

Lyon
County
All
Hazard
Mitigation
Plan

August

2016

This multi-jurisdictional hazard mitigation plan includes Lyon County and the Cities of Balaton, Cottonwood, Florence, Garvin, Ghent, Lynd, Marshall, Minneota, Russell, Taunton, and Tracy. This project was supported by Grant Award awarded by the Federal Emergency Management Agency (FEMA).

Prepared by
Southwest
Regional
Development
Commission
and Lyon
County
Emergency
Management

LYON COUNTY

ALL HAZARD MITIGATION PLAN

August 2016

Executive Summary

The purpose of the Lyon 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 Lyon 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 Lyon 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 Lyon 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.

“The overall benefit-cost ratio for FEMA mitigation grants is about 4:1, though the ratio varies from 1.5 for earthquake mitigation to 5.1 for flood mitigation.”¹

The Lyon County AHMP Planning Team identified the following natural and manmade hazard as a High Rank Hazard for Lyon County:

- Blizzards, Winter Storms, and Extreme Cold Events

This planning process has been conducted by the Southwest Regional Development Commission (SRDC) and Lyon 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 Lyon County, Minnesota, which is intended to meet the requirements of the Federal Emergency Management Agency (FEMA) Regulation 44 CFR 201.6 Local Mitigation Plans.

All participating jurisdictions in Lyon 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 Lyon County, that wished to participate, could participate and remain eligible for FEMA funding.

¹ FEMA. Benefits-Cost Analysis of FEMA Hazard Mitigation Grants. Accessed: 3/4/16. Available: <http://earthmind.org/files/risk/Nat-Haz-Review-2007-CBA-of-FEMA-Grants.pdf>

The previous Lyon County AHMP was adopted in 2010. 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 Lyon County AHMP Planning Team. The plan resides with the Office of Emergency Management in Lyon County, who is responsible for maintenance and updates.

Lyon County's All Hazard Mitigation Mission:

“Support the Lyon County citizens and emergency responders to ensure that as a county we work together to build, sustain and improve our capability to prepare for, protect against, respond to, recover from and mitigate all hazards through a risk-based, comprehensive emergency management system of preparedness that includes prevention, response, recovery and mitigation.”

Participation in Plan Development

The Lyon County All Hazard Mitigation Plan is a multiparty effort among Lyon County, Lyon County Emergency Management, Lyon 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 Lyon 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.

Lyon County AHMP Planning Team:

- Tammy VanOverbeke – Lyon County: Emergency Management Director
- Loren Stomberg – Lyon County: Administrator
- Mark Mather – Lyon County: Sheriff
- Aaron VanMoer – Lyon County Public Works : County Engineer
- John Biren – Lyon County Land Management Office: Zoning Administrator
- Mark Volz – Lyon County: GIS Specialist
- Anna Snyder – Southwest Health and Human Services: Public Health Emergency Preparedness Coordinator
- Rob Yant – Marshall Police Department Director & City Emergency Manager
- Mike Votca – Tracy City Administrator
- Dawn Vlaminck – Ghent City Clerk
- Tim O’Leary – Lincoln-Lyon Electric Cooperative
- Kerry Netzke – Area II Minnesota River Basin
- Bruce Lamprecht – Marshall Public Schools: Director of Business Services
- Troy Wendland – Balaton Fire Department
- Terry Schreiber – Township Representative
- Eva Bruns – Avera Marshall Regional Medical Center: Safety Officer
- Dan Desmet – North Memorial Ambulance – Marshall
- Mike Munford – Southwest Minnesota State University; Director of University Public Safety
- Lucas Youngsma – Department of Natural Resources – Area Hydrologist

Southwest Regional Development Commission:

- Drew Hage, AHMP Planner
- Jay Trusty, Executive Director
- Kathy Schreiber, Administrative Assistant

➤ For more information regarding hazard mitigation, contact:



Lyon County Emergency Management
611 West Main Street
Marshall, MN 56258
Phone: 507-929-6615
<http://www.lyonco.org/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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CHAPTER 1: INTRODUCTION

I Mitigation Planning

Natural and manmade hazards present risks throughout Minnesota. Lyon 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 Lyon County All Hazard Mitigation Plan (AHMP). This plan helps Lyon 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

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).

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

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

➤ *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.

II 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 All 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).

III 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).

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

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

Pre-Disaster Mitigation (PDM)

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

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

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

Repetitive Flood Claims (RFC)

RFC intends to reduce/eliminate long-term risk to structures with one or more NFIP claim. State-level agencies, tribes, and local government that cannot meet FMA requirements for cost-share or management capacity are eligible sub-applicants through HSEM. Project grants are available for acquisition, structure demolition, or structure relocation of insured structures, with the property deed restricted for open space uses in perpetuity. There were no Severe Repetitive Loss properties in Lyon County.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

⁴ FEMA, Date Request. Received 6/4/13.

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.

IV FEMA Guidance

FEMA has created the *Local Multi-Hazard Mitigation Planning Guidance* (the “Blue Book”) to provide guidance to local governments to meet the requirements of 44 CFR §201.6 *Local Mitigation Plans*. 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 Lyon County All Hazard Mitigation Plan is going to follow the planning process outlined in the Blue Book. The Lyon 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).

V County Capabilities

The Capabilities Worksheet identifies planning capabilities, policies and ordinances, programs, studies and reports, staff, and community partners that are relevant to hazard mitigation. The Worksheet is attached as Addendum I. Several documents were referenced extensively in the planning process, including the county comprehensive (land use) plan and development ordinance, transportation plans, and water management plans. Other policies and ordinances were referenced more generally in the planning process. Specific items, such as wellhead protection plans, watershed plans, and other local resources, helped the planning team develop mitigation goals, objectives, and strategies. County and city staff and representatives were consulted by the planning team throughout the planning process.

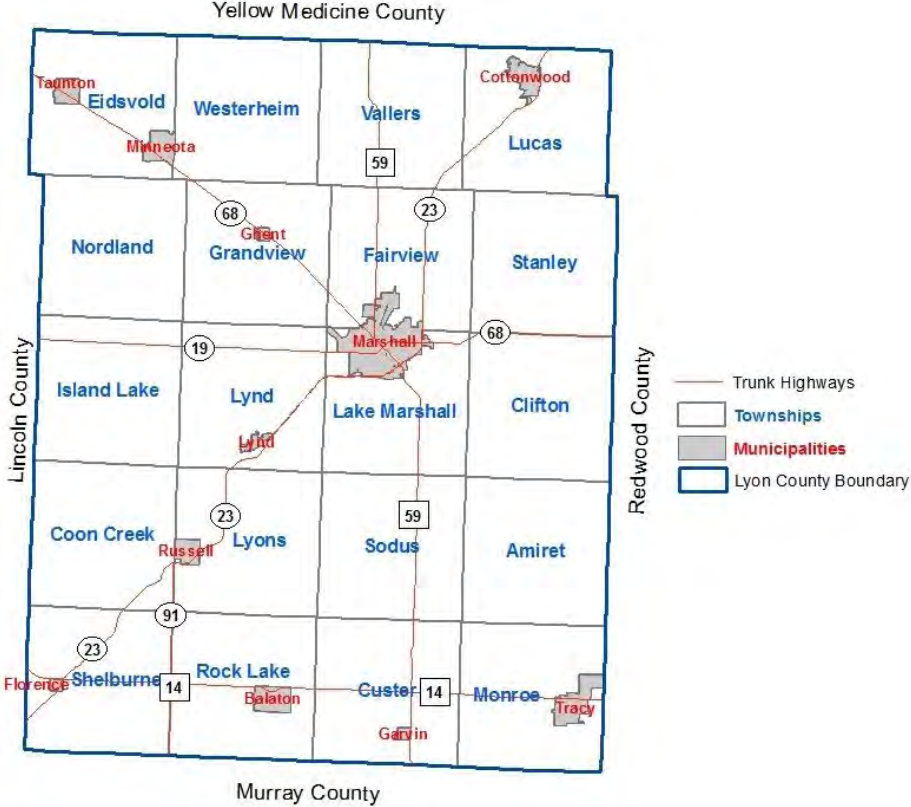
CHAPTER 2: LYON COUNTY PROFILE

I Location and Area

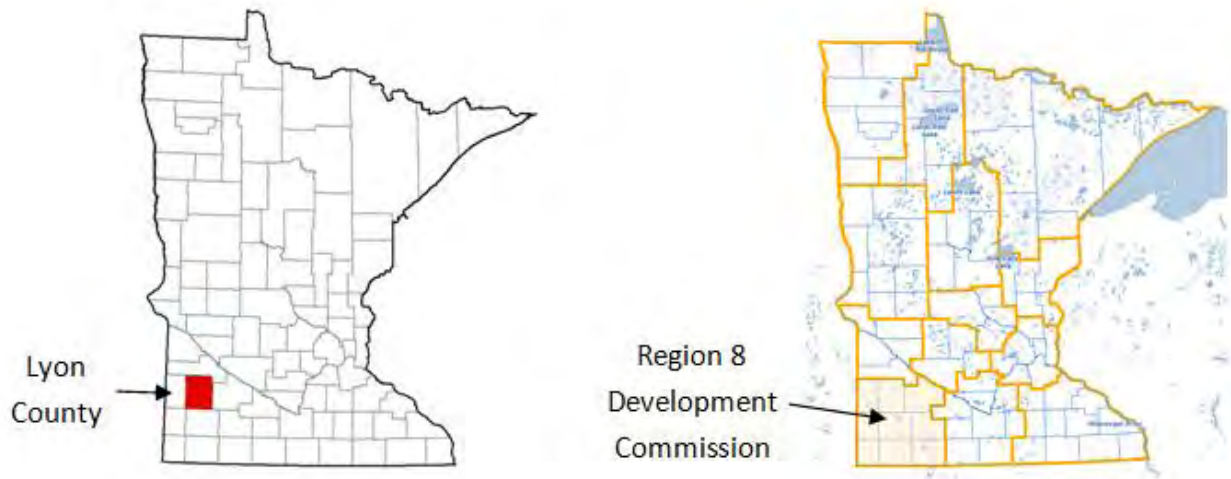
Lyon County is located in southwest Minnesota and has a land area of 721 square miles. The county is bordered on the north by Yellow Medicine County, on the south by Murray County, on the east by Redwood County, and on the west by Lincoln County. Cities within Lyon County include Balaton, Cottonwood, Florence, Garvin, Ghent, Lynd, Marshall, Minneota, Russell, Taunton and Tracy.

The City of Marshall is the largest city in Lyon County and serves as the Lyon County seat. The city is along U.S. Highway 59, Minnesota State Highway 19, 23 and 68. U.S Highway 59, State Highway 19, 23, and 68 provide thoroughfares into and out of the county from the north and south and east and west respectively. US Highway 59 runs north-south through the county, connecting I-90 at Worthington to I-94 near Fergus Falls. U.S. Highway 14 crosses the county from west to east, at Florence, Balaton and Tracy, running parallel to Rapid City, Pierre and Eastern (RCPE) railroad. The Canadian Pacific (CP) railroad starts from east of Tracy, paralleling U.S. Highway 14, running to Redwood County. Minnesota Trunk Highway (TH) 23 runs from I-90 near the South Dakota border northeast through the county to Willmar and St. Cloud. The BNSF railroad runs parallel to TH 23. MN TH 19 runs east-west through the county, with TH 68 diverting from TH 19 in Marshall towards the northwest. US 59, TH 23, TH 19 and TH 68 all meet in the city of Marshall.

G Figure #1 Minor Civil Divisions – Lyon County



G Figure #2 Minnesota Counties & Region 8 Development Commission



II History

Lyon County was created in 1868 from Redwood County, and was officially organized in 1870 in Lynd. The City of Marshall was founded in 1872 by the Winona and St. Peter Railroad Company. In 1872 a land grant to the railroad changed the county seat to Marshall, which was the only rail town in Lyon.⁵

In the spring of 1873 a bill was introduced in the Legislature for the creation of Lincoln County. Until 1873, Lyon County encompassed what is now Lincoln County. “On December 5, 1873, Governor Horace Austin issued a proclamation declaring the county of Lincoln formed and on that day Lyon County was reduced to its present area.⁶

The settlement of Lyon County was rapid and was spurred on by the advent of the railroad in the 1870s. The population in 1880 was 6,257, and it became 9,501 in 1890 and 14,591 in 1900. The population continued increasing until the 1980s. In 1950, the rural population in Lyon County comprised 60 percent of the total population. Since the 1950s, the rural population has decreased while the cities have grown larger. The population grew at a steady pace after the 1980s with less than three percent changes each decade after. By 2014, there was an estimated 25,665 residents living in Lyon County.⁷

III Physical Features

Land within Lyon County is part of the Coteau des Prairies in the southwestern portion of the county and is glacial ground moraine in the northeastern portion of the county, according to the Lyon County soil survey. There is a five hundred foot decent from the southwestern corner of the county to the edge of

⁵ History of Marshall. Accessed: 2/4/16. Available: <http://www.swmnantiques.com/main/index.php/stores-services/marshall-history.html>

⁶ *Early History of Lincoln County*; Compiled by A. E. Tasker; Lake Benton News Print (1936) by Arthur P. Rose (published in 1912) transcribed by Susan Geist). Accessed: 2/4/16. Available: <http://genealogytrails.com/minn/lyon/history.htm>

⁷ United States Census Bureau. Accessed: 2/4/16. Available: <http://www.census.gov/prod/www/decennial.html>

the Coteau des Prairies with only sixteen miles of travel. From that point the slope is less severe, roughly a 150 foot decent, to the edge of the county in the northeast corner. The elevation is 1,719 feet above sea level (ASL) in the southwest corner of the county, 1,450 feet ASL in the southeast corner, 1,178 feet ASL in the northwest corner, and 1,057 feet ASL in the northeast corner. The county's relative flatness is attributed to the remnants of glaciers that once covered the area.⁸

The bedrock in the southwestern corner of Lyon County is Sioux quartzite. The rest of the county has granite bedrock. Glacial material also covers the county's bedrock. The thickness of the glacial till ranges from 50 feet in the northwest part of the county to over 460 feet in the southwestern portion of the county. There is little to no exposed bedrock in the county.⁹

A study by the University of Minnesota's Remote Sensing and Geospatial Analysis Laboratory found that 76 percent of the land area in Lyon County was in agricultural use, 7.25 percent was urban, 12 percent was covered by grass, shrubs, or wetlands, approximately 9 percent was forest, and two percent was covered by water. The future land use in Lyon County will likely remain predominately in agriculture production.

Open Water Sources

There are approximately 5,894 acres of open water in Lyon County. The open water is characterized in three categories: lakes, marshes, and rivers and streams.

Lakes

Lyon County has several lakes that provide recreational and natural resources. The lakes include: Clear, Cottonwood, East Twin, Goose, Island, Lady Slipper, Lake Marshall, Lake of the Hills, Yankton, Lone Tree, Long, McKay, North Twin, Rock, School Grove, Sham, South Twin, West Twin, and Wood Lake.

Cottonwood Lake is the largest lake and is located in the northeast corner of Lyon County. Rock Lake is the second largest lake, located between Russell and Balaton. School Grove Lake, southeast of Cottonwood, is the third largest, while Lake Yankton, in Balaton, is the fourth largest lake in the county. Most of the lakes provide the opportunity to catch game fish and are generally shallow. East Twin Lake is the deepest lake with a maximum depth of 25 feet.¹⁰

Rivers

Lyon County has two major rivers, the Redwood River and Cottonwood River. The Redwood River enters from Pipestone and Murray Counties to the southwest and drains the central portion of Lyon County. The Cottonwood River drains the southeast portion of Lyon County.

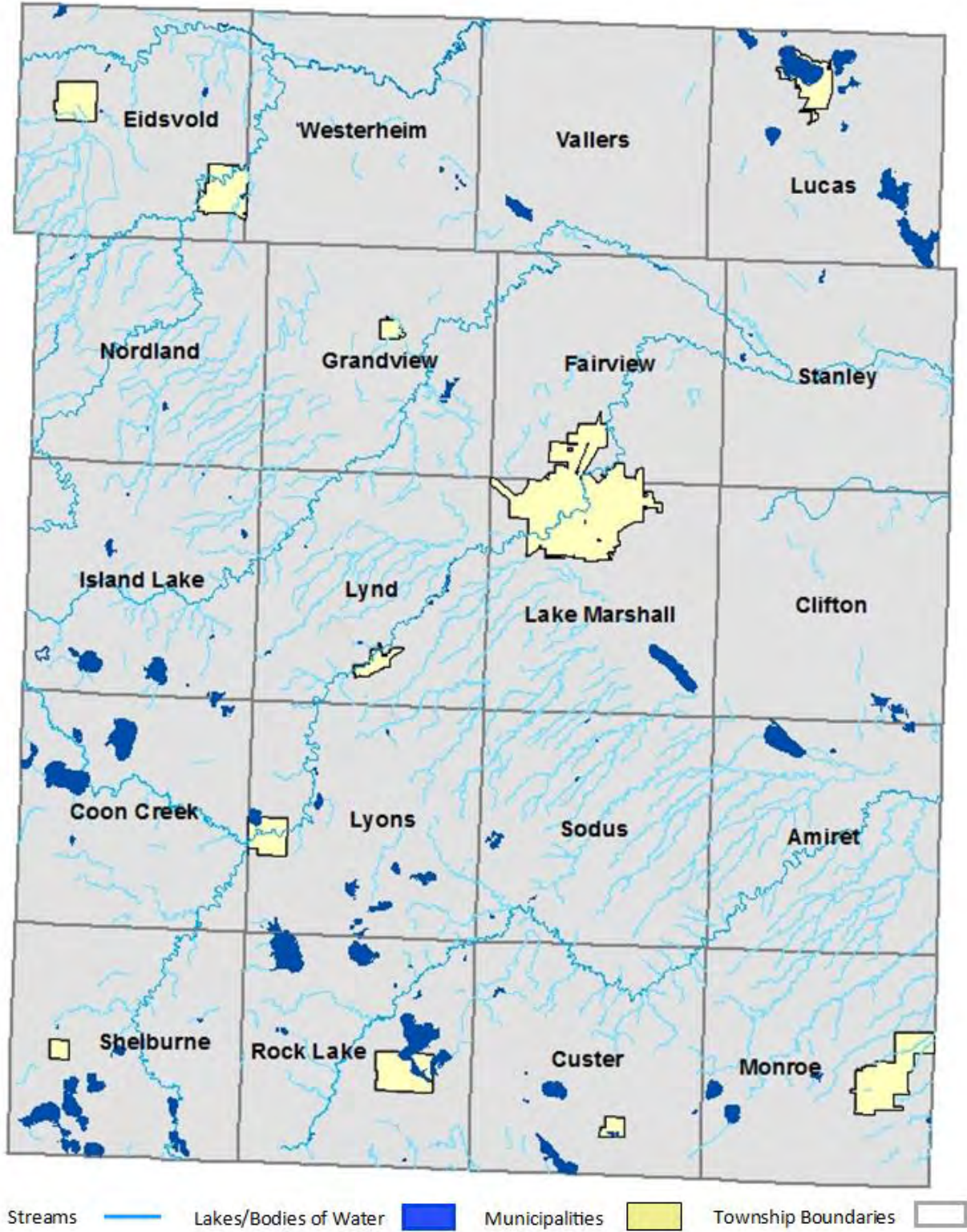
⁸ Lyon County Comprehensive Plan. 2002. Accessed: 2/4/16. Available: http://www.lyonco.org/attachments/article/169/Chapter07_Environmental_Features.pdf

⁹ Lyon County Comprehensive Plan. 2002. Accessed: 2/4/16. Available: http://www.lyonco.org/attachments/article/169/Chapter07_Environmental_Features.pdf

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

G Figure #3

Shoreland, Lakes & Streams - Lyon County



Watersheds

There are three main watersheds in Lyon County that help drain surface water. The main watersheds are the Yellow Medicine River Watershed, Redwood River Watershed, and Cottonwood River Watershed. These three watersheds drain into the Mississippi watershed by way of the Minnesota River. In addition, the Des Moines River-Headwaters watershed covers small parts of Lyon County at the county's norther boundary, which enters the Mississippi River eventually. There are also a number of small streams that flow into these waterways.

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 Lyon 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 Lyon 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 Lyon 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 Lyon 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."¹¹ 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.

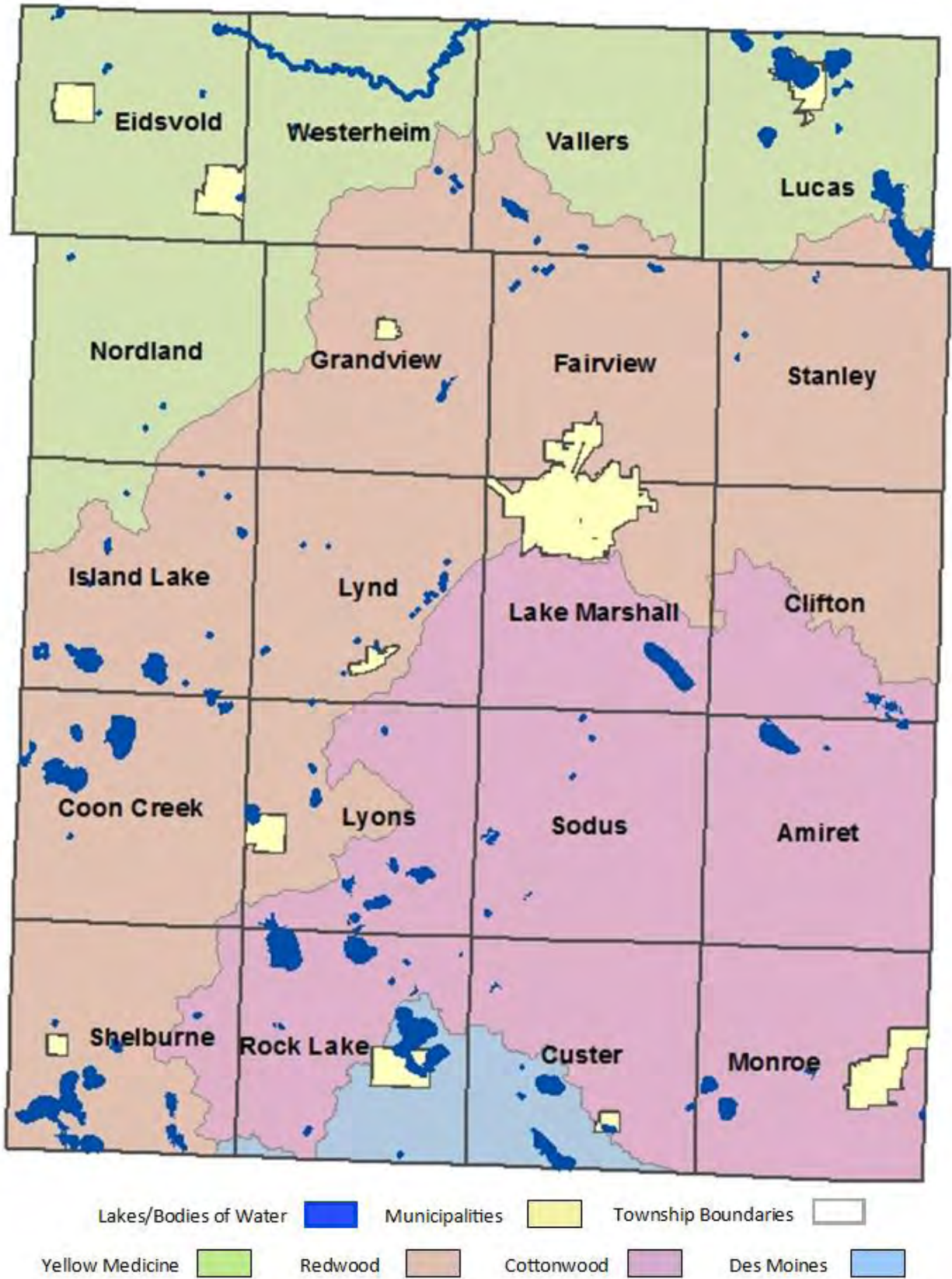
In addition, the wetlands in Lyon County provide the following benefits:

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

¹¹ Wisconsin Wetland Association. Accessed 10/29/15. Available: <http://www.wisconsinwetlands.org/HowWetlandsBenefitYourCommunity.pdf>

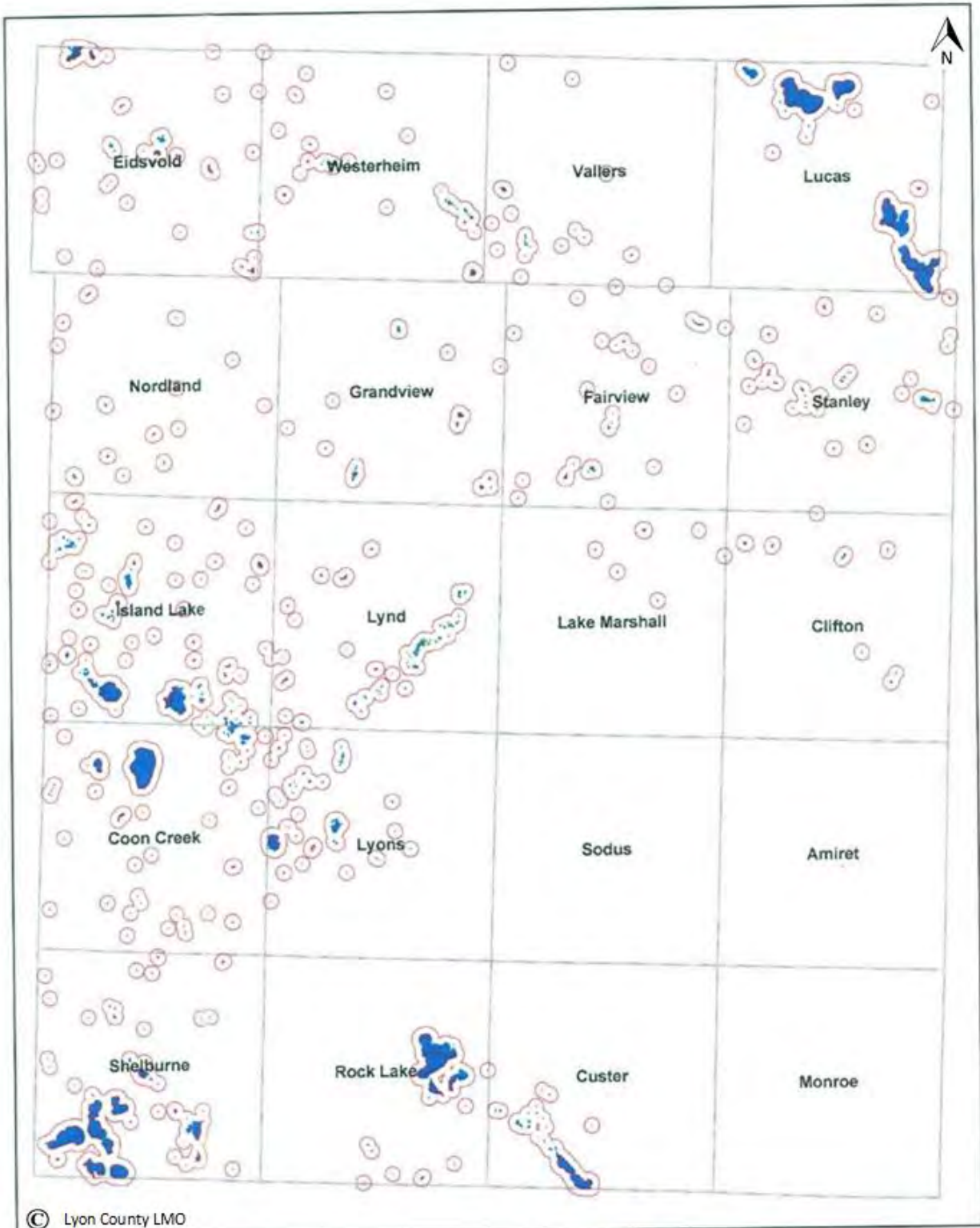
G Figure #4

Watersheds Map – Lyon County






G Figure #5

High Priority Sedimentation: Bodies of Water – Lyon County

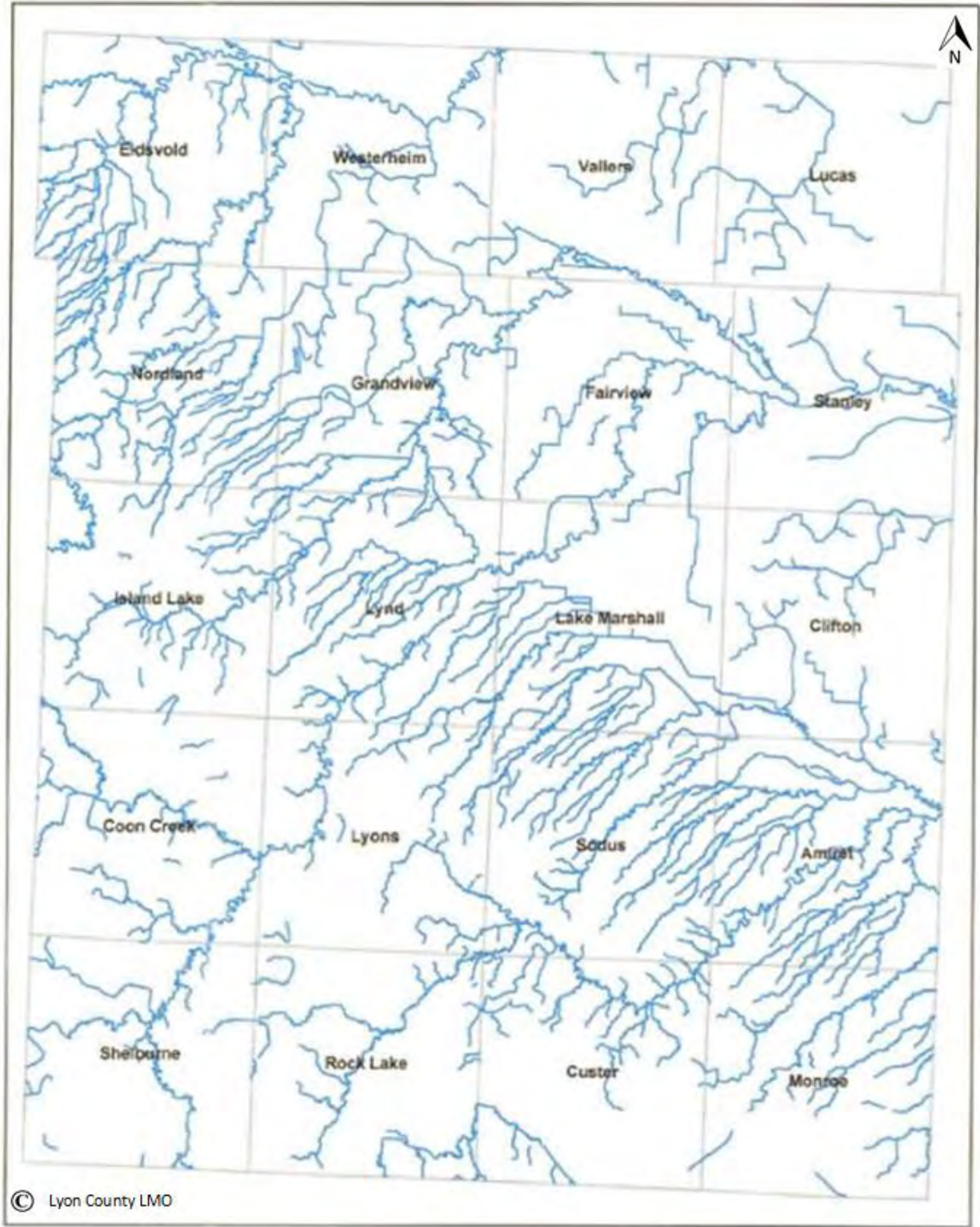


© Lyon County LMO

Township Boundaries  Lakes/Bodies of Water  1000 ft. Buffer 

G Figure #6

High Priority Sedimentation: Streams - Lyon County



© Lyon County LMO

Streams ——— Township Boundaries □

As the landscape in Lyon 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 Lyon County since increased agricultural activities is unknown. The majority of the remaining wetlands in Lyon 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 Lyon 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.

Surficial Geology

There are five geomorphic regions found in Lyon County. Different types of parent materials and topography characterize each region. The Marshall moraine, Canby moraine, and Gary moraine trend northwest and southeast through central Lyon County. The northeastern most two of these moraines, the Antelope and the Marshall, are flanked on their southwest sides by extensive belts of outwash. The intervening areas are flat to slightly rolling ground moraine. The end moraines in the area are part of a morainal system that extends through South Dakota, Minnesota and Iowa.

These features are subdued in many places, rising less than 25 feet above the surrounding area, and they are composed largely of till but may include some melt-water deposits. The melt-water deposits composed of sorted sand, silt, and clay, largely occur as outwash in southeast-trending melt-water channels or as small isolated deposits within the till. The surficial melt-water deposits associated with the Marshall and Antelope moraines were considered do to their apparent value as sources of ground water.

Deposits in the channels comprise till, glaciolacustrine deposits, and outwash. The outwash has thick sections of highly permeable sand and gravel in many places. The surficial melt-water deposits are extensive in front of the Marshall moraine, Antelope moraine, Gary moraine near Clear Lake northeast of Russell and in front of the Altamont moraine west of Florence. Most recent deposits are largely confined to stream valleys, where they overlie the glacial drift.

Although these deposits occur to some extent in all stream valleys in the county, they are thickest in Valleys near the toe of the Slope province, where the gradients of sediment-laden streams change abruptly. In the flood plain of the Redwood River, between Lynd and Marshall, these deposits are mined

commercially for their sand and gravel.¹² Part of the area may also have the glacial till and other local material deposits from water.

Rapidly moving glacial melt-water removed fine textured particles from the glacial till and deposited the coarse textured material in areas where the current slowed. Sand and gravel deposits are along the present day streams and rivers. The former glacial streams and beaches contain sand and gravel deposits.

Bedrock Geology

Underlying the surface at a distance from 100 to 300 feet is Sioux Quartzite. The quartzite is located in southwestern corner of Lyon County. The rest of the county has granite bedrock. Sedimentary material is found covering the bedrock from former inland seas. Glacial material also covers the county's bedrock. The thickness of the glacial till ranges from 50 feet in the northwest part of the county to over 460 feet in the southwestern portion of the county. There is little to no exposed bedrock in the county.¹³

Soils

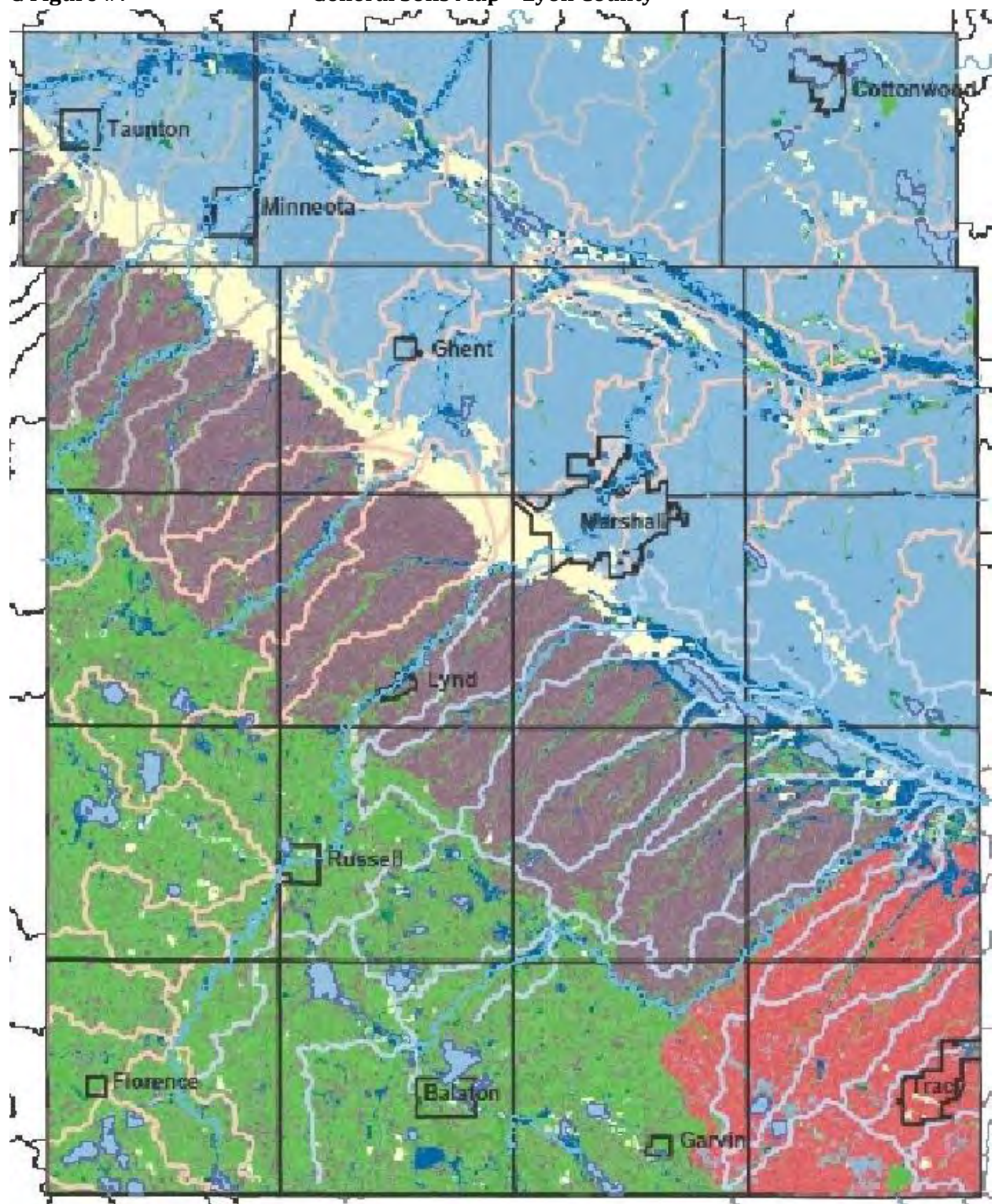
There are seven soil associations within Lyon County according to the Soil Survey of Lyon County. Three of the soil associations make up about 79 percent of the county. The first, Ves-Canisteo Association, which is nearly level, makes up 35 percent of the county. The second, Barnes-Flom-Buse Association, which is nearly level and poorly drained, makes up 23 percent of the county. The third, Forman-Aastad Association, which is nearly level, makes up 21 percent of the county. The four remaining associations are Lamoure-La Prairie Association, Colvin-Bearden Association, Arvilla-Barnes-Buse Association, and Everly-Letri-Wilmonton Association.

¹² Geology and Occurrence of Ground Water in Lyon County, Minnesota. (1963). Accessed 10/30/15. Available: pubs.usgs.gov/wsp/1619n/report.pdf

¹³ Environmental Feature. Lyon County Comprehensive Plan.

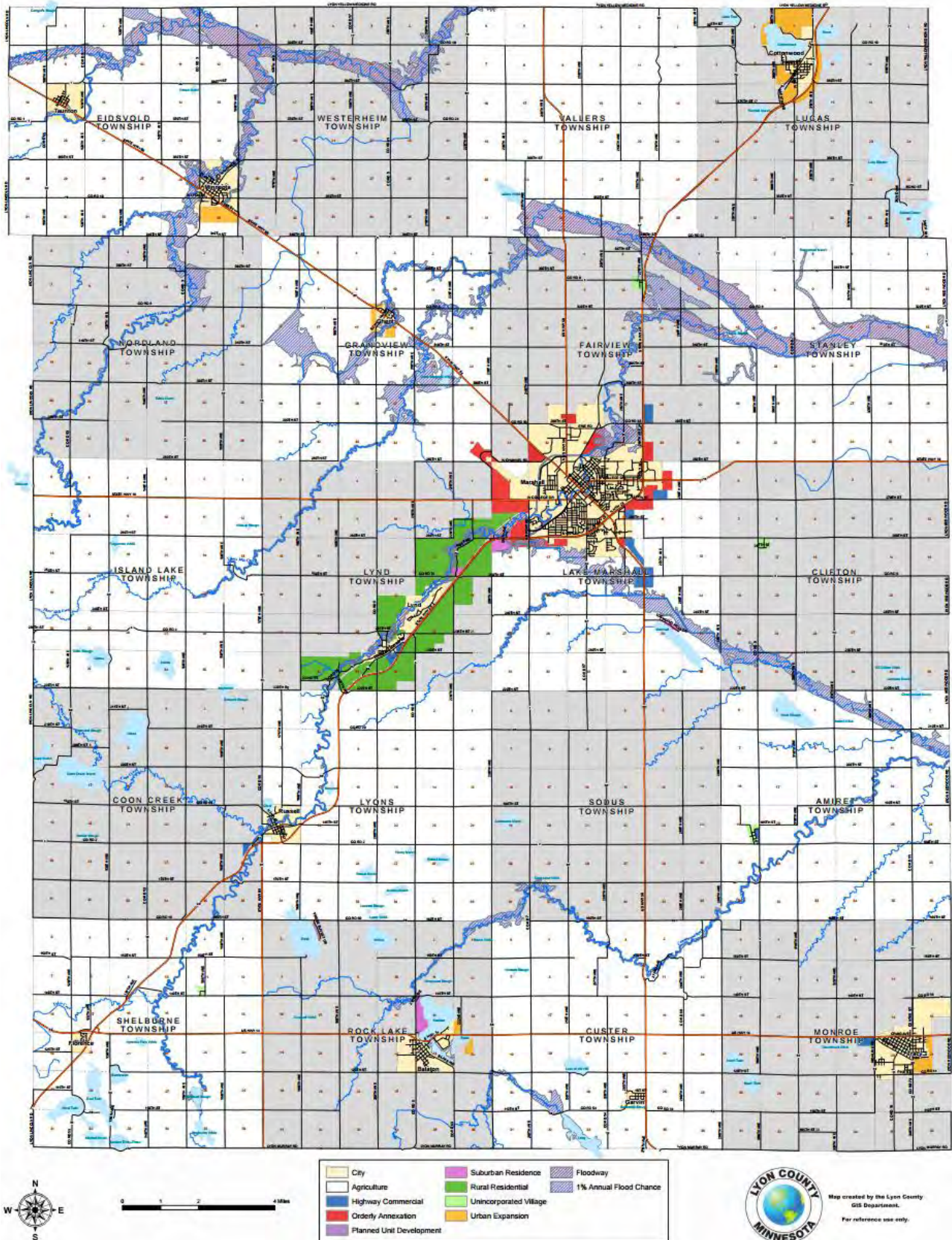
G Figure #7

General Soils Map - Lyon County



G Figure #8

Zoning Map - Lyon County



IV 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 Lyon County. Weather patterns circulate counter-clockwise and generally enter Lyon County from the west to southwest and sometimes from the south.

Precipitation

Average precipitation in Lyon County from 1981 to 2010 was 28.3 inches. Average precipitation ranged from 21 inches to 40 inches from 1988 to 2008. From 1981 to 2010, the average seasonal snow fall in the City of Marshall, which is the center of Lyon County, was 46.8 inches. Over that same time period, the average seasonal snow fall in the City of Tracy, which is in the southeast corner of Lyon County, was 46.1 inches; and the average seasonal snow fall in the City of Minneota, which is in the northwest corner of Lyon County, was 44.5 inches.

G Table #1 **Precipitation: 1981 – 2010 Average**

Month	Precipitation in Inches – Marshall	Snowfall in Inches – Marshall	Snowfall in Inches – Tracy	Snowfall in Inches – Minneota
January	0.99	11.7	8.1	8.8
February	0.70	6.4	5.6	7.5
March	1.73	7.4	10.1	9.3
April	2.67	1.8	4.2	2.4
May	3.39	0.0	0.0	0.0
June	3.82	0.0	0.0	0.0
July	3.68	0.0	0.0	0.0
August	3.39	0.0	0.0	0.0
September	3.09	0.0	0.0	0.0
October	2.13	0.5	0.8	0.4
November	1.52	7.7	7.6	7.4
December	1.17	11.3	9.7	8.7
Annual Average	28.3	46.8	46.1	44.5

Source: National Climatic Data Center (<http://ggweather.com/normal/>)

Temperature

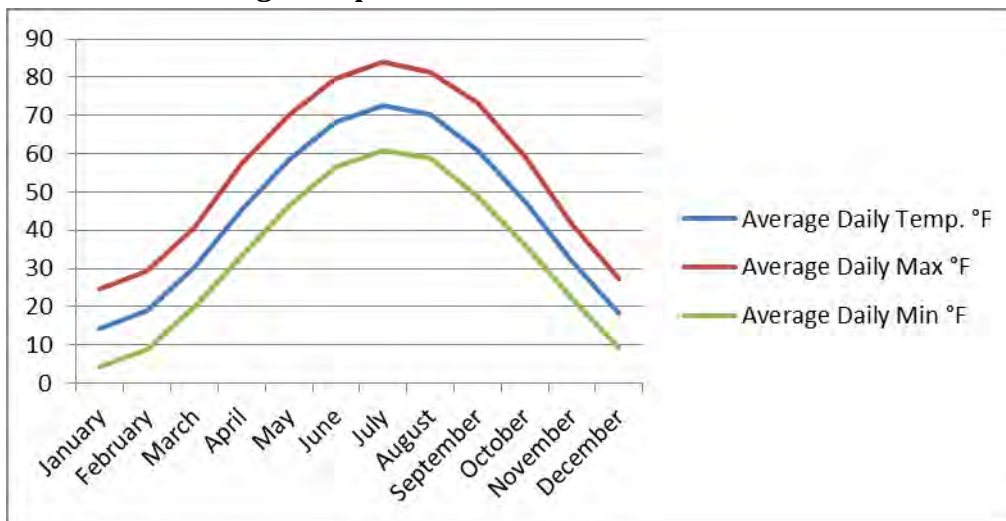
Average temperature in Lyon County from 1981 to 2010 was 44.9 degrees Fahrenheit. The hottest month on average in Lyon County is July with an annual average temperature of 72.5°F. The coolest month on average is January with an annual average temperature of 14.3°F. Temperatures were taken in the City of Marshall.

G Table #2 **Average Temperature: 1981 - 2010 - Marshall**

Month	Average Daily Temp. °F	Average Daily Max °F	Average Daily Min °F
January	14.3	24.5	4.1
February	19.1	29.2	9.0
March	30.4	40.7	20.1
April	45.4	57.6	33.2
May	58.4	70.2	46.5
June	68.1	79.7	56.6
July	72.5	83.9	61.0
August	70.1	81.4	58.8
September	60.9	73.2	48.7
October	47.6	59.3	36.0
November	32.0	41.6	22.4
December	18.3	27.4	9.1
Annual Average	44.9	55.8	33.9

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

G Figure #9 **Average Temperature: 1981 - 2010 - Marshall**



V Population

Lyon County is the 40th most populous county in the State of Minnesota.¹⁴ 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.

¹⁴ Department of Employment and Economic Development. Accessed: 5/29/13. Available: <http://www.positivelyminnesota.com/apps/lmi/rws/default.aspx>

Population Trends

The 2010 Census shows that Lyon County has a population of 25,857. The two largest communities are Marshall with a population of 13,680 in 2010 and Tracy with a population of 2,163 in 2010. From 2000 to 2010, Marshall’s population increased by 7.4 percent but Tracy’s population decreased by 4.6 percent. As a whole, Lyon County experienced a growth in population of 1.7 percent from 2000 to 2010. Lyon 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, Lyon County’s population has maintained relatively constant.

G Table #3 Population Trends – Region 8

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

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

G Table #4 Distribution of Population – Lyon County

	1980	1990	2000	2010
Cities	18,261	18,615	19,696	20,559
Townships	6,946	6,174	5,729	5,298
Lyon County	25,207	24,789	25,425	25,857

Source: U.S. Census 2000, 2010

While 59.8 percent of the county’s population lived in the rural areas in 1950, only 20.5 percent lived in townships in 2010. The loss in population numbers from the rural areas and increasing urban population is not unique to Lyon County, which is seen in the decline of the number of farmers. Populations in rural farming communities, like Lyon 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 nine county subdivisions that did not see a population decline from 2000 to 2010 was Amiret Township (6.5 percent), the City of Balaton (0.9 percent), the City of Cottonwood (5.6 percent), Eidsvold Township (5.8 percent), the city of Ghent (17.5 percent), Lake Marshall Township (9.9 percent), the city of Lynd (29.5 percent), the city of Marshall (7.4 percent), and Sodus Township (0.4 percent). The two largest population declines were in the City of Florence with a (-36.1) percent decrease and the City of Taunton with a (-32.9) percent decrease.

G Table #5 Distribution of Population by County Subdivision - Lyon County

County Subdivision	2000	2010	Percent Change 2000 - 2010
Amiret township	230	245	6.5%
Balaton city	637	643	0.9%
Clifton township	288	249	-13.5%
Coon Creek township	282	244	-13.5%
Cottonwood city	1,148	1,212	5.6%
Custer township	220	203	-7.7%
Eidsvold township	223	236	5.8%
Fairview township	485	394	-18.8%
Florence city	61	39	-36.1%
Garvin city	159	135	-15.1%
Ghent city	315	370	17.5%
Grandview township	317	288	-9.1%
Island Lake township	208	175	-15.9%
Lake Marshall township	517	568	9.9%
Lucas township	260	246	-5.4%
Lynd city	346	448	29.5%
Lynd township	471	423	-10.2%
Lyons township	208	199	-4.3%
Marshall city	12,735	13,680	7.4%
Minneota city	1,449	1,392	-3.9%
Monroe township	242	202	-16.5%
Nordland township	251	213	-15.1%
Rock Lake township	282	265	-6.0%
Russell city	371	338	-8.9%
Shelburne township	180	178	-1.1%
Sodus township	282	283	0.4%
Stanley township	254	238	-6.3%
Taunton city	207	139	-32.9%
Tracy city	2,268	2,163	-4.6%
Vallers township	243	214	-11.9%

Westerheim township	286	235	-17.8%
Total	25,425	25,857	1.7%

Source: U.S. Census 2000, 2010

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 41.5 percent. The largest loss in population by age cohort was 35 to 44 with (-23.5) percent.

G Table #6 Population by Age Cohort – Lyon County

Age Group	2000	Percent of Total	2010	Percent of Total	Percent Change 2000 - 2010
0-9	3,480	13.7%	3,558	13.7%	2.2%
10-19	4,236	16.7%	3,712	14.3%	-12.4%
20-24	2,312	9.1%	2,465	9.5%	6.6%
25-34	3,023	11.9%	3,415	13.2%	13.0%
35-44	3,710	14.6%	2,840	11.0%	-23.5%
45-54	3,013	11.9%	3,591	13.9%	19.2%
55-64	1,949	7.6%	2,757	10.7%	41.5%
65-74	1,592	6.3%	1,605	6.2%	0.8%
75-84	1,458	5.7%	1,224	4.8%	-16.0%
85+	652	2.6%	690	2.7%	5.8%

Source: U.S. Census 2000, 2010

Median Age

Cities in Lyon County had a small change in median age from 2000 to 2010, which was a 2.0 percent increase. The largest two increases in the median age were in the City of Gavin with 15.3 percent, and in the City of Cottonwood with 12.1 percent. The largest decrease in the median age was in the City of Taunton, and the decrease was (-14.7) percent. The City of Marshall had the smallest change in median age, which was a (-1.0) percent decrease.

G Table #7 Median Age by City – Lyon County

City	2000	2010	Percent Change 2000- 2010
Balaton	36.4	37.9	4.1%
Cottonwood	34.6	38.8	12.1%
Florence	X	39.3	X
Garvin	33.4	38.5	15.3%
Ghent	33.7	32.0	-5.0%
Lynd	33.0	34.2	3.6%
Marshall	30.0	29.7	-1.0%

Minnesota	41.3	43.5	5.3%
Russell	34.9	37.7	8.0%
Taunton	49.5	42.2	-14.7%
Tracy	40.8	38.7	-5.1%
Cities	36.8	37.5	2.0%

Source: U.S. Census 2000, 2010

In townships in Lyon County the median age increased by 17.3 percent from 2000 to 2010. The largest increase in the median age was in Nordland Township, and the increase was 42.0 percent. The two decreases in the median age were in Shelburne Township, with (-10.5) percent, and in Eidsvold Township, with (-0.6) percent decrease.

G Table #8

Median Age by Township – Lyon County

Township	2000	2010	Percent Change 2000 - 2010
Amiret	43.2	46.3	7.2%
Clifton	33.9	37.8	11.5%
Coon Creek	38.9	45.0	15.7%
Custer	43.4	43.9	1.2%
Eidsvold	34.2	34.0	-0.6%
Fairview	35.1	46.1	31.3%
Grandview	29.9	34.0	13.7%
Island Lake	37.0	44.2	19.5%
Lake Marshall	36.4	42.2	15.9%
Lucas	33.3	38.5	15.6%
Lynd	36.5	43.7	19.7%
Lyons	35.8	41.6	16.2%
Monroe	36.7	47.5	29.4%
Nordland	29.5	41.9	42.0%
Rock Lake	42.4	46.6	9.9%
Shelburne	43.0	38.5	-10.5%
Sodus	38.1	41.8	9.7%
Stanley	33.8	42.5	25.7%
Vallers	34.8	44.1	26.7%
Westerheim	35.0	40.5	15.7%
Townships	36.1	42.4	17.3%

Source: U.S. Census 2000, 2010

In Lyon County the median age had a very small increase from 34.0 to 34.1 from 2000 to 2010. The median age in Lyon County is 7.4 years lower than Region 8 and is 3.3 years lower than the State of Minnesota, while Region 8 has a median age that is 4.1 years higher than the State of Minnesota.

G Table #9**Median Age by County/Region/State**

	2000	2010	Percent Change 2000 - 2010
<i>Lyon County</i>	34.0	34.1	0.2%
<i>Region 8</i>	39.9	41.5	4.0%
<i>Minnesota</i>	35.4	37.4	5.6%

Source: U.S. Census 2000, 2010

Population by Race

From 1990's, the Caucasian population of Lyon County continued to decline while each minority group increased by significant percentages. From 2000 to 2010, white had a 2.2 increase in percentage while a (-1.8) percent decrease in number. There has been a shift towards a more diverse population. The number of population for each non-white race in 2010 had mostly doubled the number in 2000, and this growth led to the 1.2 percent increase in total population for one race.

G Table #10**Population by One Race – Lyon County**

	2000 Number	Percent	2010 Number	Percent	Percent Change 2000 - 2010
White	23,792	93.6	23,360	95.8	-1.8%
Black or African American	378	1.5	587	0.5	55.3%
American Indian and Alaska Native	80	0.3	114	0.4	45.5%
Asian	425	1.7	679	2.6	59.8%
Native Hawaiian and other Pacific Islander	5	0.0	7	0.0	40.0%
Some Other Race	481	1.9	708	2.7	47.2%
Two or More Races	264	1.0	402	1.6	52.3%
Total Population	25,161	99.0	25,455	98.4	1.2%

Source: U.S. Census 2000, 2010

Diversity in Lyon County influences the number of spoken languages. Roughly 90 percent of residents in Lyon County only speak English. There are a number of other languages that are spoken in Lyon County, that include: Spanish or Spanish Creole, other Indo-European, Russian, Somali, Asian and Pacific Island languages.

G Table #11**Language Spoken At Home – Lyon County**

Subject	Percent	Margin of Error
Speak only English	89.6	+/- .9
Speak a language other than English	10.4	+/- .9
Spanish or Spanish Creole	5.5	+/- .5
Other Indo-European	1.0	+/- .4

Asian and Pacific Island Languages	2.7	+/- .3
Other Language	1.1	+/- .6

Source: 2010-2014 American Community Survey 5-Year Estimates

Population Projections

Population projections from the MN Department of Administration show that the population in Lyon County is projected to increase by 12.1 percent from 2015 to 2045. The projections show a dramatic increase in the age cohorts 75+ from 2015 to 2045. The population for the age cohorts 60 – 74 and 35 – 59 are also projected to increase by percentages ranging from 10.1 to 26.4. Some of the other population cohorts are expected to have small increases while some have decreases during the same time period. Lyon County communities will undoubtedly be impacted by the changing age structure of their communities. The county must insure 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.

G Table #12 Population Projections – Lyon County

Age Group	2015		2020		2025		2030	
	Male	Female	Male	Female	Male	Female	Male	Female
0 to 4	745	709	741	704	758	721	797	758
5 to 9	862	818	731	696	731	695	746	709
10 to 14	884	905	854	812	730	694	728	692
15 to 19	973	1,223	1,160	1,263	1,134	1,175	1,006	1,054
20 to 24	1,073	1,204	1,091	1,370	1,283	1,417	1,254	1,326
25 to 29	950	781	899	717	924	891	1,112	938
30 to 34	789	745	702	730	657	671	681	843
35 to 39	789	697	785	736	703	725	657	665
40 to 44	483	646	774	688	776	731	692	717
45 to 49	873	730	482	644	774	690	773	730
50 to 54	923	877	867	720	483	641	772	684
55 to 59	840	884	907	873	859	724	475	642
60 to 64	720	600	828	864	900	860	848	709
65 to 69	659	665	709	598	821	861	890	855
70 to 74	462	412	646	647	701	586	809	845
75 to 79	252	358	452	408	632	643	684	580
80 to 84	240	375	242	357	435	408	610	636
85+	226	465	224	426	225	403	319	417
Gender totals	12,743	13,094	13,094	13,253	13,526	13,536	13,853	13,800
Total Population	25,837		26,347		27,062		27,653	

Age Group	2035		2040		2045		Percent Change 2015- 2045
	Male	Female	Male	Female	Male	Female	
0 to 4	824	783	811	772	784	745	5.2%
5 to 9	787	748	820	779	812	772	-5.7%
10 to 14	745	708	792	752	830	789	-9.5%
15 to 19	1,006	1,053	1,031	1,077	1,086	1,130	0.9%
20 to 24	1,129	1,207	1,137	1,215	1,171	1,249	6.3%
25 to 29	1,088	851	972	741	985	751	0.3%
30 to 34	872	892	856	812	742	705	-5.7%
35 to 39	683	838	880	894	868	819	13.5%
40 to 44	648	660	679	839	882	901	57.9%
45 to 49	692	720	654	668	689	853	-3.8%
50 to 54	773	726	698	721	664	674	-25.7%
55 to 59	764	688	771	736	700	736	-16.7%
60 to 64	471	630	763	680	776	733	14.3%
65 to 69	841	709	471	636	768	690	10.1%
70 to 74	879	840	838	701	473	632	26.4%
75 to 79	792	837	867	839	832	706	152.1%
80 to 84	662	577	768	834	852	839	175.0%
85+	444	537	525	560	616	703	90.9%
Gender totals	14,100	14,004	14,333	14,256	14,530	14,427	
Total Population	28,104		28,589		28,957		12.1%

Source: Minnesota Department of Administration

VI 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 increase by 58.6 percent from 2015 to 2045. 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.

Housing Units

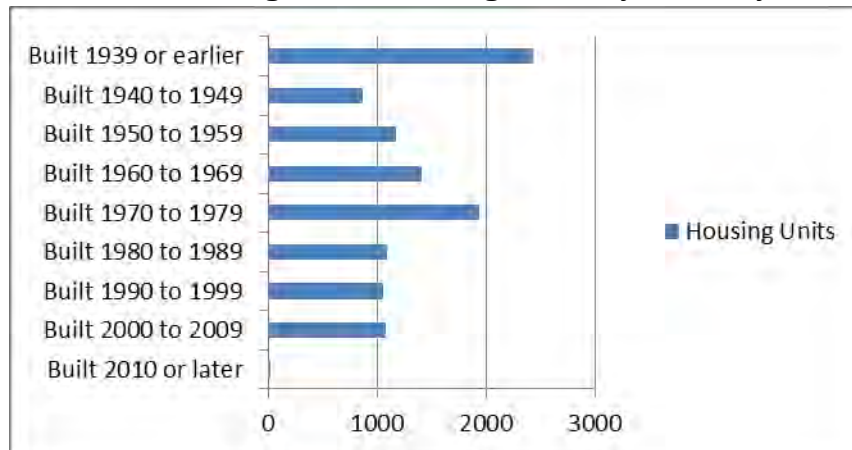
In Lyon County 22.0 percent of housing units were built in 1939 or earlier. Almost half of the housing units in Lyon County were built in 1970 to 2010 or later, while 29.9 percent of housing units were built before 1950. Lyon County still has an older housing stock which impacts the county’s ability to with stand a disaster.

G Table #13 Build Year of Housing Units - Lyon County

Year Built	Housing Units	Percent
<i>Built 2010 or later</i>	18	0.2%
<i>Built 2000 to 2009</i>	1,079	9.7%
<i>Built 1990 to 1999</i>	1,057	9.5%
<i>Built 1980 to 1989</i>	1,095	9.9%
<i>Built 1970 to 1979</i>	1,935	17.5%
<i>Built 1960 to 1969</i>	1,413	12.8%
<i>Built 1950 to 1959</i>	1,173	10.6%
<i>Built 1940 to 1949</i>	874	7.9%
<i>Built 1939 or earlier</i>	2,438	22.0%
<i>Total Housing Units</i>	11,082	100.0%

Source: U.S. Census Bureau, 2009 – 2013 5-year ACS

G Figure #10 Building Year of Housing Units - Lyon County



There were a total of 46,762 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 Lyon County, the total number of housing units continued increasing from 1970, with a 22.2 percent (1,670 actual units) increase from 1970 to 1980, a 5.2 percent (479 actual units) increase from 1980 to

1990, a 6.4 percent (623 actual units) increase from 1990 to 2000, and a 7.8 percent (800 actual units) increase from 2000 to 2010. Lyon County saw the greatest dramatic housing units' growth among Region 8 counties, with a 47.5 percent (3,572 actual units) increase from 1970 to 2010 overall.

G Table #14 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%
Jackson	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

Lyon County's population in households remained virtually the same, with a decrease of 0.1 percent from 1990 to 2010, mostly recovering from a small decline in the 2000 census. 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. This population trend of households was not the trend of the number of households, which had an increase, by 12.7 percent from 1990 to 2010.

As the result of the increasing households, the persons per household decreased from 2.73 in 1990 to 2.42 in 2010. The decrease over that time period was (-11.4) 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 3,028 householders living alone and 1,129 householders 65 years and over living alone.

G Table #15 Population by Household – Lyon County

	1990	2000	2010	Percent Change 1990 - 2010
<i>Population in Households</i>	24,789	24,169	24,765	-0.1%
<i>Households</i>	9,073	9,715	10,227	12.7%
<i>Persons Per Household</i>	2.73	2.49	2.42	-11.4%

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

In Lyon County 66.5 percent of occupied housing units are owner-occupied. In Region 8, 76.7 percent of occupied housing units are owner-occupied. Lyon County has seen continued increases in the number

of owner-occupied housing units over the past four decades. From 1970 to 2010, Lyon County has seen a 33.1 percent increase in owner-occupied housing units, which has been the greatest increase in Region 8. During that same time period, Region 8 saw a 4.6 percent decrease in owner-occupied housing units.

G Table #16

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	76.7%

Source: U.S. Census 2010

G Table #17

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 Lyon County was similar with the owner-occupied units, which had a continued increase over the past four decades. From 1970 to 2010, the percentage change in renter-occupied housing units increased by 77.6 percent (1,498 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 overall growing population in Lyon County.

G Table #18**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

Vacant Housing Units

The 1970 U.S. Census reported that Lyon County had 484 vacant housing units. This number increased by 28, to 512 units from 1970 to 1980. The number of vacant housing units increased again from 1980 to 1990 by 90 units to 602. The number of vacant housing units stabilized and dropped by 19 units between 1990 and 2000. Between 2000 and 2010, the number rose dramatically to 871 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 Lyon County and other rural counties.

G Table #19**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, 7.8 percent of the housing units in Lyon County were vacant, which was below the 10.9 percent in Region 8. The percentage of a county's housing units being vacant adversely affects preparing for and cleaning up after a disaster.

G Table #20 **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	7.2%	6.9%	9.2%	8.3%	10.9%

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

Housing Unit Value

Lyon County has the highest median housing unit value in Region 8 and higher median rent than the Region 8 average. The median rent is only 11 dollars more than the Region 8 average. The cost of a disaster is potentially higher in Lyon County when compared to Region 8 averages.

G Table #21 **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	\$94,944	\$532

Source: U.S. Census 2010

G Table #22 **Housing Summary: 2010 – Lyon County**

Subject	Number	Percent
Total Population		
In Households	24,765	95.8%
In Group Quarters	1,092	4.2%

Total Households		
Family Households	6,365	62.2
Non Family Households	3,862	37.8
Householder Living Alone	3,028	29.6
Households 65 years and over living Alone	1,129	11.1
Households with Individuals under 18	3,102	30.3
Households with Individuals 65 and over	2,404	23.5
Average Household Size	2.42	(X)
Units in Structure		
1 unit, detached	7,875	71.3%
1 unit, attached	193	1.7%
2 units	259	2.3%
3 or 4 units	389	3.5%
5 to 9 units	519	4.7%
10 to 19 units	565	5.1%
20 or more units	985	8.9%
Mobile Home	261	2.4%
Vehicles Available		
None	806	7.9%
1 Vehicle	2,926	28.5%
2 Vehicles	4,003	39.0%
3 or more	2,528	24.6%
House Heating Fuel		
Utility Gas	4,005	39.0%
Bottled, tank, or LP gas	2,116	20.6%
Electricity	3,247	31.6%
Fuel oil, kerosene, etc.	591	5.8%
Coal or coke	0	0.0%
Wood	71	0.7%
Solar Energy	0	0.0%
Other fuel	107	1.0%
No fuel used	126	1.2%
Selected Characteristics		
Lacking complete plumbing facilities	18	0.2%
Lacking complete kitchen facilities	107	1.0%
No telephone service	317	3.1%

Source: U.S. Census 2010 and 2006-2010 ACS

VII Employment

Lyon County had an estimated employment of 14,272 persons in 2010, including 11,610 employments by private ownership and 2,662 employments 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.

G Table #23

Employment by Industry – Lyon County

Industry	2000	2010
Natural Resources and Mining	114	146
Construction	656	689
Manufacturing	4,459	2,136
Trade, Transportation and Utilities	2,809	3,109
Information	204	142
Financial Activities	880	1,141
Professional and Business Services	428	1,342
Education and Health Services	2,813	3,200
Leisure and Hospitality	938	1,213
Other Services	543	383
Public Administration	761	769
All Industries	14,607	14,272

Source: Department of Employment and Economic Development

Agriculture is a significant driving force in Lyon County. The USDA 2007 Census of Agriculture showed that there were 1,011 farms in Lyon County in 2007, 7% more than in 2002. In 2007, the average farm size was 424 acres, and the average farm reported sales of \$302,000. There were 428,693 acres of farm land in production in Lyon County.¹⁵ In 2007, the market value of agricultural products sold in Lyon County was \$305,723,000. Since 2007, 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 Lyon County as compared to 2007.

Unemployment Trends

The unemployment rate in Lyon County was 4.4 percent in 2012, while the State of Minnesota had an unemployment rate of 5.7 percent. From 2000 through 2012, the average unemployment rate was 3.9 percent for Lyon County, 4.6 percent for Region 8, 4.6 percent for Minnesota, and 5.8 percent for the

¹⁵ USDA Census 2007. Accessed: 10/10/15. Available: http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Minnesota/cp27083.pdf

United States. The average unemployment rate for Lyon County was much lower than Region 8, State and national rates.

During the economic downturn of Obama’s first term as President (2009-2012), the average unemployment rate was 5.5 percent for Lyon County, 6.1 percent for Region 8, 6.9 percent for the State of Minnesota, and 9.1 percent for the United States. Lyon County fared significantly better during Obama’s first term than Region 8, the State of Minnesota, and the United States.

One explanation for Lyon County seeing significantly lower unemployment rates was the agriculture industry. Lyon County is part of a strong agricultural region in Southwest Minnesota. About 2/3 of farmers list farming as their primary occupation. County has a significant amount of livestock, including turkeys, hogs and pigs, cattle, and sheep. Moreover, there is a large employer in the county, the Schwan Food Company, a global food manufacturing and sales company headquartered in the city of Marshall, and other considerable scale employers such as the US Bank Corporation, Hy-Vee Foods, Walmart Supercenter, Southwest Minnesota State University, Avera Marshall Regional Medical Center, Archer Daniels Midland Company, Marshall Public Schools, Norcraft Companies and others.

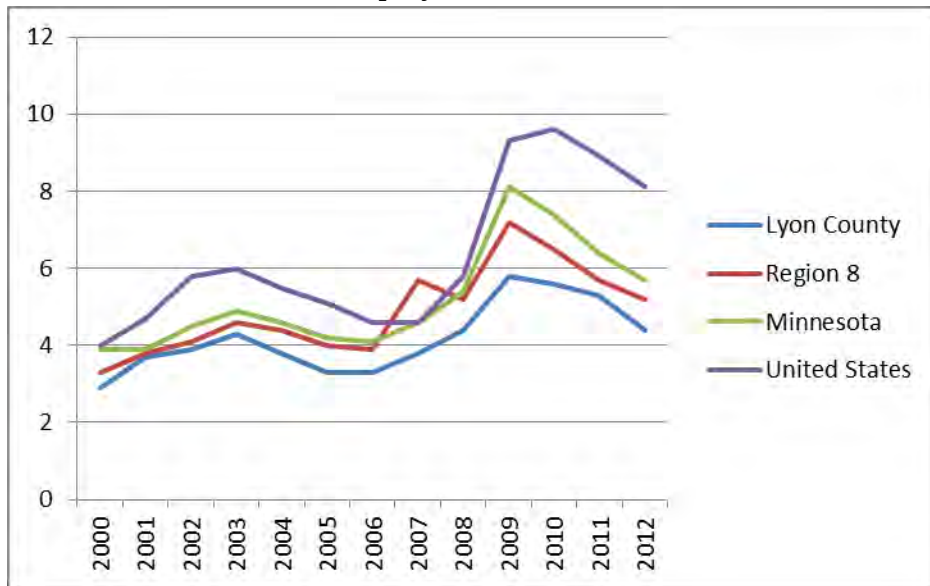
G Table #24 Unemployment Trends

Year	Lyon County	Region 8	Minnesota	United States
2012	4.4	5.2	5.7	8.1
2011	5.3	5.7	6.4	8.9
2010	5.6	6.5	7.4	9.6
2009	5.8	7.2	8.1	9.3
2008	4.4	5.2	5.4	5.8
2007	3.8	5.7	4.6	4.6
2006	3.3	3.9	4.1	4.6
2005	3.3	4.0	4.2	5.1
2004	3.8	4.4	4.6	5.5
2003	4.3	4.6	4.9	6.0
2002	3.9	4.1	4.5	5.8
2001	3.7	3.8	3.9	4.7
2000	2.9	3.3	3.9	4.0

Department of Employment and Economic Development & Bureau of Labor Statistics

G Figure #11

Unemployment Trends



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 Lyon County was \$46,872, while the Region 8 average was \$44,176. Per capita income in Lyon County was \$23,755, while Region 8 was \$23,433. The median family income was \$63,793, while Region 8 was \$56,697. In all three income examples, Lyon County ranked higher than the Region 8 average.

G Table #25

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	35,256	44,176	17,317	23,433	42,825	56,697

Source: U.S. Census 2000, 2010

CHAPTER 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 all hazard mitigation plan by HSEM and FEMA.

I 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).

Lyon County has the land use authority over the townships, so Lyon County will represent the townships in the All Hazard Mitigation Plan (AHMP). The Lyon County AHMP will cover all the townships in the county. Representatives from the townships were asked to participate in the planning process. Lyon County and the following cities passed resolutions of intention to participate in the process. Land use authority within city limits is controlled by the local jurisdiction.

Lyon County is a rural county. A number of resources and responsibilities are shared throughout the county. The Lyon County Sheriff’s Office provides law enforcement throughout the county. The Cities of Marshall, Minneota and Tracy also have separate police departments. Additional resources and responsibilities are shared regional. Lyon County is part of the Southwest Health and Human Services (SWHHS) service area, which includes the following counties: Lincoln, Lyon, Murray, Pipestone, Redwood, and Rock. A representative from the Lyon County Sheriff’s office and SWHHS were members of the planning team. This ensured a regional prospective was taken when analyzing natural and manmade hazards.

Resolutions of Participation from each participating jurisdiction can be found in Addendum II. Resolutions of Adoption from each participating jurisdiction that chooses to adopt this plan will be appended in Addendum III. The Resolutions of Adoption will be added after FEMA approval.

**G Table #26 a Multi-Jurisdictional Participation
Lyon County All Hazard Mitigation Plan**

Local Unit of Government	Participation
City of Balaton	Yes
City of Cottonwood	Yes
City of Florence	Yes
City of Garvin	Yes
City of Ghent	Yes
City of Lynd	Yes

City of Marshall	Yes
City of Minneota	Yes
City of Russell	Yes
City of Taunton	Yes
City of Tracy	Yes

G Table #26 b Summary of Jurisdiction Participation

Name	Worksheet	Goals	Attended Meeting
Lyon County Emergency Management; Director*	Y	Y	Y
Lyon County; Administrator*	Y	Y	Y
Lyon County; Sheriff*	Y	Y	Y
Lyon County Public Works; County Engineer*	Y	Y	Y
Lyon County Land Management Office; Director*	Y	Y	Y
Lyon County GIS*	Y	Y	Y
Southwest Health and Human Services; Emergency Planner*	Y	Y	Y
City of Balaton; City Clerk	Y	Y	
City of Cottonwood; City Administrator	Y	Y	
City of Florence; City Clerk	Y	Y	
City of Garvin; City Clerk	Y	Y	
City of Ghent; City Clerk*	Y	Y	Y
City of Lynd; City Clerk	Adopt County	Y	
City of Marshall; Police Department Director*	Y	Y	Y
City of Minneota; City Clerk	Y	Y	
City of Russell; City Clerk	Y	Y	Y
City of Taunton; City Clerk	Adopt County	Y	
City of Tracy; City Clerk*	Y	Y	Y
Township Representatives*	Y	Y	Y
Lincoln-Lyon Electric Cooperative; General Manager*	Y	Y	Y
Avera Marshall Regional Medical Center; Emerg.Planner*	Y	Y	Y
North Memorial Ambulance – Marshall*	Y	Y	Y
Marshall Public Schools; Director of Business Services*	Y	Y	Y

Worksheet: A representative completes the Hazard Identification Worksheet
Goals: A representative reviewed the goals and provided feedback
Denotes Planning Team Member: *

NA: was not specifically listed in any goals

G Table #26c Emergency Response, Schools, and Organization Participation

Name	Goals	Attended Meeting
Taunton Fire Department		
Minneota Fire Department		
Cottonwood Fire Department		
Ghent Fire Department		
Marshall Fire Department		
Lynd Fire Department		
Russell Fire Department	Y	Y
Balaton Fire Department*		
Garvin Fire Department	Y	
Tracy Fire Department		
Minneota Ambulance District		
Cottonwood Ambulance District	Y	
Marshall Ambulance District (North Memorial Ambulance – Marshall*)	Y	Y
Tyler Ambulance District	Y	
Balaton Ambulance District		
Tracy Ambulance District		
Lakeview Public Schools	Y	
Marshall Public Schools	Y	Y
Minneota Public School		
Tracy Area Public Schools		
Russell-Tyler-Ruthton Public Schools		
Lyon County SWCD; Director	Y	Y
Lincoln Pipestone Rural Water; System Manager	Y	
Red Rock Rural Water; System Manager	Y	
Marshall Public Utility; General Manager	Y	
Minnesota Board of Water and Soil Resources; Southwest Region Representative		
Minnesota Department of Agricultural; Acting Director – Inspection Division	Y	
Minnesota Department of Health; Public Health Preparedness Consultant	Y	
Minnesota Department of Transportation; District 8 Planner	Y	

Minnesota Board of Animal Health; Assistant Director		
University of Minnesota Extension; Regional Director	Y	
Minnesota Pollution Control Agency; Region Representative		
Minnesota Department of Natural Resources; Area Representative		
American Red Cross; Disaster Program Manager		
Southwest Minnesota Regional Airport-Marshall (Ryan Field): City Representative		
Tracy Municipal Airport; City Representative	Y	Y

Goals: A representative reviewed the Goals and provided feedback

II 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 Lyon 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. When satisfied with the plan, the planning team recommends the Lyon 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 Lyon 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 Lyon 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 Lyon County Emergency Management Department will work with local jurisdiction to help incorporate the applicable strategies, goals, and policies from the Lyon 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.

III 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 Lyon County Emergency Management.

CHAPTER 4: PLANNING PROCESS

I Description of the Planning Process

Preplanning

Since the previous Lyon County AHMP was approved and adopted in 2010, Lyon County Emergency Manager and the Southwest Regional Development Commission (SRDC) have collected information on hazards that occurred in Lyon 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 winter of 2015, the planning process began for the update of the Lyon County AHMP. Every five years the Lyon 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."¹⁶ Lyon 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 Lyon County AHMP Planning Team was reformed to assist with the update. The planning team consists of a number of elected officials, county staff, city staff, and emergency personnel.

Lyon County AHMP Planning Team:

- Tammy VanOverbeke – Lyon County: Emergency Management Director
- Loren Stomberg – Lyon County: Administrator
- Mark Mather – Lyon County: Sheriff
- Aaron VanMoer – Lyon County Public Works : County Engineer
- John Biren – Lyon County Land Management Office: Zoning Administrator
- Mark Volz – Lyon County: GIS Specialist
- Anna Snyder – Southwest Health and Human Services: Public Health Emergency Preparedness Coordinator
- Rob Yant – Marshall Police Department Director & City Emergency Manager
- Mike Votca – Tracy City Administrator
- Dawn Vlaminck – Ghent City Clerk
- Tim O’Leary – Lincoln-Lyon Electric Cooperative
- Kerry Netzke – Area II Minnesota River Basin
- Bruce Lamprecht – Marshall Public Schools: Director of Business Services
- Troy Wendland – Balaton Fire Department
- Terry Schreiber – Township Representative

¹⁶ FEMA. 44 CFR 201.6 - Local Mitigation Plans. Accessed: 9/25/15. Available: <http://www.law.cornell.edu/cfr/text/44/201.6>

- Eva Bruns – Avera Marshall Regional Medical Center: Safety Officer
- Dan Desmet – North Memorial Ambulance – Marshall
- Mike Munford – Southwest Minnesota State University; Director of University Public Safety
- Lucas Youngsma – Department of Natural Resources – Area Hydrologist

Southwest Regional Development Commission:

- Drew Hage, Planner

The SRDC contacted all of the cities within Lyon County that the update to the Lyon 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 Lyon County and multiple planning team members also represent townships in Lyon County.

Planning Meeting

The first All Hazard Mitigation Plan Meeting was held on February 24, 2015. This meeting was an introduction to the Lyon 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.

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. The Local Mitigation Plan Review Tool was presented to the planning team as a master guide to the materials that are required to be included in the Lyon County AHMP. There will be a total of four planning meetings, including the first meeting, to gather information, analyze the natural and manmade hazards that pose a risk in Lyon County, and outline mitigation strategies to mitigate the risk of the hazards that were identified.

There were also resources allocated to have up to three subcommittee meetings. These subcommittee meetings are used to help gather additional information, analyze potential hazards, and identify mitigation measures. These subcommittee meetings helped SRDC staff to prepare and present information to the larger planning team during Lyon County AHMP planning meetings.

The Hazard Identification Worksheet was also discussed during the presentation regarding the planning process. The Hazard Identification Worksheet is an important part of the planning process. The Hazard Identification Worksheets helps the planning team rank and quantify the natural and manmade hazards in Lyon County. The planning team and city involvement is needed to help identify hazards and provide feedback in regards to potential frequency, spatial extent, potential severity, warning time, risk level, and hazard rank.

The Hazard Identification Worksheet outlined the natural and manmade hazards that were included in the original Lyon 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
- Earthquakes
- 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 and Transportation Crashes
- 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 Lyon County. These hazards included:

- Coastal Erosion—Lyon 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 Lyon County. This is an issue in counties in eastern Minnesota.
- Nuclear Generating Plants—none are located in or near Lyon County.

Public participation is a critical component in the development of the Lyon 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 Lyon County AHMP needs to come from county staff, township and city representatives, and the general public. Efforts were discussed to actively include these groups in the update of the Lyon County AHMP.

Planning Meeting / Risk Assessment Meeting

The second All Hazard Mitigation Plan Meeting was held on January 11, 2016. The second and third meetings were centered on creating a profile of the natural and manmade hazards. Vulnerability is the critical component to the Risk Assessment meetings.

The first Risk Assessment meeting covered hazard identification and creating a profile of the identified natural hazards. The profile 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.

Planning Team members were given the opportunity to revisit the list of identified hazards to make sure no hazards were overlooked. The hazard identification worksheets were distributed during the meeting, so planning team members could keep the categories in mind when the natural hazards were being discussed. Planning team members were asked to complete the worksheets after the second risk assessment meeting concluded. This will allow 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 identify and discuss gaps that they identified.

Risk Assessment Meeting #2

The third All Hazard Mitigation Plan Meeting was held on February 1, 2016. The meeting agenda was to profiling the manmade hazards. The profile was the same as the natural hazards, which included: locations affected by the hazard, extent of the hazard, previous occurrences of the hazard, probability of future events of this hazard, and vulnerability which covered plans and programs, gaps and deficiencies, and existing mitigation measures.

Risk Assessment – Subcommittee Meeting

A Risk Assessment Subcommittee Meeting was held on March 3, 2016. The meeting agenda was to review the Risk Assessment Chapter of the Lyon County AHMP. The primary focus was to identify gaps and areas to research in more depth. This subcommittee meeting was also an opportunity to review progress of the entire Lyon County AHMP. The Risk Assessment Subcommittee consisted of Tammy VanOverbeke (Lyon County Emergency Management Director), Dawn Vlaminck (Ghent City Clerk), and Drew Hage (SRDC Planner).

Mitigation Strategies Meeting

The fourth All Hazard Mitigation Plan Meeting was held on March 25, 2016. The Mitigation Strategies meeting started with a summary of the existing Vision and Mitigation Goals outline in the previous Lyon County AHMP. The presentation highlighted the previously identified goals, objectives, and strategies. Strategies that were already accomplished were added to the list of existing mitigation actions and new goals, objectives, and strategies were added to address identified gaps and deficiencies that were identified during the risk assessment meetings.

SRDC staff outlined the importance of Goals to be specific, measurable, attainable, relevant, and time bound (SMART Goals). The planning team analyzed and updated the Goal Section in a manner to reflect SMART Goals. Draft goals were developed during the mitigation strategies meeting.

Mitigation Strategies & STAPLEE Process – Subcommittee Meeting

The fifth All Hazard Mitigation Plan Meeting was held on May 9, 2016. A subcommittee meeting was held to farther discuss the goals, objectives, and strategies that were identified at the previous meeting. The Mitigation Strategies Subcommittee referred to the Risk Assessment Section to confirm that the goals, objectives, and strategies addressed the needs outlined in the plan. By reviewing the Risk Assessment Section, the Mitigation Strategies Subcommittee was better be able to finalize and prioritize mitigation goals, objectives, and strategies to address the specific natural and manmade hazards outlined in the plan update.

The Mitigation Strategies Subcommittee 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 Mitigation Strategies Subcommittee. 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. Trusty was instructed by the group to reword the goals into more action oriented statements. Upon completion, the Subcommittee reviewed the draft of the goals and strategies electronically.

Mitigation Strategies Subcommittee:

- Tammy Vanoverbeke, Lyon County Emergency Management Director
- Dawn Vlaminck, City of Ghent
- Aaron VanMoer, Lyon County Engineer
- Lucas Youngsma, Minnesota DNR
- Jay Trusty, SRDC Executive Director

Plan Review Meeting

The finished plan was sent to the Lyon County Emergency Management Director for review at the beginning of September 2016.

A Draft Plan Review Meeting was held _____2016. During this time the Lyon County AHMP Planning Team reviewed the entirety of the Lyon County AHMP. Modifications were made via email and phone to the SRDC.

The Public Review Meeting was held _____2016. 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 Lyon County AHMP was available online on Lyon County’s website and the SRDC 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 press release for the Public Review Meeting was advertised in the Marshall Independent, the only daily newspaper in Lyon County. 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 Lyon County AHMP.

II Public Involvement

Intergovernmental coordination was essential in the development of the Lyon County AHMP. The SRDC and Lyon County Emergency Manager provided information to all local units of government in the county regarding the Lyon 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 Lyon 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 Lyon 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 G Table #26a, G Table #26b and G Table #26c for more information regarding jurisdictions, emergency response departments, schools, and organizations that reviewed and approved the goals section of the Lyon County AHMP.

III 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)
- Jackson County (2008; update 2016)
- Lincoln County (2010)
- Lyon County (2010)
- Murray County (2012)
- Nobles County (2005; update 2011)
- Pipestone County (2010)
- Redwood County (2005; update 2012)
- Rock County (2007; update 2014)

IV 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 Lyon 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.

- Lyon County Emergency Operations Plan
- Lyon County Comprehensive Plan
- The Lyon County Water Management Plan
- Lyon County Land Use Map
- Lyon 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 Marshall Comprehensive Plan
- FEMA Planning Aids and Tools
- County All Hazard Mitigation Plans

The Capabilities Worksheet identifies planning capabilities, policies and ordinances, programs, studies and reports, staff, and community partners that are relevant to hazard mitigation. The Worksheet is attached as Addendum I. 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 Lyon County and the SRDC utilizing data from Lyon County GIS and the State of Minnesota's Land Management Information Center (LMIC).

CHAPTER 5: RISK ASSESMENT

I Introduction

This Chapter profiles hazards facing Lyon County. Section I lists the natural and manmade hazards identified by the Lyon County All Hazard Mitigation Plan (AHMP) Planning Team that have been included in this plan and the methodology used in assessing the risk of each hazard. Section II provides a profile of identified hazards including locations affected by the hazard, extent of the hazard and relationship to other hazards, previous occurrences of the hazard, probability of future events of this hazard, and vulnerability which includes plans and program, gaps and deficiencies, and existing mitigation measures. Section III provides an analysis of the hazard identification worksheet including methodology and findings. Section IV addresses repetitive flood claim properties and severe repetitive loss properties. Section V provides an analysis of development trends for jurisdictions within Lyon County.

Natural Hazards affecting the jurisdiction include:

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

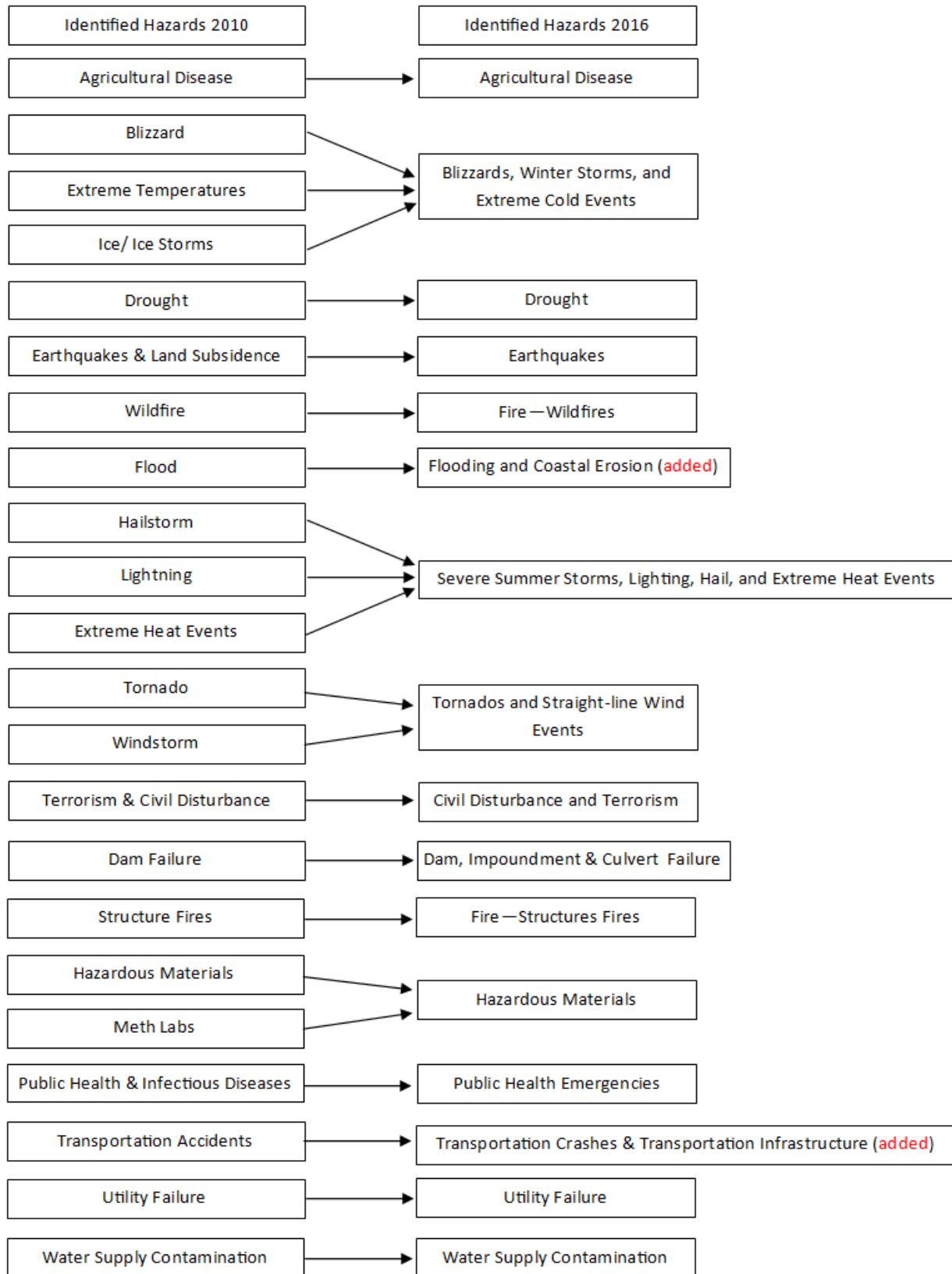
Manmade Hazards affecting the jurisdiction include:

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

There have been some additions in the 2014 update in regards to the hazards identified by the planning team. Earthquakes, Dam Failure, and Transportation Crashes & Transportation Infrastructure were added as an identified hazard. Some hazards were combined for analysis due to their similarity. Refer to RA Figure #1 for which hazards were combined for analysis.

RA Figure #1

Identified Hazards



Methodology

Much of the data in the Risk Assessment Chapter of this plan comes from the National Climatic Data Center (NCDC) Storm Events database. This data is gathered by the National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service. NCDC also receives Storm Data from the National Weather Service. Lyon County is covered by the Sioux Falls office of the National Weather Service. The National Weather service receives their information from a variety of sources, which includes but is not limited to: county, state and federal emergency management officials, local law enforcement officials, severe weather spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public. Lyon County is also in the Sioux Falls major media market, so the county benefits from receiving news of impending weather events from the west.

All of the identified natural and manmade hazards are profiled individually. The hazard profiles include: locations affected by the hazard, extent of the hazard, previous occurrences of the hazard, probability of future events of this hazard, and vulnerability which covers plans and programs, gaps and deficiencies, and existing mitigation measures.

The hazard profiles also reference the Planning Team's Hazard Identification Worksheet. The Planning Team's Hazard Identification Worksheet is an accumulative summary of the individual planning team members Hazard Identification Worksheet. The Hazard Identification Worksheet is a tool to help profile the natural and manmade hazards individually and rank them in regards to potential frequency, spatial extent, potential severity, warning time, risk level, and hazard rank. 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 the next year, Likely = between 10% and 100% chance in the next year, Highly Likely = greater than 100% chance in the next year.
Spatial Extent:	Countywide or Local
Potential Severity:	Limited = <10% area affected destroyed, Minor = 10% to 25% area affected destroyed, Major = 25% to 50% area affected destroyed, Substantial = >50% area affected destroyed.
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

RA Table #1**Hazard Rankings – Planning Team**

High Hazard Ranking	Hazard
Blizzards, Winter Storms, and Extreme Cold Events	Natural
Moderate Hazard Ranking	
Agricultural Disease (animal or crop)	Natural
Drought	Natural
Flooding	Natural
Fire – Wildfires (combined with structure fire for analysis)	
Severe Summer Storms, Lightning and Hail, and Extreme Heat Events	Natural
Tornadoes and Straight-line Wind Events	Natural
Fire – Structure Fires (combined with wildfires for analysis)	Man-made
Hazardous Materials	Man-made
Public Health Emergencies	Man-made
Transportation Crashes	Man-made
Transportation Infrastructure	Man-made
Utility Failure	Man-made
Water Supply Contamination	Man-made
Low Hazard Ranking	
Earthquakes	Natural
Civil Disturbance and Terrorism	Man-made
Dam Failure	Man-made

Refer to RA Table #33 for the Planning Team’s Hazard identification Worksheet. There was also an accumulative summary of cities Hazard Identification Worksheets. Refer to RA Table #34 for the Cities Hazard Identification Worksheet.

Plans and Programs

A number of plans and programs were identified and discussed as part of the Profiling Hazards and Assessing Vulnerability Section. A number of these plans and programs overlap from one hazard to another. Plans and programs will generally only be listed once. This listing helps to document what was discussed.

A number of these plans and programs contain in-depth information and procedures. The plans and programs subsection only identifies the plan or program and provides a brief description. If there were deficiencies, the deficiencies were identified in the gaps and deficiencies subsection.

II Profiling Hazards and Assessing Vulnerability

Natural Hazards

This section provides information on the nature of natural hazards which are a risk in Lyon County. These natural hazards include those caused by climatological, geological, hydrological or other events of the physical rather than manmade world. FEMA defines a natural hazard as a “natural event that threatens lives, property, and other assets. Natural hazards are both predictable and unpredictable in nature.

Natural hazards tend to be predictable in nature as they occur repeatedly in the same geographical locations due to weather patterns and physical characteristics of an area. Natural hazards tend to be unpredictable in nature in regards to exact times and locations when they occur. Natural hazards can change rapidly and can be unpredictable at times. We need to study and understand the risks associated with various natural hazards, so mitigation efforts can help limit damages to property and loss of life.

A1 Agricultural Disease (animal or crop)

Agriculture is a major economic driver in Lyon 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 was assigned a hazard rank of moderate by the planning team.

Locations Affected by the Hazard

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. The planning team identified the spatial extent of agricultural disease as countywide.

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.

Extent of the Hazard

The majority of the land in Lyon County is used for agriculture. An agricultural disease causing crop failure could cause millions of dollars in lost production. The potential severity of agricultural disease is major according to the planning team. Lyon County is ranked 19 in crop production and 9 in livestock production among counties in Minnesota with a total of \$433,182,000 in 2011.¹⁷ Animal transmitted

¹⁷ Lyon County Agricultural Profile. Accessed 11-24-2015. Available: <http://www.mda.state.mn.us/food/business/agmktg-research/~media/Files/food/business/countyprofiles/econrpt-lyon.ashx>

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.¹⁸

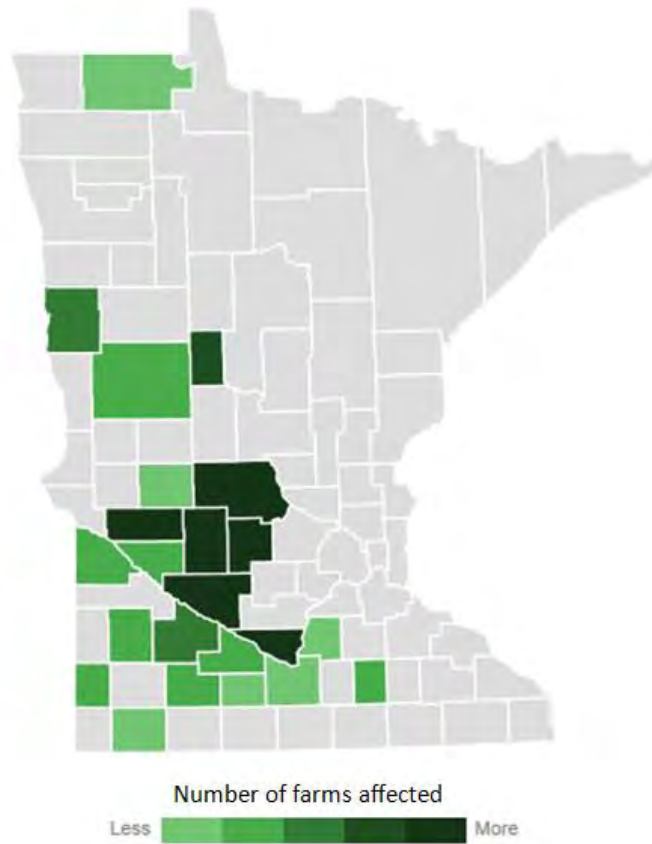
“Influenza in poultry falls into two groups: low pathogenic avian influenza (LPAI), or highly pathogenic avian influenza (HPAI). Similar to influenza symptoms in people, birds infected with LPAI usually experience only mild signs if any, including respiratory signs such as conjunctivitis and nasal discharge, 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.”¹⁹

¹⁸ CDC. Information on Avian Influenza. Access: 11/24/15. Available: <http://www.cdc.gov/flu/avianflu/>

¹⁹ Minnesota Board of Animal Health. Avian Influenza. Accessed: 11/24/15. Available: <https://www.bah.state.mn.us/avian-influenza>

RA Figure #2

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, infected animals can be infected for a long period of time before showing any outward signs of TB.²⁰

The United States has been free of Hoof and Mouth Disease Bovine Spongiform Encephalopathy (BSE-Mad Cow Disease) since 1929.²¹ 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.

²⁰ Minnesota Board of Animal Health. Accessed 5-17-13. Available: <http://mn.gov/bah/diseases/bovine-tb/tb-testing.html>

²¹ University of California Cooperative Extension. Accessed: 9/10/13. Available: http://cesanbernardino.ucanr.edu/Dairy511/FACT_SHEET_No-1_Foot_and_Mouth_Disease/

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.

Animals are also susceptible to the flu and common colds. “Respiratory diseases are common and costly to livestock producers.”²² 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.²³

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,

²² The Cattle Site. Accessed: 9/11/13. Available:
<http://www.thecattlesite.com/diseaseinfo/#sthash.KWvGHoRq.dpuf>

²³ 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>

but Mother Nature is often one step ahead. Other plant diseases include: Asian Soybean Rust, European Corn Borer, and a number of insects.

Relationship to Other Hazards—Cascading Effects

- **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.
- **Civil Disturbance.** A shortage of food could also result in civil disturbance. When the supply of a necessity becomes drastically low, distress can take over and cause civil unrest.

Previous Occurrences of the Hazard

There have not been any recent large scale occurrences of agricultural disease in Lyon County. There was only one reported turkey farm in Lyon County that was affected by Avian Flu.²⁴ There were a number of affected farms in Minnesota and around Lyon County, but fortunately Lyon 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 were affected and humanely put down in Minnesota.²⁵ Lyon County had one turkey farm that was affected, with a loss of 66,000 birds. Neighboring Redwood County also saw a significant impact with 126,900 birds 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

²⁴ Minnesota Board of Animal Health. Accessed: 2/3/16. Available: <https://www.bah.state.mn.us/avian-influenza#collaborative-effort>

²⁵ CDC. Information on Avian Influenza. Access: 7/23/15. Available: <http://www.cdc.gov/flu/avianflu/>

\$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.”²⁶

Probability of Future Events of this Hazard

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.

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.

Emerald Ash Borer (EAB) is one pest that has the potential for a large amount of damage in Lyon 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.”²⁷

RA Table #2 Farm Summary – Lyon County

	1987	1992	1997	2002	2007	2012	Change 2007-2012
Land in Farms	368,115	395,023	403,001	404,004	428,693	412,896	-3.7%
Number of Farms	1,036	947	931	949	1,011	904	-10.6%
Average Size (acres)	355	417	433	426	424	457	7.8%
Harvested Crops	265,676	319,467	338,234	340,258	362,326	361,555	-0.2%

²⁶ 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>

²⁷ Minnesota Department of Agriculture. Accessed 5-17-13. Available: <http://www.mda.state.mn.us/plants/pestmanagement/eab.aspx>

Corn	107,532	151,049	154,986	161,693	191,161	198,061	3.6%
Soybean	114,841	140,841	163,984	160,313	151,513	149,156	-1.6%

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

RA Figure #3

Land in Farms - Lyon County 2012



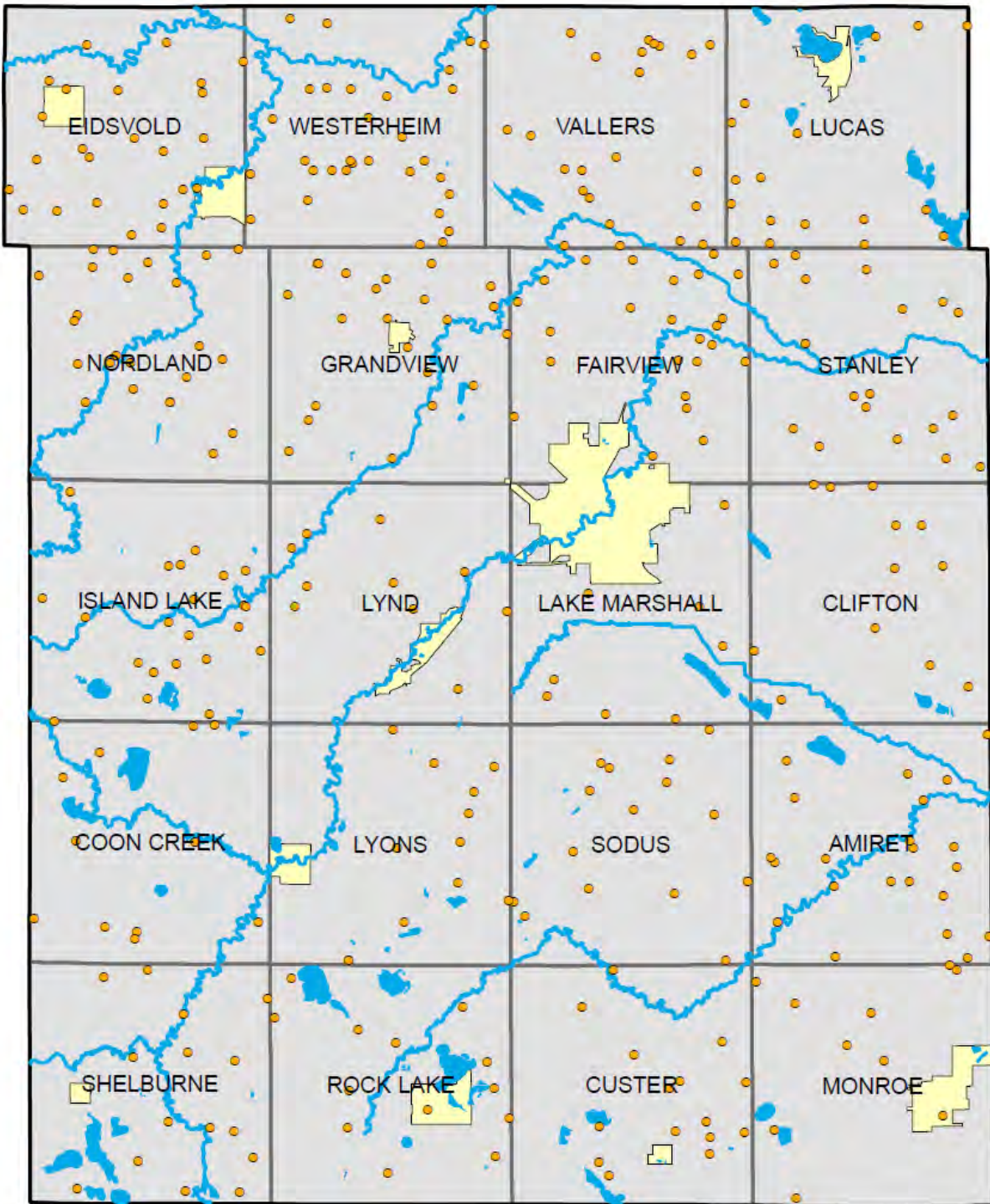
Feedlots

The Minnesota Pollution Control Agency (MPCA) regulates collection, transportation, storage, processing and disposal of animal manure. As of February 2016, there were 282 registered feedlots within Lyon County.²⁸ Management of feedlots and manure is a priority for Soil and Water Conservation Districts in southwest Minnesota.

²⁸ Lyon County Planning and Zoning Department Information request. Received: 3/24/16.

RA Figure #4

Feedlots - Lyon County



- Feedlots
- Rivers
- Lakes
- City Limits
- Townships



Vulnerability

Agricultural disease is difficult to contain and can spread quickly. The risk level assigned to agricultural disease by the planning team is average. 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 2012.²⁹ It is recommended by the Minneapolis Tree Advisory Commission to remove and replace another 5,000 ash trees in 2013 to help prevent the widespread infestation of the bug.

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 Lyon 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 Lyon 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.³⁰ The primary responsibility for regulating carcass disposal in Minnesota lies with the BAH. The 7020 feedlot rule addresses site selection for composting animal carcasses.³¹ 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.

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

²⁹ City of Minneapolis. Accessed: 9/17/13. Available:

<http://www.minneapolismn.gov/sustainability/indicators/WCMS1P-081056>

³⁰ Minnesota Pollution Control. Accessed: 7/19/13. Available: <http://www.pca.state.mn.us/index.php/view-document.html?gid=3579>

³¹ Minnesota Pollution Control. Accessed: 7/19/13. Available: <http://www.pca.state.mn.us/index.php/view-document.html?gid=3579>

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. Lyon 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 Lyon 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 Lyon County. Lyon 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 Lyon 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, Southwest Health and Human Services (SWHHS), 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 Lyon 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.”³² 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.

Existing Mitigation Measures

- The private sector has done a good job of policing itself in 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. Lyon 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.

A2 Blizzards, Winter Storms, and Extreme Cold Events

Minnesota experiences winter weather from mid-autumn through the winter season into spring. Heavy snowfall and extreme cold can immobilize large regions at the same time. All types of winter storms can be accompanied by extreme cold—both absolute temperatures and wind chill. Blizzards, winter storms, and extreme cold events were assigned a hazard rank of high by the planning team.

Locations Affected by the Hazard

All locations in Lyon 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

³² Minnesota Department of Natural Resources. Accessed: 5/18/15. Available: <http://www.dnr.state.mn.us/invasives/aquatic/index.html>

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 Lyon 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. The planning team identified the spatial extent of blizzards, winter storms, and extreme cold events as countywide.

Extent of the Hazard

There are several types of winter storm events that are typical for this area including: heavy snow events, ice storms, blizzards, and extreme cold events. The potential severity of blizzards, winter storms, and extreme cold events is major according to the planning team.

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 A.7 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 Lyon 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.

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.³³ 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.

RA Table #3

Wind Chill Table

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



Frostbite Times

- 30 minutes
- 10 minutes
- 5 minutes



³³ National Oceanic and Atmospheric Administration. Accessed 5-17-13. Available: <http://www.nws.noaa.gov/om/brochures/wnttrstm.htm>

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 Lyon 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 Lyon 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.

Previous Occurrences of the Hazard

From January 2000 through August 2015, there have been 24 documented winter storms in Lyon County. These winter storms are often not confined to Lyon County but affect all of southwest Minnesota. In the table below are winter storm occurrences that occurred from January 2011 through August 2015.

RA Table #4

Winter Storms – Lyon County

Date	Location	Event Narrative
1/30/2011	Lyon, Lincoln, Pipestone, Murray, Cottonwood	Snowfall of 8 to 11 inches, including 11 inches at Marshall, included light accumulations which fell before and after the heavy snow during the night of January 30th and 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.
4/9/2013	Nobles, Jackson, Cottonwood, Rock, Murray, Pipestone, Lyon, 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	Jackson, Murray, Nobles, Lincoln, Cottonwood, Pipestone, 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	Lyon, Lincoln, Murray, Rock, Pipestone, Cottonwood	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.
12/15/2014	Pipestone, Murray, Lyon, Lincoln	Freezing rain produced ice accumulations, measured at one quarter inch at Marshall. The freezing rain was followed by 1 to 2 inches of snow, including 2 inches at Marshall. Strong northwest winds produced some drifting snow. Roads were made very icy, there was

		damage to power lines and resulting power outages, and school classes were cancelled.
1/5/2015	Lyon, Lincoln, Rock, Pipestone, Nobles, Cottonwood, Murray, 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.

National Climatic Data Center (NCDC) Storm Events database

From January 2000 through August 2015, there have been 15 documented Blizzards in Lyon County. In the table below are blizzard occurrences that occurred from December 2012 through August 2015.

RA Table #5 Blizzards – Lyon County

Date	Location	Event Narrative
12/9/2012	Cottonwood, Murray, Lincoln, Lyon	Northwest winds gusting to 50 mph and loose snow cover combined to lower visibilities to near zero in blowing snow over much of the area. Travel was brought to a standstill and businesses were closed.
2/10/2013	Rock, Pipestone, Nobles, Lincoln, Lyon, Cottonwood, Jackson, Murray	Snowfall of 2 to 5 inches, including 4 inches at Marshall, was accompanied by northwest winds gusting to 45 mph, producing blizzard conditions with widespread visibilities below a quarter mile. The low visibilities and drifting snow closed several roads, some businesses, and forced school closings on Monday February 11th.
1/16/2014	Pipestone, Lyon, Rock, Nobles, Lincoln, Murray, Jackson, Cottonwood	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.
1/8/2015	Lyon, Lincoln, Murray, Cottonwood, Nobles, Jackson, 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.

National Climatic Data Center (NCDC) Storm Events database

From January 2000 through August 2015, there have been eight documented extreme cold events in Lyon County. In the table below are extreme cold events that occurred from January 2014 through August 2015.

RA Table #6 Extreme Cold Events – Lyon County

Date	Location(s)	Event Narrative
1/23/2014	Jackson, Nobles, Rock, Lincoln, Murray, Pipestone, Lyon, Cottonwood	Temperatures reaching double digits below zero and northwest winds of 10 to 15 mph combined to produce wind chill readings of 35 to 40 below zero in southwest Minnesota.
2/27/2014	Jackson, Nobles, Lincoln, Murray, Lyon, Cottonwood	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	Jackson, Nobles, Rock, Lincoln, Murray, Pipestone, Lyon, Cottonwood	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.
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National Climatic Data Center (NCDC) Storm Events database

Probability of Future Events of this Hazard

Winter storms are highly likely in the area, and they occur annually. The potential frequency of a blizzard, winter storm, and extreme cold event is highly likely according to the planning team.

Vulnerability

Winter storms have major impacts on local communities. The risk level assigned to blizzards, winter storms, and extreme cold 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 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 Lyon County do have emergency generators that help keep emergency services available during a winter storm.

RA Table #7 Locations with Emergency Generators, Lyon County

City	Location / Description
Balaton	4 Generators: 1 Generator – 35 KW; 1 Generator – 9500 Watt; 1 Generator – 8000 Watt; 1 Generator – 4000 Watt
Cottonwood	10KW portable generator at our maintenance shop and fixed generators at the sewer lift stations
Florence	None
Garvin	3 generators: 1 fixed generator at the lift station and 2– at the fire hall which are portable (3500kw and 1500kw)
Ghent	None
Lynd	None
Marshall	Sewer Lift Station – Oak Street; Sewer Lift Station – Highway 23; Red Baron Arena & Expo; Wastewater Facility; Wastewater Facility (there is also an old diesel generator that can power part of the older part of Marshall)
Marshall Public Utilities	MMU Portable 125 KW Generator; GE Frame V Gas Turbine; MMU Office Generator; MMU Filter Plant Generator; there are also generators at new hospital, and Lyon County Law Enforcement Center.

Minnesota	Back-up for the City's main lift station – 80,000 KW Portable Generator; Back-up for the City's Grant Street lift station – 5,000 KW Portable Generator
Russell	None
Taunton	None jealous
Tracy	The fire hall has a 75KW diesel powered generator permanent; Public Works has a 100KW permanent mounted Diesel; City Water Wells have a 100KW permanent mount diesel; Hospital Lift Station has a 30KW permanent mount diesel; 30KW Portable Diesel generator; 15KW portable Gas generator; semi-portable 15KW gas that needs work; a 4.5KW in our water main repair trailer; and a 2000watt portable for miscellaneous work around town
Lyon County	Generator in the Marshall Highway Shop; A portable generator that would be ample to power a gas pump at Lyon County Highway Shops;

Information request to city and county representatives

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 Marshall has a real-time weather monitoring station at the Southwest Minnesota Regional Airport-Marshall 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.”³⁴

³⁴ MnDOT. 511. Accessed: 12-2-14. Available: <http://hb.511mn.org/About.html>

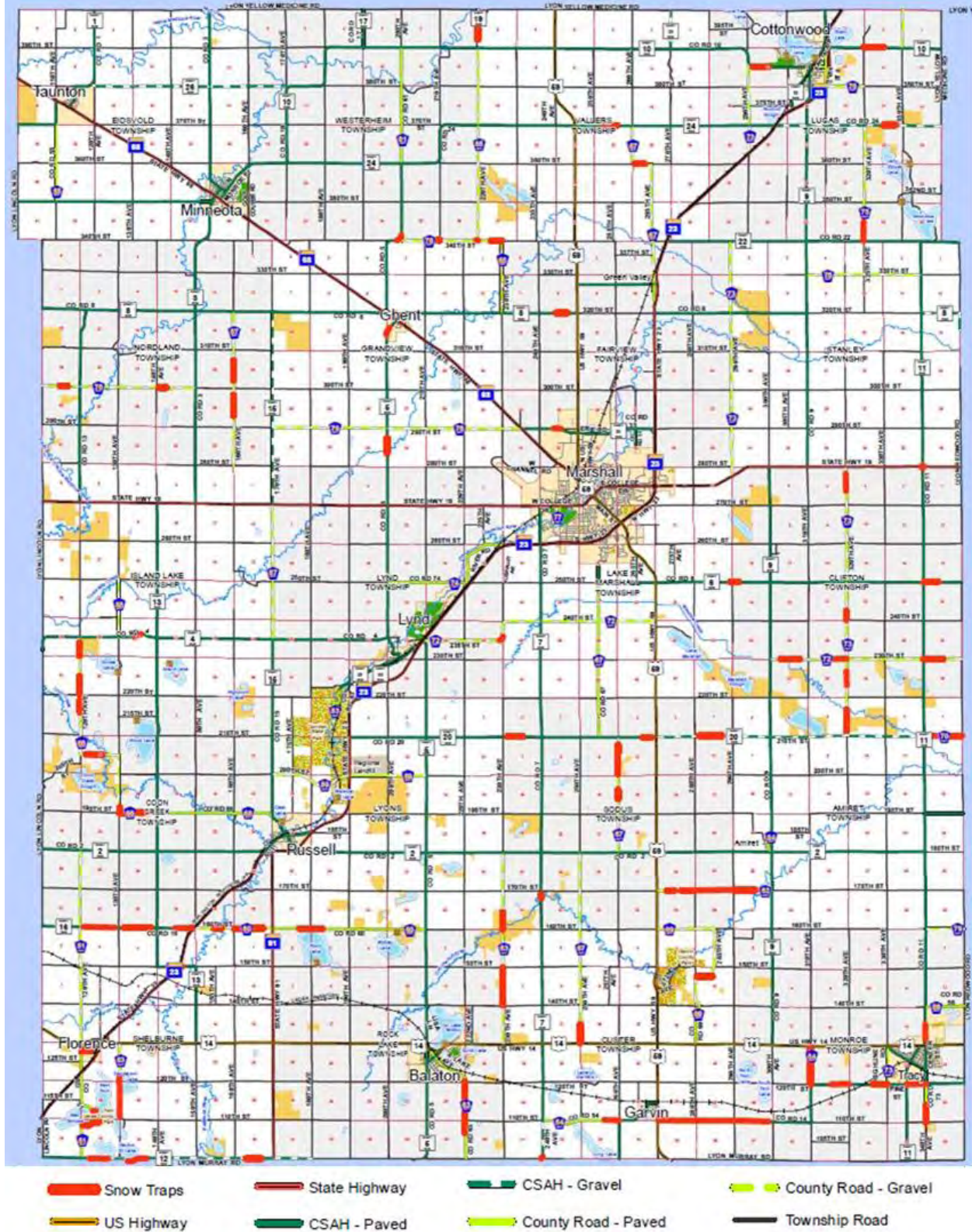
- Regional Forecasts – Lyon County is in the Sioux Falls broadcasting region. Weather forecasts in the Sioux Falls region tend to be a good predictor of weather in Lyon County. Lyon County uses this information in regards to school closures and other weather related announcements.
- School closings – Lyon 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.
- 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.
- Snow Fences – Lyon County has in the past promoted natural and manmade snow fences to protect highways against drifting snow.
- Road closures – Lyon 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. Refer to RA Table #7 for public entities with emergency generators in Lyon County.
- City Policies – Cities have snow removal and winter parking policies in place to ensure access throughout the city.
- Rental Ordinance – The City of Marshall has a rental ordinance to help identify and correct deficient rental housing units within the city.
- Minnesota Building Code – The Cities of Ghent, Marshall, and Tracy 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: Balaton, Cottonwood, Florence, Garvin, Lynd, Minneota, Russell, and Taunton. Lyon County has not adopted the Minnesota Building Code.

Gaps and Deficiencies

- Automated weather stations at schools – Automated weather stations at schools throughout Lyon 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.

RA Figure #5

Snow Removal Problem Areas - Lyon County



- Snow removal ordinance – Snow removal along sidewalks and at intersections can be an issue in Lyon County. Most cities in Lyon 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.
- 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 is 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 Ghent, Marshall and Tracy have adopted the Minnesota State Building Codes, which includes snow load requirements. The Cities of Balaton, Cottonwood, Florence, Garvin, Lynd, Minneota, Russell, and Taunton 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 in Lyon 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 Lyon County a number of residents commute long distances to work, which increases their exposure to winter weather hazards. Population in Marshall doubles during the work day.
- 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 Lyon County. The table below identifies essential locations that should have back-up generators.

RA Table #8 Facilities that Need Emergency Generators – Lyon County

City	Location	Description / Need
Balaton		
Cottonwood		
Florence	None	
Garvin		
Ghent	None	
Lynd	Sewer lagoons	A portable generator to power the pumps at the sewer lagoons is needed, so pumping can continue when there is a power outage.

Marshall	Marshall Fire Hall/EMS/Storage Building Complex	The Marshall Fire Hall, EMS building, and storage building is all one complex. This complex would most likely be used as a regional command center and/or back-up dispatch center in the event of a disaster or major emergency. A generator to power critical components of the fire hall is needed. This will help to ensure emergency response capabilities during a power outage.
Marshall	City Hall	Critical infrastructure facility for Marshall.
Marshall	Merit Center	Merit Center is the backup emergency operations center for Marshall.
Minneota	Minneota Fire Department	The Minneota Fire Department needs a backup generator at the fire hall. The backup generator would be used to recharge equipment when there is no and to assist with other backup generation needs.
Russell	Lift station, city hall, and fire station	Portable generator to be shared for used at lift station, city halls, and fire station.
Taunton	Sewer System	The City of Taunton does not have any backup generators. A portable generator that can be used at the lift station and for the city sewer system needs.
Lyon County	County Highway Shops (Minnesota, Russell, Amiret, and Cottonwood)	A portable generator that would be ample to run the lights and heaters.

Information request to city and county representatives

- Lack of rental ordinances – The City of Marshall has a rental ordinance to help identify and correct deficient rental housing units within the city. Other cities in Lyon 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 Lyon 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 Lyon County Government Center is not equipped with a quick connect system for a transportable generator. All critical government infrastructure should be built with a quick connect generator system.

Existing Mitigation Measures

- Backup generators – Some critical public facilities have emergency electrical generation on-site. Refer to Risk Assessment Table #7 for locations with emergency generators. 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 – Lyon-Lincoln Electric Cooperative (LLEC) 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, LLEC builds and maintains its distribution system to specifications that try to limit damage during extreme weather conditions. Some of the techniques that are used include: use of heavier conductor; spans for all conductors between overhead poles shall be 250 feet; conductor tensions are calculated to NESC heavy conditions; using larger class of poles; the relocation of overhead lines to underground; and tree maintenance, which helps to increase the reliability of the utility grid. LLEC 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, LLEC 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.

Below are a few non-site specific projects that could be pursued if mitigation funding from FEMA was available:

- 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.

A3 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. Drought was assigned a hazard rank of moderate by the planning team.

Locations Affected by the Hazard

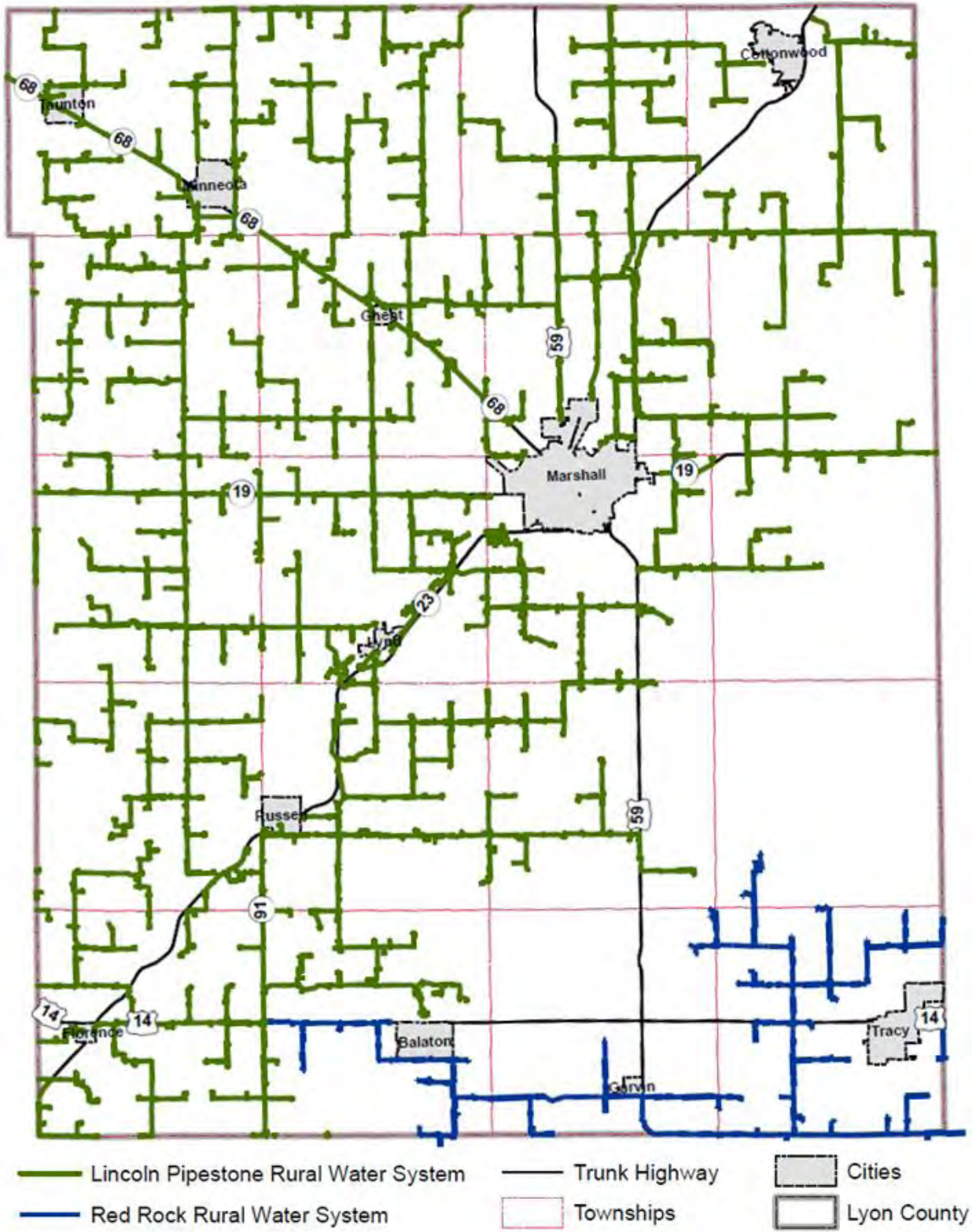
The entire county is equally at risk for drought; however, areas within the county may react differently to drought conditions. Areas with well-drained soils may be more likely to experience adverse impacts to crops. Areas that rely on individual wells for drinking water supplies are more likely to experience shortages than areas with access to municipal and rural water suppliers.

Different areas in Lyon 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 planning team identified the spatial extent of a drought as countywide.

The Cities of Balaton, Cottonwood, Lynd, Marshall and Tracy have their own water system that consists of multiple wells. Lincoln-Pipestone Rural Water System (LPRW) provides potable water service to rural Lyon County, the unincorporated community of Green Valley and the Cities of Florence, Ghent, Minneota, Russell, and Taunton. LPRW currently does not provide any emergency backup to cities in Lyon County that have their own water system.

RA Figure #6

Rural Water Distribution Map - Lyon County



Extent of the Hazard

Lyon County's economy is base heavily on agriculture. A severe drought could cause economic hardship within the county. The potential severity of a drought is major according to the planning team.

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 estimates that the drought during the summer of 2012 will push retail food prices up by between 3% and 4% in 2013.³⁵

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 Lyon 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.** Lyon County's limited groundwater resources, provided by surficial aquifers, can be easily negatively impacted by drought.

³⁵ 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/#ixzz2Tqswe7kB>

- 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.

Previous Occurrences of the Hazard

From January 2000 through August 2015, there were 14 documented droughts in Lyon County. In the table below are documented droughts that occurred from January 2013 through August 2015.

RA Table #9 Droughts – Lyon County

Date	Location	Event Narrative
1/1/2013	Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock	Drought conditions continued over all of southwest Minnesota in January. Precipitation was below to well below normal, although with the low midwinter normals, even greater precipitation would have been unlikely to change the dry soil conditions. There was little noted in the way of new effects of the drought, with the dry conditions giving a poor outlook for the Spring and Summer, including poor germination of the winter wheat crop during the dry fall. Water restrictions continued to be few during the winter because of the low water usage, but the area was becoming more vulnerable to even marginally weather if it developed in the spring and summer. Drought was generally listed as continued severe to extreme for the area.
2/1/2013	Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock	Drought conditions continued over all of southwest Minnesota in February, despite precipitation which was a little above normal. The excess of a few tenths of an inch in the driest month of the year did little to relieve the long term dry soil conditions. There was little noted in the way of new effects of the drought, with the dry conditions giving a poor outlook for the Spring and Summer, including the poor germination of the winter wheat crop during the dry fall. Water restrictions continued to be few during the winter because of the low water usage, but the area was deemed vulnerable to even marginally dry weather if it developed in the spring and summer. Drought was generally listed as continued severe to exceptional for the area, with the northern edge of the area, from Ivanhoe to Marshall, making a slight improvement to severe because of greater snowfall and snow cover during the month.
3/1/2013	Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock	Drought conditions continued over all of southwest Minnesota in March. Precipitation was normal to half of normal, with drought rated severe to extreme over all of the area. There continued to be a lack of soil moisture as winter approached its end, since even normal winter precipitation is low compared to the warmer seasons. Also, the frozen ground forced runoff of what precipitation and snowmelt there was.

		There was little noted in the way of new effects of the drought, with the dry conditions giving a poor outlook for the Spring and Summer, including the winter wheat crop, which was also affected by poor germination conditions in the dry fall. Water restrictions continued to be few because of the low water usage, but the area was deemed vulnerable to even marginally dry weather if it developed in the spring and summer. Some effect was noted on livestock, although the majority of the livestock was in good condition despite persistent feed shortages.
4/1/2013	Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock	Extreme to exceptional drought abated slowly to the moderate to severe category over southwest Minnesota during April. Near to a little above normal precipitation was not enough to end the long standing drought entirely, given the long term dry soil conditions that carried over into the month. Accordingly, the area was still deemed very sensitive to the potential of below normal rainfall during the planting and growing seasons. However, the severity of the drought generally decreased. No new effects of the drought were noted during the month.

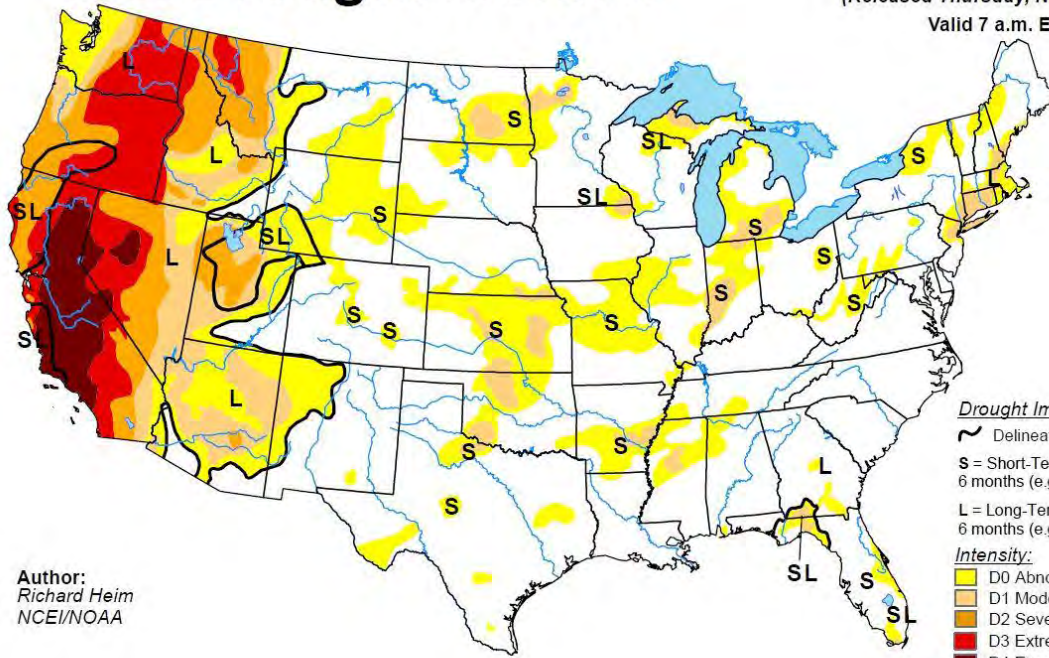
National Climatic Data Center (NCDC) Storm Events database

RA Figure #7

U.S. Drought Monitor

November 17, 2015
(Released Thursday, Nov. 19, 2015)

Valid 7 a.m. EST



Author:
Richard Heim
NCEI/NOAA

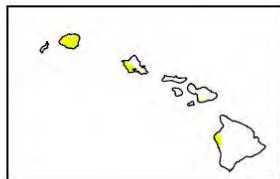
Drought Impact Types:

- Delineates dominant impacts
- S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

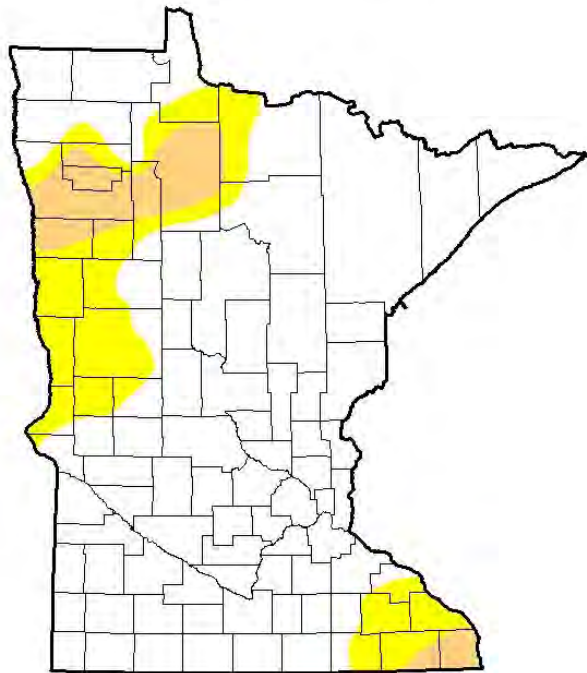


<http://droughtmonitor.unl.edu/>

RA Figure #8

**U.S. Drought Monitor
Minnesota**

November 17, 2015
(Released Thursday, Nov. 19, 2015)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	77.98	22.02	7.05	0.00	0.00	0.00
Last Week 11/10/2015	77.54	22.46	7.05	0.00	0.00	0.00
3 Months Ago 8/18/2015	84.36	15.64	3.24	0.00	0.00	0.00
Start of Calendar Year 12/02/2014	19.60	80.40	0.67	0.00	0.00	0.00
Start of Water Year 8/29/2015	90.40	9.60	0.00	0.00	0.00	0.00
One Year Ago 11/19/2014	36.43	63.57	0.65	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Richard Heim
NCEI/NOAA



<http://droughtmonitor.unl.edu/>

Probability of Future Events of this Hazard

Droughts occur in the area. The potential frequency of a drought in Lyon County is likely according to the planning team.

Vulnerability

The risk level assigned to drought by the planning team is average.

Plans and Programs

- Watering Ban Ordinance – Lyon County and the Cities of Ghent, Marshall, and Minneota 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 Lyon County have not issued a watering ban in recent memory.
- Burning ban – Lyon County can issue a burning ban during a drought event.
- Lyon County Water Management Plan – The Lyon County Comprehensive Water Management Plan serves as the five year ‘Work Plan’ for the Lyon 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 Lyon County

Comprehensive Water Management Plan can be found on the Lyon County SWCD website.³⁶ The next update is planned for 2018.

- Recharge rates – The Lyon 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 – Lyon County 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.

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 – Lyon County and the Cities of Marshall and Minneota, have developed ordinances on water usage within their communities and can place restrictions on this usage in time of drought. The Cities of Balaton, Cottonwood, Florence, Garvin, Lynd, Russell, Taunton, and Tracy 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 Lyon 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.
- Lincoln-Pipestone Rural Water – The water sources that serve residents in Lyon County are not located within the County, but there are some distribution improvements that could mitigate some low pressure issues in the Russel and Florence areas.
- Large water users – Food processors are large water users. The City of Marshall is a large water user, since one of the city’s main industries is food processing. An adequate water supply is critical to the food processing industry in Marshall and Lyon County.
- Annual recharge rates – Lyon County does not have estimated annual recharge rates, but there is a robust mounting of heavy water users and wells. The Marshall South Wellfields have seen a roughly 50 percent decline in available water supply. The well monitoring site by Camden State Park has also seen a steady decline in the availability of the water supply.

Existing Mitigation Measures

- 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.

³⁶ Lyon County Soil and Water Conservation District. Accessed: 12/16/15. Available: <http://www.lyonco.org/swcd-reports/565-local-water-management-plan>

- 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 Lyon County Soil and Water Conservation District and rural water systems. This helps to ensure Lyon County’s ground water supplies are sufficient to meet demands.

A4 Earthquakes

“An earthquake is a sudden motion or trembling caused by an abrupt release of accumulated strain in the tectonic plates that comprise the earth’s crust.”³⁷ Earthquakes were assigned a hazard rank of low by the planning team.

Locations Affected by the Hazard

All of Lyon County is at equal risk of an earthquake according to the United States Geological Survey (USGS) seismic map of Minnesota. The planning team identified the spatial extent of an earthquake as countywide. It is important to acknowledge that earthquakes are a possibility in Lyon County and plan accordingly.

Extent of the Hazard

The average magnitude for an earthquake in Minnesota is 3.2. The effects of an earthquake with a magnitude of 3.0 – 3.9 range from a few persons feeling the vibration, especially on upper floors of a building to many people noticing the vibration. Standing motor cars may rock slightly. The potential severity of an earthquake is minor according to the planning team.

³⁷ MN All Hazard Mitigation Plan. Accessed: 5/29/13. Available: https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011_MinnesotaAllHazardMitigationPlanDraft.pdf

RA Table #10

Richter Scale

Less than 2.0	Micro	Micro earthquakes, not felt
2.0–2.9	Minor	Generally not felt, but recorded
3.0–3.9		Often felt, but rarely causes damage
4.0–4.9	Light	Noticeable shaking of indoor items, rattling noises Significant damage unlikely
5.0–5.9	Moderate	Can cause major damage to poorly constructed buildings over small regions. At most slight damage to well-designed buildings
6.0–6.9	Strong	Can be destructive in areas up to about 160 kilometres (99 mi) across in populated areas
7.0–7.9	Major	Can cause serious damage over larger areas
8.0–8.9	Great	Can cause serious damage in areas several hundred kilometres across
9.0–9.9		Devastating in areas several thousand kilometres across
10.0+	Massive	Never recorded, widespread devastation across very large areas.

Relationship to Other Hazards—Cascading Effects

An earthquake can be the catalyst to a number of other natural and manmade hazards.

- **Flooding.** An earthquake could result in dam failure and flooding downstream.
- **Transportation Infrastructure.** An earthquake could damage transportation infrastructure and make emergency response difficult.
- **Civil Disturbance.** An earthquake could cause countywide distress. Emergency responders may not be able to handle everything, so as people grow desperate, distress can take over and cause civil unrest.

Previous Occurrences of the Hazard

Lyon County has not had any significant earthquake events. “Minnesota has one of the lowest occurrence levels of earthquakes in the United States, but a total of 19 small to moderate earthquakes have been documented since 1860.”³⁸

³⁸ MN All Hazard Mitigation Plan. Accessed: 5/29/13. Available: https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011_MinnesotaAllHazardMitigationPlanDraft.pdf

RA Table #11**Earthquakes, Minnesota**

Epicenter (nearest Town)	Date	Magnitude
Rosholt	10/20/1995	3.7
Granite Falls	2/9/1994	3.1
Dumont	6/4/1993	4.1
Walker	9/27/1982	2.0
Cottage Grove	4/24/1981	3.6
Nisswa	7/26/1979	1.0
Rush City	5/14/1979	0.1
Evergreen	4/16/1979	3.1
Milaca	3/5/1979	1.0
Pipestone	9/28/1964	3.4
Alexandria	2/15/1950	3.6
Detroit Lakes	1/28/1939	3.9
Bowstring	12/23/1928	3.8
Staples	9/3/1917	4.3
Red Lake	2/6/1917	3.8
New Ulm	02/12/1881	3.0-4.0
St Vincent	12/28/1880	3.6
New Prague	12/16/1860	4.7
Long Prairie	Date unknown (1860-61)	5.0

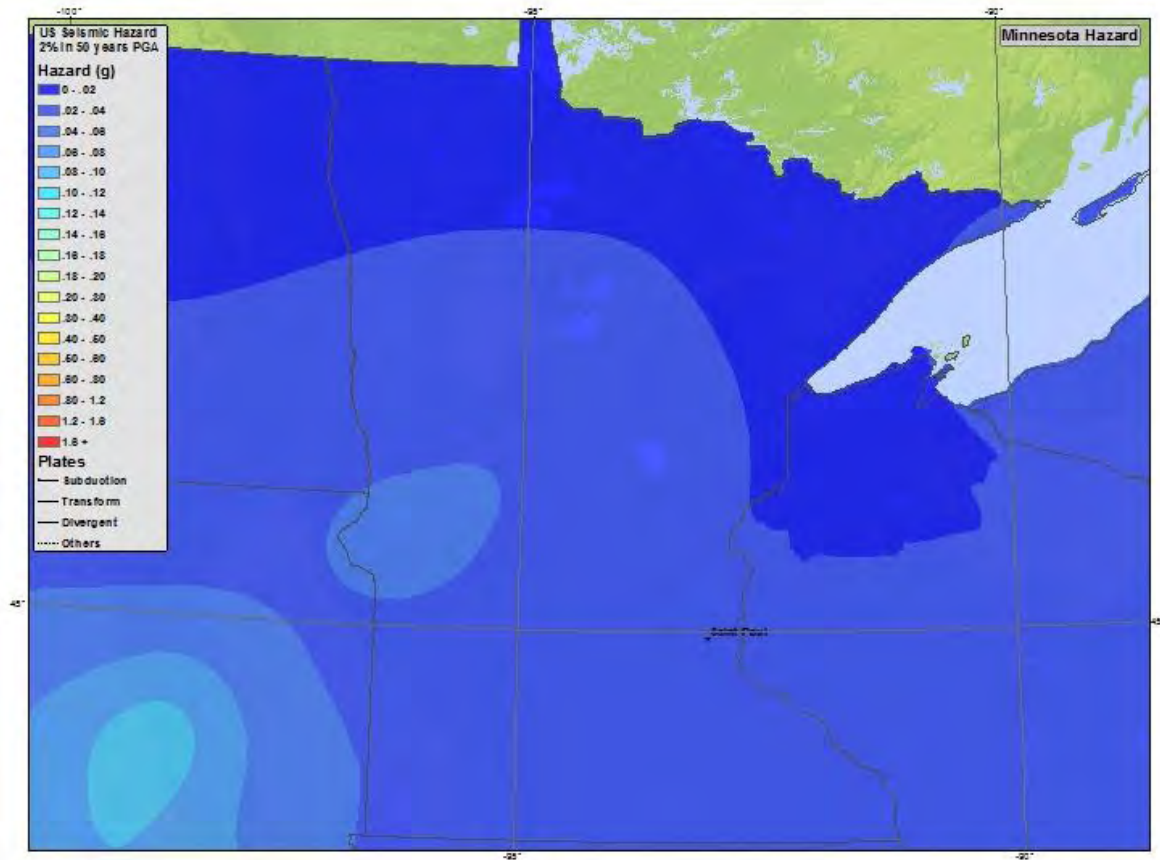
National Climatic Data Center (NCDC) Storm Events database

Probability of Future Events of this Hazard

The USGS Seismic Map shows the seismic activity in the United States, the potential for an earthquake of any significant magnitude happening in Lyon County is very minimal. The potential frequency of an earthquake in Lyon County is unlikely according to the planning team.

RA Figure #9

Seismic Hazard Map – Minnesota



Source: USGS Minnesota Seismic Hazard Map

Vulnerability

Since it is unlikely for an earthquake to occur in Lyon County, little or no preparation has occurred. There have been multiple earthquakes in Minnesota with a magnitude of 4.0 – 5.0. An earthquake registering a 5.0 on the Richter Scale could occur and cause major damage to poorly constructed buildings. The risk level assigned to earthquakes by the planning team is limited.

Plans and Programs

- Lyon County does recognize that there is some risk associated with earthquakes, but there are not extensive plans and programs to address the risk.
- Well defined response – Emergency responders have a well-defined response protocol outlined in the Emergency Operations Plan. The response protocol is in regards to all hazards. An earthquake would result in a large hazard event with a number of smaller events that include the risk of fire, transportation infrastructure damage, utility damage, civil disturbance, and water supply contamination. The response protocols would generally be applied to an earthquake and the resulting hazard events.

Gaps and Deficiencies

- The risk associated with an Earthquake in Lyon County is perceived as very minimal, so extensive planning does not take place. This lack of preparation could result in an earthquake causing large damages and disorganization in the aftermath of the hazard.

Existing Mitigation Measures

- Past mitigation measures consist of recognizing that an earthquake is possible in Lyon County.

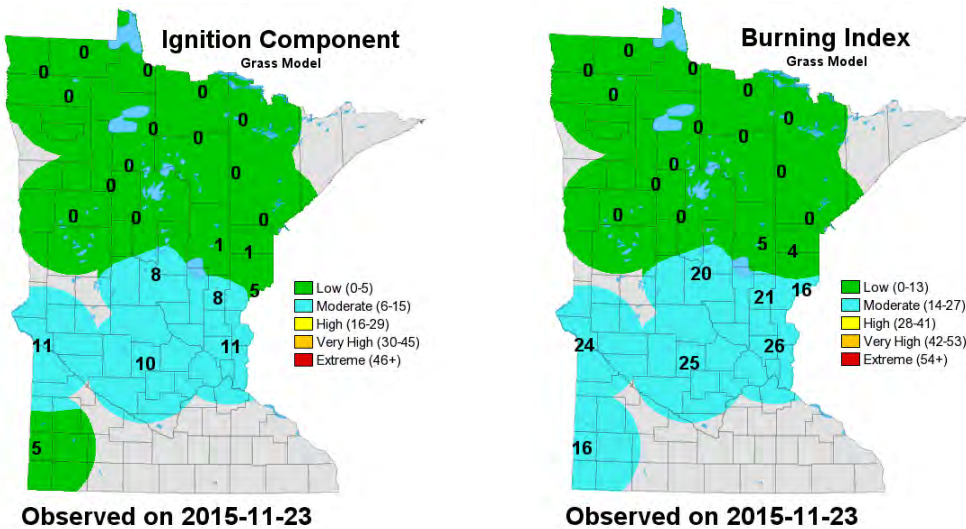
A5 Fire (Wildfires and Structure Fires)

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.³⁹ A home fire is reported every 85 seconds in the United States.⁴⁰ Fires can occur in any community and pose a year-round threat. Wildfires and structure fires were assigned a hazard rank of moderate by the planning team.

Locations Affected by the Hazard

All locations in Lyon County are at risk to be exposed to this hazard. Incidents of wildfire tend to be localized in southwest Minnesota due to the low burning index in this area. The planning team identified the spatial extent of a wildfire as local. "Burning Index relates the potential amount of effort needed to contain a single fire in a particular fuel type."⁴¹ Wildfires can start in grasslands or in crops if the conditions are dry.

RA Figure #10 Ignition Component & Burning Index Map – Minnesota



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.

³⁹ FEMA. Accessed: 6/2/14. Available: <http://www.ready.gov/fires>

⁴⁰ 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>

⁴¹ MN Department of Natural Resources. Accessed: 5/20/13. Available: http://www.dnr.state.mn.us/forestry/fire/maps/fdi_grass.html

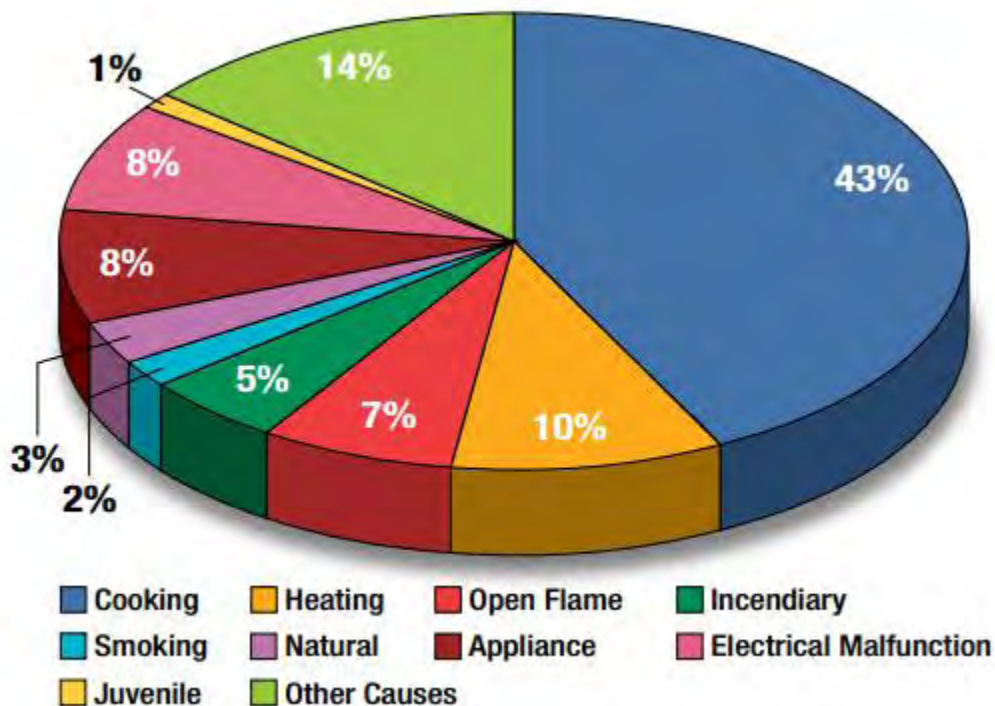
Extent of the Hazard

Structure fires are classified into three categories:

- Residential Structures
- Public and Mercantile Structures
- Industrial Structures

In Minnesota, there was over 119 million dollars in losses due to residential structure fires in 2014. Almost half of structure fires are caused by cooking accidents (mostly from unattended cooking equipment), 14 percent by other causes, and 10 percent by heating sources.⁴² Refer to RA Figure 11 for a complete breakdown of structure fire causes.

RA Figure #11 Structure Fire Causes – Minnesota (2014)



“While careless smoking accounts for only two percent of structure fires, it caused 35 percent of known fire fatalities and 27 percent of residential fire deaths.”⁴³ The most deadly time for a fire is during the

⁴² Minnesota Fire Marshall. Fire in Minnesota Report. Accessed: 1/8/16. Available: <https://dps.mn.gov/divisions/sfm/Documents/2014-Fire-Minnesota-Report.pdf>

⁴³ Minnesota Fire Marshall. Fire in Minnesota Report. Accessed: 1/8/16. Available: <https://dps.mn.gov/divisions/sfm/Documents/2014-Fire-Minnesota-Report.pdf>

night when people are sleeping. There have been 10 civilian deaths related to fires in Lyon County, since 1990.⁴⁴

The State Fire Marshall reports that there was \$1,338,450 in fire related losses reported in Lyon County in 2014. From 2011 to 2014, there was an average of \$1,563,951 in fire-related losses reported in Lyon County per year. The potential severity of a structure fire is substantial according to the planning team.

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
- 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. The potential severity of a wildfire is minor according to the planning team.

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.

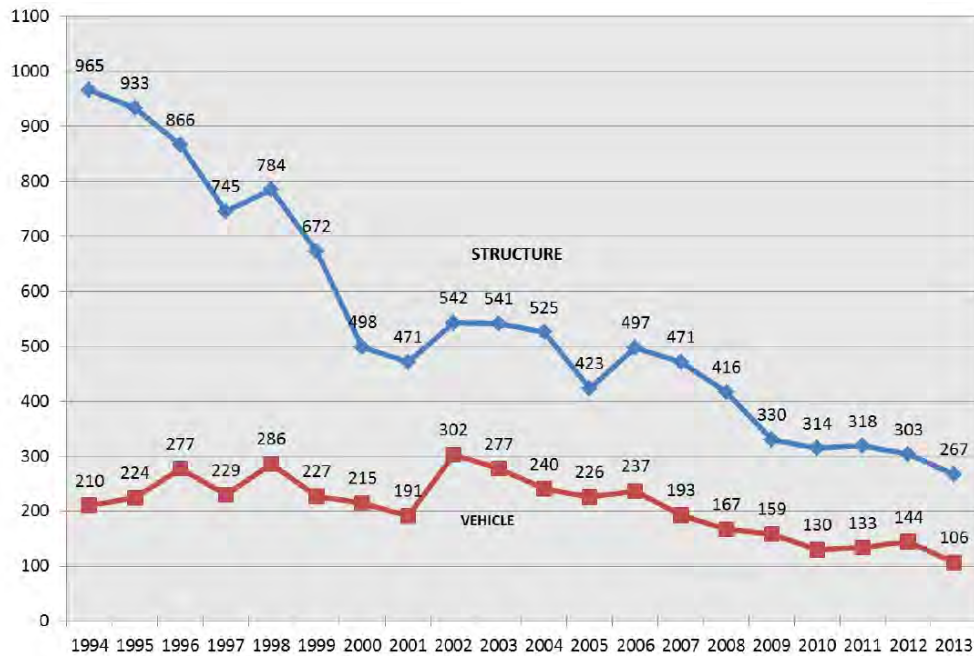
⁴⁴ Minnesota Fire Marshall. Fire in Minnesota Report. Accessed: 1/8/16. Available: <https://dps.mn.gov/divisions/sfm/Documents/2014-Fire-Minnesota-Report.pdf>

- 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.

Previous Occurrences of the Hazard

Structure Fires occur periodically throughout Lyon County. From 2004 through 2014, there were 311 structure fires in Lyon County.⁴⁵ From 1990 through 2014, there were 10 civilian deaths related to fires in Lyon County.⁴⁶

RA Table #12 Structure & Vehicle Incendiary Fires - Minnesota

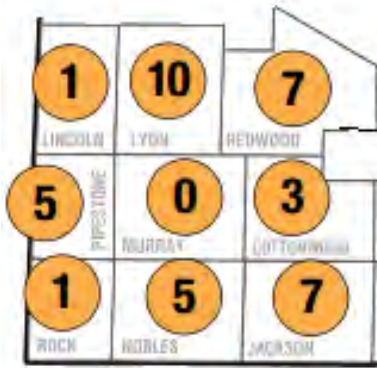


⁴⁵ MN Department of Safety. Data Request. Received 1/8/16.

⁴⁶ Minnesota Fire Marshall. Fire in Minnesota Report. Accessed: 1/8/16. Available: <https://dps.mn.gov/divisions/sfm/Documents/2014-Fire-Minnesota-Report.pdf>

RA Figure #12

Civilian Fire Deaths by County: 1990 – 2014



Minnesota Department of Public Safety⁴⁷

RA Table #13

Runs & Dollar Losses by County – 2014

County	Fire Runs	Other Runs	Total County Dollar Loss	Fire Rate	Avg. Dollar Loss/Fire
Cottonwood	24	37	\$296,304	315	\$7,797
Jackson	39	84	\$1,028,100	535	\$48,957
Lincoln	16	7	\$303,500	412	\$20,233
Lyon	105	259	\$1,338,450	317	\$17,160
Murray	53	53	\$324,500	265	\$9,544
Nobles	75	202	\$785,241	445	\$14,542
Pipestone	44	97	\$326,600	234	\$7,966
Redwood	56	56	\$927,635	463	\$26,504
Rock	44	127	\$2,339,600	70	\$55,705

Minnesota Department of Public Safety⁴⁸

There were zero wildfires in Lyon County from January 2000 through July 2014.⁴⁹ 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.

Probability of Future Events of this Hazard

There are structure fires every year, so the planning team felt the potential frequency of a structure fire is likely. Wildfires in Lyon County are rare, but they can occur under the right conditions. The potential frequency of a wildfire is occasional according to the planning team.

⁴⁷ Minnesota Fire Marshall. Fire in Minnesota Report. Accessed: 1/8/16. Available: <https://dps.mn.gov/divisions/sfm/Documents/2014-Fire-Minnesota-Report.pdf>

⁴⁸ Minnesota Fire Marshall. Fire in Minnesota Report. Accessed: 1/8/16. Available: <https://dps.mn.gov/divisions/sfm/Documents/2014-Fire-Minnesota-Report.pdf>

⁴⁹ NOAA. Storm Events Database. Accessed 1/7/16. Available: <http://www.ncdc.noaa.gov/stormevents/>

Vulnerability

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.⁵⁰ There is often only enough time to get out of the house safely, 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 Lyon 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.
- Burning Bans – Currently, in times of extreme heat and drought, the county will enact burning bans. Residents are alerted through the media when a burning ban is enacted.
- Burn Permits – Lyon County Sheriff's Office issues burn permits free of charge. Burning permits are good for two years and law enforcement will be checking and calling if they see smoke. Emergency responders respond to reported fires, so you should alert the authorities when you are going to burn.
- 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, 28 of Minnesota's 87 counties have passed no-burn/bury resolutions to close this exemption."⁵¹ It is illegal to burn garbage in Lyon County.
- Property management – Many properties that are owned by Lyon 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 Marshall Fire Department works 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 Marshall Fire Department and other neighboring departments are invited to participate in the training. The Marshall Fire Department

⁵⁰ FEMA. Learn About Fire: The Nature of Fire. Accessed: 1/6/16. Available: http://www.usfa.fema.gov/citizens/about_fire.shtml

⁵¹ Minnesota Pollution Control Agency. Accessed: 3/27/15. Available: <http://www.pca.state.mn.us/index.php/view-document.html?gid=11355>

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 Lyon 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 between the DNR and local fire departments is done to ensure the controlled burns are contained.
- Burning permits – Local residents are required to acquire burning permits to conduct burns.
- 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 Lyon County to understand water source capacity to fight fires.
- Road closures – Fire departments in Lyon County keep up to date on road closures so efficient routes can be used to reduce response times.
- Development Policy – New developments in Lyon County are required to have streets and alleys wide enough to sufficiently handle the size of a modern fire truck.
- Mutual Aid Agreements – Mutual Aid Agreements are in place between police forces, fire districts and ambulance districts to ensure adequate emergency services in Lyon County. Mutual Aid Agreements create agreement among emergency responders to lend assistance across jurisdictional boundaries. Mutual Aid Agreements are updated every five years in Lyon County, and they are currently in the process of updating them.
- Quarterly Fire Protection Meeting – Lyon County holds quarterly fire protection meetings.

Gaps and Deficiencies

- Lack of fire breaks – Lyon 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 – Lyon County does not undertake a systematic assessment of wildfire risk and associated prevention measures.
- Countywide fire department – With a number of smaller fire departments, Lyon County could benefit from creating a countywide fire department. A countywide department could help with coordination, fire inspections, education, and regulations regarding compliance. A countywide department would also help with sharing of resources and decreasing operating costs.
- 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 Lyon 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.
- Zoning – Currently, Lyon 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 Lyon County residents work outside the county, 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.
- Water availability – Lyon 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 is only one dry hydrant in Lyon County (Cottonwood Lake). More dry hydrants spread throughout Lyon 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. One of the closest dry hydrants is at Current Lake in Murray County.
- 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. The homeowner has an incentive to ensure the work is done properly, but some people may not be able to ensure proper electrical work.
- Water pressure in Ghent – The City of Ghent does not have enough water pressure from Lincoln-Pipestone Rural Water to fight fires. LPRW wants Ghent to build a water tower, but they are under contract with LPRW for water. The availability of water for economic growth and population growth is currently not available.
- Rural fire hydrants – There are no fire hydrants located by water storage towers in rural Lyon County.

Existing Mitigation Measures

- Right-of-way maintenance – Road Authorities maintain the right-of-way of roadways in Lyon County. This helps to limit tree growth and farm fields from approaching onto public right-of-way of roadways.
- Fire education – Lyon 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.

A6 Flooding

Flooding is one of the most common hazards across the United States. Flooding can occur anytime, anywhere. Seemingly benign streams can overflow their banks from a sudden rainstorm, quick snowmelt, or blockage of 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. Flooding was assigned a hazard rank of moderate by the planning team.

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.⁵²

There are 52 flood insurance policies in Lyon County.⁵³ 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.

RA Table #14

Flood Insurance Policies – Lyon County

City	Number of NFIP
Ghent	9
Lynd	4
Marshall	28
Minneota	1
Russell	1
Rural Lyon County	9

FEMA Region V Information request. Received: 2/25/16

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

⁵² Flood Smart. Accessed 5/21/13. Available:

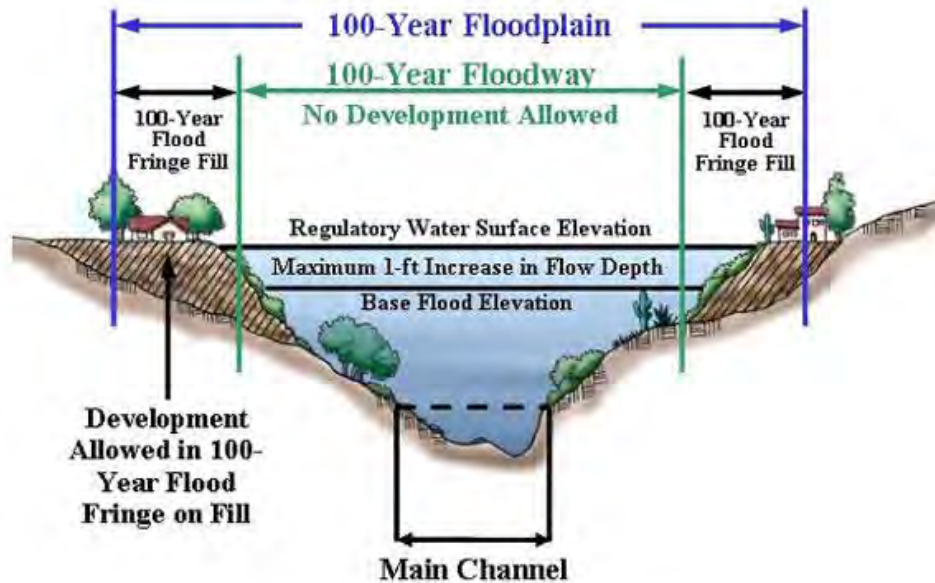
http://www.floodsmart.gov/floodsmart/pages/about/nfip_overview.jsp

⁵³ FEMA Region V. Information request. Received: 2/25/16.

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.”

RA Figure #13 100-Year Floodplain (1 percent Floodplain)



Locations Affected by the Hazard

Flooding can occur anytime, anywhere. The planning team identified the spatial extent of flooding as local. The majority of Lyon 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.

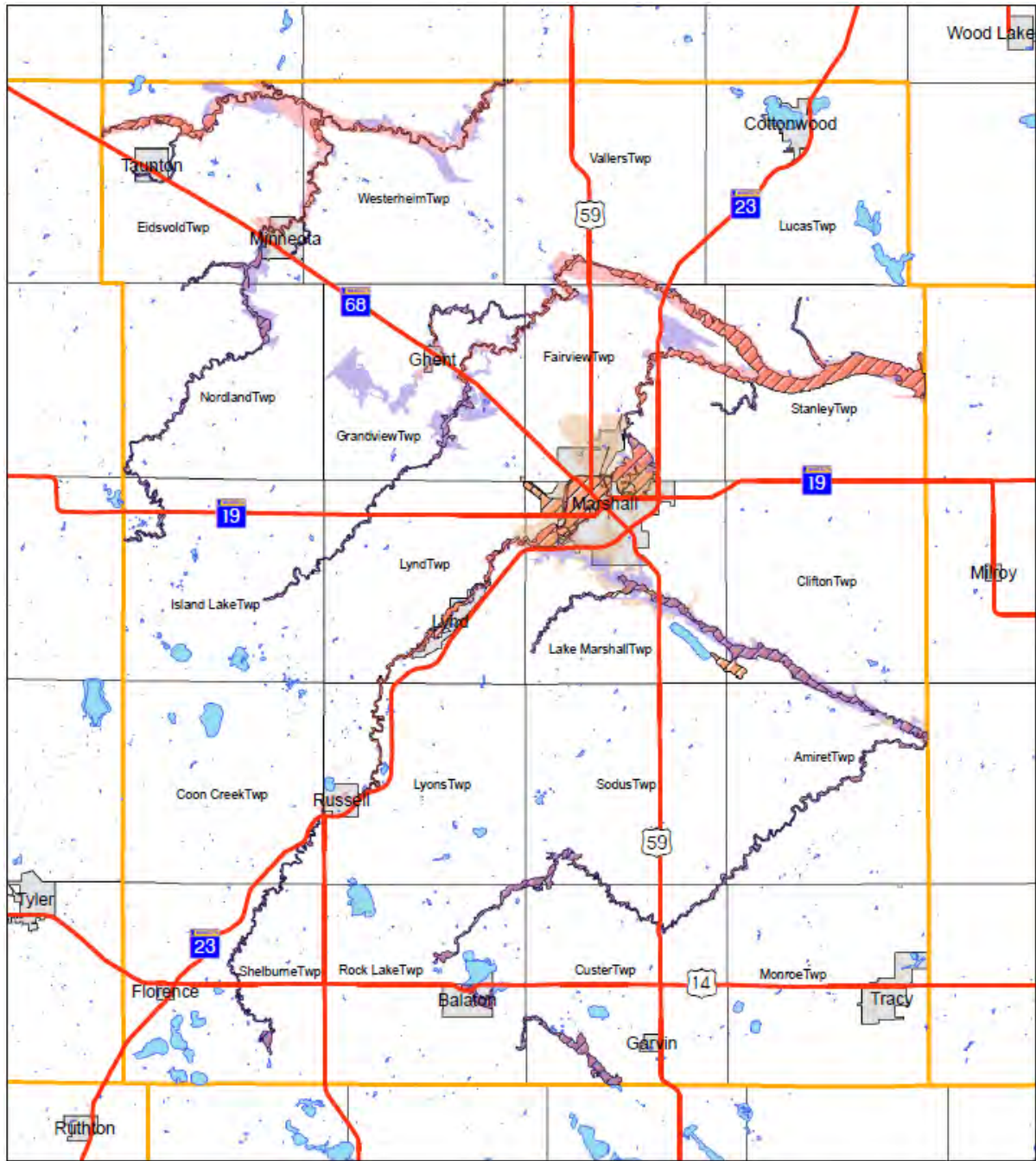
One percent floodplain areas do exist in Lyon County. These flood plain areas are along the Redwood River, Cottonwood River, and multiple streams and creeks. Roughly 1,450 parcels are intersected by the 1% Annual Flood Chance (100-year floodplain). These areas tend to follow the Cottonwood River across Rock Lake, Custer and Amiret townships; the Redwood River from Shelburne Township in the southwest through the cities of Russell, Lynd and Marshall to Stanley Township in the northeast part of the county; Threemile Creek from Island Lake Township in the west through Grandview, Fairview and Vallers

Townships on the way to the Redwood River; and the Yellow Medicine River across Nordland Township, the City of Minneota, and Westerheim Township.

Flood Insurance Rate Maps (FIRMs) are available for the City of Marshall and a number of townships that include: Amiret, Lucas, Lynd, Lyons, Monroe, Nordland, Rock Lake, Shelburne, Sodus, Stanley, Vallery, Clifton Westerheim, Coon Creek, Custer, Eidsvold, Fairview, Grandview, Island Lake, and Lake Marshall. The Flood Insurance Rate Maps (FIRM) for these public entities can be found by contacting the Lyon County Emergency Manager.

RA Figure #14

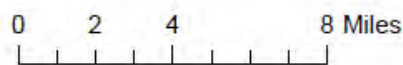
Flood Plain Map - Lyon County



Lyon County All Hazard Mitigation Plan

Lyon County Floodplains

- Trunk Highways
- Floodway
- 1% Annual Flood Chance
- .2% Annual Flood Chance
- Q3 FEMA Floodplain
- Lakes
- City
- Township
- County



Source: Lyon County GIS, MnDOT, MnGEO, FEMA
 Projection: NAD83 HARN Adj Lyon, SRDC 16.2.10

City of Balaton

Lake Yankton graces the City of Balaton at the top of the North Fork of the West Des Moines watershed in southern Lyon County. There are 53 parcels in the city in the draft 100-year floodplain. However, these are lake-side, rather than river parcels, that have not been subject to seasonal flooding. The City is currently disputing the FIRM elevations.

City of Cottonwood

Although there is no mapped floodplain in Cottonwood, the City chose to participate in the NFIP after heavy snow and rains in 1996-1997 prompted concerns with potential overland flooding. There is an unnamed stream draining the eastern part of the community along Trunk Highway (TH) 23 into Cottonwood Lake that can cause nuisance flooding.

City of Ghent

The City of Ghent is located between Marshall and Minneota on TH 68. Ghent was previously designated as having No Special Flood Hazard Area and was not covered by a FIRM map. However, there are now over 90 parcels in the city in the draft FIRM 100-year floodplain. The previous floodplain map stopped downstream from the city, where the unnamed tributary to Threemile Creek becomes an intermittent stream. The new digital floodplain map is extending the floodway thru Ghent, including a newly developed area of single family homes.

City of Lynd

The City of Lynd is located on TH 23 between Marshall and Camden State Park. There are 78 parcels in the city in the draft FIRM 100-year floodplain. The greatest area of concern is "Old Lynd" in the historic heart of the community, in particular along Redwood Street and Redwood Ct (a cul-de-sac).

The Floodway was drawn widely through Lynd, and there is some concern that elevation data utilized may not have been precise. At least one parcel indicated as Floodway had previously been awarded a Letter of Map Revision (LOMR) to remove the developed portion of the property from the 100-year floodplain.

City of Marshall

The Redwood River enters Marshall under the BNSF railroad tracks at the extreme southwestern corner of the city. There are about 240 parcels in the city in the draft 100-year floodplain. The river crosses the county fairgrounds, a golf course and city park before snaking through a residential neighborhood and downtown Marshall. The river exits the city northeast of the ADM corn sugar and ethanol plant.

The Army Corp of Engineers started a Flood Control and Diversion Project in 1963-64, with the construction of a few earth dikes for flood protection just southwest of the City. At this time they also constructed the diversion channel around the west and northwest portion of the city. Following the flooding events in the spring of 1993 the Army Corp of Engineers completed Phase I of improvements to the diversion channel. This work was done in 1996-97 and included the removal of sediments in the diversion channel. Phase II was completed in 1999-2000 and included extensive construction of new additional dikes along the diversion channel. The work also included a control structure at the south end of the city to control the flow of water through the original river channel. It also included a high

water diversion structure at Wayside Park under TH23; this allows the water to flow into a county ditch on the south side of TH23 and ultimately into the Cottonwood River drainage basin.

In 1994, the City of Marshall installed large capacity pumps and a large force main pipe to drain the Tiger Lake stormwater pond in the middle of town. In 1997, the City dredged the pond to remove the sediment from the bottom and improve water quality of the discharge.

In 1997, the City also designed and constructed improvements to Ditch 62 which flows through a portion of eastern Marshall. The project included large diameter storm sewer pipe and a stormwater detention pond in the northeast corner of the city near the campus of SMSU. This same summer the City constructed a sister project to the Ditch 62 Project. This project installed a large diameter storm sewer main down Birch Street which ultimately discharges into the improved Ditch 62 system. In 1999, the City further extended the Birch Street storm sewer main to the west and north along Minnesota Street to further mitigate localized flooding in the north central portion of the city.

The City now has provisions for new developments which include the construction of stormwater ponds for detention of the 1% events in local on-site ponds.

City of Minneota

Northwest of Marshall on TH68, Minneota is nestled into the South Branch of the Yellow Medicine River. There are 69 parcels in the city in the draft flood hazard area. Minneota is protected by levees beginning at County State Aid Highway (CSAH) 10 in the southwest corner of town north across TH68 and along CSAH 3, and then east along the north edge of the developed area of town. The City has recently re-certified the levee system with the Amy Corp of Engineers. The City is currently bidding a \$2.3 million storm and sanitary sewer infrastructure replacement project to prevent sewage from entering the Yellow Medicine River.

City of Russell

Located on TH 23 just south of Camden State Park, the City of Russell has a stream monitoring gauge on the Redwood River. There are 20 parcels in the draft DFIRM, although only 1 or 2 structures appear to be located in the actual floodplain based on aerial imagery.

City of Taunton

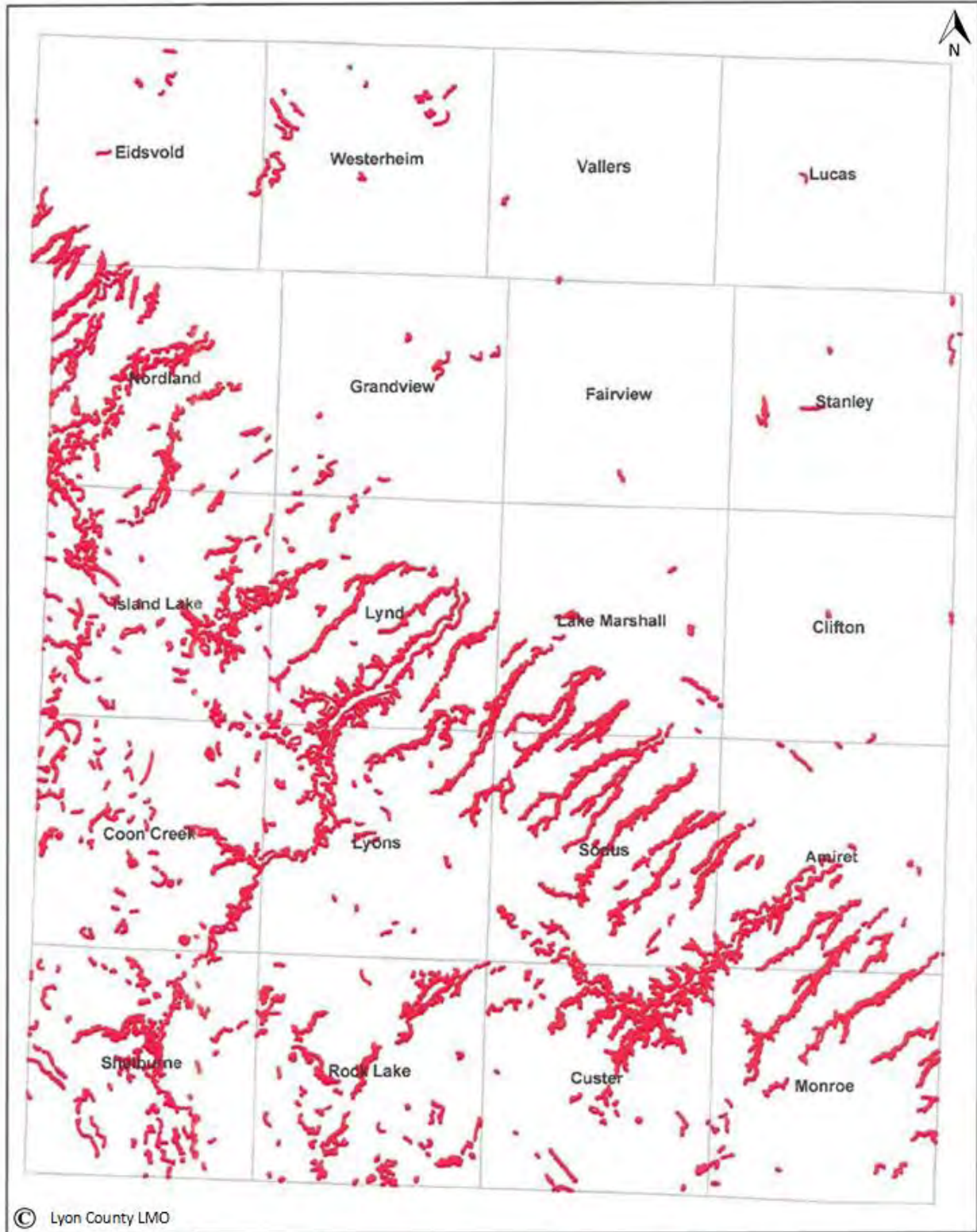
The City of Taunton is located on TH 68 northwest of Minneota. While there are 13 parcels in the city in the FIRM 100-year floodplain, there appears to be only one residence in the 1% floodplain that follows an unnamed intermittent tributary to the Yellow Medicine River.

City of Tracy

While there is no mapped floodplain near Tracy in the southeast part of the county, the City participates in the NFIP to give landowners the opportunity to purchase flood insurance.

RA Figure #15

Highly Erodible Soils - Lyon County



Highly Erodible Soils ——— Township Boundaries □

“A highly erodible soil, or soil map unit, has a maximum potential for erosion that equals, or exceeds, eight times the tolerable erosion rate. The maximum erosion potential is calculated without consideration to crop management or conservation practices, which can markedly lower the actual erosion rate on a given field. The maximum potential erosion rate is determined using the formula: $RKLS/R$ (where R = the rainfall factor, K = erodibility value of the soil, and LS = the slope factor). If $RKLS/T$ is > 8 then the soil meets the criteria for a highly erodible soil.”⁵⁴

Highly erodible soils can result in landslides and sinkholes. Both of these phenomenon can occur in Lyon County.

Extent of the Hazard

“Floods are among the most frequent and costly natural disasters.”⁵⁵ The potential severity of flooding in Lyon County is minor according to the planning team.

Critical Facilities

There are a limited number of critical facilities in Lyon County that are within the one percent floodplain. Ghent does have two lift stations that are in the one percent floodplain.

Effect on Housing

The majority of Lyon 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 Lyon County due to the aesthetics they create. The median housing unit value in Lyon County was \$100,300 in 2010.⁵⁶ If we assign this median value for all the residential structures within the floodplain in Lyon County, there is a total value of \$6,118,300. This is just the value of the residential structures. Since flooding could occur in any of the communities within Lyon 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 Lyon County, but past damages that have occurred were minimal. Future construction of commercial buildings in the floodplain has been prohibited under Lyon County’s zoning regulations.

⁵⁴ National Resources Conservation Service. Accessed: 11/24/14. Available: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ri/soils/?cid=nrcs144p2_016637

⁵⁵ American Red Cross. Accessed: 10/30/13. Available: <http://www.redcross.org/prepare/disaster/flood>

⁵⁶ Census 2010. Accessed: 2/26/15. Available: <http://factfinder2.census.gov>

Public Infrastructure

Within Lyon 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 Redwood 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 287 bridges on county, municipal, and township roadways within Lyon County.⁵⁷ Most are made of steel or steel reinforced concrete, which can withstand annual spring flooding. To date, none of the bridges within Lyon County have been destroyed as a result of flooding.

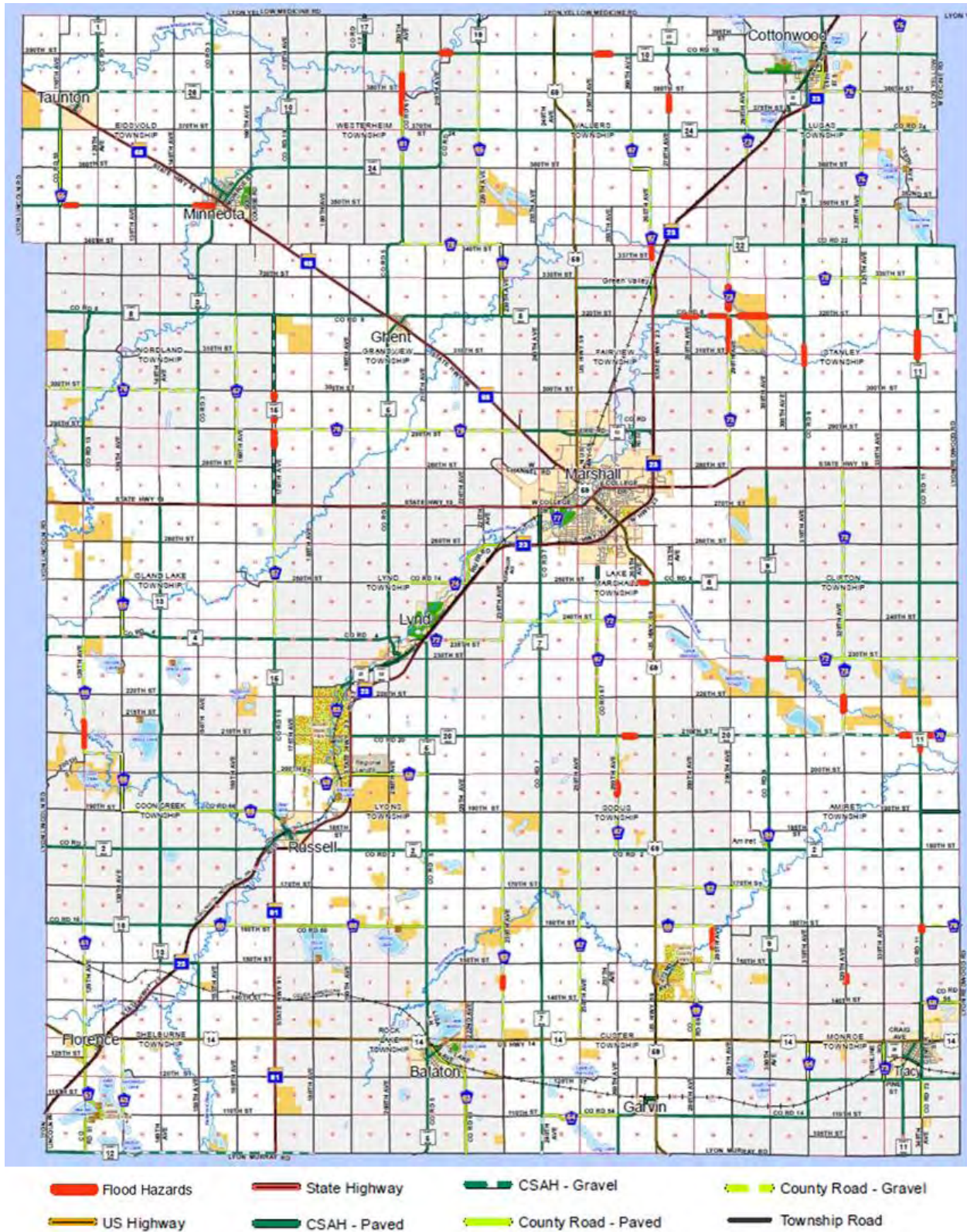
The majority of damages from flooding occur on township roads and county roads. Many other locations can experience damage from flooding depending on the location, amount, and duration of the rainfall event. A one percent flood event would result in a number of roadways sustaining damage and wider spread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

Roads, bridges, and culverts are susceptible to damage from flooding. The figure below identifies areas where drainage is an issue. 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 Lyon County Public Works Office.

⁵⁷ Lyon County Public Works. Data Request Received 1/26/16

RA Figure #16

Public Infrastructure Susceptible to Flooding - Lyon County Roads, Bridges & Culvert



There are no communities in Lyon 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.

Previous Occurrences of the Hazard

From January 2000 through August 2015, there have been 8 documented floods and 10 documented flash floods in Lyon County. 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.”⁵⁸

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.”⁵⁹

RA Table #15 Floods – Lyon County

Date	Location	Event Narrative
3/16/2011	Lyon County	Melting of a heavy winter snow cover caused flooding of the Redwood River, as well as flooding of lowlands, lakes, and small streams. The Redwood River crested at 3.85 feet above flood stage at Russel on March 23rd. 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.

⁵⁸ NOAA. Accessed: 11/24/14. Available: <http://www.srh.noaa.gov/mrx/hydro/flooddef.php>

⁵⁹ NOAA. Accessed: 11/24/14. Available: <http://www.srh.noaa.gov/mrx/hydro/flooddef.php>

4/1/2011	Lyon County	Flooding of lakes, streams, and lowlands, including some farmland, continued in the county through April. The Redwood river crested at a foot above flood stage at Russel on April 10th. 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.
5/6/2012	Lyon County	Runoff from heavy rain caused minor lowland flooding of the Redwood River from May 6 th to May 9 th , with lowlands including some parkland affected. The river crested at 1.44 feet above flood stage at Russell on May 7 th .
6/19/2014	Lyon County	Thunderstorms produced a tornado and heavy rain in the late evening of June 18 th and morning of June 19 th . Persistent moderate to heavy rain caused flooding of fields and other lowlands, including numerous roads, and several homes and businesses. This flooding lasted through most of the daytime hours. Some roads were damaged or washed out.

National Climatic Data Center (NCDC) Storm Events database

RA Table #16 Flash Floods – Lyon County

Date	Location	Event Narrative
9/2/2010	Lyon, Lincoln	Heavy rain caused flash flooding of numerous roads in the Marshall area, including Highway 59.
9/22/2010	Pipestone, Lyon, Nobles, Murray, Jackson, Cottonwood	Heavy rain of several inches over the southern part of Lyon County caused flash flooding of numerous roads, fields, and basements. The roads flooded included U.S. Highway 14 near Tracy and U.S. Highway 59 near Garvin.
7/1/2011	Lyon	Heavy rain caused flash flooding of several streets in Marshall.
6/18/2014	Lyon	Heavy rain caused flash flooding of numerous streets, parks, and fields near and south of the town of Cottonwood. Basements of some homes were also flooded.

National Climatic Data Center (NCDC) Storm Events database

Probability of Future Events of this Hazard

Flooding is highly likely to occur each year and forecasting technology and models can help predict yearly spring flooding. The potential frequency of a flood is likely according to the planning team. Even with weather forecasting technology floods can occur rapidly and poses a risk throughout the county.

Vulnerability

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.

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. The risk level assigned to flooding by the planning team is high.

Plans and Programs

- Zoning – The floodplain section of the Lyon County Development Code addresses the placement of structures within the floodplain. Lyon County’s zoning regulations prohibits 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 Yellow Medicine River Watershed District (YMRW) ten-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.
- Dry Dams – Area II River Basin have worked with Lyon County to sponsor upstream projects in Lincoln County.
- County flood area maps – Lyon County has FIRM maps identifying the 100-year. The county zoning ordinance controls permitted land uses in these areas, what can be built, and how.
- City flood area maps – Cities in Lyon County have official FIRM maps identifying the 100-year flooding plain. All cities addressed flood risks in their planning and zoning documents.
- Lyon 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) – Lyon County and the following cities participate in the NFIP: Balaton, Cottonwood, Ghent, Lynd, Marshall, Minneota, Russell, Taunton, and Tracy.⁶⁰ The NFIP has three basic aspects that include: floodplain identification and mapping, floodplain management, and flood insurance. The City of Garvin has not participated in the NFIP.
- Zoning restrictions – The City of Marshall and Lyon County have zoning restrictions that limit new structures and land uses within the Floodway, Flood Fringe, and General Flood Plain District.

⁶⁰ FEMA. National Flood Insurance Program. Accessed: 11/7/14. Available: <http://www.fema.gov/cis/MN.pdf>

- Water level monitoring – Water levels in the Redwood River are monitored, so the water levels downstream are predictable. The closest gage is by County Road 33.
- 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.
- Ditch system / drainage – Lyon 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 Lyon County Highway Departments works with the DNR and other organizations to increase the number of sedimentation ponds along roadways in Lyon County. Sedimentation ponds hold back water, which helps to control flooding. Lyon 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. Lyon County follows state recommendations on storm water management for bare land development and other applicable projects.

Gaps and Deficiencies

- Wastewater treatment vulnerability to flooding – Wastewater treatment plants are vulnerable to flooding. 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.
- Grandfathered in structures in the floodplain – At-risk uses and structures remain in identified 100-year floodplains, because they are “grandfathered” in.
- 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 – Ghent’s two lift stations are in the one percent flood plain.

- Floodplain maps – Ghent and Lyon County both have issues regarding their floodplain maps. Ghent and Lyon County are collecting and submitting information to FEMA to resolve discrepancies with the floodplain maps
- Ghent flood plain map – Ghent is required to use their old floodplain map, so the majority of their new development is in the old floodplain, which has been elevated.
- 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.
- Eidsvold Township flooding – Eidsvold Township has four sites that encounter repetitive flooding. These sites have caused Eidsvold Township financial hardship over multiple flood events. Appendix A contains documents outlining the flooding issues and suggestions for permanent fixes at the specific sites.
- 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.

Existing Mitigation Measures

- 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. Lyon County has been proactive in culvert replacement.
- Diversion channel – Water retention systems and water quality projects have been constructed along diversion channels. These projects have slowed the flow of water into Marshall.
- Ghent floodplain - Ghent is waiting on Area II to construct an upstream water retention system to decrease water flows during high water events.

A7 Severe Summer Storms, Lightning, Hail, and Extreme Heat Events

During the spring, summer and autumn, severe thunderstorms, lightning, hail, and excessive heat can occur. Severe summer storms, lightning, hail, and 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. (Windstorm and tornado events are addressed in the next section.)

Locations Affected by the Hazard

All locations in Lyon County are at risk to be affected by this hazard. Severe summer storms and extreme heat events will be more widespread. These weather events can generate lightning and hail that tend to be more isolated. The planning team identified the spatial extent of severe summer storm, lightning, hail, and extreme heat events as countywide.

Extent of the Hazard

The potential severity of severe summer storms, lightning, hail, and extreme heat events is major according to the planning team.

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.

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. More people in the United States died from extreme heat than from hurricanes, lightning, tornadoes, flood and earthquakes combined.⁶¹

Lightning 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.

⁶¹ CDC. Emergency Preparedness and Response. Accessed: 9/6/13. Available: http://www.bt.cdc.gov/disasters/extremeheat/heat_guide.asp

RA Table #17**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.** Extreme heat can lead to the power grid being overloaded and can in turn cause blackouts.
- **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.

Previous Occurrences of the Hazard

Thunderstorms are not documented by the NOAA as a separate event. Extreme heat events are documented as a separate event by NOAA. There were four documented extreme heat events in Lyon County from January 2000 through August 2015. 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.⁶²

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.

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.

RA Table #18 Excessive Heat – Lyon County

Date	Location	Event Narrative
7/15/2011	Lyon 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	Lyon County	A combination of high heat and humidity, with temperatures reaching the 90s and dew points in the 70s, pushed the heat index to a little above 100 degrees during the afternoon and early evening hours of June 27th over southwest Minnesota.
7/2/2012	Lyon County	A combination of high heat and humidity persisted for several days. Daytime temperatures reached the 90s to just above 100, and dew points were in the 70s. The heat index went as high as 110 degrees. Low temperatures were in the 70s, leading to some uncooled indoor locations remaining excessively warm through the night. The dangerous nature of the heat was added to by its continuing over a period of several days.

⁶² Minnesota Department of Health. Assessed: 11/24/15. Available: http://www.health.state.mn.us/divs/climatechange/docs/toolkit_chapter1.pdf

7/16/2012	Lyon County	A combination of high heat and humidity consisted of daytime temperatures reaching the 90s, and dew points in the 70s. The heat index went as high as 105 degrees.
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National Climatic Data Center (NCDC) Storm Events database

There were three documented lightning events in Lyon County from January 2000 through August 2015.⁶³ 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.”⁶⁴

RA Table #19 Lightning Events - Lyon County

Date	Location	Event Narrative
8/7/2000	Tracy	Lightning struck an electrical pole at a car dealership, starting a small fire in the electrical meter. The lightning also caused slight damage to an adjoining grocery store.
8/3/2004	Marshall	Lightning struck the joint law enforcement center, knocking out power and damaging some equipment. Some communications were lost for several hours, but emergency service was not affected.
9/12/2005	Tracy	Lightning struck a transformer at the back of a food store, causing a local power outage which lasted for 10 hours. Volunteers moved perishable refrigerated and frozen food into ice trucks and a freezer trailer, avoiding spoilage of over \$100,000 worth of food.

National Climatic Data Center (NCDC) 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:

RA Table #20 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.	16-25

⁶³ NOAA. Accessed: 11/24/15. Available: <http://www.ncdc.noaa.gov/stormevents/>

⁶⁴ NOAA. Accessed: 11/24/15. Available: <http://www.nssl.noaa.gov/education/svrwx101/lightning/>

	Moderate rain is common and lightning is frequent.	
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.	

RA Table #21a Lightning Detector Needs – Lyon County Schools

Location	Lightning Detectors	Need for Lightning Detectors
Lakeview Schools	None	We would only need two since all of our fields are in the same complex.
Marshall Public Schools	2 – generally kept with our athletic trainers at our outdoor events	Add 2 additional devices to our supply, since we often have multiple events at multiple sites taking place concurrently.
Minneota Public School		
Tracy Area Public Schools		
Russell-Tyler-Ruthton Public Schools		

RA Table #21b Lightning Detector Needs – Cities (Public Facilities)

Location	Lightning Detectors	Need for Lightning Detectors
Marshall	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 Lyon County. From January 2000 through August 2015, there have been 62 documented hail events in Lyon 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.

RA Table #22 Hail Events, Lyon County

Date	Location	Event Narrative
8/1/2012	Taunton, Minneota; Currie (rural Lyon Co)	Large hail caused an unknown amount of crop, vehicle, window, and roof damage.
8/23/2012	Lynd, Marshall, Balaton; Luverne, Hills, Steen (rural Lyon Co)	Thunderstorms produced large hail and damaging winds at several locations in Lyon and Rock Counties in southwest Minnesota during the late afternoon and early evening of August 23rd.
6/21/2013	Minneota, Marshall, Dudley, Balaton; Ghent, Tyler, Storden (rural Lyon Co)	Hail was accompanied by 60 mph wind gusts. Large hail caused an unknown amount of damage to vehicles, roofs, and crops.
8/31/2013	Marshall ; Kenneth, Lismore, Jeffers (rural Lyon Co)	Thunderstorms produced large hail at scattered locations in southwest Minnesota during the late afternoon and evening of August 31st.
5/10/2014	Marshall	A thunderstorm produced penny size hail in Marshall, MN on the afternoon of May 10th.

5/27/2014	Marshall	A thunderstorm produced penny size hail in Marshall, MN on the afternoon of May 27th.
6/5/2014	Green Valley, Dudley; Jasper, Ivanhoe, Luverne (rural Lyon Co)	Thunderstorms produced marginally large hail and two tornadoes in southwest Minnesota during the afternoon and early evening of June 5th.
7/17/2015	Ghent	A thunderstorm produced quarter size hail at Ghent in Lyon County in southwest Minnesota during the evening of July 17th.

National Climatic Data Center (NCDC) Storm Events database

Probability of Future Events of this Hazard

Severe summer storms are highly likely to take place every year, including excessive heat, lightning, and hail. The potential frequency of a severe summer storm is likely according to the planning team.

Vulnerability

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. The risk level assigned to severe summer storms by the planning team is high.

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 – Lyon County has the CodeRED emergency notification system. CodeRED allows emergency officials to notify residents and businesses by telephone, cell phone, text message, email and social media regarding time-sensitive general and emergency notifications.
- 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.”⁶⁵ Lightning detectors would improve safety at outdoor sporting events. Refer to RA Table #21a for an inventory and need for lightning detectors for schools in Lyon 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

⁶⁵ National Lightning Safety Institute. Overview of Lightning Detection Equipment. Accessed: 2/24/16. Available: http://lightningsafety.com/nlsi_lhm/detectors.html

extreme weather events. Lyon County, Southwest Minnesota State University, and the Cities of Marshall and Tracy are Storm Ready Communities.

- Weather Ready Nation Ambassador – Lyon 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.”⁶⁶

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 RA Table #21a for an inventory and need for lightning detectors for schools in Lyon County.

Existing Mitigation Measures

- Severe Weather Awareness – Each spring, Lyon County Emergency Management personnel will educate local schools, nursing homes, hospitals, etc. on the importance of doing a “Severe Weather Awareness Week” workshop for their staff. This workshop identifies evacuation routes and emergency shelters, along with other important information. Entities that participate include: Lakeview Public Schools, Marshall Public Schools, Minneota Public Schools, Tracy Area Public Schools, Russell-Tyler-Ruthton Public Schools, Avera Marshall Regional Medical Center, Sanford Tracy Medical Center, and Lyon County Government 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. Public service announcements are one of the ways to warn the public of severe weather.
- Severe weather spotter training – an annual training is provided in Lyon County. The National Weather Service conducts the training.

⁶⁶ NOAA. Weather Ready Nation Ambassadors. Accessed: 3/24/16. Available: <http://www.nws.noaa.gov/com/weatherreadynation/ambassadors.html>

A8 Tornado & Straight-line Wind Events

Tornadoes are the most violent of all storm types experienced in Minnesota.⁶⁷ 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). Tornadoes and straight-line wind events were assigned a hazard rank of moderate by the planning team.

Locations Affected by the Hazard

All of Lyon County is at risk of a tornado. FEMA places Southern Minnesota in Wind Zone IV, subject to winds of up to 250 mph.⁶⁸ The planning team identified the spatial extent as local for tornadoes and straight-line wind events.

Extent of the Hazard

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.⁶⁹ The potential severity of tornadoes and straight-line wind events is major according to the planning team.

The severity of tornado damage is measured by the Fujita Tornado Scale, with a sliding scale from F0 to F5 depending on wind speed. 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.⁷⁰

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 Lyon County, many funnel clouds have only caused damages to crops and unpopulated area.

⁶⁷ MN All Hazard Mitigation Plan. Accessed: 5/29/13. Available: https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011_MinnesotaAllHazardMitigationPlanDraft.pdf

⁶⁸ FEMA. Accessed: 5/29/13. Available: <http://www.fema.gov/safe-rooms/wind-zones-united-states>

⁶⁹ MN All Hazard Mitigation Plan. Accessed: 5/29/13. Available: https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011_MinnesotaAllHazardMitigationPlanDraft.pdf

⁷⁰ MN All Hazard Mitigation Plan. Accessed: 5/29/13. Available: https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011_MinnesotaAllHazardMitigationPlanDraft.pdf

RA Table #23**Enhanced F-Scale for Tornado Damage**

Scale	Wind Estimate	Typical Damage
F0	65-85 mph	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	86-110 mph	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	111-135 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.
F3	136-165 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.
F4	166-200 mph	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	>200 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) Storm Events database

RA Table #24**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 0.84 of a windstorm event causing \$54,167 worth of damages per event.⁷¹ This average damage per event is based on wind damages from 1950 through 2007. During that timeframe there were 48 reported incidences of damages from windstorms.

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.
- 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.

Previous Occurrences of the Hazard

There were 11 documented tornadoes in Lyon County from January 2000 through August 2015. There were 22 thunderstorm wind events documented during this same time period. Straight-line winds are classified by NOAA as thunderstorm wind events.

RA Table #25 Tornadoes – Lyon County

Date	Location	Event Narrative
6/21/2013	Amiret	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. A brief tornado caused no reported damage. There was also flash flooding in Lyon County, which continued after midnight into the early morning hours of June 22nd. A brief tornado caused no reported damage.
3/31/2014	Minneota	A tornado destroyed outbuildings, damaged a grain bin, and broke windows in a house in northern Lyon County, then crossed the county line into Yellow Medicine County.
6/18/2014	Marshall	Thunderstorms produced a tornado and heavy rain in the late evening of June 18th and morning of June 19th. The heavy rain caused flash flooding and areal flooding. A brief tornado caused no reported damage.

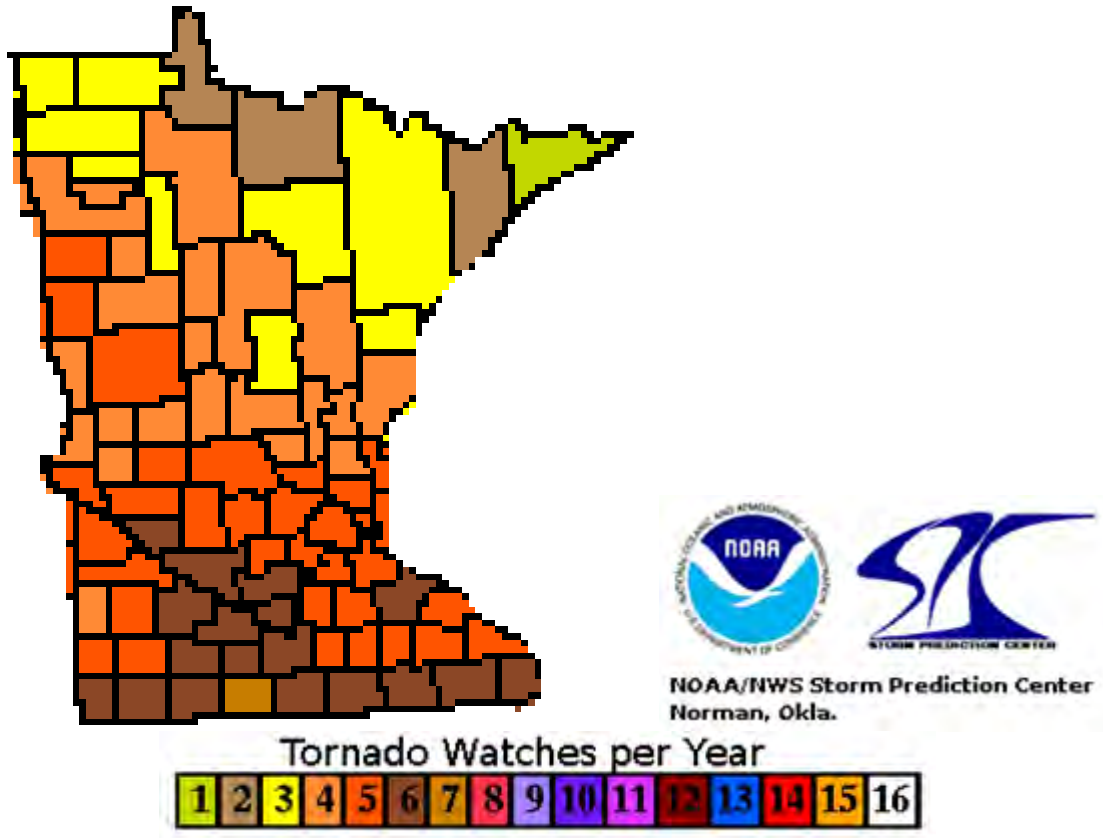
National Climatic Data Center (NCDC) Storm Events database

RA Table #26 Thunderstorm Wind Event – Lyon County

Date	Location	Event Narrative
9/19/2013	Lyon Co	Thunderstorm winds caused tree damage, including numerous branches blown down and flattened corn crops. The amount of crop damage was not known.
6/20/2015	Lyon Co	Thunderstorm winds caused tree damage and tossed a farm wagon.
6/27/2015	Lyon Co	Thunderstorm winds caused tree damage, including trees blown over. The winds also damaged a billboard.

⁷¹ MN All Hazard Mitigation Plan. Accessed 9/11/13. Available: http://www.rrbdin.org/wp-content/uploads/2011/08/MN_state_mitigation_plan.pdf

RA Figure #17 Tornado Watches per Year - Minnesota



There was on average six tornado watches per year in Lyon County from 1999 to 2008. Often the right conditions exist to produce a tornado, but a tornado will not be produced. Also, an unknown number of tornadoes are not reported because they do not touch down or cause any damages.

RA Table #27

**Potential Structure Vulnerability to F4/F5 Tornadoes
Estimated Market Value 2015 - Lyon County**

	No. Improved Parcels	Value of Parcels	At-Risk Parcels	Value
City of Balaton				
Agricultural	7	\$ 215,400	6	\$ 193,860
Commercial	38	\$ 2,061,200	34	\$ 1,855,080
Exempt/Non-Profit	28	\$ 2,771,000	25	\$ 2,493,900
Industrial	1	\$ 16,400	1	\$ 14,760
Residential	295	\$ 16,431,300	266	\$ 14,788,170
Vulnerable Structures			332	\$ 19,345,770
City of Cottonwood				
Agricultural	0	\$ -	0	\$ -
Commercial	37	\$ 7,038,800	33	\$ 6,334,920
Exempt/Non-Profit	22	\$ 13,734,300	20	\$ 12,360,870
Industrial	3	\$ 3,510,700	3	\$ 3,159,630
Residential	428	\$ 47,970,300	385	\$ 43,173,270
Vulnerable Structures			441	\$ 65,028,690
City of Florence				
Agricultural	0	\$ -	0	\$ -
Commercial	2	\$ 5,600	2	\$ 5,040
Exempt/Non-Profit	5	\$ 43,900	5	\$ 39,510

Industrial	0	\$	–	0	\$	–
Residential	31	\$	1,943,400	28	\$	1,749,060
Vulnerable Structures				34	\$	1,793,610
City of Garvin						
Agricultural	5	\$	89,100	5	\$	80,190
Commercial	9	\$	381,700	8	\$	343,530
Exempt/Non-Profit	17	\$	391,300	15	\$	352,170
Industrial	0	\$	–	0	\$	–
Residential	75	\$	1,943,400	68	\$	1,749,060
Vulnerable Structures				95	\$	2,524,950
City of Ghent						
Agricultural	1	\$	25,800	1	\$	23,220
Commercial	11	\$	525,300	10	\$	472,770
Exempt/Non-Profit	6	\$	985,600	5	\$	887,040
Industrial	0	\$	697,700	0	\$	627,930
Residential	165	\$	13,082,300	149	\$	11,774,070
Vulnerable Structures				165	\$	13,785,030
City of Lynd						
Agricultural	1	\$	25,600	1	\$	23,040
Commercial	10	\$	345,900	9	\$	311,310
Exempt/Non-Profit	8	\$	2,053,500	7	\$	1,848,150

Industrial	0	\$	–	0	\$	–
Residential	161	\$	17,652,000	145	\$	15,886,800
Vulnerable Structures				162	\$	18,069,300
City of Marshall						
Agricultural	1	\$	186,600	1	\$	167,940
Commercial	459	\$	167,753,600	413	\$	150,978,240
Exempt/Non-Profit	337	\$	409,634,700	303	\$	368,671,230
Industrial	76	\$	74,072,700	68	\$	66,665,430
Residential	3697	\$	474,116,100	3327	\$	426,704,490
Vulnerable Structures				4113	\$	\$1,013,187,330
City of Minneota						
Agricultural	5	\$	329,000	5	\$	296,100
Commercial	72	\$	3,682,000	65	\$	3,313,800
Exempt/Non-Profit	17	\$	11,105,900	15	\$	9,995,310
Industrial	5	\$	894,500	5	\$	805,050
Residential	543	\$	40,235,500	489	\$	36,211,950
Vulnerable Structures				578	\$	50,622,210
City of Russell						
Agricultural	6	\$	199,400	5	\$	179,460
Commercial	18	\$	644,600	16	\$	580,140
Exempt/Non-Profit	21	\$	2,152,500	19	\$	1,937,250

Industrial	0	\$	–	0	\$	–
Residential	182	\$	10,675,200	164	\$	9,607,680
Vulnerable Structures				204	\$	12,304,530
City of Taunton						
Agricultural	3	\$	59,100	3	\$	53,190
Commercial	3	\$	414,700	3	\$	373,230
Exempt/Non-Profit	5	\$	155,900	5	\$	140,310
Industrial	1	\$	913,000	1	\$	821,700
Residential	84	\$	3,246,300	76	\$	2,921,670
Vulnerable Structures				86	\$	4,310,100
City of Tracy						
Agricultural	2	\$	71,500	2	\$	64,350
Commercial	123	\$	6,186,200	111	\$	5,567,580
Exempt/Non-Profit	63	\$	26,368,800	57	\$	23,731,920
Industrial	2	\$	1,389,100	2	\$	1,250,190
Residential	856	\$	42,154,100	770	\$	37,938,690
Vulnerable Structures				941	\$	68,552,730
Vulnerable Structures				5178	\$	1,255,739,220

Assuming a 90% destruction rate per National Weather Service
Source: Lyon County Tax System Data Base; July 2014

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 2010 Census identified 73 mobile home units in Lyon County.⁷²

Probability of Future Events of this Hazard

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. The potential frequency of tornadoes and straight-line wind events in Lyon County is likely according to the planning team.

Vulnerability

Severe wind events can cause minor damage to structural failure and full-scale devastation. The risk level assigned to tornadoes and straight-line wind events by the planning team is high. 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. Lyon County annually trains 80 to 100 severe weather spotters who report directly to the NWS when severe weather is observed.
- Severe Weather Shelters – The Minnesota State Zoning Ordinance regarding severe weather shelters has been adopted by Lyon County. This ordinance requires on-site shelter for mobile home park residents or provides information on evacuation routes to safe shelters elsewhere. There are four mobile home parks in Lyon County, located in the Cities of Cottonwood, Marshall, Minneota and Tracy.
- 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 – 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 Lyon County have good coverage by emergency sirens that can be activated to warn residents in the event of a severe weather event or other emergency. All of the sirens in Lyon County have been converted to narrow band frequency.
- 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.

⁷² FactFinder. Accessed 5/29/13. Available: <http://factfinder2.census.gov>

- Minnesota State Parks and Trails Severe Weather Policy –Minnesota State Parks have a severe weather policy to help inform visitors on how to respond during severe weather events. Camden State Park does not have an emergency siren, so visitors rely on direct state park and state recreation area managers to provide information and communication methods to visitors. State parks, state recreation areas and state forest recreation areas have posted general procedures on how visitors should respond to severe weather events. Division of Parks and Trails staff will make reasonable efforts to advise visitors of impending severe weather information when staff is present. The state park and state recreation area manager is responsible for the implementation of this policy. State park, state recreation area and forest recreation area visitors are ultimately responsible for their own safety during severe weather.
- Text Alert – Marshall Public Schools has a text alert system for emergencies and school closings.
- Warning sirens – Some warning sirens in Lyon County have voice capabilities.
- Tornado drills – Lakeview Public Schools, Marshall Public Schools, Minneota Public Schools, Tracy Area Public Schools, and Russell-Tyler-Ruthton Public Schools participate in severe weather awareness week. The schools have a plan in place for tornadoes and other severe weather events.

RA Table #28 Outdoor Warning Sirens – Lyon County

Cities	Sirens Adequate	Have backup battery	Feedback
Balaton	Yes	Yes	No
Cottonwood			
Florence	No	No	Florence does not have a warning siren. We had it on our agenda for a long time, but there is no way there is any money for this equipment.
Garvin	Yes	Yes	No
Ghent	Yes	Yes	No
Lynd			
Marshall			
Minneota	Yes	Yes, will be adding another backup battery in 2016	The plan is to replace the 3rd siren but this will have to be done as the budget allows
Russell			
Taunton			
Tracy	Yes	Yes	Tracy has four sirens currently. Two are new as of 1999 or 2000 and these two alone are supposed to be able to cover the city limits. These two sirens are battery backup sirens. We also still have two older style sirens that are placed in different areas that work fine and double cover our busy areas of downtown and the business area of Highway 14.
County Parks	No	None	There are no outdoor warning sirens in Lyon County Parks.

Gaps and Deficiencies

- Emergency shelters in nursing homes and assisted living facilities – A number of nursing homes and assisted living facilities in Lyon County do not have basement shelters or other suitable shelters for the residents. A survey conducted by the Southwest Area Agency on Aging analyzed how many nursing homes within the county do have basement shelters or other suitable shelters for the residents. Over 90 percent of the respondents indicated that their facility does NOT have a basement that can be used for a shelter. While some of the facilities do have basements, in the event of a violent storm residents are moved into an interior hallway away from windows. This policy is in place because the majority of the residents are elderly and don't move well, so it would be difficult to move all the residents to the basement.
- Emergency shelters in mobile home parks – Mobile homes typically do not provide adequate emergency shelter for residents. The cities of Cottonwood, Marshall, Minneota, and Tracy have mobile home parks and were identified as needing additional emergency shelters.
- Warning siren range – The effective range of warning sirens is limited. Rural areas are outside the range of the severe weather warning system areas.
- 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 – Not all parks in Lyon County have emergency shelters. There are no safe rooms in Lyon County. Funding is an obstacle for the construction of safe rooms.

RA Table #29 Emergency Shelters & Safe Rooms – Lyon County

Cities	Emergency Shelter	Safe Room	Need
Balaton		No	
Cottonwood	Community Center	No	Community center meets current needs as an emergency shelter. The Community Center has a large basement.
Florence	none	No	basements are adequate
Garvin	Local bar	No	local bar is also a Red Cross location
Ghent		No	
Lynd		No	
Marshall		No	
Minneota		No	
Russell	No	No	due to the lack of personal storm

			protection, a storm shelter connected to the fire hall would be a much needed protection for the public and city workers
Taunton		No	
Tracy		No	
County Parks		No	county fairgrounds, Twin Lakes County Park, and Garvin Park

- Warning sirens in county parks – None of the county parks in Lyon 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 Table RA Table #28 for warning sirens in Lyon 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 Lyon County. This makes it difficult to send out emergency broadcast. Having to translate emergency broadcasts into multiple languages takes time and money.

Existing Mitigation Measures

- Emergency shelters – Local units of government in Lyon County provide emergency shelters.

Manmade Hazards

Manmade hazards are hazards caused by humans rather than nature. These hazards are primarily caused directly by people or in the case of disease spread person to person, rather than by natural events. The nature of this hazard covers acts both intentional and accidental. Manmade hazards considered in this plan include terrorism, hazardous materials and meth labs, public health emergencies, and risks to transportation infrastructure.

B1 Civil Disturbance and Terrorism

Several large-scale manmade disasters have highlighted the need to address terrorism along with civil disturbance. Timothy McVey was in Minnesota conducting surveillance on the Whipple Federal Building before he decided to attack the Murrah Federal Building in Oklahoma City. The 2001 World Trade Center and Pentagon attacks demonstrate the need to protect our citizens, in large cities and small. Civil disturbance and terrorism was assigned a hazard rank of low by the planning team.

FEMA’s *Integrating Manmade Hazards into Mitigation Planning* guide explains:

The term “terrorism” refers to intentional, criminal, malicious acts. There is no single, universally accepted definition of terrorism, and it can be interpreted in many ways. Officially, terrorism is defined in the Code of Federal Regulations as “...the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.” (28 CFR, Section 0.85). The Federal Bureau of Investigation (FBI) further characterizes terrorism as either domestic or international, depending on the origin,

base, and objectives of the terrorist organization; however, the origin of the terrorist or person causing the hazard is far less relevant to mitigation planning than the hazard itself and its consequences.

For the purposes of this plan, civil disturbance and terrorism refers to the use of:

- Weapons of Mass Destruction (WMD), including biological, chemical, nuclear, and radiological
- Arson, incendiary explosive, and armed attacks
- Industrial sabotage and intentional hazardous materials releases
- Cyber terrorism
- Staging grounds for acts to take place in other areas

Within these general categories, however, there are many variations. Particularly in the area of biological and chemical weapons, there are a wide variety of agents and ways for them to be disseminated.

Locations Affected by the Hazard

Terrorism can take the form of both the act of taking out a target to the planning that goes into an attack. All locations in Lyon County are at risk from this hazard. Cities, public and private buildings, churches, and schools may all be targets for attacks. Due to the rural nature of Lyon County, rural farmsteads may be inviting staging grounds for terroristic groups or individuals. Training and planning could take place in these rural settings due to the seclusion. The planning team identified the spatial extent of civil disturbance and terrorism as local.

Extent of the Hazard

Protests and demonstrations in the United States tend to be scheduled peaceful gatherings. Civil disturbances can erupt if liberties are threatened by the government or if excessive force is used. Public protests and demonstrations can lead to windows being smashed, dumpster fires being lit, cars being overturned, and demonstrators and officials being injured. The potential severity of a civil disturbance or terrorist event is substantial according to the planning team.

Domestic Concerns

The Minnesota All Hazard Mitigation Plan (MAHMP) defines domestic terrorism as involving groups or individual whose unlawful activities are directed at elements of our government or population without foreign direction. Domestic Preparedness focuses on mitigating these activities without foreign direction.

The US Department of Homeland Security (DHS) and the FBI classify domestic threats in four broad categories—special interest, rightwing, leftwing, and lone wolf. While current monitoring is typically classified at the Law Enforcement Sensitive (LES) level, the MAHMP notes that there are specific areas of concern within Minnesota. Two examples specifically cited in the state plan (p.172):

- *Both lone gunmen and small organized cells have planned and carried out attacks in public places, such as the school shootings at Red Lake (2005).*

- *Minnesota’s growing migrant worker populations, including East African, South East Asian, and other ethnic groups, have numerous documented affiliations with criminal/gang-related activity. As well, the American Nazi Party has been active within the state.*

There are homegrown terrorists and antigovernment groups in Lyon County and southwest Minnesota. A number of these groups are on state and federal watch lists. This is a concern in regards to future terrorist events.

International Concerns

Threats from abroad are typically addressed at the federal level. The state Mitigation Plan defines international terrorism as involving groups or individuals whose terrorist activities are foreign-based and/or directed by countries or groups outside of the United States or whose activities transcend national boundaries. The state plan notes (p 172):

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

Relationship to Other Hazards—Cascading Effects

- Numerous/Uncertain. The nature of domestic or international terrorism is inherently unpredictable. Cascading effects depend on the specifics of the event. Release of anthrax or other biological agents could lead to animal and crop disaster. Small pox has also been threatened as a biological agent.

Destruction of a bridge would lead to a crisis with transportation infrastructure. Destruction of an industrial or farm chemical site could lead to a hazardous material being carried by water and wind to other areas, having far reaching effects. A bomb or other explosive device could lead to fires.

Previous Occurrences of the Hazard

Lyon County has been fortunate to not have experienced any major incidents that could be classified as domestic unrest or terrorism.

There have been five or more incidences regarding Swatting. ‘Swatting’ is known as the act of tricking law enforcement or other emergency services into believing there is an emergency situation afoot. A bomb threat at Marshall Public Schools was the latest Swatting incident in Lyon County.

Probability of Future Events of this Hazard

The potential frequency of a civil disturbance or terrorist event is occasional according to the planning team. Due to the rural nature of Lyon County, it is more likely for the county to be used as a staging ground for a terrorist event.

Vulnerability

The unpredictable nature of terrorism creates a crisis between liberty and safety. A balance has to be struck between letting people live their lives and trying to keep people safe. Terrorism is a serious risk, so mitigation needs to be strategic and focused. The risk level assigned to civil disturbance and terrorism by the planning team is average.

Plans and Programs

- Emergency Operations Plan – The Lyon County Emergency Operations Plan outlines procedures for county and local governments to deal with the occurrence of civil disturbances.
- Media outreach – Lyon County has established a position of public service operator. The position is identified in the Lyon County Emergency Operations Plan and is named by department in the event of an emergency.
- Law enforcement – Local, State, and Federal Law Enforcement monitor and analyze possible terrorist threats. Local law enforcement has plans in place to call upon regional and state assets to help with terrorism and civil disturbances. This consists of a Community Emergency Response Team (CERT) from the Twin Cities, Chemical Assessment Team (CAT) from Marshall, bomb squad from the Twin Cities, and the National Guard.
- School plans – Local schools have plans in place and have drills to practice the response actions in the plans.
- Regional Bioterrorism Response Care Center – Avera Marshall Regional Medical Center is designated as a Regional Bioterrorism Response Care Center.
- Threat Liaison Officers – Lyon County has roughly 10 people trained to report incidences to state and federal agencies. The Threat Liaison Officers work with the Minnesota Fusion Center, which is part of the HSEM.
- Chemical Assessment Team – The Southwest Minnesota Chemical Assessment Team (CAT) is based in Marshall and is part of the Marshall Public Safety Division in collaboration with Homeland Security Emergency Management. CAT Teams have highly trained response personnel able to give technical advice for monitoring chemicals to assist the local first responders when hazardous materials events occur.
- Security of emergency medical supplies – SWHHS has a Security Plan in place to cover measures of civilian disturbances during a Medical Countermeasure Dispensing Event or Strategic National Stockpile Event.

Gaps and Deficiencies

- Scenario planning – Annual scenario training should occur regarding lethal attacks and other terrorist events. Planning should occur with schools in Lyon County and at other government buildings. It is difficult to bring all of the different organizations together to plan (schools, law enforcement, emergency management, etc.). Smaller schools have limited resources, so there needs to be county support to run the exercise.
- Worst case scenario planning – The Lyon County Emergency Operations Plan does not reflect possible worst case scenarios in regards to terrorist events.

- Evacuation plans – Spaces that have higher population densities should have evacuation plans. A non-exhaustive list of locations includes schools and other major employers.
- Specialized equipment – Emergency responders are in need of specialized equipment to deal with hazardous materials and SWAT / technical response equipment. This equipment is often expensive, single use items.
- Lack of local SWAT training – Specialized training is typically only offered in the Twin Cities. It is difficult to send the entire team to trainings.
- Riot preparation – Highest potential cases and locations for potential riot need to be identified.
- High value target security – Security regarding high value targets needs to be evaluated. High value locations for potential threats include: elevators and fertilizer storage facilities. A rural agricultural area can provide the space and material needed to plan a large scale terrorist act. Other high value targets include large employers in Lyon County and sporting events where large numbers of people are gathered.
- Cyber terrorism – Cyber terrorism and internet viruses are a major threat to Lyon County. It is likely that the county will have to deal with at least one internet virus annually. The county computer server is a critical site that needs to be evaluated annually regarding cyber terrorism.
- Computer systems for critical facilities – Increased awareness, training, equipment that help to safeguard the electrical grid, communication systems, transportation systems, and water supply. Better plans and programs need to be implemented to ensure that all computers remain current with their current anti-virus updates.
- Opting in to the countywide warning system – A countywide warning system for a disaster is currently in place (CodeRED emergency notification system). Residents have to opt in, so there is a percentage of the population without instant alerts. The warning system that can send out messages to residents via phone and email.
- Social media – Lyon County does not utilize social media for alerts.
- Response time for HAZMAT team and bomb squad – The HAZMAT team and bomb squad are out of the Twin Cities, so there is a response time issue.
- Facility design and operation – The design and operation of facilities in the county were not developed with terrorism prevention in mind. Lyon County government buildings, including the county courthouse and city hall, have unrestricted pedestrian access. Lyon County has various public buildings that do not have up-to-date water supply and fire suppression system and are not blast resistant. This is also an issue in city offices in Lyon County.
- Continuing education – Continuing education occurs for emergency responders, but additional in-depth training may be needed. Regional trainings need to be offered, instead of all the trainings happening in the Twin Cities.
- Sharing of information – There needs to be a better flow of information between community members, the private sector, and law enforcement regarding suspicious activity. Community members need to be observant and report suspicious activity.
- Civil disturbance training and equipment – There is no or limited funding for equipment and training pertaining to civil disturbances.

- Ex-military equipment - Ex-military equipment is released via a first come basis out of the cities, so this equipment is typically gone before emergency managers from Greater Minnesota can respond.
- Police not being able to use military equipment (Executive Order 13688) – SWAT Teams should look intimidating. Intimidation is a deterrent. Executive Order 13688 started to limit the 1033 Program through the Department of Defense.

Existing Mitigation Measures

- Statewide domestic preparedness strategy – Local, regional, state, and national efforts are working together to combat hazards associated with terrorism and civil disturbances. These efforts include but are not limited to training, sharing of resources, planning, and participating in the statewide domestic preparedness strategy.
- Terrorism risk assessment – Lyon County Emergency Management staff conducted a countywide terrorism assessment.
- Schools in Lyon County have increased safety at their entrances by limiting access.

B2 Dam, Impoundment & Culvert 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.”⁷³

Dam failure is defined as a collapse or failure of an impoundment resulting in downstream flooding. Dam failure was assigned a hazard rank of low by the planning team. 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.

Locations Affected by the Hazard

There are 40 dams in Lyon County. The majority of dams are a Class 3, which is the lowest risk. There are no Class 1 dams. Below is a dam inventory table for Lyon County.

RA Table #30 Dam Inventory – Lyon County

Dam Name	ID	Next Inspection Year	Last Inspection Date	Dam Class
Amiret Twp 19	MN01620	2020	3/30/2012	3
Amiret Twp 32	MN01621	2020	3/30/2012	3

⁷³ Minnesota Department of Natural Resources. Accessed: 11/14/13. Available: http://www.dnr.state.mn.us/waters/surfacewater_section/damsafety/index.html

Brawner Lake	MN00120	2016	7/8/2015	3
Coon Creek	MN00730	2017	4/9/2009	3
Coon Creek Twp 24	MN01421	2018	4/13/2010	3
Cottonwood Lake	MN00768	2018	4/23/2010	3
CSAH 5 Detention	MN01374	2018	6/2/2010	3
Custer Twp 13	MN01361	2016	5/13/2008	3
Dog Creek	MN00121	2023	3/12/2015	3
Forbes Pond	MN00955	2017	9/19/2013	3
Griffith-Glynn Farm Pond	MN00845	2016	5/13/2008	3
Highway 14 Detention	MN01049	2023	3/12/2015	3
Island Lake Twp 27	MN01570	2017	4/9/2009	3
Island Lake Twp 4	MN01555	2022	5/7/2014	3
Kass-Morgan Group Farm Pond	MN00844	2017	9/19/2013	2
Kruger-Gregoire Farm Pond	MN00843	2016	5/13/2008	3
Lake Marshall Twp 29	MN01599	2018	4/23/2010	3
Lake Marshall Twp 32	MN01401	2018	4/23/2010	3
Lake Yankton	MN00230	2023	3/12/2015	3
Lynd Twp 8	MN01637	2021	4/8/2013	3
Lyon County Road 13	MN01373	2016	6/20/2008	3
Monroe Twp 3	MN01428	2018	4/13/2010	3
Monroe Twp 8	MN01566	2022	5/7/2014	3
Nordland Twp 15	MN01639	2021	9/19/2013	3
Nyroca Flats WMA	MN01659	2023	3/12/2015	3
Pagel-Madden	MN00679	2016	4/9/2008	3
Redwood River	MN00072	2017	9/19/2013	2
Runholt-Mellenthin	MN00474	2017	4/9/2009	3
Sodus Twp 17	MN01643	2021	9/19/2013	3
Sodus Twp 5	MN01586	2022	5/7/2014	3
Sonstegard-Telste	MN01010	2019	3/12/2015	2
Tracy Road Detention	MN01048	2018	6/23/2010	3
Twp Road 107	MN01644	2017	4/8/2013	3
Twp Road 112	MN01375	2023	3/12/2015	3
Twp Road 18	MN01366	2016	5/13/2008	3
Twp Road 233	MN01043	2017	4/9/2009	3
Twp Road 29	MN01046	2018	7/16/2010	3
Twp Road 30 East	MN01045	2016	5/13/2008	3
Twp Road 30 West	MN01044	2018	3/31/2010	3
Twp Road 73	MN01047	2023	3/12/2015	3

DNR Dam Safety Engineer

Select areas along other streams and water ways in Lyon County where impoundments were constructed to hold back water are also susceptible to flooding from impoundments washing out or dam failure upriver. The planning team identified the spatial extent of dam failure as local.

Extent of the Hazard

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. The potential severity of dam failure is major according to the planning team.

It is more likely to have an impoundment or culvert fail. 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.

Previous Occurrences of the Hazard

Lyon County has not experienced a major dam failure. There have been impoundment and culvert failures.

Probability of Future Events of this Hazard

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. The potential frequency of dam failure affecting Lyon County is unlikely according to the planning team.

Vulnerability

There are a number of dams in Lyon 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 Lyon County. The risk level assigned to dam failure by the planning team is average.

If an impoundment or culvert failed, a number of cities in Lyon County could be vulnerable. There is an extensive impoundment along Division Channel in Marshall. There are multiple critical culverts upstream of Ghent. The Lyon County Highway Department identified a number of critical culverts in RA Figure #16, Public Infrastructure Susceptible to Flooding.

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 Lyon 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.

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 Lyon 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.

Existing Mitigation Measures

- Impoundment dams and other water control systems.

B3 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. Hazardous materials were assigned a hazard rank of moderate by the planning team.

Locations Affected by the Hazard

All locations in Lyon County are affected by this hazard. The planning team identified the spatial extent of hazardous materials as local. In Lyon County there are a number of manufacturers who use and or produce a number of hazardous chemicals. MN 23 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.

Extent of the Hazard

Federal law defines certain hazardous chemicals, and requirements for emergency planning for facilities at which hazardous substances are present. According to the 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 Lyon County there are 26 facilities that report hazardous material storage to state and local authorities. These 26 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. The potential severity of hazardous materials is substantial according to the planning team.

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.

Pipelines

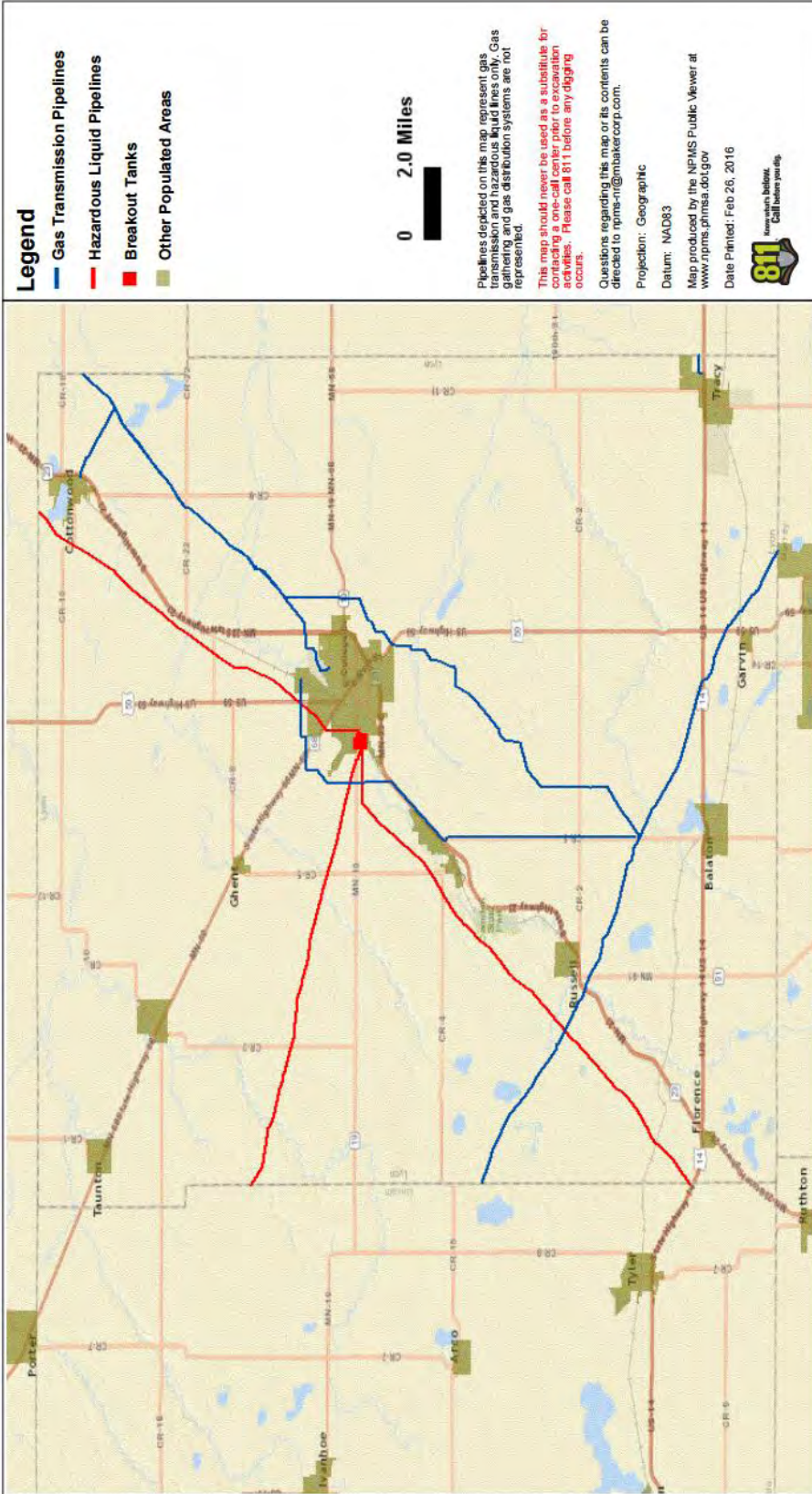
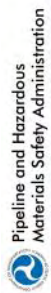
The State Fire Marshall’s Pipeline Safety Team (SFMPST) oversees pipeline operations in Minnesota. The National Pipeline Mapping System identifies three Hazardous Liquid Pipelines traversing Lyon County, converging at a breakout tank facility located just west of Marshall. The pipelines are in red on the map below. There are also several Gas Transmission Pipelines in Lyon County. These pipelines are 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.”⁷⁴

⁷⁴ 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

RA Figure #18

Hazardous Liquid Pipelines - Lyon County

NATIONAL PIPELINE MAPPING SYSTEM



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

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.⁷⁵ Information in regional data systems and feedback from law-enforcement agencies and Avera Marshall Regional Medical Center indicate that meth is still a problem facing the populations they serve.

Decommissioning of Wind Towers

There are a number of wind towers in Lyon County and more are being built. 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.

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 23 passes through Lyon 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 Lyon 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.

Previous Occurrences of the Hazard

Hazardous material incidents can occur in different locations:

- Fixed site facilities
-

⁷⁵ Rand. Accessed: 5/29/13. Available: http://www.rand.org/pubs/research_briefs/RB9438/index1.html

- Highway and rail transportation
- Air transportation
- Pipeline transportation

There have not been any major hazardous materials incidents in Lyon County. 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 hazard materials are buried in Lyon County.

Meth

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.

Probability of Future Events of this Hazard

The potential frequency of hazard events involving hazardous materials is likely according to the planning team. With MN 23 passing through the county and two Class I railroads (the Canadian Pacific and the BNSF) there is a high probability that there will be a crash involving hazardous materials. Refer to RA Figure #21 for the Minnesota Railroad Map in the Transportation Infrastructure subsection.

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.

Vulnerability

With MN HWY 23 and two Class I railroads crossing Lyon County, hazardous materials may be traveling through the area at any time. This volume of hazard materials traversing Lyon County poses a serious risk of a hazardous material incident occurring. The risk level assigned to hazardous materials by the planning team is high. Precautionary measures are in place to prevent an incident from occurring, but a crash on MN HWY 23 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.

Plans and Programs

- State agency cooperation – Lyon 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 Lyon County that maintain a supply of hazardous chemicals.

- Environmental health regulations – Lyon 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.
- Ordinance – Lyon 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.
- Lyon County Solid Waste Plan – In 2014, Lyon 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 – Lyon 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 Lyon County so that local emergency officials can prepare for incidents.
- Household Hazardous Waste Facility – In 2002, Lyon 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.
- Mobile Household Hazardous Waste Unit – In 1992, Lyon County purchased a Household Hazardous Waste Mobile Unit to provide a service to the smaller communities within Lyon County. The unit provides an opportunity for residents to dispose of their HHW correctly and safely.
- Regional hazardous waste facility. Lyon 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 – Lyon County does not have a HAZMAT Team. Lyon 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.
- Regional Deacon Trailer – Mass decontamination can be performed using this asset. This asset is portable and available to the HSEM Region Five.
- Avera Marshall Regional Medical Center and Sanford Tracy Medical Center both have a portable decontamination shower. The facility has access to other decontamination assets, personal protective equipment (PPE), and other resources through the System and Regional partners which can be deployed with a phone call (through SWEPT).
- 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.
- County assistance – Although the potential risk of a radiological emergency to the county is small, Lyon County is responsible to house displaced residents from eastern Minnesota around the Prairie Island Nuclear Power Plant.

- Water plan – Lyon County’s water plan recognizes that the county’s ground water is impacted by both agricultural and residential fertilizer and pesticide applications.

Gaps and Deficiencies

- Specialized equipment – Lyon 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 / Meth lab cleanup -The sheriff’s office and local fire departments are trained to handle a number of hazardous materials, but for meth labs and other hazard materials a HAZMAT certified cleanup team is required. The Lyon County sheriff’s office does not have a HAZMAT Team. Meth lab clean up can be very costly. If a fire fighter goes into a fire and sees that it is a meth lab, the equipment the fire fighter is wearing is no longer good. The chemicals in the fire contaminate the suit, so there are other costs that can be associated with a meth 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 Lyon 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 Marshall. The Lyon County sheriff's office in conjunction with the Marshall police department and the Marshall Area Crime Fund helped to setup the drug drop box. Additional outreach and marketing to the public is needed to increase use of the drug drop box.

Existing Mitigation Measures

- Regional and State assistance – Plans are in place specifying hazardous material cleanup and protocol for who should be contacted for regional and state assistance.

B4 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. Public health emergencies were assigned a hazard rank of moderate by the planning team.

- 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.

Locations Affected by the Hazard

People throughout Lyon County are equally affected by this hazard. The planning team identified the spatial extent of public health emergencies as countywide.

Extent of the Hazard

“Infectious diseases have the potential to affect any form of life.”⁷⁶ 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. The potential severity of public health emergencies is minor according to the planning team.

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 1999.⁷⁷ In 2012, there was one death in Minnesota associated with West Nile Virus. In Lyon County there was one donor who was reported as being a carrier of West Nile Virus.⁷⁸

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

⁷⁶ MN All Hazard Mitigation Plan. Accessed: 5/29/13. Available: https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011_MinnesotaAllHazardMitigationPlanDraft.pdf

⁷⁷ Minnesota Department of health. Accessed: 8/19/13. Available: <http://www.health.state.mn.us/divs/idepc/diseases/westnile/>

⁷⁸ Minnesota Department of health. Accessed: 8/19/13. Available: <http://www.health.state.mn.us/divs/idepc/diseases/westnile/wnvmap12.pdf>

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.⁷⁹

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.”⁸⁰

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.

Previous Occurrences of the Hazard

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

There has been one major public health emergency in Lyon County in recent years. There was an outbreak of Legionnaires’ disease in Lyon County during the 1990s. Legionnaires’ disease is a severe form of pneumonia that is caused by a bacterium known as legionella. Legionnaires’ disease causes lung inflammation, and if left untreated can be fatal. Legionella bacterium can also cause Pontiac fever, a milder illness resembling the flu. Following this event, legionella testing has remained a standing order when considering forms of pneumonia within Lyon County residents due to this particular outbreak.

Influenza is a common seasonal occurrence in Lyon 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.

⁷⁹ Center for Disease Control and Prevention. Accessed: 5/29/13. Available: <http://www.cdc.gov/h1n1flu/qa.htm>

⁸⁰ Center for Disease Control and Prevention. Accessed 11/5/14. Available: <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/index.html>

Probability of Future Events of this Hazard

People contract seasonal influenza every year. Other diseases occur regularly. The potential frequency of a public health emergency is occasional according to the planning team.

Vulnerability

If an outbreak occurs that is contagious it is critical to quarantine the population affected by the disease. This is often difficult since the outbreak may go unnoticed for a period of time. Certain 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. The risk level assigned to a public health emergency by the planning team is average.

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 Lyon 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.
- Southwest Health and Human Services (SWHHS) – SWHHS 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 Lyon County, SWHHS works with MDH and local medical providers to limit the spread of the disease. SWHHS 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. SWHHS provides information to public and private employers, schools and hospitals about potential infectious disease threats and prevention measures.
- Area Strategic Stockpile Plan – SWHHS has a Strategic National Stockpile (SNS) plan in place. SWHHS is 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. SWHHS will continue to coordinate with regional partners for mass distribution of needed medical supplies for a public health emergency.
- Response capabilities (facilities) – SWHHS have designated buildings for the Strategic National Stockpile and Medical Countermeasure Dispensing Sites.
- Medical Countermeasure Dispensing Plan – SWHHS 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. SWHHS 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. SWHHS 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 – SWHHS 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. SWHHS does not monitor individuals once they are placed in I/Q. This monitoring will come down from MDH.
- Media outreach – County Emergency Management works with SWHHS and other local media throughout the county in the event of an infectious disease outbreak.
- Vaccination program – SWHHS 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. SWHHS 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 – SWHHS in cooperation with MDH has worked to develop environmental health regulations, a policy guide, and procedures to address infectious disease and food borne illness. Lyon County relies on the State for inspections.
- Outbreaks – Avera Marshall Regional 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 Team – 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.⁸¹
- MDH FluSafe Program – Avera Marshall Regional Medical Center 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.

⁸¹ Southwest Regional Emergency Preparedness Team. Accessed: 2/24/16. Available: <http://www.mnswept.com/>

Gaps and Deficiencies

- Strategic National Stockpile vulnerable to power outages – Southwest Health and Human Services (SWHHS) 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) – SWHHS 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 2010.⁸² 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 Lyon 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.

Existing Mitigation Measures

- Public education – Des Moines Valley Health and Human Services has various campaigns to educate the public on the importance of active living and healthy eating, vaccinations, tobacco, and other public health issues.
- 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.
- ACT on Alzheimer’s Marshall – A group dedicated to helping build awareness about dementia. Programs and activities regarding Alzheimer’s began as early as 1980. For more information visit: <http://www.actonalz.org/marshall>.

⁸² U.S. Census 2000, 2010. Accessed: 6/3/13. Available: <http://factfinder2.census.gov>

B5 Transportation Infrastructure & Transportation Crashes

Infrastructure is a critical need for the operation and competitiveness of a city, county, or region. Infrastructure is the skeleton and nervous system of a community. Infrastructure includes roads and bridges, rail, air and transit.

Minnesotans move goods and people on a variety of transportation networks. In the wake of the Interstate 35W bridge collapse, the 2008 update of the Minnesota AHMP focused attention on the status of bridges across Minnesota. Transportation infrastructure and transportation crashes were assigned a hazard rank of moderate by the planning team.

Locations Affected by the Hazard

Roads, bridges, rails, landing strips, and other transportation infrastructure wear out. Transportation infrastructure is characterized by long-term, capital-intensive investments that are interdependent and vulnerable to both natural and manmade hazards. Transportation infrastructure continually needs to be inspected and upgraded. Numerous locations in Lyon County have the potential to be affected by transportation infrastructure hazards. The planning team identified the spatial extent of transportation infrastructure and transportation crashes as local.

Lyon County's transportation network is comprised of highways, railways, airports and trails. The system is designed to serve local residents, agriculture and industry, as well as travelers and regional commerce. The Minnesota Department of Transportation (MnDOT) works with the county engineer and municipal authorities to construct, maintain, and regulate a comprehensive system of roads, rail and airports for public and private use.

Roads

There are hundreds of miles of roadway to be monitored and maintained in Lyon County. There are city highways, county roads, township roads, and city streets traversing Lyon County that all require different monitoring and upkeep. It is critical to keep the system in a good state of repair, so people and goods can travel safely.

Lyon County has roads and bridges in state, county, and local jurisdictions with each entity having primary responsibility for construction and maintenance over their segments. The road network is designated by jurisdiction:

- **Trunk Highway System.** Statewide routes originally established under a 1920 constitutional amendment. The routes are the responsibility of MnDOT. Lyon County is located in MnDOT's District 8, which has its primary office in Willmar. U.S. Highways 14 and 59, and State Highways 19, 23 and 64 are Trunk Highways (TH routes).
- **County State Aid Highways (CSAH).** Roads or streets established and designated under county jurisdiction in accordance with Minnesota Statutes Chapter 162. The State provides funding assistance to maintain the CSAH system.
- **County Roads (CR).** Roads established and maintained by the county under the sole authority of the county board.

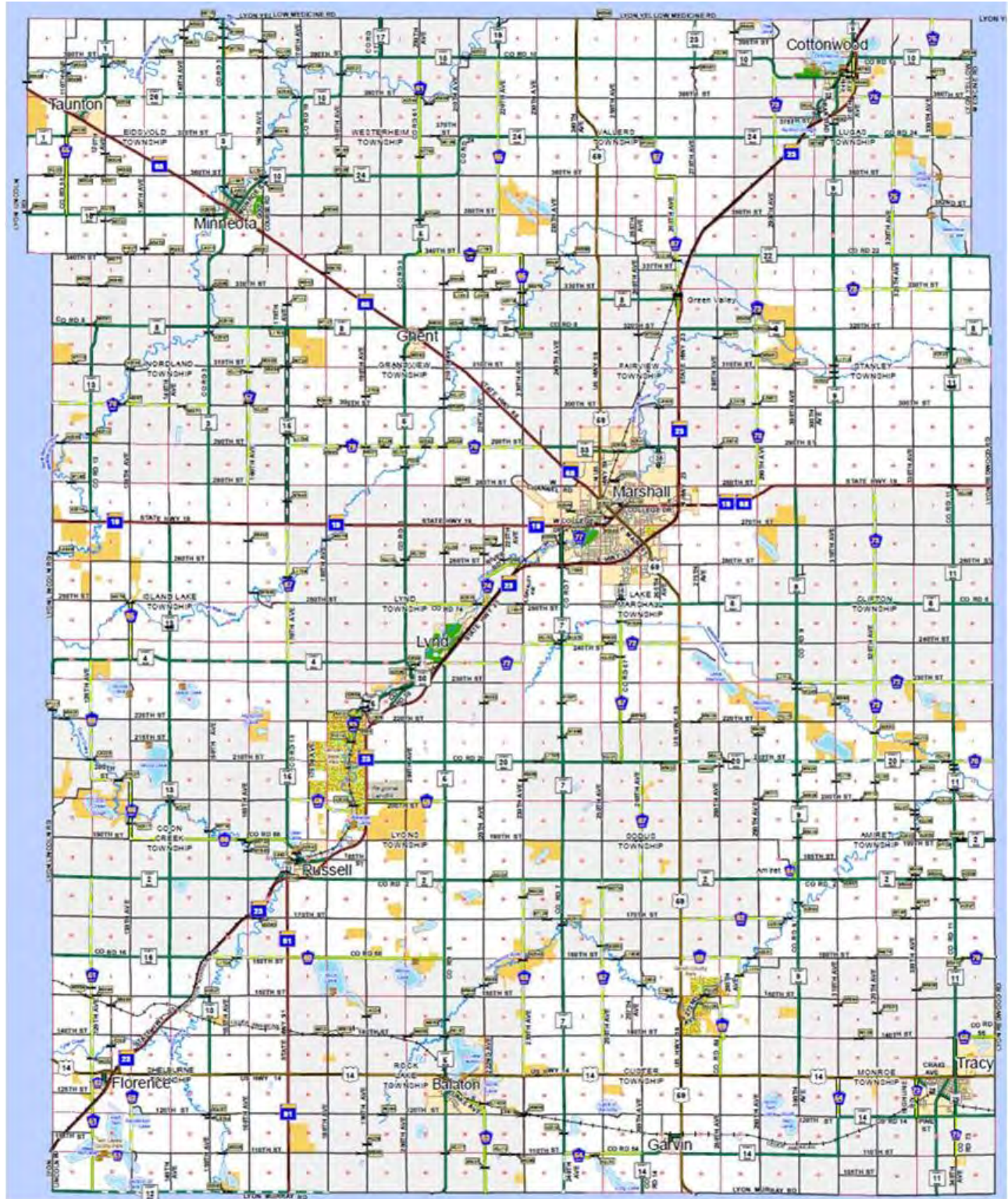
- Township Roads. Roads established and maintained by township boards or reverted back to township jurisdiction by the county board.
- City Streets. Any street/road in a municipality not otherwise designated.

Bridges

There are approximately 287 bridges on county, municipal, and township roadways within Lyon County. MnDOT lists 232 bridges in Lyon County on their inventory of bridges over 20 feet. Of the 287 bridges, 133 bridges intersect with the mapped floodplain.

RA Figure #19

Road & Bridge Map - Lyon County



- US Highway
- State Highway
- County Road - Paved
- County Road - Gravel
- CSAH - Paved
- CSAH - Gravel
- Township Road
- Other Road
- Railroads

Railroads

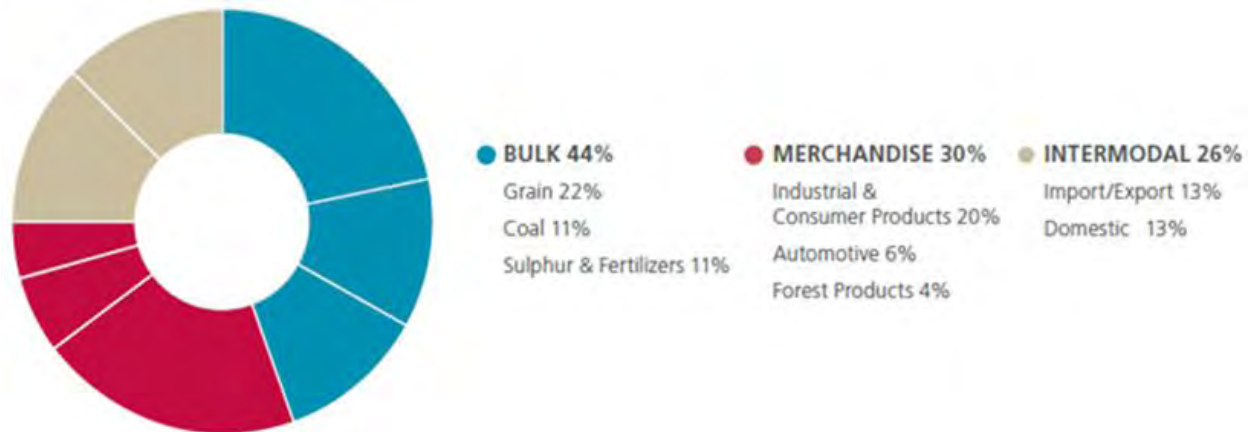
There are three railroads serving Lyon County, the Burlington Northern Santa Fe (BNSF) Railway, the Canadian Pacific, and the Rapid City, Pierre, and Eastern (RCPE) Railroad. The BNSF and the Canadian Pacific are Class I railroads. The RCPE is a Class II railroad. Class I railroads have operating revenues of 433.2 million or more. Class II railroads are regional with operating revenues under 433.2 million. These railroads are a critical element in Lyon County's transportation system.

The BNSF crosses Lyon County from the northeast to the southwest and has 1,584 miles of track in Minnesota. Agricultural products account for the majority of rail commodities shipped in the region, including grain, farm and chemical products. BNSF also hauls significant amounts of coal into the state and increasing amounts of crude oil. The Marshall Subdivision, running from Willmar to the Iowa Border paralleling TH 23, sees about 14 trains a day, according to a technical memorandum for the MnDOT Statewide Rail Plan. There are numerous rail crossings close to TH 23, often at skewed angles which make clear views difficult.

The Canadian Pacific and the RCPE railroads cross Lyon County from the east to west parallel to US Hwy 14. The Canadian Pacific interchanges with the RCPE just west of the City of Tracy. "Canadian Pacific Railroad Limited operates a 14,700-mile rail network linking the principal cities of Canada from Montreal to Vancouver, and the U.S. Midwest and Northeast."⁸³ Forty-four percent of Canadian Pacific Railroad Limited shipments include grain, coal, sulfur, and fertilizer. The RCPE primarily ships grain, bentonite clay, ethanol, fertilizer, cement and other products.⁸⁴

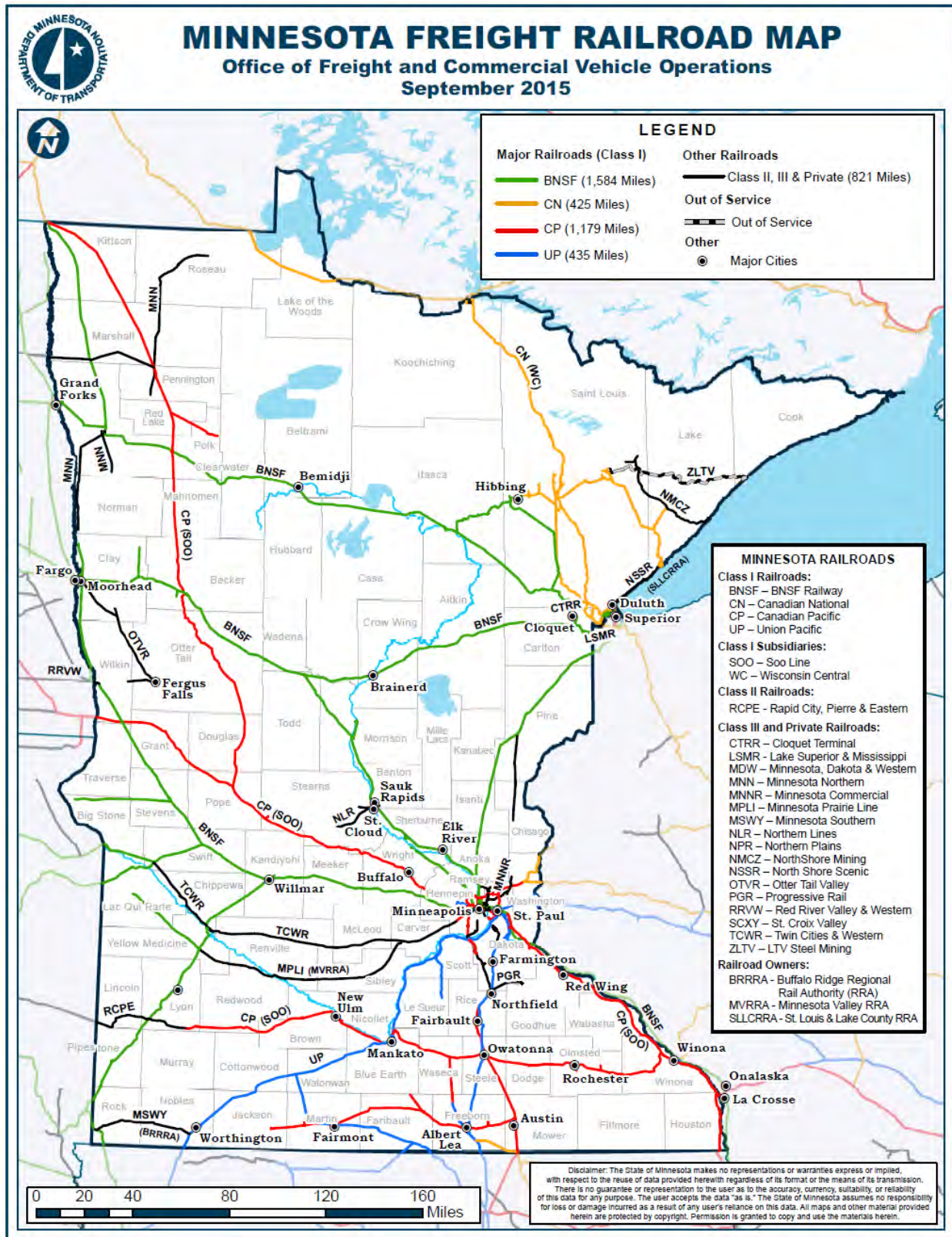
RA Figure #20

Canadian Pacific Freight Overview



⁸³ Canadian Pacific Railroad Limited. Accessed: 9/14/15. Available: <http://www.cpr.ca/en>

⁸⁴ Rapid City, Pierre & Eastern Railroad. Accessed: 2/19/16. Available: https://www.gwrr.com/operations/railroads/north_america/rapid-city-pierre--eastern-railroad



Air Transportation

There are two municipal airports in Lyon County, the Southwest Minnesota Regional Airport-Marshall (Ryan Field) and the Tracy Municipal Airport. The Southwest Minnesota Regional Airport-Marshall is a modern municipal airport that features a 7,220' primary runway to handle corporate/commercial aircraft. There is also a 4,000' crosswind runway.⁸⁵ The airport has charter flights available.

The Tracy Municipal Airport is a general aviation airport located northeast of the city. The airport features two active runways. Runway (8/26) is aligned east/west and features a 3,438' by 75' runway. Runway (12/30) is aligned northwest/southeast and features a 4,001' by 75' runway. Both airports offer hanger rentals, tie-downs, as well as aviation and jet fuel sales.

The cities of Marshall and Tracy have adopted Airport Zoning regulations to protect adjacent land use from conflicts with airport traffic. MnDOT also reviews applications within a certain distance of an airport to reduce the chance of future use conflicts.

Extent of the Hazard

Rails, landing strips, and other transportation infrastructure are monitored, inspected, and maintained to ensure people and goods are transported safely. The potential severity of transportation infrastructure is substantial according to the planning team. There are a number of variables that impact safety that vary from current weather condition and design to age and upkeep. Driving and planning for the conditions are important to ensure safety.

One issue that affects road conditions is winter weather. Ice and snow can build up on the road and can cause hazardous driving conditions. Due to the prevailing wind patterns in the area, east-west roads are more susceptible to ice and snow affecting the road surface. Road crews are responsible for maintaining the roadway, clearing snow, and salting for ice. It is also the responsibility of the driver to take the road conditions into consideration and drive appropriately. Winter weather is just one variable that impacts road conditions. There are a number of other variables that impact road conditions.

Traffic crashes are the primary hazard to people and property related to transportation infrastructure. The potential severity of transportation crashes is substantial according to the planning team. The Minnesota Department of Transportation (MnDOT) and Minnesota Department of Public Safety (DPS) developed a *Comprehensive Highway Safety Plan* in 2004. The plan was intended to examine the underlying causes of traffic deaths and serious injuries, determine strategies to mitigate those causes, and implement the most promising strategies in the "Toward Zero Deaths" program. The Toward Zero Death program continues today.

⁸⁵ Southwest Minnesota Regional Airport-Marshall. Accessed: 2/26/16. Available: <http://ci.marshall.mn.us/main/index.php/public-works/airport>

Minnesota Comprehensive Strategic Highway Safety Plan (CHSP) study for Area Transportation Partnership (ATP) 7 found the most frequent crash types and contributing factors included:⁸⁶

- Impaired Driving
- Safety Belt Usage
- Young Drivers
- Aggressive Drivers
- Lane Departures
- Intersections
- Driver Safety Awareness
- Data Information Systems

These variables along with transportation infrastructure conditions and design can impact the severity of crash or incident. The condition can be a variable that is assumed to be safe, as in the 35W bridge collapse. Bridges are classified as “structurally deficient” if they have a general (poor) condition rating for the deck, superstructure, substructure, or culvert or if the road approaches regularly overtop due to flooding. The fact that a bridge is structurally deficient does not imply that it is unsafe. If a bridge has been identified as unsafe during a physical inspection, the structure will be closed.

There are approximately 287 bridges on county, municipal, and township roadways within Lyon County. These bridges are inspected and a grade of the bridge is given. This helps to ensure the safety of crossing using a bridge. There are 14 bridges in Lyon County that have been identified as structurally deficient, January 1, 2015.⁸⁷ In Minnesota, 9.1 percent of bridges are structurally deficient in 2012.⁸⁸

Railroad crossing pose a serious risk for motor vehicles passing over the tracks. Railroad crossings are marked and a number have crossing arms, but according to MnDOT, the chance of death or serious injury from a vehicle and train crash is 11 times greater than other traffic collisions.⁸⁹ Since there is an increased risk of crossing, additional measures should be taken to ensure the safety of the crossing.

Relationship to Other Hazards—Cascading Effects

- Hazardous Materials. Dangerous roadways can lead to an accident and hazardous materials being spilt. This spill can result in ground water contamination, dangerous chemicals going into the air, and dangerous fire scenarios. If a fuel tanker is involved in the crash, the fire would be extremely hot and the fire would burn until the right equipment can be brought in to control the fire.
- Emergency Response. Dangerous roadways can make emergency response difficult.

⁸⁶ MnDOT. Accessed: 5/29/13. Available: <http://www.dot.state.mn.us/trafficeng/safety/shsp/>

⁸⁷ Lyon County Highway Department Information request. Received: 1/26/16.

⁸⁸ Governing. Local Bridges in Bad Shape. Accessed: 2/18/16. Available: <http://www.governing.com/topics/transportation-infrastructure/gov-local-state-government-owned-bridge-condition-disparity.html>

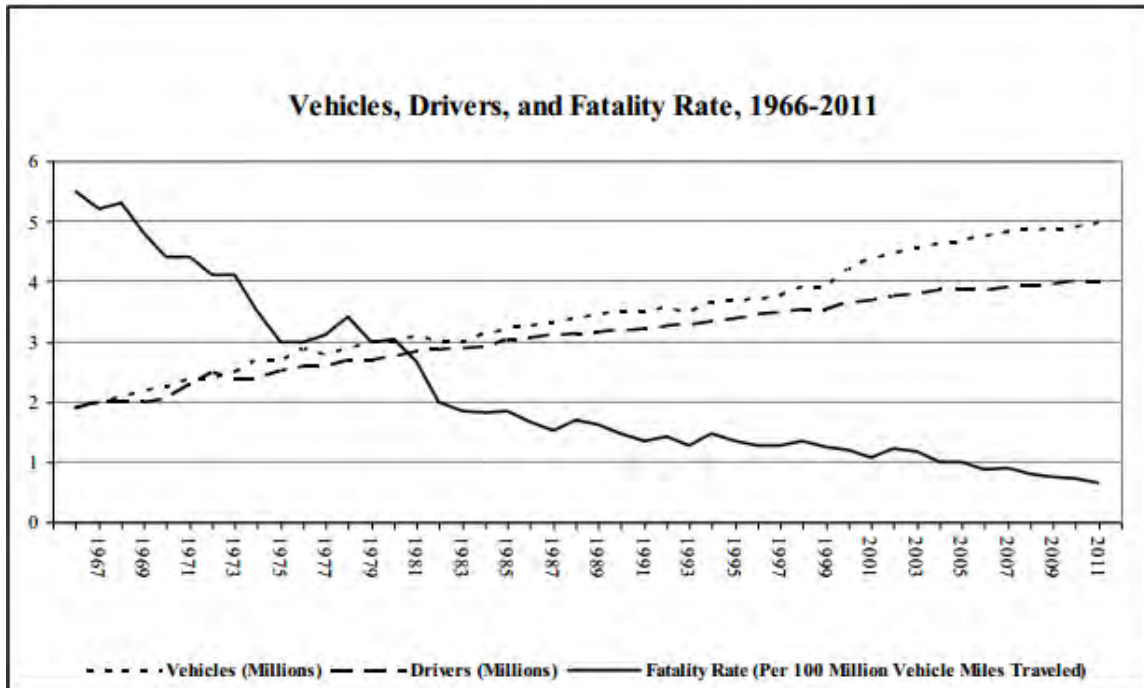
⁸⁹ MnDOT. Accessed: 2/18/16. Available: <http://www.dot.state.mn.us/ofrw/railroad/safety.html>

Previous Occurrences of the Hazard

Vehicle Crashes

Fatal crashes per million vehicle miles traveled have been on a steady decline since 1966 in Minnesota. According to Minnesota Department of Transportation (MnDOT), there were 23 traffic deaths in Lyon County from 2003 through July, 2014. “For all crashes, the driver behaviors police cite most often as contributing factors are, in order of frequency, driver inattention or distraction, failure to yield right of way, and illegal or unsafe speed.”⁹⁰ “Most crashes occur in good driving conditions. Over half of fatal crashes, and two-thirds of nonfatal crashes occurred during daylight hours”⁹¹

RA Figure #22 Driver Fatality Rate - Minnesota



Source: Minnesota Department of Public Safety

RA Table #31 Motor Vehicle Crashes & Fatalities - Lyon County

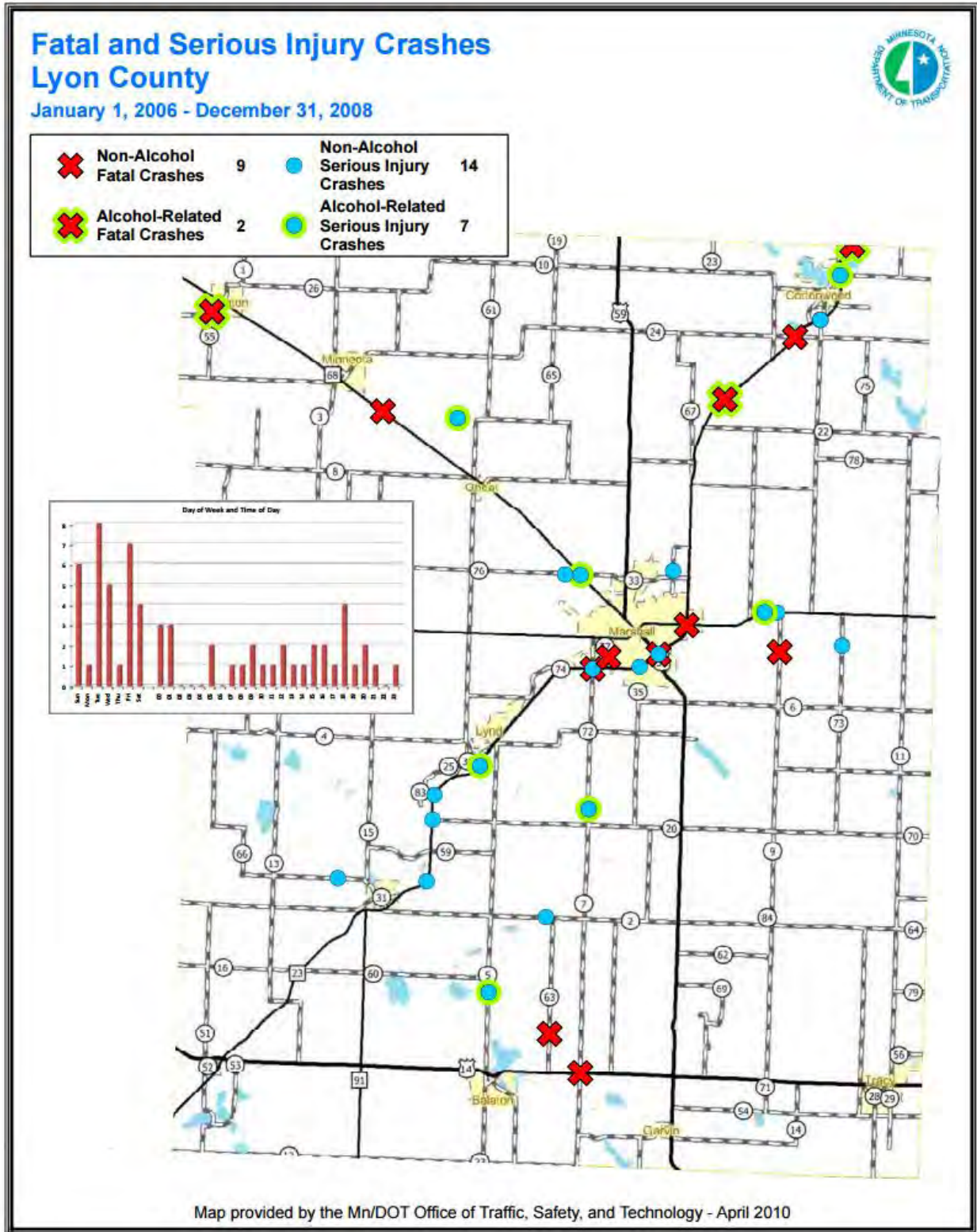
Year	Number of Crashes	Number of Fatal Crashes
April, 2013	33	0
2012	110	4
2011	156	3
2010	173	4
2009	139	1

⁹⁰ Minnesota Department of Public Safety. 2011. Accessed: 6/4/13. Available: <https://dps.mn.gov/divisions/ots/educational-materials/Documents/CRASH-FACTS-2011.pdf>

⁹¹ Minnesota Department of Public Safety. 2011. Accessed: 6/4/13. Available: <https://dps.mn.gov/divisions/ots/educational-materials/Documents/CRASH-FACTS-2011.pdf>

2008	172	3
2007	151	4
2006	175	1
2005	151	1
2004	199	2
2003	188	0

Source: MnDOT



Bridges

There have been no recent bridge related incidents, nor fatal rail or air-related incidences in Lyon County.

Railroads

There was one major train derailment in Lyon County. On Tuesday, July 27, 2004, there was a train derailment by the City of Balaton. Roughly 40,000 gallons of flammable ethanol spilled. Around 75 residents in a three block radius from the derailment were evacuated. No one was hurt, but trains carrying ethanol are a serious risk. Other transport trails also pose a serious risk, if a derailment occurs.

Probability of Future Events of this Hazard

Fatal crashes are more likely to occur in rural areas, which are defined as having a population of less than 5,000 people. In 2011, 67 percent of all fatal crashes in Minnesota occurred in rural areas.⁹² The potential frequency of a transportation crash is highly likely according to the planning team.

There are a number of variables that impact the likelihood of a crash from driver distraction to infrastructure failure. Distracted drivers are a definite threat to safety regarding other drivers, pedestrians, and bicyclists. Infrastructure failure, like a bridge collapsing, can also cause transportation crashes, but are less common. The potential frequency of a hazard involving transportation infrastructure is occasional according to the planning team.

Vulnerability

Transportation infrastructure is a basic component of government. Funding for transportation infrastructure should be maintained in every budget cycle, but funding previously allocated for transportation infrastructure has been used for other programs, like subsidizing ethanol and other programs in the general fund. This has resulted in less funding to maintain our transportation infrastructure. This decrease in funding makes maintaining and improving our transportation infrastructure more difficult. The risk level assigned to transportation crashes and transportation infrastructure by the planning team is average.

Plans and Programs

- Emergency Operations Plan – The Lyon County Emergency Operations Plan explains the procedures of evacuation during an emergency evacuation.
- Road authorities – The Lyon County High Department works closely with MnDOT to improve local transportation infrastructure. MnDOT encourages discussions to identify and improve locations where higher risk areas of conflict may exist and is interested in suggestions to improve safety. Public Roadways and other transportation infrastructure are inspected, monitored, and maintained to ensure safety.
- Safe Routes to School (SRTS) – Transportation projects around schools may be eligible for SRTS funding. These projects can be related to education, encouragement, enforcement, evaluation, and

⁹² MN Department of Safety. Data Request. Received 1/8/16.

engineering. Southwest Regional Development Commission Staff and MnDOT can discuss potential SRTS projects on request.

- Towards Zero Deaths (TZD) – Strategies for promoting safe driving are important facets to MnDOT’s TZD program. Many counties are forming local TZD coalitions involving schools, law enforcement, and other agencies. Representatives from Lyon County are encouraged to attend TZD meetings with MnDOT. Lyon County representatives can attend either in Mankato, or via video conference in Windom. Besides Education, the TZD program includes Engineering, Enforcement, and Emergency Services as the “4 – E’s” the program focuses on.
- Marshall Area Safe Committee – The committee is the Towards Zero Deaths committee in Lyon County.
- Safe and Sober – A Minnesota campaign under the umbrella of the Minnesota Department of Public Safety and the Office of Traffic Safety. The program is dedicated to reducing traffic related deaths and injuries.⁹³
- Traffic safety resources – Several publications, such as the National Cooperative Highway Research Program (NCHRP), are available to MnDOT to suggest options for improved safety for all users. Other technical guides exist to improve pedestrian safety and include: 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.
- Snow management – According to MnDOT, “Drift-free roads are achievable through two mitigation strategies, proper road design and/or the use of snow fences. A suitably designed roadway will promote snow deposition in ditches rather than on the roadway and blowing snow that does reach the road will move across without drifting. Snow fences can also help maintain clear roadways by capturing blowing snow upwind of a problem area and storing that snow over the winter season.”⁹⁴
- Living snow fences – Lyon County in partnership with the Extension Service and the Board of Soil and Water Conservation continues to explore the use of and reimbursement of natural snow fences to protect highways against drifting snow
- National Bridge Inventory System – Bridges or culverts that carry vehicular traffic and are longer than 20 feet are part of the National Bridge Inventory System. In Minnesota, bridges 10 feet or longer are inspected and inventoried. The general condition rating ranges from 0 (failed condition) to 9 (excellent) based on the physical condition of the deck (riding surface), the superstructure (load carrying members such as beams or trusses that support the driving surface), and substructures (abutments and piers).
- Lyon County Transportation Safety Plan – the Lyon County Highway Department develops a transportation safety plan to identify higher risk intersections and other transportation related safety concerns. Higher risk intersections are identified by the number of crashes and local knowledge by the Lyon County Highway Department and local law enforcement.

⁹³ DMV. Accessed 10/15/13. Available:

⁹⁴ MNDOT. Accessed: 5/29/13. Available: <http://www.dot.state.mn.us/environment/livingsnowfence/design.html>

- Comprehensive Plan – the City of Marshall has a Comprehensive Plan, which contains a chapter on transportation. Transportation goals are outlined in the plan to mitigate transportation related issues.
- ADA Accessibility – Southwest Minnesota State University (SMSU) promotes ADA accessibility as a tool to attract students. As a result, SMSU has a higher number of persons who require ADA accommodations.

Gaps and Deficiencies

- Transportation Funding – As funding has declined the condition of the transportation infrastructure has also declined
- High commuting numbers – Many people in Lyon County commute to work, which increases exposure to transportation hazards. The population of Marshall doubles during the work day.
- Road width limitations – A narrow road can cause difficulties when trying to improve safety. If a road is too narrow there is not room to add rumble strips and a safe place to pull over in case of an emergency. Rumble strips alert drivers that they are leaving the travel lane.
- Train derailment – Train derailments have occurred in Lyon County. As the number of trains increase the likelihood of a derailment causing injury, death, and property damage goes up.
- Hazard materials transport – Hazard materials are being shipped on BNSF trains roughly twice a week through Lyon County. This includes hazard materials as well as Bakken Oil.
- Southwest Minnesota Regional Airport-Marshall – There has been limited training with the Marshall Fire Department regarding emergency response at the Marshall Regional Airport.

Existing Mitigation Measures

- There are a number of regional assets that are shared throughout southwest Minnesota in Emergency Management Region Five. Primary among these shared assets is the Minnesota Emergency Response and Industrial Training (MERIT) Center located in Marshall. The MERIT Center provides training opportunities for local and regional emergency responders for a wide variety of situations, including hazardous materials spills, tanker spills and renewable energy related disasters.

B6 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. Utility failure was assigned a hazard rank of moderate by the planning team.

Locations Affected by the Hazard

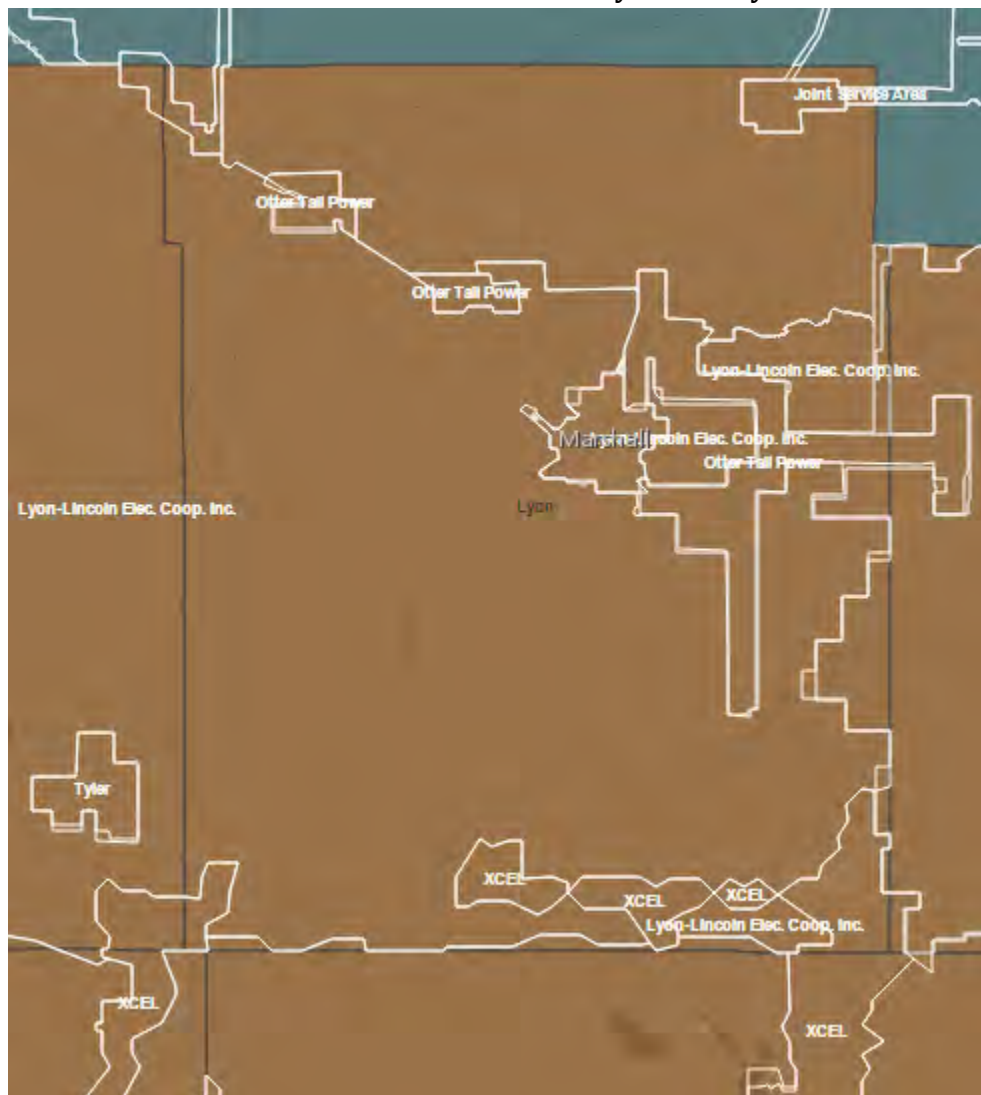
The majority of Lyon County residents is connected to and relies on one or more of these systems: power grid, water treatment system, and waste water treatment system. A small percentage of residents have personal backup generator, personal wells, and septic tanks. In the event of a major utility failure, the majority of Lyon County residents will be affected by the event. The planning team identified the spatial extent of utility failure as local.

There are five main electric utilities in Lyon County. The main electric utilities include: Xcel, Otter Tail Power, Marshall Municipal Utilities, Minnesota Valley Cooperative Light and Power, and Lyon-Lincoln Electric. Refer to RA Figure #24 for electric utility service area map.

Xcel Energy (formerly Northern States Power Co.) provides electrical service to the cities of Balaton, Cottonwood, Florence, Garvin, and Tracy. Otter Tail Power provides electrical service to the cities of Ghent, Minnesota and Taunton, (and Amiret, Dudley, and Green Valley). These two investor-owned utilities also serve some residents along distribution lines between cities.

Marshall Municipal Utilities provides electrical service within the city of Marshall. Minnesota Valley Co-Op Light & Power serves the northern townships, generally north of TH 68 and the city of Marshall. Lyon-Lincoln Electric Cooperative provides rural electric service to most of the rest of the county, as well as the cities of Russell and Lynd. There are a few service lines from neighboring rural electric co-ops (Nobles REC and Redwood REC) along the county lines.

RA Figure #24 **Electric Utilities – Lyon County**



Extent of the Hazard

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. The potential severity of utility failure is substantial according to the planning team.

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.

Previous Occurrences of the Hazard

Lyon 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.

Ice storm can also cause power outages that last for multiple days. In the spring of 2013, an ice storm hit Lyon County 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 Lyon County residents were without power.

RA Figure #25

Downed Powerlines



Associated Press

Probability of Future Events of this Hazard

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. The potential frequency of a large scale utility failure is occasional according to the planning team.

Vulnerability

There are miles of power lines in Lyon 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 Lyon County that are most likely to experience damage to power lines from falling tree limbs. Lyon County works with each of its communities to ensure that these activities are conducted regularly.
- 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 – The Marshall High School 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 – The City of Marshall recently completed a twenty-seven mile pipeline project to bring water into the City from a well filed located in Yellow Medicine County. It is anticipated that this project will meet the needs of the City for the foreseeable future including planning for any growth.
- Red Rock Rural Water is expanding to the southwest section of Lyon County. This expansion will provide a more reliable water supply in this area.
- Mutual Aid Agreement – Federated Rural Electric Association has mutual aid agreements with neighboring electric utilities to provide support in case of a large scale outage.
- Federated Rural Electric – 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 man-made 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: Cottonwood, Ghent, Marshall, Minneota, and Russell.

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. Refer to RA Table #8 for a list of facilities that need new or additional backup generators.
- Cell phone coverage – Cell phone reception in Lynd and other rural areas in Lyon 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 Lyon 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 Lyon 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.

Existing Mitigation Measures

- 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.

B7 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.⁹⁵ Water supply contamination can be the result of mismanaged landfills and dumps, negative externalities of industrial activity, and agricultural run-off. Water supply contamination was assigned a hazard rank of moderate by the planning team.

Locations Affected by the Hazard

All of Lyon County is equally at risk of water supply contamination. The planning team identified the spatial extent of water supply contamination as local. Lyon County does not have an overabundance of high quality groundwater. Groundwater is generally drawn from three aquifers in Lyon County that include: the unconsolidated glacial-drift deposits, the Sioux Quartzite, and the Cretaceous bedrock aquifer. 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 Lyon County have different risk factors in regards to certain contaminates, but there is equal risk throughout the county for water contamination.

⁹⁵ EPA. Accessed 6/3/13. Available: <http://www.epa.gov/agriculture/tsur.html>

RA Table #32

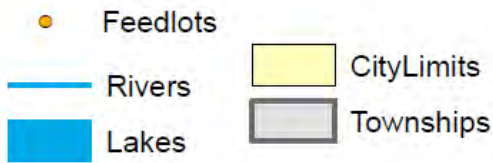
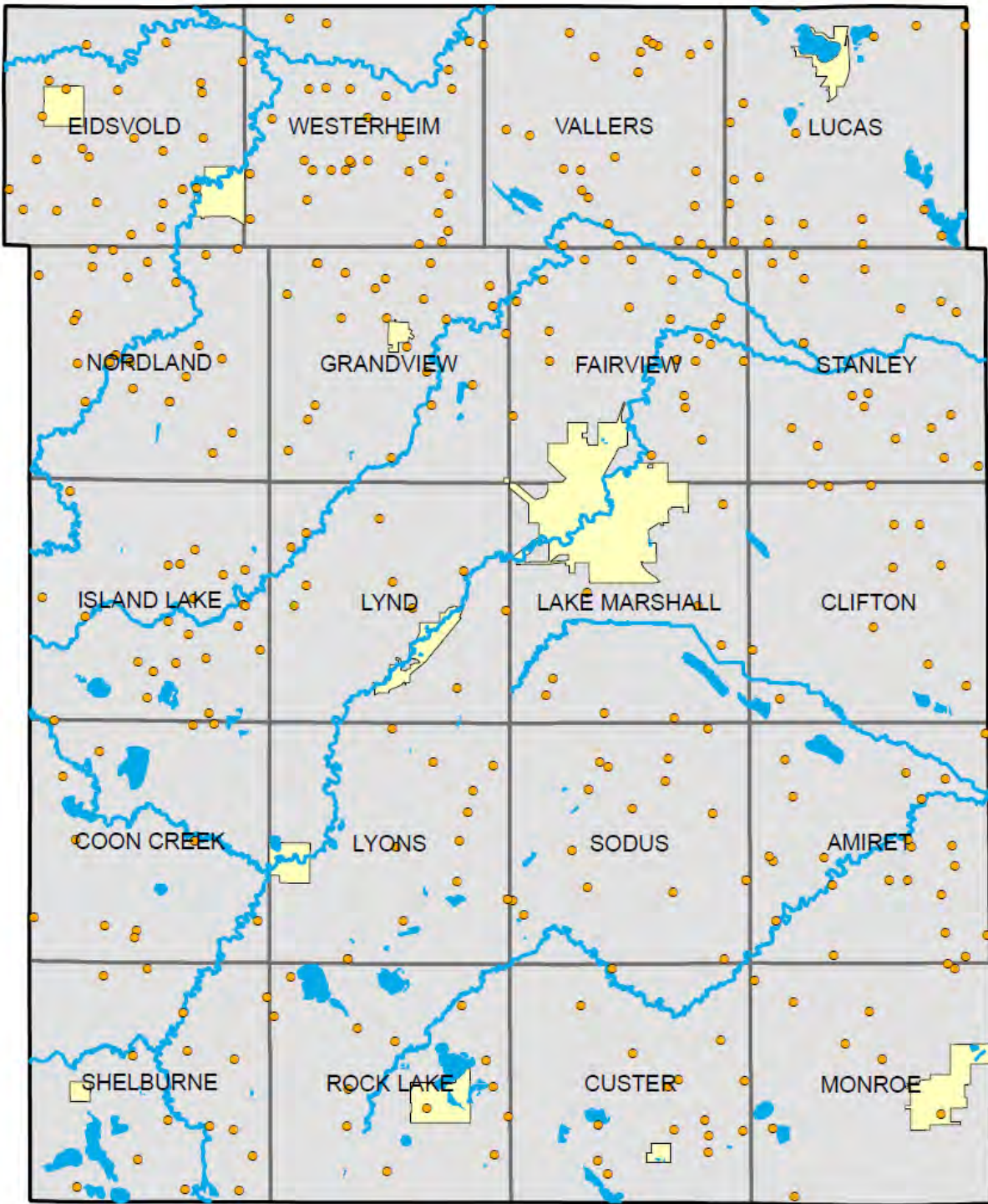
Public Water Supplies – Lyon County

Public Water Supply Name	ID	Surface / Ground Water Assessment	Address	City
Balaton	1420001	<u>GW</u>	City Hall	Balaton
CHS-Marshall	5420028	<u>GW</u>	2712 County Road 6	Marshall
Camden State Park	5420143	<u>GW</u>	1897 County Road 6	Lynd
Cottonwood	1420002	<u>GW</u>		Cottonwood
Evangelical Free Lutheran Church	5420026	<u>GW</u>	2667 County Road 7	Marshall
Fairview Township Water Association	1420012	Purchased Water	NA	Green Valley
Florence	1420003	Purchased Water	NA	Florence
Garvin	1420011	Purchased Water	NA	Garvin
Garvin Park	5420130	<u>GW</u>	2782 – 150th Street	Garvin
Ghent	1420004	Purchased Water	County Road 8	Ghent
Kingdom Hall of Jehovah's Witnesses	5420145	<u>GW</u>	2865 – 269th Avenue	Marshall
Lynd	1420005	Purchased Water <u>GW</u>	201 North River	Lynd
Marshall	1420006	<u>GW</u>	1501 Travis Road	Marshall
Minneota	1420007	Purchased Water <u>GW</u>	129 East First Street	Minneota
Russell	1420008	Purchased	NA	Russell

		Water		
Taunton	1420009	Purchased Water <u>GW</u>	NA	Taunton
Tracy	1420010	<u>GW</u>	Morgan Street	Tracy

RA Figure #26

Feedlot Map - Lyon County

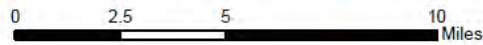
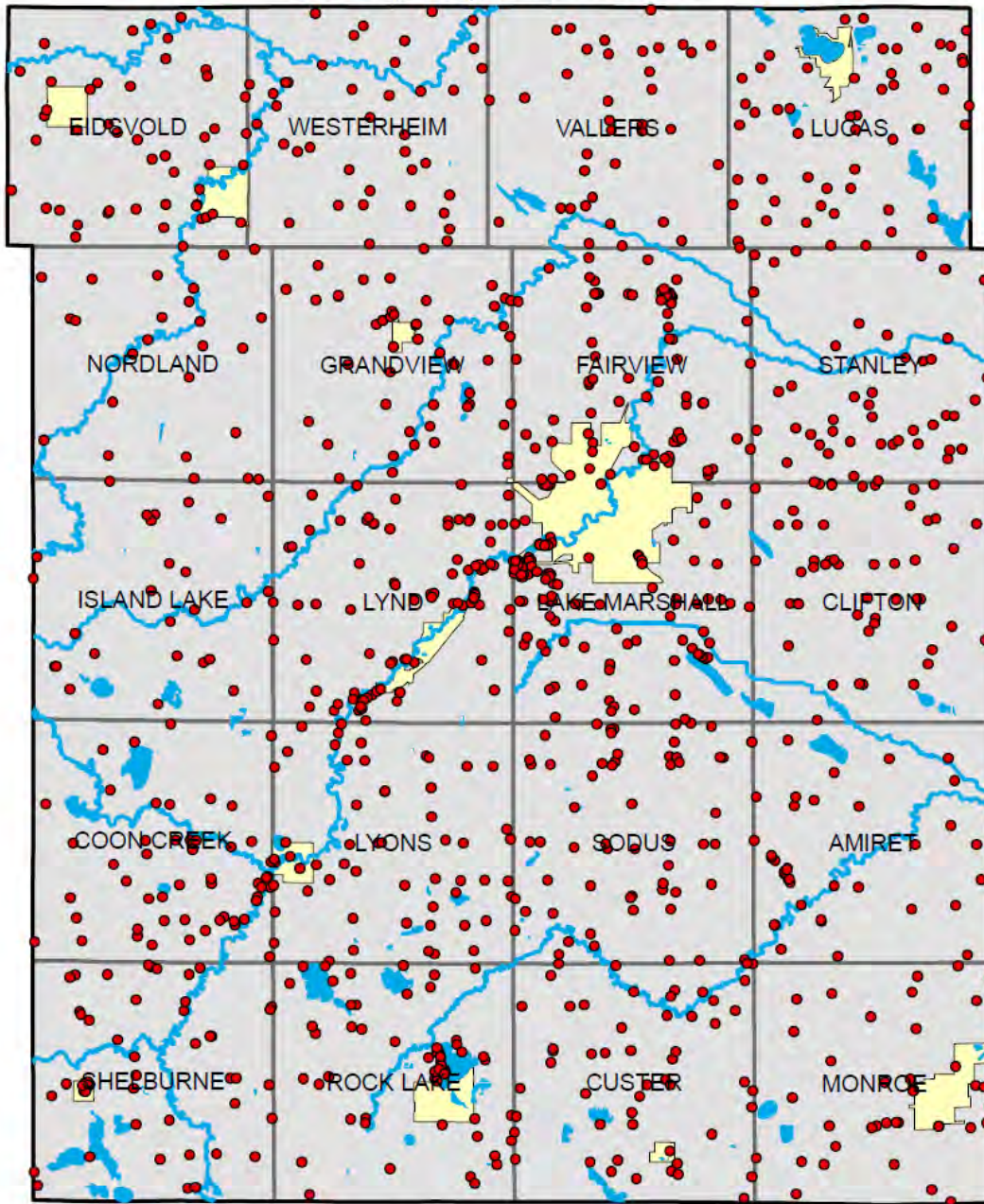


RA Figure #27

Septic Systems - Lyon County



Lyon County
New Septic Systems 1995-2011



● Septics		1995 - 63	1999 - 76	2003 - 73	2007 - 53	
— Rivers	■ City Limits	1996 - 65	2000 - 78	2004 - 60	2008 - 56	
■ Lakes	■ Townships	1997 - 68	2001 - 79	2005 - 65	2009 - 46	2011 - 47
		1998 - 83	2002 - 77	2006 - 60	2010 - 49	

Extent of the Hazard

A major contamination could cause massive disruption to Lyon 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 Lyon County unused until contaminants are removed from the water supply. The potential severity of water supply contamination is major according to the planning team.

Relationship to Other Hazards—Cascading Effects

- **Public Health Emergency.** Since Lyon County has a shallower well system, the county is 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.

Previous Occurrences of the Hazard

Lyon County has not had a major groundwater contamination problem.

Probability of Future Events of this Hazard

Lyon County is at a greater risk of water supply contamination since the county is tapped into shallower aquifers, but no major groundwater contamination has occurred. The potential frequency of a water supply contamination is occasional according to the planning team. A number of regulations and monitoring procedures are in place to help maintain a quality water supply. Refer to the Plans and Programs section under Vulnerability for more measures to keep ground water supplies safe.

Vulnerability

Lyon County relies on shallower aquifers since the water quality is better than deeper aquifers. 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. The risk level assigned to water supply contamination by the planning team is average.

Plans and Programs

- **Yellow Medicine Watershed Plan** – The Yellow Medicine Watershed 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 Lyon 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** – Several municipalities in Lyon County have set up a wellhead protection program, as promoted by the Minnesota Department of Health. All incorporated

communities in Lyon County will eventually be developing wellhead protection plans. Since 1974, all water wells constructed in Minnesota must meet the location and construction requirements of the Minnesota Well Code. These requirements pertain to private wells, also. Refer to Appendix A for a handout regarding wellhead protection.

- Abandoned Well Sealing Program – Lyon County has a cost share program for sealing abandoned wells. This program is part of the Local Water Management Plan.
- Feedlot pollution prevention – Lyon 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.
- 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 Lyon County continually works with MPCA towards updating failing septic systems.
- Septic System Code – Lyon County enforces the state code for septic systems and floodplain ordinances.
- Household Hazardous Waste Program (HHW) – The Lyon County’s HHW program, helps residents with the disposal of toxic household products and provides an exchange program for usable leftover products.⁹⁶
- 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 Lyon County wastewater facilities are certified operators under state requirements. These operators are required to take state training to maintain their certified operator status.
- 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 Lyon 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

⁹⁶ Lyon County Local Household Hazardous Waste Facility. Accessed: 11/21/14. Available: http://www.co.jackson.mn.us/index.asp?SEC=56F425CF-9D81-411C-880E-DAEA5A5DF9C1&DE=893BD2B8-B631-43BC-9B31-07757B4B44F8&Type=B_BASIC

supplies are safe. Also, the EPA requires all local suppliers to promptly inform the public should the supply become contaminated.

- Shoreline zoning – Lyon 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 Lyon 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 Lyon 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 Lyon County work to reduce Infiltration and Inflow in their sanitary sewer systems.
- Sediment ponds – The Lyon County Highway Department works with the DNR and other organizations to increase the number of sedimentation ponds along roadways in Lyon 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.

Gaps and Deficiencies

- Backup drinking water sources – The Lyon 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.
- Public outreach for wellhead protection – Efforts to educate private well owners on the importance of wellhead protection plans are not well planned and coordinated with state and federal efforts.
- Septic system inspection – Lyon 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 – Lyon County does not have estimated annual recharge rates, but there is a robust mounting of heavy water users and wells. The Marshall South Wellfields have seen a roughly 50 percent decline in available water supply. The well monitoring site by Camden State Park has also seen a steady decline in the availability of the water supply.
- Sump pump public education – The general public may be unaware that sump pumps cannot drain into the city wastewater system.

- Wellhead protection plans -All cities do not have Wellhead Protection Plans. The Cities of Balaton and Marshall have wellhead protection plan. The Cities of Cottonwood and Tracy do not have wellhead protection plans, but are planning to have one developed by the Minnesota Department of Health within the next five years. All of the other cities in Lyon County are served by rural water. Some of those cities do have backup wells, but MDH does not go through the Wellhead Protection Planning Process for backup wells. Lyon County currently does not have a wellhead protection program. Existing rural wells can provide a pathway for potential pollutants to reach the county's aquifers.
- Wellhead protection plan funding – The Minnesota Department of Health lacks resources to work with every community to complete wellhead protection plans quickly.
- 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.

Existing Mitigation Measures

- County zoning – Several steps are being taken to protect ground water sources from feedlot runoff. County ordinances require that all feedlots within Lyon 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.
- Inflow & Infiltration – All cities in Lyon County work to reduce inflow and infiltration in their sanitary sewer systems.
- 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.
- New Well – A new well was constructed by the City of Cottonwood for the City of Marshall. Marshall is a heavy water user, so a clean and reliable water supply is critical.

III Hazard Identification Worksheet

Methodology

The Hazard Identification Worksheet 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.

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

RA Table #33 Hazard Identification Worksheet – Planning Team

Hazard	Potential Frequency	Spatial Extent	Potential Severity	Warning Time	Risk Level	Hazard Rank
Ag Disease (animal or crop)	Occasional	Countywide	Major	12 - 24 hours	Average	Moderate
Blizzards, Winter Storms, and Extreme Cold Events	Highly Likely	Countywide	Major	12 - 24 hours	High	High
Drought	Likely	Countywide	Major	24+ hours	Average	Moderate
Earthquakes	Unlikely	Countywide	Minor	Minimal	Limited	Low
Flooding	Likely	Local	Minor	6 - 12 hours	High	Moderate
Fire—Wildfires	Occasional	Local	Minor	Minimal	Average	Moderate
Severe Summer Storms, Lightning and Hail, and Extreme Heat Event	Likely	Countywide	Major	6 - 12 hours	High	Moderate
Tornados and Straight-line Winds	Likely	Local	Major	Minimal	High	Moderate
Manmade Hazards						
Civil Disturbance and Terrorism	Occasional	Local	Substantial	Minimal	Average	Low
Dam Failure	Unlikely	Local	Major	6 - 12 hours	Average	Low
Fire—Structure Fires	Likely	Local	Substantial	Minimal	Average	Moderate
Hazardous Materials	Likely	Local	Substantial	Minimal	High	Moderate
Public Health Emergencies	Occasional	Countywide	Minor	12 - 24 hours	Average	Moderate
Transportation Crashes	Likely	Local	Substantial	Minimal	Average	Moderate
Transportation Infrastructure	Occasional	Local	Substantial	Minimal	Average	Moderate
Utility Failure	Occasional	Local	Substantial	Minimal	Average	Moderate
Water Supply Contamination	Occasional	Local	Major	6 - 12 hours	Average	Moderate
Hazard	Potential Frequency	Spatial Extent	Potential Severity	Warning Time	Risk Level	Hazard Rank
	<i>Highly Likely</i>		<i>Substantial</i>	<i>Minimal</i>	<i>Very High</i>	
	<i>Likely</i>	<i>Countywide</i>	<i>Major</i>	<i>6 - 12 hours</i>	<i>High</i>	<i>High</i>
	<i>Occasional</i>	<i>Local</i>	<i>Minor</i>	<i>12 - 24 hours</i>	<i>Average</i>	<i>Moderate</i>
	<i>Unlikely</i>		<i>Limited</i>	<i>24+ hours</i>	<i>Limited</i>	<i>Low</i>

RA Table #34

Hazard Identification Worksheet – Cities

Hazard	Potential Frequency	Spatial Extent	Potential Severity	Warning Time	Risk Level	Hazard Rank
Ag Disease (animal or crop)	Occasional	Countywide	Major	12 - 24 hours	Average	Moderate
Blizzards, Winter Storms, and Extreme Cold Events	Highly Likely	Countywide	Major	12 - 24 hours	High	High
Drought	Likely	Countywide	Major	24+ hours	Average	Moderate
Earthquakes	Unlikely	Countywide	Minor	Minimal	Limited	Low
Flooding	Likely	Local	Minor	6 - 12 hours	High	Moderate
Fire—Wildfires	Occasional	Local	Minor	Minimal	Average	Moderate
Severe Summer Storms, Lightning and Hail, and Extreme Heat Event	Likely	Countywide	Major	6 - 12 hours	High	Moderate
Tornados and Straight-line Winds	Likely	Local	Major	Minimal	High	Moderate
Manmade Hazards						
Civil Disturbance and Terrorism	Occasional	Local	Substantial	Minimal	Average	Low
Dam Failure	Unlikely	Local	Major	6 - 12 hours	Average	Low
Fire—Structure Fires	Likely	Local	Substantial	Minimal	Average	Moderate
Hazardous Materials	Likely	Local	Substantial	Minimal	High	Moderate
Public Health Emergencies	Occasional	Countywide	Minor	12 - 24 hours	Average	Moderate
Transportation Crashes	Likely	Local	Substantial	Minimal	Average	Moderate
Transportation Infrastructure	Occasional	Local	Substantial	Minimal	Average	Moderate
Utility Failure	Occasional	Local	Substantial	Minimal	Average	Moderate
Water Supply Contamination	Occasional	Local	Major	6 - 12 hours	Average	Moderate
Hazard	Potential Frequency	Spatial Extent	Potential Severity	Warning Time	Risk Level	Hazard Rank

<i>Highly Likely</i>			<i>Substantial</i>	<i>Minimal</i>	<i>Very High</i>	
<i>Likely</i>	<i>Countywide</i>		<i>Major</i>	<i>6 - 12 hours</i>	<i>High</i>	<i>High</i>
<i>Occasional</i>		<i>Local</i>	<i>Minor</i>	<i>12 - 24 hours</i>	<i>Average</i>	<i>Moderate</i>
<i>Unlikely</i>			<i>Limited</i>	<i>24+ hours</i>	<i>Limited</i>	<i>Low</i>

IV 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.

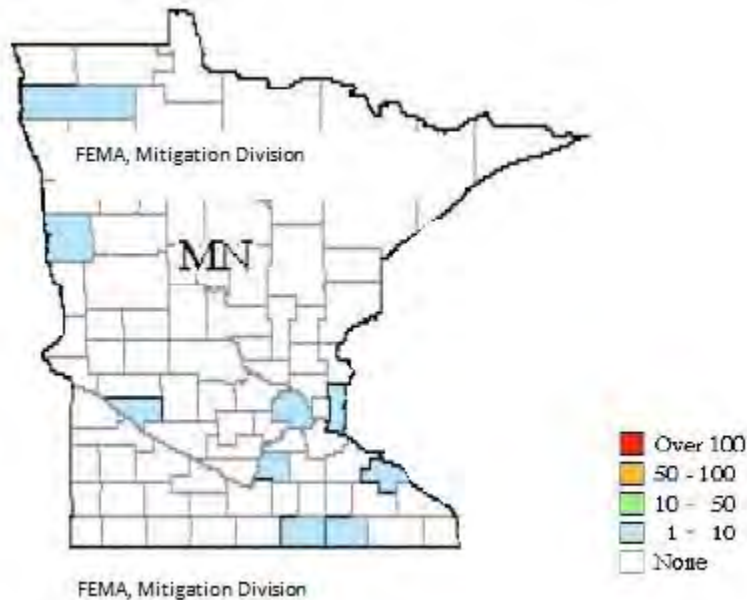
Based on this database, Lyon County does not have any repetitive loss structures identified. From January 1, 1978, through December 31, 2015, 57 total losses were reported in Lyon County; 1 was reported in Ghent, 43 were reported in Marshall, 2 were reported in Minneota, and 11 were reported in rural Lyon County.⁹⁷

**RA Table #34 Loss Statistics Flooding – Lyon County
January 1, 1978 – December 31, 2015**

Community Name	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
Ghent	1	1	0	0	\$434.19
Marshall	43	16	0	27	\$72,570.65
Minneota	2	2	0	0	\$3,953.16
Lyon County	11	16	0	2	\$72,412.41
Totals	57	35	0	29	\$149,370.41

FEMA: Loss Statistics

RA Figure #28 Counties with Repetitive Loss Properties



Severe Repetitive Loss Properties

As of June 2013, there were no Severe Repetitive Loss properties in Lyon County.⁹⁸

⁹⁷ FEMA. Loss Statistics. Accessed: 2/26/16. Available: <http://bsa.nfipstat.fema.gov/reports/1040.htm>

⁹⁸ FEMA, Date Request. Received 6/4/13.

V Analyzing Development Trends

Land Use and Development Trends

Lyon County is a rural county with urban growth in the City of Marshall. There are 412,896 acres in farm production in Lyon County.⁹⁹ Agriculture and food processing are two primary business categories in Lyon County.

A large percentage of tillable land in Lyon 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.

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 Lyon County. These flood plain areas are along the Redwood River, Cottonwood River, and multiple streams and creeks. Roughly 1,450 parcels are intersected by the one percent Annual Flood Chance (100-year floodplain). Refer to the subsection under Flooding, Location Affected by the Hazard, on page 96 for 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 A5 Fires for more information related to wind turbines ethanol plants, and biofuel fires.

A combination of conservation and planning has helped Lyon County maintain safe and efficient development. Lyon 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 Lyon County.

⁹⁹ USDA Census 2012. Accessed: 3/15/16. Available:
http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Minnesota/st27_2_001_001.pdf

CHAPTER 6: EMERGENCY RESPONSE PROFILE

I 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 Lyon County residents. The existing facilities, equipment, and staff in Lyon 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. Lyon 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 Lyon County. This Chapter profiles the emergency response capabilities of Lyon County. Facilities included in the profile include:

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

Lyon County Emergency Management

The Lyon County Emergency Management Director administers the county-wide emergency management program in Lyon County. The Director coordinates the emergency management functions of county and city governmental units assigned to various 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 Lyon County Emergency Management Planning Advisory Commission (EMPAC)
- Works with the EMPAC to develop and maintain the Lyon 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

RA Figure #29a

Public Facilities Map - Lyon County

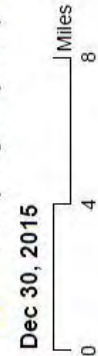
Lyon County Public Facilities

Legend

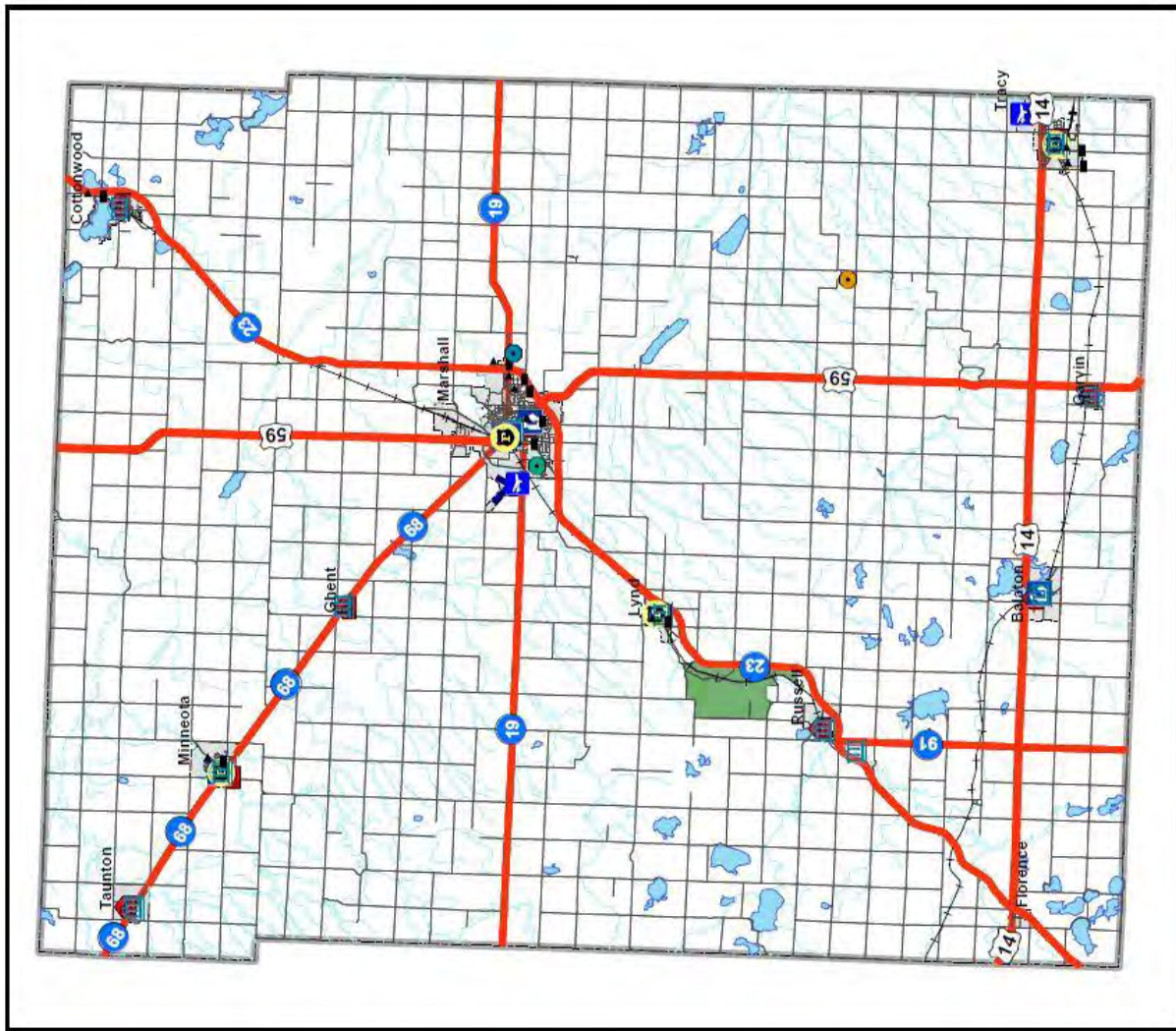
- Road
- Runways
- Railroad
- Trunk Highway
- River and Stream
- Lake
- State Park
- Cities
- Lyon County

Public Facility

- Airport
- School
- Library
- Fairground
- City Hall
- Firehalls
- Courthouse
- MnDOT Office
- Law Enforcement
- County Highway Shop



Dec 30, 2015



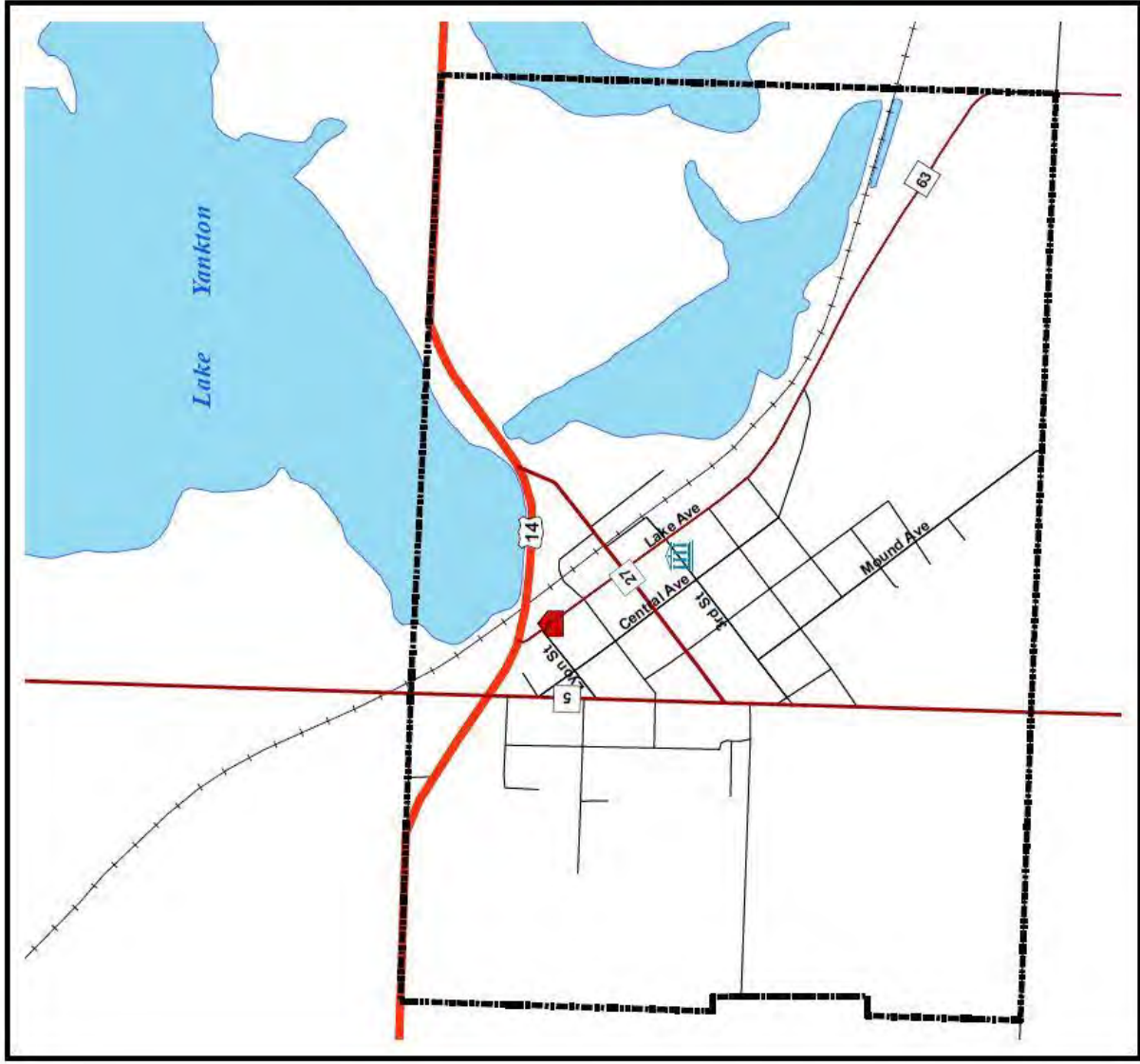
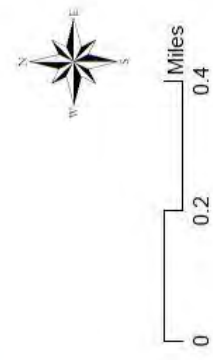
Balaton City Public Facilities

Legend

- Road
- Railroad
- County Road
- CSAH
- Trunk Highway
- Balaton City Boundary

Public Facility

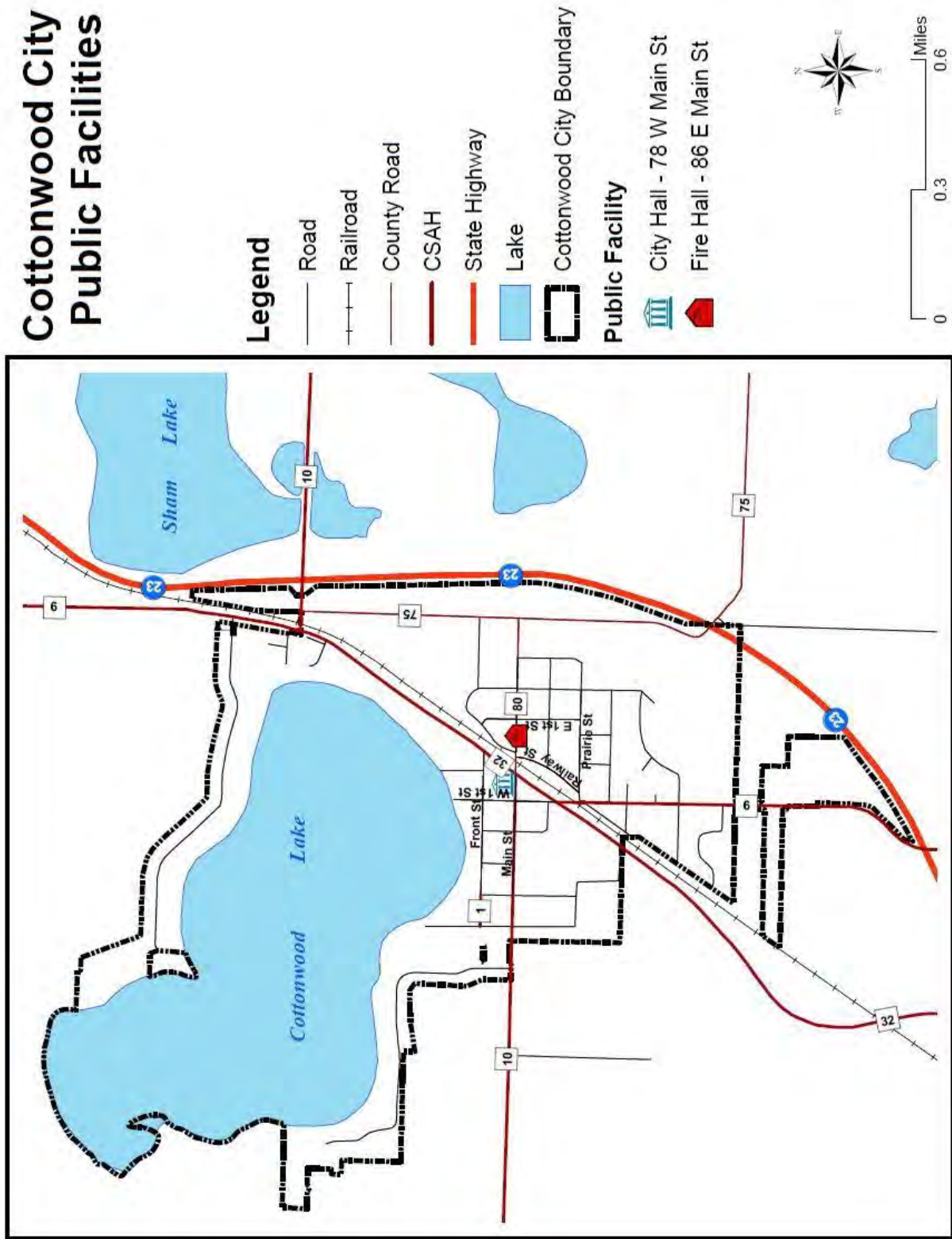
- Balaton City Hall & Library
-134 3rd St
- Fire Hall -154 Lake Ave



RA Figure #29c

Public Facilities Map - Cottonwood

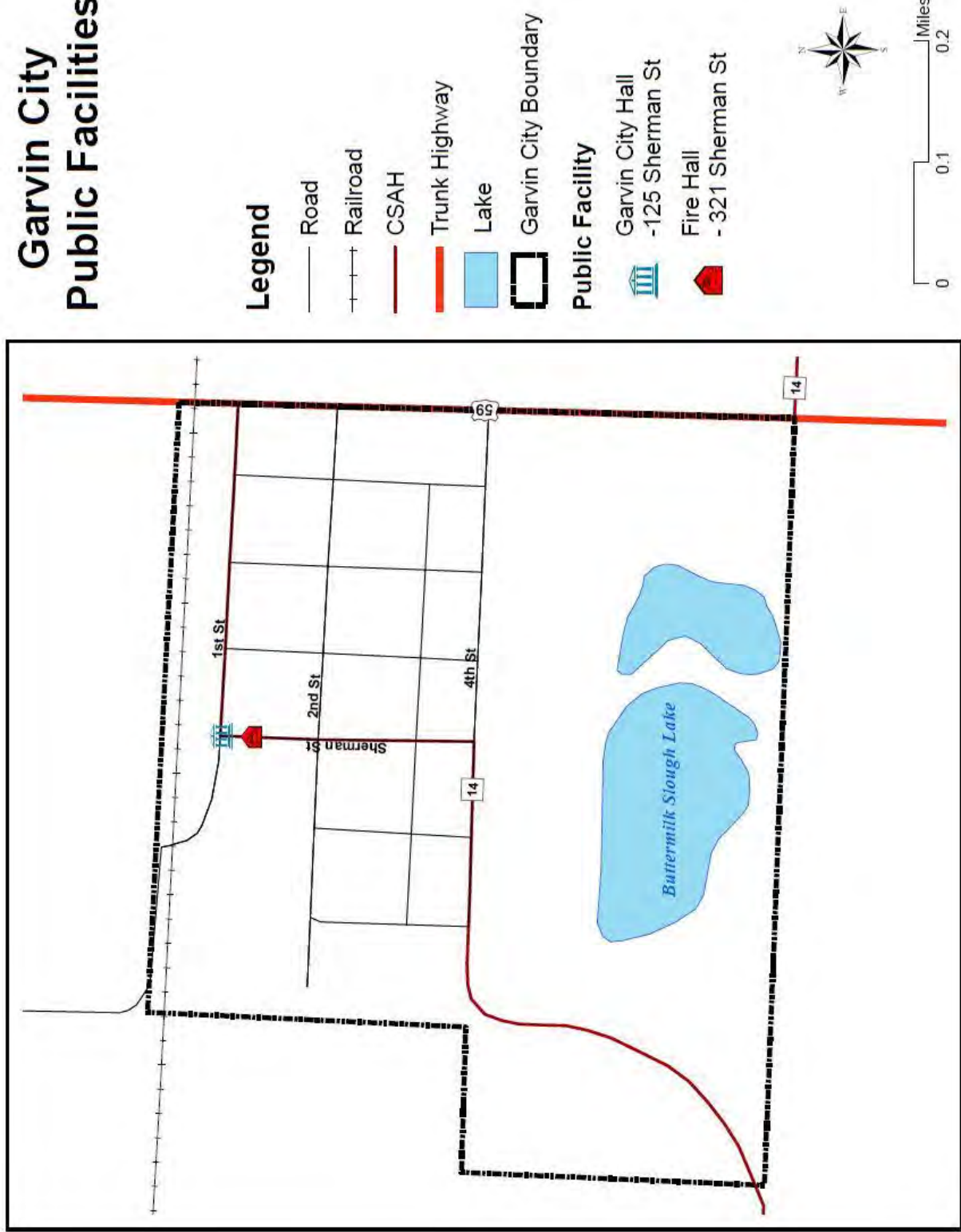
Cottonwood City Public Facilities



Florence City Public Facilities



Garvin City Public Facilities









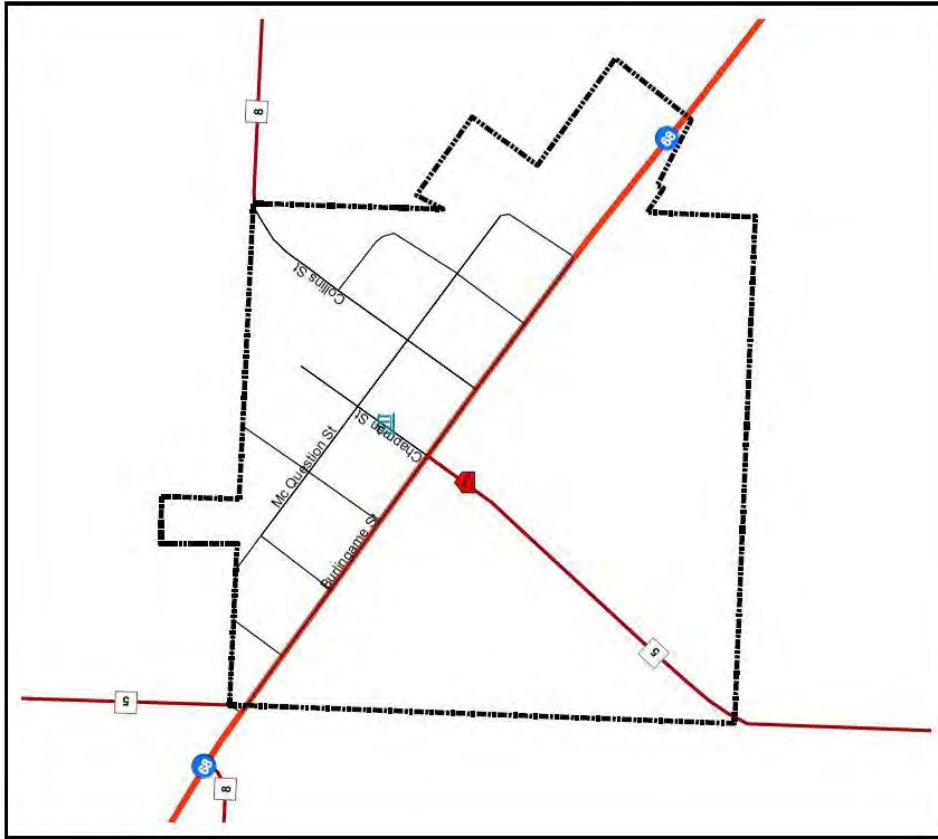
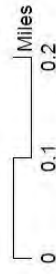
RA Figure #29f

Public Facilities Map - Ghent

Ghent City Public Facilities

Legend

-  Road
 -  CSAH
 -  State Highway
 -  Ghent City Boundary
- ## Public Facilities
-  City Hall - 107 N Chapman St
 -  Fire Hall - 105 S Chapman St

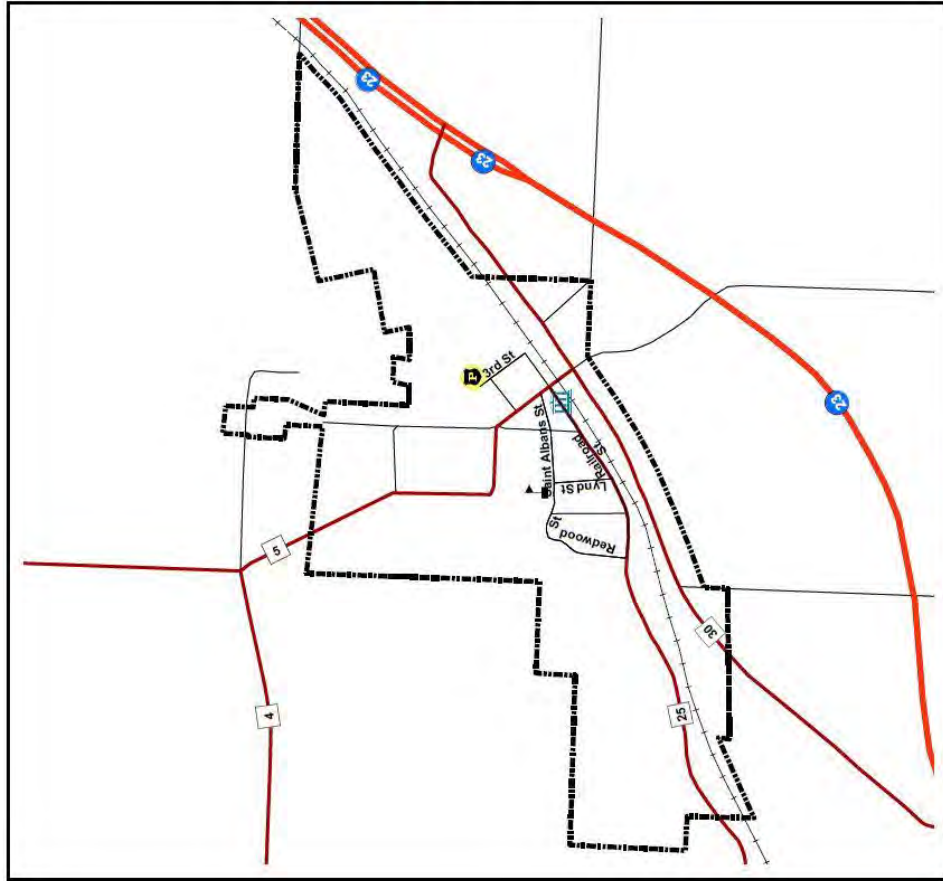
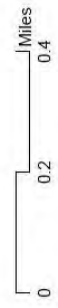


RA Figure #29g

Public Facilities Map - Lynd

Lynd City Public Facilities

- Legend**
- Road
 - Railroad
 - CSAH
 - State Highway
 - Lynd City Boundary
- Public Facility**
- Lynd Elementary School -100 Saint Albans St
 - City Hall & Fire Hall -111 W Railroad St
 - Lynd Police Department -201 3rd St



RA Figure #29h

Public Facilities Map - Marshall

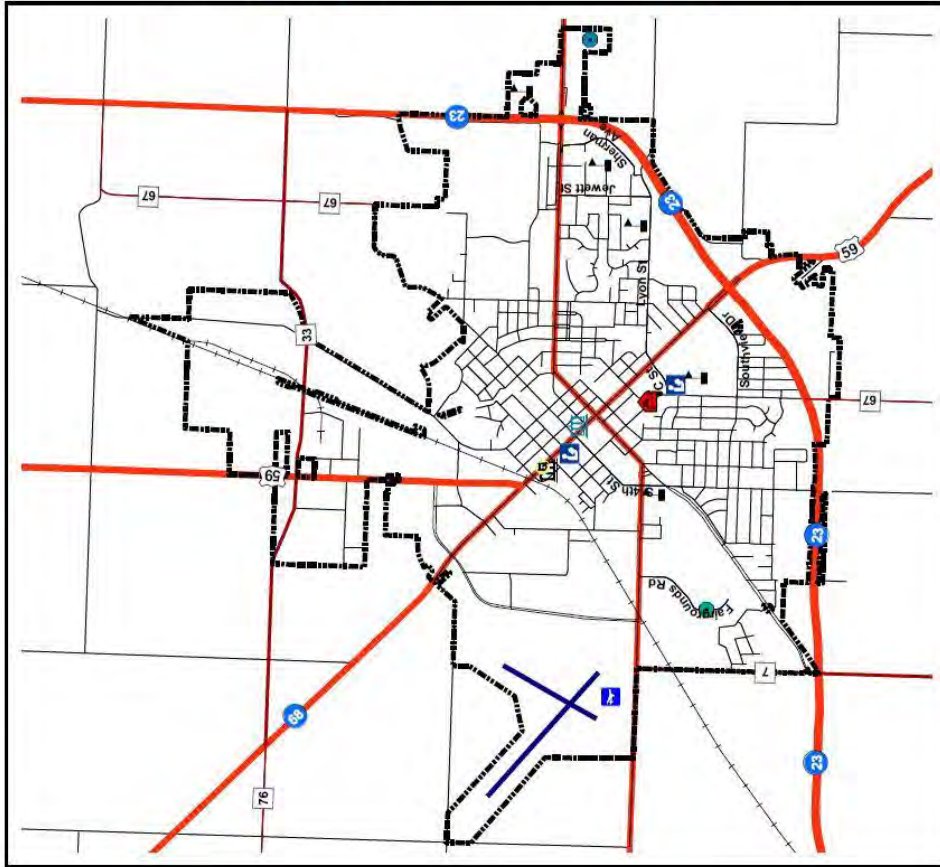
Marshall City
Public Facilities

Legend

- Road
- +—+ Railroad
- Runways
- County Road
- CSAH
- Truck Highway
- ▭ Marshall City Boundary

Public Facilities

- Southwest MN Regional Airport
-1650 W College Dr
- Marshall Middle School-401 S Saratoga St
- Marshall Senior High School-1420 E College Dr
- Park Side Elementary School-1300 E Lyon St
- West Side Elementary School-500 S 4th St
- Marshall Lyon Co Library-201 C St
- SW Area Exchange Sammie-109 S 5th St
- Lyon Co Park & Fairground
-504 Fairgrounds Rd
- City Hall-344 W Main St
- Fire Hall-201 E Saratoga St
- Lyon County Court-607 W Main St
- MnDOT Office-1800 E College Dr
- County Emergency Management Office
- County Sheriff's Office
- Marshall Police Department
- County Jail & Detention
-611 W Main St













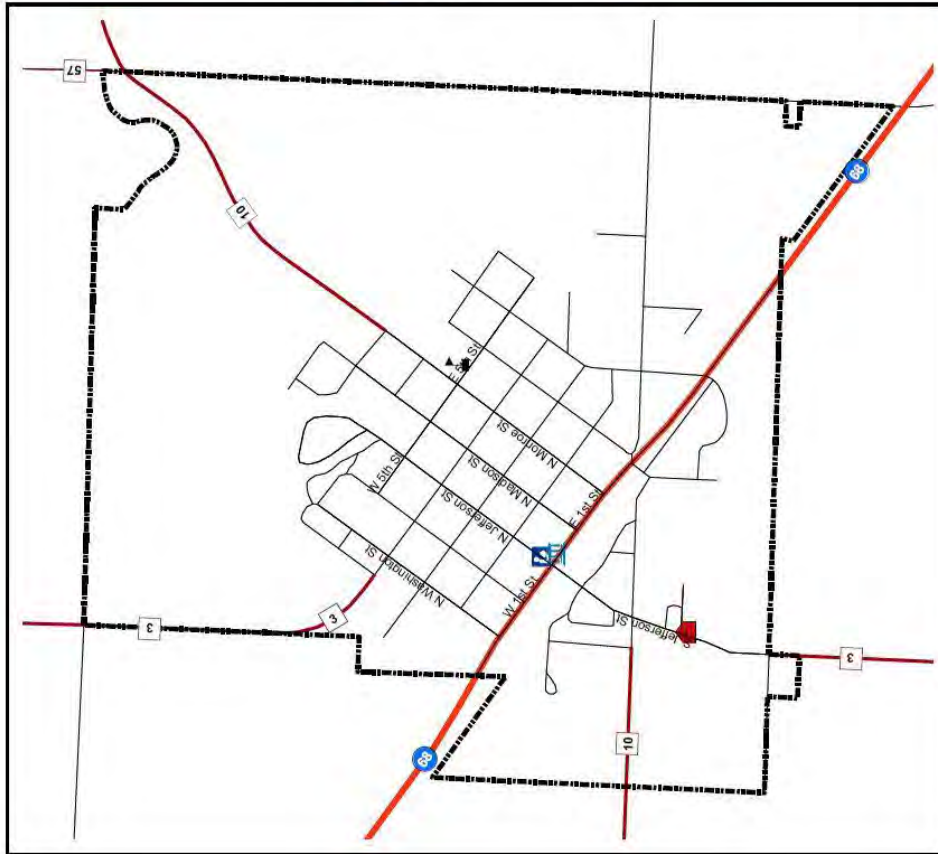
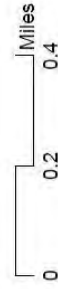
RA Figure #29i

Public Facilities Map - Minneota

Minneota City Public Facilities

Legend

-  Road
-  County Road
-  CSAH
-  State Highway
-  Minnesota City Boundary
-  Public Facilities
 -  Elementary School
 - 504 N Monroe St
 -  City Public Library
 - 103 N Jefferson St
 -  City Hall & Police Department
 - 129 E 1st St
 -  Fire Hall - 101 S Jefferson St



RA Figure #29j

Public Facilities Map - Russell

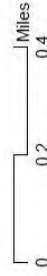
Russell City Public Facilities

Legend

- Road
- Railroad
- CSAH
- State Highway
- Lake
- Lynd City Boundary

Public Facility

- Russell City Hal
-200 Front St
- Florence City Hall
-1764 St Hwy 231
- Fire Hall -106 River St



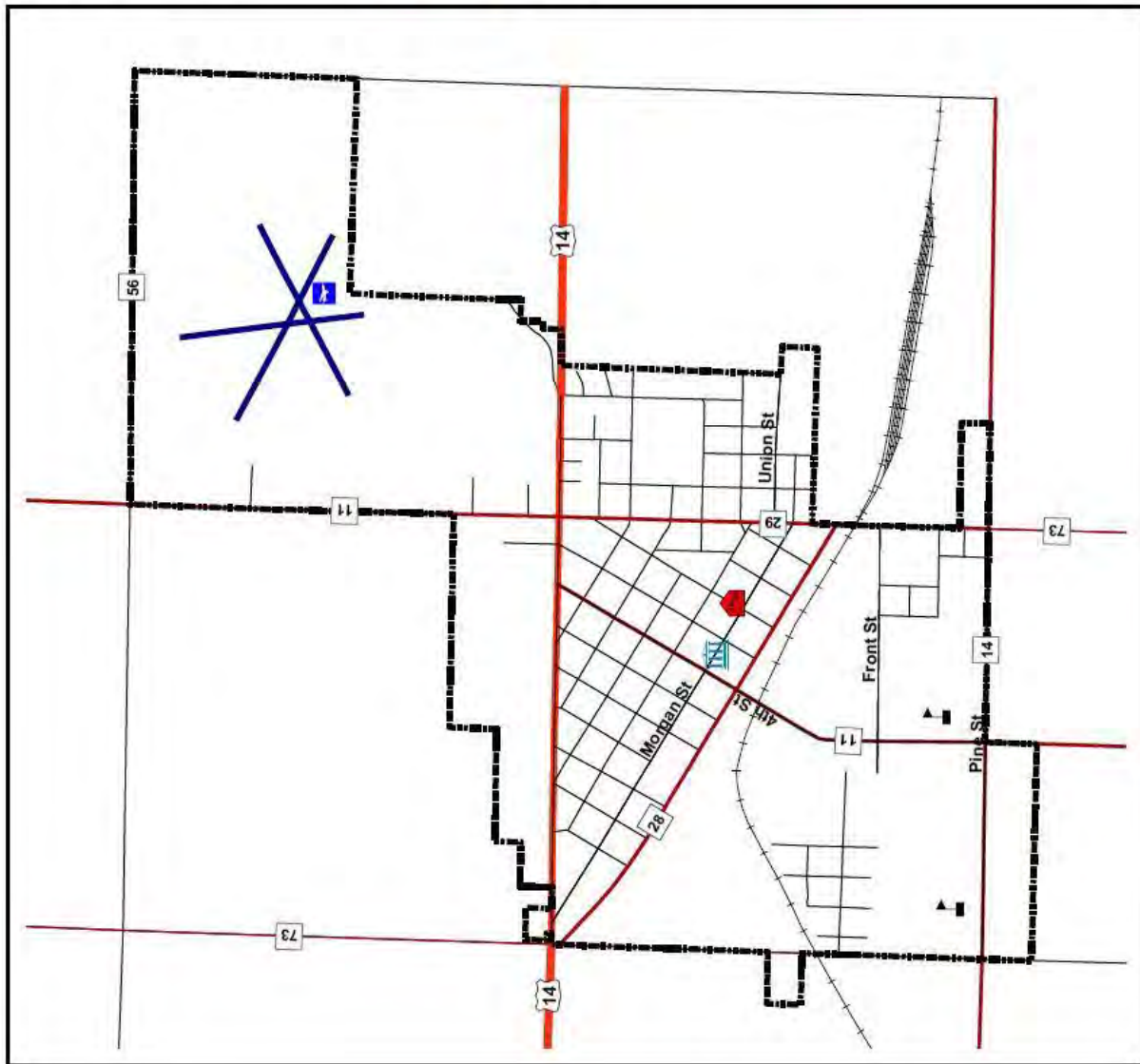
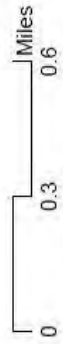
Tracy City Public Facilities

Legend

- Road
- County Road
- CSAH
- Trunk Highway
- Railroad
- Runways
- Tracy City Boundary






Public Facility

- Tracy Municipal Airport
-County Rd 11
- Tracy Elementary School
-700 S 4th St
- City Hall & Police Department
-336 Morgan St
- Fire Hall -231 2nd St





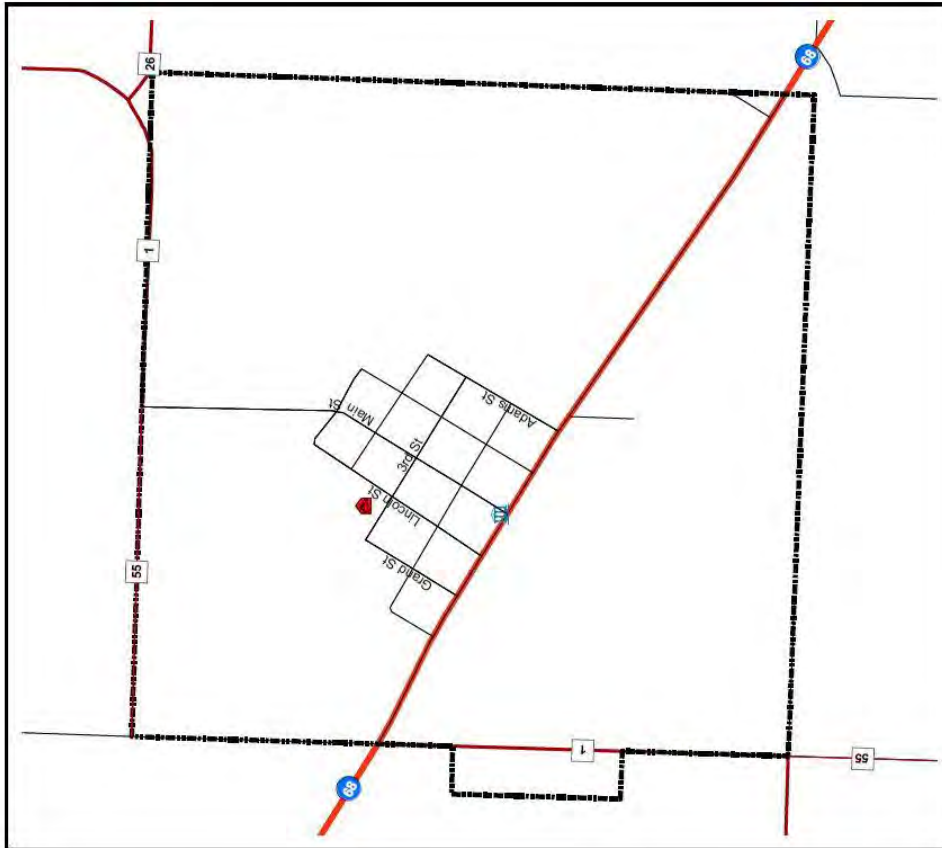
Taunton City Public Facilities

Legend

-  Road
-  County Road
-  CSAH
-  State Highway
-  Taunton City Boundary

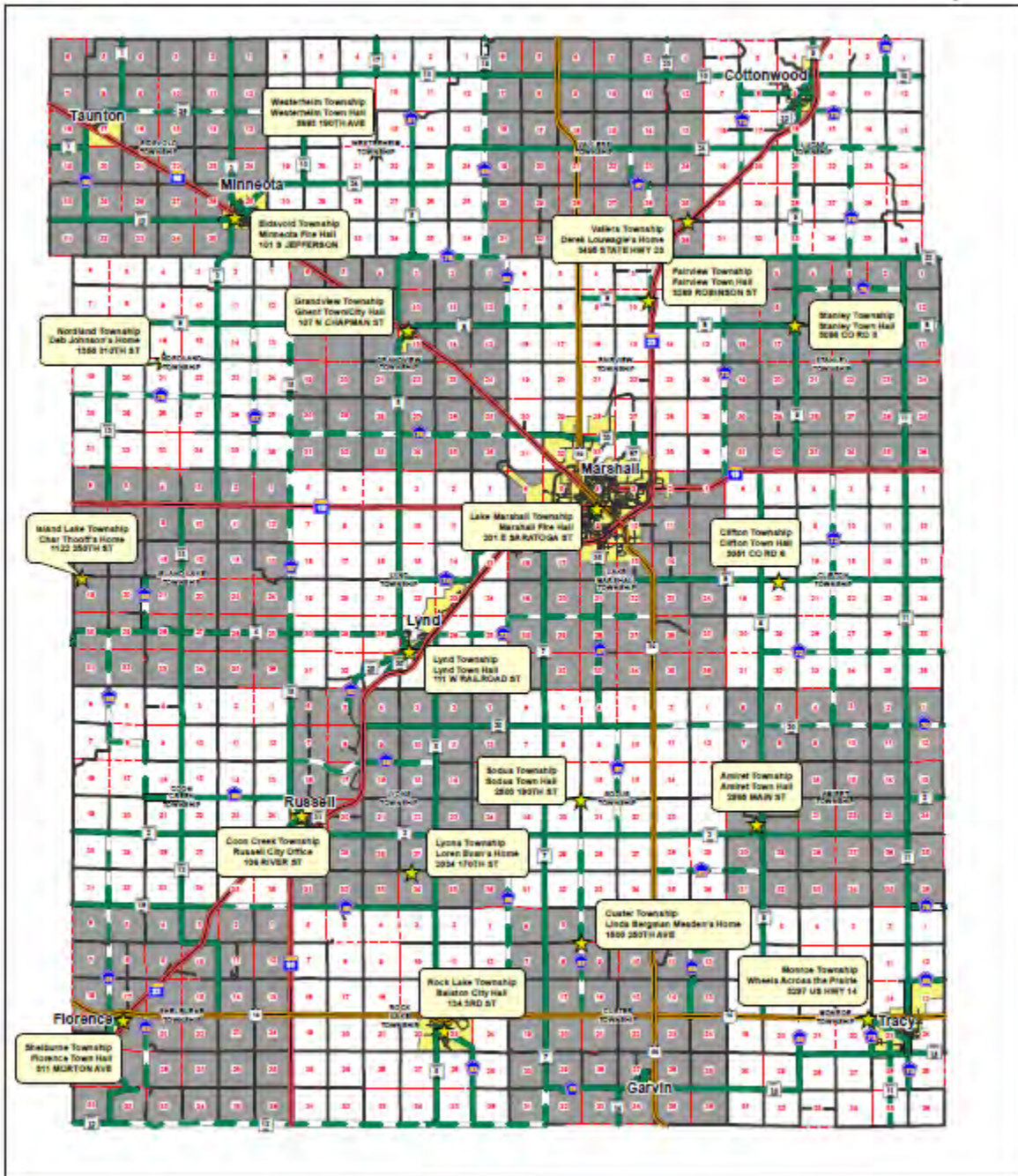
Public Facilities

-  City Hall
- 109 North Main Street
-  Firehalls
- 301 N Lincoln St

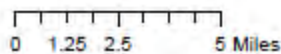




Township Meeting Locations



★ Township Meeting Location



This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of information from various sources and is to be used for reference purposes only. Lyon County is not responsible for any inaccuracies herein contained. If discrepancies are found please contact the Lyon County GIS Department.

Document Path: G:\Lyon\GIS\Data_work\TownHalls\TownHall.mxd

Date: 8/26/2016

II Profiling Emergency Response Capabilities

Emergency Operations Center

The Lyon County Emergency Management Office and the Emergency Operations Center (EOC) are located in the Sheriff's Office at the Law Enforcement Center in Marshall.

A1 Law Enforcement

In Lyon County, the Cities of Marshall, Tracy and Minneota have an independent police department. The rest of the county is served by the Lyon County Sheriff's Office. The Sheriff's deputies patrol approximately 721 square miles, and contract police services to the cities of Cottonwood, Balaton, Lynd, Russell, and Ghent. Lyon County Sheriff Deputies are affiliated with the Brown, Lyon, and Redwood Drug Task Force as Emergency Response Unit and Liaison members.

The Lyon County Sheriff's Office houses the Correctional Detention Facility, Emergency Management, and is responsible for courthouse safety and security. The Lyon County Sheriff's Office currently has 16 full-time licensed Deputy Sheriff's and one part-time licensed Deputy Sheriff assigned to the Patrol Division. The patrol deputies provide law enforcement and other sheriff's services to the citizens of Lyon County.

Lyon County Sheriff's Office also operates a county jail system. The Lyon County jail is located in Marshall, and is connected to the Lyon County Law Enforcement Center and directly adjacent to the Lyon County Courthouse. The jail operates 24 hours a day and 7 days a week. The designed maximum capacity for the facility is 87 beds. The Lyon County 911 Emergency Dispatch and Communications Center is comprised of eleven dedicated dispatchers who work 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 Lyon County jail provides for the safe, secure, and humane detention of offenders in Lyon County.

Marshall Police Department

The Marshall Police Department's Mission is to provide quality police services to the community, acting as partners with community members to promote safety, peace, and order; to respond to and deter crime; to enforce laws and ordinances; and the safeguarding of constitutional guarantees. The Marshall Police Department is comprised of 19 full-time sworn officers and two part-time officers. The department also has three full-time civilian employees, generally 3 part-time employees, and two to three seasonal employees. We have one officer assigned full-time to the regional drug taskforce and another officer assigned to work in the schools as a School Resource Officer during the school year. We provide the Emergency Management for the City of Marshall and operate the animal kennel. We are a part of the regional drug taskforce and the regional Emergency Response Unit.

Tracy Police Department

The Mission of the Tracy Police Department is to serve and protect our community by enforcing the law, preserving peace, and providing a safe community in which people can work, play and raise their families. The Tracy Police Department is comprised of a full-time police chief, two full-time patrol officers, and a part-time patrol officer. The Tracy Police Department is assisted by the Lyon County Sheriff's Office, but the Tracy police department also provides support to other neighboring law

enforcement agencies because of the unique location. The Tracy Police Department supports the Lyon County Sheriff's Office, Redwood County Sheriff's Office, Murray County Sheriff's Office, Minnesota State Patrol, and Walnut Grove Police Department.

Minnesota Police Department

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

Law enforcement agencies in Lyon 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 Lyon County.

Regional Assets

There are a number of regional assets that are shared throughout southwest Minnesota in Emergency Management Region Five. These assets include: light towers, generators, cameras, livestock trailers, APX radios, computers, go kits, video tele-conferencing systems, cots, blankets, privacy screens, identification equipment, pet shelter equipment, and presentation equipment.

- Radio communications trucks – There are five radio communications trucks available.¹⁰⁰
- Portable ARMER Tower

RA Table #36 Regional Assets – Minnesota Emergency Management Region 5

County	Light Towers	Livestock Trailers	APX Radios	Cots	Blankets	Privacy Screens	Generators
Brown	2	1	3				
Chippewa	1		3	88	100		1 – 20 Kilowatt
Cottonwood	1		3	63	13	51	
Jackson	1		3				
Lac qui Parle	1		3	12	25		
Lincoln	1		3				
Lyon	1		2	195	250		
Martin	1	1	3	18	15		
McLeod	2		3				
Murray	1		3				
Nobles		1	2				
Pipestone	1	1	2				1 – 38 Kilowatt

¹⁰⁰ Minnesota Southwest ARES District. Accessed: 1/1/16. Available: <http://www.minnesotaares.org/ares/index.php/mn-ares-districts/2014-02-15-22-14-39>

Redwood	2		2				1 – 38 Kilowatt
Renville	1	1	3	50			1 – 20 Kilowatt
Rock	1		3				
Sibley			3				
Watowan			2				1 – 20 Kilowatt
Yellow Medicine		1	2				

Information request: Region 5 Emergency Planner

A2 Public Health

Lyon County is part of the Southwest Health and Human Services (SWHHS) group. SWHHS provides services across six counties serving Lincoln, Lyon, Murray, Pipestone, Redwood, and Rock Counties. Southwest Health and Human Services is a multi-county agency that is committed to strengthening individuals, families and communities by providing quality services in a respectful, caring and cost effective manner. SWHHS 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.

Medical Facilities

Medical facilities inventoried in Lyon County consist of two hospitals, six medical clinics, four nursing homes, five assisted living facilities, and 11 chiropractic clinics.

Hospitals

The hospitals in Lyon County are the Avera Marshall Regional Medical Center and Sanford Tracy Medical Center. The Avera Marshall Regional Medical Center is a Level III Trauma Center and is part of the Avera Health Network. The medical center is a 25-bed full service hospital, a 76-bed skilled nursing long term care facility, an emergency care center, specialty physician clinics, imaging center, and an outpatient services center.

The Sanford Tracy Medical Center is a Level IV Trauma Center and is part of the Sanford Health Network.

Patients in Lyon County are also transferred to hospitals in the region. Other hospitals in the region include: Tyler Healthcare Center, Rice Memorial Hospital, Avera McKennan Hospital, and Sanford USD

Medical Center. The Tyler Healthcare Center is located in the City of Tyler, which is just west of Lyon County. The Tyler Healthcare Center is a Level IV Trauma Center and is part of the Avera Health Network. The Rice Memorial Hospital is located in Wilmar and is a Level III Trauma Center. 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 six health clinics within Lyon County. The health clinics in Lyon County include: Sanford Tracy Balaton Clinic in Balaton, Sanford Health Minneota Clinic, Avera Marshall Regional Medical Center, APMC-Marshall Main Clinic, Curaquick Avera Clinic in Marshall, and Avera Medical Group Optometry Tracy. In Lyon County all of these clinics are classified as Medicare Certified Rural Health Clinics.

Nursing Homes

There are four nursing homes in Lyon County. The nursing homes in Lyon County include: Avera Marshall Morningside Heights Care Center, Colonial Manor of Balaton, Minneota Manor Health Care Center, and Prairie View Healthcare Center in Tracy.

- Avera Marshall Morningside Heights Care Center is a 76 bed facility. The facility offers long-term care, transition programs, adult day services, ventilator care, outpatient therapy, restorative rehab services, spiritual care, and a monthly caregiver support group.
- Colonial Manor of Balaton is a 33 bed dual Medicare/Medicaid non-profit skilled health care facility that provides 24-hour nursing care and 7 days per week rehabilitative services.
- The Minneota Manor Health Care Center is a 67 bed dual Medicare/Medicaid skilled independently-owned health care facility providing care through Minneota Manor, private apartments and assisted living through Madison Avenue Apartments & Assisted Living, and home health services through Town & Country Home Health Care. There is 81 24-hour qualified nursing staff, including 5 RNs certified in geriatric nursing, 11 LPNs, and 65 RNAs.
- The Prairie View Healthcare Center in Tracy is a 58 bed dual Medicare/Medicaid certified 24-hour skilled nursing home facility offering a wide range of services and the medical clinic and hospital are directly across from the facility.

Assisted Living Facilities

There are five assisted living facilities in Lyon County. The assisted living facilities in Lyon County include: Heritage Pointe Senior Living and Divine House in Marshall, Fieldcrest Assisted Living in Cottonwood, Minneota Manor which plays roles in both nursing homes and assisted living facility, and Ecumen - Lakeview Senior Housing in Balaton.

Chiropractic Clinics

There are 11 chiropractic clinics in Lyon County with most in Marshall. The chiropractic clinics in Lyon County include: Hoganson Chiropractic Center, Fixen Chiropractic, Preferred Health Chiropractic, Sherman Chiropractic and Rehab, Complete Health Center, Bruns Chiropractic, and HealthSource in Marshall, Prairie Winds Chiropractic and Wellness and Minneota Chiropractic Clinic in Minneota, Tracy

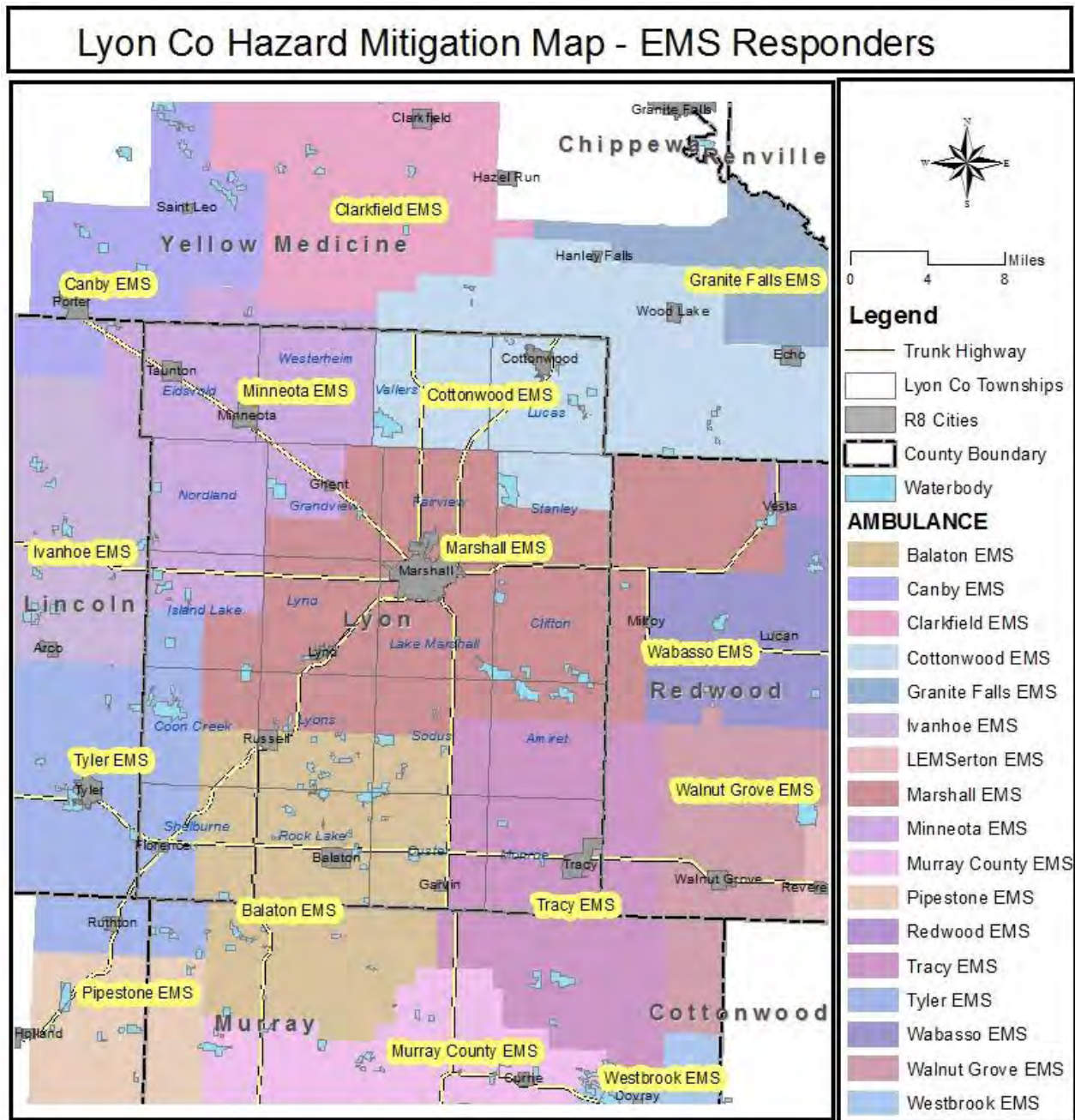
Chiropractic, P.A. and Horn Lane DC in Tracy. There may be other Chiropractic Clinics, but they were not searchable online.

A3 Ambulance Service

There are six primary Ambulance Districts in Lyon County. The primary Ambulance Districts include: Minneota Ambulance District, Cottonwood Ambulance District, Marshall Ambulance District, Tyler Ambulance District, Balaton Ambulance District, and Tracy Ambulance District. Additional ambulances can be called from neighboring counties. Secondary Ambulance Districts include: Canby Ambulance District, Clarkfield Ambulance District, Granite Fall Ambulance District, Redwood Falls Ambulance District, Wabasso Ambulance District, Walnut Grove Ambulance District, LEM Serton Ambulance District, Westbrook Ambulance District, Murray County Ambulance District, Pipestone Ambulance District, and Ivanhoe Ambulance District.

RA Figure #31

Ambulance Districts - Lyon County



North Memorial Ambulance Service (Minneota EMS & Marshall EMS)

The North Memorial Ambulance Service covers the Cities of Marshall, Minneota, Ghent and Taunton, as well as surrounding rural areas. The North Memorial Ambulance District went on approximately 1400 to 1500 calls in 2013 and 2014. The majority of the calls was within the city limits of Marshall and Minneota and were calls to transport patients to the Avera Marshall Regional Medical Center.

For assistance the North Memorial Ambulance Service more frequently call upon neighboring ambulance service that includes: Cottonwood Ambulance, Balaton Ambulance, Tyler Ambulance, Tracy

Ambulance, Canby Ambulance, Granite Falls Ambulance, and Willmar Ambulance. The North Memorial Ambulance Service does have mutual aid agreements with these neighboring ambulance services. The North Memorial Ambulance Service has four operational ambulances in Marshall and one operational ambulance in Minneota.

Cottonwood Ambulance Service (Cottonwood EMS)

The Cottonwood Ambulance Service covers the City of Cottonwood, as well as surrounding rural areas. The Cottonwood Ambulance Service is composed of four paramedics and 12 Emergency Medical Technicians (EMT). The Cottonwood Ambulance Service went on 153 calls in 2013 and 164 calls in 2014. The majority of the calls were to transfer patients to hospitals in Granite Falls and Marshall.

For assistance the Lyon County Ambulance Service most frequently calls upon neighboring ambulance service that includes: Granite Falls Ambulance, Marshall Ambulance, Redwood Falls Ambulance and Clarkfield Ambulance. The Cottonwood Ambulance Service does have mutual aid agreements with these neighboring ambulance services. The Cottonwood Ambulance Service has two operational ambulances.

Tyler Ambulance Service (Tyler EMS)

The Tyler Ambulance Service covers the Cities of Tyler, Lake Benton, Verdi, Florence and Ruthton, as well as surrounding rural areas in Lincoln, Lyon, Pipestone and Murray Counties. The Tyler Ambulance Service is comprised of 11 Emergency Medical Technicians (EMT). The Tyler Ambulance Service averages roughly 220 calls per year. The majority of calls tend to be 911 calls where the patient is transported from their home or the scene to the closest hospital or hospital of their choice. Approximately 30% of the calls are medical transports to other facilities including Marshall, Sioux Falls and Rochester.

For assistance the Tyler Ambulance Service calls upon neighboring ambulance services that includes: Balaton, Hendricks, Ivanhoe, Marshall, Minneota, Pipestone, and Tracy. The Tyler Ambulance Service does have mutual aid agreements with these neighboring ambulance services. Tyler Ambulance also works with the Lake Benton, Holland, Ruthton and Russell First Responder Units. The Tyler Ambulance Service has two operational ambulances.

Balaton Ambulance Service (Balaton EMS)

The Balaton Ambulance Service covers the Cities of Balaton, Garvin and Russell, as well as surrounding rural areas. The Balaton Ambulance Service is comprised of eight Emergency Medical Technicians-B (EMT-B) and eight first responders (EMR). The Balaton Ambulance Service averages roughly 135 calls per year. The majority of calls tend to be medical transports from the Colonial Manor of Balaton Nursing Home to the emergency room (ER) in Marshall or Tracy.

For assistance the Balaton Ambulance Service more frequently calls upon neighboring ambulance service that includes: Tracy Ambulance service, North Memorial, Murray County ambulance as well as Tyler Ambulance. The Balaton Ambulance Service does have mutual aid agreements with these neighboring ambulance services. The Balaton Ambulance Service has one operational ambulance.

Russell Ambulance Service (Russell EMS)

The Russell Ambulance Service covers the City of Russell, as well as surrounding rural areas. The Russell Ambulance Service is comprised of two EMTs and six First Responders. The Russell Ambulance Service went on eight calls in 2013 and 18 calls in 2014. The majority of calls were to transfer elderly residents to nearby hospitals and medical clinics.

For assistance the Russell Ambulance Service relies on neighboring ambulance services. The Russell Ambulance Service does have mutual aid agreements with Balaton, Tyler and North Memorial Ambulance Service. The Russell Ambulance Service has one ambulance and one rescue van.

Tracy Ambulance Service (Tracy EMS)

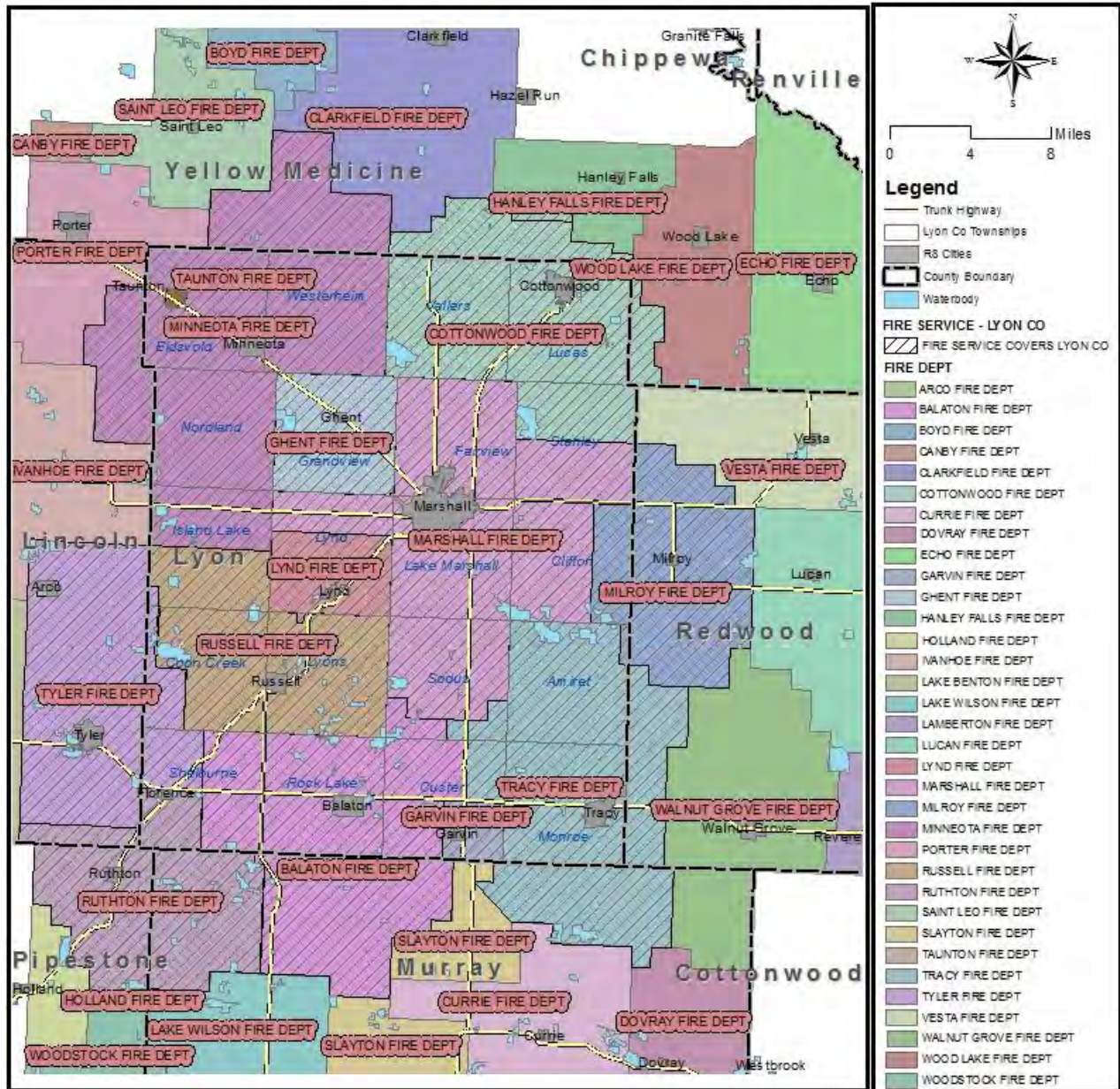
The Tracy Ambulance Service covers the City of Tracy, as well as surrounding rural areas. The Tracy Ambulance Service is composed of three paramedics and 20 Emergency Medical Technicians (EMT). The Tracy Ambulance Service went on 315 calls in 2013 and 305 calls in 2014. The majority of the calls were to transfer patients to Sanford in Sioux Falls, South Dakota.

For assistance the Tracy Ambulance Service most frequently calls upon neighboring ambulance service that includes: North Memorial Ambulance in Marshall, Balaton Ambulance, Murray County Ambulance in Slayton, Westbrook Ambulance, and Walnut Grove Ambulance. The Tracy Ambulance Service does have mutual aid agreements with these neighboring ambulance services. The Tracy Ambulance Service has three operational ambulances.

A4 Fire/ Emergency Services

There are 10 primary fire districts in Lyon County. The primary fire districts include: Taunton Fire District, Minneota Fire District, Cottonwood Fire District, Ghent Fire District, Marshall Fire District, Lynd Fire District, Russell Fire District, Balaton Fire District, Garvin Fire District, and Tracy Fire District. Secondary fire districts include: Tyler Fire District, Ruthton Fire District Milroy Fire District, and all other neighboring fire districts.

Lyon County Hazard Mitigation Map - Fire Responders



There are no full time fire departments within Lyon County. All fire departments are volunteer based with responsibilities being divided between the fire districts. The ten districts allow for response times to be reduced, but since Lyon County is a rural county some areas are better served than other.

Primary Fire Districts

Taunton Fire Department (Taunton Fire District)

The Taunton Fire Department covers the City of Taunton and surrounding townships including: Eidsvold, Westerheim, Nordland, and parts of Island Lake. The Taunton Fire Department consists of 15 volunteer fire fighters. The Taunton Fire Department went on 6 calls in 2013 and 2014. The Taunton Fire Department does have mutual aid agreements with all the fire departments in Lyon County.

Needs: The Taunton Fire Department is currently short staffed. Ideally the fire department would have at least two more members.

Minneota Fire Department (Minneota Fire District)

The Minneota Fire Department service covers the City of Minneota and surrounding townships including: Eidsvold, Westerheim, Nordland, and parts of Island Lake. The Minneota Fire Department consists of 26 volunteer fire fighters. The Minneota Fire Department went out on 29 calls in 2013 and 32 calls in 2014. The Minneota Fire Department does have mutual aid agreements with neighboring fire departments, including: Balaton, Garvin, Tracy, Russell, Lynd, Marshall, Cottonwood, and Ghent.

Cottonwood Fire Department (Cottonwood Fire District)

The Cottonwood Fire Department covers the City of Cottonwood and surrounding townships including: Lucas, Vallers and the north parts of Stanley, with 24 volunteer fire fighters, having had approximately 36 calls in 2013. To assist the Lyon County Fire Service, the Cottonwood Fire Department does have mutual aid agreements with the City of Marshall, Minneota, Ghent, Taunton, Balaton, Lynd, Russell, Garvin, Tracy, Wood Lake, Hanley Falls, Echo, and 39 other fire departments.

Ghent Fire Department (Ghent Fire District)

The Ghent Fire Department covers the City of Ghent and Grandview Township. The Ghent Fire Department consists of 22 volunteer fire fighters. The Ghent Fire Department went on 15 calls in 2013 and 19 calls in 2014. The Ghent Fire Department does have mutual aid agreements with every fire department in the county.

Needs: The need of the fire department is for a new water tower, fire hall, and SCBA and Turn out gear.

Marshall Fire Department (Marshall Fire District)

The Marshall Fire Department covers the City of Marshall and surrounding townships including: Lake Marshall, Fairview, and parts of Clifton, Stanley, Sodus and Lynd. The Marshall Fire Department consists of 46 volunteer fire fighters. The Marshall Fire Department went on 134 calls in 2013, 174 calls in 2014 and 165 calls by Dec 8, 2015. The Marshall Fire Department does have mutual aid agreements with neighboring fire departments, including: Ghent, Minneota, Cottonwood, Tracy, Lynd, Balaton, and Russell Fire Departments.

Lynd Fire Department (Lynd Fire District)

The Lynd Fire Department covers the City of Lynd and part of Lynd Township. The Lynd Fire Department consists of 12 volunteer fire fighters. The Lynd Fire Department went on approximately 35 calls in 2013

and 34 calls in 2014. The Lynd Fire Department does have mutual aid agreements with neighboring fire departments in Lyon County.

Russell Fire Department (Russell Fire District)

The Russell Fire Department covers the city of Russell and parts of Coon Creek, Lyons and Island Lake Townships. The Russell Fire Department consists of 20 volunteer fire fighters. The Russell Fire Department went on 6 calls in 2014. The Russell Fire Department does have mutual aid agreements with neighboring fire departments, including all Lyon County Fire Departments.

Balaton Fire Department (Balaton Fire District)

The Balaton Fire Department covers the City of Balaton and surrounding townships including: Rock Lake and parts of Sodus, Shelburne and Custer. The Balaton Fire Department consists of 22 volunteer fire fighters. The Balaton Fire Department went on approximately 35 calls in 2013 and 39 calls in 2014. The Balaton Fire Department does have mutual aid agreements with neighboring fire departments, including: Garvin, Tracy, Russell, Lynd, Marshall, Cottonwood, Minneota, and Ghent.

Needs: Current need of the fire department is to replace one of their pumper trucks. They currently have two pumper trucks, one is 17 years old and the other is 23 years old.

Garvin Fire Department (Garvin Fire District)

The Garvin Fire Department covers the City of Garvin and part of Custer Township. The Garvin Fire Department consists of 14 volunteer fire fighters. The Garvin Fire Department went on approximately 11 fire calls in 2013 and 14 fire calls in 2014, not including 14 calls for medical purposes. The Garvin Fire Department has mutual aid agreements with all Lyon County Fire Departments.

Tracy Fire Department (Tracy Fire District)

The Tracy Fire Department covers the City of Tracy and the surrounding townships including: Amiret, Monroe, and part of Custer and Sodus. The Tracy Fire Department consists of 26 volunteer fire fighters. The Tracy Fire Department went on approximately 167 calls in 2013 and 2014. The Tracy Fire Department does have mutual aid agreements with neighboring fire departments, including: all fire departments in Lyon County and the Walnut Grove Fire Department.

Needs: Current needs of the fire department are a newer pumper truck and new air packs. The pumper truck is becoming more expensive to fix and reliability is an issue. A new pumper truck will increase response capabilities and reliability.

Air packs are becoming more expensive, so replacement is less frequent. The existing air packs are outdated. New air packs will increase safety and reliability.

Secondary Fire Districts

Milroy Fire Department (Milroy Fire District)

The Milroy Fire Department covers the easterly part of Clifton Township and a small part of Amiret Township in Lyon County. The Milroy Fire Department consists of 23 volunteer fire fighters. The Milroy

Fire Department went on 5 calls in 2013 and 3 calls in 2014. The Milroy Fire Department does not have written mutual aid agreements with neighboring fire departments in writing but will go when requested.

Tyler Fire Department (Tyler Fire District)

The Tyler Fire Department covers a small part of the Coon Creek and Shelburne Townships in Lyon County. The Tyler Fire Department consists of 28 volunteer fire fighters. The Tyler Fire Department went on 11 fire calls in 2013 and nine fire calls in 2014. The Tyler Fire Department does not have written mutual aid agreements with neighboring fire departments but go when requested.

Ruthton Fire Department (Ruthton Fire District)

The Ruthton Fire Department covers the City of Florence and southwest parts of Shelburne Township in the Lyon County. The Ruthton Fire Department consists of 17 volunteer fire fighters. The Ruthton Fire Department went on 13 calls in 2013 and 2014. The Ruthton Fire Department does have aid agreements with the Pipestone and Tyler Fire Department.

Needs: The Ruthton Fire Department is in need a of new pumper truck.

A5 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, Lyon, 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.¹⁰¹

- *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.

¹⁰¹ FEMA. Accessed: 4/16/14. Available: <http://www.fema.gov/pdf/emergency/nrf/nrf-esf-06.pdf>

- *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.¹⁰²

A6 Sirens and other Emergency Notification Devices

Outdoor warning sirens provide coverage in cities and other more densely populated areas within Lyon County. The emergency sirens can be activated by the Lyon County Dispatchers or city officials to warn residents in the event of severe weather. Lyon County is a rural county, so large portions of the county are outside the range of severe weather warning sirens. Refer to RA Table #28 for outdoor warning siren coverage and needs in Lyon County.

Since Lyon 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 severe weather warnings. NOAA Weather Transmitter is the Rowena Tower.

Lyon County selected CodeRed Community Notification System as their emergency response system. CodeRED is an emergency notification service that allows emergency officials to notify residents and businesses by telephone, cell phone, text message, email and social media regarding time-sensitive general and emergency notifications.

Marshall Public School District uses Black Connect, which is an automated alert system with the capacity for phone calls only. The Marshall Public Schools are looking into the system's covering a wide variety of devices including text messages and emails. Lakeview Public Schools has a mass notification system for students, staff and families, using emails and text notifications to send out alerts for emergencies and school closings. Tracy Public Schools has a mass instant alert system which includes text, email and voice mail.

¹⁰² FEMA. Accessed: 4/16/14. Available: <https://www.hsd.org/?view&did=483049>

Features You Can Count On With Instant Alert

- Delivery and reach
 - Mass alerts via multiple devices, including phone, email and text
 - Send thousands of messages with the click of a button
 - Effective messaging
 - Record your messages or use an electronic, text-to-speech voice
 - Target communication to unlimited groups to control who receives information
 - Eliminate paper notifications with email alert attachments
 - Multiple activation methods
 - Launch alerts from an easy-to-use web interface
 - Send alerts using our 24/7/365 staffed help desk, if internet access is unavailable
 - Fully hosted, cloud-based service with no hardware, software or phone lines to maintain
-

CHAPTER 7: MITIGATION STRATEGIES

I Introduction

This Chapter documents goals, objectives and mitigation strategies that the Lyon County All Hazard Mitigation Plan (AHMP) Planning Team developed through the hazard mitigation planning process. Section II describes mitigation goals, objectives, and strategies. Section III describes strategy implementation & administration. Section IV addresses NFIP compliance.

II Hazard Mitigation Goals

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 Lyon County wants to achieve. Objectives narrow the general guidelines and define in more detail what Lyon 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. 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 on page 209.

Priority Rank

The priority rank is scored on a scale of one through five, one being the least important and five being most important. The STAPLEE Process assisted the planning team in assigning the priority ranking.

Status

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

Timeframe

The timeframe for implementing a mitigation strategy is divided into three categories:

- Short Term – 1 to 5 years
- Long Term – 5 + years
- Continuous

Mitigation Type

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

- Prevention (shortening: Prevention)
- Property & Natural Resources Protection (shortening: Protection)
- Public Education & Awareness (shortening: Awareness)
- Structural Projects (shortening: Structural)
- Emergency Services (shortening: Emergency Services)

III Implementation of Mitigation Strategies

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 Lyon County AHMP are recommendations from the planning team, so during implementation modifications can take place.

Lyon 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.

Mitigation Strategies Acronym List

Cities

CiB	City of Balaton
CiC	City of Cottonwood
CiF	City of Florence
CiGa	City of Gavin
CiGh	City of Ghent
CiL	City of Lynd
CiMa	City of Marshall
CiMi	City of Minneota
CiR	City of Russell
CiTa	City of Taunton
CiTr	City of Tracy

Townships

Twp	All Townships
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Local Organizations

LCA	Lyon County Administration
LCPW	Lyon County Public Works
EM	Lyon County Emergency Management
LMO	Lyon County Land Management Office
HAZ	HAZMAT Team
SWHHS	Southwest 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 (Marshall & Tracy)
FEMA	U.S. Federal Emergency Management Administration
USDA	U.S. Department of Agriculture

MS Table #1

General

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
All Hazards	Improve the planning process for updating All Hazard Mitigation Plans (AMHP) in Minnesota.	Needs and projects outlined in the Lyon County AHMP are eligible for funding.	Educate state and federal decision makers that county AHMPs should not expire. Currently, a county AHMP can expire if a plan is not updated within the five year update cycle. Projects outlined in an expired county AHMP are not eligible for FEMA funding. Mitigation strategies should remain eligible for funding, if local issues have not changed, there is a need for the project, and the project is outlined in a county AHMP.		New Short Term	EM, LCA, All Cities	<p><i>Cost:</i> In-kind</p> <p>Rural counties that are not seeing dramatic population change may not need to update their full AHMP every five years. Updating the Mitigation Strategies Chapter may be sufficient.</p>
	Improve coordination between entities working with emergency response and hazard mitigation.	Ensure emergency response and hazard mitigation needs are met in Lyon County.	Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives.		Existing: Ongoing Continuous General	EM, Fire, EMS	

MS Table #2

Agricultural Disease

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
Agricultural Disease – including plant and animal hazards	To reduce the risk to livestock, poultry, pets, production crops and local gardens from agricultural disease.	Work more closely with the Minnesota Department of Agricultural, University of Minnesota Extension, and the Minnesota Board of Animal Health to limit and contain agricultural disease.	Provide information on agricultural diseases and prevention methods to producers and the general public.		Existing: Ongoing Continuous Awareness	EM, LMO, SWCD, MDAG, Ext, BAH	Cost: In-kind, may also require some additional funding for research into the spread of diseases such as the bird flu.
		Producers are informed on animal/crop diseases and pest/insects that are prevalent in the region.	Encourage agricultural officials to provide more timely and specific information regarding hazards and warning signs of various diseases that are likely to affect Lyon County.		Existing: Ongoing Continuous	EXT, MDAG, BAH	Cost: In-kind Mass email blasts are not as effective as targeted emails. Emergency managers receive a number of information email blasts that are sent out indiscriminately. This is not effective.
		Develop a response plan for addressing agricultural disasters (Avian Flu, etc.).	Work with farmers, local, state, and federal government to develop a section in the Emergency Operations Plan to respond to agricultural disasters, which allows for business continuity.		Existing: Ongoing Short Term Prevention	EM, LMO, MDAG, BAH	Cost: In-kind

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Develop a plan for farmers if there is an outbreak of disease or a major disaster occurs (help to contain foreign animal diseases).	Create and expand a section in the Emergency Operations Plan that deals with response and care of animals in an outbreak of disease or a major disaster along with disposal.		Existing: New Annual review Prevention	EM, LMO, EXT	Cost: In-kind
	Reduce the risk of plant loss from insects/pests and diseases.	Keep informed of current pests and insects that could threaten Lyon County.	Utilize information provided by the University of Minnesota Extension, private industry, and the Department of Agriculture on how to handle certain pests and insects.		Existing: New Continuous Awareness	EXT, SWCD, LMO, MDAG, BAH	Cost: In-kind
		Educate citizens on the types of fungi, insects, and pests that could potentially cause a problem for plants and trees.	Monitor invasive insect species, including emerald ash borer and forest tent caterpillar.		Existing: Ongoing Continuous Awareness	EXT, LMO, MDAG	Cost: In-kind
		Contain invasive species in lakes and rivers (Asian Carp, zebra mussels, etc.).	Provide wash bays at boat landings (rinse boat with hot water (120 degrees for two minutes, or 140 degrees for 10 seconds).		Existing: New Continuous Prevention	DNR, USDA, MDAG	Cost: grants to build wash bays Policies, education, and enforcement do not work if it's impossible to comply with regulations.

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Ensure nurseries have proper information regarding the importance of planting diverse species.	Discourage monoculture planting (repetitively planting a single plant species rather than growing a variety of types of plants).		Existing: New Continuous Prevention	LMO, Ext, MDAg	

MS Table #3

Severe Storms & Extreme Temperatures

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe / Type	Who	Comments on Implementation & Potential Funding
Severe Storms & Extreme Temperatures includes: Blizzards, Winter Storms, and Extreme Cold Events; Severe Summer Storms, Lightning, Hail, and Extreme Heat Events; Tornado & Straight-line Wind Events	Minimize the negative impacts caused by severe storms and extreme temperatures.	Residents will understand the importance and need to take responsibility for themselves and their families/neighbors in a severe storm event.	Encourage all residents to have and use NOAA All Hazards Public Alert weather radios and sign up to receive alerts through the Lyon County CodeRED System.		Existing: In Progress Continuous Awareness	EM, Law, All Cities	Cost: In-kind EM will work with local jurisdictions that have campgrounds to provide information to campground operators.

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe / Type	Who	Comments on Implementation & Potential Funding
		All critical government buildings are equipped with quick connect systems for transportable generators.	<p>Develop a building policy to construct all new critical county buildings with quick connect system for a generator.</p> <p>Develop a building policy for cities in Lyon County to adopt that ensures all new critical city buildings are built with a quick connect system for a generator.</p> <p>Identify critical county and city buildings that should be equipped with a quick connect system for a generator.</p>		<p>New:</p> <p>Short Term</p> <p>Emergency Services</p>	EM, LCA, All Cities	<p>Cost: In-kind</p> <p>A grant would help to ensure a quick connect system is added to existing critical county and city buildings.</p>
		To have a backup generator for electric failure to ensure proper heating and cooling of designated emergency shelters, safe rooms, and critical facilities.	Identify critical buildings that should be equipped with a backup generator.		<p>Existing:</p> <p>Ongoing</p> <p>Short Term</p> <p>Emergency Services</p>	EM, LCA, All Cities, NGOs	Cost: In-kind

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe / Type	Who	Comments on Implementation & Potential Funding
		There are adequate emergency shelters in Lyon County.	<p>Conduct a countywide assessment of the availability of emergency shelters and basements, including shelter capacity, and transportation routes to emergency shelters.</p> <p>Improve signage and marketing for emergency shelters.</p> <p>Advocate for safe room construction when new public facilities projects are undertaken.</p> <p>Pursue funding for safe room construction.</p>		<p>New</p> <p>Short Term</p> <p>Emergency Services</p>	EM, LCA, All Cities	<p>Cost: In-kind</p> <p>An informal study was conducted as part of the Lyon County AHMP update. Cities were asked if emergency shelters were available in their community. This list needs to be evaluated in regards to time availability, size, and other capabilities. Refer to RA Table #29 Emergency Shelters and Safe Rooms – Lyon County.</p>
		To have appropriate emergency shelters available to people without appropriate emergency shelter and people living in manufactured home parks in Lyon County.	<p>Work with manufactured home park managers to improve communication during severe storm events and where residents can go for emergency shelter.</p> <p>Encourage construction of safe rooms in manufactured home parks.</p>		<p>Existing: New</p> <p>Short Term</p> <p>Awareness / Structural</p>	EM, LCA, MDH, All Cities	<p>Cost: In-kind and grants for building emergency shelters and safe rooms.</p>

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe / Type	Who	Comments on Implementation & Potential Funding
		Have all cities in Lyon County become Storm Ready Communities and Weather-Ready Nation Ambassadors	Maintain Storm Ready Communities status for Lyon County, Southwest Minnesota State University, and the Cities of Marshall and Tracy. Pitch Storm Ready Communities and Weather-Ready Nation Ambassadors to other city councils.		Existing: in progress Short Term Awareness	EM, All Cities	Cost: In-kind
		Residents should understand snow and wind load provisions in the Minnesota State Building Code.	Work with cities to adopt the Minnesota State Building Code.		Existing: Ongoing Continuous Structural	EM, All Cities	Cost: In-kind The Cities of Ghent, Marshall, and Tracy have adopted the Minnesota Building Code.
		Entities in Lyon County are prepared for hazard events.	Work with communities to review and/or complete Continuity of Operations Planning, and encourage private businesses and families to prepare for all-hazard events.		Existing: Ongoing Continuous Emergency Services	EM, All Cities	Cost: In-kind
		Conserve electrical resources during an extreme heat event.	Educate the public on the importance of utility conservation during extreme heat events.		Existing: Ongoing Continuous Prevention	All Cities, PU, EM	Cost: In-kind Social Media is one tool to educate the public.

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe / Type	Who	Comments on Implementation & Potential Funding
		Spotter training is available in Lyon County.	Recruit volunteers to supplement emergency staff in summer weather emergency response.		Existing: Ongoing Continuous Emergency Services	EM, All Cities	<i>Cost:</i> In-kind Typically train between 75 and 100 severe weather spotters.
		Have staff at the schools, hospitals, and nursing homes trained for severe weather emergency response.	Each spring, Lyon County Emergency Management personnel will educate local schools, nursing homes, hospitals, etc. on the importance of participating in "Severe Weather Awareness Week" activities. This would identify evacuation routes, emergency shelters, and safe rooms, along with other important information.		Existing: Ongoing Continuous Awareness	EM, Sch, SMSU, Hosp, All Cities,	<i>Cost:</i> In-kind
		Have a robust, uninterruptable communication system available for use in emergencies.	Support amateur radio operators in emergency preparedness and response. Have three deep communication options to maintain communication in emergencies.		Existing: Ongoing Short Term Emergency Services	EM,LAW	<i>Cost:</i> In-kind

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe / Type	Who	Comments on Implementation & Potential Funding
		Warning Systems are regularly tested and all sirens have a back-up power source.	<p>Identify sirens that currently do not have a back-up power source. Refer to Table RA Table #25 for sirens that do and do not have backup batteries (backup power generation).</p> <p>Identify funding sources, when available, to purchase back-up power sources for warning sirens.</p>		New Continuous Emergency Services	EM, All Cities, LCPW, LAW	<p>Cost: \$14,000 - \$20,000 per back-up power source.</p> <p>Sirens are tested the first Wednesday of the month.</p>
		Proper siren coverage within Lyon County.	Work with local entities to ensure proper warning siren coverage in Lyon County (Refer to RA Table #28 Outdoor Warning Sirens – Lyon County for gap regarding warning sirens).	5	New Continuous Emergency Services	EM, All Cities, LCPW, LAW	Cost: \$15,000 - \$30,000 per siren

MS Table #4

Drought

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
Drought	Minimize the negative impacts of drought conditions in Lyon County.	Have adequate groundwater resources.	Pursue a County Geologic Atlas. Work with water appropriators to determine sustainability measures.		Existing: Ongoing Continuous Prevention	LMO, SWCD, BWSR, ALL Cities, RWS	<i>Cost: In-kind</i> DNR issues the pumping permits for wells. They also have the right to suspend the permit during drought.
		All cities within Lyon County will have the capability to restrict water use.	Develop watering ban ordinances for the cities of Balaton, Florence, Garvin, Lynd, Russell, and Taunton that do not have watering ban ordinances. Enforce existing watering ban ordinances.	3	New Short Term Prevention	CiB, CiC, CiF, CiGa, CiR, CiTa	<i>Cost: In-kind</i> Cities with populations over 1,000 have Water Supply Plan with the DNR, which has triggers for water reduction measures.
		Water conservation measures are being followed during drought conditions.	Educate the public on the importance of water conservation in times of low rainfall.		Existing: Ongoing Continuous Prevention	LMO, BWSR, RWS, All Cities	

MS Table #5

Fire – Structure Fires & Wildfires

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
Fire – Structure Fires & Wildfires	Eliminate or lessen the negative impacts from fire.	Limit the potential for wildfires to spread.	Establish fire breaks. Reduce fuel loading in areas that may be susceptible to wildfires.		Existing: New Continuous Prevention	EM, LCPW, Fire, Twp, DNR	Cost: In-kind
		Educate community members on fire prevention and safety.	Participate in the nationally coordinated “Firewise” program to increase resident education. Educate community members about red flag warnings.		Existing: Ongoing Continuous Awareness	All Cities, Fire, LMO, Sch, EM	Cost: In-kind Education regarding vegetation management and the use of fire resistant building materials.
		All burning is done in compliance with burn permit requirements.	Create an awareness program for burn permits and enforce fines for noncompliance. Create burning permit application process on the Lyon County website.		Existing: Ongoing Continuous Awareness	All Cities, Fire, LMO, EM	Cost: In-kind
		Property owners construct new facilities to MN Uniform Building Code.	Encourage building construction to include fire/smoke/CO alarms, sprinkler systems, and other minimum design standards.		Existing: Ongoing Continuous Prevention	All Cities, LMO, LAW, Fire	Cost: In-kind The Cities of Ghent, Marshall, and Tracy have adopted the Minnesota Building Code.

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Have a facility and equipment plan for EMS and fire departments in Lyon County.	Work with medical response personnel (EMS) and fire departments on long-range capital improvements planning (CIP) for facilities and equipment.		Existing: Ongoing Continuous Prevention	Fire, EMS, EM, DNR	Cost: In-kind
		Conduct controlled burns in a safe and controlled manner.	Educate property owners on the proper use of controlled burns and firebreaks and coordination of efforts. Provide materials that have detailed information on the proper use of controlled burns.		Existing: Ongoing Continuous Awareness	Fire, LAW, Twp DNR	Cost: In-kind

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Fire fighters and medical response personnel (EMS) have adequate resources.	<p>Work with regulators to create reasonable regulations in regards to equipment and training to prevent undue hardships on rural fire departments.</p> <p>Move toward a decision support system for the replacement of equipment and away from universal expiration dates.</p> <p>Encourage trainings in southwest Minnesota, so travel time can be decreased.</p>		New Short Term Emergency Services	EM, Fire, EMS, local elected officials	<p>Cost: Grants for equipment and training</p> <p>Regulations are putting expiration dates on tires and other equipment.</p> <p>Trainings are held out of the region, so it is very difficult to get volunteer firefighters to the trainings.</p>
		Fire fighting vehicles and other emergency vehicles have access to all buildings and structures.	<p>Outline streets and alleys that are and are not sufficient size to handle modern fire fighting vehicles and other emergency vehicles.</p> <p>When doing new subdivision design, make sure that the sizes are sufficient for emergency vehicles.</p>		New Short Term Emergency Services	All Cities, Twp, LCPW, LMO, Fire, Planning and Zoning	<p>Cost: In-kind</p> <p>This may require limiting parking on the street and having setback requirements along alleys.</p>

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Emergency response personnel are prepared to respond to incidents at renewable energy facilities.	Facilitate education on best practices for response to incidents at renewable energy facilities (including ADM, industrial solar, roof top solar, pipelines, etc.).		Existing: Ongoing Continuous Emergency Services	EM, LAW, EMS, Fire	Cost: In-kind
		Water access in rural areas is fast and efficient.	Install dry hydrants in the cities of Balaton and Russell.		New Long Term Emergency Services	EM, Fire, DNR	Cost: \$1,000 to \$3,000 Issues: DNR regulations and maintenance costs. There is only one dry hydrant in Lyon County (Cottonwood Lake).

MS Table #6

Flooding & Dam Failure

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
Flooding & Dam Failure	Minimize the negative impacts from seasonal flooding and flash flooding.	Future developments constructed within Lyon County and each city within the county are located outside of 100-year flood plains.	Continuation of flood plain mapping and zoning in the official land use maps and zoning ordinances.		Existing: Ongoing Continuous Protection	LMO, EM, FEMA, DNR	<i>Cost:</i> In-kind The cities of Russell, Lynd, Marshall, and Minneota have land in the one percent floodplain.
		Developments in flood hazard areas follow best practices to minimize risk.	Work closely with DNR on all development applications in identified flood hazard areas. Update ordinances to ensure ordinances reflect best practices to minimize risk.		New Short Term Structural	CiL, CiR, CiMa, CiMi, DNR, EM, LMO	<i>Cost:</i> In-kind
		Update the Flood Insurance Rate Maps in Lyon County as new data becomes available.	Lyon County communities with flood hazards are encouraged to work with DNR and FEMA to modernize the floodplain maps.		Existing: Ongoing Continuous Awareness	DNR, OK, CJ, LCPW, LMA	<i>Cost:</i> In-kind
		Cities that utilize centralized sewer treatment systems have compliant systems that keep inflow and infiltration to a minimum.	Work with cities to implement best practices in regards to inflow and infiltration.		New Continuous Structural	All Cities, MPCA, FEMA	<i>Cost:</i> Cities do this but it is costly.

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Decrease the transport of phosphorus, nitrogen, and sediment during flood events.	<p>Promote a vegetative buffer system along creeks and streams that are prone to flooding (Grass Strips, CRP, RIM, etc.).</p> <p>Promote the use of storm water retention and detention systems.</p> <p>Design sanitary treatment systems that can limit discharges during floods.</p>		New Short Term Prevention	LMO, SWCD, BWSR, MPCA, DNR	<p><i>Cost:</i> land owners – government devaluing agricultural land without compensating landowners</p> <p>In 2015, a buffer initiative was signed into law, designating an estimated 110,000 acres of land for water quality buffer strips statewide. The law establishes new perennial vegetation buffers of up to 50 feet along rivers, streams, and ditches.</p>
		Share resources within Lyon County and the Region.	Encourage all cities in Lyon County to participate in the MN Warn System.		New Short Term Emergency Response	EM, All Cities	<p><i>Cost:</i> In-kind</p> <p>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.</p>

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		No new development in the flood hazard areas.	Discourage zoning variances in identified flood hazard areas. Discourage development in the 500 year floodplain.		New Short Term Structural	All Cities, EM, LCA	Cost: In-kind
		Decrease activities that increase downstream flow rates.	Work with property owners to slow water drainage systems and encourage more natural water infiltration.		New Continuous Prevention	LCPW, SWCD, LMO, DNR	Cost: In-kind
		Eliminate repetitive flooding in Eidsvold Township.	Work with Eidsvold Township to pursue mitigation funding for addressing repetitive flooding sites in Eidsvold Township, in accordance with the existing plan.			Eidsvold Twp, EM, DNR, LMO, SWCD	Cost: unknown Appendix A contains documents outlining the flooding issues and suggestions for permanent fixes at the specific sites.

MS Table #7

Civil Disturbance & Terrorism

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
Civil Disturbance & Terrorism	Protect residents and critical infrastructure from domestic or foreign threats.	New facility construction is responsive to potential terrorist activity, where appropriate.	Consider zoning and building code changes and updates that reflect building measures to withstand civil disturbances and terrorist attacks, where appropriate.		New Continuous Prevention	LMO, All Cities, EM, LAW	Cost: In-kind
		Increase community resiliency regarding emergency preparedness.	Local governments complete and maintain thorough community risk and threat assessments.		Existing: Ongoing Continuous Prevention	EM, LAW	Cost: In-kind
		Achieve continuity of emergency services.	Plan for potential loss of essential services in the event of a regional catastrophe.		Existing: Ongoing Continuous Prevention	EM	Cost: In-kind
		Increase safety in county and city public facilities.	Consider limiting public access in high profile county and city locations in times of increased potential for civil disturbances and terrorist activity. These times should follow the Federal Department of Homeland Security warning system, or local threat assessments.		New Continuous Prevention	LAW, LCA, EM, Sch, All Cities, Hosp	Cost: In-kind

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Increase the level of security of public facilities through landscape design, vehicle barriers, and separation of public and private functions.	When remodeling or building a new building consider the design to increase security. When landscaping around a public building consider the design to increase security.		New Continuous Prevention	LCA, All Cities, LAW, EM, Sch, Hosp	Cost: In-kind
		Increase security throughout Lyon County.	Encourage the, "See Something Say Something" campaign. Include this message in a public service announcement biannually (radio, local broadcast channels).		New Continuous Prevention	EM, LAW	Cost: In-kind
		Increase coordination with schools and other government agencies regarding scenario planning for terrorist events.	Conduct annual scenario trainings with schools in Lyon County, government agencies, businesses, etc.		New Short Term Prevention	Sch, EM LAW, Fire, EMS, LCA, All Cities, Hosp	Cost: In-kind
		Increase safety at higher density public places.	Identify higher density locations in Lyon County. A non-exhaustive list includes: schools, ADM, Schwan's, fairgrounds, and event center. Work with them to develop evacuation plans at these locations.		New Short Term Prevention	EM, Law, Sch, Fire, EMS, Hosp	Cost: In-kind

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Increase security at government facilities in Lyon County.	<p>Install security devices (metal detector, etc.) at the entrances to the Lyon County Government Center.</p> <p>Evaluate other government facilities regarding the need for additional security.</p>		<p>New</p> <p>Continuous</p> <p>Prevention</p>	LCA, EM, LAW	<p>Cost: ???</p> <p>There are cameras in the Law Enforcement Center and court administrative entrance, but not in the main entrance to the government center.</p>
		Enhance the transportation capabilities of the ERU.	Pursue grant funds and purchase a lower cost ex-military troop carrier that can be used to transport the ERU.		<p>New</p> <p>Short Term</p> <p>Emergency Services</p>		<p>Cost: ???</p> <p>Ex-military equipment is released via a first come basis out of the cities, so this equipment is typically gone before emergency managers from Greater Minnesota can respond.</p>

MS Table #8

Hazardous Materials

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
Hazardous Materials	Improve the effectiveness and quality of the various agencies addressing hazardous materials that may impact Lyon County.	Hazardous Material Releases are quickly identified and properly and safely responded to.	<p>Increase training of emergency personnel so that all types of potential releases will be readily recognized upon arrival. Quickly map the affected disaster area as well as surrounding areas within Lyon County.</p> <p>Train personnel in the appropriate response.</p>		<p>New</p> <p>Continuous</p> <p>Emergency Response</p>	<p>Law, Fire, EMS, EM, LCPW, MnDOT</p>	<p>Cost: In-kind</p>
		Public is educated on sheltering in place during hazardous material events.	Conduct biannual public service announcements regarding sheltering in place and when it is appropriate.		<p>Existing: Ongoing</p> <p>Continuous</p> <p>Emergency Services</p>	EM	<p>Cost: In-kind</p>

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Elected officials, emergency responders, and the general public have access to accurate information regarding hazardous materials.	Work with state and federal agencies to address hazardous materials and delivery systems (e.g. pipelines, rail, and trucks) that have the potential to impact the county and region. Increase education of school officials, health care workers, employers, and the general public about response to hazardous materials events.		Existing: Ongoing Continuous Awareness	EM, LMO, Fire, DPS, MPCA	Cost: In-kind Different shipping methods have different risks (refer to the footnote below for more information). ¹⁰³
		Emergency personnel have equipment and training to respond to emergencies regarding hazardous materials.	Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives.		Existing: Ongoing Continuous Emergency Services	LCPW, Law, FIRE, EMS, All Cities, EM	Cost: In-kind

¹⁰³ Forbes. "Pick Your Poison for Crude – Pipeline, Rail, Truck or Boat." Accessed: 3/29/16. Available: <http://www.forbes.com/sites/jamesconca/2014/04/26/pick-your-poison-for-crude-pipeline-rail-truck-or-boat/#4117b90f5777>

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Support policies and programs that assist in creating factual and timely information about hazardous materials in Lyon County.	Coordinate databases into one system using E Plan, so information is distributed using one platform.		New Short Term Emergency Services	LCA, LMO, EM, LCPW	Cost: In-kind + equipment and database costs
		All parties responsible for hazardous material spill cleanup are held accountable.	Enforce ordinances that deal with who is responsible for hazardous material spill cleanup.		Existing: Ongoing Continuous Prevention	LAW, LCA, EM, Fire, LMO, MPCA	Cost: In-kind
		The public is aware of the indicators of illegal activities.	Conduct an annual education campaign to increase education of store owners, school officials, health care workers, and the general public about the warning signs of meth. Educate the public about the warning signs of clandestine illegal labs. Especially school officials and health officials along with mail carriers, cable repair men, plumbers, electricians, and delivery personnel (UPS, FEDEX).		New Continuous Prevention	LCA, LAW, EM, LMO, LCPW, Sch, SWHHS	Cost: In-kind

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Landowners monitor their properties and report any signs of illegal activities promptly.	Educate landowners that they are responsible for the cost of clandestine lab cleanups, so that there is an increased economic incentive for monitoring properties		Existing: Ongoing Continuous Prevention	LAW, HAZ, Fire, LMO, EM, LCA	Cost: In-kind (letter with tax statement)
		Store owners are aware of the ingredients used to make illegal drugs and report any suspicious activity.	Educate store owners on the ingredients used to manufacture and grow dangerous drugs and what they can do to prevent or limit the sale of the ingredients.		New Continuous Prevention	EM, SWHHS, LAW, Sch	Cost: In-kind

MS Table #9

Public Health Emergencies

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
Public Health Emergencies	Reduce the threat of public health emergencies.	Better coordination with local partners in the case of public health emergencies. Public is informed on effective measures to prevent the spread of infectious diseases.	Provide information to public and private employers, schools and hospitals about potential infectious disease threats and prevention measures.		Existing: Ongoing Continuous Prevention	EM, SWHHS, Hosp, Sch	Cost: In-kind

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Increased distribution of medications and medical supplies in the case of emergency.	Encourage SWHHS to continue work with Minnesota Department of Health and local partners for the mass distribution of needed medicines and supplies for public health emergencies.		New Continuous Emergency Services	SWHHS, MDH, LAW, Fire, EMS, EM, Hosp, Sch	Cost: In-kind
		Maintain Health Alert Network (HAN).	Notify local medical providers and local partners of potential infectious disease threats.		New Continuous Prevention	SWHHS, MDH, Hosp, EM	Cost: In-kind
		Citizens dependent on oxygen or respiration assistance in their homes have access to back-up power or alternative life support.	Work with rural electric and Medicare to maintain a list of homes that are dependent on oxygen or respiration assistance and require backup power.		Existing: Ongoing Continuous Awareness	SWHHS, PU	Cost: In-kind

MS Table #10

Transportation Infrastructure & Transportation Crashes

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
<p>Transportation Infrastructure & Transportation Crashes</p>	<p>Transportation systems in Lyon County are efficient, cost effective, and safe for all users.</p> <p>Improve effectiveness of local agencies in preventing and responding to crashes.</p>	<p>Work with MnDOT / local road authorities to identify and improve hazardous intersections, bridges, and other transportation infrastructure.</p>	<p>The most problematic intersections have been identified by the Lyon County Highway Department as part of the Lyon County Transportation Safety Plan. Identify traffic safety improvements to mitigate the risk of crashes at these intersections.</p> <p>Identify funding sources to assist with reducing the risk of crashes at these intersections.</p>		<p>Existing: Ongoing</p> <p>Continuous</p> <p>Prevention</p>	<p>LCPW, EM, LAW, All Cities, MnDOT, Twp</p>	<p>Cost: In-kind</p> <p>Refer to the Lyon County Transportation Safety Plan for higher risk intersections. There may not be mitigation measures to improve safety at these intersections. These intersections may have more crashes due to reckless driving and other measures out of control of engineering and local law enforcement.</p>
		<p>Increase safety for vehicle road departures (crashes).</p>	<p>Limited driveways, field accesses, and obstructions in the right-of-way.</p>		<p>Existing: Ongoing</p> <p>Continuous</p> <p>Prevention</p>	<p>LCPW, EM, LAW, MnDOT, Twp</p>	<p>Cost: In-kind</p>

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Emergency personnel are properly trained to respond to a variety of transportation accidents.	Pursue funding to assist with trainings for emergency personnel. Encourage regional training, so emergency personnel travel time is minimized.		Existing: Ongoing Continuous Prevention	EMS, Fire, LCPW, EM	Cost: Unknown
		Clear rights-of-way for safety and visibility.	Encourage road authorities to work to prevent encroachment and maintain adequate right-of-way setbacks.		Existing: Ongoing Continuous Prevention	Twp, LMO, LCPW	Cost: In-kind
		Maintain safe and proper clearance around airports in Lyon County.	Ensure county and city staff review airport improvement plans and zoning before new development occurs.		Existing: Ongoing Continuous Prevention	LMO, Marshall, Tracy, MnDOT, FAA	Cost: In-kind

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Maintain visibility and clearance along public roadways and railways in Lyon County.	<p>Work with maintenance personnel to keep the train tracks clear of debris when they are grading the roads.</p> <p>Maintain adequate visibility and lighting at strategic intersections.</p> <p>Work with local road authorities to identify other visibility and clearance issues.</p>		<p>New</p> <p>Continuous</p> <p>Prevention</p>	EM, LAW, MnDOT, LCPW, Rail	Cost: In-kind
		Have an adequate maintenance budget for road authorities in Lyon County.	<p>Research additional funding sources for road maintenance and traffic safety improvements and provide education to elected officials on the maintenance of infrastructure needs.</p>		<p>New</p> <p>Continuous</p> <p>Prevention</p>	EM, LCPW	Cost: In-kind

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		<p>Maintain roads that may be vulnerable to erosion and closure.</p> <p>Ensure connectivity of road network, so emergency personnel are not redirected due to road closures.</p>	<p>Identify culverts that are frequently in need of repair or are in poor condition.</p> <p>Work to address vulnerabilities to address public infrastructure that is susceptible to flooding. Refer to RA Figure 16 – Public Infrastructure Susceptible to Flooding.</p>		<p>New</p> <p>Short Term</p> <p>Prevention</p>	LCPW, EM, MnDOT, Twp	Cost: Unknown
		Reduce road closures due to drifting snow.	<p>Identify mitigation measures to mitigate road closures caused by drifting snow. Refer to RA Figure #5 – Snow Removal Problem Areas.</p> <p>Use road design, living snow fences, slope easements and land cover to help control snow on roadways.</p>		<p>New</p> <p>Short Term</p> <p>Prevention</p>	LCPW, EM, LAW, Twp, All Cities, LMO	Cost: Unknown
		Increase visibility of pedestrians at higher traffic volume crossings.	Support projects outlined in local Active Living Plans, Safe Routes to School Plans, Land Use Plans, and Comprehensive Plans that increase pedestrian safety.		<p>New</p> <p>Continuous</p> <p>Prevention</p>	LCPW, EM, LAW, All Cities, MnDOT, Sch	Cost: Unknown

MS Table #11

Utility Failure

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
Utility Failure	Increase coordination between Rural Electrical Cooperatives, emergency response, SWHHS, and emergency management.	Critical facilities have redundant services in case of utility failure.	Evaluate the needs and costs for providing backup generation where none currently exists. Refer to RA Table #8 for a list of facilities that need new or additional backup generators.		Existing: Ongoing Short Term Prevention	EM, All Cities, PU, LCPW, SWHHS, RWS	Cost: In-kind for research. Costs vary for backup generators from \$5,000 to \$100,000.
		Critical facilities such as hospitals and rural water suppliers have access to back up power generators.	Evaluate the needs and costs for providing back up generation to critical facilities, including: hospitals, rural water suppliers, and locations of Strategic National Stockpile of medicines and supplies.		Existing: Ongoing Short Term Prevention	EM, PU, RWS, Hosp, SWHHS	Cost: In-kind for research. Costs vary for backup generators from \$5,000 to \$100,000.
		Protect vulnerable populations during extreme heat and cold events.	Work with SWHHS and Medicare to maintain a list of vulnerable populations to check on in times of extreme heat and cold events.		Existing: Ongoing Continuous Prevention	SWHHS, EM	Cost: In-kind

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
	Eliminate or reduce the effect of utility failures that occur within Lyon County.	Increase hardening of the electrical grid in Lyon County.	Examine need for redundant utility service/sources at critical facilities. Encourage utility providers to bury electric lines where feasible.		Existing: Ongoing Continuous Prevention	EM, PU, LCPW, All Cities	<i>Cost:</i> 3 phase lines cost \$79,000 a mile so it is extremely costly to bury lines. Mitigation funding will speed up projects identified by electric cooperatives.
		Property owners maintain landscaping distances to overhead power lines.	Conduct an annual tree planting campaign along with a damage prevention meeting through Gopher State One Call – call before you dig.		New Continuous Prevention	EM, LMO, PU, All Cities	<i>Cost:</i> in-kind Damage prevention meetings are held throughout the state. Refer to the footnote for more information. ¹⁰⁴

¹⁰⁴ Gopher State One Call. Damage Prevention Meetings. Accessed: 3/30/16. Available: <http://www.mncga.com/damage-prevention-meeting-info/register-to-attend>

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Reduce the risk of damaging natural gas lines.	Require a permit when working along township roads.		New Short Term Prevention	Twp, PU, LMO, LCPW	Cost: in-kind There is a risk associated with snagging natural gas lines along township roads when work is being done. County Roads require getting a permit, while township roads do not.
		Reduce the risk of substation vulnerability to disruption. Increase security around substations.	Install cameras and other security devices / deterrents around substations.		New Short Term Prevention	PU, EM, LAW	Cost: unknown Western States have seen a problem of people vandalizing substations.

MS Table #12

Water Supply Contamination

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
Water Supply Contamination	Preserve and protect the quantity and quality of the county's public water resources.	An adequate supply of clean drinking water is available even in the case of emergencies.	Provide updates to the Emergency Response Plan that identifies alternate sources of drinking water.		Existing: Ongoing Continuous Prevention	EM, RWS, SWHHS	Cost: In-kind

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Minimize contamination of groundwater from abandoned wells.	Continue the abandoned well sealing program within Lyon County.		New Continuous Prevention	LMO, SWCD, BWSR, LCPW	Cost: \$1,000 per well
		All public water suppliers should have a wellhead protection plan.	Work with MDH to complete and implement Wellhead Protection Plans for all public water suppliers.	3	Existing: Ongoing Short Term Prevention	CiC, CiTr, EM, MDH	Cost: In-kind The Cities of Cottonwood and Tracy do not have wellhead protection plans, but planned to be developed by the Minnesota Development of Health within the next five years.
		Maintain an interconnected water supply in case of emergencies.	Maintain wells that are accessible if Rural Water (current source) would need to shut down.		New Continuous Prevention	RWS, All Cities	Cost: unknown (could be substantial) Rural water is the primary source or backup water sources for the majority of cities in Lyon County.

Hazard	Goal	Mitigation Objective	Mitigation Strategy	Priority	Status / Timeframe	Who	Comments on Implementation & Potential Funding
		Minimize inflow and infiltration in sewer systems in Lyon County.	Work with cities in Lyon County to identify funding sources to improve sewer systems that are outdated and do not meet current standards regarding inflow and infiltration.		New Continuous Structural	All Cities, EM, LMO, MPCA	<i>Cost:</i> it is extremely costly to update a sewer system Cities want to minimize inflow and infiltration but cost can be a barrier.
		Minimize point source and nonpoint source pollution.	Work with MPCA and DNR to identify best practices to minimize point source and nonpoint source pollution.		New Continuous Prevention	MPCA, DNR, LMO, SWCD	<i>Cost:</i> In-kind
		Water supplies and water treatment facilities have backup generators.	Identify critical water supply and treatment facilities in Lyon County.		New Continuous Prevention	EM, RWS, All Cities	<i>Cost:</i> unknown (could be substantial) Pumps go down, treatment and water supply goes down.

Sources of Funding

Funding sources for mitigation actions vary from FEMA to other federal, state, and local funding sources. Certain mitigation actions lend themselves to specific funding sources.

- Mitigation actions for Public Health Emergencies are typically led by Public Health Services, with funding through the Minnesota Department of Health and other sources.
- Mitigation actions for Transportation Infrastructure will likely be accomplished in conjunction with MnDOT/Federal Highway Administration, County State Aid, and other County/Township/City-funded projects. MnDOT may pay \$500-\$700 per acre, per year for living snow fence projects in priority locations, which is often supplemented by the Conservation Reserve Program (CRP) through USDA Farm Service Agency and SWCD.
- Mitigation action items for Drought/Water Supply may find funding from DNR, the Minnesota Board of Water and Soil Resources (BWSR), Minnesota Pollution Control Agency (MPCA), US Environmental Protection Agency (EPA) and US Department of Agriculture (USDA).
- Mitigation actions for flooding/dam failure beyond property acquisition, relocation and elevation may be fundable through DNR, BWSR, and local Soil & Water Conservation District sources.
- Mitigation actions for Fires (both structure/vehicle fires and wildfires) may be fundable by local fire departments through FEMA's Assistance to Firefighters Grants (AFG), Staffing for Adequate Fire and Emergency Response Grants (SAFER), Fire Prevention and Safety Grants (FP&S), and Assistance to Firefighters Fire Station Construction Grants (SCG) programs. The DNR also works with local fire departments to conduct wildfire training programs.
- Mitigation actions for hazardous materials mitigation and response may be funded by Minnesota Pollution Control Agency (MPCA) and US Environmental Protection Agency (EPA). An example project may include: water and sewer projects, Brownfield cleanups, Voluntary Investigation and Cleanup (VIC) projects, and Tank Compliance and Assistance Program.
- Other actions would have to be funded from general tax levies, ongoing program budgets, and by private citizens.

Action items for Participating Jurisdictions

Lyon County is a rural county with few full-time paid staff in the area of emergency management. Jurisdictions in Lyon County rely on Lyon County Emergency Management for services regarding emergency management and hazard mitigation. Lyon 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 Lyon 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.

IV Identification and Analysis of Mitigation Strategies: National Flood Insurance program (NFIP)

Participation in the National Flood Insurance Program

FEMA’s National Flood Insurance Program (NFIP) is intended to provide flood insurance, assist with floodplain management, and complete flood hazard mapping (Refer to Chapter 5, Section A6 for more information regarding flooding). A number of jurisdictions in Lyon County participate in the National Flood Insurance Program (NFIP).

There are 52 flood insurance policies in Lyon County.¹⁰⁵ Each policy covers a single building, but all single family home policies include detached garages. Refer to Risk Assessment MS Table #13 for an outline of policies in each city.

MS Table #13 Participation in the National Flood Insurance Program

CID Community	Jurisdiction	Init FHBM Identified	Init FIRM Identified	Curr EFF Map Date	Reg-Emer Date
270553	City of Balaton	1/17/75	8/19/85	11/26/10(M)	8/19/85
270765	City of Cottonwood	NA	11/26/10	(NSFHA)	3/21/97
270257	City of Ghent	8/2/74	11/26/10	11/26/10	6/8/84
270584	City of Lynd	2/14/75	8/19/85	11/26/10	8/19/85
270256	Lyon County	12/13/74	6/1/98	11/26/10	6/1/98
270258	City of Marshall	11/2/73	9/30/77	11/26/10	9/30/77
270259	City of Minneota	5/3/74	4/6/00	11/26/10	4/6/00
270600	City of Russell	12/13/74	11/26/10	11/26/10	7/6/84
270260	City of Taunton	7/19/74	11/26/10	11/26/10(M)	1/24/11
270766	City of Tracy	NA	11/26/10	(NSFHA)	11/26/10

FEMA <http://www.fema.gov/cis/MN.pdf>

¹⁰⁵ FEMA Region V. Information request. Received: 2/25/16.

CHAPTER 8: PLAN MAINTENANCE

This Chapter documents procedures for long-term plan maintenance. Section I describes monitoring, evaluating and updating the plan. Section II addresses the need for continued public involvement.

I Monitoring, Evaluating, & Updating the Plan

Plan Monitoring

The Lyon County All Hazard Mitigation Plan (AHMP) is not a static document. It is the intent of the plan to serve as a guide for mitigating current and future hazards. Lyon County Emergency Management Department maintains regular contact with all jurisdictions in Lyon County. This will allow the Lyon County Emergency Management Director and Department to monitor and implement strategies outlined in the AHMP. The Lyon County Emergency Management Director will evaluate the goals that have been implemented by Lyon County and jurisdictions within the county. The Lyon County Emergency Management Director will also evaluate the Lyon 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 Lyon County will help to ensure that the Lyon 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 3 years 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 Lyon County AHMP Planning Team members, local units of government, and local residents to start the process to update the Lyon County AHMP. The Emergency Management Director will also extend an invitation to non-participating jurisdictions to join the planning process for the update.

The Lyon County Emergency Management Department will work with the Development Planner at Southwest Regional Development Commission (SRDC) to collect information regarding hazard events during the five year update cycle. This includes but is not limited to: keeping newspaper articles describing hazard events, taking notes regarding feedback from residents of Lyon County in relations to hazard events and mitigation efforts, working with cities and townships to document hazard events, and plan for mitigation measures to mitigate the effects of hazard events and potential hazard events.

II Continued Public Involvement

Lyon 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 Lyon 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.lyonco.org/>

<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

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.

G Figure #12 **Disaster Management Cycle**



APPENDIX

Appendix A - Eidsvold Township Repetitive Flooding

March 30 2015

Due to continuous flooding over the years Eidsvold Township has encountered financial hardship. Because of this Eidsvold Township is looking for ways to construct permanent structures to prevent the flooding damage. Listed below are Eidsvold Townships suggestions of permanent fixes at specific sites.

Site one is along the west edge of Eidsvold Township in the southwestquarter of section seven. Due to water running over the road surface at a point where there is a sag or spillway the road suffers damage or has been washed out numerous times. Eidsvold Township believes the best correction for this site would be to hard surface the sag or spillway to eliminate overtopping damage. also rip-rap on the slopes of the road would eliminate undermining of the hard top surface.

Site two is located at the intersection of Eidsvold 130th ave. and Lyon-Yellow Medicine road. The main culvert across this intersection is in need of repair due to flood damage. If some flood waters were diverted there would be less pressure on this culvert thus eliminating some of the damage. If a culvert was placed across the road upstream between sections 33 & 4, at or above field level, and another culvert across the road at or above field level between sections 3 & 4, and another culvert set low in the road ditch near the watercourse, Eidsvold Township believes this would eliminate the flooding problem.

Site three is located just over one half mile north of roads 140th ave and 390th street between sections 2 & 3 of Eidsvold Township. At this site there is a stream to the north of the box culverts that flows into the culverts. When flood from the north meet the water of the main stream, both flows slow and deposit sediment into the box culverts. Eidsvold Township believes by putting a culvert across the road just north of the main stream box culverts it would divert the flood water into the main stream downstream from the box culverts and eliminate sediment buildup.

A second problem with this site is the lateral migration of the river. This problem is just west of the box culverts. Eidsvold Township believes that a series of J-hooks in the river would divert waterflow and eliminate corrosion of the river banks.

Site four is located just under one half mile east of the intersection of Eidsvold Township roads 390th street and 130th avenue where the Yellow Medicine river crosses 390th street.

At this site when the river floods south of the road, the road acts as a dam. The water spreads west, south of the road

flooding farm land. If the water gets high enough it crosses the road at a spot west of the bridge where there is a spillway. This part of the road is first to wash out. Eidsvold Township believes that if this spillway was hard surfaced, with rip-rap slopes, it would not wash out thereby eliminating year after year costs to rebuild the road. Also to eliminate some road pressure from flooding, Eidsvold Township believes that a small flood plain culvert placed across the road west of the spillway would help with the problem. Once the water is on the north side of the road farm land floods. To eliminate some of the monetary damage from this flooding, along with erosion problems Eidsvold Township believes if approximately two and a half to three acres of the farm land by the spillway was taken out of production and put into a Government farm program such as CRP or CREP, the soil formed from being in this program would keep the soil from washing away. The farmer owner by enrolling in a program would be paid for doing so and not have to endure the cost and loss of a crop being drowned by flood water.

On the north side of the road west of the river there is a small driveway or cartway, running north to a pasture north of the river where it turns east. If the driveway were to be moved west of the flood plain culvert it could still be used as a driveway and also act as a field levee to keep flood waters out of the productive farm land and channel the water back into the river. Also along the road on both sides, Eidsvold Township believes that by cleaning out both ditches and reshaping the slopes, water would funnel back to the river in case of a smaller flood event.

Eidsvold Township Board

Terry Schreiber Chairman





Minnesota Department of Natural Resources

Division of Ecological & Water Resources
1400 East Lyon Street, Marshall, MN 56258
507-537-7258
Lucas.Youngsma@state.mn.us

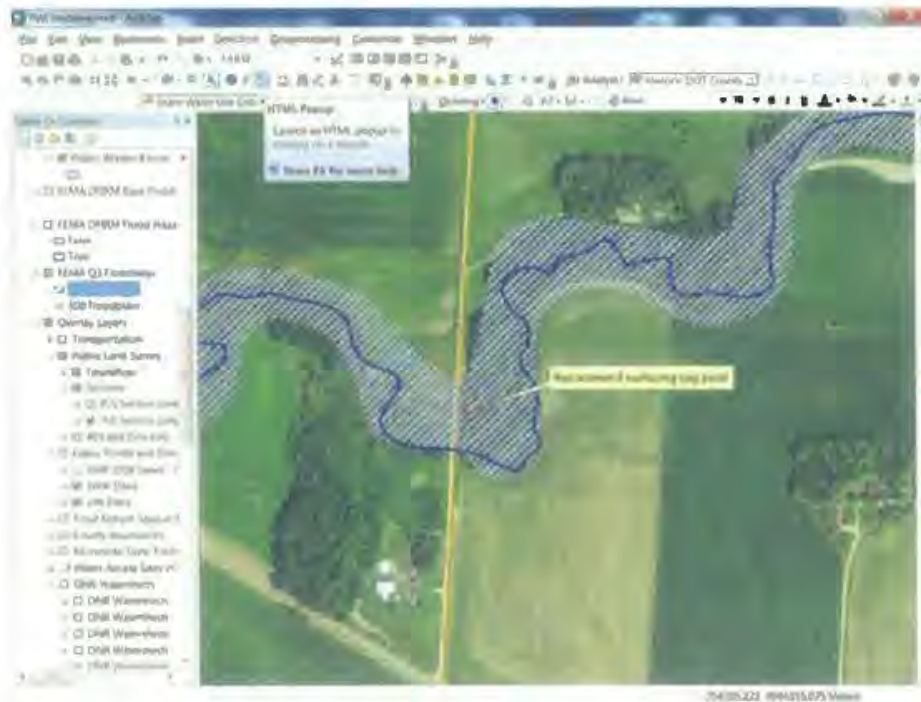
March 12, 2015

Terry Schreiber
3747 County Rd 1
Taunton, MN 56291

Dear Mr. Schreiber;

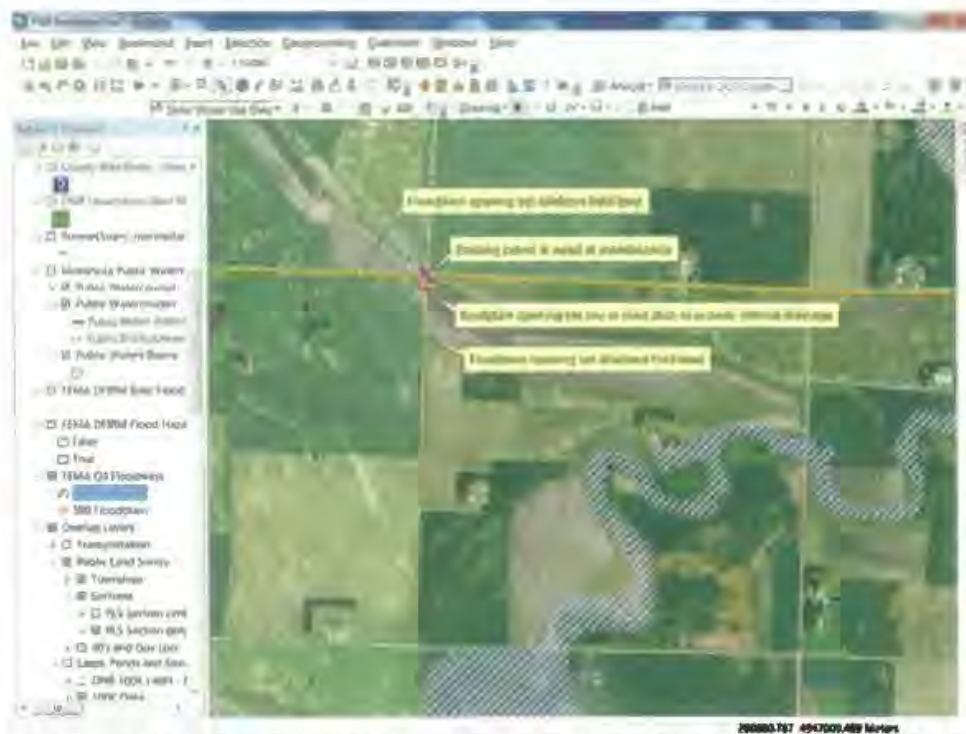
On Tuesday, January 14 2015, township members from Eidsvold Township met with Lucas Youngsma, DNR Area Hydrologist to discuss several River Crossings and subsequent flooding and geomorphic issues along the Yellow Medicine River within Eidsvold Township. The meeting was held with the intent to provide up-front collaboration between DNR and the township and to assist the township with their long-range planning efforts to provide for the sustainability of their transportation resources.

The discussion began with the crossing on the western edge of Eidsvold Twp in the SW $\frac{1}{4}$ Sec. 7. This structure was reconstructed in 1993 with a road sag point designed to allow for overtopping, however the road surface was not protected by a hard surface or riprap. I had looked into some alternatives, however due to the cross-sectional area needed to pass flood flows brought me to conclude that the best method of protecting this structure from repetitive damages would be to surface the sag to limit erosion from overtopping. This crossing is needlessly damaged on a repetitive basis.

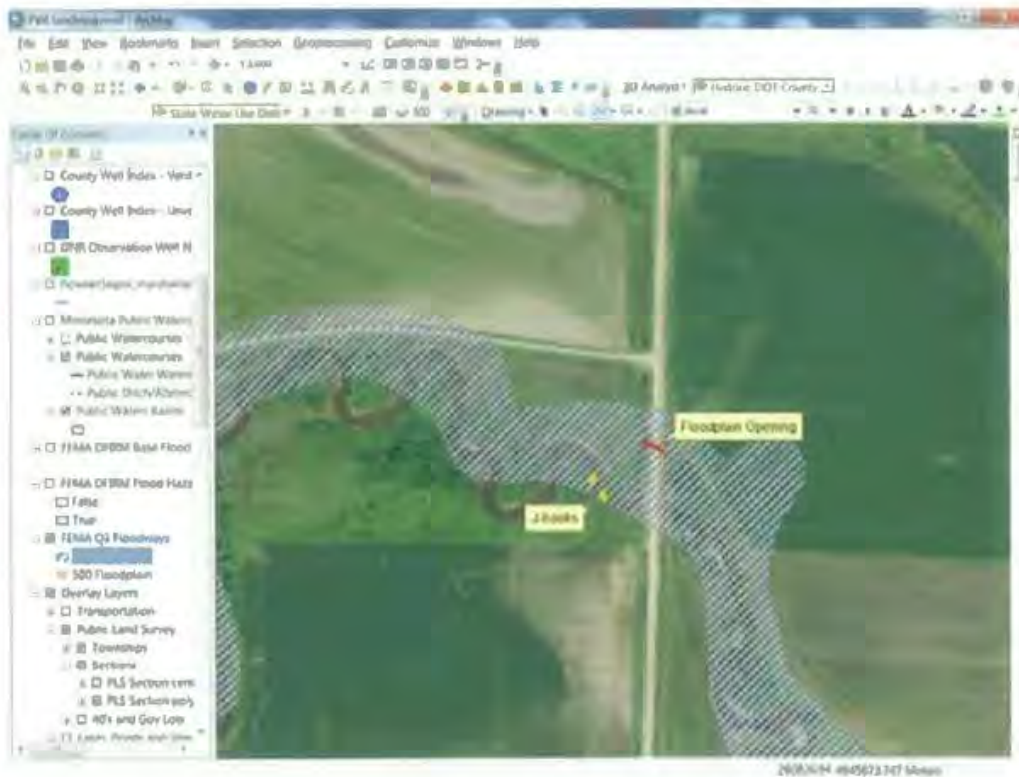


The discussion then moved to discuss some geomorphic principles of river crossing sustainability from both a transportation perspective and natural resource perspective. This discussion was based off of a report: [Reducing Localized Impacts to River Systems through Proper Geomorphic Sizing of On-Channel and Floodplain Openings at Road/River Intersections.](#)

We discussed applicability of these concepts at a few more crossings. One of the crossings we discussed was in the corners of sections 3,4 & Burton 33,34. This culvert is apparently in need of minor repairs as there is some separation occurring between pipe segments. This would be an ideal location for floodplain openings that could help alleviate pressure on this culvert that has likely led to, or exacerbated, the need for maintenance on this pipe. Floodplain openings would likely consist of small centerline culvert(s) set at/above field level on the upstream road crossing between sections 33 & 4, with small centerline culvert(s) set at/above field level between sections 4 & 3, and another small centerline culvert set low in the road ditch near the watercourse.

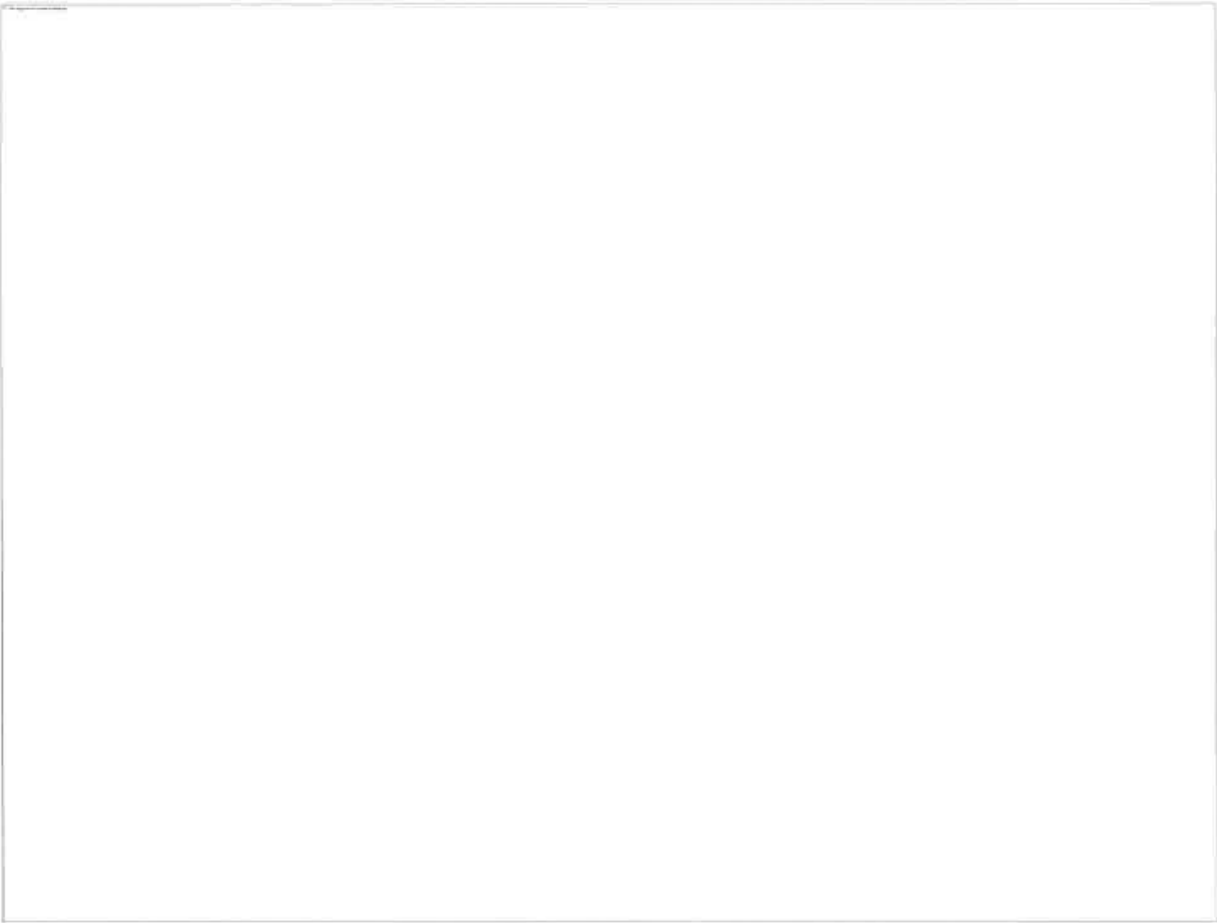


Our conversation then moved to the crossing between sections 3 & 2. This crossing is relatively new, and due to design inadequacies continually accumulates sediment with in 2 of the 3 lines of box culvert. The design did not adequately take bedload transfer into consideration. Additionally, the stream is migrating laterally at this location as the culvert placement did not adequately take stream migration into consideration. Our discussion involved two potential options at this site. The first is proper geomorphic sizing of the culverts and floodplain opening to pass the entire range of flows along the Yellow Medicine River. To accomplish this, the township could measure the square footage of opening that accumulates sediment, and replicate that area of opening through the road prism a little ways to the north to pass flood flows more effectively, while allowing the normal and low flows to continue to use the partially obstructed culverts without excavating this material out of the culverts (only to have to clean them out again in less than one open water season). The floodplain opening would be set at the level of the ground adjacent to the river, and would also help to pass flood water from the confluence with the upstream tributary that meets just upstream of the box culvert. The second aspect we discussed was the installation of a series of J-hooks, that would seek to help direct flows towards the culverts so that the lateral migration does not continue and end up flanking the culverts or causing other alignment issues.



We then talked about some possibilities involving the crossing between sections 3 & 10. We discussed not only a small floodplain culvert, but also paving the spillway area where the road overtops, and working with the northern neighbor on entering approx. 2.5-3 acres into a conservation program and relocating the field road which would in turn serve as a little bit of an agricultural field levee. We also discussed for smaller frequency events the potential benefit of restoring capacity in the south road ditch.

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Eidsvold Township
March 12, 2015



Based on our conversation I believe that the township should be able to proceed with a comprehensive transportation plan that would not only address their needs, but allow projects to be readily authorized by DNR under our permitting jurisdiction for Public Waters.

If you have any questions, please contact me at the above phone number or address.

Thank you for your cooperation in protecting our irreplaceable water resources.

Sincerely,

Lucas Youngsma
Area Hydrologist

Appendix B – Wellhead Protection Plan Handout



MN Department of Health staff work with Wellhead Protection Advisory Committees including local officials and landowners to create a Wellhead Protection Plan. The plan involves several steps, starting with DELINEATION.

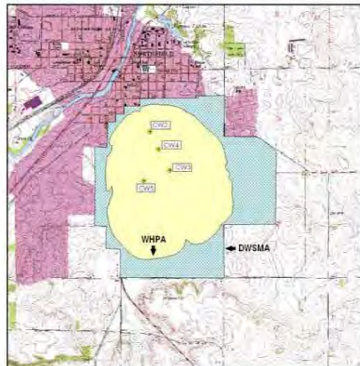
Wellhead Protection Protects Our Drinking Water!

Wellhead Protection seeks to prevent contaminants from entering the wells and groundwater that provide our public water supply. The Minnesota Department of Health works with communities and other public water suppliers to carry out the Wellhead Protection Program.

Why Wellhead Protection? Wellhead Protection helps to prevent the health effects of drinking water contaminants such as nitrates, organic and inorganic compounds, and pathogens. Wellhead Protection also helps water suppliers avoid the high cost of replacing a well or installing expensive treatment equipment.

1 DELINEATION Create a map of the wellhead protection area (WHPA) and drinking water supply management area (DWSMA).

The groundwater within the wellhead protection area (WHPA) will reach the well within 10 years. The drinking supply management area (DWSMA) includes the scientifically calculated WHPA, but is defined using identifiable landmarks such as railroads, streets, and highways.



2 VULNERABILITY ASSESSMENT Assess the vulnerability of the well and the DWSMA

Hydrologists from the Minnesota Department of Health and private firms use technical data to determine whether the geology of the land around the well is likely to permit contaminants to get into the groundwater. For example, sandy soils from land surface to the aquifer can convey contaminants.

3 CONTAMINANT SOURCE INVENTORY Make an inventory of potential sources of contamination within the WHPA

Examples: fuel tanks, feedlots, septic tanks, lawns, dumps, abandoned wells



Storage tanks can leak contaminants



Runoff from feedlots in the WHPA can contaminate groundwater.

4 MANAGEMENT PLAN Develop a plan of action to manage inventoried sources

Examples: Seal unused wells, upgrade septic systems, manure management



A buffer zone of vegetation along a creek helps to prevent contaminants from entering the creek.



This mural in Cold Spring was created by high school students.

5 CONTINGENCY PLAN Develop a water supply contingency strategy

This is a plan for getting water from another source in the event the well becomes contaminated. Examples: Other wells, water transported by tanker, bottled water

6 IMPLEMENTATION Carry out the plan of action

The variety of sources of contamination requires that diverse community members participate in managing them. Education is an important part of IMPLEMENTATION.

Everyone has a role to play in protecting ground water!



For more information about Wellhead Protection, contact the Source Water Protection Unit at the Minnesota Department of Health, 651/216-0800 or 800/818-9318



Appendix C – STAPLEE Process

All Hazards

Goal: Improve the planning process for updating All Hazard Mitigation Plans (AMHP) in Minnesota.

Objective	Needs and projects outlined in the Lyon County AHMP are eligible for funding		
Strategy	Educate state and federal decision makers that county AHMPs should not expire. Currently, a county AHMP can expire if a plan is not updated within the five year update cycle. Projects outlined in an expired county AHMP are not eligible for FEMA funding. Mitigation strategies should remain eligible for funding, if local issues have not changed, there is a need for the project, and the project is outlined in a county AHMP.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety - Decrease mitigation planning costs, so additional funding could be used for mitigation projects
<i>Technical</i>		+	More effective planning process – rural counties not burdened by requirements for an update when nothing has changed
<i>Administrative</i>		+	More efficient planning process (five year update - only Mitigation Strategies Chapter; 10 year update -complete update)
<i>Political</i>		+	FEMA and HSEM are being more efficient
<i>Legal</i>	NA	NA	
<i>Economic</i>		+	Decrease mitigation planning costs, so additional funding could be used for mitigation projects
<i>Environmental</i>		+	Larger number of mitigation projects could be funded
<i>Priority</i>			2

Goal: Improve coordination between entities working with emergency response and hazard mitigation.

Objective	Emergency response and hazard mitigation needs in Lyon County are met.
Strategy	Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local and federal agencies and appropriate private sector representatives.

<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	A more organized and coordinated response to events results in the general public having more confidence in the efficacy of emergency management efforts
<i>Technical</i>		+	Will result in a better use of available equipment and training
<i>Administrative</i>		+	Pre-existing agreements are easier to administer than ad hoc arrangements in the middle of an emergency and easier to follow up on with a defined process
<i>Political</i>		+	Local units of government better meet the needs of their constituents
<i>Legal</i>	-	+	LUGs might have increased legal review costs on the front end of agreements but should show significant cost savings and reduction of liability in the long term
<i>Economic</i>		+	Joint use of training, manpower, and equipment should result in a decrease in the overall costs of providing services compared to providing services individually
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			2

Agricultural Disease

Goal: To reduce the risks to livestock, poultry, pets, production crops and local gardens from agricultural disease.

Objective	Work more closely with the Minnesota Department of Agriculture, University of Minnesota Extension, and the Minnesota Board of Animal Health to limit and contain agricultural disease.		
Strategy	Provide information on agricultural diseases and prevention methods to producers and the general public		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Increased knowledge and awareness can help reduce anxiety about possible disease outbreaks
<i>Technical</i>		+	Feasible given current technology

<i>Administrative</i>	-		Getting the information to the farmers
<i>Political</i>	-	+	Support for AG but can be a slow process
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Could have a large impact on the ag economy, which is a large part of the local economy
<i>Environmental</i>	-		Containment and disposal have definite environmental impacts
<i>Priority</i>			2

Objective	Producers are informed on animal/crop diseases and pest/insects that are prevalent in the region.		
Strategy	Encourage agricultural officials to provide more timely and specific information regarding hazards and warning signs of various diseases that are likely to affect Lyon County.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	-	+	Important information can be difficult to differentiate from the background noise of modern life, but is crucial in an actual outbreak
<i>Technical</i>		+	Using electronic media and social networking to spread information
<i>Administrative</i>	-		Requires sophisticated information specialists on staff to be effective
<i>Political</i>	-	+	Increased information sharing makes hard but necessary decisions more palatable
<i>Legal</i>	NA	NA	
<i>Economic</i>		+	Better, more timely information could help stop or slow down the spread of diseases
<i>Environmental</i>	-		Containment and disposal can prove costly and environmentally unfriendly
<i>Priority</i>			2

Objective	Develop a response plan for addressing agricultural disasters (Avian Flu, etc.).		
Strategy	Work with farmers, local, state, and federal government to develop a section in the Emergency Operations Plan to respond to agricultural disasters, which allows for business continuity.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Produces confidence in the ability of the County to respond appropriately
<i>Technical</i>		+	Is technically feasible right now
<i>Administrative</i>	-		Adds additional work to the development of the EOP
<i>Political</i>		+	May increase confidence in the government's ability to respond
<i>Legal</i>		+	May decrease the likelihood of a lawsuit
<i>Economic</i>		+	Achieving business continuity stabilizes the local economy
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			Existing and ongoing

Objective	Develop a plan for farmers if there is an outbreak of disease or a major disaster occurs (help to contain foreign animal diseases).		
Strategy	Create and expand a section in the Emergency Operations Plan that deals with response and care of animals in an outbreak of disease or a major disaster along with disposal.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Produces confidence in the ability of the County to respond appropriately
<i>Technical</i>		+	Is technically feasible right now
<i>Administrative</i>	-		Adds additional work to the development of the EOP
<i>Political</i>		+	May increase confidence in the government's ability to provide assistance to farmers

<i>Legal</i>	N/A	N/A	
<i>Economic</i>		+	Effective emergency response stabilizes the local economy
<i>Environmental</i>		+	Knowledgeable and proper disposal of diseased animals reduces the impacts on the environment
<i>Priority</i>			Existing and ongoing

Goal: Reduce the risk of plant loss from insects/pests and diseases.

Objective	Keep informed of current pests and insects that could threaten Lyon County.		
Strategy	Utilize information provided by the University of Minnesota Extension, private industry, and the Department of Agriculture on how to handle certain pests and insects.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	-	+	May be difficult to achieve full information take-up
<i>Technical</i>		+	Including all the different players listed under the objective of who is involved will increase knowledge broadly
<i>Administrative</i>	-		Getting the information to the farmers may be costly/difficult
<i>Political</i>	-		Distrust of government information may be difficult to overcome
<i>Legal</i>	N/A	N/A	
<i>Economic</i>		+	Maintenance of operations has a positive impact on the local economy
<i>Environmental</i>	-		Potential issues with pesticides/insecticides/fungicides
<i>Priority</i>			2

Objective	Educate citizens on the types of fungi, insects, and pests that could potentially cause a problem for plants and trees.
Strategy	Monitor invasive insect species, including emerald ash borer and forest tent caterpillar.

<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	-	+	May need to increase staffing. May also lead to less spending long term by containing the spread.
<i>Technical</i>		+	Information campaigns may be conducted using social media
<i>Administrative</i>	-		May need to spend on staff training or outsourcing of media distribution
<i>Political</i>		+	There is funding
<i>Legal</i>	-		Enforcement – court costs
<i>Economic</i>	-		Decrease of tourism
<i>Environmental</i>	-		Containing the spread of invasive species
<i>Priority</i>			3

Objective	Contain invasive species in lakes and rivers (Asian Carp, zebra mussels, etc.)		
Strategy	Provide wash bays at boat landings (rinse boat with hot water (120 degrees for two minutes, or 140 degrees for 10 seconds))		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	-		Community acceptance may be difficult
<i>Technical</i>		+	Information campaigns may be conducted using social media
<i>Administrative</i>	-		Ownership and supervision/maintenance of wash bays
<i>Political</i>		+	There is public support for stopping the spread of invasive species
<i>Legal</i>	-		Enforcement actions
<i>Economic</i>	-		Complicating boating may make some decide it's not worth the effort
<i>Environmental</i>	-		Containing the spread of invasive species
<i>Priority</i>			3

Objective	Ensure nurseries have proper information regarding the importance of planting diverse species.		
Strategy	Discourage monoculture planting (repetitively planting a single plant species rather than growing a variety of types of plants).		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	-		Community acceptance may be difficult
<i>Technical</i>		+	Information campaigns may be conducted using social media
<i>Administrative</i>	N/A	N/A	
<i>Political</i>	N/A	N/A	
<i>Legal</i>	N/A	N/A	
<i>Economic</i>		+	May increase sales by increasing variety
<i>Environmental</i>	-		Containing the spread of invasive species
<i>Priority</i>			3

Severe Storms & Extreme Temperatures

Goal: Minimize the negative impacts caused by severe weather and extreme temperatures.

Objective	Residents will understand the importance and need to take responsibility for themselves and their families/neighbors in a severe storm event		
Strategy	Encourage all residents to have and use NOAA All Hazards Public Alert weather radios and sign up to receive alerts through the Lyon County CodeRED System.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>	-		Availability of weather radios
<i>Administrative</i>	-		Increase in staff time to promote
<i>Political</i>		+	Public support for better warning notification systems

<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Cost of weather radios
<i>Environmental</i>	NA	NA	
<i>Priority</i>			4

Objective	All critical government buildings are equipped with quick connect systems for transportable generators.		
Strategies	<p>Develop a building policy to construct all new critical county buildings with quick connect system for a generator.</p> <p>Develop a building policy for cities in Lyon County to adopt that ensures all new critical city buildings are built with a quick connect system for a generator.</p> <p>Identify critical county and city buildings that should be equipped with a quick connect system for a generator.</p>		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Access to public services for the community in an emergency
<i>Technical</i>	-	+	Retrofitting existing buildings can be expensive Integrating into new construction provides a long term solution
<i>Administrative</i>	-		Developing a policy and getting it through the proper channels would require extra staff time and effort
<i>Political</i>		+	Political support for access to services
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Cost of quick connect systems
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			4

Objective	To have a backup generator for electric failure to ensure proper heating and cooling of designated emergency shelters, safe rooms, and critical facilities.		
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Strategy	Identify critical buildings that should be equipped with a backup generator.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community confidence
<i>Technical</i>	-		Compatibility issues with older electrical systems
<i>Administrative</i>	-		Relatively little extra work
<i>Political</i>		+	Public support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-	+	Back-up generators are expensive, but there may be funding available
<i>Environmental</i>	-		Gasoline and diesel generators produce significant amounts of air pollution
<i>Priority</i>			5

Objective	There are adequate emergency shelters in Lyon County.		
Strategies	<p>Conduct a countywide assessment of the availability of emergency shelters and basements, including shelter capacity, and transportation routes to emergency shelters.</p> <p>Improve signage and marketing for emergency shelters.</p> <p>Advocate for safe room construction when new public facilities projects are undertaken</p> <p>Pursue funding for safe room construction.</p>		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Positive effect on the community
<i>Technical</i>		+	Technically achievable
<i>Administrative</i>	-		Labor costs
<i>Political</i>		+	Public support

<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-	+	Expense of funding safe rooms may be offset by the availability of mitigation funds
<i>Environmental</i>	NA	NA	
<i>Priority</i>			4

Objective	To have appropriate emergency shelters available to people without appropriate emergency shelter and people living in manufactured home parks in Lyon County.		
Strategies	Work with manufactured home park managers to improve communication during severe storm events and about where residents can go for emergency shelter. Encourage construction of safe rooms in manufactured home parks.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Targets a vulnerable population
<i>Technical</i>	-		Construction of safe rooms may face construction issues
<i>Administrative</i>	-		Staffing and funding for pursuing
<i>Political</i>		+	Both political and public support
<i>Legal</i>		+	Decreases liability of manufactured park owners and licensing entities
<i>Economic</i>	-		Expense of construction
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Objective	Have all cities in Lyon County become Storm Ready Communities and Weather-Ready Nation Ambassadors		
Strategies	Maintain Storm Ready Communities status for Lyon County, Southwest Minnesota State University, and the Cities of Marshall and Tracy. Pitch Storm Ready Communities and Weather-Ready Nation Ambassadors to other		

	city councils.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community benefit
<i>Technical</i>	N/A	N/A	
<i>Administrative</i>	-		Minimal staff costs for outreach
<i>Political</i>		+	Public service and safety
<i>Legal</i>	N/A	N/A	
<i>Economic</i>		+	Minimal expense
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Objective	Residents should understand snow and wind load provisions in the Minnesota State Building Code.		
Strategy	Work with cities to adopt the Minnesota State Building Code		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community benefit
<i>Technical</i>	-		Training for code enforcement
<i>Administrative</i>	-		Added burden for city administrative staff
<i>Political</i>	-		May not be public support for enforcement
<i>Legal</i>		+	Building Code Enforcement may result in less litigation
<i>Economic</i>	-		Code enforcement is an added expense
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Objective	Entities in Lyon County are prepared for hazard events.		
Strategy	Work with communities to review and/or complete Continuity of Operations Planning, and encourage private businesses and families to prepare for all-hazard events.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community benefit
<i>Technical</i>	N/A	N/A	
<i>Administrative</i>	-		Additional staff time will be required
<i>Political</i>		+	Public and political support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	N/A	N/A	
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Objective	Conserve electrical resources during an extreme heat event.		
Strategy	Educate the public on the importance of utility conservation during extreme heat events.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community benefit
<i>Technical</i>		+	Less strain on local electrical utility system
<i>Administrative</i>	-		Additional staff time will be required
<i>Political</i>		+	Public and political support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>		+	Off-peak electrical usage saves consumers
<i>Environmental</i>		+	Reduces generation which may reduce carbon emissions

<i>Priority</i>			5
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Objective	Spotter training is available in Lyon County.		
Strategy	Recruit volunteers to supplement emergency staff in summer weather emergency response.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community benefit
<i>Technical</i>		+	Additional trained spotters
<i>Administrative</i>	-		Additional staff time will be required
<i>Political</i>		+	Public and political support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Additional training will cost more
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Objective	Have staff at the schools, hospitals, and nursing homes trained for severe weather emergency response.		
Strategy	Each spring, Lyon County Emergency Management personnel will educate local schools, nursing homes, hospitals, etc. on the importance of participating in “Severe Weather Awareness Week” activities. This would identify evacuation routes, emergency shelters, and safe rooms, along with other important information.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community benefit
<i>Technical</i>	N/A	N/A	
<i>Administrative</i>	-		Additional staff time will be required
<i>Political</i>		+	Public and political support

<i>Legal</i>	N/A	N/A	
<i>Economic</i>	N/A	N/A	
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Objective	Entities in Lyon County are prepared for hazard events.		
Strategy	Work with communities to review and/or complete Continuity of Operations Planning, and encourage private businesses and families to prepare for all-hazard events.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community benefit
<i>Technical</i>	N/A	N/A	
<i>Administrative</i>	-		Additional staff time will be required
<i>Political</i>		+	Public and political support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	N/A	N/A	
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Objective	Have a robust, uninterruptable communication system available for use in emergencies.		
Strategy	Support amateur radio operators in emergency preparedness and response. Have three deep communication options to maintain communication in emergencies.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community benefit
<i>Technical</i>	-		Maintenance of the required technology may be expensive

<i>Administrative</i>	-		Additional staff time will be required
<i>Political</i>		+	Public and political support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Outside funding may be required
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Objective	Warning Systems are regularly tested and all sirens have a back-up power source.		
Strategies	<p>Identify sirens that currently do not have a back-up power source. Refer to Table RA Table #25 for sirens that do and do not have backup batteries (backup power generation).</p> <p>Identify funding sources, when available, to purchase back-up power sources for warning sirens</p>		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community benefit
<i>Technical</i>	-		Mixing old and new technology and the cost of back-ups where they don't exist
<i>Administrative</i>	-		Additional staff time will be required as well as funding
<i>Political</i>		+	Public and political support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Outside funding may be required
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Objective	Proper siren coverage within Lyon County.		
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Strategies	Work with local entities to ensure proper warning sirens coverage in Lyon County (Refer to RA Table #28 Outdoor Warning Sirens – Lyon County for gap regarding warning sirens).		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community benefit
<i>Technical</i>	-		Cost of acquiring new technology
<i>Administrative</i>	-		Additional staff time may be required
<i>Political</i>		+	Public and political support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Filling the gaps may prove costly
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Drought

Goal: Minimize negative impacts of drought conditions in Lyon County.

Objective	Have adequate groundwater resources.		
Strategies	Pursue a County Geologic Atlas. Work with water appropriators to determine sustainability measures.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Ensuring a sustainable water supply
<i>Technical</i>	-		Cost of studies
<i>Administrative</i>	-		Coordinating with parties listed in the objective
<i>Political</i>		+	Public service
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Need a reliable water source for maintaining our economy

<i>Environmental</i>	-		Negative water quality/availability
<i>Priority</i>			3

Objective	All cities within Lyon County will have the capability to restrict water use		
Strategy	Develop watering ban ordinances for the cities of Balaton, Florence, Garvin, Lynd, Russell, and Taunton that do not have watering ban ordinances. Enforce existing watering ban ordinances.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Adequate water supply
<i>Technical</i>	-		Developing the ordinances
<i>Administrative</i>	-		Enforcing the ordinances
<i>Political</i>	-		Public support
<i>Legal</i>	-		Cost of enforcement
<i>Economic</i>		+	Adequate water supply
<i>Environmental</i>		+	Less stress on water resources
<i>Priority</i>			3

Objective	Water conservation measures are being followed during drought conditions.		
Strategy	Educate the public on the importance of water conservation in times of low rainfall.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Adequate water supply
<i>Technical</i>	N/A	N/A	
<i>Administrative</i>	-		Staff time for education efforts
<i>Political</i>	-		Public support

<i>Legal</i>	-		Cost of enforcement
<i>Economic</i>		+	Adequate water supply
<i>Environmental</i>		+	Less stress on water resources
<i>Priority</i>			3

Fire – Structure Fires and Wildfires

Goal: Eliminate or lessen the negative impacts from fire.

Objective	Limit the potential for wildfires to spread.		
Strategy	Establish fire breaks. Reduce fuel loading in areas that may be susceptible to wildfires.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Limits the spread of wild fires
<i>Technical</i>		+	Limits the spread of wild fires
<i>Administrative</i>	-		Staff time and oversight
<i>Political</i>	-		Public Support
<i>Legal</i>	-		DNR regulations
<i>Economic</i>	-		Will take resources
<i>Environmental</i>		+	Less chance of uncontrolled wildfires
<i>Priority</i>			1

Objective	Educate community members on fire prevention and safety.		
Strategies	Participate in the nationally coordinated “Firewise” program to increase resident education. Educate community members about red flag warnings.		
<i>Criteria</i>	Cost	Benefit	Comments

<i>Social</i>		+	Public safety
<i>Technical</i>		+	Firewise materials are provided
<i>Administrative</i>		+	Firewise materials are provided
<i>Political</i>		+	Public service
<i>Legal</i>	N/A	N/A	
<i>Economic</i>		+	Saving lives
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			4

Objective	All burning is done in compliance with burn permit requirements.		
Strategy	Create an awareness program for burn permits and enforce fines for noncompliance. Create burning permit application process on the Lyon County website.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Less confusion in the community about burning rules
<i>Technical</i>	-		Building an application into the website
<i>Administrative</i>	-		Staff time
<i>Political</i>	-		Public can be resistant to compliance
<i>Legal</i>	-		Enforcement costs
<i>Economic</i>		+	More enforcement means more revenue
<i>Environmental</i>		+	Cleaner air
<i>Priority</i>			4

Objective	Property owners construct new facilities to MN State Building Code.
Strategy	Encourage building construction to include fire/smoke/CO alarms, sprinkler systems,

	and other minimum design standards.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	-	+	Community acceptance, safer housing
<i>Technical</i>		+	More consistent construction
<i>Administrative</i>	-		Staff time
<i>Political</i>	-		Public can be resistant to compliance
<i>Legal</i>	-		Enforcement costs
<i>Economic</i>		+	Smaller losses when there is a fire
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			4

Objective	Have a facility and equipment plan for EMS and fire departments in Lyon County		
Strategy	Work with medical response personnel (EMS) and fire departments on long-range capital improvements planning (CIP) for facilities and equipment.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	N/A	N/A	
<i>Technical</i>	-		Developing the plan
<i>Administrative</i>	-		Staff time
<i>Political</i>		+	Political support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>		+	Better capital planning
<i>Environmental</i>		N/A	
<i>Priority</i>			4

Objective	Conduct controlled burns in a safe and controlled manner.		
Strategies	<p>Educate property owners on the proper use of controlled burns and firebreaks and coordination of efforts.</p> <p>Provide materials that have detailed information on the proper use of controlled burns.</p>		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Less confusion in the community about burning rules
<i>Technical</i>	N/A	N/A	
<i>Administrative</i>	-		Staff time
<i>Political</i>	-		Public can be resistant to compliance
<i>Legal</i>	N/A	N/A	
<i>Economic</i>		+	Fewer burns getting out of control
<i>Environmental</i>		+	Rejuvenate certain habitats
<i>Priority</i>			4

Objective	Fire fighters and medical response personnel (EMS) have adequate resources.		
Strategies	<p>Work with regulators to create reasonable regulations in regards to equipment and training to prevent undue hardships on rural fire departments.</p> <p>Get rid of expiration dates on equipment (this is something local firefighters can evaluate).</p> <p>Encourage trainings in southwest Minnesota, so travel time can be decreased.</p>		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community acceptance
<i>Technical</i>	N/A	N/A	
<i>Administrative</i>	-		Staff time
<i>Political</i>		+	Public and political support

<i>Legal</i>	N/A	N/A	
<i>Economic</i>		+	Less need to buy new equipment to replace equipment that has barely been used
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			4

Objective	Fire fighting vehicles and other emergency vehicles have access to all buildings and structures		
Strategy	Outline streets and alleys that are and are not sufficient size to handle modern fire fighting vehicles and other emergency vehicles. When doing new subdivision design, make sure that the sizes are sufficient for emergency vehicles.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	-	+	Restructure an alley v. effective emergency response
<i>Technical</i>	-		Assessing access
<i>Administrative</i>	-		Assessing access
<i>Political</i>	-		Public support
<i>Legal</i>	-		Access issues (private / public) and cost of enforcement
<i>Economic</i>	-	+	Cost of restructuring v. less damage in case of a fire
<i>Environmental</i>	-		Cutting down existing trees
<i>Priority</i>			2

Objective	Emergency response personnel are prepared to respond to incidents at renewable energy facilities.		
Strategy	Facilitate education on best practices for response to incidents at renewable energy facilities (including ADM, industrial solar, roof top solar, pipelines, etc.).		
<i>Criteria</i>	Cost	Benefit	Comments

<i>Social</i>		+	Public safety / increased coordination
<i>Technical</i>		+	Public safety
<i>Administrative</i>		+	Already established so maintaining this is not extensive
<i>Political</i>		+	Community benefit
<i>Legal</i>	N/A	N/A	
<i>Economic</i>		+	Faster response
<i>Environmental</i>		+	Improved response
<i>Priority</i>			5

Objective	Water access in rural areas is fast and efficient.		
Strategy	Install dry hydrants in the Cities of Balaton and Russell		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public Safety
<i>Technical</i>	-		Cost of install and maintenance
<i>Administrative</i>	-		Maintenance costs
<i>Political</i>	-		Funding
<i>Legal</i>	-		Compliance – DNR regulations
<i>Economic</i>	-		Cost
<i>Environmental</i>		+	Water level
<i>Priority</i>			2

Flooding & Dam Failure

Goal: Minimize the negative impacts from seasonal flooding and flash flooding.

Objective	Future developments constructed within Jackson County and each city within the county are located outside of 100-year flood plains.
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Strategy	Continuation of flood plain mapping and zoning in the official land use maps and zoning ordinances.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Less vulnerability to flooding
<i>Technical</i>	-		Updating the ordinance
<i>Administrative</i>	-		Administering zoning ordinances
<i>Political</i>	-	+	New land owners being identified in the flood plain
<i>Legal</i>	-		Working with land owners
<i>Economic</i>	-		Cost of updating plans
<i>Environmental</i>		+	More greenspace
<i>Priority</i>			1

Objective	Developments in flood hazard areas follow best practices to minimize risk.		
Strategies	Work closely with DNR on all development applications in identified flood hazard areas. Update ordinances to ensure ordinances reflect best practices to minimize risk.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>	-		Difficult to identify areas
<i>Administrative</i>	-		Oversight
<i>Political</i>	-		Issues with maps - FEMA
<i>Legal</i>	-		Issues with maps - FEMA
<i>Economic</i>	-		Cost of updating maps
<i>Environmental</i>		+	Potentially more greenspace
<i>Priority</i>			2

Objective	Update the Flood Insurance Rate Maps in Lyon County as new data becomes available.		
Strategy	Lyon County communities with flood hazards are encouraged to work with DNR and FEMA to modernize the floodplain maps.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>	-		Difficult to identify areas
<i>Administrative</i>	-		Oversight
<i>Political</i>	-		Issues with maps - FEMA
<i>Legal</i>	-		Issues with maps - FEMA
<i>Economic</i>	-		Cost of updating maps
<i>Environmental</i>		+	Potentially more greenspace
<i>Priority</i>			2

Objective	Cities that utilize centralized sewer treatment systems have compliant systems that keep inflow and infiltration to a minimum.		
Strategy	Work with cities to implement best practices in regards to inflow and infiltration.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public health
<i>Technical</i>	-		Difficult to identify areas
<i>Administrative</i>	-		Oversight
<i>Political</i>	-		Issues with MPCA
<i>Legal</i>	-		Issues with MPCA / compliance with sump pumps
<i>Economic</i>	-		Cost of reducing I and I

<i>Environmental</i>		+	Cleaner discharge
<i>Priority</i>			3

Objective	Decrease the transport of phosphorus, nitrogen, and sediment during flood events.		
Strategy	Promote a vegetative buffer system along creeks and streams that are prone to flooding (Grass Strips, CRP, RIM, etc.). Promote the use of storm water retention and detention systems. Design sanitary treatment systems that can limit discharges during floods.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public health
<i>Technical</i>	-		Identifying private ditches
<i>Administrative</i>	-		Administering buffer regulations
<i>Political</i>	-		Administering buffer regulations
<i>Legal</i>	-		Administering buffer regulations
<i>Economic</i>	-		Devaluing property / easements
<i>Environmental</i>		+	Cleaner water / wildlife
<i>Priority</i>			3

Objective	Share resources within Lyon County and the Region		
Strategy	Encourage all cities in Lyon County to participate in the MN Warn System.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Reduced flood risk
<i>Technical</i>		+	Technically feasible
<i>Administrative</i>	-		Minimal administrative cost

<i>Political</i>		+	Increased cooperation
<i>Legal</i>	N/A	N/A	
<i>Economic</i>		+	Better preparation
<i>Environmental</i>		+	Less vulnerability to flooding
<i>Priority</i>			1

Objective	No new development in the flood hazard areas		
Strategy	Discourage zoning variances in identified flood hazard areas. Discourage development in the 500 year floodplain.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	-		Community Acceptance
<i>Technical</i>		+	Long-term solution
<i>Administrative</i>	-		Additional administrative staff time
<i>Political</i>	-		Public support
<i>Legal</i>	-		Possible legal challenges by landowners
<i>Economic</i>		+	No flood losses from developments that aren't built
<i>Environmental</i>		+	Increased ability of natural systems to handle excess water
<i>Priority</i>			Completed

Objective	Decrease activities that increase downstream flow rates.		
Strategy	Work with property owners to slow water drainage systems and encourage more natural water filtration.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	-		Community Acceptance

<i>Technical</i>	-		May involve some technical issues
<i>Administrative</i>	-		Some additional administrative costs
<i>Political</i>	-		Public Support
<i>Legal</i>	-		Enforcement
<i>Economic</i>	-		Property owner costs
<i>Environmental</i>		+	Vulnerability to flooding downstream
<i>Priority</i>			2

Objective	Eliminate repetitive flooding in Eidsvold Township.		
Strategy	Work with Eidsvold Township to pursue mitigation funding for addressing repetitive flooding sites in Eidsvold Township, in accordance with the existing plan.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community Acceptance
<i>Technical</i>	-		May involve some technical issues
<i>Administrative</i>	-		Some additional administrative costs
<i>Political</i>		+	Public Support
<i>Legal</i>	N/A	N/A	Enforcement
<i>Economic</i>	-		Outside funding required
<i>Environmental</i>		+	Vulnerability to flooding
<i>Priority</i>			2

Civil Disturbance & Terrorism

Goal: Protect residents and critical infrastructure from domestic or foreign threats.

Objective	New facility construction is responsive to potential terrorist activity, where appropriate.
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Strategy	Consider zoning and building code changes and updates that reflect building measures to withstand civil disturbances and terrorist attacks, where appropriate.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>		+	Schools and government facilities are starting to do this
<i>Administrative</i>	-		Cost of improvements
<i>Political</i>	N/A	N/A	
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Extra cost
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			4

Objective	Increase community resiliency regarding emergency preparedness.		
Strategy	Local governments complete and maintain thorough community risk and threat assessments.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>		+	Technically feasible
<i>Administrative</i>	-		Additional costs
<i>Political</i>		+	Political support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Extra cost
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			4

Objective	Achieve continuity of emergency services.		
Strategy	Plan for potential loss of essential services in the event of a regional catastrophe.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>		+	Technically feasible
<i>Administrative</i>	-		Additional planning costs
<i>Political</i>		+	Political support
<i>Legal</i>		+	Existing local authority
<i>Economic</i>	-		Extra cost
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			4

Objective	Increase safety in county and city public facilities.		
Strategy	Consider limiting public access in high profile county and city locations in times of increased potential for civil disturbances and terrorist activity. These times should follow the Federal Department of Homeland Security warning system or local threat assessments.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>		+	Schools and government facilities are starting to do this
<i>Administrative</i>	-		Cost of improvements
<i>Political</i>	-		Public support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Extra cost
<i>Environmental</i>	N/A	N/A	

<i>Priority</i>			4
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Objective	Increase the level of security of public facilities through landscape design, vehicle barriers, and separation of public and private functions.		
Strategy	When remodeling or building a new building consider the design to increase security. When landscaping around a public building consider the design to increase security.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>		+	Something to look into
<i>Administrative</i>	-		Cost of improvements
<i>Political</i>	-		Public support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Extra cost
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Increase security throughout Lyon County.		
Strategy	Encourage the model, “See Something Say Something” campaign. Include this message model in a public service announcement biannually (radio, local broadcast channels).		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	-		Community Acceptance
<i>Technical</i>		+	Technically feasible
<i>Administrative</i>	-		Some additional administrative costs
<i>Political</i>	-		Public support

<i>Legal</i>	-		Exposure to accusations of racial profiling
<i>Economic</i>	N/A	N/A	
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Increase coordination with schools and other government agencies regarding scenario planning for terrorist events.		
Strategy	Conduct annual scenario trainings with schools in Lyon County, other government agencies, businesses, etc.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>		+	Schools and government facilities are continuing to develop trainings. Continuous training for active shooter and other scenarios.
<i>Administrative</i>	-		Include law enforcement and emergency management
<i>Political</i>		+	Public Support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Extra cost
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			4

Objective	Increase safety at higher density public places.		
Strategy	Identify higher density locations in Lyon County. A non-exhaustive list includes: schools, ADM, Schwan's, fairgrounds, and event center. Work with them to develop evacuation plans at these locations.		
<i>Criteria</i>	Cost	Benefit	Comments

<i>Social</i>		+	Increased public safety
<i>Technical</i>	-		Acceptance that this is an issue
<i>Administrative</i>		+	Work with safety coordinators at facilities
<i>Political</i>	-	+	Acceptance that this is an issue
<i>Legal</i>	-		Have to have a plan / safety coordinator
<i>Economic</i>	-		Additional costs
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			4

Objective	Increase security at government facilities in Lyon County.		
Strategy	Install security devices (metal detector, etc.) at the entrances to the Lyon County Government Center Evaluate other government facilities regarding the need for additional security.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public and employee safety
<i>Technical</i>	-		New technologies
<i>Administrative</i>	-		Number of facilities
<i>Political</i>	-	+	Support for the need of the improvement
<i>Legal</i>		+	Limits liability
<i>Economic</i>	-	+	Extra cost / potentially saves lives
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Enhance the transportation capabilities of the ERU.		
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Strategy	Pursue grant funds and purchase a lower cost ex-military troop carrier that can be used to transport the ERU.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public and employee safety
<i>Technical</i>		+	Decreased response times
<i>Administrative</i>	-		Small administrative cost
<i>Political</i>	-		Public support
<i>Legal</i>	-		Exposure to added risk if used improperly
<i>Economic</i>	-	+	Extra cost / potentially saves lives
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Hazardous Materials

Goal: Improve the effectiveness and quality of the various agencies addressing hazardous materials that may impact Lyon County.

Objective	Hazardous Material Releases are quickly identified and properly and safely responded to.		
Strategies	<p>Increase training of emergency personnel so that all types of potential releases will be readily recognized upon arrival.</p> <p>Quickly map the affected disaster area as well as surrounding areas within Lyon County.</p> <p>Train personnel in the appropriate response.</p>		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>		+	Technically feasible
<i>Administrative</i>	-	+	App to identify hazardous material (cargo decoder) / app is not widely used (Fire, EMT, Law, and EM all have this app)

<i>Political</i>		+	Public support
<i>Legal</i>		+	Training and support reduces risk exposure
<i>Economic</i>	-	+	App is not expensive / GIS mapping would be more expensive
<i>Environmental</i>		+	Lessens environmental impacts
<i>Priority</i>			3

Objective	Public is educated on sheltering in place during hazardous material events		
Strategy	Conduct biannual public service announcements regarding sheltering in place and when it is appropriate.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>		+	PSAs are free and easy to do
<i>Administrative</i>	-		Minimal
<i>Political</i>		+	Public and Political support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	N/A	N/A	
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Elected officials, emergency responders, and the general public have access to accurate information regarding hazardous materials.
Strategies	<p>Work with state and federal agencies to address hazardous materials and delivery systems (e.g. pipelines, rail, and trucks) that have the potential to impact the county and region.</p> <p>Increase education of school officials, health care workers, employers, and the general public about response to hazardous materials events.</p>

<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>		+	Technically feasible
<i>Administrative</i>	-		Training materials
<i>Political</i>		+	Public support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Cost of training materials
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Emergency personnel have equipment and training to respond to emergencies regarding hazardous materials.		
Strategy	Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public Safety
<i>Technical</i>	-		New/better technology
<i>Administrative</i>		+	Staffing
<i>Political</i>		+	Public support
<i>Legal</i>	-		Legal work on agreements
<i>Economic</i>	-		Outside funding may be required
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			4

Objective	Support policies and programs that assist in creating factual and timely information about hazardous materials in Lyon County.		
Strategy	Coordinate databases into one system using E Plan, so information is distributed using one platform.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>	-		Coordination of databases
<i>Administrative</i>	-		Administrative intensive
<i>Political</i>	N/A	N/A	
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Cost of action
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	All parties responsible for hazardous material spill cleanup are held accountable.		
Strategy	Enforce ordinances that deal with who is responsible for hazardous material spill cleanup.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community acceptance
<i>Technical</i>	N/A	N/A	
<i>Administrative</i>	-		Oversight
<i>Political</i>		+	Political support
<i>Legal</i>	-		Enforcement actions
<i>Economic</i>	-		Cost of action
<i>Environmental</i>		+	Reduction of negative environmental impacts

<i>Priority</i>			3
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Objective	The public is aware of the indicators of illegal activities.		
Strategies	<p>Conduct an annual education campaign to increase education of store owners, school officials, health care workers, and the general public about the warning signs of meth.</p> <p>Educate the public about the warning signs of clandestine illegal labs. Especially school officials and health officials, along with mail carriers, cable repair men, plumbers, electricians, and delivery personnel (UPS, FEDEX).</p>		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>	-		Rural farms – number of potential locations
<i>Administrative</i>	-		Oversight
<i>Political</i>		+	Support to fight illegal activities
<i>Legal</i>	-		Educating land owners
<i>Economic</i>	-	+	Cost of cleanup and educational material / identify a site before it is in use
<i>Environmental</i>	-		Containment
<i>Priority</i>			3

Objective	Landowners monitor their properties and report any signs of illegal activities promptly.		
Strategy	Educate landowners that they are responsible for the cost of clandestine lab cleanups, so that there is an increased economic incentive for monitoring properties.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>	-		Hard to reach all of these groups
<i>Administrative</i>	-		Hard to reach all of these groups

<i>Political</i>		+	Support to fight clandestine labs
<i>Legal</i>	-		Enforcement
<i>Economic</i>		+	Addressing the issue before it is a problem
<i>Environmental</i>		+	Addressing the issue before it is a problem
<i>Priority</i>			3

Objective	Store owners are aware of the ingredients used to make illegal drugs and report any suspicious activity.		
Strategy	Educate store owners on the ingredients used to manufacture and grow dangerous drugs and what they can do to prevent or limit the sale of the ingredients.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public Safety
<i>Technical</i>	-		Changing policies and regulations
<i>Administrative</i>	-		Staffing costs / trainings
<i>Political</i>		+	Support to fight illegal drugs
<i>Legal</i>	-		Enforcement
<i>Economic</i>	-		Educational materials
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Public Health Emergencies

Goal: Reduce the threat of public health emergencies.

Objective	Better coordination with local partners in the case of public health emergencies. Public is informed on effective measures to prevent the spread of infectious diseases.
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Strategy	Provide information to public and private employers, schools and hospitals about potential infectious disease threats and prevention measures.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public Awareness
<i>Technical</i>	-		Continuous updates
<i>Administrative</i>	-		Continuous updates
<i>Political</i>		+	Public safety
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Cost of updating media plan
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Increased distribution of medications and medical supplies in the case of emergency.		
Strategy	Encourage SWHHS to continue work with Minnesota Department of Health and local partners for the mass distribution of needed medicines and supplies for public health emergencies.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public health benefits
<i>Technical</i>	-		Maintaining supply (expiration dates)
<i>Administrative</i>	-		Medical regulations
<i>Political</i>		+	Public health benefits
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Cost of maintaining the supply
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Maintain Health Alert Network (HAN).		
Strategy	Notify local medical providers of potential infectious disease threats.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Increased public awareness
<i>Technical</i>	-		Maintaining database
<i>Administrative</i>	-		Maintaining database
<i>Political</i>		+	Public health benefits
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Staff costs and maintaining the database
<i>Environmental</i>	NA	NA	
<i>Priority</i>			3

Objective	Citizens dependent on oxygen or respiration assistance in their homes have access to back-up power or alternative life support.		
Strategy	Work with rural electric and Medicare to maintain a list of homes that are dependent on oxygen or respiration assistance and require backup power.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Effect on segment of population
<i>Technical</i>	-		Technology could be expensive
<i>Administrative</i>	-		Maintenance of database
<i>Political</i>		+	Public support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Costs associated with information gathering
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Transportation Infrastructure & Transportation Crashes

Goals: Transportation systems in Lyon County are efficient, cost effective, and safe for all users.

Improve effectiveness of local agencies in preventing and responding to crashes.

Objective	Work with MnDOT / local road authorities to identify and improve hazardous intersections, bridges, and other transportation infrastructure.		
Strategy	The most problematic intersections have been identified by the Lyon County Highway Department as part of the Lyon County Transportation Safety Plan. Identify traffic safety improvements to mitigate the risk of crashes at these intersections. Identify funding sources to assist with reducing the risk of crashes at these intersections.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>	-		Complex network
<i>Administrative</i>	-		Increased staff time
<i>Political</i>		+	Public and Political support
<i>Legal</i>		+	Public safety
<i>Economic</i>	-	+	Cost of improvements / potentially saves lives
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Increase safety for vehicle road departures (crashes).		
Strategy	Limited driveways, field accesses, and obstructions in the right-of-way.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>	-		Complex network
<i>Administrative</i>	-		Increased staff time

<i>Political</i>		+	Public and Political support
<i>Legal</i>	-		Enforcement issues with land owners
<i>Economic</i>		+	Fewer crashes
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Emergency personnel are properly trained to respond to a variety of transportation accidents.		
Strategies	Pursue funding to assist with trainings for emergency personnel. Encourage regional training, so emergency personnel travel time is minimized.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>	-		Training costs
<i>Administrative</i>	-		Increased staff time
<i>Political</i>		+	Public and Political support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Cost of action
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Clear rights-of-way for safety and visibility.		
Strategy	Encourage road authorities to work to prevent encroachment and maintain adequate right-of-way setbacks.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community acceptance

<i>Technical</i>		+	Technically feasible
<i>Administrative</i>	-		Maintenance/operations
<i>Political</i>	-		Public support
<i>Legal</i>	-		Enforcement issues with land owners
<i>Economic</i>		+	Fewer crashes
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Maintain safe and proper clearance around airports in Lyon County.		
Strategy	Ensure county and city staff review airport improvement plans and zoning before new development occurs.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community acceptance
<i>Technical</i>		+	Technically feasible
<i>Administrative</i>	-		Increased staff time
<i>Political</i>		+	Public and Political support
<i>Legal</i>	-		Enforcement issues with land owners
<i>Economic</i>		+	Increased utilization of existing airports
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Maintain visibility and clearance along public roadways and railways in Lyon County.		
Strategies	Work with maintenance personnel to keep the train tracks clear of debris when they are grading the roads.		

	Maintain adequate visibility and lighting at strategic intersections. Work with local road authorities to identify other visibility and clearance issues.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community acceptance
<i>Technical</i>	-		Complex network
<i>Administrative</i>	-		Increased staff time
<i>Political</i>	-	+	Public and Political support
<i>Legal</i>	-		Enforcement issues with land owners
<i>Economic</i>		+	Fewer crashes
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Have an adequate maintenance budget for road authorities in Lyon County.		
Strategy	Research additional funding sources for road maintenance and traffic safety improvements and provide education to elected officials on the maintenance of infrastructure needs.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	-		Community acceptance
<i>Technical</i>	-		Maintenance costs
<i>Administrative</i>	-		Increased staff time
<i>Political</i>	-		Lack of political support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Outside funding required
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Maintain roads that may be vulnerable to erosion and closure. Ensure connectivity of road network, so emergency personnel are not redirected due to road closures.		
Strategy	Identify culverts that are frequently in need of repair or are in poor condition. Work to address vulnerabilities to address public infrastructure that is susceptible to flooding. Refer to RA Figure 16 – Public Infrastructure Susceptible to Flooding.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>	-		Number of culverts
<i>Administrative</i>	-		Engineering costs / labor costs
<i>Political</i>	-	+	Road improvements / mitigation funding is needed for some of these projects to move forward
<i>Legal</i>	-		Water erosion issues / road support issues
<i>Economic</i>	-		Engineering costs / labor costs
<i>Environmental</i>	-		Downstream water flow issues
<i>Priority</i>			5

Objective	Reduce road closures due to drifting snow.		
Strategy	Identify mitigation measures to mitigate road closures caused by drifting snow. Refer to RA Figure #5 – Snow Removal Problem Areas. Use road design, living snow fences, slope easements and land cover to help control snow on roadways.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety / increased travel efficiencies
<i>Technical</i>		+	Easy to identify
<i>Administrative</i>	-		Cost of getting on paper

<i>Political</i>		+	Public safety / increased travel efficiencies
<i>Legal</i>	NA	NA	
<i>Economic</i>	-		Cost of clearing roads
<i>Environmental</i>	NA	NA	
<i>Priority</i>			5

Objective	Increase visibility of pedestrians at higher traffic volume crossings.		
Strategy	Support projects outlined in local Active Living Plans, Safe Routes to School Plans, Land Use Plans, and Comprehensive Plans that increase pedestrian safety.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public Safety
<i>Technical</i>		+	Projects have been identified in Safe Routes to School Plans and Active Living Plans
<i>Administrative</i>	-		Cost of identifying the areas and potential engineering solutions
<i>Political</i>		+	Public safety
<i>Legal</i>	-		Road design standards and sign regulations
<i>Economic</i>		+	Potentially saves lives
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Utility Failure

Goal: Increase coordination between Rural Electrical Cooperatives, emergency response, SWHHS, and emergency management.

Objective	Critical facilities have redundant services in case of utility failure.
Strategy	Evaluate the needs and costs for providing backup generation where none currently exists. Refer to RA Table #8 for a list of facilities that need new or additional backup

	generators.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>	-		Funding and prioritizing projects
<i>Administrative</i>		+	Have identified need and locations for backup generators
<i>Political</i>	-	+	Continuity of government
<i>Legal</i>	-	+	Continuity of government
<i>Economic</i>	-		Cost of backup generators and associated project costs
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Objective	Critical facilities such as hospitals and rural water suppliers have access to back up power generators.		
Strategy	Evaluate the needs and costs for providing back up generation to critical facilities, including: hospitals, rural water suppliers, and locations of Strategic National Stockpile of medicines and supplies.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>	-		Maintaining Strategic National Stockpile of medications and supplies
<i>Administrative</i>	-		Maintaining Strategic National Stockpile of medications and supplies
<i>Political</i>		+	Public safety
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Cost associated project costs
<i>Environmental</i>	N/A	N/A	

<i>Priority</i>			5
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Objective	Protect vulnerable populations during extreme heat and cold events.		
Strategy	Work with SWHHS and Medicare to maintain a list of vulnerable populations to check on in times of extreme heat and cold events.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>	-		Identifying and maintaining the database of those in need
<i>Administrative</i>	-		Identifying and maintaining the database of those in need
<i>Political</i>		+	Public safety
<i>Legal</i>	-		HIPPA concerns
<i>Economic</i>	-		Data base costs
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Goal: Eliminate or reduce the effect of utility failures that occur within Lyon County.

Objective	Increase hardening of the electrical grid in Lyon County.		
Strategies	Examine need for redundant utility service/sources at critical facilities. Encourage utility providers to bury electric lines where feasible.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Reliability of utility grid
<i>Technical</i>	-		Engineering regarding redundancy of the grid
<i>Administrative</i>	-		Engineering regarding redundancy of the grid
<i>Political</i>		+	Reliability of utility grid
<i>Legal</i>	N/A	N/A	

<i>Economic</i>	-	+	Cost of economic loss / cost of grid hardening / long term savings
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Objective	Property owners maintain landscaping distances to overhead power lines.		
Strategy	Conduct an annual tree planting campaign along with a damage prevention meeting through Gopher State One Call – call before you dig.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	-		Community acceptance
<i>Technical</i>		+	Technically feasible
<i>Administrative</i>	-		Minimal staff time
<i>Political</i>	-		Public support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Cost of action
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			5

Objective	Reduce the risk of damaging natural gas lines.		
Strategy	Require a permit when working along township roads.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Public safety
<i>Technical</i>		+	Process is already in place for county roads
<i>Administrative</i>		+	Consistency with county roads
<i>Political</i>	-		Resistance to regulation

<i>Legal</i>	-		Costs associated with non-permitted work
<i>Economic</i>	-		Cost of damaging the line and service interruption
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Objective	Reduce the risk of substation vulnerability to disruption. Increase security around substations.		
Strategy	Install cameras and other security devices / deterrents around substations.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Reliability of utilities
<i>Technical</i>	-		Potential solutions (wall, cameras, etc.)
<i>Administrative</i>	-		Potential solutions (wall, cameras, etc.)
<i>Political</i>	-		Increased surveillance
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Labor and project costs
<i>Environmental</i>	N/A	N/A	
<i>Priority</i>			3

Water Supply Contamination

Goal: Preserve and protect the quantity and quality of the County’s public water resources.

Objective	An adequate supply of clean drinking water is available even in the case of emergencies.		
Strategy	Provide updates to the Emergency Response Plan that identifies alternate sources of drinking water.		
<i>Criteria</i>	Cost	Benefit	Comments

<i>Social</i>		+	Adequate amounts of safe drinking water
<i>Technical</i>	-		Identifying and maintaining inventory
<i>Administrative</i>	-		Identifying and maintaining inventory
<i>Political</i>		+	Public support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Costs associated with provided needed water
<i>Environmental</i>	-		Water supply contamination
<i>Priority</i>			3

Objective	Minimize contamination of groundwater from abandoned wells.		
Strategy	Continue the abandoned well sealing program within Lyon County.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Decrease risk of contamination
<i>Technical</i>	-		Identifying all wells
<i>Administrative</i>	-		Identifying all wells
<i>Political</i>		+	Proactive
<i>Legal</i>		+	Reduces exposure to liability
<i>Economic</i>	-		Costs associated with the well sealing program
<i>Environmental</i>		+	Proactive
<i>Priority</i>			4

Objective	All public water suppliers should have a wellhead protection plan.
Strategy	Work with MDH to complete and implement Wellhead Protection Plans for all public water suppliers.

<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Reliability of water supply
<i>Technical</i>	-		Costs associated with planning
<i>Administrative</i>	-		Staff time
<i>Political</i>	-		Political resistance to additional regulation
<i>Legal</i>	-		Enforcement
<i>Economic</i>	-		Costs associated with planning
<i>Environmental</i>		+	Increased protection of water supply
<i>Priority</i>			4

Objective	Maintain an interconnected water supply in case of emergencies.		
Strategy	Maintain wells that are accessible if Rural Water (current source) would need to shut down.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community acceptance
<i>Technical</i>	-	+	Technically feasible but costly
<i>Administrative</i>	-		Staff time
<i>Political</i>		+	Public support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Infrastructure costs
<i>Environmental</i>		+	Increased protection of water supply
<i>Priority</i>			4

Objective	Minimize inflow and infiltration in sewer systems in Lyon County.		
Strategy	Work with cities in Lyon County to identify funding sources to improve sewer systems that are outdated and do not meet current standards regarding inflow and infiltration.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Improved sewer systems – public health
<i>Technical</i>	-		Locations of I&I are difficult to identify
<i>Administrative</i>	-		Locations of I&I are difficult to identify
<i>Political</i>		+	Improved sewer systems – public health
<i>Legal</i>	-		Compliance with regulations and changing regulations
<i>Economic</i>	-		Costs associated with improving the system
<i>Environmental</i>	-	+	Improved sewer systems – ground water contamination
<i>Priority</i>			4

Objective	Minimize point source and nonpoint source pollution.		
Strategy	Work with MPCA and DNR to identify best practices to minimize point source and nonpoint source pollution.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>	-		Community acceptance
<i>Technical</i>		+	Technically feasible
<i>Administrative</i>	-		Compliance issues / permitting
<i>Political</i>	-		Public support
<i>Legal</i>	-		Compliance with regulations and changing regulations
<i>Economic</i>	-		Costs associated with adopting best practices
<i>Environmental</i>	-	+	Adequate feedlot systems in Jackson County
<i>Priority</i>			4

Objective	Water supplies and water treatment facilities have backup generators.		
Strategy	Identify critical water supply and treatment facilities in Lyon County.		
<i>Criteria</i>	Cost	Benefit	Comments
<i>Social</i>		+	Community acceptance
<i>Technical</i>	-	+	Technically feasible but costly
<i>Administrative</i>	-		Staff time
<i>Political</i>		+	Public support
<i>Legal</i>	N/A	N/A	
<i>Economic</i>	-		Acquisition and installation of generators may require outside funding
<i>Environmental</i>		+	Increased protection of water supply
<i>Priority</i>			4

Appendix D – Priority changes from previous plan to update

The plan must describe if and how any priorities changed since the plan was previously approved. If no changes in priorities are necessary, plan updates may validate the information in the previously approved plan.

Appendix C highlights the Hazard Identification Worksheet from the 2010 Lyon County All Hazard Mitigation Plan (AHMP) and the Hazard Identification Worksheet from the 2016 update. Below are the 2010 and 2016 Hazard Identification Worksheets for Lyon County.

The Hazard Identification Worksheets were used by the planning team to rank and quantify the natural and manmade hazards in Lyon County. Variables that impact the ranking include: potential frequency, spatial extent, potential severity, warning time, and risk level.

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 100% 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

2010 Hazard Identification Worksheet – Planning Team

Hazard	Potential Frequency	Spatial Extent	Potential Severity	Risk Level	Hazard Rank
Natural Hazards					
Ice and Ice Storms	Highly Likely	Local	Major	High	High
Agricultural Disease (Animal & Crop)	Likely	Countywide / Local	Major	Average	Moderate
Blizzards / Winter Storms	Highly Likely	Countywide	Major	Average	Moderate
Drought	Occasional	Local	Minor	Average	Moderate
Extreme Temperatures	Likely	Countywide	Major	High	Moderate
Flooding	Highly Likely	Local	Minor	High	Moderate
Tornado / Straight-line Wind	Highly Likely	Local	Major	Average	Moderate
Wildfire	Likely	Local	Limited	Limited	Moderate
Earthquake	Unlikely	Countywide	Limited	Limited	Low
Land Subsidence	Unlikely	Local	Limited	Limited	Low
Summer Storms, Lightning / Hail	Highly Likely	Local	Minor	Average	Low
Technological Hazards					
Public Health and Infectious Disease	Likely	Countywide	Minor	Average	High
Transportation Infrastructure	Highly Likely	Local	Minor	Average	High
Hazardous Materials	Highly Likely	Local	Minor	High	Moderate
Structure Fires	Highly Likely	Local	Minor	Average	Moderate
Dam Failure	Unlikely	Local	Limited	Limited	Low
Meth Lab	Occasional	Local	Major	Limited	Low
Terrorism and Civil Disturbance	Occasional	Local	Limited	Limited	Low
Hazard	Potential Frequency	Spatial Extent	Potential Severity	Risk Level	Hazard Rank
	<i>Highly Likely</i> <i>Likely</i> <i>Occasional</i> <i>Unlikely</i>	<i>Countywide</i> <i>Local</i>	<i>Substantial</i> <i>Major</i> <i>Minor</i> <i>Limited</i>	<i>Very High</i> <i>High</i> <i>Average</i> <i>Limited</i>	<i>High</i> <i>Moderate</i> <i>Low</i>

For Potential Frequency, *Unlikely* if <1% chance in the next 100 years, *Occasional*= 1% and 10% in next year,

Likely=between 10% and 100% in next year, *Highly Likely*=100% in next year.

For Potential Severity, *Limited*=<10% area affected destroyed, *Minor*=10% to 25% area affected,

Major=25% to 50% area affected, *Substantial*=>50% area affected.

Risk Level is subjective ranking by Task Force members based on previous categories.

SRDC, adapted from Minnesota Planning

2016 Hazard Identification Worksheet – Planning Team

Hazard	Potential Frequency	Spatial Extent	Potential Severity	Warning Time	Risk Level	Hazard Rank
Ag Disease (animal or crop)	Occasional	Countywide	Major	12 - 24 hours	Average	Moderate
Blizzards, Winter Storms, and Extreme Cold Events	Highly Likely	Countywide	Major	12 - 24 hours	High	High
Drought	Likely	Countywide	Major	24+ hours	Average	Moderate
Earthquakes	Unlikely	Countywide	Minor	Minimal	Limited	Low
Flooding	Likely	Local	Minor	6 - 12 hours	High	Moderate
Fire—Wildfires	Occasional	Local	Minor	Minimal	Average	Moderate
Severe Summer Storms, Lightning and Hail, and Extreme Heat Event	Likely	Countywide	Major	6 - 12 hours	High	Moderate
Tomados and Straight-line Winds	Likely	Local	Major	Minimal	High	Moderate
Manmade Hazards						
Civil Disturbance and Terrorism	Occasional	Local	Substantial	Minimal	Average	Low
Dam Failure	Unlikely	Local	Major	6 - 12 hours	Average	Low
Fire—Structure Fires	Likely	Local	Substantial	Minimal	Average	Moderate
Hazardous Materials	Likely	Local	Substantial	Minimal	High	Moderate
Public Health Emergencies	Occasional	Countywide	Minor	12 - 24 hours	Average	Moderate
Transportation Crashes	Likely	Local	Substantial	Minimal	Average	Moderate
Transportation Infrastructure	Occasional	Local	Substantial	Minimal	Average	Moderate
Utility Failure	Occasional	Local	Substantial	Minimal	Average	Moderate
Water Supply Contamination	Occasional	Local	Major	6 - 12 hours	Average	Moderate
Hazard	Potential Frequency	Spatial Extent	Potential Severity	Warning Time	Risk Level	Hazard Rank
	<i>Highly Likely</i>		<i>Substantial</i>	<i>Minimal</i>	<i>Very High</i>	
	<i>Likely</i>	<i>Countywide</i>	<i>Major</i>	<i>6 - 12 hours</i>	<i>High</i>	<i>High</i>
	<i>Occasional</i>	<i>Local</i>	<i>Minor</i>	<i>12 - 24 hours</i>	<i>Average</i>	<i>Moderate</i>
	<i>Unlikely</i>		<i>Limited</i>	<i>24+ hours</i>	<i>Limited</i>	<i>Low</i>

Appendix E – Vulnerability Worksheet: Natural & Manmade Hazards

Vulnerability Worksheet – Natural Hazards

A1 Agricultural Disease (animal or crop)

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

A2 Blizzards, Winter Storms, and Extreme Cold Events

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

A3 Drought

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

A4 Earthquakes

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

A5 Fire (Wildfires and Structure Fires)

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

A6 Flooding

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

A7 Severe Summer Storms, Lightning, Hail, and Extreme Heat Events

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

A8 Tornado & Straight-line Wind Events

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

Vulnerability Worksheet – Manmade Hazards

B1 Civil Disturbance and Terrorism

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

B2 Dam Failure

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

B3 Hazardous Materials

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

B4 Public Health Emergencies Plans and Programs

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

B5 Transportation Infrastructure & Transportation Crashes

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

B6 Utility Failure

Plans and Programs

Gaps and Deficiencies

Existing Mitigation Measures

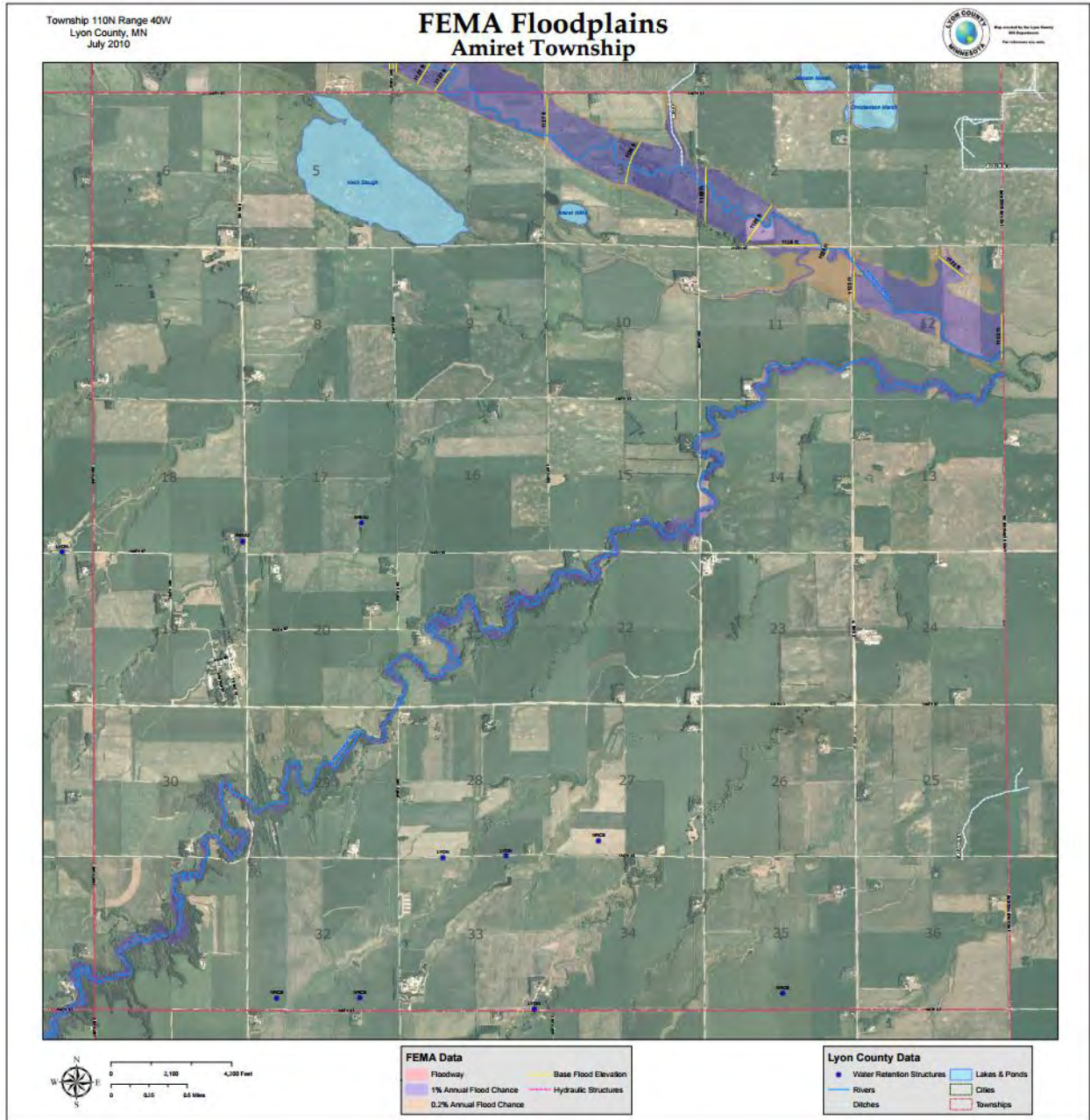
B7 Water Supply Contamination

Plans and Programs

Gaps and Deficiencies

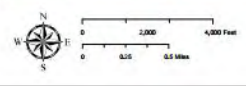
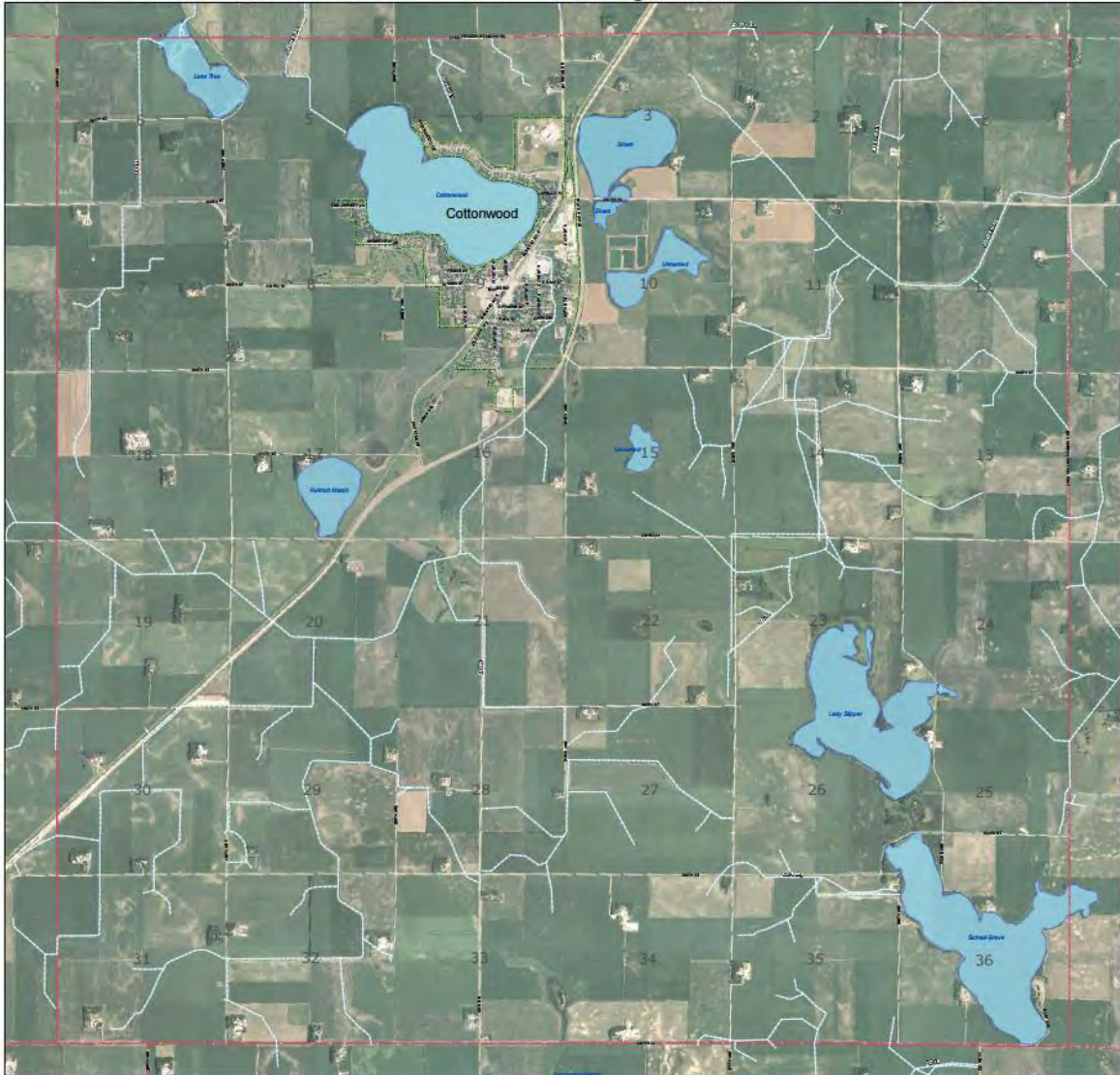
Existing Mitigation Measures

Appendix F – Flood Insurance Rate Maps



Township 113N Range 40W
Lyon County, MN
July 2010

FEMA Floodplains Lucas Township

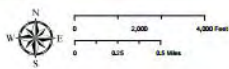
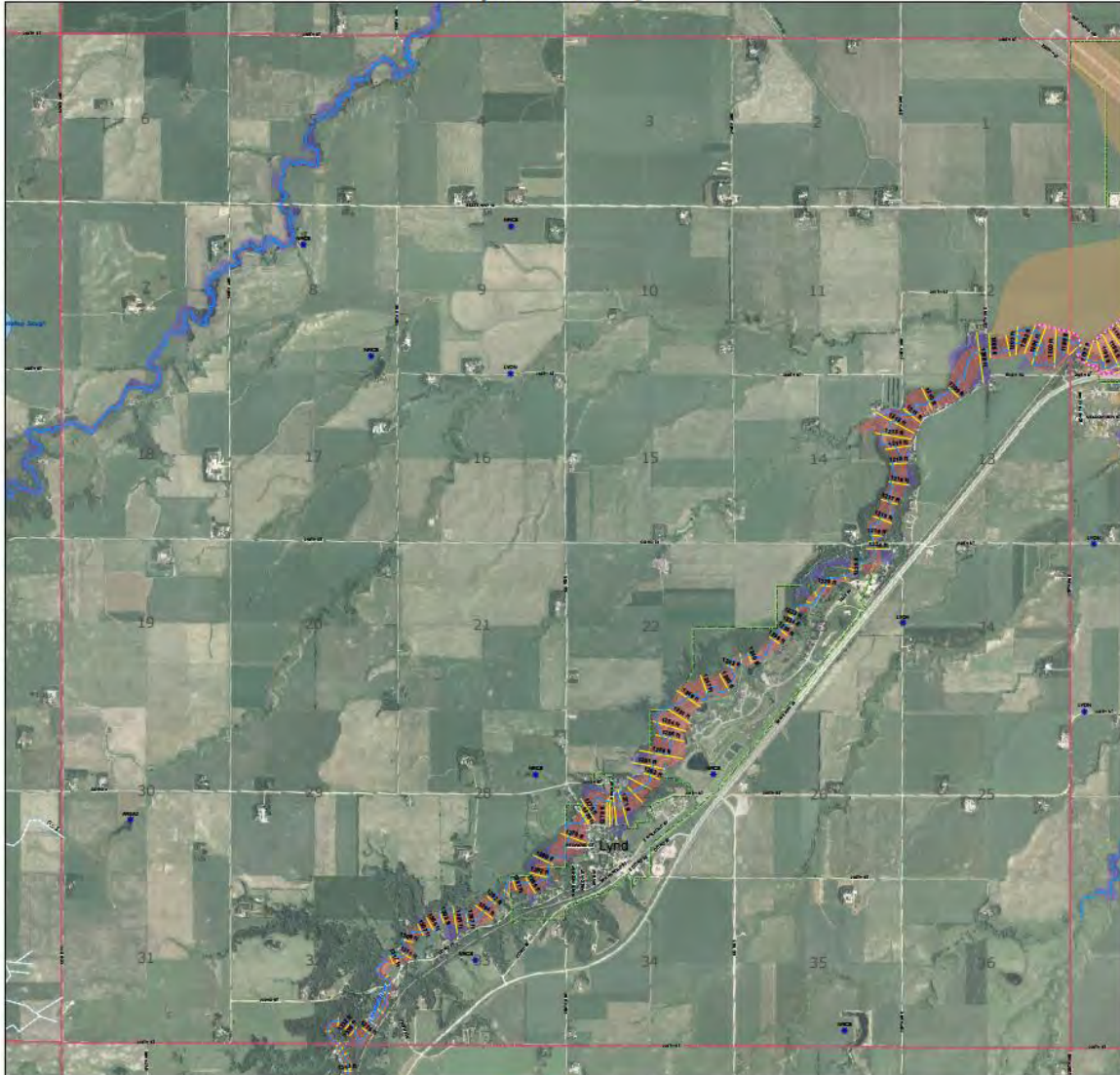


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 111N Range 42W
Lyon County, MN
July 2010

FEMA Floodplains Lynd Township

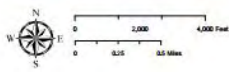
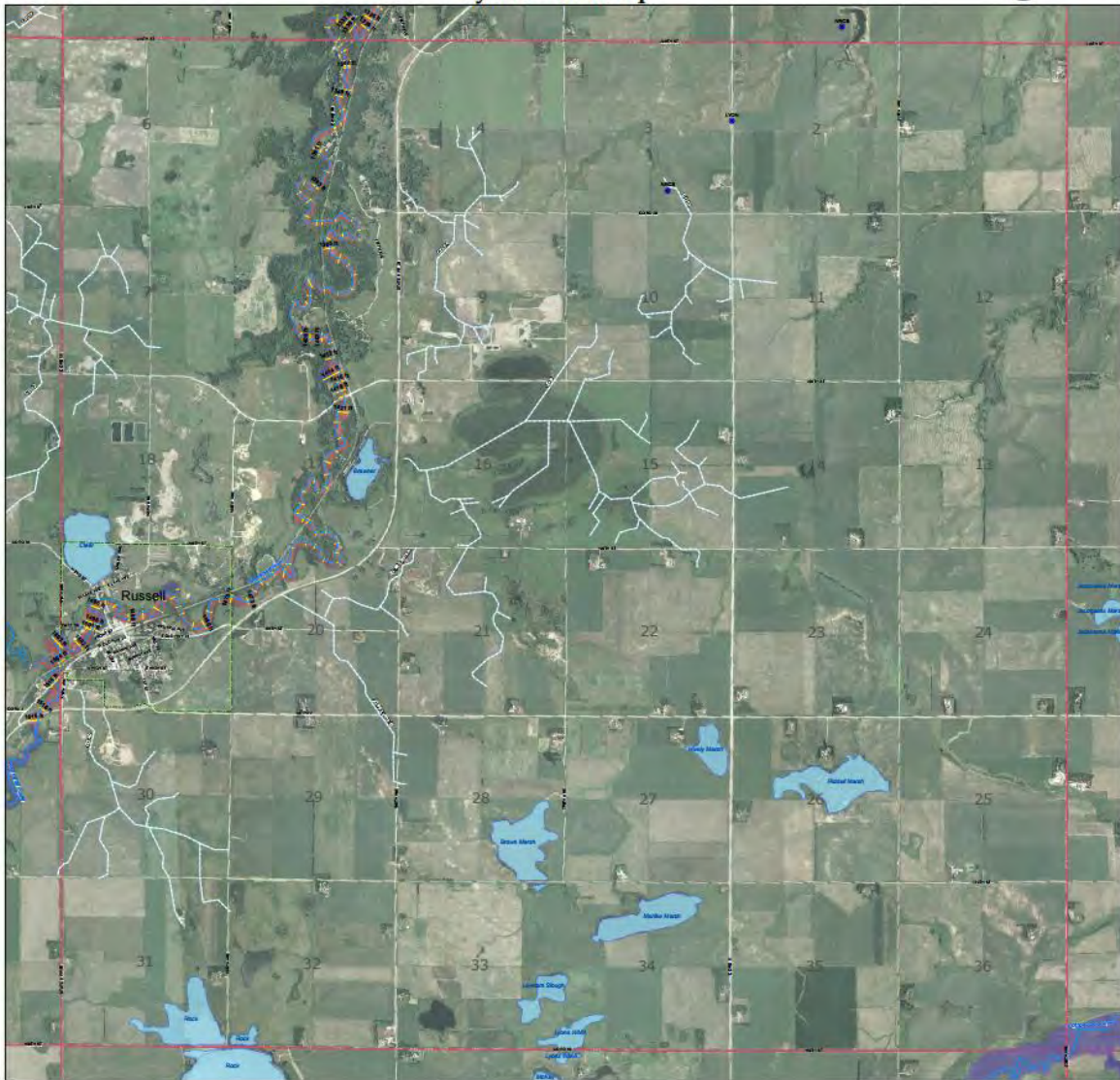


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 110N Range 42W
Lyon County, MN
July 2010

FEMA Floodplains Lyons Township

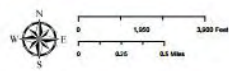


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 109N Range 40W
Lyon County, MN
July 2010

FEMA Floodplains Monroe Township

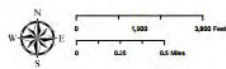
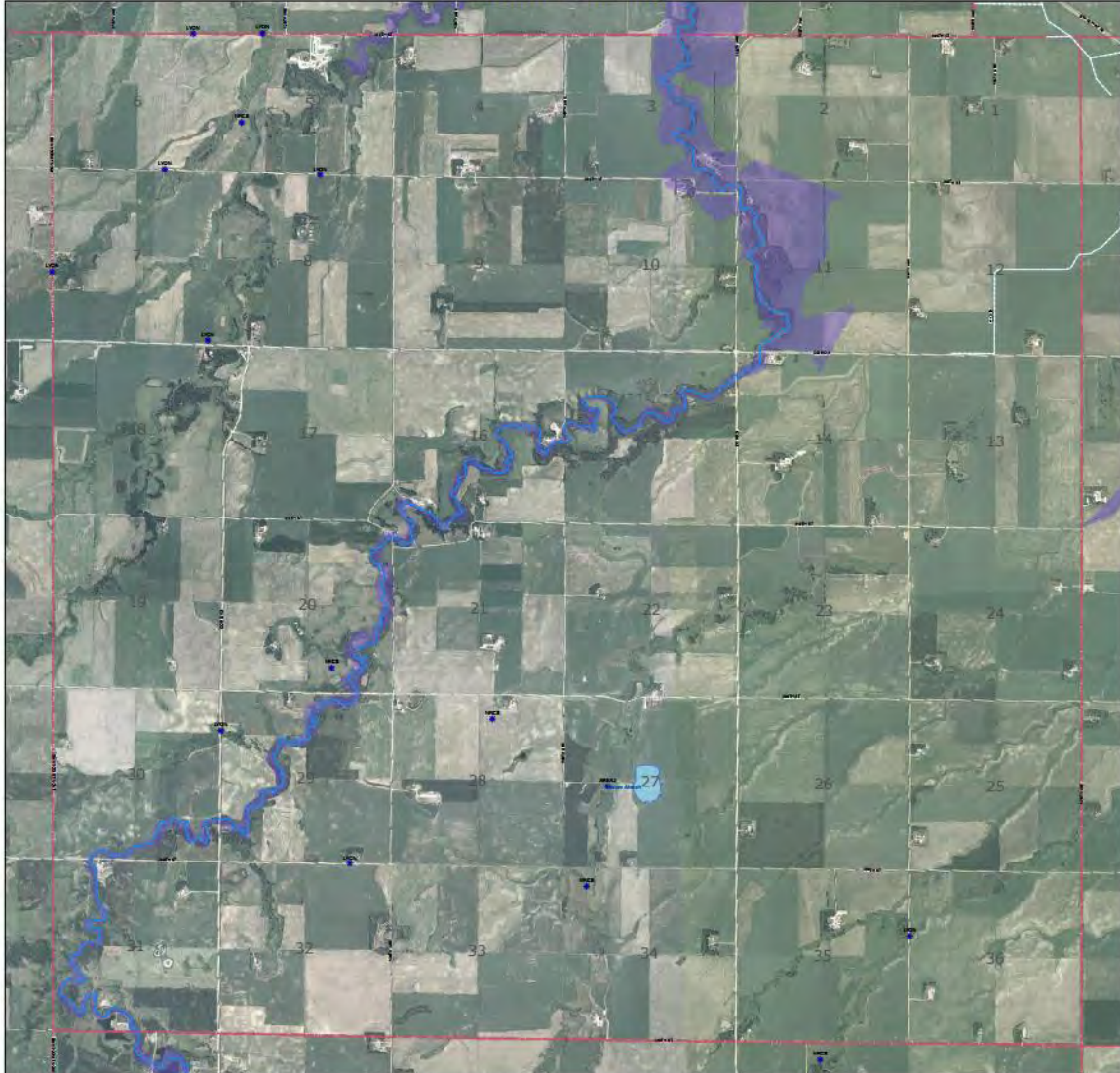


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 112N Range 43W
Lyon County, MN
July 2010

FEMA Floodplains Nordland Township

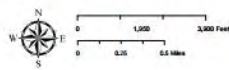
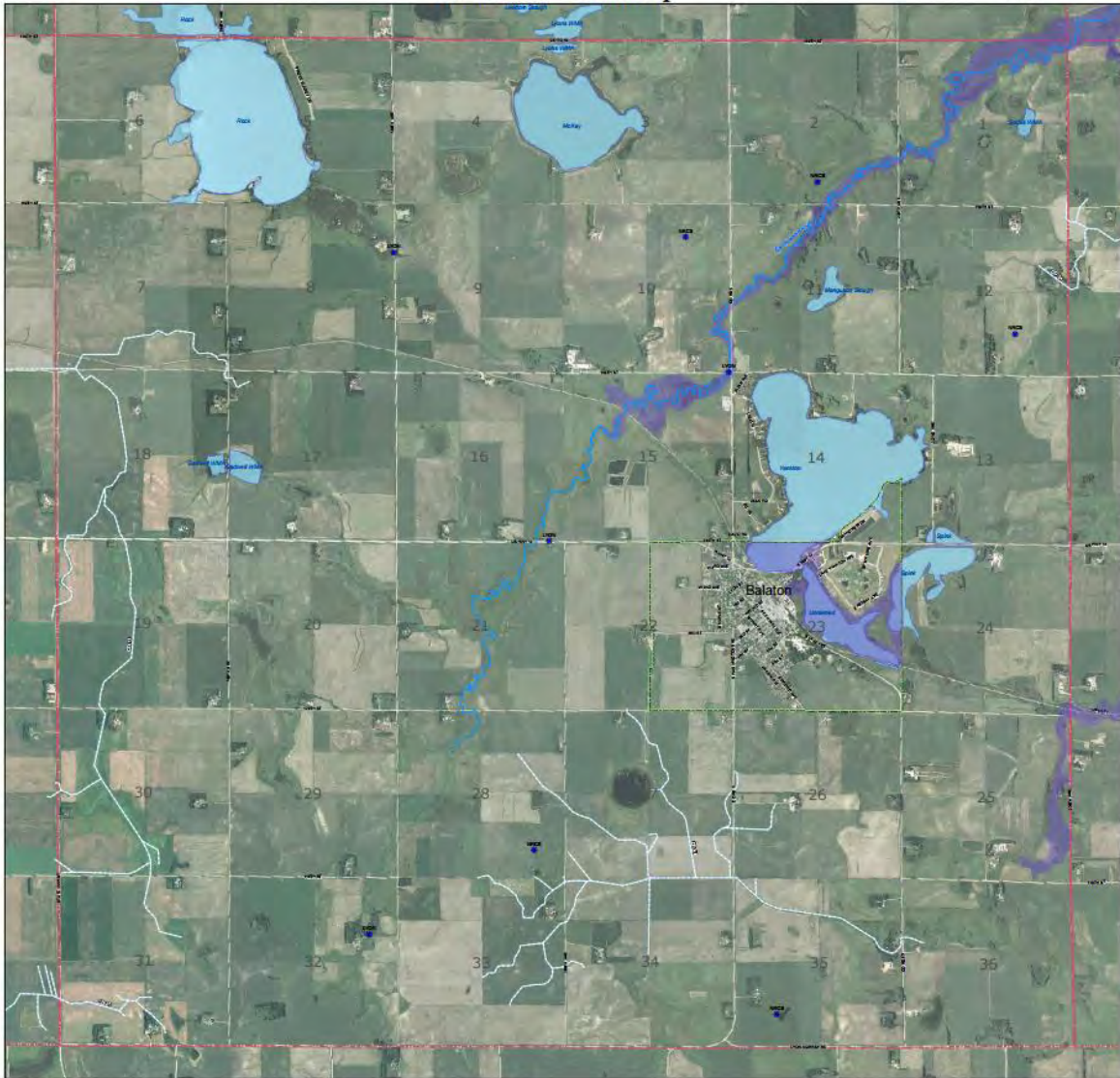


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 109N Range 42W
Lyon County, MN
July 2010

FEMA Floodplains Rock Lake Township

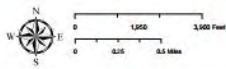
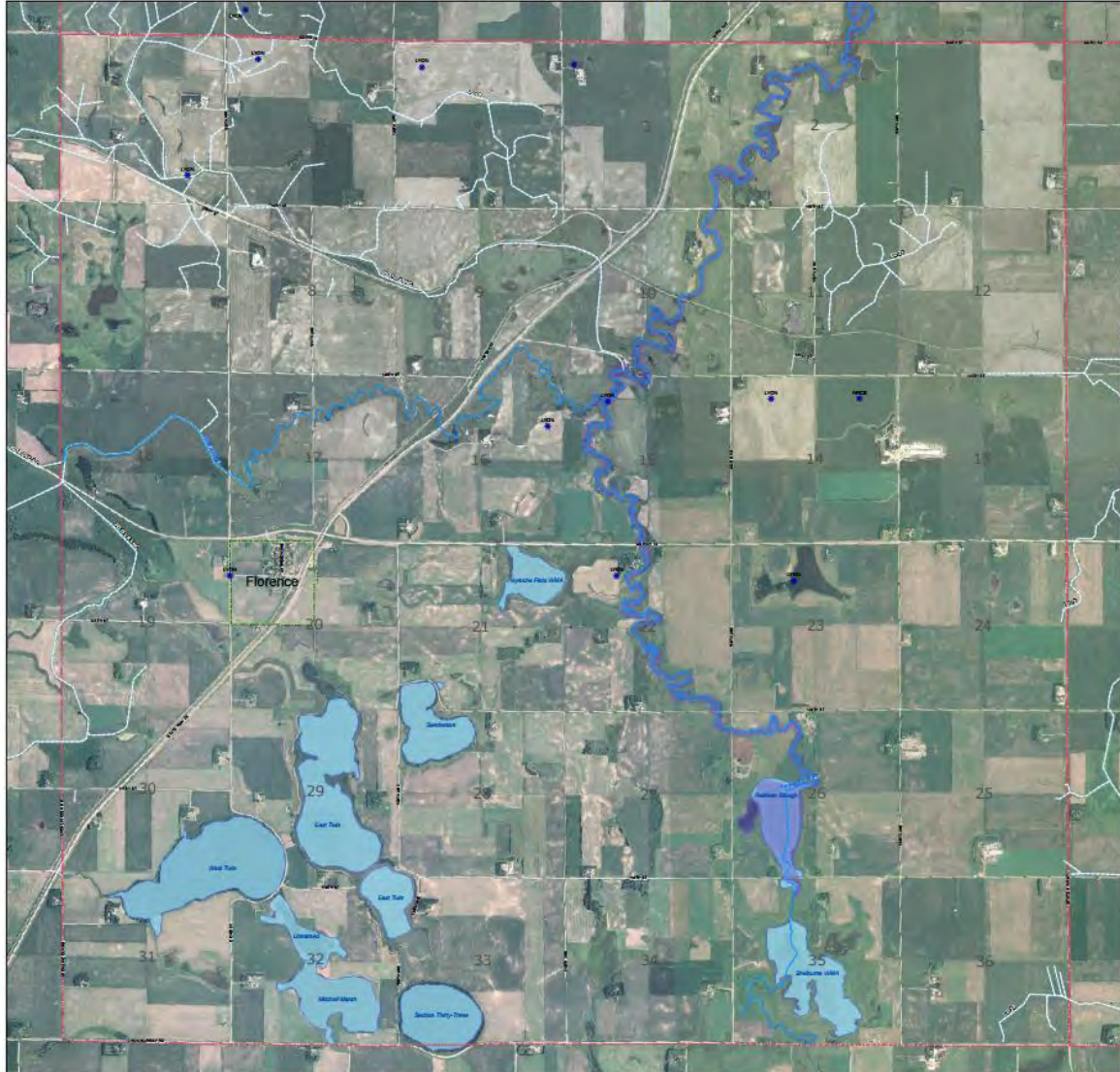


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 109N Range 43W
Lyon County, MN
July 2010

FEMA Floodplains Shelburne Township

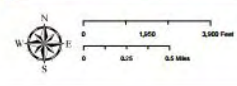
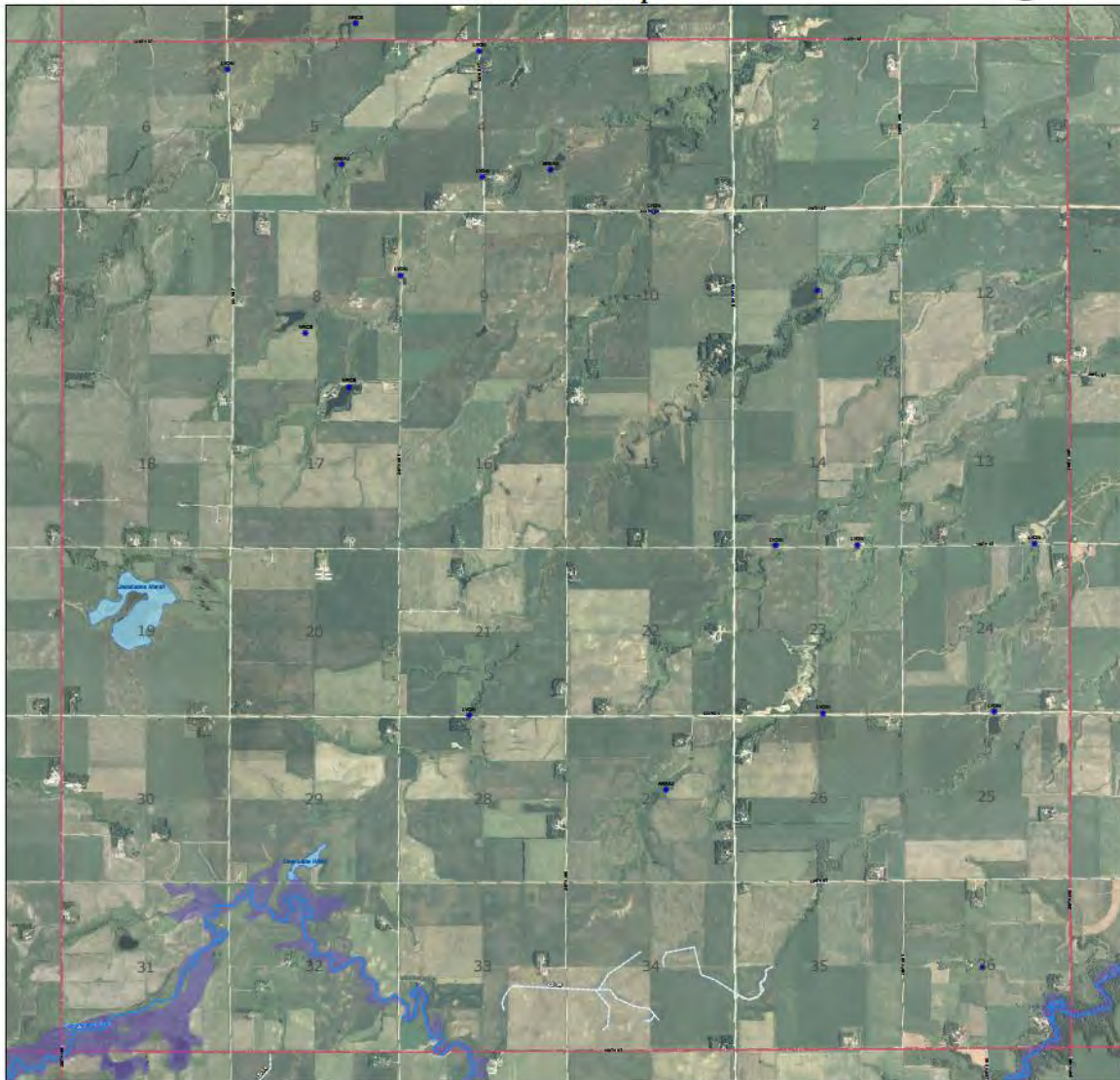


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 110N Range 41W
Lyon County, MN
July 2010

FEMA Floodplains Sodus Township

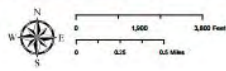
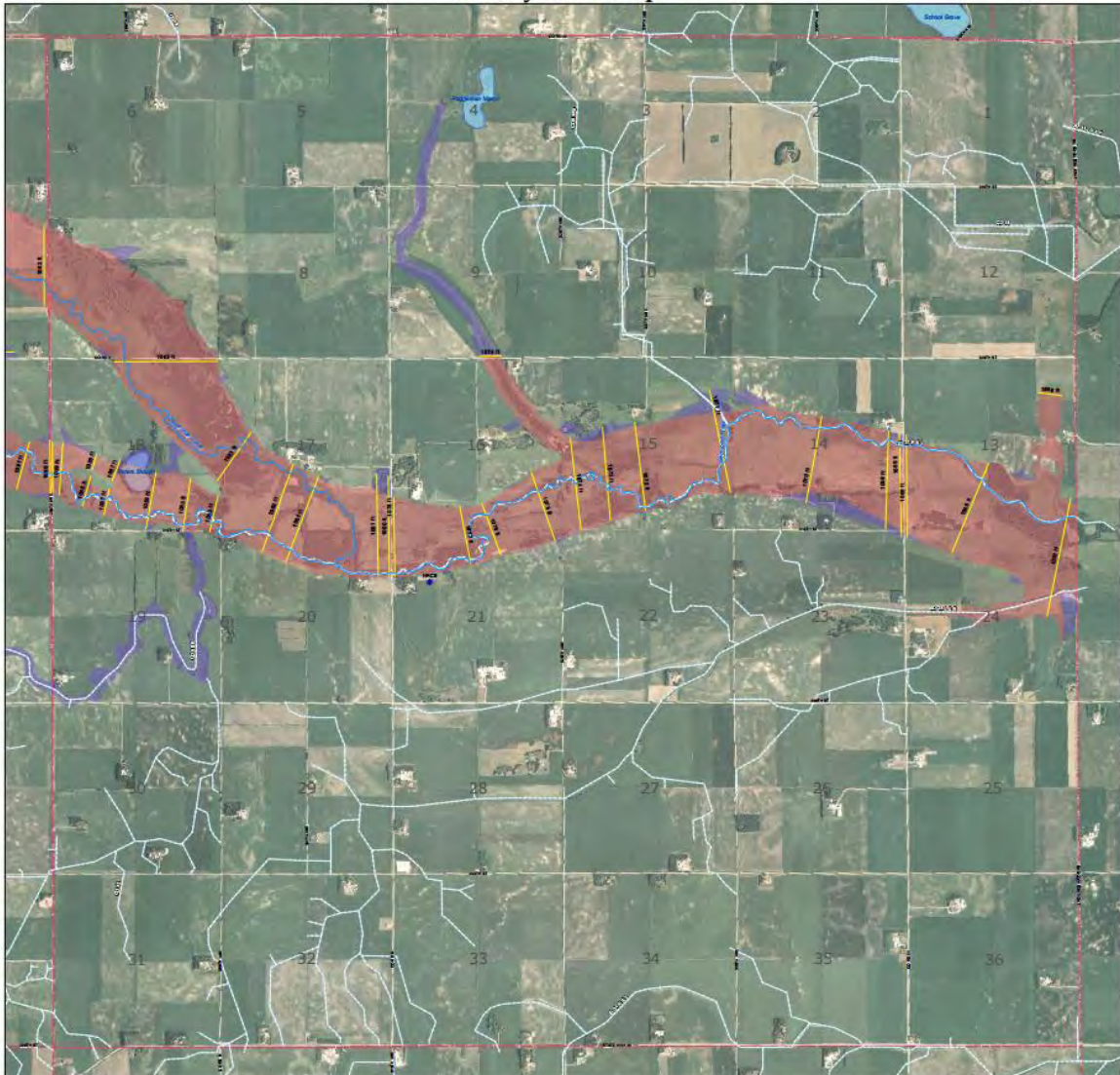


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 112N Range 40W
Lyon County, MN
July 2010

FEMA Floodplains Stanley Township

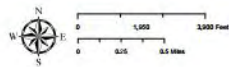
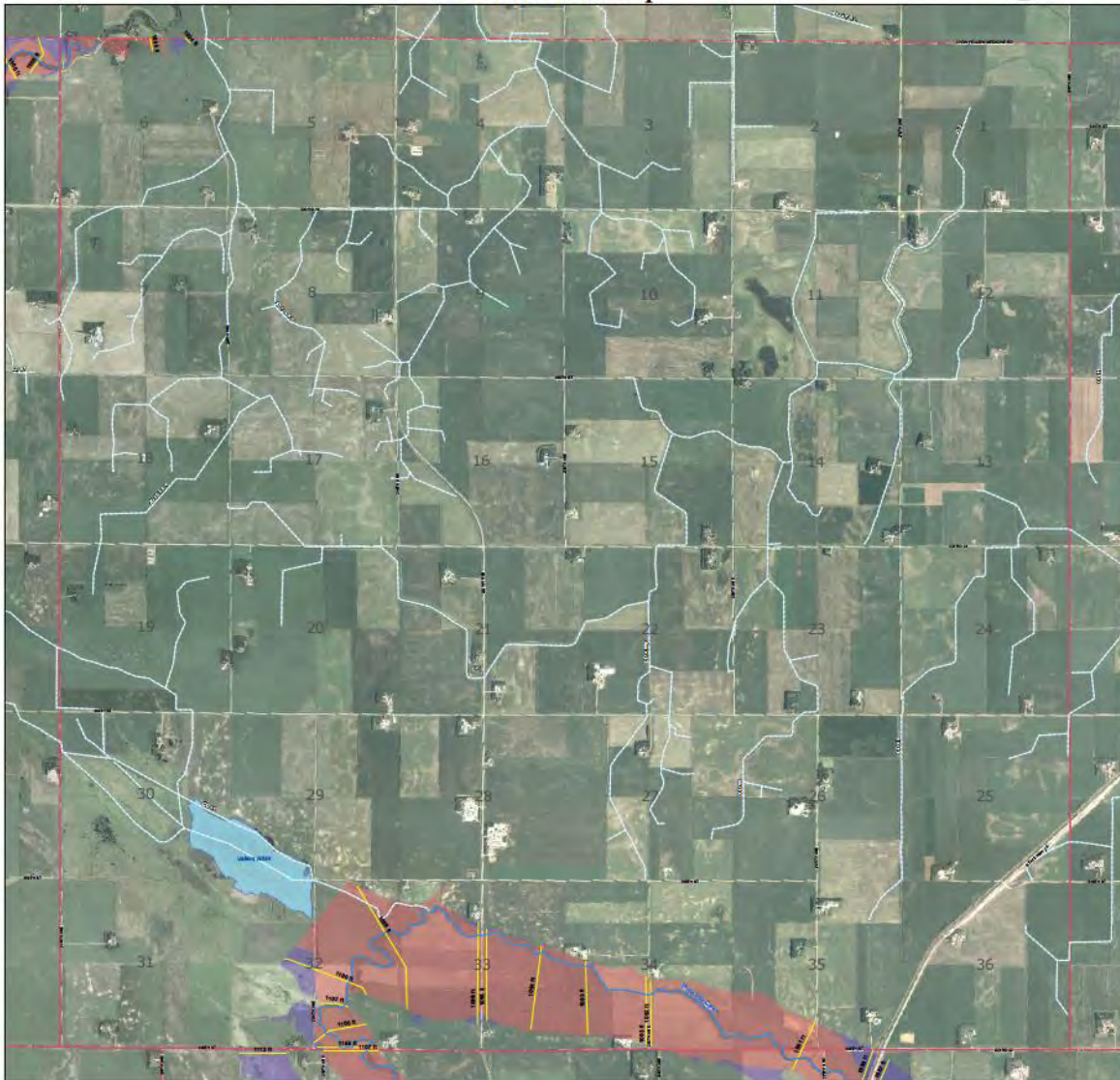


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 113N Range 41W
Lyon County, MN
July 2010

FEMA Floodplains Vallers Township

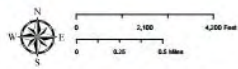
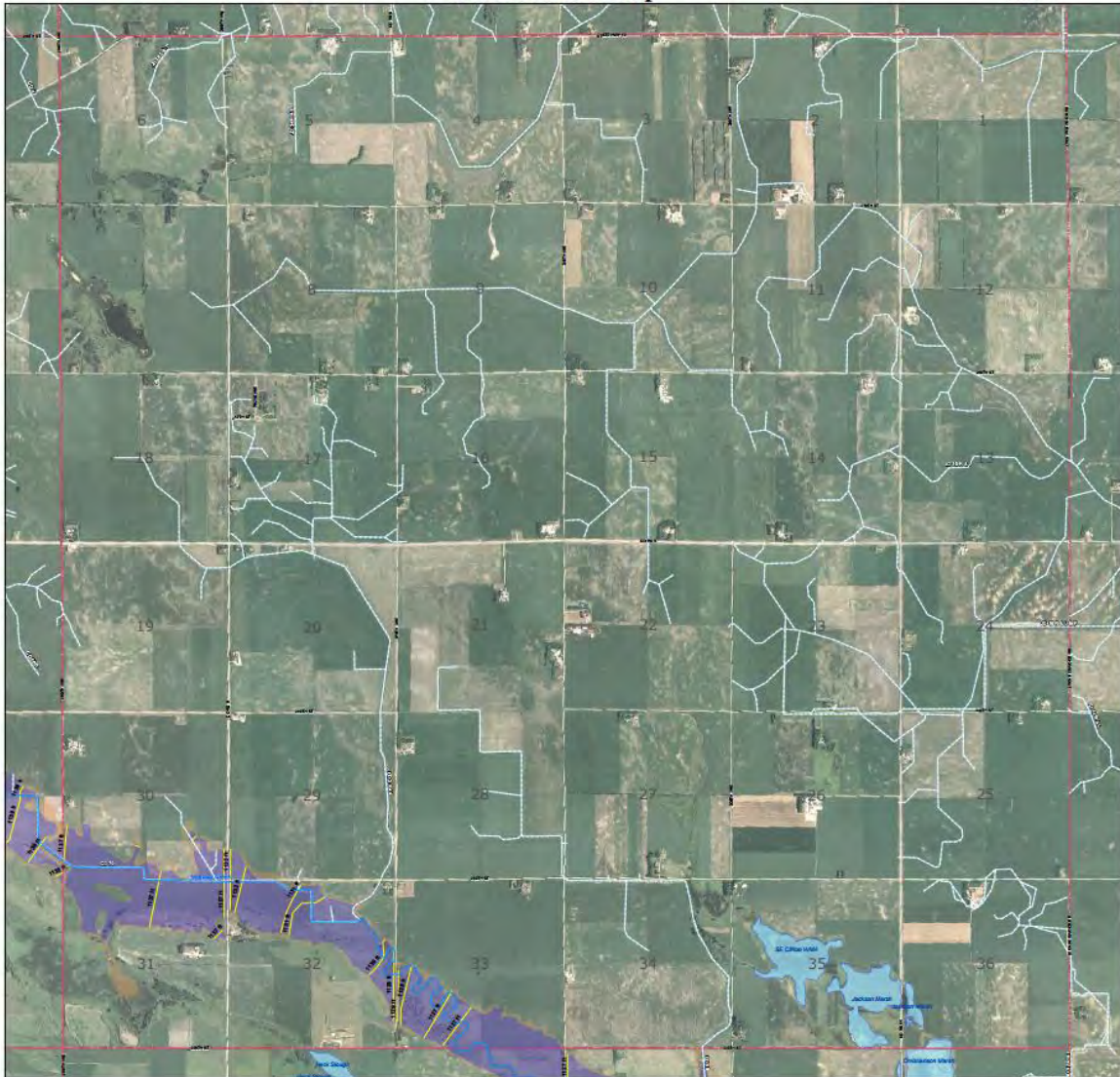


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Ditches
Townships	

Township 111N Range 40W
 Lyon County, MN
 July 2010

FEMA Floodplains Clifton Township

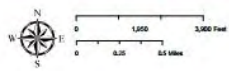
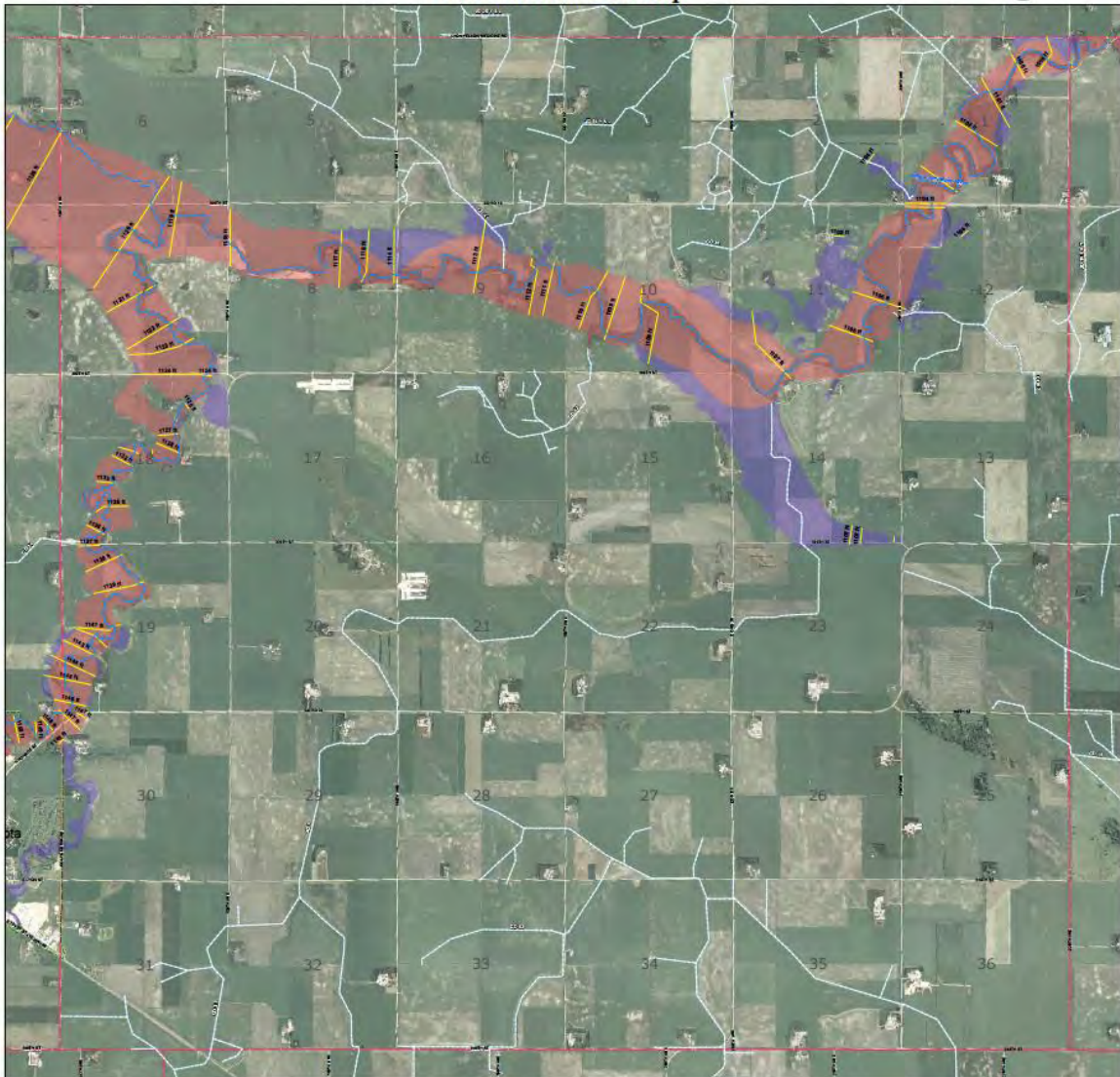


FEMA Data	
	Floodway
	1% Annual Flood Chance
	0.2% Annual Flood Chance
	Base Flood Elevation
	Hydraulic Structures

Lyon County Data	
	Water Retention Structures
	Rivers
	Ditches
	Lakes & Ponds
	Cities
	Townships

Township 113N Range 42W
Lyon County, MN
July 2010

FEMA Floodplains Westerheim Township

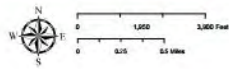
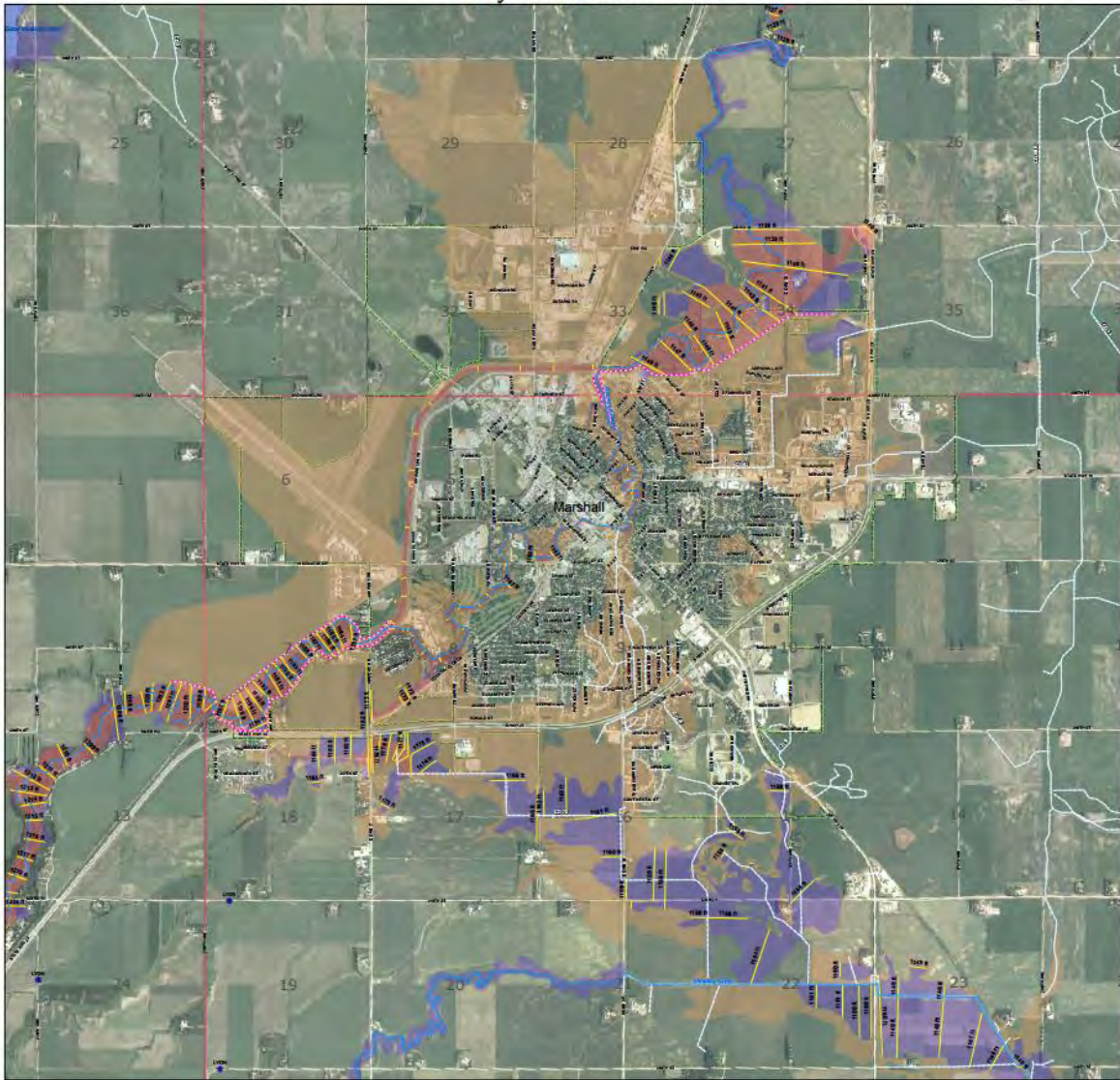


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 111N Range 41W
Township 112N Range 41W
Lyon County, MN
July 2010

FEMA Floodplains City of Marshall

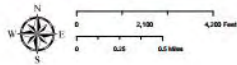
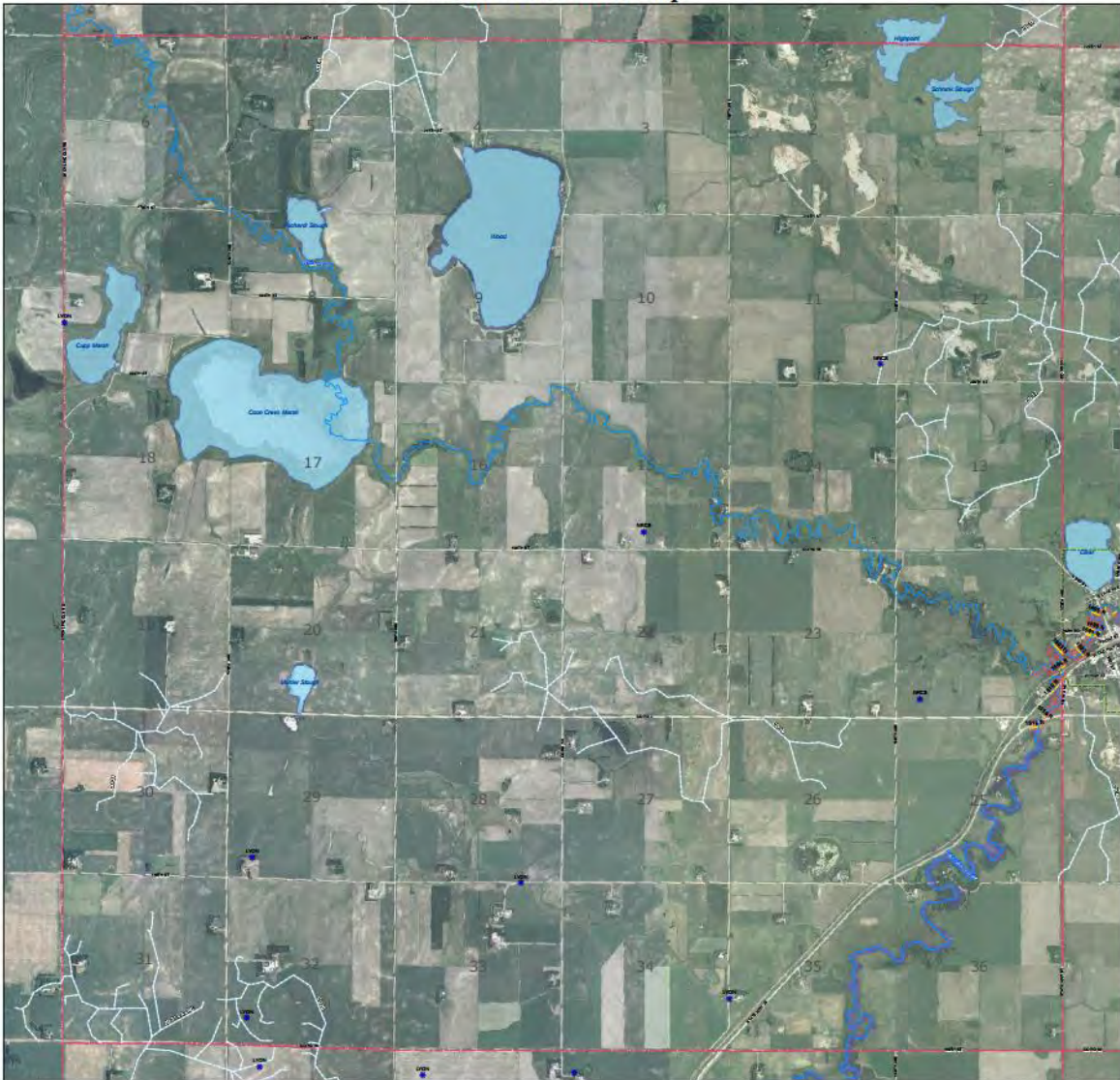


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 110N Range 43W
 Lyon County, MN
 July 2010

FEMA Floodplains Coon Creek Township

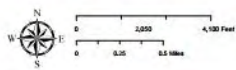


FEMA Data	
	Floodway
	1% Annual Flood Chance
	0.2% Annual Flood Chance
	Base Flood Elevation
	Hydraulic Structures

Lyon County Data	
	Water Retention Structures
	Rivers
	Ditches
	Lakes & Ponds
	Cities
	Townships

Township 109N Range 41W
Lyon County, MN
July 2010

FEMA Floodplains Custer Township

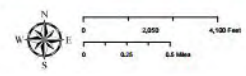
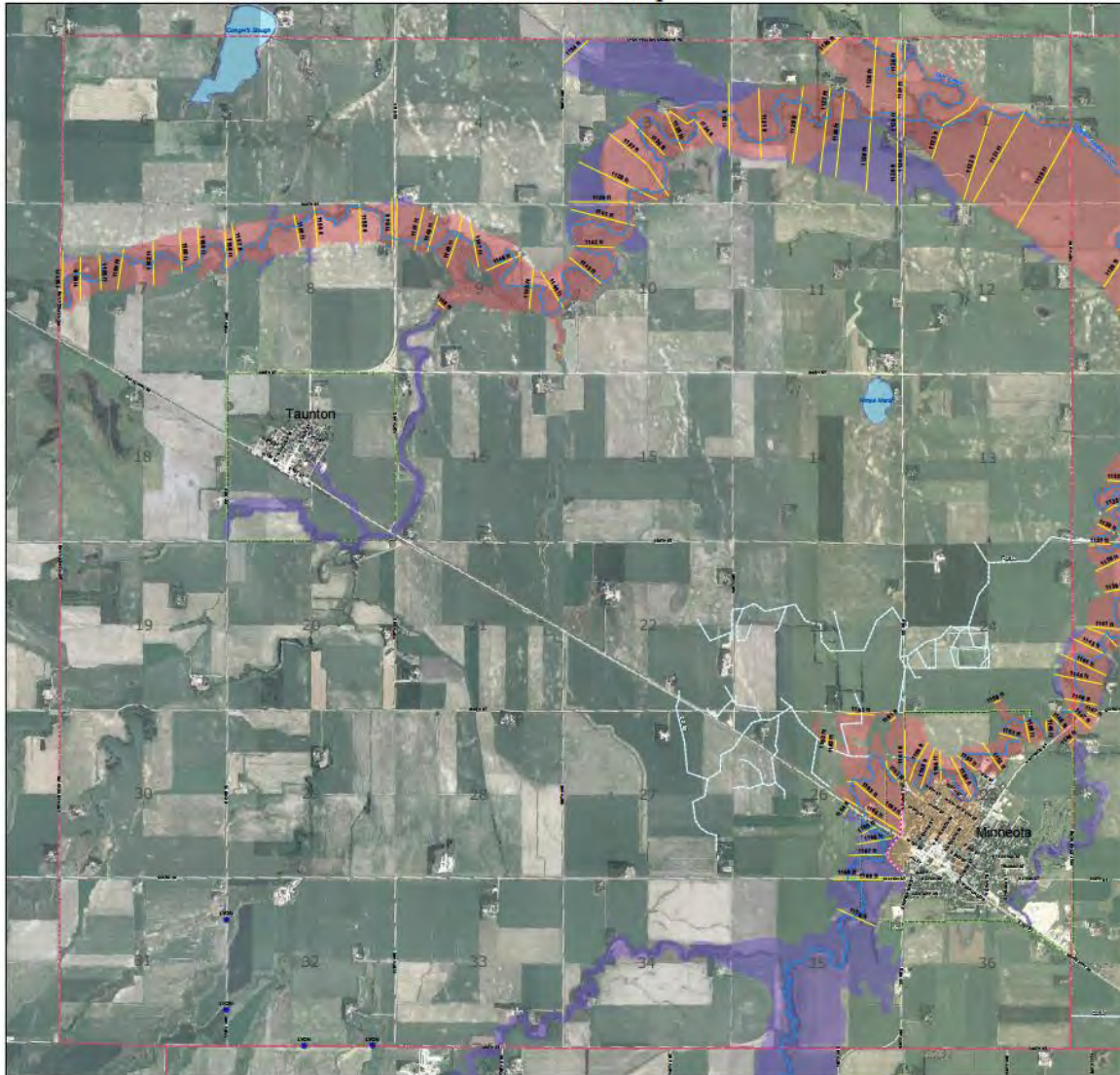


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 113N Range 43W
Lyon County, MN
July 2010

FEMA Floodplains Eidsvold Township

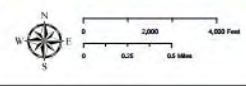
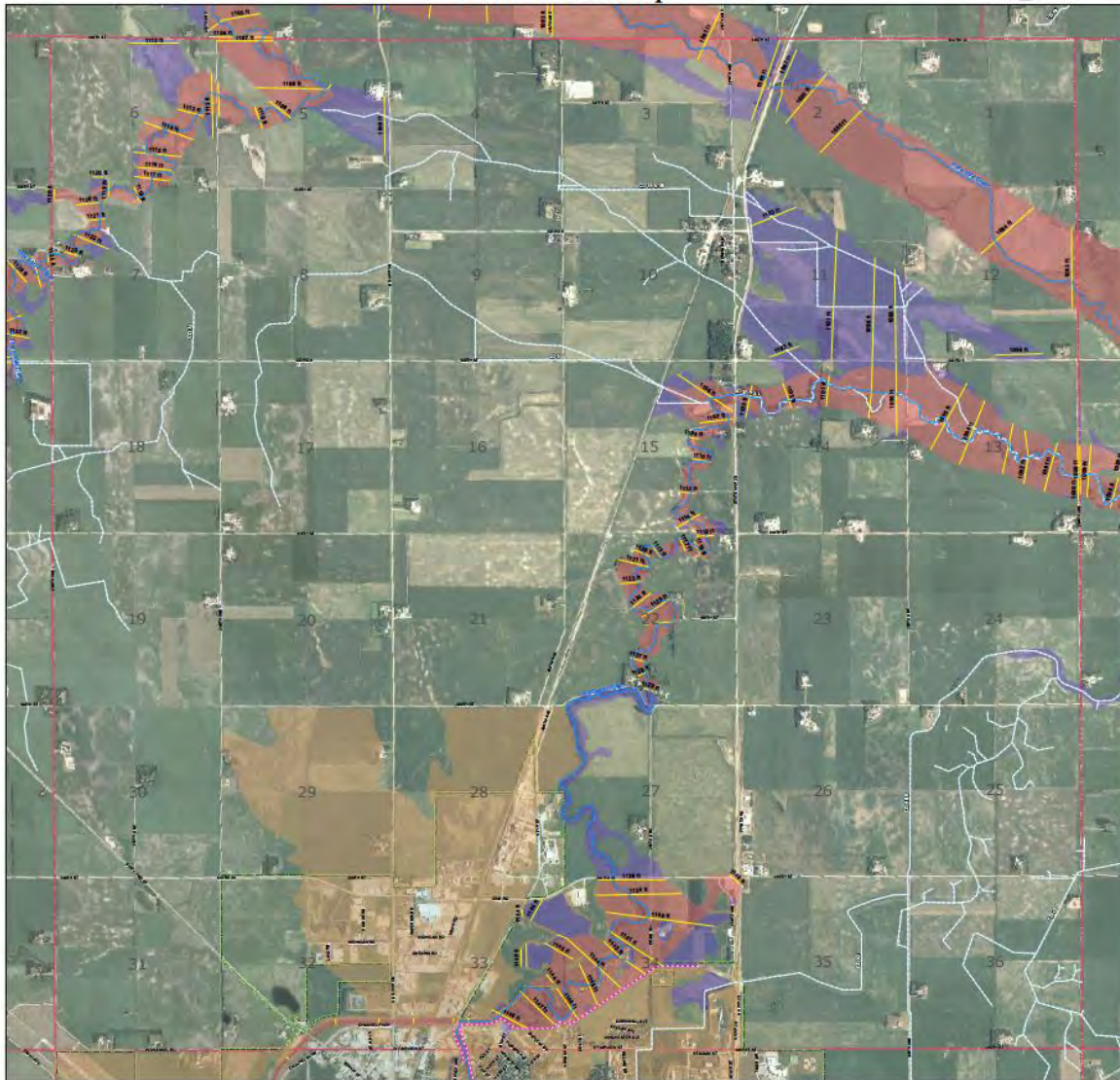


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 112N Range 41W
Lyon County, MN
July 2010

FEMA Floodplains Fairview Township

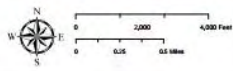
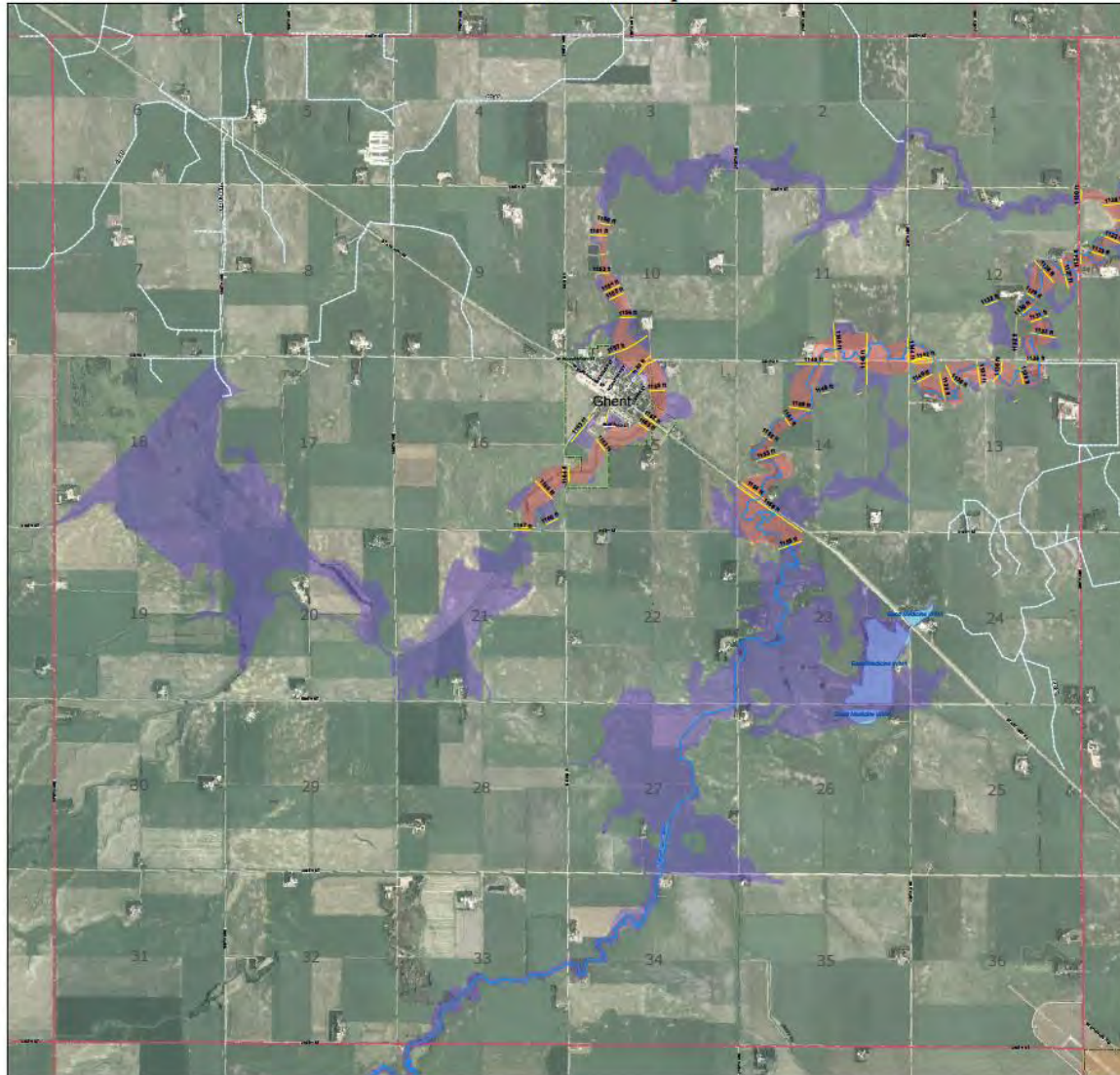


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 112N Range 42W
Lyon County, MN
July 2010

FEMA Floodplains Grandview Township

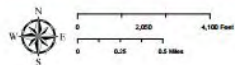


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 111N Range 43W
Lyon County, MN
July 2010

FEMA Floodplains Island Lake Township

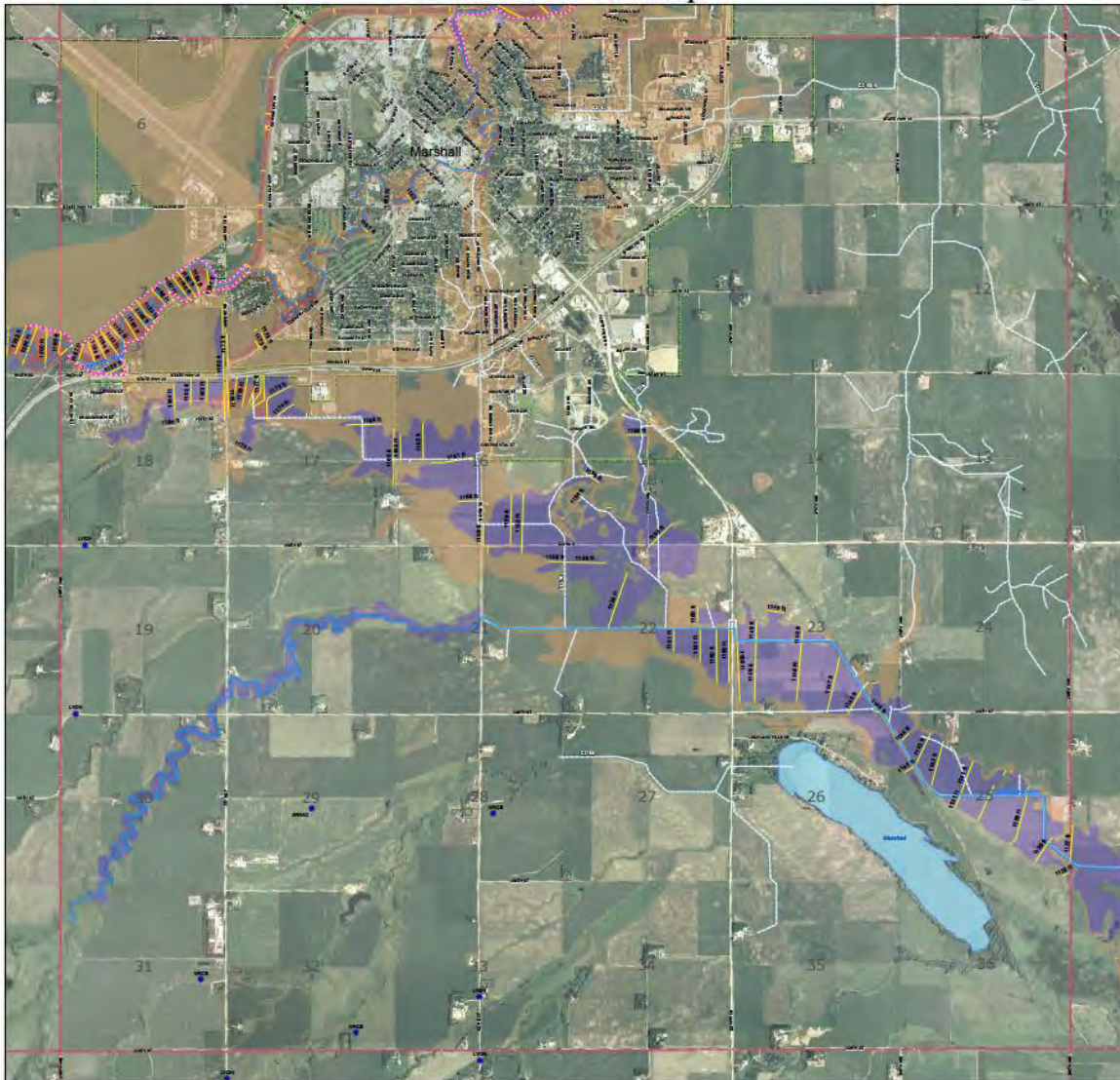


FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Township 111N Range 41W
Lyon County, MN
July 2010

FEMA Floodplains Lake Marshall Township



FEMA Data	
Floodway	Base Flood Elevation
1% Annual Flood Chance	Hydraulic Structures
0.2% Annual Flood Chance	

Lyon County Data	
Water Retention Structures	Lakes & Ponds
Rivers	Cities
Ditches	Townships

Addendums

Addendums to the Lyon County All Hazard Mitigation Plan (AHMP) are available separately.

I Capabilities Worksheet

The Capabilities Worksheet identifies planning capabilities, policies and ordinances, programs, studies and reports, staff, and community partners that are relevant to hazard mitigation.

County Name	Lyon County						
Reviewer	Tammy VanOverbeke and Drew Hage						
CAPABILITIES	WE HAVE ONE	THIS PLAN IS AVAILABLE ONLINE	POINT PERSON IS ON PLANNING TEAM	POINT PERSON SHOULD BE ON PLANNING TEAM	POINT PERSON CONTACT	LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN	OTHER POINT PERSON CONTACT
Local Planning Plans and Tools							
Capital Improvement Plan	X		X		Loren Stomberg - Lyon County Administrator		
Redevelopment Plan							
Growth Management Plan							
Emergency Operations Plan	X		X		Tammy VanOverbeke - Lyon County Emergency Management Director		
County / Local Emergency Plan	X		X		Tammy VanOverbeke - Lyon County Emergency Management Director		
County / Local Recovery Plan							
Local Mitigation Plan	X		x		Tammy VanOverbeke - Lyon County Emergency Management Director		
Economic Development Plan	x				Cal Brinkman - EDA Director		
Land-use Plan (Comprehensive Plan)	x		x		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		

Land-use Plan (Comprehensive Plan)							
Pandemic or Public Health Incident Response Plan	X		X		Anna Snyder - Southwest Health & Human Services: Public Health Emergency Preparedness Coordinator		
Transportation Plan	X		X		Aaron VanMoer - Lyon County Highway Engineer Department: County Engineer		
School Disaster Plan	X		X		Bruce Lamprecht - Marshall Public Schools: Director of Business Services		School Superintendents
Environment and Natural Resources Plan							
Strategy Implementation Plan							
County Parks Plan	X				Brooke Wyffels - Lyon County: Parks Manager		
Water / Watershed Management Plan	X		X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		
SWCD Local Water Management Plan	X		X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		
Wildfire Plan							
Critical Facilities Plan (Mitigation/Response/Recovery)							
College Campus Plans	X		X		Mike Munford – Southwest Minnesota State University: Director of University Public Safety		
Evacuation Route Map / Plan	X		X		Tammy VanOverbeke - Lyon County Emergency Management Director		

Critical Facilities Inventory							
Vulnerable Population Inventory	X		X		Tammy VanOverbeke - Lyon County Emergency Management Director		
Soil Conservations Plans	X		X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		
Continuity Operations Plan							
Storm Water Plan							
National Flood Insurance Program	X		X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator; Tammy VanOverbeke - Lyon County Emergency Management Director		
Emergency Response Plan							
Emergency Action Plan							
Groundwater Protection Plan					-		
Wellhead Protection Plan					-		
Snow Removal Plan					-		
Communications Plan	X		X		Mark Mather - Lyon County Sheriff		
Regional Development Plans	X		X		Drew Hage - Southwest Regional Development Commission		
NFIP Floodplain Management Plan	X		X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		
Emergency Response Plan for Nuclear Generating Plant							

Local Planning Assistance Mock-Hazard Plan							
Road Closure Plan							
Human Quarantine Plan	X						
Wildfire Integrated Response Plan							
National Fire Plan							
Water Emergency and Conservation Plan							
Community Needs Assessment	X		X		Tammy VanOverbeke - Lyon County Emergency Management Director		
CAPABILITIES	WE HAVE ONE	THIS PLAN IS AVAILABLE ONLINE	POINT PERSON IS ON PLANNING TEAM	POINT PERSON SHOULD BE ON PLANNING TEAM	POINT PERSON CONTACT	LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN	OTHER POINT PERSON CONTACT
Policies / Ordinance							
Zoning Ordinance	X		X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		
Building Code							
Planning Ordinance	X		X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		
Bluff Land Ordinance							
Fire Code	X		X		Mike Votca - Tracy City Administrator; Dawn Vlaminck - Ghent City Clerk		Ghent, Marshall, and Tracy have adopted the Minnesota Building Code
Floodplain Ordinance	X		X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		
Subdivision Ordinance							
Nuisance Ordinance							
Storm Water Ordinance							

Drainage Ordinance							
County Park Ordinance	X				Brooke Wyffels - Lyon County: Parks Manager		
Site Plan Review Requirements	X		X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		
Karst Ordinance							
Shoreland Ordinance	X		X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		
City Ordinance	X		X		Mike Votca - Tracy City Administrator; Dawn Vlaminck - Ghent City Clerk		City Administrators & Clerks
Steep Slope Ordinance							
Soil Erosion Control Ordinance							
Sanitary Sewage Treatment System Ordinance / Solid Waste Management Plan & Ordinance	X			X	Roger Schroeder - Lyon County Environmental Office		
Historic Preservation Ordinance	X		X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		
Land Use Ordinance	X		X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		
Methamphetamine Lab Ordinance	X		X		Mark Mather - Lyon County Sheriff; Rob Yant - Marshall Police Department Director		
Wild & Scenic River District							

CAPABILITIES	WE HAVE ONE	POINT PERSON IS ON PLANNING TEAM	POINT PERSON SHOULD BE ON PLANNING TEAM	POINT PERSON CONTACT	LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN	OTHER POINT PERSON CONTACT
Local Staff/ Departments						
Building Code Official						
Building Inspector						
Mapping Specialist (GIS)	X	X		Mark Volz - Lyon County GIS		
Engineer	X	X		Aaron VanMoer - Lyon County Highway Engineer Department: County Engineer		
Land Use Planner						
Public Works Official	X	X		Aaron VanMoer - Lyon County Highway Engineer Department: County Engineer		
Emergency Management Coordinator / Emergency Management Program	X	X		Tammy VanOverbeke - Lyon County Emergency Management Director		
NFIP Floodplain Administrator						
Bomb and/or Arson Squad						
Emergency Response Team						
Hazardous Materials Expert	X	X		Rob Yant - Marshall Police Department Director		
Local Emergency Planning Cmte						
County Emergency Mgmt Cmsn						
Sanitation Department (or Solid Waste)				-		
Transportation Department	X	X				
Economic Development Department	X	X		Drew Hage - Southwest Regional Development Commission		
Environmental Health Department						

Public Works Department	X		X	Roger Schroeder - Lyon County Environmental Office		
Building Department	X	X		Mike Votca - Tracy City Administrator; Dawn Vlaminck - Ghent City Clerk		Ghent, Marshall, and Tracy have adopted the Minnesota Building Code
Housing Department						
Planning Department						
Zoning Department	X	X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		
Planning Consultant						
Regional Development Commission	X			Drew Hage - Southwest Regional Development Commission		
Historic Preservation						
Public Health Coordinator/Department	X	X		Anna Snyder - Southwest Health & Human Services: Public Health Emergency Preparedness Coordinator ; Jason K		
Water / Watershed Planner	X	X		John Biren - Lyon County Land Management Office: Planning & Zoning Administrator		
Critical Infrastructure Planner						
City Administrator				-		
County Administrator	X	X		Loren Stomberg - Lyon County Administrator		
County Assessor				-		
Environment Services Department	X	X		Roger Schroeder - Lyon County Environmental Office		
Citizen Planning Team						

Soil & Water Conservation District				-		
Sheriff's Department	X	X		Mark Mather - Lyon County Sheriff		
Management Information Systems	X	X		Jason Lenz - Lyon County IT		
Social Services						
County Commissioners	X	X		Charlie Sanow - Board Chair		
Fire Department	X	X		Troy Wendland - Balaton Fire Department		
Red Cross						
Electric Service Providers (involved)	X	X		Tim O'Leary - Lincoln-Lyon Electric Cooperative		
Highway Engineer	X	X		Aaron VanMoer - Lyon County Highway Engineer Department: County Engineer		
Pipeline Companies (involved)						
Hospitals (involved)	X	X		Eva Bruns - Avera Marshall Regional Medical Center: Safety Officer		
Public Library				-		
Department of Health						
Human Services	X			Chris Sorenson - Southwest Health & Human Services: Director		
County Auditor	X			E.J. Moberg - Lyon County Auditor/Treasurer		
Environmental Quality Board						
Watershed Districts						
Community Awareness & Emergency Response (CAER)						
Police Department	X	X		Rob Yant - Marshall Police Department Director		
Township Representatives	X	X		Terry Schreiber - Township Representative		

Technical Committee						
Non-Governmental Organizations						
Hazardous Substances Emergency Events Surveillance System						
County Attorney	X			Rick Maes - Lyon County Attorney		

II Resolutions of Participation

RESOLUTION AUTHORIZING PARTICIPATION IN PLANNING PROCESS AND EXECUTION OF SUB-GRANT AGREEMENT

WHEREAS, the County of Lyon is participating in a hazard mitigation planning process as established under the Hazard Mitigation Act of 2000; and

WHEREAS, the Act establishes a framework for the development of a county hazard mitigation plan; and

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

WHEREAS, the plan must include a risk assessment including past hazards, hazards that threaten the county, maps of hazards, an estimate of structures at risk, estimate of potential dollar losses for each hazard, a general description of land uses and development trends; and

WHEREAS, the plan must include a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the plan must include a maintenance or implementation process including plan updates, integration of plan into other planning documents and how the county will maintain public participation and coordination; and

WHEREAS, the draft plan will be shared with the State of Minnesota and the Federal Emergency Management Agency (FEMA) for coordination of state and federal review and comment on the draft; and

WHEREAS, approval of the all hazard mitigation will make the county eligible to receive Hazard Mitigation Assistance Program grants and other funding sources; and

WHEREAS, approval of the all hazard mitigation plan will make the county eligible to receive Hazard Mitigation Assistance Programs grants and other funding sources; and

NOW THEREFORE, Be it resolved that Lyon County Emergency Management enter into a sub-grant
(Name of Organization/Local Unit of Government)

agreement with the Division of Homeland Security and Emergency Management in the Minnesota Department of Public Safety for the program entitled Hazard Mitigation Assistance Programs for Development or update

of the Lyon county Mitigation plan. Tammy VanOverbeke, Lyon County Emergency Management, director is hereby
(Name and Title of Authorized Official)

authorized to execute and sign such sub-grant agreements and any amendments hereto as are necessary to implement the plan on behalf of Lyon County.

(Name of Organization/Local Unit of Government)

I certify that the above resolution was adopted by the Board of Commissioners of
(Executive Body)

Lyon County on August 5, 2014.
(Name of Organization/Local Unit of Government)

SIGNED:



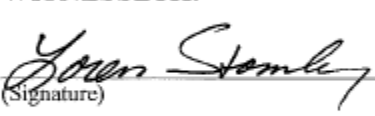
(Signature)

County Board, Chair
(Title)

8/5/2014

(Date)

WITNESSETH:



(Signature)

Lyon County Administrator
(Title)

8/5/2014

(Date)

III Resolutions of Adoption

The following jurisdictions signed resolutions to adopt the Lyon County AHMP.

- Lyon County
- City of Balaton
- City of Cottonwood
- City of Florence
- City of Garvin
- City of Lynd
- City of Marshall
- City of Minneota
- City of Russell
- City of Taunton
- City of Tracy

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