
  - Mitigation Actions

Mitigation Plan Review

The state and FEMA review all plans prior to approval.

Not all requirements are addressed in this presentation.

2

LOGISTICS AND REPORTING

Milestones

Action	Completion Date
Hazard Identification	6/30/2017
Data to SRDC	11/30/2017
Risk Assessment	5/30/2018
Capability Assessment	9/30/2018
Mitigation Actions	1/30/2019
Public Review	3/31/2019
FEMA/State Review	6/31/2019
Plan Adoption	9/31/2019

What if – a county becomes delayed

- The process will continue for all counties.
- The county must designate the resources to keep the plan update process alive.

3

What if – applying for project funding

Mitigation plans are put on a parallel path with applications if the jurisdiction was impacted by the declared disaster.

Roles - State

- Oversee progress
- Review payments and reimburse
- Provide program assistance

Roles - SRDC

- Coordinate update with EMDs
- Assist in scheduling meetings, developing agendas, and facilitating review
- Update the plan
- Coordinate the HAZUS flood assessment with UMD
- Quarterly reporting

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Roles - EMDs

County will lead the process by:

- Coordinating meetings, data, and meeting invitations with the SRDC
- Lead the mitigation planning team
- Liaison with county agencies, local jurisdictions, and the public
- Review the plan

Roles - EMDs

- Lead the review and approval process
- Obtain adoption resolutions from local jurisdictions.

Federal Award

- State is the subgrantee
- State contracted with the SRDC
- Counties provide local match as part of the update process.

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Federal Award Per County

Consultants	$26,400
Local Match	$8,880

Consultant costs may be lower

Participation and Match

Mitigation covers work done by multiples of agencies, organizations, individuals and the private sector.

Participation =
Robust Plan =
Disaster Resilient Community

County Match Example

County	$35 (est)	191	$6688
City	$26.40	40	$1056
Public	$26.40	40	$1,056
			$8,800

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County Cash Match

- All county staff except elected officials
- Non-federally funded base + fringe for
  - mitigation meeting participation
  - plan review
  - mitigation meeting prep
  - mitigation training

County provides base + fringe record.

City and Public In-Kind

- Volunteer rate for
  - mitigation meeting participation
  - plan review
  - surveys

Use payroll tracking form

Local Match Documentation

- County keeps time records
- SRDC records meeting share
- State reviews for eligibility

Base and Fringe record needed once.
No transplanting of federal funds.

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Quarterly Reporting

- Reports due on the 15th of the month following the quarter.
- HSEM will remind SRDC.
- SRDC will collect match records, report on progress and request reimbursement.
- HSEM will review per requirements.

Meetings

- Who participates on the mitigation team?
- Who may be invited to a public meeting?

Standardized Plan

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Changes

- Natural hazard focus
- Common mitigation strategies
- HAZUS Flood Assessment
- List PA projects
- List Hazard Mitigation Projects
- Jurisdiction Executive Summary
- Common mitigation strategies

Hazard Identification

Hazards Based on Mitigation Ideas

River Flood	Subsidence
Flash Flood	Erosion
Dam/Levee Failure	Land/Mud Slide
Tornado	Hail
Wildfire	Drought
Windstorm	Extreme Heat
Winter Storm	Extreme Cold
Lightening	Earthquake

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Strategies

- Local Planning and Regulations
- Structure and Infrastructure Projects
- Natural Systems Protection
- Education and Awareness Programs
- Mitigation Preparedness and Response Support

Example

Flooding Goal: Reduce deaths, ...

Strategy: Structure and Infrastructure Projects

Action: Acquire and demolish structures on River Point Road.

'Other' Hazards

Do not have to comply with FEMA HMA plan requirements.

Goals and strategies may vary from Mitigation Ideas. Or, not even be addressed (example: state plan).

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Jurisdiction Executive Summary

Includes:

- Hazard Map
- Rankings of Hazards
- Mitigation Goals, Strategies, and Actions

Risk Assessment

Requirement Review

Natural hazards have to be assessed per FEMA requirements.

The 'other' hazards do not.

How to handle this?

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Inputs

- Disaster Declarations
- PA projects
- Mitigation Projects
- NFIP Information
- Disaster Databases
- Capability Assessment
- Local plans, procedures, and studies

HAZUS Flood Risk Assessment

- FEMA tool
- Predicts location of river flooding
- Estimates vulnerability in terms of structures and economic loss

Request: County Assessor Data

Map Strategy

- Flash Flood
- Dams and Levees
- Erosion
- Wildfire

Note: Minimize map updates or eliminate.

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Natural Hazard Ranking

Calculated Priority Risk Index (CPRI)

- Probability
- Magnitude/Severity
- Warning Time
- Duration

Probability Consideration

Hazard	Tendencies through century	Confidence in projected change
Extreme cold	Continued loss of cold extremes and increasingly widening of evident consistency	Very high
Extreme rainfall	Continued increase in frequency and especially large-scale/most disastrous	High
Heat waves	More hot days with likelihood to lasting, coverage, and duration of heat waves	High
Drought	Risk of dips between precipitation events, leading to more and longer severe, coverage, and duration	Moderately high
Heavy snowfall	Large events less frequent as winter warms, but accompanied were larger snowfalls	Moderately low
Severe thunderstorms & tornadoes	More "super events" possible, even if frequency decreases	Moderately low

Confidence scale: Lowest > Moderately low > Moderately high > High > Highest

- Adapting to Climate Change in Minnesota, 2017

Magnitude/Severity

- Catastrophic – Federal Declaration
- Critical – State Assistance
- Moderate – Regional Mutual Aid
- Negligible – Standard Mutual Aid

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Mitigation Actions Status

Plan Updates

- Review mitigation actions from the current plan.
- Update their status.
- Include new mitigation actions.

Current Mitigation Action Status

- Completed
- Ongoing
- Delayed
- Deleted

Priority: High, Medium, or Low
Not needed of 'other' hazards

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Funding

- FEMA HMA Programs
- HUD Mitigation Funding
- USDA Rural Communities
- DNR Funding
- Clean Water Funding
- Public Facilities Authority
- Local and Private

Property Owner Initiatives

Climate Adaptation Projects

Related to:

- Flood
- Erosion
- Drought
- Wildfire

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Plan Maintenance

Maintenance Items

These items needs to be more specific

- Discuss other planning mechanisms
- Document mitigation effectiveness after an event

Questions?

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Cottonwood County All-Hazard Mitigation Plan Update
Meeting #1 – Planning Process

Date: Tuesday, October 24, 2017
Time: 4:00 PM – 5:30 PM
Location: Cottonwood County Law Enforcement Center,
902 5th Ave, Windom, MN 56101

Agenda

4:00 PM Introductions

4:05 PM Presentation – Max Kaufman, SW Regional Development Commission
Intro to Hazard Mitigation Planning & Benefits

- Planning Process/Timeline
  - Meeting #2
  - Meeting #3
  - Public Hearing
  - Up to 4 sub-committee meetings
- Types of Mitigation Assistance

Hazards identified in initial plan

- Hazards from 2010 plan will be reviewed and updated per their current status. Historical data since the initial plan will be discussed to determine if a hazard/mitigation strategy is still applicable or should be deleted.
- Hazards not addressed in the initial plan may also be added. All participating jurisdictions should be involved with hazard validation.

4:50 PM Sub-Committee Formation

- Mitigation Strategies Subcommittee
- Plan Review Subcommittee
- Other Committees Needed?

5:00 PM CPRI Worksheet "Homework" Handout & Explanation

5:15 PM Questions, Comments, Observations – Schedule Meeting #2 and Adjourn

Meeting #1 Deliverables

- Better understanding of planning process
- Better understanding of research and data gathering responsibilities
- Updated list of hazards
- Schedule Meeting #2

Cottonwood County All-Hazard Mitigation Plan Update
Meeting #1 – Planning Process

Date: Thursday, February 1, 2018
Time: 5:00 PM – 6:45 PM
Location: Cottonwood County Law Enforcement Center,
902 5th Ave, Windom, MN 56101

Attendees: Jason Purrington, Steve Nasby, Donna Stresemann, Tim Hacker, Ryan Sokolofsky, Donna Gravley, Scott Peterson, Nick Anderson, Dave Watkins, Alan Wahl, Kelly Brown, Curtis Madson, Dan Ortmann, Nick Klisch, Andrew Spielman, Denise Nichols, Paul Johnson, Maxwell Kaufman

Notes

Hazards to Include for Mitigation

- Erosion: South Bank of the Des Moines River in Windom is a concern. Trees and riffles were put in to stop erosion in one areas, but concerns still exist by the gravel pit. The snowmobile trail in that area can't be used due to the concerns. Identify other areas and come up with a general strategy to address it.
- Transportation Infrastructure: Road sinkage due to tile is a concern (like Highway 30 in Murray County). Potentially including the Perkins Creek Bridge (expanding it in order to let the water flow better – that bridge is already in good shape, though). However, most transportation infrastructure damage is covered by a natural hazard. Including transportation in the plan would be very extensive.
- Structure Fires under both Man-Made and Natural?
- Hazardous Materials: Hazardous materials may be traveling on railroads and Highway 60.
- Water Supply Contamination: Moving industry away from water supply. Rural water is near a landfill, and you never know what could happen. It is good to include it.

Mitigation Actions Update

- See the "Status" column in the attached mitigation actions chart for the discussed updates.

CPRI Worksheet "Homework" Handout & Explanation

- Please remember to fill these out and get them to Paul or Max by February
- Rank the hazards by the threat they pose to *your* jurisdiction.

Meeting #1 Deliverables

- Better understanding of planning process
- Better understanding of research and data gathering responsibilities
- Updated list of hazards
- Schedule Meeting #2

Public Meeting Sign In Sheet

Date: 02/01/18 **Time Held:** 5:00 **to** 6:45

City/ County Location: Windom, Cottonwood Co. **Purpose:** Planning Meeting #1

PRINT NAME	SIGNATURE	COMMUNITY AFFILIATION
Jason Farrington		Cottonwood County SHERIFF
Steve Nasby		City of Windom
Donna Stressenann		Cottonwood County Solid Waste
Tim Hacker		Windom Ambulance
Ryan Sokolosky		Bingham Lake
Donna Crowley		C.C. Commissioners
Scott Peterson		Windom Police
Nick Anderson		CCAO
Dave Watkins		Mt. Lake Amb/Fire
[illegible]		Westbrook P.D.
Kelly Brown		Westbrook City council
Curtis Madson		Westbrook Fire EM
Dan Ortmann		Windom Fire
Nick Klisch		Cottonwood County PW
Andrew Spielman		City of Windom
Denise Nichols		City of Bingham Lake

Reported by: Max [illegible] **Signature** **Agency:** SW Regional Development Commission

The value of participation by volunteer members of the public is $26.40/hour.

The Community Affiliation is if the attendee wish to state a public or private organization they are representing or if they are representing themselves.

Cottonwood County
All-Hazard Mitigation Plan Update

Planning Team Kickoff Meeting
February 1, 2018

Cottonwood County Emergency Management
+
Southwest Regional Development Commission

Agenda

- Welcome & Introductions
  - Paul Johnson, Cottonwood County Emergency Management Director
- Presentation: Cottonwood County All-Hazard Mitigation Plan
  - Max Kaufman, Southwest Regional Development Commission
  - AHMP Overview
  - Hazard Ranking
  - Mitigation Actions
- Feedback
- Next Steps

What is Hazard Mitigation?

- HM is sustained action to reduce or eliminate long-term risk to people and their property from hazards.
- HM planning is the process local governments use to identify risks and vulnerabilities associated with natural disasters, and develop long-term strategies for protecting people and property from future hazard events.
- HM planning allows communities to strategically plan for and work together to implement activities that are cost-effective, technically feasible and environmentally sound BEFORE a disaster strikes.

Planning Process Timeline

- ~~*Kickoff (HSEM, EMDs, SRDC)*~~
- *Meeting 1 (Overview, Choose & Rank Hazards, Update Strategies)*
- Meeting 2 (Discuss Rankings and Existing & Potential Mitigation Projects)
- Meeting 3 as full team or Mitigation Strategies Subcommittee (Confirm updated mitigation strategies)
- Plan Review Subcommittee Meeting (review via email)
- Public Hearing

AHMP Planning Team

Role of the Planning Team

1. Provide input on development of the plan
2. Rank hazards, prioritize mitigation strategies, and identify projects for implementation.
3. Assist with public outreach and participate in public meetings.
4. Review draft plans and provide feedback.
5. Facilitate final adoption of the AHMP by local governments.

About the Plan

- The All-Hazard Mitigation Plan (AHMP) is a requirement of the Federal Disaster Mitigation Act of 2000 (DMA 2000). The development of a local government plan is required in order to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs.
- Content:
  - Cottonwood County physical and social profile
  - Asset Inventory
  - Hazard Assessment and Vulnerability Analysis
  - Mitigation Actions

Hazard Identification

- This plan is a multi-jurisdictional plan that covers Cottonwood County, including all 6 incorporated cities.
  - To be considered a participating jurisdiction, you must do a CPRI and the mitigation development review.
- Hazard Identification
  - Existing County Plans
  - Hazard Ranking
  - Record of Events (FEMA, NCDC)
  - GIS and HAZUS (Flood only)

While only cities passed resolutions of participation in the plan, any townships can also participate and are encouraged to participate if they have specific hazard mitigation needs.

What hazards can be addressed?

- An All-Hazard Mitigation Plan looks primarily at natural disasters, which can include any of the following (not all required):

Drought	Earthquake	Erosion	Extreme Temperatures
Flood (+Dam/Levees)	Hail	Landslide	Lightning
~~Sea Level Rise~~	Severe Wind	Severe Winter Weather	~~Storm Surge~~
Subsidence	Tornado	~~Tsunami~~	Wildfire

Man-Made Hazards

- Non-natural hazards (man-made) are not required by the DMA 2000 to be addressed in the AHMP and are not eligible for FEMA mitigation funds, but may be eligible for mitigation funds from other departments.
- Can include, but not limited to:
  - Civil Disturbance/Terrorism
  - Dam, Impoundment, & Culvert Failure
  - Hazardous Materials
  - Public Health Emergencies
  - Transportation Infrastructure
  - Utility Failure
  - Water Supply Contamination

Cottonwood County Hazard Events (2000-2017)

Natural

- Blizzards: 16
- Drought: 14 *(4 separate years)*
- Earthquake: 0
- Extreme Cold: 10
- Extreme Heat: 6
- Flash Floods: 9
- Floods: 12
- Hail: 46
- Lightning: 4
- Thunderstorm Wind: 30
- Tornadoes: 9
- Wildfire: 1
- Winter Storms: 30

Man-Made

- Aviation: 1 (since 2010)
- Hazardous Materials: 6 (since 2000)

Lightning is much larger, but these are only the events recorded by NOAA.
Hail events are the largest in terms of number.
Flooding is what FEMA likes to focus on and what will be done by UMD with the HAZUS analysis.

FEMA-Declared Disasters in Cottonwood County

Incident	Declaration Date and Disaster Number	Incident Period	Total PA Obligated by FEMA for Disaster in Minnesota	Total PA Obligated by FEMA for Disaster in Cottonwood County	Individual Assistance in Minnesota	Individual Assistance in Cottonwood County
Severe Storms, Straight-Line Winds, Flooding, Landslides, And Mudslides	DR-7/21/2014	6/11/2014-7/11/2014	$41,013,710	$519,946	No	No
Severe winter Storm	DR-4113	4/9/2013 – 4/11/2013	$11,090,674	$494,457	No	No
Severe Storms, Flooding	DR-1982 5/10/2011	3/16/2011-5/25/2011	$20,790,850	$293,907	No	No
Severe Storms And Flooding	DR-1941 10/13/2010	9/22/2010–10/14/2010	$25,963,422	$505,995	No	No
Flooding	DR-1900 4/19/2010	3/1/2010-4/26/2010	$12,721,045	$36,450	No	No
Tornadoes and Severe Storm	DR-1212 4/1/1998	3/29/1998	Unknown	Yes $ Unknown	Unknown	Yes $ Unknown
Severe Winter Storms	DR-1158 1/16/1997	1/3/1997 – 2/3/1997	Unknown	Yes $ Unknown	No	No
Severe Ice Storm	DR-1151 1/7/1997	11/14/1996 – 11/30/1996	Unknown	Yes $ Unknown	No	No
Severe Storms, Tornadoes & Flooding	DR-993 6/11/1993	5/6/1933 – 8/25/1993	Unknown	Yes $ Unknown	Yes $ Unknown	Unknown
Flooding	DR-255 4/18/1969	4/18/1969	Unknown	Yes $ Unknown	Unknown	Yes $ Unknown
Flooding	DR-188 4/11/1965	4/11/1965	Unknown	Yes $ Unknown	Unknown	Yes $ Unknown

10 FEMA-Declared Disasters
7 included flooding
5 included severe storms
2 winter storms
2 tornadoes
2 high winds
1 ice storm

Implementation of Mitigation Actions

- Happens at every jurisdictional level.
- Happens in partnership with other local, State, and Federal agencies and non-profit organizations.
- Can be inexpensive ("low-hanging fruit")
- Can be high-cost (some are HMA-eligible)
- Some may be implemented quickly, others may be ongoing, and some may occur over several years.

The impact of hazards on people and property can only be reduced when efforts are made to mitigate against them before they occur.

Not everything will be something that FEMA can cover. Their funds are limited. So sometimes things might have to be written in to a budget at a county or city level.

Mitigation Actions Eligible for HMA

1. Retrofit or construction of safe room facilities to protect public during extreme wind events.
2. Purchase of generators for backup power to support the operation of essential function in critical facilities in the event of severe storms.
3. Burying or strengthening of power lines to reduce the risk of power outages from downed lines during a severe storm.
4. Install new warning systems in identified vulnerable locations
5. Mitigation measures to reduce the threat of wildfire.
6. Infrastructure retrofit for flood prone areas.
7. Minor localized flood reduction projects to lessen the frequency of severity of flooding and decrease predicted flood damages.
8. Relocate flood-prone properties or acquire and demolish flood prone properties.
9. Dry-proof or wet-proof facilities that are flood prone.

•Retrofit or construction of safe room facilities to protect public during extreme wind events.

- Locations may include schools, mobile home parks, campgrounds, or other areas where there are populations vulnerable to high winds and tornado events.

•Purchase of generators for backup power to support the operation of essential function in critical facilities in the event of severe storms.

- Critical facilities may include police and fire stations, hospitals, and water and sewer treatment facilities, and other facilities that the county deems critical.

•Burying or strengthening of power lines to reduce the risk of power outages from downed lines during a severe storm.

- Where it is feasible and cost-effective as part of new construction or retrofit.

•Install new warning systems in identified vulnerable locations

- Used to alert people in high-risk, vulnerable areas such as campgrounds, parks and rural residents out of reach of other existing warning siren systems to approaching severe weather.

•Mitigation measures to reduce the threat of wildfire.

- Activities such as creation of defensible space, application of ignition-resistant construction, hazardous fuels reduction, and installation of external wildfire sprinkler systems.

•Infrastructure retrofit for flood prone areas.

- To make mitigation improvements for structures such as culverts, road, bridges, and government buildings.

•Minor localized flood reduction projects to lessen the frequency of severity of flooding and decrease predicted flood damages.

- Such as installation or modification of culverts; stormwater management activities, such as creating retention and detention basins, protection of sanitary sewer lift stations in flood-prone areas, installation of flow-rate meters (stream gauges) on rivers and streams that are prone to flooding high-risk, vulnerable properties.

•Relocate flood-prone properties or acquire and demolish flood prone properties.

- Located in the special flood hazard area and outside of the special flood hazard area.

•Dry-proof or wet-proof facilities that are flood prone.

- Reduce potential infrastructure flood damages on utilities such as wastewater treatment, pipelines, and power facilities by dry-proofing or wet-proofing facilities that are flood prone.

Mitigation Strategies

- **Prevention:** Government, administrative, or regulatory actions.
- **Property Protection:** Removal or modification of existing buildings or structures to protect them from a hazard.
- **Public Education and Awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.
- **Natural Resource Protection:** Actions that minimize hazard losses and preserve or restore the functions of natural systems.
- **Emergency Services:** Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.
- **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard, for example: floodwalls, safe rooms.

2011 Mitigation Strategies Review

Hazard	Mitigation Action	Priority	Mitigation Type	Status	Responsibility	Estimated Cost
Tornado and Straight-line Winds	A.1.a.1 – Improve the weather warning system in at least one community each year	High	Structural	Complete, In Progress, Deferred, Deleted	CCEM, CCEO, CCSO, CiBL, CiC, CiJ, CiML, CiS, CiWb, CiWi	High
Tornado and Straight-line Winds	A.1.a.2 - Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, preferably with Specific Alert Message Encoding (SAME) capability.	High	Awareness		CCEM, CiBL, CiC, CiJ, CiML, CiS, CiWb, CiWi, Twp	Low
Tornado and Straight-line Winds	A.1.a.3 - Increase support for the local storm spotters' network.	High	Awareness		CCEM, NOAA	Low
Tornado and Straight-line Winds	A.1.a.4 - Review and update the EOP media plan to provide public information about all-hazard events.	High	Awareness		CCEM, HSEM, FEMA	Low
Tornado and Straight-line Winds	A.1.a.5 - Work with critical facilities such as hospitals and rural water suppliers to assure access to back-up power generation.	High	Protection		Utilities, CCEM, CoJAK, Hosp, RWS, MDH	Medium
Tornado and Straight-line Winds	A.1.a.6 - Consider adopting building code for new construction.	High	Prevention		CiWb	Medium
Tornado and Straight-line Winds	A.1.a.7 - Encourage residents to use licensed contractors.	High	Prevention		CiBL, CiC, CiML, CiS, CiWb, CiWi	Low
Tornado and Straight-line Winds	A.1.a.8 - Plan for designated long-term shelter location(s) in case of disaster event.	High	Emerg Svcs		CCEM, CiBL, CiML, CiWb, CiWi	Low
Tornado and Straight-line Winds	A.1.a.9 - Educate public about benefit of safe rooms and funding sources available.	High	Awareness		CCEM, CCEO, CiBL, CiC, CiJ, CiML, CiS, CiWb, CiWi	Low
Tornado and Straight-line Winds	A.1.a.10 - Encourage construction of safe rooms in public facilities and parks.	High	Structural		CCEM, CCEO, Sch	High
Hazardous Materials / Meth Labs.	A.1.b.1 - Work with state and federal agencies to address hazardous materials and delivery systems that have the potential to impact the county and region.	High	Prevention		CCEM, CCSO, CCEO, EMS, Fire, DPS, MPCA	Low

2011 Mitigation Strategies Review

Hazardous Materials / Meth Labs.	A.1.b.2 - Review and update the County Emergency Operations Plan (EOP) for hazardous material incident information.	High	Prevention		CCEM, HSEM	Low
Hazardous Materials / Meth Labs.	A.1.b.3 - Work with MDH to complete and implement Wellhead Protection Plans.	High	Prevention		CCEO, SWCD, RWS, MDH	Medium
Hazardous Materials / Meth Labs.	A.1.b.4 - Work with state & local partners to implement and update Local Water Management Plan.	High	Prevention		CCEO, SWCD, RWS, BWSR, DNR	Medium
Hazardous Materials / Meth Labs.	A.1.b.5 - Educate the public on ordinances that deal with responsibility for cleanup of contaminated property.	High	Protection		CCSO	Medium
Hazardous Materials / Meth Labs.	A.1.b.6 - Develop Geographic Information Systems (GIS) capability to map locations of fixed facilities using hazardous materials and associated transportation corridors.	High	Protection		CCEM, CCEO	Medium
Agricultural Disease (animal and plant)	A.2.a.1 - Provide information on ag disease and prevention to producers & residents.	Moderate	Awareness		CCEO, SWCD, Ext, FSA	Low
Agricultural Disease (animal and plant)	A.2.a.2 - Review the EOP for response and care of animals, including disposal, in an outbreak of disease or a major hazard event.	Moderate	Emerg Svcs		CCEM, CCEO, MDA, MPCA, Ext, FSA	Medium
Agricultural Disease (animal and plant)	A.2.a.3 - Monitor invasive insect species, including emerald ash borer.	Moderate	Prevention		CCEO, CiML, CiWi, MDA, Ext	Low
Severe Winter Storms—Blizzards & Extreme Cold	A.2.b.1 - Work with communities to review and/or complete Continuity of Operations Planning, and encourage private businesses and families to prepare for all-hazard events.	Moderate	Emerg Svcs		CCEM	Medium
Severe Winter Storms—Blizzards & Extreme Cold	A.2.b.2 - Work with MnDOT / local road authorities to identify and improve hazardous intersections and bridges.	Moderate	Prevention		CCHWY, CiBL, CiC, CiJ, CiML, CiS, CiWb, CiWi, Twp, railroad	High

2011 Mitigation Strategies Review

Severe Winter Storms—Blizzards & Extreme Cold	A.2.b.3 - Use road design and living snow fences to help control snow on roadways.	Moderate	Prevention		CCHWY, CCEO, SWCD, Twp, MnDOT	Medium
Severe Winter Storms—Blizzards & Extreme Cold	A.2.b.4 - Encourage road authorities to work with farmers to prevent cropping in road ROW.	Moderate	Prevention		CCHWY, Twp	Low
Severe Winter Storms—Blizzards & Extreme Cold	A.2.b.5 - Encourage property owners to maintain landscaping distances to overhead power lines.	Moderate	Prevention		CCEO, CiWb, CiWi, Utilities	Low
Severe Winter Storms—Blizzards & Extreme Cold	A.2.b.6 - Require utility providers to have power lines buried and/or hardened against hazards, where feasible.	Moderate	Protection		CCEM, CCEO, CiML, CiWb, CiWi, Utilities	High
Public Health and Infectious Disease	A.2.d.1 - Encourage the local Public Health agency to continue work with Minnesota Dept. of Health for the mass distribution of medicines and supplies for public health emergencies.	Moderate	Emerg Svcs		CoJAK, MDH, EMS, Fire, Hosp, CCEM	Low
Public Health and Infectious Disease	A.2.d.2 - Provide information to public and private employers, schools and hospitals about potential infectious disease threats and prevention measures.	Moderate	Awareness		CoJAK, MDH, Sch, Hosp, CCEM	Low
Public Health and Infectious Disease	A.2.d.3 - Develop a County quarantine plan, in coordination with local doctors and other health professionals in the county.	Moderate	Awareness		CoJAK, CCSO, EMS, Fire, Hosp, CCEM	Low
Drought / Extreme Heat	A.3.a.1 - Educate the public on the importance of wellhead protection and water conservation.	Low	Prevention		CCEO, SWCD, RWS, BWSR	Low
Severe Summer Storms—Lightning & Hail / Earthquake	A.3.b.1 - Participate in "Severe Weather Awareness Week" each spring.	Low	Awareness		CCEM, CiBL, CiC, CiML, CiS, CiWb, CiWi	Low
Severe Summer Storms—Lightning & Hail / Earthquake	A.3.b.2 - Continue to enforce building code for new construction.	Low	Prevention		CiML, CiWi	Medium

2011 Mitigation Strategies Review

Fires—Structures and Wildfires	A.3.c.1 - Continue fire education, adding the nationally coordinated "Firewise" program.	Low	Awareness		Fire, Sch	Low
Fires—Structures and Wildfires	A.3.c.2 - Work with owners of conservation properties on the proper use of controlled burns and firebreaks.	Low	Awareness		Fire, CCSO, SWCD, Twp, DNR	Low
Fires—Structures and Wildfires	A.3.c.3 - Continue to use mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives.	Low	Emerg Svcs		ALL	Low
Terrorism and Civil Disturbance	A.3.d.1 - Local governments complete and maintain thorough community risk and threat assessments.	Low	Prevention		CCEM, CCSO, LE	Low
Mitigation Plan Maintenance	A.4.a.1 - Budget to perform additional data collection and analysis to identify vulnerable structures in specific detail in next plan update.	Low	Prevention		CCEM, CCEO	Medium
Mitigation Plan Maintenance	A.4.a.2 - Budget to perform estimates of potential monetary loses to structures, contents and functions in specific detail in next plan update.	Low	Prevention		CCEM	Medium
Hazard: Flooding and Dam Failure	B.1.a.1 - Work with FEMA to modernize floodplain maps.	Moderate	Prevention		CCEO, CiC, CiWi, DNR	Medium
Hazard: Flooding and Dam Failure	B.1.a.2 - Review and update floodplain protection in zoning ordinance.	Moderate	Prevention		CCEO, CiC, CiWi, DNR	Low
Hazard: Flooding and Dam Failure	B.1.a.3 - Work closely with DNR on all development applications in identified flood hazard areas; have check box on building/zoning permit forms indicating flood hazard areas; discourage zoning variances in flood hazard areas.	Moderate	Prevention		CCEO, CiWi	Low
Hazard: Flooding and Dam Failure	B.1.a.4 - Educate and encourage property owners and insurance agents on purchasing flood insurance.	Moderate	Awareness		DNR, CCEO, CiC, CiWi	Low

2011 Mitigation Strategies Review

Hazard: Flooding and Dam Failure	B.1.a.5 - Promote buffer system along creeks and streams that are prone to flooding (e.g. grass strips, CRP).	Moderate	Natural Resources		SWCD, BWSR, Watershed Districts	Medium
Hazard: Flooding and Dam Failure	B.1.a.6 - Study programs to voluntarily acquire, relocate or elevate at-risk structures in floodplains.	Moderate	Protection		CCEM, CCEO, CiWi	High

Discussion: Hazards to Include for Mitigation

NATURAL

- Agricultural Disease (animal/crop)
- Drought
- Earthquake
- Erosion
- Extreme Temperatures
  - (Severe Summer Storms, Hail, Lightning, Extreme Heat)
- Fire (Wildfire & Structure)
- Flood (+Dam/Levee Failure)
- Hail
  - (Severe Summer Storms, Hail, Lightning, Extreme Heat)
- Landslide
- Lightning
  - (Severe Summer Storms, Hail, Lightning, Extreme Heat)
- ~~Sea Level Rise~~
- Severe Wind (under Tornado)
- Severe Winter Weather
  - (Blizzards & Winter Storms, Ice & Extreme Cold)
- ~~Storm Surge~~
- Subsidence
- Tornado (& Straight Line Winds)
- ~~Tsunami~~
- Wildfire

MAN-MADE

- Civil Disturbance/Terrorism
- Hazardous Materials
- Public Health Infectious Disease
- Transportation Infrastructure (including Aviation)
- Utility Failure
- Structure Fire (under Fire)
- Water Supply Contamination

There have been no historical mitigation funding received by Cottonwood County. Those in black had mitigation strategies in the 2010 plan.

Hazard Ranking – CPRI Worksheet

- Worksheet that allows each jurisdiction to rank the risk that each hazard poses to the jurisdiction.
  - Probability
  - Magnitude/Severity
  - Warning Time
  - Duration

0.45 Probability	0.3 Magnitude / Severity	0.15 Warning Time	0.1 Duration
4 – Highly Likely ☐ Event is probable within the calendar year. ☐ Event has up to 1 in 1 year chance of occurring (1/1 = 100%) ☐ Chance of event is greater than 33% likely per year. ☐ Event is "highly likely" to occur.	**4 – Catastrophic** ☐ Local jurisdiction is overwhelmed and unable to effectively respond to the hazard. Local resources are inadequate or non-existent. Complete loss of communications. Massive regional, state, SWAC and federal response is required. Federal disaster declaration. ☐ Local and regional medical services are unable to manage the volume of injuries and fatalities. Mass evacuations, sheltering, and care of displaced residents, medical patients, high risk and vulnerable populations are required. ☐ Loss of public utilities, government and essential services for more than 1 month. Widespread destruction of critical infrastructure, public and private property. More than 50% of critical and non-critical facilities and infrastructure damaged or destroyed. Extended emergency response operations lasting more than 1 month may be required.	**4 – Minimal** ☐ No notice up to 6 Hours	**4 – Extended** ☐ More Than 1 Week
3 – Likely ☐ Event is probable within the next three years. ☐ Event has up to 1 in 3 years chance of occurring (1/3 = 33%) ☐ Chance of event is greater than 20% but less than or equal to 33% per year. ☐ Event is "likely" to occur.	**3 – Critical** ☐ Local jurisdiction is unable to effectively respond without District-level mutual aid support and significant state assistance. Local resources have been expanded and local agencies have reached the limits of their capabilities. Communications seriously degraded with significant impact on operations. State disaster declaration. ☐ Local medical services are unable to manage number of injuries and fatalities. Patients require transportation to regional medical facilities outside of the affected areas. Local area evacuations, sheltering, and care of displaced residents, medical patients, high risk and vulnerable populations are required. ☐ Loss of public utilities, government and essential services for up to 1 month. Significant damage to critical infrastructure, public and private property over a large area. Up to 50% of critical and non-critical facilities and infrastructure damaged. Emergency response operations lasting up to 1 month may be required.	**3 – Marginal** ☐ 6 to 12 Hours	**3 – Extended** ☐ Up to 1 Week
2 – Possible ☐ Event is probable within the next five years. ☐ Event has up to 1 in 5 year chance of occurring (1/5 = 20%) ☐ Chance of event is greater than 10% but less than or equal to 20% per year. ☐ Event could "possibly" occur.	**2 – Moderate** ☐ Local jurisdiction is able to effectively respond with significant inter-local mutual aid support and limited state assistance. Local and mutual aid resources are adequate to support response. Communications systems operating near capacity. Local medical services are able to manage volume of injuries and fatalities but are near the limits of their capabilities. Only critically injured patients are diverted to facilities outside of the affected areas. Limited evacuations and sheltering required. ☐ Loss of public utilities, government and essential services for up to 1 week. Significant damage to critical infrastructure, public and private property over a medium area. Up to 25% of critical and non-critical facilities and infrastructure damaged. Response operations lasting up to 1 week may be required.	**2 – Limited** ☐ 12-24 Hours	**2 – Intermediate** ☐ Up to 1 Day
1 – Unlikely ☐ Event is probable within the next 10 years. ☐ Event has an up to 1 in 10 years chance of occurring (1/10 = 10%) ☐ Chance of event occurrence is less than or equal to 10% ☐ Event is "unlikely" to occur.	**1 – Minor** ☐ Local jurisdiction is able to manage incident with standard mutual aid and little or no state assistance. Local resources are adequate to support response. Communications system operating normally. Local emergency. ☐ Local medical services are able to manage number of injuries and fatalities with on hand personnel and resources. ☐ Loss of public utilities, government and essential services for up to 24 hours. Damage contained to a single incident scene and immediate area. Up to 5% of critical and non-critical facilities and infrastructure damaged. ☐ Response operations lasting up to 72 hours may be required.	**1 – Optimal** ☐ 24+ Hours	**1 – Brief** ☐ Up to 6 Hours

Next Steps

- 2nd Planning Team meeting
  - Review CPRI Rankings
  - Review HAZUS Flood Data
  - Identifying New Mitigation Strategies
- Subcommittee Formation (if needed)
  - Mitigation Strategies Subcommittee
  - Plan Review Subcommittee
- CPRI Worksheets & Completed Action Steps
  - Explanation
  - Will be sent as PDFs

Cottonwood County AHMP Contacts:

Paul Johnson
Emergency Management Director – Cottonwood County
902 5th Avenue, Windom, MN 56101
Paul.Johnson@co.cottonwood.mn.us | (507) 832-8255

Max Kaufman
Development Planner – Southwest Regional Development Commission
2401 Broadway Ave, Slayton, MN 56172
maxk@swrdc.org | 507-836-1633

Cottonwood County All-Hazard Mitigation Plan Update
Meeting #2 – New Strategies

Date: 10/29/2018
Time: 6:00 PM – 7:30 PM
Location: Cottonwood County Law Enforcement Center,
902 5th Ave, Windom, MN 56101

Agenda

4:00 PM Introductions

4:05 PM Review Flood Hazard Analysis

Review CPRI worksheet results
- Still needed from: Comfrey, Jeffers, Westbrook

Identify hazard mitigation strategies to add to the new plan
- Plans & Programs / Gaps & Deficiencies
- New Strategies

4:50 PM Sub-Committee Formation
- Mitigation Strategies Subcommittee
- STAPLE+E
- Plan Review Subcommittee

5:00 PM

5:15 PM Questions, Comments, Observations – Schedule Meeting #2 and Adjourn

Meeting #2 Deliverables
- Identified deleted, deferred, and updated strategies
- Added new mitigation strategies

Cottonwood County All-Hazard Mitigation Plan Update
Meeting #2 – New Strategies

Date: 10/29/2018
Time: 6:00 PM – 7:30 PM
Location: Cottonwood County Law Enforcement Center,
902 5th Ave, Windom, MN 56101

Notes

Review Flood Hazard Analysis

- Some discrepancies between the flood hazard analysis and what we've seen in real life.
  - Elevation change by the Windom industrial park. No floodplain nearby. Might be caused by grouping parcels into one census block when calculating expected losses.
- This past summer was not quite a 100-year flood. (About 20" under in the river)

Review CPRI worksheet results

- CPRIs (and hazard mitigation strategy updates) still needed from: Comfrey, Jeffers, Westbrook

New Hazard Mitigation Strategies Discussion

- Flooding
  - New Strategy: Acquire/demolish at-risk property within the floodplain. | This would be a county-level strategy.
  - New Strategy: Place flood gauges at locations advantageous for forecasting flooding downstream – in particular Avoca and Talcot. | This will help with crest prediction in places like Windom and help with preparedness.
  - Dams: There may have been discussion about the DNR wanting to remove Talcot Dam? It doesn't sound like this is likely. There is probably not a need for another dam downstream – if the Windom Dam had still been in place then Highway 62 would have likely flooded this summer. The DNR was worried about the sides of the dam – during the flooding they sandbagged the sides of the dam.
    - New Strategy: Work with the DNR to address issues at Talcot Dam in anticipation of more frequent future flood events. Specifically on the south side of the dam and control structure.
  - New Strategy: Raise road levels in areas prone to washing out during flood events. | Specific need at 360th Street near Delft (between sections 20 & 29) to slow water like a levee.
  - Klisch: The cost to replace township roads is often lower than the cost of upgrading/raising them.
    - It might be more helpful to replace culverts.
    - Raising roads can sometimes create a levee and thus problems with the floodplain and involvement with the DNR. This gets to be controversial.

    - New Strategy: Identify locations for and construct slow-release water retention basins. | Specifically for Windom and Bingham Lake, but potentially others.
- Erosion
    - Perkins Creek: Once the soil dried, it lost more soil. Trees fell in. It sounds like the DNR's plan is to allow the fallen trees to stop further erosion.
    - New Strategy: Work with DNR to address at-risk properties for erosion specifically.
    - New Strategy: Work with the local Watershed District to extend/finish the berm that has already been started. | The second phase of this was never finished because of a lack of funding. This would be in Northern Germantown Township, just south of the Redwood County line.
    - New Strategy: Place riprap or other techniques to stabilize banks along rivers in Cottonwood County. | County-wide. Specific need at Pat's Grove in Springfield Township along the Des Moines River.
- Severe Storms
    - New Strategy: Construct safe rooms at outdoor recreational facilities.
    - New Strategy: Place sirens at populated unincorporated areas including the community of Delft and the Talcot Lake campground.
        - Weather spotter training should touch on places like Delft and Talcot if those sirens would be hooked up to surrounding cities' sirens (such as Jeffers and Dundee, respectively).
        - The public doesn't know the difference between the two siren tones. Might this be an area for public education?
- Utility Failure
    - New Strategy: Place generators at water systems, including lift stations and well systems. | Well 10 is a specific concern.
- Water Supply Contamination
    - Fence off alternative supplies in water plants. Should this be a new strategy?

Next Steps

- Draft plan & team review online
- Public hearing plus bring plan to planning commission for comments
- Plan finalization
- HSEM & FEMA review
- Participating jurisdictions adopt plan by resolution.

Meeting #2 Deliverables

- Identified new mitigation strategies

Public Meeting Sign In Sheet

Date: 10/29/18 **Time Held:** 6:00 PM **to** 7:30 PM

City/ County Location: Windom, Cottonwood Co. **Purpose:** Hazard Mitigation Mtg. #2

PRINT NAME	SIGNATURE	COMMUNITY AFFILIATION
Paul Johnson	[illegible]	Cottonwood Co EM
Donna Gravley	Donna Gravley	Cottonwood CO Commish
Jim Jorgensen	[illegible]	Cottonwood Co S.O.S
Kevin Stevens	[illegible]	Cottonwood Co Commish
Donna Stresemann	[illegible]	Cottonwood Co Solid Waste
Karla Nelson	Karla Nelson	City of Storden
Valerie Halter	[illegible]	Germantown Twp.
Nick Klegh	[illegible]	Cottonwood County
Jed Flubee	[illegible]	Cottonwood County
Tim Conels	[illegible]	Mountain Lake Fire/Amb
Kevin Haggeseth	[illegible]	Springfield Twp
Laurie Bartsch	Laurie Bartsch	Carson Twp.
Roy SCHMIDT	Roy Schmidt	Carson Twp
Mark Redman	Mark Redman	City of Bingham Lake
Ryan Solcolotsky	[illegible]	City of Bingham Lake
Steve Nasby	[illegible]	City of Windom
Michael Schultz	[illegible]	City of Mountain Lake
David Van Loon	[illegible]	Westbrook Twp
Andrew Spielman	[illegible]	City of Windom
Tim Janzen	[illegible]	Mtn Lake Fire/Amb

Reported by: [illegible] **Agency:** SW Regional Development Commission

Signature

The value of participation by volunteer members of the public is $27.40/hour.

The Community Affiliation is if the attendee wish to state a public or private organization they are representing or if they are representing themselves.

Cottonwood County
All-Hazard Mitigation Plan Update

Planning Team Meeting #2

October 29, 2018

Cottonwood County Emergency Management

+

Southwest Regional Development Commission

Agenda

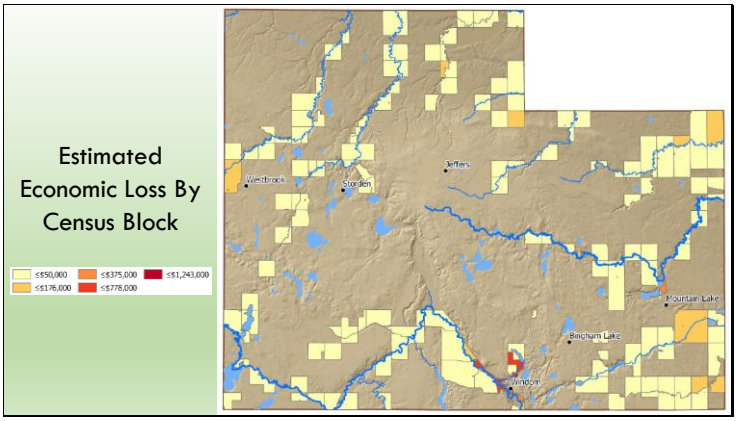
- HAZUS Flood Assessment
- Completed CPRI Rankings
- New Mitigation Strategies
  - What programs are already in place? Where are our current gaps?
- Next Steps

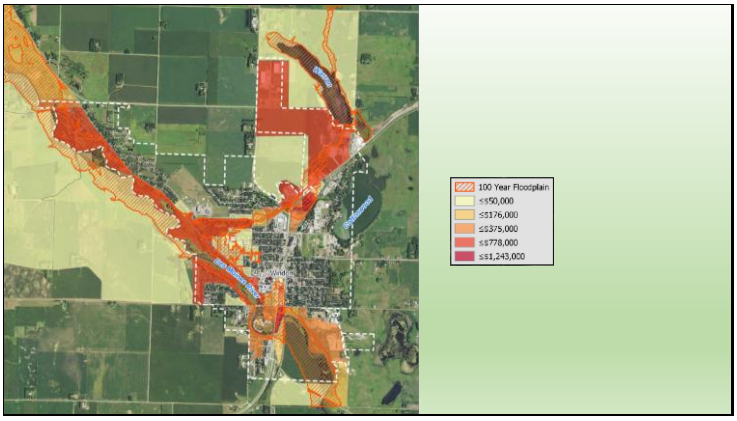
HAZUS Flood Assessment

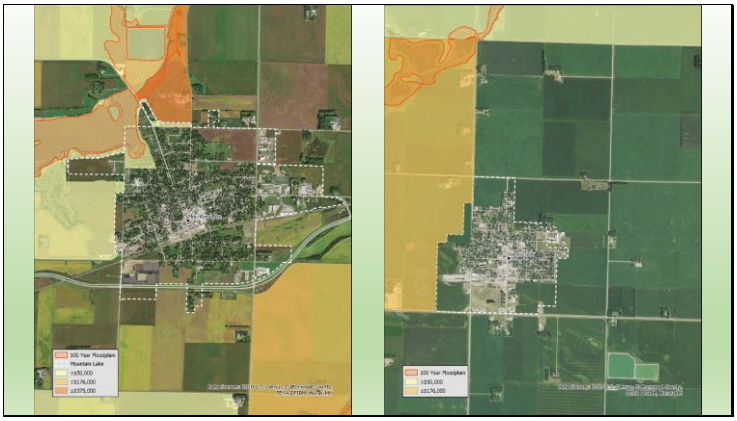
- 5,785 parcels in Redwood County with buildings on them.
  - 66 parcels' buildings will be at least moderately damaged (>10% damage) in a 100-year flood. 5 are estimated to be completely destroyed.
- Total Economic Loss: $51.74 million (25.5% of total replacement value of scenario buildings).
  - Total Building-Related Losses: $16.5 million
  - 68% of estimated losses were related to business interruption.
  - Residential occupancies made up 22.5% of total loss.

General Occupancy	Estimated Total Buildings	Total Damaged Buildings	Total Building Exposure	Total Economic Loss	Building Loss
Agricultural	1,142	0	$170,982,000	$16,242,000	$522,000
Commercial	417	12	$55,424,000	$23,276,000	$1,306,000
Education	0	0	$0	$0	$0
Government	0	0	$0	$0	$0
Industrial	92	0	$62,966,000	$586,000	$94,000
Religious/Non-Profit	0	0	$0	$0	$0
Residential	4,134	87	$314,081,000	$11,639,000	$3,685,000
Total	**5,785**	**99**	**$603,453,000**	**$51,743,000**	**$5,607,000**

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


Estimated Economic Loss By Census Block
≤$50,000
≤$176,000
≤$375,000
≤$778,000
≤$1,243,000
Westbrook
Storden
Jeffers
Mountain Lake
Bingham Lake
Windom


100 Year Floodplain
≤$50,000
≤$176,000
≤$375,000
≤$778,000
≤$1,243,000



Census Blocks of Concern

Census Block Number	Total Estimated Loss (Building's Value & Contents)	Location
270332704002024	$1,243,000	Windom
270332704003060	$920,000	Windom
270332703004012	$778,000	Windom

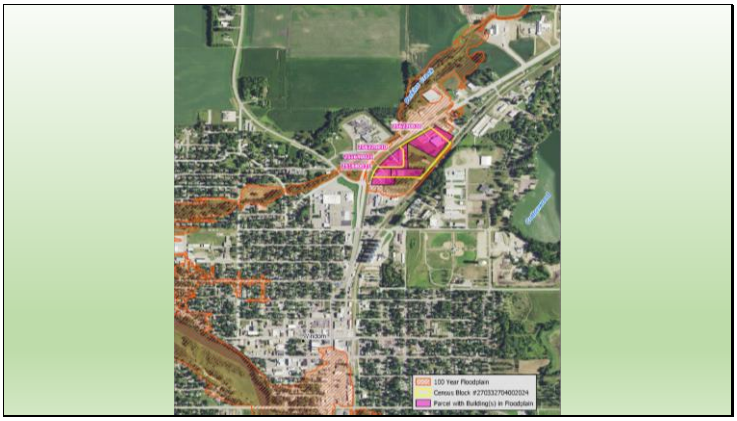
Table 2. Census Blocks with the greatest estimated losses in the 100-Year Floodplain

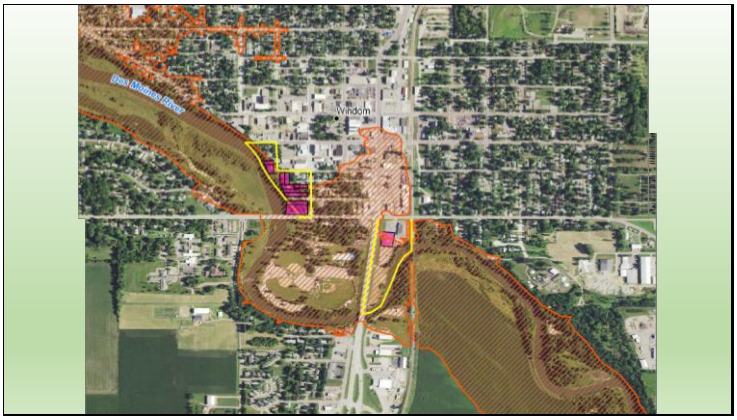
Parcels of Concern

Parcel ID	Total Value of Building(s) + Building's Contents on Parcel	Class Description	Building Area (ft^2)
120250500	$6,145,250	Industrial - Light	138,393
251030010	$3,064,200	Commercial – Retail Trade	45,757
256220010	$2,615,400	Commercial – Retail Trade	28,086
251640021	$2,429,600	Commercial – Retail Trade	12,101
256220030	$1,913,600	Commercial – Retail Trade	35,059
258200530	$1,630,000	Commercial – Retail Trade	8,257
251640060	$1,340,600	Commercial – Retail Trade	38,679
253540020	$976,600	Commercial – Retail Trade	4,209
160140300	$917,000	Agriculture	20,434
251640011	$913,200	Commercial – Retail Trade	11,893
Total	**$21,945,450**		

Table 3. Cottonwood County Properties with Highest Building/Contents Value with Potential Building Flood Damage

Table 3: Unable to use county GIS to find locations easily.


100 Year Floodplain
Census Block #270332704002024
Parcel with Building(s) in Floodplain


Windom

Essential Facility Loss

- None of Cottonwood County's essential facilities (care, fire, police, school) fall within the flood boundary.

Shelter Requirement

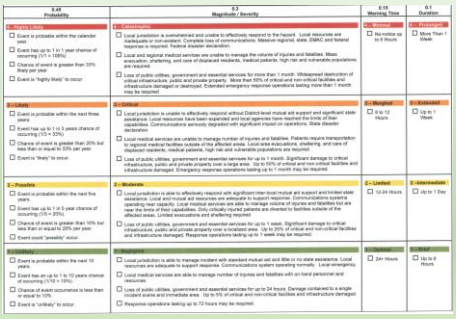
- 199 households are estimated to be displaced. 24 people estimated to seek temporary shelter in public shelters.

Debris Generation

- 3,779 tons of debris may be generated by a 100-year flood. It would require 152 truckloads to remove that debris.

Hazard Ranking – CPRI Worksheet

- Worksheet that allows each jurisdiction to rank the risk that each hazard poses to the jurisdiction.
  - Probability
  - Magnitude/Severity
  - Warning Time
  - Duration



0.45 Probability	0.3 Magnitude / Severity	0.15 Warning Time	0.1 Duration
4 – Highly Likely ☐ Event is probable within the calendar year. ☐ Event has up to 1 in 1 year chance of occurring (1/1 = 100%) ☐ Chance of event is greater than 33% likely per year ☐ Event is "highly likely" to occur	**4 – Catastrophic** ☐ Local jurisdiction is overwhelmed and unable to effectively respond to the hazard. Local resources are exhausted and local agencies have reached the limits of their capabilities. Massive regional, state, EMAC and federal response is required. Federal disaster declaration. ☐ Local and regional medical services are unable to manage the volume of injuries and fatalities. Mass evacuation, sheltering, and care of displaced residents, medical patients, high risk and vulnerable populations are required. ☐ Loss of public utilities, government and essential services for more than 1 month. Widespread destruction of critical infrastructure, public and private property. More than 50% of critical and non-critical facilities and infrastructure damaged or destroyed. Extended emergency response operations lasting more than 1 month may be required	**4 – Minimal** ☐ No notice up to 6 Hours	**4 – Prolonged** ☐ More Than 1 Week
3 – Likely ☐ Event is probable within the next three years ☐ Event has up to 1 in 3 years chance of occurring (1/3 = 33%) ☐ Chance of event is greater than 20% but less than or equal to 33% per year. ☐ Event is "likely" to occur	**3 – Critical** ☐ Local jurisdiction is unable to effectively respond without District-level mutual aid support and significant state assistance. Local resources have been expended and local agencies have reached the limits of their capabilities. Communications seriously degraded with significant impact on operations. State disaster declaration. ☐ Local medical services are unable to manage number of injuries and fatalities. Patients require transportation to regional medical facilities outside of the affected areas. Local-area evacuations, sheltering, and care of displaced residents, medical patients, high risk and vulnerable populations are required. ☐ Loss of public utilities, government and essential services for up to 1 month. Significant damage to critical infrastructure, public and private property over a large area. Up to 50% of critical and non-critical facilities and infrastructure damaged. Emergency response operations lasting up to 1 month may be required	**3 – Marginal** ☐ 6 to 12 Hours	**3 – Extended** ☐ Up to 1 Week
2 – Possible ☐ Event is probable within the next five years. ☐ Event has up to 1 in 5 year chance of occurring (1/5 = 20%) ☐ Chance of event is greater than 10% but less than or equal to 20% per year. ☐ Event could "possibly" occur.	**2 – Moderate** ☐ Local jurisdiction is able to effectively respond with significant inter-local mutual aid support and limited state assistance. Local and mutual aid resources are adequate to support response. Communications systems operating near capacity. Local medical services are able to manage volume of injuries and fatalities but are near the limits. Local emergency services and medical patients are diverted to facilities outside of the affected areas. Limited evacuations and sheltering required. ☐ Loss of public utilities, government and essential services for up to 1 week. Significant damage to critical infrastructure, public and private property over a localized area. Up to 25% of critical and not-critical facilities and infrastructure damaged. Response operations lasting up to 1 week may be required.	**2 – Limited** ☐ 12-24 Hours	**2 – Intermediate** ☐ Up to 1 Day
1 – Unlikely ☐ Event is probable within the next 10 years. ☐ Event has an up to 1 in 10 years chance of occurring (1/10 = 10%) ☐ Chance of event occurrence is less than or equal to 10% ☐ Event is "unlikely" to occur.	**1 – Negligible** ☐ Local jurisdiction is able to manage incident with standard mutual aid and little or no state assistance. Local resources are adequate to support response. Communications system operating normally. Local emergency resources are adequate. ☐ Local medical services are able to manage number of injuries and fatalities with on hand personnel and resources. ☐ Loss of public utilities, government and essential services for up to 24 hours. Damage contained to a single incident scene and immediate area. Up to 5% of critical and non-critical facilities and infrastructure damaged. ☐ Response operations lasting up to 72 hours may be required.	**1 – Delayed** ☐ 24+ Hours	**1 – Brief** ☐ Up to 6 Hours

CPRI Risk Index

(Preliminary – Still need: Comfrey, Jeffers, Westbrook)

- Highest Ranked
  - Tornado
  - Winter Storm
  - Windstorm
  - Hail
  - Lightning
- Lowest Ranked
  - Landslide/Mudslide
  - Subsidence
  - Erosion
  - Dam Failure
  - Earthquake

Type	Threat/Hazard/Technological Accident - do not alter alphbetical order - calulation in next categories are tied to the order of the hazards	Probability	Magnitude/Severity	Warning Time	Duration	
Natural Hazards	Flood (Riverine)	1.59	1.76	1.47	2.76	1.74
Natural Hazards	Flash Flood	2.24	2.18	2.54	2.35	2.27
Natural Hazards	Dam Failure	1.13	1.93	2.13	2.07	1.62
Natural Hazards	Tornado	2.59	3.59	3.42	2.74	3.03
Natural Hazards	Wildfire	1.71	1.94	3.24	2.18	2.05
Natural Hazards	Windstorm	3.29	2.25	2.88	2.26	2.82
Natural Hazards	Winter Storm	3.71	2.24	2.24	2.77	2.95
Natural Hazards	Lightning	3.12	1.88	3.41	2.18	2.70
Natural Hazards	Hail	3.35	1.82	3.35	2.01	2.76
Natural Hazards	Drought	2.18	1.59	1.42	3.48	2.02
Natural Hazards	Extreme Heat	2.88	1.76	1.77	2.77	2.37
Natural Hazards	Extreme Cold	3.06	1.71	1.71	2.94	2.44
Natural Hazards	Erosion	1.64	1.21	1.36	2.29	1.54
Natural Hazards	Subsidence	1.07	1.43	2.57	1.93	1.49
Natural Hazards	Landslide/Mudslide	1.07	1.27	2.53	1.73	1.41
Natural Hazards	Earthquake	1.06	2.13	2.88	1.94	1.74

Mitigation Strategies (Handout)

- Carryover Strategies
- Deleted/Completed Strategies
- New Strategies Discussion
  - Mitigation Ideas (https://www.fema.gov/media-library-data/20130726-1904-25045-0186/fema_mitigation_ideas_final508.pdf)

While only cities passed resolutions of participation in the plan, any townships can also participate and are encouraged to participate if they have specific hazard mitigation needs.

Discussion: Hazards to Include for Mitigation

NATURAL
- Drought
- Erosion
- Extreme Temperatures
- Flood (+ Dam Failure)
- Hail
- Lightning
- Severe/Straight-Line Wind
- Severe Winter Weather
- Landslide
- Tornado
- Wildfire

MAN-MADE
- Agricultural Disease (animal/crop)
- Civil Disturbance
- Hazardous Materials
- Public Health & Infectious Disease
- Structure Fire
- Utility Failure
- Water Supply Contamination

No strategies yet for those in blue.

FOCUS: Those in blue and flooding. Any others they want to touch on.

Mitigation Strategies

- **Prevention:** Government, administrative, or regulatory actions.
- **Property Protection:** Removal or modification of existing buildings or structures to protect them from a hazard.
- **Public Education and Awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.
- **Natural Resource Protection:** Actions that minimize hazard losses and preserve or restore the functions of natural systems.
- **Emergency Services:** Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.
- **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard, for example: floodwalls, safe rooms.

Mitigation Actions Eligible for HMA

1. Retrofit or construction of safe room facilities to protect public during extreme wind events.
2. Purchase of generators for backup power to support the operation of essential function in critical facilities in the event of severe storms.
3. Burying or strengthening of power lines to reduce the risk of power outages from downed lines during a severe storm.
4. Install new warning systems in identified vulnerable locations
5. Mitigation measures to reduce the threat of wildfire.
6. Infrastructure retrofit for flood prone areas.
7. Minor localized flood reduction projects to lessen the frequency of severity of flooding and decrease predicted flood damages.
8. Relocate flood-prone properties or acquire and demolish flood prone properties.
9. Dry-proof or wet-proof facilities that are flood prone.

•Retrofit or construction of safe room facilities to protect public during extreme wind events.

- Locations may include schools, mobile home parks, campgrounds, or other areas where there are populations vulnerable to high winds and tornado events.

•Purchase of generators for backup power to support the operation of essential function in critical facilities in the event of severe storms.

- Critical facilities may include police and fire stations, hospitals, and water and sewer treatment facilities, and other facilities that the county deems critical.

•Burying or strengthening of power lines to reduce the risk of power outages from downed lines during a severe storm.

- Where it is feasible and cost-effective as part of new construction or retrofit.

•Install new warning systems in identified vulnerable locations

- Used to alert people in high-risk, vulnerable areas such as campgrounds, parks and rural residents out of reach of other existing warning siren systems to approaching severe weather.

•Mitigation measures to reduce the threat of wildfire.

- Activities such as creation of defensible space, application of ignition-resistant construction, hazardous fuels reduction, and installation of external wildfire sprinkler systems.

•Infrastructure retrofit for flood prone areas.

- To make mitigation improvements for structures such as culverts, road, bridges, and government buildings.

•Minor localized flood reduction projects to lessen the frequency of severity of flooding and decrease predicted flood damages.

- Such as installation or modification of culverts; stormwater management activities, such as creating retention and detention basins, protection of sanitary sewer lift stations in flood-prone areas, installation of flow-rate meters (stream gauges) on rivers and streams that are prone to flooding high-risk, vulnerable properties.

•Relocate flood-prone properties or acquire and demolish flood prone properties.

- Located in the special flood hazard area and outside of the special flood hazard area.

•Dry-proof or wet-proof facilities that are flood prone.

- Reduce potential infrastructure flood damages on utilities such as wastewater treatment, pipelines, and power facilities by dry-proofing or wet-proofing facilities that are flood prone.

Next Steps

- Subcommittees (Online)
  - Mitigation Strategies Subcommittee
  - Plan Review Subcommittee
- Finalize Plan
- Public Hearing & Comment Period (30 Days)
- All participating jurisdictions must adopt the plan by resolution in order to be eligible for Hazard Mitigation Assistance.
  - Once Cottonwood County has adopted the plan, it will be reviewed by HSEM and FEMA, any changes will be made, and the plan will be finalized.

Redwood County AHMP Contacts:

Paul Johnson
Emergency Management Director – Cottonwood County
902 5th Ave, Windom, MN 56101
paul.johnson@co.cottonwood.mn.us | 507-832-8255

Maxwell Kaufman
Development Planner – Southwest Regional Development Commission
2401 Broadway Ave, Slayton, MN 56172
maxk@swrdc.org | 507-836-1633

Appendix E - Public Meeting Notices and Comments

Cottonwood County Hazard Mitigation Plan
Public Hearing
5/21/2019 | 10:05 – 10:35 AM | Cottonwood County Courthouse, Windom, MN

Notes

- Emergency Management Director, Paul Johnson, provided an overview of the plan to members of the public who attended. This included a breakdown of the plan contents and the planning process.
- SRDC Development Planner, Maxwell Kaufman, noted the highest ranked natural hazards (tornado, winter storm, windstorm, lightning, and hail) per the planning team's Calculated Priority Risk Index.
- Members of the public asked general questions about Hazard Mitigation Assistance funds, frequency of plan updates, and the utility of the hazard mitigation plan.
- Cottonwood County Commissioners in attendance expressed their thanks for the work done on this plan and asked questions about next steps. Johnson and Kaufman explained the approval process and what the Commission and cities can expect in terms of adopting the plan by resolution.
- No suggestions for specific changes to the plan were made during the public hearing.

Comments were received through email and the online survey. Comments received were incorporated into the planning process. Comments dealt with the priorities of hazards within the county and where the County's limited resources good best be put to use. The online survey asked 50 questions and identified the following 5 topics as the most important with 75% of respondents rating these a 3 on a scale of 1 to 3, with 3 being the most important.

<u>Work with critical facilities such as hospitals and rural water suppliers to assure access to back-up power generation.</u>

<u>Provide information to public and private employers, schools and hospitals about potential infectious disease threats and prevention measures.</u>

<u>Continue to enforce building code for new construction.</u>

<u>Construct safe rooms at outdoor recreational facilities.</u>

<u>Place riprap or use other techniques to stabilize banks along rivers in Cottonwood County.</u>

Public hearing on

Proposed Cottonwood County All Hazard Mitigation Plan 2019 Update

The Cottonwood County Board of Commissioners will conduct a public hearing on Tuesday, May 21, commencing at 10:05 a.m., in the County Commissioner's Meeting Room, Cottonwood County Courthouse 900 3rd Ave. Windom, MN, to take public comment on the proposed Cottonwood County All Hazard Mitigation Plan 2019 update.

A copy of the proposed plan update is available for review during normal business hours at the Cottonwood County Emergency Management Office, located in the Cottonwood County Law Enforcement Center, Windom, MN, and on the Cottonwood County Website https://www.co.cottonwood.mn.us/county-departments/emergency-management/events/.

All interested parties are invited to attend. If you are unable to attend, any comments or questions may be submitted in writing by Monday, June 3, 2019, to the Cottonwood County Emergency Management Office, 902 5th Ave, Windom, MN 56101, or via email to Paul Johnson: paul.johnson@co.cottonwood.mn.us.

Public Meeting Sign In Sheet

Date: 5/21/19 Time Held: 10:05 to 10:35 AM

City/ County Location: Windom, MN Purpose: Hoz Mit. Public Hearing

PRINT NAME	SIGNATURE	COMMUNITY AFFILIATION
Donna Gradley	Donna J. Gradley	Comm.
THOMAS D. APPEL	Thomas D. Appel	CO. COMMISSIONER
Kelly Thongvivong	Kelly Thongvivong	County Coordinator
Norm Nelson	Norm Nelson	Commissioner
~~Kelly~~ Kevin Stevens	Kevin Stevens	Commissioner
Larry Anderson	Larry Anderson	Commissioner
Jan Johnson	Jan Johnson	Auditor / Treas.
Kathy Marsh	Kathy Marsh	County Employee
Rahn Larsur	Rahn Larsur	Citizen Newspaper
Bipin Thapa	Bipin Thapa	Citizen.
Mark Jay-Dixon	Mark Jay-Dixon	work in county - Big Bend Wind
Andrew Olson	Andrew T. Olson	Citizen
Emily Wegener	Emily Wegener	—
Brian Hopwood	Brian Hopwood	Citizen
Mack Miller	Mack Miller	Citizen

Reported by: Mark Kempf Agency: SRDC
Signature

The value of participation by volunteer members of the public is $27.58/hour.

The Community Affiliation is if the attendee wish to state a public or private organization they are representing or if they are representing themselves.

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Appendix F - Completed and Deleted Actions from the 2011 Plan

Hazard	Mitigation Action	Priority	Status	Jurisdictions	Responsibility	Cottonwood County Comments	Estimated Cost
Hazardous Materials – Prevention	Work with state & local partners to implement and update Local Water Management Plan.	High	Complete	Cottonwood County	CCEO, SWCD, RWS, BWSR, DNR	Complete.	Medium
Severe Winter Storms— Blizzards & Extreme Cold – Prevention	Encourage road authorities to work with farmers to prevent cropping in road ROW.	Moderate	Complete	Cottonwood County	CCHWY, Twp	This is law now.	Low
Fires— Structures and Wildfires – Emerg Svcs	Continue to use mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives.	Low	Complete	Cottonwood County, Bingham Lake, Comfrey, Jeffers, Mountain Lake, Storden, Westbrook, Windom	ALL	County-wide mutual aid agreement. Southwest region is working on a mutual aid agreement. Complete?	Low
Fires— Structures and Wildfires – Emerg Svcs	Continue to use mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives.	Low	Complete	Cottonwood County, Bingham Lake, Comfrey, Jeffers, Mountain Lake, Storden, Westbrook, Windom	ALL	County-wide mutual aid agreement. Southwest region is working on a mutual aid agreement. Complete?	Low
Mitigation Plan Maintenance – Prevention	Budget to perform additional data collection and analysis to identify vulnerable structures in specific detail in next plan update.	Low	Complete	Cottonwood County	CCEM, CCEO		Medium
Mitigation Plan Maintenance – Prevention	Budget to perform additional data collection and analysis to identify vulnerable structures in specific detail in next plan update.	Low	Complete	Cottonwood County	CCEM, CCEO		Medium
Mitigation Plan Maintenance – Prevention	Budget to perform estimates of potential monetary loses to structures, contents and functions in specific detail in next plan update.	Low	Complete	Cottonwood County	CCEM	All cities have insurance for public structures. The value is determined by city or company depending on city.	Medium
Flooding and Dam Failure – Natural Resources	Promote buffer system along creeks and streams that are prone to flooding (e.g. grass strips, CRP).	Moderate	Complete	Cottonwood County	SWCD, BWSR, Watershed Districts	With the change in state law to require buffers, this is complete.	Medium

Hazard	Mitigation Action	Priority	Status	Jurisdictions	Responsibility	Cottonwood County Comments	Estimated Cost
Public Health and Infectious Disease – Awareness	Develop a County quarantine plan, in coordination with local doctors and other health professionals in the county.	Moderate	Complete	Cottonwood County	DVHHS, CCSO, EMS, Fire, Hosp, CCEM	Isolation and quarantine plan has been developed and includes how quarantined individuals will receive essential services.	Low

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Appendix G – Mitigation Actions by Jurisdiction

Table G-1: Mitigation Actions for the City of Bingham Lake
Figure G-1: CPRI for the City of Bingham Lake

Table G-2: Mitigation Actions for the City of Comfrey
Figure G2: CPRI for the City of Comfrey

Table G-3: Mitigation Actions for the City of Jeffers
Figure G-3: CPRI for the City of Jeffers

Table G-4: Mitigation Actions for the City of Mountain Lake
Figure G-4: CPRI for the City of Mountain Lake

Table G-5: Mitigation Actions for the City of Storden
Figure G-5: CPRI for the City of Storden

Table G-6: Mitigation Actions for the City of Westbrook
Figure G-6: CPRI of the City of Westbrook

Table G-7: Mitigation Actions for the City of Windom
Figure G-7: CPRI for the City of Windom

Table G-1: Mitigation Actions for the City of Bingham Lake

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
1	Tornado and Straight-line Winds – Structural	Improve the weather warning system in at least one community each year	High	In Progress	2019-2026	Cottonwood County, Bingham Lake	CCEM, CCEO, CCSO, Bingham Lake City Administration	Sirens were updated in Windom and added to industrial park. Bingham Lake sirens updated and added 1. County uses Civic Ready text alerts.	$15,000-$25,000 depending on location and power source.
2	Tornado and Straight-line Winds – Awareness	Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, preferably with Specific Alert Message Encoding (SAME) capability.	High	Ongoing	2019-2024	Cottonwood County, Bingham Lake	CCEM, Bingham Lake City Administration	Hy-Vee does promotional events there with Paul programming radios. Ongoing status.	Citizens can purchase them for $15-$100. CCEM will program for free
6	Tornado and Straight-line Winds – Prevention	Encourage residents to use licensed contractors.	High	Ongoing	2019-2029	Bingham Lake	Bingham Lake City Clerk		EM time to educate residents
8	Tornado and Straight-line Winds – Awareness	Educate public about benefit of safe rooms and funding sources available.	High	Carried Over	2019-2029	Cottonwood County, Bingham Lake	CCEM, CCEO, Bingham Lake Fire Department		EM time to research and educate the public.
19	Severe Winter Storms—Blizzards & Extreme Cold – Prevention	Work with MnDOT / local road authorities to identify and improve hazardous intersections and bridges.	Moderate	Ongoing	2019-2024	Cottonwood County, Bingham Lake	CCHWY, Bingham Lake Public Works, Bingham lake City Engineer	Highway 60 work is happening.	Staff time, plus potentially millions of dollars for road constr. To fix the issues
25	Drought / Extreme Heat – Prevention	Educate the public on the importance of wellhead protection and water conservation.	Low	Ongoing	2019-2024	Cottonwood County, Bingham Lake	CCEO, SWCD, RWS, BWSR, Bingham Lake Public Works	Windom, ongoing: Water bans, low flow aerators distributed.	Staff time to educate the public.

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
26	Severe Summer Storms—Lightning & Hail / Earthquake – Awareness	Participate in "Severe Weather Awareness Week" each spring.	Low	Ongoing	2019-2029	Cottonwood County, Bingham Lake	CCEM, Bingham Lake Fire Department	EMD posts on social media for this. Participate in statewide tornado drill (all sirens sounded in the county).	Budget around $2,000 per year for Radio/ Newspaper Advertisements
44	Flooding and Dam Failure – Prevention	Additional tile for the City of Bingham Lake to mitigate street flooding that occurs with heavy rain. Currently, there is a 6" line, which is inadequate. It would empty into a county ditch, which would need to be improved. There is also research needed into water retention ponds if the ditch cannot handle the water	Moderate	New	2019-2029	Cottonwood County, Bingham Lake	SWCD, CCEO, CCA, CCEM, Bingham Lake City Engineer and Public Works		Rough estimate of $250,000 as of 2018 for the tile line. If retention is needed, land acquisition at $6,000-$9,000 an acre plus construction.

City of Bingham Lake

Figure G-1: CPRI for the City of Bingham Lake

Type	Threat/ Hazard/ Technological Accident	Probability	Magnitude/ Severity	Warning Time	Duration	Risk Index
Natural Hazards	Flood (Riverine)	1	1	1	4	0
Natural Hazards	Flash Flood	1	3	2	4	0
Natural Hazards	Dam Failure	1	1	1	1	0
Natural Hazards	Tornado	3	4	4	4	0
Natural Hazards	Wildfire	2	2	4	1	0
Natural Hazards	Windstorm	3	2	4	1	0
Natural Hazards	Winter Storm	4	2	2	3	0
Natural Hazards	Lightning	3	1	4	1	0
Natural Hazards	Hail	3	1	4	1	0
Natural Hazards	Drought	1	1	1	4	0
Natural Hazards	Extreme Heat	2	1	3	3	0
Natural Hazards	Extreme Cold	2	1	3	3	0
Natural Hazards	Erosion	—	—	—	—	0
Natural Hazards	Subsidence	—	—	—	—	0
Natural Hazards	Landslide/Mudslide	—	—	—	—	0
Natural Hazards	Earthquake	—	—	—	—	0

PrD = Property Damage

CrD = Crop Damage

Table G-2: Mitigation Actions for the City of Comfrey

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
1	Tornado and Straight-line Winds – Structural	Improve the weather warning system in at least one community each year	High	In Progress	2019-2026	Cottonwood County, Comfrey	CCEM, CCEO, CCSO, Comfrey City Administration	Sirens were updated in Windom and added to industrial park. Bingham Lake sirens updated and added 1. County uses Civic Ready text alerts.	$15,000-$25,000 depending on location and power source.
2	Tornado and Straight-line Winds – Awareness	Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, preferably with Specific Alert Message Encoding (SAME) capability.	High	Ongoing	2019-2024	Cottonwood County, Comfrey	CCEM, Comfrey City Administration	Hy-Vee does promotional events there with Paul programming radios. Ongoing status.	Citizens can purchase them for $15-$100. CCEM will program for free
6	Tornado and Straight-line Winds – Prevention	Encourage residents to use licensed contractors.	High	Ongoing	2019-2029	Comfrey	Comfrey City Clerk		EM time to educate residents
8	Tornado and Straight-line Winds – Awareness	Educate public about benefit of safe rooms and funding sources available.	High	Carried Over	2019-2029	Cottonwood County, Comfrey	CCEM, CCEO, Comfrey Fire Department		EM time to research and educate the public.
19	Severe Winter Storms—Blizzards & Extreme Cold – Prevention	Work with MnDOT / local road authorities to identify and improve hazardous intersections and bridges.	Moderate	Ongoing	2019-2024	Cottonwood County, Comfrey	CCHWY, Comfrey Public Works, City Engineer	Highway 60 work is happening.	Staff time, plus potentially millions of dollars for road constr. To fix the issues

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
26	Severe Summer Storms—Lightning & Hail / Earthquake – Awareness	Participate in "Severe Weather Awareness Week" each spring.	Low	Ongoing	2019-2029	Cottonwood County, Comfrey	CCEM, Comfrey Fire Department	EMD posts on social media for this. Participate in statewide tornado drill (all sirens sounded in the county).	Budget around $2,000 per year for Radio/ Newspaper Advertisements
33	Flooding and Dam Failure – Prevention	Work with FEMA to modernize floodplain maps.	Moderate	In Progress	2019-2024	Cottonwood County, Comfrey	CCEO, Comfrey City Administration, DNR		Locally, staff time to review the maps, possibly hire an engineer to contest the proposed maps.
34	Flooding and Dam Failure – Prevention	Review and update floodplain protection in zoning ordinance.	Moderate	In Progress	2019-2024	Cottonwood County, Comfrey	CCEO, Comfrey City Administration	Updated in 2015 comp plan. Mountain Lake in NFIP with flood plain ordinance. Storden in process. Bingham Lake is reviewing – no decision.	Staff time to update and review the ordinance, costs to enforce the ordinance could be $100,000 per year, depending on enforcement by building officials.
36	Flooding and Dam Failure – Awareness	Educate and encourage property owners and insurance agents on purchasing flood insurance.	Moderate	Ongoing	2019-2029	Cottonwood County, Comfrey	DNR, CCEO, Comfrey City Clerk	Mountain Lake adopted flood plain ordinance in 2017.	Staff time to research and develop materials for the public.

Figure G-2: CPRI for the City of Comfrey

City Of Comfrey

Type	Threat/Hazard/ Technological Accident	Probability	Magnitude/Severity	Warning Time	Duration	Risk Index
Natural Hazards	Flood (Riverine)	1	1	1	1	
Natural Hazards	Flash Flood	2	2	2	2	
Natural Hazards	Dam Failure	1	1	1	1	
Natural Hazards	Tornado	2	3	4	4	
Natural Hazards	Wildfire	1	1	4	2	
Natural Hazards	Windstorm	3	2	4	2	
Natural Hazards	Winter Storm	3	2	4	2	
Natural Hazards	Lightning	3	2	4	1	
Natural Hazards	Hail	2	1	4	1	
Natural Hazards	Drought	2	1	1	4	
Natural Hazards	Extreme Heat	3	1	1	4	
Natural Hazards	Extreme Cold	3	1	1	4	
Natural Hazards	Erosion	1	1	1	1	
Natural Hazards	Subsidence (Sink Hole)	1	1	1	1	
Natural Hazards	Landslide/Mudslide	1	1	1	1	
Natural Hazards	Earthquake	1	1	1	1	

Paul Johnson <Paul.Johnson@co.cottonwood.mn.us> | Jay Trusty | 11/19/2019

FW: Hazard Mitigation Planning Team Request

You replied to this message on 11/19/2019 2:27 PM.

SECURITY NOTICE:
This email originated from an external sender. Exercise caution before clicking on any links or attachments and consider whether you know the sender. For more information please contact IT support.

Here is another one I got from Comfrey.

Paul

From: Tammy Kelly <comfreyclerk@frontiernet.net>
Sent: Tuesday, October 10, 2017 11:36
To: Paul Johnson <Paul.Johnson@co.cottonwood.mn.us>
Subject: Re: Hazard Mitigation Planning Team Request

Paul - Steve Berberich (personal cell 507-227-0479) who is our public works director and fire chief or John Schmitt (personal cell 507-220-3376) who is our emergency management director will plan on attending the meetings. If you prefer email, you can email me and I can get them the info as neither one of them have an email address they check often enough.

Please let me know if you have any other questions.
Thanks,
Tammy

Tammy Kelly
Clerk/Treasurer, City of Comfrey
PO Box 175
Comfrey, MN 56019
Ph: 507-877-2665
Fax: 507-877-4071
comfreyclerk@frontiernet.net

Paul Johnson <Paul.Johnson@co.cottonwood.mn.us> | Jay Trusty | 11/19/2019

FW: Hazard Mitigation Planning Team Request

You replied to this message on 11/19/2019 2:27 PM.

From: Tammy Kelly [mailto:comfreyclerk@frontiernet.net]
Sent: Wednesday, October 04, 2017 2:34 PM
To: Paul Johnson
Subject: Re: Hazard Mitigation Planning Team Request

Hi Paul - We have our council meeting tomorrow and I have this on our meeting agenda. Are you looking for more than one member from Comfrey? Would the meetings be held during the day or evening and do you know roughly how often you would meet?

Thanks for any additional info you can provide!
Tammy

Tammy Kelly
Clerk/Treasurer, City of Comfrey
PO Box 175
Comfrey, MN 56019
Ph: 507-877-2665
Fax: 507-877-4071
comfreyclerk@frontiernet.net

From: Paul Johnson
Sent: Friday, September 29, 2017 3:36 PM
To: dnichols@windom-mn.com ; Wendy Meyer ; Katie Steen ; Sharen Goeman ; Karla Nelson (stordencity@live.com) ; comfreyclerk@frontiernet.net
Subject: Hazard Mitigation Planning Team Request

Good Afternoon,

Cottonwood County is in the process of updating its Hazard Mitigation Plan. The last time this was done was 2010-2011, and the plan is usually updated every 5 to 6 years. Some of you participated on the planning team in the past, and I am inquiring if there is interest in participating this time around. We have people from the county involved like myself, the county attorney, Environmental, Public Works, County Administrator, and the Sheriff. Windom will also have their planning and zoning and others involved as well too. I am hoping someone from your city would be willing to attend these meetings. City Clerks, police, fire, or ambulance personnel, public works, or elected officials would be good to send.

Paul Johnson <Paul.Johnson@co.cottonwood.mn.us> | Jay Trusty | 2 | 11/19/2019

FW: Hazard Mitigation Plan information

City Of Comfrey - Threat Risk.docx
13 KB

Mitigation Strategies Comfrey.docx
21 KB

From: Comfrey Clerk <comfreyclerk@frontiernet.net>
Sent: Friday, April 26, 2019 10:32
To: Paul Johnson <Paul.Johnson@co.cottonwood.mn.us>
Subject: Re: Hazard Mitigation Plan information

Hi Paul - Here is our best attempt to complete the information you are looking for. Please let us know if you have any questions or if we did not do something correctly.
Thanks,
Tammy

Tammy Kelly
Clerk/Treasurer, City of Comfrey
PO Box 175
Comfrey, MN 56019
Ph: 507-877-2665
Fax: 507-877-4071
comfreyclerk@frontiernet.net

Table G-3: Mitigation Actions for the City of Jeffers

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
1	Tornado and Straight-line Winds – Structural	Improve the weather warning system in at least one community each year	High	In Progress	2019-2026	Cottonwood County, Jeffers, Mountain Lake, Storden, Westbrook, Windom	CCEM, CCEO, CCSO, City of Jeffers	Sirens were updated in Windom and added to industrial park. Bingham Lake sirens updated and added 1. County uses Civic Ready text alerts.	$15,000-$25,000 depending on location and power source.
2	Tornado and Straight-line Winds – Awareness	Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, preferably with Specific Alert Message Encoding (SAME) capability.	High	Ongoing	2019-2024	Cottonwood County, Jeffers,	CCEM, Jeffers City Administration	Hy-Vee does promotional events there with Paul programming radios. Ongoing status.	Citizens can purchase them for $15-$100. CCEM will program for free
8	Tornado and Straight-line Winds – Awareness	Educate public about benefit of safe rooms and funding sources available.	High	Carried Over	2019-2029	Cottonwood County, Jeffers	CCEM, CCEO, Jeffers City Administration		EM time to research and educate the public.
19	Severe Winter Storms—Blizzards & Extreme Cold – Prevention	Work with MnDOT / local road authorities to identify and improve hazardous intersections and bridges.	Moderate	Ongoing	2019-2024	Cottonwood County, Jeffers	CCHWY, Jeffers Public Works, City Engineer	Highway 60 work is happening.	Staff time, plus potentially millions of dollars for road constr. To fix the issues
25	Drought / Extreme Heat – Prevention	Educate the public on the importance of wellhead protection and water conservation.	Low	Ongoing	2019-2024	Cottonwood County, Jeffers	CCEO, SWCD, RWS, BWSR, Jeffers Public Works	Windom, ongoing: Water bans, low flow aerators distributed.	Staff time to educate the public.

Figure G-3: CPRI for the City of Jeffers

City Of Jeffers

Type	Threat/Hazard/ Technological Accident	Probability	Magnitude/Severity	Warning Time	Duration	Risk Index
Natural Hazards	Flood (Riverine)	1	1	2	3	
Natural Hazards	Flash Flood	3	2	2	2	
Natural Hazards	Dam Failure	1	1	2	1	
Natural Hazards	Tornado	3	4	4	4	
Natural Hazards	Wildfire	2	1	4	1	
Natural Hazards	Windstorm	4	2	4	3	
Natural Hazards	Winter Storm	4	1	1	2	
Natural Hazards	Lightning	4	1	4	1	
Natural Hazards	Hail	3	1	4	1	
Natural Hazards	Drought	1	1	1	4	
Natural Hazards	Extreme Heat	3	1	1	3	
Natural Hazards	Extreme Cold	4	2	1	3	
Natural Hazards	Erosion	1	1	1	2	
Natural Hazards	Subsidence (Sink Hole)	1	1	3	1	
Natural Hazards	Landslide/Mudslide	1	1	1	1	
Natural Hazards	Earthquake	1	1	4	1	

Table G-4: Mitigation Actions for the City of Mountain Lake

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
1	Tornado and Straight-line Winds – Structural	Improve the weather warning system in at least one community each year	High	In Progress	2019-2026	Cottonwood County, Mountain Lake	CCEM, CCEO, CCSO, Mountain Lake City Administration	Sirens were updated in Windom and added to industrial park. Bingham Lake sirens updated and added 1. County uses Civic Ready text alerts.	$15,000-$25,000 depending on location and power source.
2	Tornado and Straight-line Winds – Awareness	Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, preferably with Specific Alert Message Encoding (SAME) capability.	High	Ongoing	2019-2024	Cottonwood County, Mountain Lake	CCEM, Mountain Lake City Administration	Hy-Vee does promotional events there with Paul programming radios. Ongoing status.	Citizens can purchase them for $15-$100. CCEM will program for free
6	Tornado and Straight-line Winds – Prevention	Encourage residents to use licensed contractors.	High	Ongoing	2019-2029	Mountain Lake	Mountain Lake City Clerk		EM time to educate residents
7	Tornado and Straight-line Winds – Emerg Svcs	Plan for designated long-term shelter location(s) in case of disaster event.	High	Revised	2019-2024	Cottonwood County, Mountain Lake	CCEM, Mountain Lake City Administration	Bingham Lake community center. Westbrook Community center/school. Windom LEC & BARC.	Time for EM to partner with locations for shelter.
8	Tornado and Straight-line Winds – Awareness	Educate public about benefit of safe rooms and funding sources available.	High	Carried Over	2019-2029	Cottonwood County, Mountain Lake	CCEM, CCEO, Mountain Lake City Clerk		EM time to research and educate the public.

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
17	Ag Disease – Prevention	Monitor invasive insect species, including emerald ash borer.	Moderate	Ongoing	2019-2029	Cottonwood County, Mountain Lake	CCEO, Mountain Lake Public Works, MDA, Ext	Always giving reports. UMN Extension is doing a training and parks might send one. Windom and Mountain Lake have tree commissions that plant trees and work to remove infested trees.	Staff time
19	Severe Winter Storms—Blizzards & Extreme Cold – Prevention	Work with MnDOT / local road authorities to identify and improve hazardous intersections and bridges.	Moderate	Ongoing	2019-2024	Cottonwood County, Mountain Lake	CCHWY, Mountain Lake Public Works, City Engineer	Highway 60 work is happening.	Staff time, plus potentially millions of dollars for road constr. To fix the issues
21	Severe Winter Storms—Blizzards & Extreme Cold – Prevention	Encourage property owners to maintain landscaping distances to overhead power lines.	Moderate	Revised & Ongoing	2019-2029	Cottonwood County, Mountain Lake,	CCEO, Mountain Lake City Administration, Utilities	Windom walks the system once per year. Mountain Lake has a utility tree program – trees near power lines are removed & paid for by the Electric Department – replacement trees are small and will not ever reach the power line.	Staff time to walk and check the grid, trim where necessary, and costs of removal and replacement trees

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
22	Severe Winter Storms—Blizzards & Extreme Cold – Protection	Require utility providers to have power lines buried and/or hardened against hazards, where feasible.	Moderate	Ongoing	2019-2034	Cottonwood County, Mountain Lake	CCEM, CCEO, Mountain Lake City Administration, Utilities	Within wind farms the lines are underground then the transmission lines are above. REA doesn't want to bury anymore because of complications once they are there. The City of Windom is burying theirs and its 70% underground. Mt. Lake Electric continually works to move lines underground.	Underground boring companies charge $12-$18 per foot to bury lines per research. Windom purchased their own machine for $225,000 in 2016, but do need staff trained on operation.
26	Severe Summer Storms—Lightning & Hail / Earthquake – Awareness	Participate in "Severe Weather Awareness Week" each spring.	Low	Ongoing	2019-2029	Cottonwood County, Mountain Lake	CCEM, Mountain Lake Fire Department	EMD posts on social media for this. Participate in statewide tornado drill (all sirens sounded in the county).	Budget around $2,000 per year for Radio/ Newspaper Advertisements

Mt. Lake City

Figure G-4: CPRI for the City of Mountain Lake

Type	Threat/ Hazard/ Technological Accident	Probability	Magnitude/ Severity	Warning Time	Duration	Risk Index
Natural Hazards	Flood (Riverine)	1	1	2	3	7 0
Natural Hazards	Flash Flood	2	1	2	2	7 0
Natural Hazards	Dam Failure	1	3	2	4	10 0
Natural Hazards	Tornado	3	4	4	4	15 0
Natural Hazards	Wildfire	3	1	4	1	9 0
Natural Hazards	Windstorm	4	2	2	4	12 0
Natural Hazards	Winter Storm	4	1	1	3	9 0
Natural Hazards	Lightning	4	1	2	3	10 0
Natural Hazards	Hail	4	1	2	3	10 0
Natural Hazards	Drought	2	1	1	4	8 0
Natural Hazards	Extreme Heat	4	1	1	3	9 0
Natural Hazards	Extreme Cold	4	1	1	3	9 0
Natural Hazards	Erosion	1	1	1	1	4 0
Natural Hazards	Subsidence sinkhole	1	1	4	4	10 0
Natural Hazards	Landslide/Mudslide	1	1	4	4	10 0
Natural Hazards	Earthquake	1	1	1	1	4 0

PrD = Property Damage

CrD = Crop Damage

Table G-5: Mitigation Actions for the City of Storden

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
1	Tornado and Straight-line Winds – Structural	Improve the weather warning system in at least one community each year	High	In Progress	2019-2026	Cottonwood County, Storden	CCEM, CCEO, CCSO, Storden City Administration	Sirens were updated in Windom and added to industrial park. Bingham Lake sirens updated and added 1. County uses Civic Ready text alerts.	$15,000-$25,000 depending on location and power source.
2	Tornado and Straight-line Winds – Awareness	Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, preferably with Specific Alert Message Encoding (SAME) capability.	High	Ongoing	2019-2024	Cottonwood County, Storden	CCEM, Storden City Administration	Hy-Vee does promotional events there with Paul programming radios. Ongoing status.	Citizens can purchase them for $15-$100. CCEM will program for free
5	Tornado and Straight-line Winds – Protection	Work with critical facilities such as hospitals and rural water suppliers to assure access to back-up power generation.	High	In Progress	2019-2024	Cottonwood County, Storden	Utilities, CCEM, DVHHS, Hospital Maintenance Dept., RWS, MDH, Storden Public Works	Westbrook lift, hospital, nursing home all have generators. Windom has generators at all lift stations, hospital, water, etc. All MnDOT towers have them. Highway Dept. needs one. Storden's fire hall and community center need generators.	Full Building Generators can cost up to $30,000.
8	Tornado and Straight-line Winds – Awareness	Educate public about benefit of safe rooms and funding sources available.	High	Carried Over	2019-2029	Cottonwood County, Storden	CCEM, CCEO, Storden City Administration		EM time to research and educate the public.

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
19	Severe Winter Storms—Blizzards & Extreme Cold – Prevention	Work with MnDOT / local road authorities to identify and improve hazardous intersections and bridges.	Moderate	Ongoing	2019-2024	Cottonwood County, Storden	CCHWY, Storden Public Works, City Engineer	Highway 60 work is happening.	Staff time, plus potentially millions of dollars for road constr. To fix the issues
26	Severe Summer Storms—Lightning & Hail / Earthquake – Awareness	Participate in "Severe Weather Awareness Week" each spring.	Low	Ongoing	2019-2029	Cottonwood County, Storden	CCEM, Storden Fire Department	EMD posts on social media for this. Participate in statewide tornado drill (all sirens sounded in the county).	Budget around $2,000 per year for Radio/ Newspaper Advertisements

City of Storden

Figure G-5: CPRI for the City of Storden

Type	Threat/ Hazard/ Technological Accident	Probability	Magnitude/ Severity	Warning Time	Duration	Risk Index
Natural Hazards	Flood (Riverine)	3	4	1	4	0
Natural Hazards	Flash Flood	3	4	4	3	0
Natural Hazards	Dam Failure	2	2	3	4	0
Natural Hazards	Tornado	3	4	4	4	0
Natural Hazards	Wildfire	2	4	4	3	0
Natural Hazards	Windstorm	3				0
Natural Hazards	Winter Storm	4	4	4	4	0
Natural Hazards	Lightning	4	4	3	4	0
Natural Hazards	Hail	4	3	3	4	0
Natural Hazards	Drought	4	4	4	4	0
Natural Hazards	Extreme Heat	4	4	4	4	0
Natural Hazards	Extreme Cold	4	4	4	4	0
Natural Hazards	Erosion					0
Natural Hazards	Subsidence	1	1	1	1	0
Natural Hazards	Landslide/Mudslide	1	1	1	3	0
Natural Hazards	Earthquake	1	1	1	1	0

PrD = Property Damage

CrD = Crop Damage

Table G-6: Mitigation Actions for the City of Westbrook

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
1	Tornado and Straight-line Winds – Structural	Improve the weather warning system in at least one community each year	High	In Progress	2019-2026	Cottonwood County, Westbrook	CCEM, CCEO, CCSO, Westbrook City Administration	Sirens were updated in Windom and added to industrial park. Bingham Lake sirens updated and added 1. County uses Civic Ready text alerts.	$15,000-$25,000 depending on location and power source.
2	Tornado and Straight-line Winds – Awareness	Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, preferably with Specific Alert Message Encoding (SAME) capability.	High	Ongoing	2019-2024	Cottonwood County, Westbrook	CCEM, Westbrook City Administration	Hy-Vee does promotional events there with Paul programming radios. Ongoing status.	Citizens can purchase them for $15-$100. CCEM will program for free
5	Tornado and Straight-line Winds – Protection	Work with critical facilities such as hospitals and rural water suppliers to assure access to back-up power generation.	High	In Progress	2019-2024	Cottonwood County, Westbrook	Utilities, CCEM, DVHHS, Hospital Maintenance Dept., RWS, MDH, Westbrook Public Works	Westbrook lift, hospital, nursing home all have generators. Windom has generators at all lift stations, hospital, water, etc. All MnDOT towers have them. Highway Dept. needs one. Storden's fire hall and community center need generators.	Full Building Generators can cost up to $30,000.
6	Tornado and Straight-line Winds – Prevention	Encourage residents to use licensed contractors.	High	Ongoing	2019-2029	Westbrook	Westbrook City Clerk		EM time to educate residents

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
8	Tornado and Straight-line Winds – Awareness	Educate public about benefit of safe rooms and funding sources available.	High	Carried Over	2019-2029	Cottonwood County, Westbrook	CCEM, CCEO, Westbrook City Administration		EM time to research and educate the public.
19	Severe Winter Storms— Blizzards & Extreme Cold – Prevention	Work with MnDOT / local road authorities to identify and improve hazardous intersections and bridges.	Moderate	Ongoing	2019-2024	Cottonwood County, Westbrook	CCHWY, Westbrook Public Works, City Engineer	Highway 60 work is happening.	Staff time, plus potentially millions of dollars for road constr. To fix the issues
21	Severe Winter Storms— Blizzards & Extreme Cold – Prevention	Encourage property owners to maintain landscaping distances to overhead power lines.	Moderate	Revised & Ongoing	2019-2029	Cottonwood County, Westbrook	CCEO, Westbrook Public Works, Utilities	Windom walks the system once per year. Mountain Lake has a utility tree program – trees near power lines are removed & paid for by the Electric Department – replacement trees are small and will not ever reach the power line.	Staff time to walk and check the grid, trim where necessary, and costs of removal and replacement trees
26	Severe Summer Storms— Lightning & Hail / Earthquake – Awareness	Participate in "Severe Weather Awareness Week" each spring.	Low	Ongoing	2019-2029	Cottonwood County, Westbrook	CCEM, Westbrook Fire Department	EMD posts on social media for this. Participate in statewide tornado drill (all sirens sounded in the county).	Budget around $2,000 per year for Radio/ Newspaper Advertisements

Figure G-6: CPRI for the City of Westbrook

City Of Westbrook

Type	Threat/Hazard/ Technological Accident	Probability	Magnitude/Severity	Warning Time	Duration	Risk Index
Natural Hazards	Flood (Riverine)	2	1	4	1	
Natural Hazards	Flash Flood	2	1	4	1	
Natural Hazards	Dam Failure	1	1	4	1	
Natural Hazards	Tornado	2	1	4	1	
Natural Hazards	Wildfire	1	1	4	1	
Natural Hazards	Windstorm	2	1	4	1	
Natural Hazards	Winter Storm	2	1	4	2	
Natural Hazards	Lightning	2	2	4	1	
Natural Hazards	Hail	2	2	4	1	
Natural Hazards	Drought	2	2	4	3	
Natural Hazards	Extreme Heat	2	2	4	1	
Natural Hazards	Extreme Cold	2	2	4	2	
Natural Hazards	Erosion	1	1	4	1	
Natural Hazards	Subsidence (Sink Hole)	1	1	4	1	
Natural Hazards	Landslide/Mudslide	1	1	4	1	
Natural Hazards	Earthquake	1	1	4	1	

Table G-7: Mitigation Actions for the City of Windom

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
1	Tornado and Straight-line Winds – Structural	Improve the weather warning system in at least one community each year	High	In Progress	2019-2026	Cottonwood County, Windom	CCEM, CCEO, CCSO, Windom City Administration	Sirens were updated in Windom and added to industrial park. Bingham Lake sirens updated and added 1. County uses Civic Ready text alerts.	$15,000-$25,000 depending on location and power source.
2	Tornado and Straight-line Winds – Awareness	Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, preferably with Specific Alert Message Encoding (SAME) capability.	High	Ongoing	2019-2024	Cottonwood County, Windom	CCEM, Windom Fire Department	Hy-Vee does promotional events there with Paul programming radios. Ongoing status.	Citizens can purchase them for $15-$100. CCEM will program for free
6	Tornado and Straight-line Winds – Prevention	Encourage residents to use licensed contractors.	High	Ongoing	2019-2029	Windom	Windom Building and Zoning Department		EM time to educate residents
8	Tornado and Straight-line Winds – Awareness	Educate public about benefit of safe rooms and funding sources available.	High	Carried Over	2019-2029	Cottonwood County, Windom	CCEM, CCEO, Windom City Administration		EM time to research and educate the public.
9	Tornado and Straight-line Winds – Structural	Encourage construction of safe rooms in public facilities and parks.	High	Carried Over	2019-2029	Cottonwood County, Comfrey, Mountain Lake, Westbrook, Windom	CCEM, CCEO, Sch, CCPW, Windom Parks Department	Talcot needs this because of camping. Windom Rec needs. Island Park in Windom needs. There are none in Mountain Lake.	Up to $100,000 according to research done.

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
17	Ag Disease – Prevention	Monitor invasive insect species, including emerald ash borer.	Moderate	Ongoing	2019-2029	Cottonwood County, Windom	CCEO, Windom Parks Department, MDA, Ext	Always giving reports. UMN Extension is doing a training and parks might send one. Windom and Mountain Lake have tree commissions that plant trees and work to remove infested trees.	Staff time
19	Severe Winter Storms—Blizzards & Extreme Cold – Prevention	Work with MnDOT / local road authorities to identify and improve hazardous intersections and bridges.	Moderate	Ongoing	2019-2024	Cottonwood County, Windom	CCHWY, Windom Street Department	Highway 60 work is happening.	Staff time, plus potentially millions of dollars for road constr. To fix the issues
21	Severe Winter Storms—Blizzards & Extreme Cold – Prevention	Encourage property owners to maintain landscaping distances to overhead power lines.	Moderate	Revised & Ongoing	2019-2029	Cottonwood County, Windom	CCEO, Windom Electric Department	Windom walks the system once per year. Mountain Lake has a utility tree program – trees near power lines are removed & paid for by the Electric Department – replacement trees are small and will not ever reach the power line.	Staff time to walk and check the grid, trim where necessary, and costs of removal and replacement trees

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
22	Severe Winter Storms—Blizzards & Extreme Cold – Protection	Require utility providers to have power lines buried and/or hardened against hazards, where feasible.	Moderate	Ongoing	2019-2034	Cottonwood County, Windom	CCEM, CCEO, Windom Electric Department	Within wind farms the lines are underground then the transmission lines are above. REA doesn't want to bury anymore because of complications once they are there. The City of Windom is burying theirs and its 70% underground. Mt. Lake Electric continually works to move lines underground.	Underground boring companies charge $12-$18 per foot to bury lines per research. Windom purchased their own machine for $225,000 in 2016, but do need staff trained on operation.
25	Drought / Extreme Heat – Prevention	Educate the public on the importance of wellhead protection and water conservation.	Low	Ongoing	2019-2024	Cottonwood County, Windom	CCEO, SWCD, RWS, BWSR, Windom Water/Wastewater	Windom, ongoing: Water bans, low flow aerators distributed. DVHHS assist with messaging & follow-up w/ affected families.	Staff time to educate the public.
26	Severe Summer Storms—Lightning & Hail / Earthquake – Awareness	Participate in "Severe Weather Awareness Week" each spring.	Low	Ongoing	2019-2029	Cottonwood County, Windom	CCEM, Windom Emergency Management	EMD posts on social media for this. Participate in statewide tornado drill (all sirens sounded in the county).	Budget around $2,000 per year for Radio/ Newspaper Advertisements

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
27	Severe Summer Storms—Lightning & Hail / Earthquake – Prevention	Continue to enforce building code for new construction.	Low	Ongoing	2019-2024	Windom	Windom Building and Zoning Department	State needs to update elevator size for ambulance structures. Ongoing. Mountain Lake has adopted building code.	Employing a building official could cost over $100,000 per year.
33	Flooding and Dam Failure – Prevention	Work with FEMA to modernize floodplain maps.	Moderate	In Progress	2019-2024	Cottonwood County, Windom	CCEO, Windom Building and Zoning Department		Locally, staff time to review the maps, possibly hire an engineer to contest the proposed maps.
34	Flooding and Dam Failure – Prevention	Review and update floodplain protection in zoning ordinance.	Moderate	In Progress	2019-2024	Cottonwood County, Windom	CCEO, Windom Building and Zoning Department DNR	Updated in 2015 comp plan. Mountain Lake in NFIP with flood plain ordinance. Storden in process. Bingham Lake is reviewing – no decision.	Staff time to update and review the ordinance, costs to enforce the ordinance could be $100,000 per year, depending on enforcement by building officials.

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
35	Flooding and Dam Failure – Prevention	Work closely with DNR on all development applications in identified flood hazard areas; have check box on building/zoning permit forms indicating flood hazard areas; discourage zoning variances in flood hazard areas.	Moderate	Ongoing	2019-2024	Cottonwood County, Windom	CCEO, Windom Building and Zoning Department	Does not necessarily discourage, but ordinance has extra steps that may discourage. Building in the flood plain goes to DNR for approval.	Staff time to work with DNR and ensure homes are not built in flood hazard areas.
36	Flooding and Dam Failure – Awareness	Educate and encourage property owners and insurance agents on purchasing flood insurance.	Moderate	Ongoing	2019-2029	Cottonwood County, Windom	DNR, CCEO, Windom City Administration	Mountain Lake adopted flood plain ordinance in 2017.	Staff time to research and develop materials for the public.
37	Flooding and Dam Failure – Protection	Study programs to voluntarily acquire, relocate or elevate at-risk structures in floodplains.	Moderate	Carried Over	2019-2024	Cottonwood County, Windom	CCEM, CCEO, Windom Building and Zoning Department	Windom does not start filling sandbags until the forecast crest through Windom is 23 feet or higher. Very few homes are in danger of flooding, but there are a couple.	Buyouts of current flood threatened homes could cost $5,000-$100,000, depending on the home. Demolition and removal is estimated around $10,000

Action Number	Hazard - Strategy	Mitigation Action	Priority	Status	Time-frame	Jurisdictions	Responsibility	Cottonwood County Comments on Planning Mechanisms for Implementation	Est. Cost/ Source
38	Flooding and Dam Failure – Prevention	Acquire/demolish property within the floodplain.	Moderate	New	2019-2034	Cottonwood County	CCEM, Windom City Administration, EDA	Owners of the homes would have to agree to the buyout. One owner has said they will not move from their location.	Buyouts of current flood threatened homes could cost $5,000-$100,000, depending on the home. Demolition and removal is estimated around $10,000
40	Flooding and Dam Failure – Protection	Upgrade the gauge in Windom from USACE stage-only gauge to a full service stage-flow USGS gauge	High	New	2019-2024	Cottonwood County	CCEM, Windom Emergency Management, DNR, USGS, USACE	EM has been contacted about upgrading the gauge so it will forecast river levels.	Staff time for meetings, unknown what the upgrade would cost currently.
43	Flooding and Dam Failure -- Prevention	Mitigate downstream flooding in the City of Windom by quarrying 10 to 30 acres to create a water retention /detention pond. This includes: 1. Identify upstream water retention and detention pond areas. 2. Work with the US Army Corps of Engineers as a project partner. 3. Gain approval from FAA	High	New	2019-2034	Cottonwood County, Windom	CCEM, CCEO, DNR, Windom City Administration		Staff time for permits and meetings. The city owns the land and would make money on the aggregate mined, but would not cover the thousands of dollars the project would cost.

Figure G-7: CPRI for the City of Windom

City of Windom

Type	Threat/ Hazard/ Technological Accident	Probability	Magnitude/ Severity	Warning Time	Duration	Risk Index
Natural Hazards	Flood (Riverine)	2	1	2	2	0
Natural Hazards	Flash Flood	2	1	2	2	0
Natural Hazards	Dam Failure	1	1	1	1	0
Natural Hazards	Tornado	1	2	1	1	0
Natural Hazards	Wildfire	1	1	2	2	0
Natural Hazards	Windstorm	2	1	1	2	0
Natural Hazards	Winter Storm	4	1	1	2	0
Natural Hazards	Lightning	2	1	2	1	0
Natural Hazards	Hail	3	1	2	1	0
Natural Hazards	Drought	2	1	1	3	0
Natural Hazards	Extreme Heat	3	1	1	3	0
Natural Hazards	Extreme Cold	3	1	1	3	0
Natural Hazards	Erosion	2	1	4	1	0
Natural Hazards	Subsidence	1	1	4	1	0
Natural Hazards	Landslide/Mudslide	1	1	4	1	0
Natural Hazards	Earthquake	1	2	4	1	0

PrD = Property Damage

CrD = Crop Damage

Appendix H - Works Cited

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